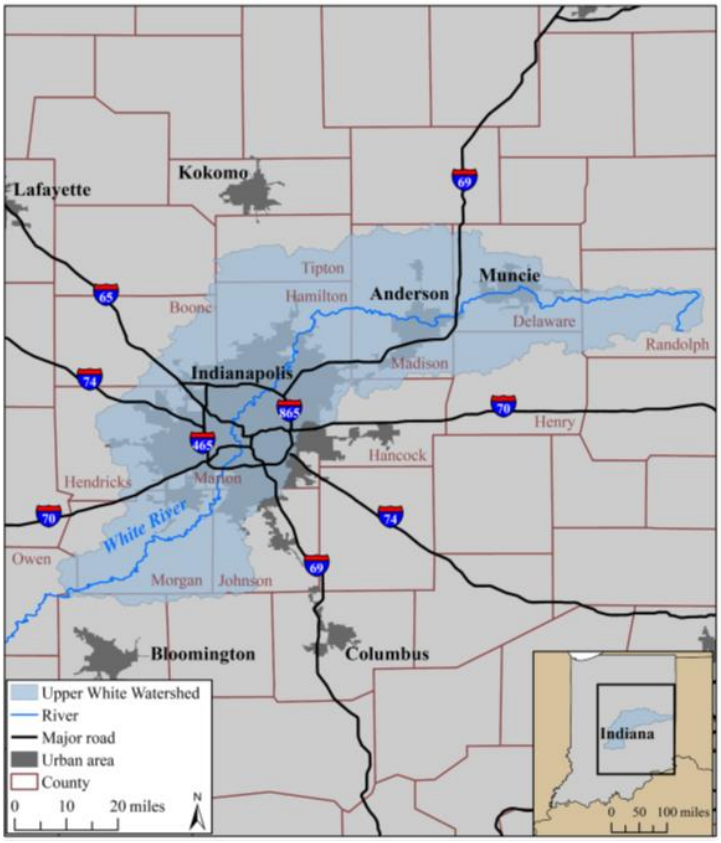
Upper White River Watershed Farmer and Landowner 2018 Survey Descriptive Report



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

The map on the cover page shows the Upper White River watershed (highlighted in blue). The map includes city and county names, as well as major U.S. and interstate highways. This map was included in the survey for participant reference.

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Tables

1 Introduction

The Nature Conservancy, in partnership with Agribusiness Council of Indiana, Conservation Cropping Systems Initiative, Indiana Association of Soil and Water Conservation Districts, Indiana Dairy Producers, Indiana Farm Bureau, Indiana Agriculture Nutrient Alliance, Indiana Corn Marketing Council, Indiana Pork, Indiana Soybean Alliance, Indiana State Department of Agriculture, Indiana State Poultry Association, Indiana Water Resources Research Center, and USDA Natural Resources Conservation Service, awarded Purdue University a contract to 1) understand motivations to recommend and/or implement conservation practices as part of farm management, for all stakeholders, 2) identify motivations, opportunities, and barriers for each stakeholder group's participation in the collaborative process, and 3) evaluate farmer conservation outreach and education events conducted in the watershed project.

The Upper White River watershed is located in Central Indiana and includes portions of Randolph, Delaware, Henry, Madison, Hancock, Tipton, Hamilton, Boone, Marion, Johnson, Morgan, Owen, Hendricks, Clinton, Monroe, Grant, and Brown Counties. This report presents the descriptive results of the year one (2018; baseline) social indicator questionnaire sent to landowners and producers in the Upper White River watershed about their views on local water resources (see appendix A for complete questionnaire).

2 Methods

2.1 Questionnaire Development

The Questionnaire was developed based off of previous social indicator questionnaires from the Natural Resources Social Science Lab, Purdue University. A map was provided on page 2 of the questionnaire for reference to ensure respondents' property is within the defined boundaries of the Upper White River Watershed. The questionnaire is comprised of seven sections including:

- Section I – Water Resources and Impairments; Three questions about water quality impairments, sources of water quality pollution, and consequences of poor water quality in the Upper White River watershed.
- Section II – Six questions about the drainage of the White River, demographics, location of property, and acreage of owned or rented farmland.
- Section III – Sources of Advice and Relationships; Three questions about advice and relationships with different entities and determination of whether or not they are actively farming in the Upper White River watershed.
- Section IV – Water Quality; One question about attitudes towards on-farm impacts to water quality.
- Section V – Management Decision Making; Two questions about overall management of the farming operation and motivations to implement a conservation practice.
- Section VI – Management Practices; Thirty-one questions about cover crops, conservation tillage, conservation plans, plan for nutrient management, soil health management systems, and other land management practices.
- Section VII – About Your Farming Operation; Nine questions about farming operations and experience.

