

Lower Kankakee Watershed Initiative

Section 205j Grant Project
Final Report 2022



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March 31, 2022



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-a joint venture of the Jasper & Newton County Soil and Water Conservation Districts-

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Project Overview

Jasper and Newton County Soil and Water Conservation Districts were awarded a Section 205j grant from the Indiana Department of Environmental Management in March of 2019. This initiative is the beginning of watershed coordination and improvements in the Lower Kankakee Watershed. The main goals of this project were to: 1) produce a watershed management plan (WMP); 2) conduct a water monitoring program to establish a water quality baseline; and 3) conduct an education and outreach program designed to bring about behavioral changes.

Watershed Management Plan: The Jasper and Newton County Soil and Water Conservation District's (SWCD) hired Arion Consultants to lead the creation of a watershed management plan for the Lower Kankakee Watershed. A group of 17 steering committee members helped assist with decision making for the plan. The group consisted of local farmers, conservation partners, representing governmental agencies and local leaders. The steering committee created the following vision and mission:

Vision: To ensure an ecological and economically healthy Lower Kankakee River watershed for today and generations to come.

Mission: To connect people for watershed improvements by creating a watershed management plan (WMP) which prioritizes areas of concern followed by implementing the WMP for ongoing improvement in the health of the watershed.

Introduction: The Lower Kankakee Watershed Initiative (LKWI) is a joint venture of the Jasper and Newton County Soil and Water Conservation Districts, along with local stakeholders, to create a watershed management plan for the Lower Kankakee River, which consisted of three HUC 10 watersheds. The project had four goals: 1) To create a baseline inventory that compiled existing water quality data; 2) to conduct a windshield survey of the region to help identify relevant concerns; 3) to conduct a social indicator survey to gauge stakeholder concerns and gain their support of the LKWI (please note this goal also included education and outreach relative to the project); and 4) to develop a WMP guided by a stakeholder steering committee that would include specific action items connected to stakeholder concerns and which addressed problems identified in scientific data and related field studies. The grant project began in March of 2019.

Much of the anthropogenic activities impacting water quality in the Lower Kankakee watershed are related to land use. Approximately 73% of the land in the watershed is used for agriculture. In addition to row crops, there are more than 47 confined animal feeding operations (CAFOs) and confined feeding operations (CFOs) and several small, unregulated farms in Jasper and Newton counties. Outside of agricultural land use, there is a high amount of infrastructure and poorly planned residential developments along the I-65 corridor due to its proximity to the Chicagoland area. The US Environmental Protection Agency has identified this region within the top 25% of the contributors to the hypoxia zone in the Gulf of Mexico.

According to Bob Barr, a research scientist from Purdue University School of Science at Indiana University-Purdue University Indianapolis (IUPUI) and expert on the Kankakee River Basin, the watershed is considered to be one of the most highly modified watersheds in Indiana. The

Kankakee River Basin's hydrology and ecosystems have been studied extensively since it was first fully dredged in 1917 by the Indiana Department of Natural Resources. However, the impact of anthropogenic activities on water quality has yet to be fully studied on three HUC 10 watersheds within the Lower Kankakee Basin Jasper and Newton Counties.

Project Goals and Objectives: Based on stakeholder input for concerns, problems, and sources; watershed inventory effort; and watershed loading information, the goals and strategies described in the sections below were developed.

Evaluation of Goal Achievement

We set out to accomplish four main goals in this project. All project goals were realized in a clear and timely manner, despite a few challenges associated with the COVID-19 pandemic.

1. Establish a baseline inventory of existing desktop and scientific data, studies, and surveys related to water quality in the region and similar highly modified watersheds.

To accomplish this goal, new water quality data were collected including total nitrogen, orthophosphate, multiple parameters from hydrolab probe, *E.coli*, and flow. These results can be reviewed in the Monitoring Results section in this report below. Existing water quality data from past surveys conducted by the IDEM, Indiana Department of Natural Resources (IDNR), United States Geological Survey (USGS) and others were simultaneously analyzed and summarized. Both historical and new water quality data were synthesized to determine the impairment levels, in terms of if and the degree of which each water quality parameter exceeds the total maximum daily load (TMDL) for the water bodies in each HUC 10 within the Lower Kankakee Watershed. These data were then incorporated into models for the Agricultural Conservation Planning Framework (ACPF). This ACPF model now allows us to help determine appropriate Best Management Practices (BMPs) for land-users throughout the watershed. With this data presented in easy to understand and GIS-based formats, we can now better prepare education and outreach activities as well as guide action steps that need to be taken to improve water quality. In addition to the development of the ACPF tools, the results of the inventory were ultimately used to develop a WMP for education and outreach efforts and to identify existing data gaps.

2. Conduct a windshield survey of the Lower Kankakee River Watershed region.

A windshield inventory was completed using a standardized field sheet with relevant concerns. Information gathered from this windshield survey was discussed at subsequent steering committee meetings and utilized during resource concern identification. This information was very valuable and is already being used to help target education and outreach efforts and informed the action plan detailed in the WMP.

3. Conduct a social indicators survey to gauge stakeholder support and gather data on their concerns in relation to water quality.

Two social indicator surveys were distributed through mail to assess awareness of water quality issues and what BMPs (agricultural and urban) landowners are willing to implement. One survey was geared towards urban communities within the watershed and the second was focused on our agricultural communities. Both surveys aimed to help us understand how people feel about the water resources, how much they know about water quality concerns, the types of practices they adopt on the land they manage, and what factors affect their land management decisions. The urban survey was sent out to 11,057 individuals and the agricultural survey was sent to 389 addresses. Social Indication Data Management and Analysis (SIDMA) survey techniques were utilized, and the survey response rate was 9.7% for urban surveys and 7.5% for the agricultural surveys. The survey resulted in information used to direct our education and outreach efforts and provided a baseline which we can use to compare future social surveys to. Our educational outreach efforts for this project were and future efforts can be tailored to the specific concerns and education gaps in this region.

4. Develop a watershed management plan with the steering committee with specific action items connected to stakeholder concerns and which address problems identified in scientific data and studies.

A watershed management plan for the three HUC 10s (Beaver Lake Ditch-Kankakee River 0712000112, Knight Ditch-Kankakee River 0712000111, and the Hodge Ditch 0712000109) defining the Lower Kankakee Watershed was developed. A locally driven steering committee comprised of Jasper and Newton SWCD's staff and board members, individual citizens representing farmers, businesses, the cities, towns, and counties within the watershed; environmental groups; and natural resource and engineering professionals lead this effort which was then put into a formal plan by contractor Sara Peel, Arion Consultants, Inc. This watershed management plan was officially approved by the Environmental Protection Agency (EPA) on January 25, 2022.

Evaluation of Project Outcomes

This project boasted several outcomes including:

1.) A completed Watershed Management Plan for the Lower Kankakee Watershed.

A WMP for the three HUC 10s (Beaver Lake Ditch-Kankakee River 0712000112, Knight Ditch-Kankakee River 0712000111, and the Hodge Ditch 0712000109) defining the Lower Kankakee Watershed (Figure 1) was developed by a locally driven steering committee comprised of Jasper and Newton SWCD's staff and board members, individual citizens representing farmers, businesses, the cities, towns, and counties within the watershed; environmental groups; and natural resource and engineering professionals. The steering committee lead this effort which was then put into a formal plan by contractor Sara Peel, Arion Consultants, Inc (Table 1). This watershed management plan was officially approved by the Environmental Protection Agency (EPA) on January 25, 2022.

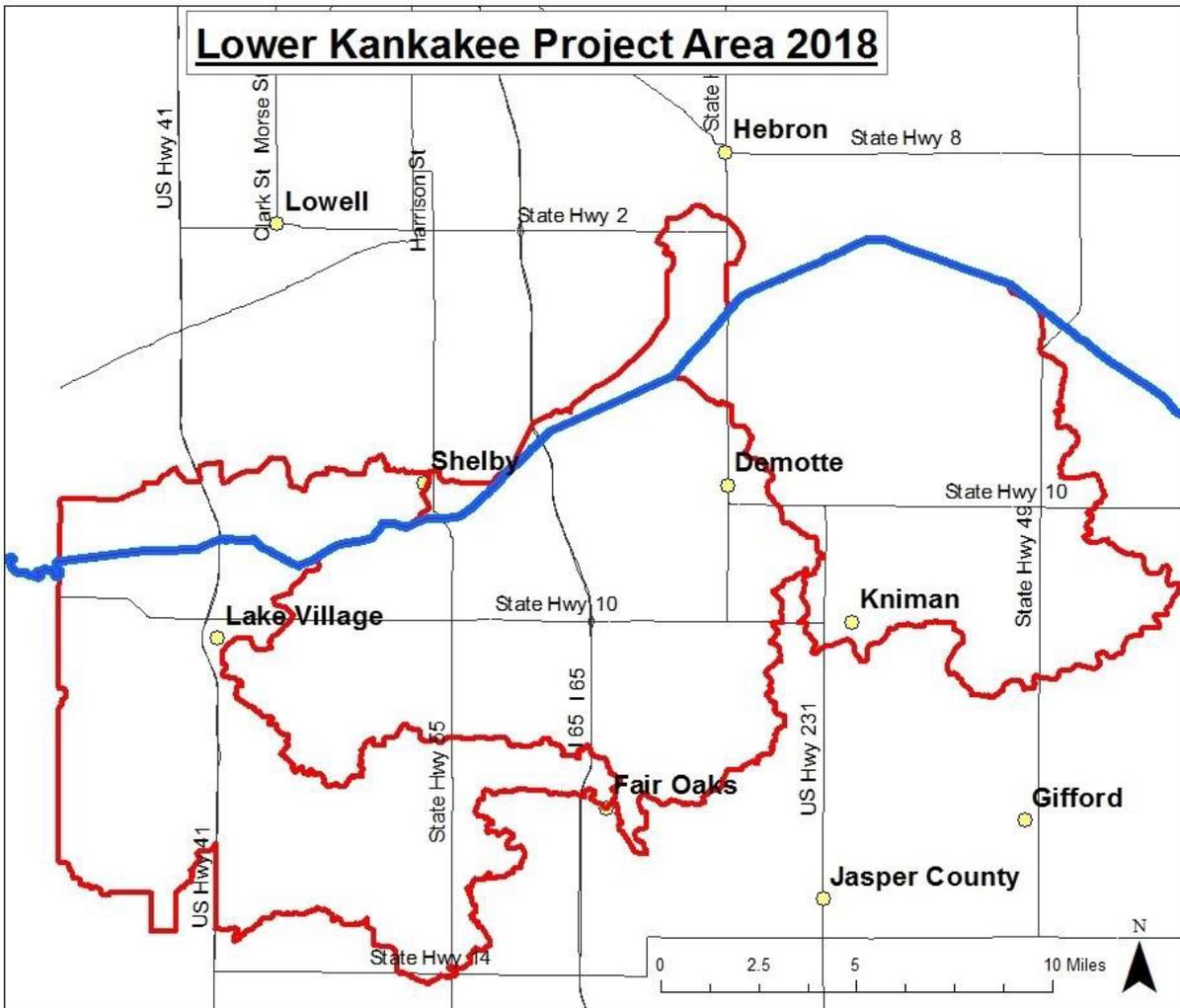


Figure 1. HUC 10 watersheds of the Lower Kankakee River Watershed

Table 1. LKWI Steering Committee members and their affiliation

Last	First	Affiliation
Ahler	Carolyn	Jasper Co. SWCD Watershed Outreach Coordinator
Boezeman	Sig	Newton Co. Farmer
Carty	Derek	Jasper Co. SWCD District Program Manager
Ciara	Bri	Newton Co. SWCD Director
DeYoung	Zack	Indiana DNR
Duttlinger	Dave	Jasper Co. Citizen
Hannon	Clayton	Jasper Co. Farmer
Keys	Shelby	Jasper SWCD Treasurer
Kingma	Mark	Jasper SWCD Supervisor
Knochel	Chris	Newton County Surveyor
Luchik	Derek	Jasper SWCD Supervisor
Magiera	Chester	Jasper Co. Farmer
Misch	Jacob	Jasper Co. Farmer
Sipkema	Austin	Jasper Co. Farmer
Styck	Cody	Newton Co. Farmer
Woolever	Zach	Jasper Co. Farmer
Zimmer	Lana	Jasper SWCD Supervisor