2.2 Data Collection

From July 20, 2018 to September 10, 2018, Purdue University conducted a five-wave social indicators survey in the Upper White River watershed, located in Central Indiana. Addresses were purchased from the Farm Market iD for the Upper White River watershed geographic location with the following restrictions applied: (1) 1200 randomly selected addresses of actively farmed land within the shapefile provided (shapefile included 13 counties within the Upper White River watershed and excluded land in Brown, Clinton, Grant, and Monroe counties), (2) all growers must have some corn and/or soy in production, (3) growers are owner/operators or operators, and (4) farmland acreage is greater than or equal to 40 acres.

Wave 1 was an advance letter that introduced the study, provided participants a unique identifier (ID), and a website address to take the online version of the questionnaire (through online survey software Qualtrics) (Qualtrics, Provo, UT). The advance letter also explained that if the online questionnaire had not been completed within a week, a hardcopy version of the questionnaire would be mailed to them. Wave 2 was a hardcopy of the questionnaire with a stamp, addressed return envelope, sent to those who had not yet completed the online questionnaire. Wave 3 was a reminder postcard that included the website address to take the online questionnaire. Wave 4 was a second hardcopy of the questionnaire and return envelope. Wave 5, sent to those who had not yet responded to any previous waves, included a final hardcopy of the questionnaire, return envelope and a postcard indicating final contact (Table 1).

Table 1. Mail distribution

Wave	Date Mailed	Item Delivered
1	07/20/18	Advanced Letter
2	08/02/18	Questionnaire #1
3	08/14/18	Reminder postcard
4	08/27/18	Questionnaire #2
5	09/10/18	Questionnaire #3 and postcard

2.3 Analysis

All results presented in the following tables reference the question number (e.g., Q1) of the questionnaire (Appendix A). This questionnaire contained five general types of questions: closed (single response), closed (multiple response), Likert (i.e., bipolar), open (numeric), and open (text). The following analyses were conducted and presented for each question type:

- Closed (single response): Calculated percentage of respondents that selected each category.
- Closed (multiple response): Calculated percentage of respondents that selected each category. This results in a total percentage greater than 100% across categories. If respondent answers "don't know" and also checks other answers, the "don't know" is superseded by the other answer(s) that is/are checked. Similarly, if a respondent answers "I created my own plan without help from others." and also checked other answers, the other answer(s) is/are superseded.
- Likert: Calculated percentage of respondents that selected each category. Means and standard deviation
- (sd) based on the bipolar scale (e.g., Strongly disagree = 1, Disagree = 2, Neither agree nor disagree = 3, Agree = 4, Strongly agree = 5) were calculated, excluding any non-bipolar options (e.g., "Don't know", "Not applicable").
- Open (numeric): Mean, sd, median and range were calculated.
- Open (text): Applicable for only Q43 and Q45; the text was coded into each category listed in the table.

All data were analyzed in R or MS Excel.

2.4 Response Rate

A total of 1,200 questionnaires were mailed to unique addresses and 53 were returned as bad addresses (see Appendix B for bad addresses definition) for a total of 1,147 valid addresses. There were 361 completed questionnaires resulting in a response rate of 31.5%.

To calculate the response rate, total completed questionnaires is divided by the amount of eligible addresses (total questionnaires sent minus bad addresses) and then that number is multiplied by 100. A questionnaire is considered "complete" if at least one question was responded to. The number of responses for each question varies due to skip patterns incorporated into the questionnaire and respondents not answering all questions.

3 Results

3.1 Section I – Water Resources and Impairments

Table 2. Upper White River watershed impairments

Corresponds to Q1: "Below is a list of water pollutants and conditions that are generally present in water bodies to some extent. The pollutants and conditions become a problem when present in excessive amounts. In your opinion, how much of a problem are the following water impairments in the Upper White River watershed (indicated as the blue map area on page 2)?"

Impairment	N	Not a problem (1)	Slight problem (2)	Moderate problem (3)	Severe problem (4)	Don't know (5)	n*	Mean *(sd)**
		Frequency (%)						
a. Sediment/silt	347	11.5	24.5	30.8	15.0	18.2	284	2.6 *(0.944)*
b. Nitrate/nitrogen	346	19.7	26.6	19.9	4.9	28.9	246	2.1 *(0.904)*
c. Phosphorus	344	19.8	27.6	18.0	4.4	30.2	240	2.1 *(0.886)*
d. Bacteria in the water (such as *E. coli*)	344	18.3	20.9	17.2	9.9	33.7	228	2.3 *(1.028)*
e. Pesticides	346	24.3	26.9	13.9	6.9	28	249	2.0 *(0.958)*

* Not calculated with "Don't know" responses.

Table 3. Upper White River watershed pollution sources

Corresponds to Q2: "The items listed below are sources of water quality pollution across the country. In your opinion, how much of a problem are the following sources in the Upper White River watershed (indicated as the blue map area on page 2)?"