This steering committee came together first on March 13, 2019 and met several times thereafter. At their first meeting, they discussed their concerns for the Lower Kankakee River. From there, they worked with Arion Consultants to plan a windshield survey, administer a social indicator survey, develop a watershed inventory, and eventually organize concerns, and form goals. A Water Quality Workgroup was formed to determine water quality monitoring sample site identification, historic water quality data identification, and perform data review and develop recommendations (Table 2). Together, the stakeholders worked to refine their concerns with data.

Table 2. LKWI Water Quality Workgroup members and their affiliation

Last	First	Affiliation
Ahler	Carolyn	Jasper Co. SWCD Watershed Outreach Coordinator
Eaton	Ben	ISDA
Jordan	Mark	Jasper SWCD Supervisor
Schroeder	Sheila	CCSI
Shide	Kevin	Newton & Jasper NRCS
Zimmer	Lana	Jasper SWCD Supervisor

Stakeholder concerns were initially organized at the first steering committee meeting through an exercise where participants discussed and documented concerns on a white board and the survey tool, Slido. Each person then voted on their highest priorities using Slido. Following completion of a windshield survey and watershed inventory, the steering committee reviewed their concerns list and adjusted as needed (Table 3).

Table 3. Revised stakeholder concern list following the addition of windshield survey, watershed inventory, and social indicator survey data

Concern	Voting Results
Capacity of Stream and Soils to Retain Water	9.1
Elevated Bacteria levels	8.6
Nutrients	8.3
Flooding: Quantity of Water is Periodically High	7.9
Soil in water (elevated turbidity)	7.6
Farmers are Perceived as Polluters	4.1
Fishing/Fish Safe to Eat	3.9
Groundwater Protection	Not scored
Low dissolved oxygen levels	Not scored

Once water sampling began, the workgroup met quarterly to review current and historic data, identify water quality targets, complete data analysis, and to begin prioritization of areas of concern in order to identify critical areas for remediation. The steering committee met again to analyze their concerns in light of new compiled data to determine if the evidence provided quantifiable data and whether each concern was within the scope of the watershed planning project. They further refined these concerns into organized problem statements and proposed potential causes of each problem (Table 4, Table 5). They identified potential sources for each problem identified by sub-watershed, load estimates, and began establishing estimated load reductions needs to meet water quality standards. This allowed the steering committee to determine priority areas to focus on in the watershed and set water quality goals (Figure 2).

Table 4. Analysis of stakeholder concerns refined to problem statements

Concern	Problem Statement
Capacity of Stream and Soils to Retain Water and Flooding: Quantity of Water is Periodically High	The Kankakee River is flashy and has undesirable periodic high levels and flows of water that threaten our towns, agricultural land, and health of the river. There is limited holding capacity for excess water, which also moves sediment and soils which also may contain increased levels of nutrients.
Groundwater Protection from Unsafe Levels of Bacteria (<i>E.coli</i>)	Area streams are impaired for recreational contact and are included on the IDEM impaired waterbodies list.
High Nutrient Levels in Streams	Area streams' nutrient levels exceed targets set by this project.
High Turbidity in Streams	Area streams are very cloudy and turbid.

Table 5. Potential causes of each identified problem

Problem	Potential Cause(s)
Flooding: Quantity of Water is Periodically High/Capacity of Streams and Soils to Retain Water	Flooding occurs within the Lower Kankakee River Watershed.
Areas streams are impaired by IDEM for recreational contact	<i>E. coli</i> levels exceed the water quality standard
Area streams have nutrient levels exceeding the targets set by this project	Nutrient levels exceed the target set by this project
Area streams are very cloudy and turbid	Total Suspended Sediment concentrations and turbidity levels exceed the targets set by this project

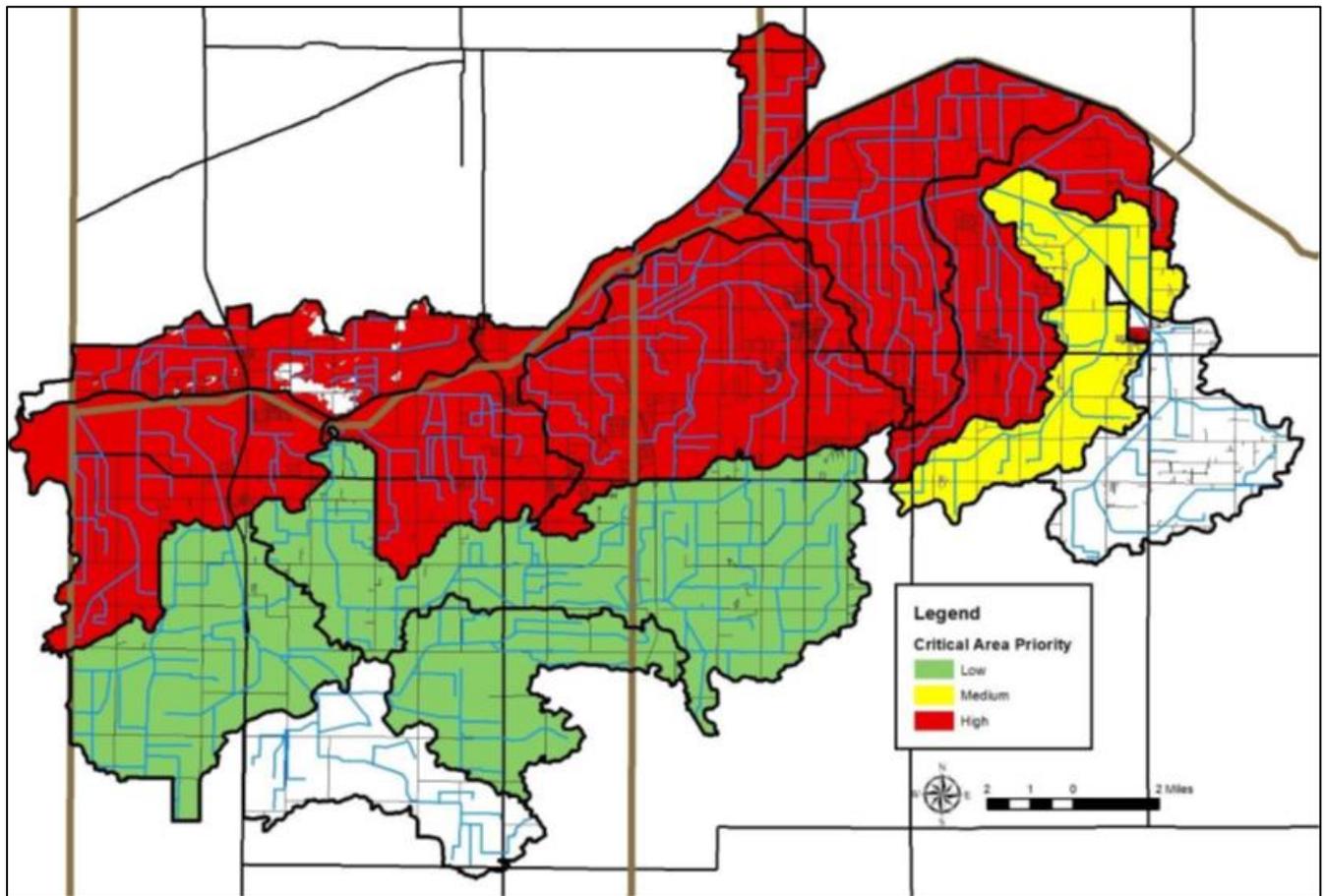


Figure 2. Prioritized critical areas in the Lower Kankakee Watershed

Once the goals listed below were set, the steering committee vetted and chose several BMPs to focus on implementing to meet the stated goals and target load reductions. They concluded the watershed planning process with identifying next steps that detail implementation of the plan, tracking progress, and measuring success.

Goals for the Lower Kankakee River Watershed outlined in the WMP:

Reduce Nutrient Loading

Based on IDEM fixed station water quality data and USGS stream gage data collected, the committee set the following goals for nitrate-nitrogen and total phosphorus.

Ultimate Goal (30 years): Reduce nitrate-nitrogen from 2,471,085 pounds per year to 707,881 pounds per year (71% reduction) and phosphorus from 134,795 pounds per year to 42,473 pounds per year (68% reduction) in the Lower Kankakee River Watershed by 2051.

10-Year Goal: Reduce nitrate-nitrogen from 2,471,085 pounds per year to 1,883,350 pounds per year (24% reduction) and phosphorus from 134,021 pounds per year to 104,021 pounds per year (23% reduction) in the Lower Kankakee River Watershed by 2031.

20-Year Goal: Reduce nitrate-nitrogen from 1,883,350 pounds per year to 1,295,915 pounds per year (31% reduction) and phosphorus from 104,021 pounds per year to 73,247 pounds per year (30% reduction) in the Lower Kankakee River Watershed by 2041.

30-Year Goal: Reduce nitrate-nitrogen from 1,295,615 pounds per year to 707,881 pounds per year (45% reduction) and phosphorus from 73,247 pounds per year to 42,473 pounds per year (41% reduction) in the Lower Kankakee River Watershed by 2051.

Reduce Sediment Loading

Based on collected water quality data collected, the committee set the following goals for total suspended solids.

Ultimate Goal (30 years): Reduce total suspended solids from 38,291,124 pounds per year to 35,394,032 pounds per year (8% reduction) by 2051.

10-Year Goal: Reduce total suspended solids from 38,291,244 pounds per year to 37,325,506 pounds per year (3% reduction) in the Lower Kankakee River Watershed by 2031.

20-Year Goal: Reduce total suspended solids from 37,325,506 pounds per year to 36,359,769 pounds per year (3% reduction) in the Lower Kankakee River Watershed by 2041.