Source	N	Not a problem (1)	Slight problem (2)	Moderate problem (3)	Severe problem (4)	Don't know (5)	n*	Mean *(sd)**
		Frequency (%)						
a. Discharges from industry into streams and lakes	340	13.8	22.9	29.1	8.8	25.3	254	2.4 *(0.925)*
b. Discharges from wastewater treatment plants	340	12.6	22.9	26.2	15.3	22.9	262	2.6 *(0.987)*
c. Soil erosion from farm fields	343	10.5	41.1	31.2	7.3	9.9	309	2.4 *(0.797)*
d. Soil erosion from shorelines and/or streambanks	344	14.2	32.8	28.5	9.0	15.4	291	2.4 *(0.888)*
e. Lawn fertilizers and/or pesticides	346	13.9	22.3	28.6	16.8	18.5	282	2.6 *(0.998)*
f. Commercial fertilizers or manure used for crop production	342	22.2	40.1	15.8	4.4	17.5	282	2.0 *(0.822)*
g. Improperly maintained septic systems	345	14.5	33.3	22.3	9.3	20.6	274	2.3 *(0.907)*
h. Littering/illegal dumping of trash	342	7.3	26.6	33	19.9	13.2	297	2.8 *(0.902)*
i. Pesticides or herbicides used for crop production	343	24.2	39.1	14.9	3.8	18.1	281	2.0 *(0.815)*
j. Animal feeding operations	343	30	38.5	9.6	2.9	19	278	1.8 *(0.776)*
k. Urban stormwater runoff (e.g., highways, rooftops, parking lots)	342	9.4	24.0	36.0	15.2	15.5	289	2.7 *(0.896)*
l. Removal of streambank vegetation	343	21.3	33.8	16.9	6.7	21.3	270	2.1 *(0.903)*
m. Golf courses	345	25.8	25.5	16.2	7.0	25.5	257	2.1 *(0.968)*

* Not calculated with "Don't know" responses.

Table 4. Consequences of poor water quality
Corresponds to Q3: "Poor water quality can lead to a variety of consequences for communities. In your opinion, how much of a problem are the following issues in the Upper White River watershed (indicated as the blue map area on page 2)?"

Consequence	N	Not a problem (1)	Slight problem (2)	Moderate problem (3)	Severe problem (4)	Don't know (5)	n*	Mean *(sd)**
		Frequency (%)						
a. Contaminated fish	338	21.3	31.4	14.5	5.3	27.5	245	2.1 *(0.888)*
b. Reduced beauty of streams	335	23.9	32.5	19.7	8.7	15.2	284	2.2 *(0.950)*
c. Reduced opportunities for water recreation	337	27.6	26.4	19.9	5.9	20.2	269	2.1 *(0.945)*
d. Reduced quality of water recreation activities	337	25.8	25.2	22.3	5.9	20.8	267	2.1 *(0.948)*
e. Excessive aquatic plants or algae	339	15.6	30.7	27.1	7.1	19.5	273	2.3 *(0.885)*
f. Fish kills	338	28.1	32.8	8.0	4.7	26.3	249	1.9 *(0.854)*
g. Lower property values	340	38.5	23.5	10.0	2.9	25.0	255	1.7 *(0.846)*
h. Human health	339	26.3	27.4	15.0	5.9	25.4	253	2.0 *(0.934)*

* Not calculated with "Don't know" responses.

3.2 Section II

Table 5. Upper White River watershed drainage
Corresponds to Q4: "Which water body does the White River eventually drain into?"

Body of water	Frequency (%; N=332)
Lake Erie	0.0
Gulf of Mexico	89.2
Lake Michigan	1.5
Other	9.3

Table 6. Water body adjacent
Corresponds to Q5: "Does the property you own, manage, or farm in the Upper White River watershed (indicated as the blue map area on page 2) touch a water body (stream, river, lake, or wetland)?"

Water body adjacent	Frequency (%; N=341)
Yes	67.7
No	32.3

Table 7. Gender
Corresponds to Q6: "What is your gender?"

Gender	Frequency (%; N=341)
Male	88.0
Female	12.0

Table 8. Age
Corresponds to Q7: "What year were you born? *Please enter numeric value*" (reported as age in years)

Age	Years (N=317)
Range	25-93
Mean	63.3
Median	64.0

Table 9. Education
Corresponds to Q8: "What is the highest level of education you have completed?"

Education Level	Frequency (%; N=341)
Some formal schooling	0.9
High school diploma/GED	26.4
Some college	20.5
2-year college	11.4
4-year college	29.0
Post-graduate degree	11.7

Table 10. Owned/rented acres of farmland

Corresponds to Q9: "Please estimate the acreage of your farmland in 2017. *Please enter a numeric value. If none, please enter a zero*."