30-Year Goal: Reduce total suspended solids from 36,359,769 pounds per year to 35,394,032 pounds per year (3% reduction) in the Lower Kankakee River Watershed by 2051.

Reduce *E. coli* Loading

Based on collected *E. coli* data, only 16% of samples exceeded state standards. Once load duration curves were created and loading rates calculated, load reductions were needed at only

one subwatershed. As these load reductions will not meet the load reductions detailed in the TMDL, the steering committee chose to use the *E. coli* concentration targets and reductions detailed in the TMDL.

30-Year Goal: Reduce *E. coli* concentrations to current state standards (125 CFU/100 mL) in the Lower Kankakee River Watershed such that the Beaver Lake Ditch-Kankakee River, Brown Levee Ditch-Kankakee River, Cook Ditch-Hodge Ditch, Dehaan Ditch, Hickam Lateral-Wolf Creek, and Lawler Ditch-Beaver Lake Ditch Subwatersheds meet the Iroquois/Kankakee River TMDL load reductions by 2051. Note that *E. coli* data collected during development of the watershed management plan indicate that concentrations measure below the state standard throughout the watershed and additional load reductions are not required.

Reduce flooding

Long term: Work in partnership with the Kankakee River Basin and Yellow River Basin Commission to implement their Kankakee River Flood and Sediment Management Work Plan (CBBEL, 2019) which lays out a series of projects and variety of best management practices which could reduce flooding within the Kankakee River Basin. The best management practice-based goals identified in the Kankakee River Flood and Sediment Management Work Plan will be addressed through the sediment and nutrient goals noted above. The KRB/YRB Commission has set an ambitious goal of addressing the structural projects in a 30 year timeframe. The Lower Kankakee Watershed Initiative will target participating in the implementation, promotion and education and outreach activities associated with no less than one structural project implemented annually. Members of the Lower Kankakee River Initiative steering committee regularly attend KRB/YRB commission meetings and will work with the commission to identify opportunities and options for collaboration in the future.

2.) **Completion of a windshield and social inventory.**

Land use throughout the Lower Kankakee Watershed was characterized during windshield surveys completed by volunteers and Arion Consulting in the Spring of 2019 by driving all accessible roads throughout the watershed. These findings were organized, mapped, and utilized by the steering committee in subsequent meetings to identify concerns in the watershed. Most issues identified fell into five categories: stream buffers limited in width or lacking all together, areas of livestock access, streambank erosion, dumping areas, and unregulated farms (Figure 3). More than 796 miles of streams had limited buffers, nearly 26.6 miles of streambank were eroded, and livestock had access to nearly 1.7 miles of streams. Additionally, 8.8 miles of recently cleaned legal drains were observed in Spring 2019.

Two social indicator surveys were distributed through mail to assess awareness of water quality issues and what agricultural and urban BMPs landowners are willing to implement. One survey was geared towards urban communities within the watershed and the second was focused on our agricultural communities. Both surveys aimed to help us understand how people feel about the water resources, how much they know about water quality concerns, the types of practices they adopt on the land they manage, and what factors affect their land management decisions. The urban survey was sent out to 11,057 individuals and the agricultural survey was sent to 389

addresses. Social Indication Data Management and Analysis (SIDMA) survey techniques were utilized, and the survey response rate was 9.7% for urban surveys and 7.5% for the agricultural surveys.

Some general insight could be gleaned from the surveys. When ranking the importance of a number of water-related activities, respondents ranked “for canoeing, kayaking, and other boating activities”, “for scenic beauty”, and “for fishing” or “for fish habitat” among the watershed’s most important qualities. Agricultural respondents recognized that using BMPs on their farms improves water quality and that is their personal responsibility to do so. However, they were less supportive of doing so if it costs them money. Urban respondents believe it’s their responsibility to protect water quality and that it’s important even if it slows economic growth; although they responded being less supportive of paying more to improve water quality.

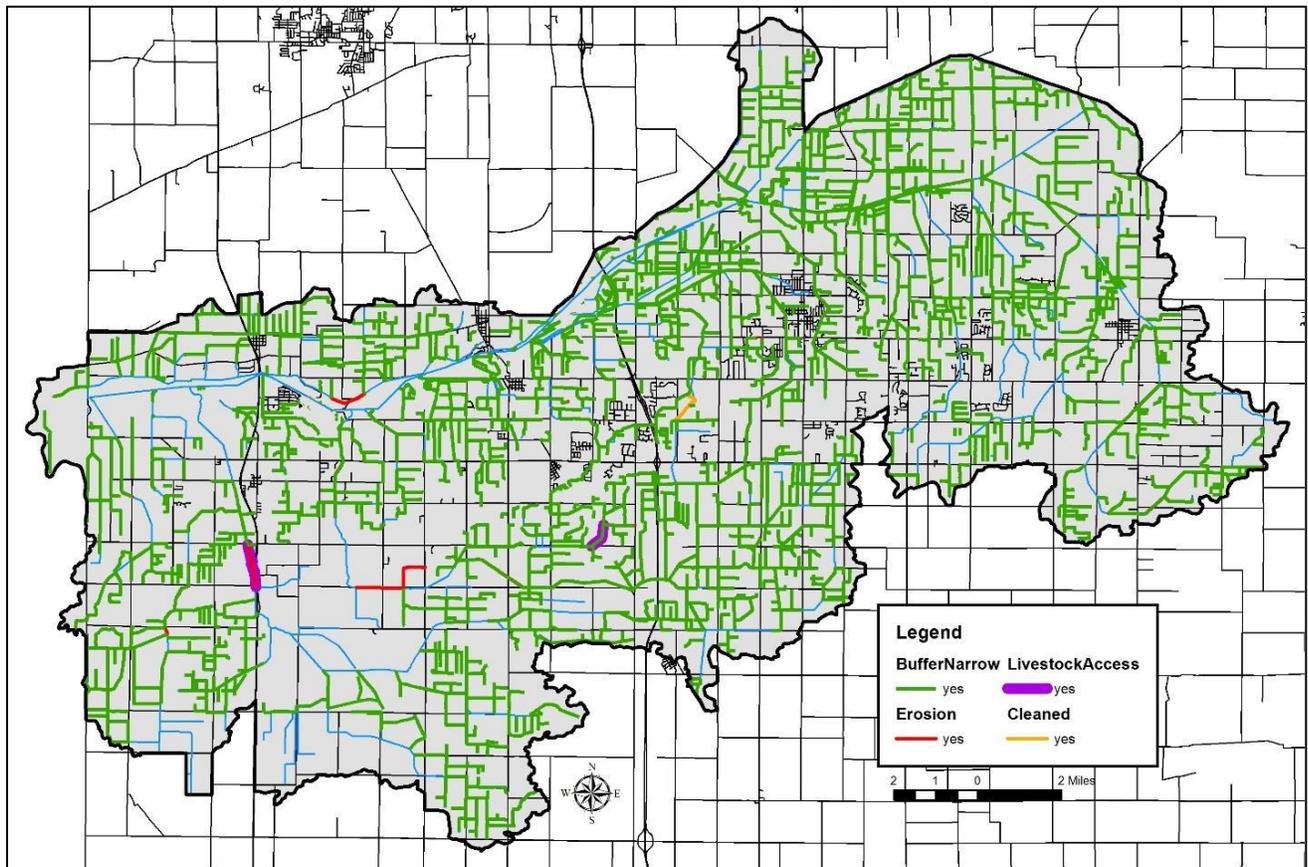


Figure 3. Stream-related watershed concerns identified during watershed inventory efforts

In general, respondents rated the most awareness of water quality impairments they could see like trash debris and sedimentation. Agricultural respondents rated development and stormwater runoff from streets and highways as their highest pollution concerns while urban respondents rated excessive herbicides, pesticides, and fertilizers as their top concerns. Respondents generally rated concerns over visible impairments such as loss of recreational function, beauty, and over production of algae/plants as their main concerns of consequences of poor water quality.

Agricultural respondents utilize BMPs like consideration of location and soil characteristics to minimize runoff and maintaining calibration of fertilizer equipment most out of all other BMPs. Urban respondents appear to implement BMPs like recycling their automotive oil, keeping grass clippings out of roads and itches, and planting appropriate grass/plants over their septic systems most often. There were many BMPs that both respondents were not familiar with or rarely used (Figure 4, Figure 5). Most respondents have septic systems while there was a general unawareness of many routine septic maintenance activities or functions of their septic system.

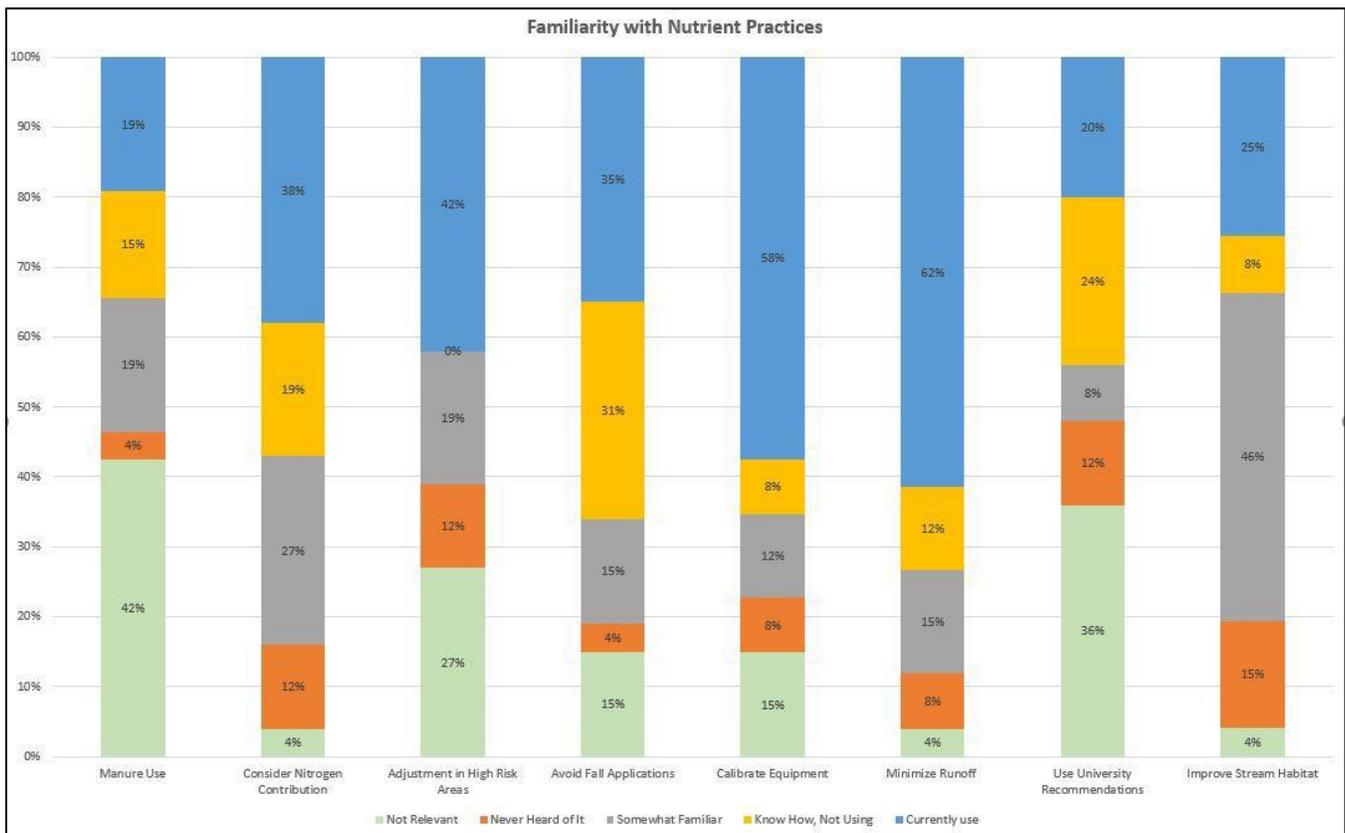


Figure 4. Agricultural survey respondents' familiarity with nutrient practices.

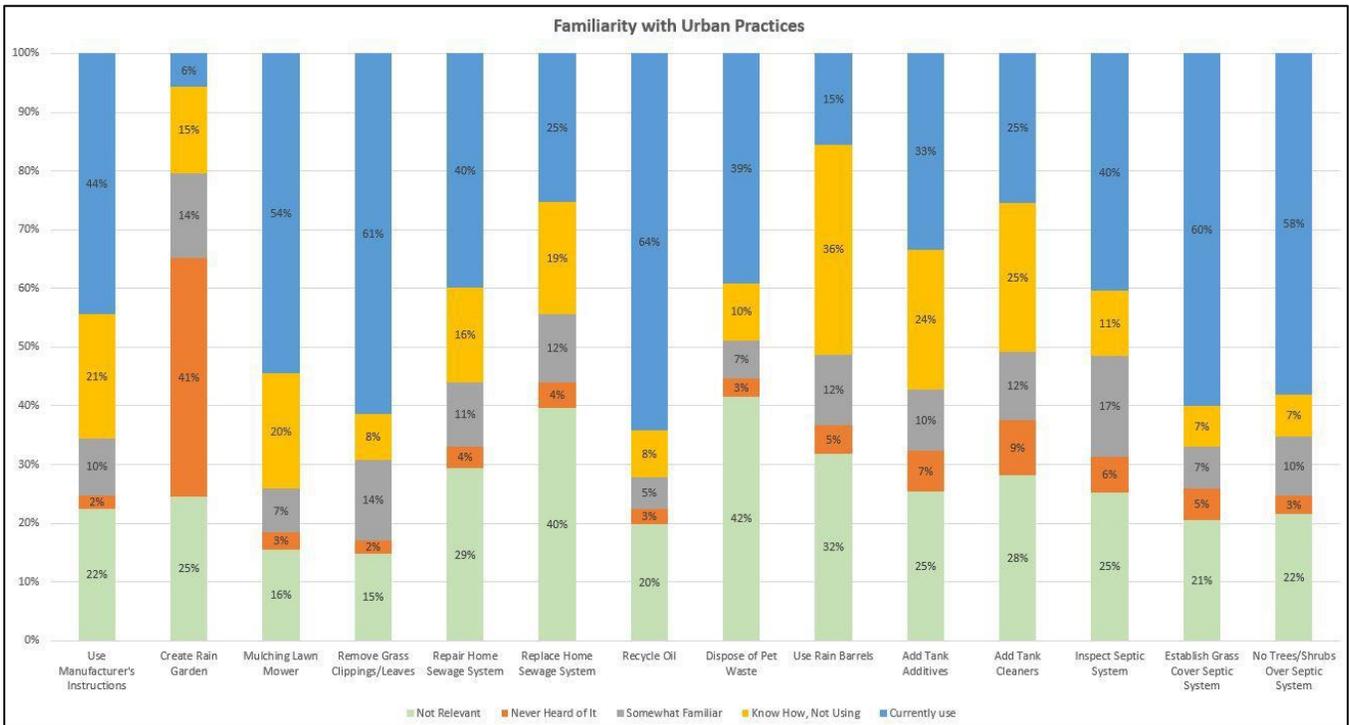


Figure 5. Urban survey respondents' familiarity with urban conservation practices

When asked about trusted sources of information regarding soil and water resources, urban respondents stated that University Extensions, State Natural Resources Agency, Local Watershed Projects, and County Health Departments are their most trusted sources of information (Figure 6). Agricultural respondents responded fairly equal in which entity or organization was trusted. Respondents slightly favored SWCDs and landowners/friends as the most trusted sources of information (Figure 7).

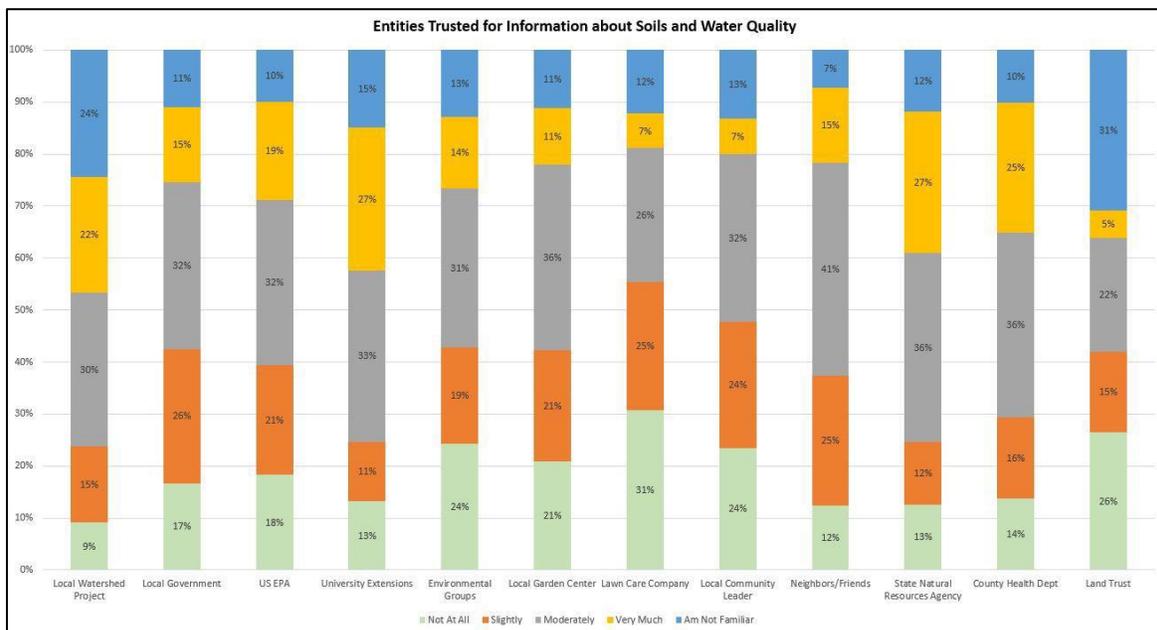


Figure 6. Urban survey respondents' trust in information sources for soils and water quality

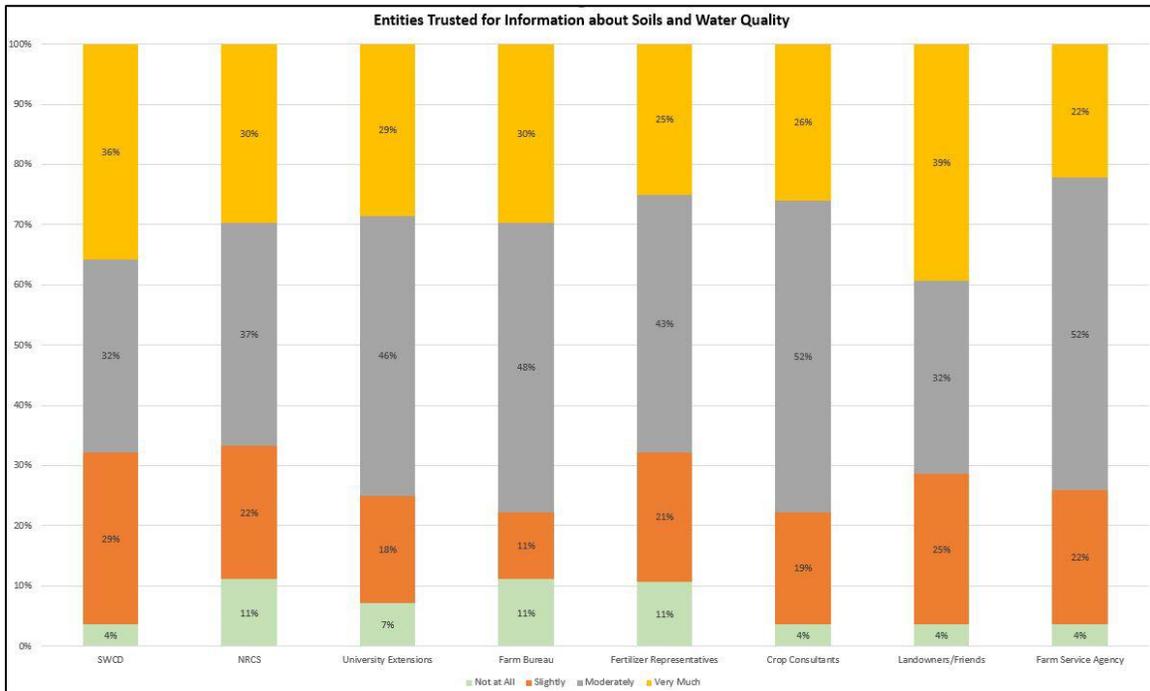


Figure 7. Agricultural survey respondents’ trust in information sources for soils and water quality

This information was and will be used to direct our education and outreach efforts and provided a baseline which we can use to compare future social surveys to. Our educational outreach efforts for this project were and future efforts can be tailored to the specific concerns and education gaps in this region.

3.) **Compilation of a baseline inventory.**

Location, climate, historic modifications of the Kankakee River, geology and topography, soil characteristics, potential sources of pollution, hydrology, natural history, land use, population trends, and regional planning efforts were all researched and synthesized to provide general background on the watershed.

The Lower Kankakee River Watershed is part of the Illinois River basin and covers portions of Jasper and Newton counties with small areas of Lake and Porter counties (Figure 8). The Kankakee River basin drains 5,165 square miles of which 2,989 square miles are located within the state of Indiana. The Lower Kankakee River Watershed drains 186,927 acres and is comprised primarily of the Kankakee River. The Kankakee River starts near South Bend, Indiana and flows southwesterly through the northern section of Jasper County into the northern section of Newton County. The stream continues westerly through Newton County, leaving the watershed just past the Indiana and Illinois state border, continuing onward to eventually form the Illinois River. Approximately 73% of the land in the watershed is used for agriculture. In addition to row crops, there are more than 47 confined animal feeding operations (CFOs) and a number of small, unregulated farms in Newton and Jasper Counties.