Farmland acres	**N**	**Acres Mean *(sd)***	**Acres Range**
Total acres			
Total owned acres	317	446.6 *(747.2)*	0-10,000
Total acres rented to others	170	152.4 *(335.2)*	0-2,002
Total acres rented from others	235	734.3 *(1,111.9)*	0-9,700
Upper White River watershed acres			
Total owned acres in the Upper White River watershed (indicated as the blue map area on page 2)?	286	359.9 *(569.3)*	0-6,000
Total acres rented to others in the Upper White River watershed (indicated as the blue map area on page 2)?	138	106.1 *(230.7)*	0-1,325
Total acres rented from others in the Upper White River watershed (indicated as the blue map area on page 2)?	202	40.5 *(32.2)*	2-102

3.3 Section III – Sources of Advice and Relationships

Table 11. Relation with entities

Corresponds to Q10: "How would you describe your interaction with the following entities?"

Source of advice	N	No interaction (1)	Receive information (2)	Service provider (3)	Not familiar (4)	n*	Mean *(sd)**
		Frequency (%)					
a. Conservation entities/government agencies (e.g., Soil and Water Conservation District (SWCD), Natural Resources Conservation Service (NRCS), Indiana State Department of Agriculture (ISDA))	327	11.6	53.5	30.9	4.0	314	2.2 *(0.635)*
b. Commodity groups (e.g., corn, soybeans, dairy)	324	19.8	56.5	16.0	7.7	299	2.0 *(0.623)*
c. Purdue Extension	332	13.9	62.0	19.3	4.8	316	2.1 *(0.588)*
d. Farm Bureau	327	26.3	49.2	20.8	3.7	315	1.9 *(0.698)*
e. Retail agronomist/Crop advisor	326	27.9	32.5	33.1	6.4	305	2.1 *(0.807)*
f. Independent agronomist/Crop advisor	329	48.0	22.8	21.3	7.9	303	1.7 *(0.819)*
g. Other farmers/Landowners	328	10.7	61.3	24.4	3.7	316	2.1 *(0.587)*
h. My family	324	13.3	54.0	28.7	4.0	311	2.2 *(0.642)*
i. My landowner	299	28.4	39.8	24.4	7.4	277	2.0 *(0.755)*
j. My tenant	278	35.3	33.1	15.5	16.2	233	1.8 *(0.743)*
k. Other (Please specify)**	63	39.7	4.8	14.3	41.3	37	1.6 *(0.867)*

*Not calculated with "Not familiar" responses.

**Other includes county surveyor office; seed company, provider, or supplier; Agricultural Stabilization and Conservation Service (ASCS) office; renter; other university extension, and developer.

Table 12. Seeking advice

Corresponds to Q11: "Whose advice do you seek most in the list above?"

Source of advice	Frequency (%; N=331)
Conservation entities/government agencies	16.0
Commodity groups (e.g., corn, soybeans, dairy)	5.1
Purdue Extension	15.1
Farm Bureau	4.5
Retail agronomist/Crop advisor	25.1
Independent agronomist/Crop advisor	15.1
Other farmers/Landowners	15.1
My family	11.8
My landowner	0.9
My tenant	6.9
Other	1.8
None of these	7.3

Note: a respondent can choose multiple sources and the sum of frequency (%) is greater than 100%.

Table 13. Farming within Upper White River watershed
Corresponds to Q12: "Are you actively farming land in the Upper White River watershed (indicated as the blue map area on page 2)?"

Actively Farming	Frequency (%; N=342)
Yes	75.4
No	24.6

3.4 Section IV – Water Quality

Table 14. Upper White River watershed consequences of poor water quality
Corresponds to Q13: "Please indicate your level of disagreement or agreement with the statements below."

Statement	N	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)	Mean *(sd)*
		Frequency (%)					
a. Using recommended management practices on farms improves water quality.	254	0.8	1.6	9.4	61.8	26.4	4.1 *(0.694)*
b. My actions have an impact on water quality.	254	1.2	0.8	9.8	61.8	26.4	4.1 *(0.699)*
c. I would be willing to change management practices to improve water quality.	256	2.3	2.3	30.9	50.8	13.7	3.7 *(0.818)*
d. The quality of life in my community depends on good water quality in local streams, rivers, and lakes.	254	1.2	2.4	18.5	58.7	19.3	3.9 *(0.759)*
e. I would be willing to change my management practices because I am concerned about the quality of water for my downstream neighbors.	254	0.8	4.7	33.9	52.0	8.7	3.6 *(0.742)*
f. Agriculture in this area has permanently altered the ecosystem of the Upper White River.	252	13.5	27.4	41.3	14.7	3.2	2.7 *(0.990)*

3.5 Section V – Management Decision-making

Table 15. Decision-making

Corresponds to Q14: "When thinking about the overall management of your operation, how strongly do you disagree or agree with the following statements?"