Soils in the targeted watersheds range from eolian sands and gravels formed by outwash deposits with high infiltration and transmission rates to those formed by sandy, loamy lacustrine and outwash deposits, which are poorly drained and nearly ground level. Nearly 183,602 acres or 98.2% of the watershed is covered by soils that are considered very limited for use in septic tank absorption fields. The remaining 3,324 acres (1.8%) are not rated for septic usage as it is not generally industry standard to install a septic system in these geographic locations.

Historic water quality data collected from multiple agencies including the Hoosier River Watch, IDEM, IDNR, SWCD, and USGS was also inventoried and synthesized. Some of the prominent findings including exceedances of phosphorus, nitrates, and turbidity in a majority of historic sampling events from all agencies. Elevated levels of *E. coli* were also detected in many of historic samples. Forty-eight stream segments (Figure 9) within the Lower Kankakee River Watershed are included on the draft list of impaired waterbodies (IDEM, 2018).

To establish baseline water quality data, the Lower Kankakee River Project implemented a professional water quality monitoring program monitoring 25 sites over the course of 18 months. The program was augmented with additional sample collection for Total Suspended Solids (TSS) and additional sample sites were added. The program included water chemistry and habitat assessments as well as a volunteer monitoring program for water chemistry and aquatic macroinvertebrate communities. Water quality data measured and analyzed on key tributaries in project area enabled the estimation load reduction goals. High quality maps of the 3 HUC 10 areas were created for planning purposes, public events, decision making, and educational and media purposes.

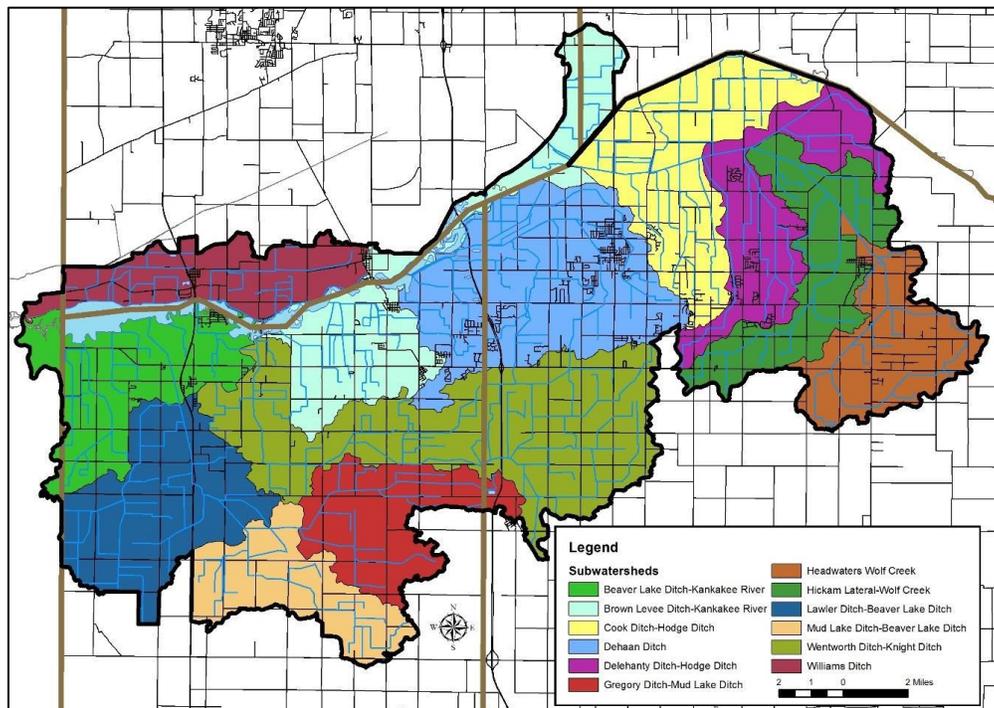


Figure 8. Subwatersheds comprising the Lower Kankakee River Watershed

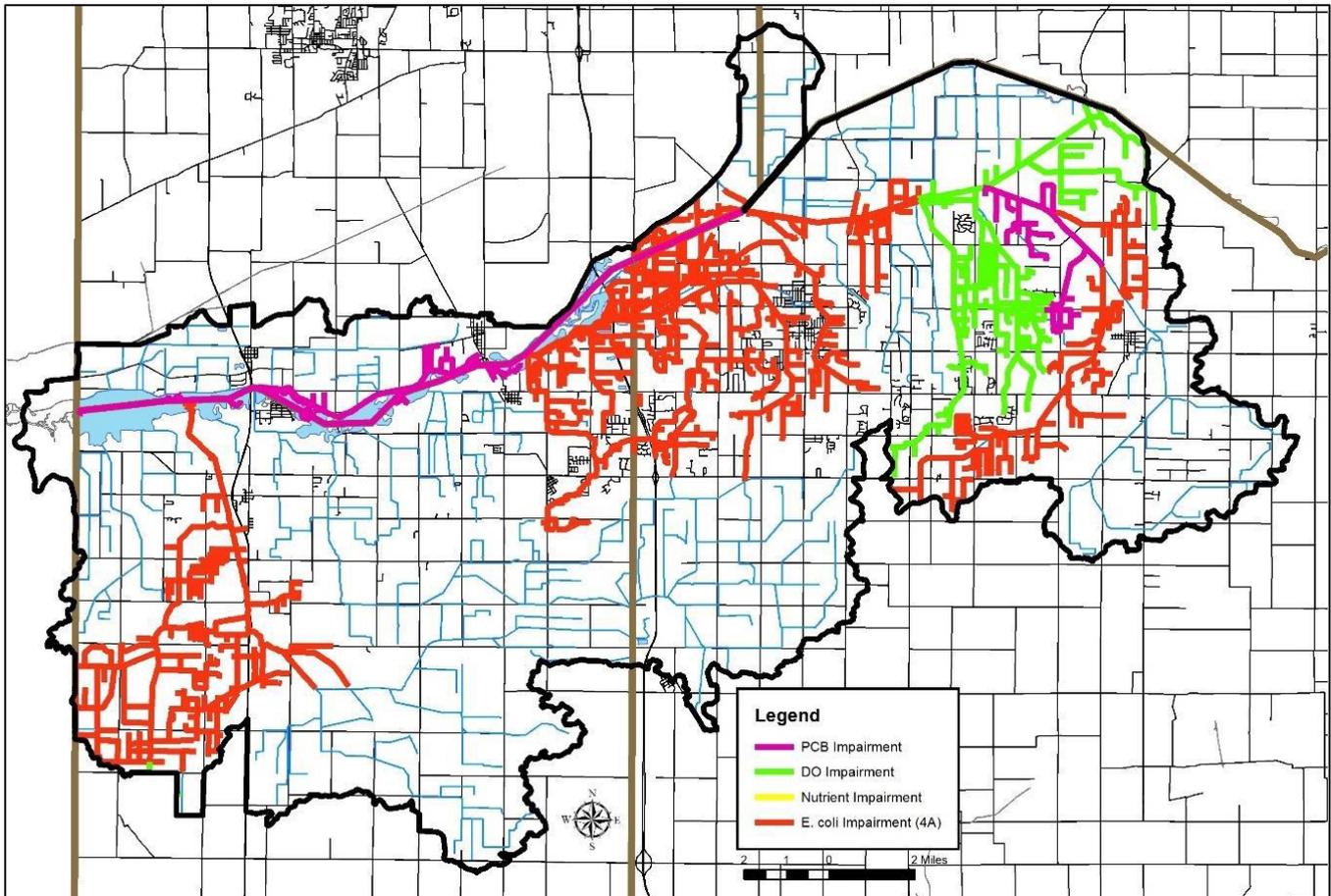


Figure 9. Waterbodies in the Lower Kankakee River Watershed impaired for E. coli, dissolved oxygen, nutrients, impaired biotic communities, mercury, and PCBs according to IDEM's 2018 303d list

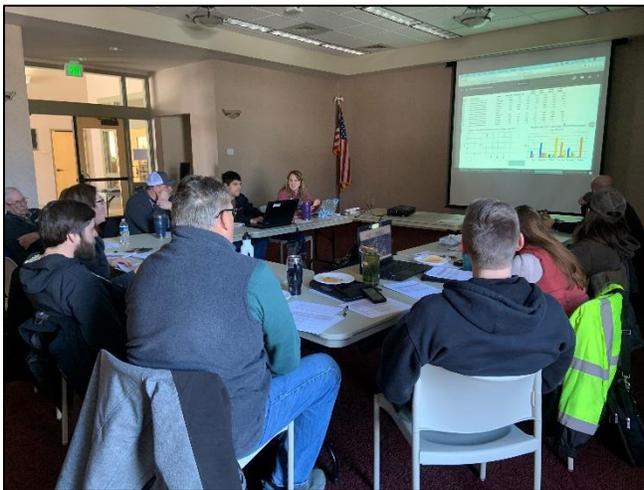
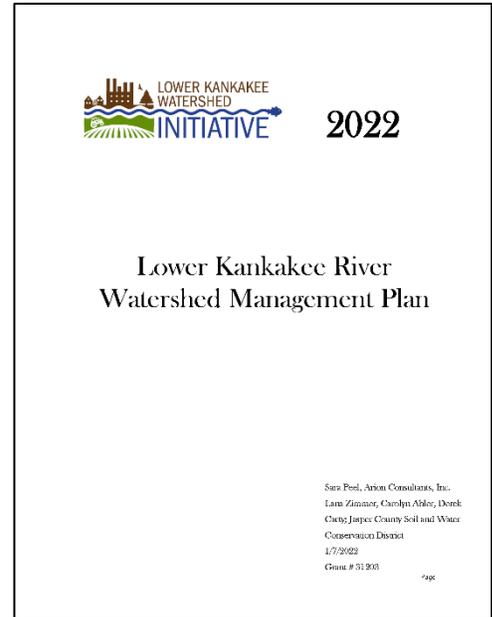
4) Successful adult and youth educational outreach.

The Jasper County SWCD published six *Conservation Counts* news releases promoting the program and continually kept the website update with most recent information about the LKWI. Six newsletters were published and sent to 71 people and published in each SWCD's Annual Report in 2020 and 2021. Four on water community events were held in conjunction with local partners including a Macroinvertebrate Field Day (seven attendees), Sandhill Crane Paddle (75 participants), Grand Kankakee Marsh Paddle (eleven attendees), and Kankakee Bison Paddle (88 attendees). Six informational booths were hosted at various community events including the Jasper County Fair, Newton County Fair, Halloween Trunk or Treat, Tractober Fest, and Beaverfest reaching over 1,000 people. Local decision makers were regularly updated on the LKWI efforts twelve times at Jasper and Newton County Commissioners meetings and DeMotte and Wheatfield Town Board meetings. To evaluate knowledge and behavior change of the workshops and events held, three pre and post events surveys were conducted. Additionally, as already discussed, a social indicator survey was conducted at the beginning of the project.

Completion of Tasks

Task A: Produce a Watershed Management Plan (WMP) for the Lower Kankakee River Watershed

A group of 17 steering committee members was developed to help assist with decision making for the plan (Table 1). The group consisted of local farmers, conservation partners, representing governmental agencies and local leaders. Twelve meetings were held over the course of three years to identify stakeholder concerns, create goals, review water quality data that was collected and give input on education and outreach events (Table 6). Committee members also shared input on the planning efforts and future goals of the Lower Kankakee Watershed. The steering committee lead this planning effort which was then put into a formal plan by contractor Sara Peel, Arion Consultants, Inc. This watershed management plan was officially approved by the Environmental Protection Agency (EPA) on January 25, 2022 (Table 7).



Stakeholder concerns were initially gathered during the first stakeholder and steering committee meeting held on March 13, 2019 at the Wheatfield Library. There were 24 people in attendance and each person was asked to place a sticky note on a watershed map of where they lived. The watershed was well represented. Attendees were invited to voice their concerns and all comments were recorded on a dry erase board and in the survey tool, Slido. Each person then voted on their highest priorities using Slido. A score of 10 indicated the respondent was “most concerned” and a score of 1 indicated the respondent was “least concerned”.

Table 6. LKWI steering committee meetings (12 meetings total):

Year	Months
2019	April, July, August, December
2020	February, April, July, October, December
2021	July
2022	February, March

Table 7. Draft WMPs submitted to the State for review

Draft Number	Sections	Due	Received
1	Elements 1-3	7/18/2019	7/18/2019
2	Elements 4-14	9/18/2019	9/18/2019
3	Elements 15-19	7/19/2020	3/19/2020
4	Elements 20-24	1/18/2021	8/27/2020
5	Elements 1-33	7/18/2021	12/22/2020
Final	Elements 1-33	3/17/2022	8/12/2021

After the initial steering committee meeting, Arion Consultants and volunteers completed windshield surveys throughout the Lower Kankakee River Watershed in spring 2019. Volunteers conducted surveys by driving all accessible roads throughout the watershed. Large maps with aerial photographs, road and stream names, and public property labels were provided to each volunteer group. Volunteers recorded observations on the provided maps and data sheets, documented field conditions with photographs, and provided all notes to the Project Coordinator for review. The windshield surveys were also used to confirm GIS map layer data throughout the watershed. Items targeted during the surveys included, but were not limited to the following:

- Aerial land use category
- Field or gully erosion
- Pasture locations and condition
- Livestock access and impact to streams
- Buffer condition and width
- Bank erosion or head-cutting
- Logjams located within the stream
- Dumping areas or areas where trash or debris accumulate
- Small, unregulated farms
- Environmental site confirmation (NPDES, CFO, open dump, Superfund, etc.)

All accessible road-stream crossings were inventoried. Most issues identified fall into five categories: stream buffers limited in width or lacking altogether, areas of livestock access, streambank erosion, dumping areas, and unregulated farms. Figure 3 details locations throughout Lower Kankakee River Watershed where problems were identified. Much of the watershed is not visible from the road; therefore, those identified in Figure 3 should not be considered exhaustive. More than 796 miles of streams possessed limited buffers, nearly 26.6 miles of streambank were eroded, and livestock had access to nearly 1.7 miles of streams. Additionally, 8.8 miles of recently cleaned legal drains were observed in the spring of 2019.

After receiving the results of these efforts, the steering committee reviewed their concerns list and added two items to the concerns list: elevated bacteria levels (high *E. coli*) and elevated turbidity or suspended solids levels. During the July 13, 2019 steering committee meeting, the committee voted to reprioritize concerns (Table 3). Following the collection of field data, review of a social indicator survey, and many more meetings, the steering committee completed pertinent data analysis, problem identification, load reduction determinations, set goals for the watershed and eventually completed the WMP.

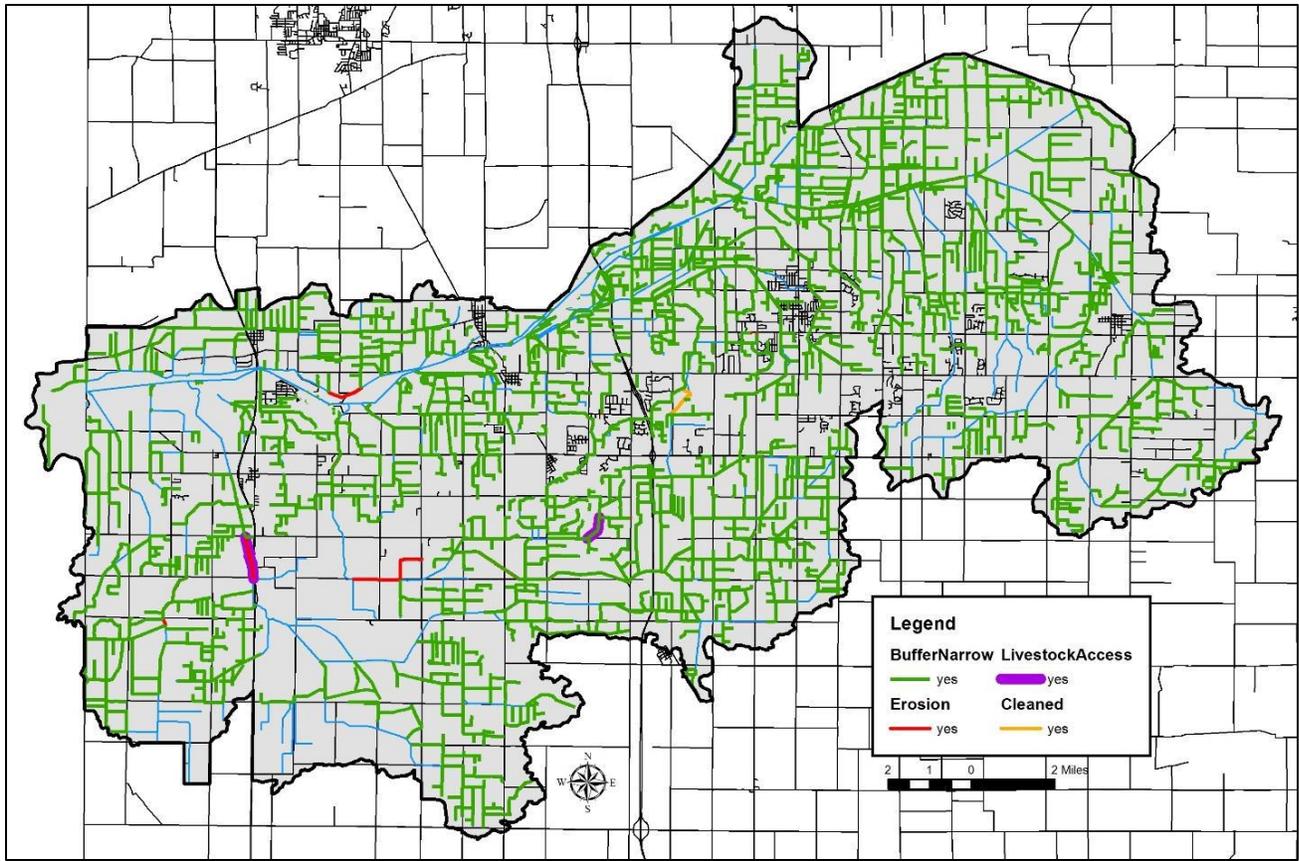


Figure 3. Stream-related watershed concerns identified during watershed inventory efforts

Task B: Develop a Quality Assurance Project Plan (QAPP) for the monitoring activities and conduct a monitoring program

A Quality Assurance Project Plan (QAPP) was completed for the monitoring activities and was approved by the State in May of 2019. An amendment was made to the QAPP and approved by the State in August of 2020.

The LKWI water sampling initiative consisted of 25 sites that were monitored for water quality over the course of 18 months (Figure 10, Table 8). The program was augmented with additional sample collection for TSS and additional sample sites were added to better represent the watershed area. The monitoring program included water chemistry and habitat assessments.

The testing parameters for the program are detailed in the Quality Assurance Project Plan for the Lower Kankakee River Watershed Management Plan, dated May 28, 2019. Sample sites were selected based on land use and watershed drainage and correspond with sites sampled by IDEM. The sampling regimen was enacted to create a baseline of water quality data.



Jasper and Newton County SWCD were responsible for the water sampling and Elements Testing in Rensselaer, IN performed the tests for *E. Coli*, Nitrates, Phosphorus and TSS. Prior to the COVID-19 pandemic, we were able to utilize the Wastewater Treatment facility in Rensselaer to perform the chemical testing. Due to the COVID-19 pandemic, we were no longer granted access to the facility and began using the services of Element Testing in Rensselaer to perform the chemical testing.

Table 8. LKWI baseline water quality data collection months of sampling

Year	Months Water Testing was Performed
2019	June, September, October, November, December
2020	January, February, April, May, June, July, September, November (twice), December
2021	January, February, March, April, May, June, July, August