Statement	N	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)	Mean *(sd)*
		Frequency (%)					
a. When I make decisions on my farm, I tend to see all kinds of possible consequences for each decision.	255	0.4	2.4	22.0	60.0	15.3	3.9 *(0.699)*
b. By making plans and controlling my farm operations, I can accurately predict how successful my farm operation will be.	255	0.8	9.0	30.2	49.8	10.2	3.6 *(0.821)*
c. When I have problems on my farm, it is usually because of something out of my control.	255	0.8	9.4	31.0	49.8	9.0	3.6 *(0.815)*
d. When I have problems on my farm, I think about how I can change my operations to help reduce those problems in the future.	255	0.4	0.4	9.0	69.0	21.2	4.1 *(0.586)*
e. I always look at the interconnections and mutual influences between all of the decisions that go into my farm management.	253	0.4	1.6	31.6	53.4	13.0	3.8 *(0.703)*
f. I think continuously about how to improve my farm operations.	254	0.4	1.2	7.5	60.2	30.7	4.2 *(0.654)*

Table 16. Implementing a conservation practice

Corresponds to Q15: "Please indicate your level of disagreement or agreement with the statements below."

I would be motivated to implement a conservation practice	N	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)	Mean *(sd)*
		Frequency (%)					
a. If it improves soil health on the land I farm.	256	0.0	0.8	16.0	59.8	23.4	4.1 *(0.651)*
b. If it decreases soil erosion on the land I farm.	256	0.4	0.8	13.7	60.2	25.0	4.1 *(0.669)*
c. If it reduces my input costs.	255	0.0	1.2	10.2	57.3	31.4	4.2 *(0.655)*
d. If it increases my crop yields.	256	0.4	0.4	6.2	59.8	33.2	4.2 *(0.620)*
e. If I think it is the right thing to do.	256	0.0	0.8	14.1	60.5	24.6	4.1 *(0.641)*
f. If it is compatible with my existing farm operations.	254	0.0	1.6	17.7	59.8	20.9	4.0 *(0.671)*
g. If cost-share is available.	255	2.0	4.3	29.4	42.4	22.0	3.8 *(0.904)*
h. If it reduces my risk potential drought.	256	0.0	1.2	16.4	58.2	24.2	4.1 *(0.672)*
i. If it reduces my risk from a potentially very wet year.	255	0.0	0.8	16.9	58.4	23.9	4.1 *(0.662)*
j. If it improves soil quality on my less productive land.	255	0.0	0.4	10.6	60.4	28.6	4.2 *(0.616)*
k. If my crop insurance program wasn't providing all the risk management I need.	256	0.0	0.8	16.0	59.8	23.4	4.1 *(0.651)*

3.6 Section VI – Management Practices

Table 17. Cover crop familiarity
Corresponds to Q16: "How familiar are you with this practice?"

Practice familiarity	Frequency (%; N=257)
Never heard of it	0.8
Somewhat familiar with it	32.7
Know how to use it; not using it	37
Currently using it	29.6

Table 18. Willingness to adopt cover crops
Corresponds to Q17. "Are you willing to try this practice?"

Willingness	Frequency (%; N=176)
Yes	26.7
Maybe	53.4
No	19.9

Table 19. Cover crop adoption barriers
Corresponds to Q18: "How much do the following factors limit your ability/willingness to implement cover crops?"

Limitation	N	Not a problem (1)	Slight problem (2)	Moderate problem (3)	Severe problem (4)	Don't know (5)	n*	Mean *(sd)**
		Frequency (%)						
a. Time or management required	252	15.5	27.4	36.5	14.3	6.3	236	2.5 *(0.943)*
b. The physical features of my property make it difficult (e.g., soil types, drainage, and/or topography)	248	47.2	25.8	15.3	1.6	10.1	223	1.7 *(0.818)*
c. Desire to continue traditional farming practices/methods	250	57.2	18.4	13.6	3.6	7.2	232	1.6 *(0.876)*
d. Disapproval from others	250	78.4	8.8	3.6	0.8	8.4	229	1.2 *(0.541)*
e. Lack of equipment/ technology	250	33.2	30.8	20.0	12.8	3.2	242	2.1 *(1.033)*
f. Insufficient proof of erosion protection, soil health benefit, and/or water quality benefit	250	49.6	22.0	10.0	8.4	10.0	225	1.7 *(0.988)*
g. Lack of information on economic benefits	251	35.1	23.9	18.7	10.0	12.4	220	2.0 *(1.035)*
h. My landowner	241	72.6	9.5	5.8	2.5	9.5	218	1.3 *(0.716)*
i. My tenant	212	75.5	5.7	3.8	0.0	15.1	180	1.2 *(0.471)*

* Not calculated with "Don't know" responses.

Table 20. Effects of cover crops
Corresponds to Q19: "Please indicate your level of disagreement or agreement with the statements below."