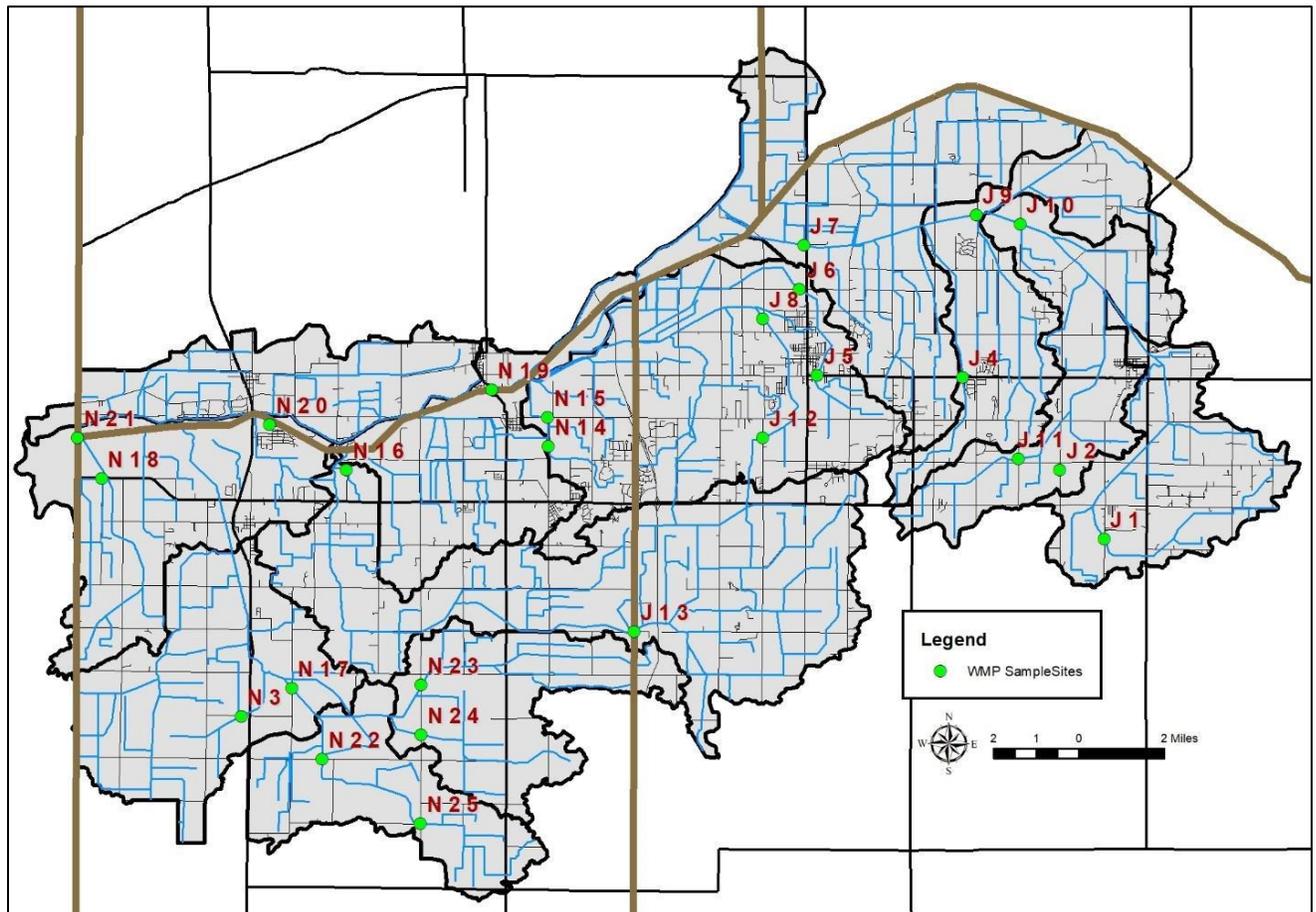


Figure 10. LKWI baseline water quality monitoring sites

Task C: Conduct an education and outreach program designed to bring about behavioral changes that will lead to reduced nonpoint source pollution in the watershed

Task C 1: Develop and disseminate biannual media/news releases (to sources such as: WLQI /WRIN radio, local T.V, the KV Post, and other newspaper outlets) to advertise meetings, the education/outreach program, project promotion etc. for a total of six (6) media/news releases.

Task C 2: Develop, launch, and encourage the use of a Lower Kankakee Watershed Management Plan Initiative project website, containing the WMP, relevant maps, meeting announcements, and educational material (septic brochures, BMP info, etc.) related to the WMP goals and outreach efforts. The current Jasper County SWCD website may host the proposed website.



Both Jasper and Newton SWCD’s Facebook pages were utilized to share important information to the public, host LKWI events and keep residents up-to-date with programs and highlight best management practices. Facebook pages for both counties have a combined 1,687 page likes. Countless updates were made via these media sources.

The web page lowerkankakeewatershed.org was integrated into the Jasper County SWCD’s website, jaspercountyswcd.org This page allows us to continuously keep the public updated with our findings and future events.



Articles were published biannually in local newspapers like the *Rensselaer Republican*, *KV Post News* and *Newton County Enterprise* (Table 9).

Three newsletters were posted online and sent via email to the steering committee and other subscribers gathered through promoting LKWI at events.

Table 9. Biannual social media/media news releases to advertise meetings, the education/outreach program, project promotion etc (6 total news releases)

Month/Year	Media Source
April 2019	Rensselaer Republican
September 2019	Rensselaer Republican
December 2019	Kankakee Valley Post News
January 2020	Rensselaer Republican
July 2020	Kankakee Valley Post News
February 2021	Rensselaer Republican

Task C 3: Provide update the project website at least biannually with information regarding meetings, opportunities to get involved with the project, water quality information, WMP development, etc. for a total of six (6) updates.

The project website: kankakeewatershed.org was continuously updated with upcoming events, project updates and project newsletters (Figure 11).



Figure 11. Screenshot of the homepage of kankakeewatershed.org

Task C 4: Conduct two (2) workshops or field days annually highlighting and addressing practices recommended by the ACPF software and potential barriers to BMP practice adoption for a total of six (6) events.



Raingarden clean up 2020

Table 10. LKWI field days and workshops hosted

Date	Event	Number of People in Attendance
9/20/2019	Is No-Till Enough? Field Day	25
1/11/2020	Everglades of the North Movie Screening	85
5/27/2020	Are You Septic Smart? Webinar	33
8/30/2020	Interseeding Field Day Q&A	200 views
9/11/2020	Raingarden Cleanup and Workshop	12
2/4/2021	Sands to Silts and Clays: Building Soil Health in a Diverse Watershed Webinar	65

Task C 5: Develop and distribute a biannual project newsletter of the Lower Kankakee Watershed Management Plan Initiative’s accomplishments and future plans. This newsletter will be distributed by email, social media outlets, and mailings to as many watershed residents as possible for a total of six (6) newsletters.

Table 11. LKWI newsletters published and distributed

Year	Month
2019	October, December
2020	September, December
2021	June, December

Task C 6: Conduct three (3) on-water community event such as float trip, stream cleanup, or macroinvertebrate field day.

Table 12. On-water community events hosted to promote the LKWI

Date	Event	Number of People in Attendance
10/6/2019	Macroinvertebrate On-Water Event	7
10/13/2019	Sandhill Crane Paddle	75
10/4/2020	Grand Kankakee River Paddle	11
10/10/2021	Kankakee Bison Paddle	88



Grand Kankakee Marsh Paddle October 2020



Macroinvertebrate sampling event October 2019

Task C 7: Set up and host an informational booth at two (2) local community events (such as the Jasper/Newton County fairs, local festivals, expos, or special events) annually for a total of six (6) booths.



Top L: Teaching about macroinvertebrates at Tractor Fest 2020

Top R: Shelby Keys representing LKWI at Earth Night 2021

Bottom L: Bri Styck and Derek Carty representing LKWI at Beaverfest 2021

Table 13. Community booth events set up to promote the LKWI

Date	Event
7/18/2019	Jasper County Fair
10/19/2019	Jasper County Halloween Trunk or Treat
10/17/2020	Tractoberfest at Fair Oaks Farms
7/14/2021	Newton County Earth Night
7/28/2021	Jasper County Fair
5/29/2021	Beaver Fest

Task C 8: Provide updates on the project to Jasper/Newton County Commissioners and Demotte & Wheatfield Town Boards (4 meetings annually, 12 meetings total for project).

Table 14. County and community public meetings where LKWI updates were presented

Community	Date Attended	Date Attended	Date Attended
Jasper County	10/07/2019	8/3/2020	12/28/2021
Newton County	11/18/2019	3/2/2020	5/18/2020
DeMotte	10/23/2019	9/28/2020	4/13/2021
Wheatfield	10/17/2019	7/16/2020	2/1/2021

Task C 9: Develop and conduct pre- and post-surveys at education workshops to evaluate change in behavior of stakeholders for a minimum total of three (3) survey events. Results will be discussed in the project’s final report.

Table 15. Workshop pre- and post- surveys conducted

Date	Event
5/27/2020	Are You Septic Smart? Webinar
2/4/2021	Sands to Silts and Clays: Building Soil Health in a Diverse Watershed Webinar
9/17/2021	Soil Health Field Day

Task C 10: Develop and distribute one (1) Social Indicator Survey pre-implementation throughout the watershed to understand the awareness, attitudes, capacity, and behaviors of residents of the watershed. The survey shall follow the EPA Region V Social Indicator Framework. Survey data shall be used to inform planning and future implementation efforts.

Social indicator surveys provide one way to analyze these attitude, awareness, behavior, and constraint measures. The data obtained provide a snapshot of a given time, helping to direct outreach efforts, and allowing for measurement of temporal change observed during future assessments.

The Lower Kankakee River Watershed is primarily comprised of agricultural land uses, but has some urban land use, so two surveys were deployed. The surveys were mailed in August of 2019. A follow up postcard was sent in January of 2020 to those non-responsive agricultural members asking them to participate. The postcard included instructions on how to complete the survey online. The 10-page urban survey was sent to 11,057 individuals and businesses within the watershed. In total, 1,077 urban surveys were returned for a response rate of 9.7%. The 11-page agricultural survey was sent to 389 addresses in the watershed. In total, 29 agricultural surveys were returned for a response rate of 7.5%.

Task D: Prepare and submit an electronic copy of a progress report to the State with each invoice, on at least a quarterly basis (no less than 11):

Table 16. LKWI progress reports submitted to the State

Year	Month
2019	July, August
2020	February, April, July, October
2021	January, April, July, October
2022	January, April

Monitoring Results

To establish baseline water quality data, the LKWI Steering Committee Water Quality Working Group implemented a professional water quality monitoring program monitoring 25 sites over the course of 18 months (Figure 10). The program was augmented with additional sample collection for Total Suspended Solids (TSS) and additional sample sites were added. The program included water chemistry and habitat assessments as well as a volunteer monitoring program for water chemistry and aquatic macroinvertebrate communities. Water quality data measured and analyzed on key tributaries in project area enabled the estimation load reduction goals.

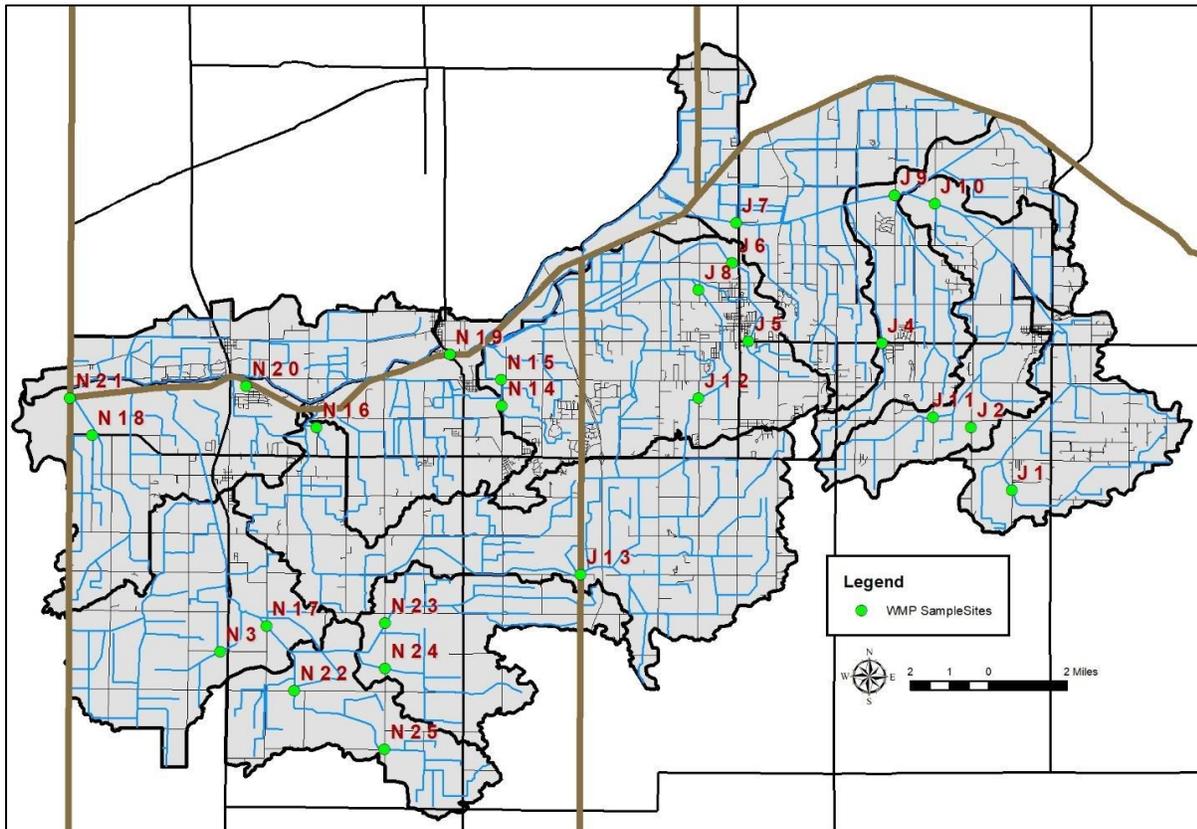


Figure 10. Sites sampled as part of the Lower Kankakee River Watershed Management Plan