Statement	N	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)	Mean *(sd)*
		Frequency (%)					
a. In a **corn and soybean rotation**, cover crops work well when combined with **no-till.**	256	3.1	7.8	44.1	32.4	12.5	3.4 *(0.918)*
b. In a **corn and soybean rotation**, cover crops work well when combined with **a livestock operation.**	256	2.3	6.6	59.8	23	8.2	3.3 *(0.801)*
c. Cover crops can reduce the need for pesticides.	256	9.8	21.1	44.9	19.9	4.3	2.9 *(0.981)*
d. Cover crops can reduce weeds.	256	5.1	15.6	32.8	39.5	7	3.3 *(0.981)*

Table 21. Conservation tillage familiarity
Corresponds to Q20: "How familiar are you with this practice?"

Practice familiarity	Frequency (%; N=255)
Never heard of it	4.3
Somewhat familiar with it	22.4
Know how to use it; not using it	16.1
Currently using it	57.3

Table 22. Willingness to apply conservation tillage
Corresponds to Q21: "Are you willing to try this practice?"

Willingness	Frequency (%; N=97)
Yes	14.4
Maybe	64.9
No	20.6

Table 23. Conservation tillage application adoption barriers
Corresponds to Q22: "How much do the following factors limit your ability/willingness to implement conservation tillage?"

Factor	N	Not a problem (1)	Slight problem (2)	Moderate problem (3)	Severe problem (4)	Don't know (5)	n*	Mean *(sd)**
		Frequency (%)						
a. Time or management required	230	58.3	23.0	10.0	4.3	4.3	220	1.6 *(0.853)*
b. The physical features of my property make it difficult (e.g., soil types, drainage, and/or topography)	231	61.5	18.2	12.6	0.4	7.4	214	1.5 *(0.742)*
c. Desire to continue traditional farming practices/methods	230	68.7	17.0	7.8	2.2	4.3	220	1.4 *(0.738)*
d. Disapproval from others	232	85.3	7.3	1.7	0.0	5.6	219	1.1 *(0.372)*
e. Lack of equipment/ technology	231	58.9	19.9	10.4	8.7	2.2	226	1.7 *(0.982)*
f. Insufficient proof of erosion protection, soil health benefit, and/or water quality benefit	231	65.4	16.5	9.1	2.2	6.9	215	1.4 *(0.764)*
g. Lack of information on economic benefits	231	60.2	17.3	10.8	3.0	8.7	211	1.5 *(0.830)*
h. My landowner	223	79.8	6.3	4.9	0.4	8.5	204	1.2 *(0.542)*
i. My landowner	194	84.5	2.6	2.1	0.0	10.8	173	1.1 *(0.341)*

* Not calculated with "Don't know" responses.

Table 24. Type of tillage before planting Corn
Corresponds to Q23: "What type of tillage do you currently use before planting corn on the majority of your acres?"

Type of tillage	Frequency (%; N=237)
No-till	34.2
Strip-till	3.4
Conventional tillage less than 2 in. depth (akin to vertical tillage) – fall + spring	9.3
Conventional tillage less than 2 inch depth – spring only	14.3
Conventional tillage greater than 2 inch depth – fall + spring	27.8
Conventional tillage greater than 2 inch depth – spring only	11.0

Table 25. Type of tillage before planting Corn
Corresponds to Q24: "What type of tillage do you currently use before planting soybeans on the majority of your acres?"

Type of tillage	Frequency (%; N=245)
No-till	66.5
Strip-till	0.0
Conventional tillage less than 2 in. depth (akin to vertical tillage) – fall + spring	11.4
Conventional tillage less than 2 inch depth – spring only	7.8
Conventional tillage greater than 2 inch depth – fall + spring	10.6
Conventional tillage greater than 2 inch depth – spring only	3.7

Table 26. Use of a conservation plan
Corresponds to Q25: "Do you have a conservation plan?"

Usage	Frequency (%; N=256)
Yes	29.3
No	70.7

Table 27. Conservation plan development and use
Corresponds to Q26: "Please indicate your level of disagreement or agreement with the following statements."

Statement	N	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)	Mean *(sd)*
		Frequency (%)					
a. Developing my conservation plan was easy.	63	6.3	14.3	34.9	38.1	6.3	3.2 *(0.995)*
b. I had enough help to develop my conservation plan.	63	4.8	3.2	38.1	50.8	3.2	3.4 *(0.819)*
c. Local conservation district staff help me determine conservation practices by looking at my conservation plan.	62	8.1	3.2	38.7	45.2	4.8	3.4 *(0.943)*
d. I look at my conservation plan to determine which new practice or program to implement.	63	3.2	7.9	39.7	42.9	6.3	3.4 *(0.854)*
e. My conservation plan addresses all of the resource concerns (soil erosion, manure storage, soil compaction, water quality, etc.) **on my farm**.	63	3.2	6.3	25.4	55.6	9.5	3.6 *(0.869)*
f. My conservation plan addresses all of the resource concerns (soil erosion, manure storage, soil compaction, water quality, etc.) **of my watershed**.	62	3.2	9.7	25.8	48.4	12.9	3.6 *(0.950)*

Table 28. Soil testing
Corresponds to Q27: "How regularly do you conduct soil testing?"

Frequency of testing	Frequency (%; N=257)
Never	0.4
Every year	14.4
Every 2-3 years	52.9
Every 4 years or longer	28.4
Don't know	3.9

Table 29. Nutrient application
Corresponds to Q28: "Do you apply nutrients based on the results of your current soil testing?"

Applies nutrients	Frequency (%; N=256)
Yes	93.0
No	3.9
Don't know	3.1

Table 30. Variable rate technology
Corresponds to Q29: "Do you use variable rate technology to apply nutrients?"

Applies nutrients	Frequency (%; N=254)
Yes	76.0
No	18.1
Don't know	5.9

Table 31. Nutrient application factors
Corresponds to Q30: **"**Which of the following do you consider in the application of nutrients and soil amendments? *Check all that apply.***"**

Application Factors	Frequency (%; N=251)
Source	61.0
Amount	89.2
Placement	76.5
Timing	77.7
None of these	3.6

Note: a respondent can choose multiple factors and the sum of frequency (%) is greater than 100%.

Table 32. Manure storage space
Corresponds to Q31: "Do you feel you have enough storage space for manure so that you can apply when needed?"

Adequate Storage	Frequency (%; N=253)
Yes	24.5
No	6.3
Not applicable because I do not have livestock	67.2
Don't know	2.0

Table 33. Manure storage timeframe
Corresponds to Q32: "How many months of manure storage do you have?"

Storage timeframe	Frequency (%; N=184)
No storage	61.4
1-3 months	8.7
4-6 months	9.2
More than 6 months	13.0
Don't know	7.6

Table 34. Frequency of nutrient application on frozen ground
Corresponds to Q33: "How often do you apply nutrients on frozen and/or snow covered ground?"

Frequency of application	Frequency (%; N=234)
Never	63.2
Occasionally	12.0
Regularly	1.7
Only as a last resort	19.7
Don't know	3.4

Table 35. Plan for nutrient management familiarity
Corresponds to Q34: "How familiar are you with this practice?"

Practice familiarity	Frequency (%; N=254)
Never heard of it	33.9
Somewhat familiar with it	35.4
Know how to use it; not using it	12.6
Currently using it	18.1

Table 36. Willingness to adopt plan for nutrient management
Corresponds to Q35: "Are you willing to try this practice?"

Willingness	Frequency (%; N=109)
Yes	13.8
Maybe	72.5
No	13.8

Table 37. Plan for nutrient management adoption barriers
Corresponds to Q36: "How much do the following factors limit your ability/willingness to implement a plan for nutrient management?"

Factor	N	Not a problem (1)	Slight problem (2)	Moderate problem (3)	Severe problem (4)	Don't know (5)	n*	Mean *(sd)**
		Frequency (%)						
a. Time or management required	162	46.9	23.5	17.9	6.2	5.6	153	1.8 *(0.961)*
b. The physical features of my property make it difficult (e.g., soil types, drainage, and/or topography)	161	67.1	14.9	10.6	1.9	5.6	152	1.4 *(0.770)*
c. Desire to continue traditional farming practices/methods	160	71.9	14.4	6.9	1.2	5.6	151	1.3 *(0.672)*
d. Disapproval from others	162	84.0	6.2	3.7	0.6	5.6	153	1.2 *(0.506)*
e. Lack of equipment/technology	160	60.6	16.2	10.0	8.1	5.0	152	1.6 *(0.980)*
f. Insufficient proof of erosion protection, soil health benefit, and/or water quality benefit	162	63.6	16.0	11.7	3.1	5.6	153	1.5 *(0.836)*
g. Lack of information on economic benefits	162	52.5	21.0	14.8	4.3	7.4	150	1.7 *(0.906)*
h. My landowner	153	83.7	4.6	2.6	0.7	8.5	140	1.1 *(0.462)*
i. My tenant	133	85.0	2.3	0.8	1.5	10.5	119	1.1 *(0.451)*

* Not calculated with "Don't know" responses.

Table 38. Development of plan for nutrient management
Corresponds to Q37:"Which of the following entities were integral to the development of your plan for nutrient management? *Check all that apply*."

Entity	Frequency (%; N=43)
I created my own plan without help from others.	32.6
Soil and Water Conservation District (SWCD) or Natural Resources Conservation Service (NRCS)	30.2
Purdue Extension	25.6
Retail agronomist/Crop advisor	48.8
Independent agronomist/Crop advisor	55.8
Tri-state fertilizer recommendations	9.3
Other (Please Specify)*	4.7

*Other includes Pork Board and Kinsey Institute & Self Testing
Note: a respondent can choose multiple entities and the sum of frequency (%) is greater than 100%.