Sample sites were selected based on land use and watershed drainage correspond with sites sampled by IDEM. Sites 1-20 were monitored monthly from June 2019 – August 2020. Sites 21 – 25 were monitored monthly from September 2020 – August 2021. Field parameters including temperature, dissolved oxygen, pH, turbidity, and conductivity were monitored monthly at each of the sampling locations. Stream flow was measured regularly only at six sites when collecting grab samples due to varying levels of flow. Laboratory water chemistry parameters were also measured June 2019 – August 2020 and included total phosphorus, nitrate-nitrogen, and *E. coli*. TSS collection also occurred at sites 1-20 but was completed June 2019 – February 2021. TSS collections from sites 21-25 occurred September 2020 – August 2021. Physical habitat was assessed at five sites (4, 6, 11, 12, and 13) by volunteers trained through the Hoosier Riverwatch program using the Citizens Qualitative Habitat Evaluation Index (CQHEI) on October 6, 2019. CQHEI was utilized to maintain consistency with Hoosier Riverwatch data, past and future. Aquatic macroinvertebrate communities were sampled on the same day at the same five habitat sites. This data provided a one-time snapshot of the health of the biological community at each site and provided a general baseline upon which to measure future aquatic life improvements.

General trends for field parameters are summarized as such:

Temperature at the sites ranged from 0°C to 30.17°C. Unsurprisingly, the lowest temperatures were recorded in December – February each year and the highest temperatures were recorded in June – September. Site J1 experienced the great fluctuations in temperatures, but overall, the sites all demonstrated similar patterns and temperatures.

Dissolved oxygen (DO) ranged from 0.89 mg/L to 19.86 mg/L. One sampling event recorded a DO concentration of near 100 mg/L in the winter of 2021 that was considered an outlier. The minimum concentration needed to comfortably sustain aquatic life is at least 4.0 mg/L of DO. Twenty seven (approximately 7%) of the samples measured at or below the 4 mg/L threshold. Sites N18 and N20 experienced the most frequent (29%) critically low DO levels (≤ 4 mg/L).

pH ranged from 1.9 up to 10.5. The safe threshold for aquatic life to comfortably thrive is between 6.0 and 9.0. The pH dipped below 6.0 one time over all sampling events at site N22 in April of 2021. The pH reached and or exceeded the 9.0 maximum 15 times at sites thirteen different sites. Exceedances occurred in late winter/early spring like corresponding with field lime applications and precipitation events.

Turbidity ranged from 0.0 NTU to 240.0 NTU. The IDEM water quality maximum benchmark for turbidity is 5.7 NTU. A vast majority of all samples (70%) exceeded the State standard target. Site N4 experienced the highest turbidity level although all sites remained consistently high. Peaks of turbidity seemed to have coincided with high flow events.

Conductivity varied moderately over the sampling period and never exceeded State standards.

General trends for water chemistry results are summarized as such:

Total Phosphorus concentrations ranged from 0.00 mg/L to 2.81 mg/L and exceeded target concentrations (0.07 mg/L) in 72% of samples. Concentrations measured throughout the watershed measured in excess of the level at which total phosphorus concentrations impair

biological communities (0.08mg/L). Site N19 contained the highest average concentration of total phosphorus (0.195 mg/L).

Nitrate-nitrogen concentrations ranged from 0.00 mg/L to 3.42 mg/L and exceeded target concentrations in 60% of the samples. Concentrations measured the highest during the spring and fell throughout the summer with the highest concentration recorded at site J13 in February of 2020. In total, 24/25 sites averaged nitrate-nitrogen concentrations higher than the median concentration at which biological communities are impaired (1.5 mg/L).

TSS concentrations ranged from 0.0 mg/L to 126.0 mg/L. Site J4 measured the highest concentration of 126.0 mg/L TSS in May of 2020 and because it is such a higher concentration than any other samples, it is considered to be an outlier. The next highest recorded TSS concentration was 28.0 mg/L at site J4 and N19 in June 2020. Approximately 4.0% of samples exceeded target concentrations (15.0 mg/L). Based on stakeholder input, there were a limited number of storm events during the sampling period resulting in fewer than normal runoff events.

E. coli concentrations ranged from 0.0 col/100 mL to 2,419.6 col/100 mL exceeding State standards (235.0 col/100 mL) in 16.0% of collected samples. Site J6 contained the highest concentration of *E. coli* (2,419.6 col/100 mL) in January 2020 however none of the sites possessed average *E. coli* concentrations in excess of State standards.

General trends for habitat results are summarized as such:

CQHEI scores ranged from 14 to 61 where low scores represent poor habitat conditions. The lowest scoring sites were N3 (CQHEI 14), J12 (CQHEI 23), and J6 (CQHEI 27) indicating extensive manmade modifications, channelization high banks, narrow buffers, limited pool/riffle/run development, and excessive siltation. The highest scoring sites were J11 (CQHEI 59) and J4 (CQHEI 61). The CQHEI metric itself ranges from 0-100 with 100 being the highest quality instream habitat and 0 being the poorest quality possible. No sites were deemed exceptional.

General trends for habitat results are summarized as such:

Eighteen different taxa of macroinvertebrates were identified from the five sites sampled by Hoosier Riverwatch volunteers. High proportions of pollution tolerant taxa adapted with features allowing them to breathe externally from the water, survive on minimal nutrients, or tolerate high levels of toxicity from pollutants like *E. coli* and others, is generally and indicator of impaired water quality. Taxa like ephemeroptera, plecoptera, and trichoptera are generally indicators of good water quality as they have specialized features such a delicate gills easily damaged or unable to function is high toxicity, temperature, and low oxygen habitats. Site J4 had the greatest diversity of taxa sampled (12 taxa), most individuals collected, but also the second highest proportion of pollution tolerant species present (48.4%). Site J11 had the second most individuals collected (71) but highest proportion of pollution tolerant species (53.5%). Site J12 had the highest proportion of beneficial species collected (89.0%) however also supported the fewest taxa (6 taxa).



Water sampling throughout the Lower Kankakee River watershed



Public Participation

Our objective throughout this project was to increase public awareness around water quality and how the public thinks about watersheds on a local level. The public was involved and informed every step of the way throughout this process. Their participation is necessary to bring about long-term, positive, impactful changes to our watershed. Because of this project, we were able to host education and outreach events, which were all open and advertised to the public. The initiative also interacted with the public through project newsletters, website updates, social media, newspaper articles, direct mailing, and face-to-face communication. We were able to learn through conducting pre-and-post event surveys how educational and informative the events we hosted were. From the results of a survey conducted at our Septic Maintenance Workshop, attendees learned the importance of distance between wells and septic's, keeping records of maintenance, knowing the location of the septic system and that septic systems affect water quality. The results from the survey conducted at our Sands to Silts and Clays: Building Soil Health in a Diverse Watershed webinar indicated that all 65 attendees claimed the information they received was valuable to them.

Partnerships

The Lower Kankakee Watershed Initiative formed several key partnerships throughout the project, all contributing to various degrees. The goals of LKWI align in different ways with these partners, and we look forward to continuing to work with them on future activities.

The following organizations, agencies, businesses, and municipalities have all provided support for the Lower Kankakee Watershed Initiative throughout the project. We thank all of those involved for providing their time participating at meetings, helping plan and promote events, providing meeting space, sponsorship, etc.

- Izaak Walton League of America
- Understanding Ag
- Northwest Indiana Paddling Association
- Soil Health Partnership
- Fountain Stone Movie Theater
- Rensselaer Republican, KV Post News, Newton County Enterprise
- Newton County Park Board
- Hideout Bar & Grill
- Kankakee River Yellow River Basin Development Commission
- Rensselaer Wastewater Treatment Plant
- Element Testing
- Fair Oaks Farms
- Jasper/Newton County Public Libraries
- Natural Resources Conservation Service
- Purdue Extension
- Indiana Department of Natural Resources
- Jasper County Soil and Water Conservation District
- Newton County Soil and Water Conservation District
- Conservation Cropping Systems Initiative
- Indiana State Department of Agriculture
- Jasper County Surveyor, Highway Department, Health Department, Commissions and Council Members
- Newton County Surveyor, Highway Department, Health Department, Commissioners, and Council Members
- The Nature Conservancy
- Friends of the Sands

Successes, Challenges & Lessons Learned

Not everything will go according to plan. This project was greatly impacted by the COVID-19 pandemic in many ways. We could no longer utilize our initial lab for water quality testing, events had to be cancelled, months of water sampling were missed, and virtual platforms had to be used for outreach and meetings.

It is important to have representation from all areas of the watershed and diversity among steering committee members. Keeping their focus and attention over a 3-year project can be difficult, but it is needed to achieve success.

Turnover in staff proved to be a challenge in the beginning. Required meetings should have had a set schedule, instead of trying last minute to see what date works best for everyone. Utilize professional companies to do the water quality testing, it is worth the extra expense.

Future Activities

The Lower Kankakee Watershed Initiative will continue to seek funding for cost-share within the watershed along with continuing to provide targeted education and outreach to the public. Jasper and Newton County SWCD's were awarded a Lake and River Enhancement Grant in 2021. The focus area of this grant is the Knight Ditch – Kankakee River Watershed. This allows

us to cost-share with landowners on a variety of BMP's that reduce the amount of sediment and nutrients entering a lake or river.

Upon completion of the approved WMP, Jasper and Newton SWCD's are able to apply for a 319 Implementation Grant through the Indiana Department of Environmental Management among other funding agencies and opportunities. A Section 319 Implementation grant application will be submitted in September 2022 in hopes of obtaining funding for cost-share and education and outreach. We will continue to collaborate and work with our partners we formed during this project.

Another lasting goal of the LKWI is to increase visibility of the website and usefulness of information. We intend to encourage volunteer growth for water quality improvement efforts and will continue to present monitoring data at fairs, festivals, and informational booths. Within our communities it will continue to be important to us to utilize the WMP for coordinating efforts to guide county and town planning, and other decision-making organizations. We are appreciative of the opportunities this grant has afforded us and our communities to further the stewardship and health of the Lower Kankakee Watershed.