Table 39. Nutrient management plan components

Corresponds to Q38: "What is included in your plan for nutrient management? *Check all that apply*."

Component	Frequency (%; N=43)
Commercial nutrients	88.4
Septic waste	0
Livestock manure	4.7
Don't know	48.8
Other (Please specify)*	2.3

*Other includes lime gypsum; city sludge, gypsum, compost

Note: a respondent can choose multiple components and the sum of frequency (%) is greater than 100%.

Table 40. Applied recommendation of nutrient management plan

Corresponds to Q39: "What percentage of the recommendations in your plan for nutrient management do you follow? *Please enter a numeric value."*

Percent of nutrient management plan followed	Percentage (N=42)
Range	75-100
Mean *(sd)*	95.5 *(7.222)*
Median	100

Table 41. Soil health management systems familiarity

Corresponds to Q40: "How familiar are you with this practice?"

Practice familiarity	Frequency (%; N=245)
Never heard of it	26.9
Somewhat familiar with it	40.8
Know how to use it; not using it	14.7
Currently using it	17.6

Table 42. Willingness to adopt Soil health management systems

Corresponds to Q41: "Are you willing to try this practice?"

Willingness	Frequency (%; N=130)
Yes	21.5
Maybe	63.1
No	15.4

Table 43. Soil health management systems adoption barriers
Corresponds to Q42: "How much do the following factors limit your ability/willingness to use soil health management systems?"

Factor	N	Not a problem (1)	Slight problem (2)	Moderate problem (3)	Severe problem (4)	Don't know (5)	n*	Mean *(sd)**
		Frequency (%)						
a. Time or management required	177	40.1	26.0	21.5	5.6	6.8	165	1.9 *(0.950)*
b. The physical features of my property make it difficult (e.g., soil types, drainage, and/or topography)	177	59.9	18.6	10.7	2.3	8.5	162	1.5 *(0.798)*
c. Desire to continue traditional farming practices/methods	176	67.0	14.8	8.0	3.4	6.8	164	1.4 *(0.800)*
d. Disapproval from others	176	84.1	6.2	2.3	1.1	6.2	165	1.2 *(0.501)*
e. Lack of equipment/technology	176	42.0	28.4	14.8	8.0	6.8	164	1.9 *(0.971)*
f. Insufficient proof of erosion protection, soil health benefit, and/or water quality benefit	175	60.0	18.9	9.1	5.1	6.9	163	1.6 *(0.882)*
g. Lack of information on economic benefits	174	47.7	22.4	17.2	4.6	8.0	160	1.8 *(0.926)*
h. My landowner	164	82.9	6.7	1.2	1.8	7.3	152	1.2 *(0.529)*
i. My tenant	148	83.1	3.4	2.0	0.7	10.8	132	1.1 *(0.433)*

* Not calculated with "Don't know" responses.

Table 44. Soil health management systems sources
Corresponds to Q43: "Where have you heard about soil health management systems?"

Sources	Frequency (n; N=109)
Meetings, conferences, magazines, publications, and online information	48
Conservation entities/government agencies (e.g., Soil and Water Conservation District (SWCD), Natural Resources Conservation Service (NRCS), Indiana State Department of Agriculture (ISDA))	21
Purdue Extension or other Extension	13
Multiple sources	4
Farm Bureau	3
Field days and farm shows	3
Other farmers/Landowners	3
Agronomist/Crop advisor	2
Commodity groups (e.g., corn, soybeans, dairy)	1
My tenant	1
Other	10

Table 45. Soil health management system components
Corresponds to Q44: "What are the critical components of a soil health management system? *Check all that apply*."

Component	Frequency (%; N=175)
Conservation tillage	77.7
Cover crops	76.6
Nutrient management	78.9
Conservation buffers	60
Pest management	56.6
Don't know	11.4

Note: a respondent can choose multiple components and the sum of frequency (%) is greater than 100%.

Table 46. Barriers to adopt soil health management system
Corresponds to Q45: "What were/are the biggest barriers for you to adopt a soil health management system?"

Barriers	Frequency (n; N=93)
Time or management or cost/money required	38
Lack of equipment/technology	8
Concerns about or Lack of information on economic costs and benefits	7
No barriers	6
Insufficient proof of erosion protection, soil health benefit, and/or water quality benefit	4
Lack of information and knowledge about this	4
Age	3
The physical features of my property make it difficult (e.g., soil types, drainage, and/or topography)	2
Not sure about unforeseen risks	1
Other	20

Table 47. Familiarity with other land management practices
Corresponds to Q46: "How familiar are you with the following practices?"

Practice	N	Never heard of it (1)	Somewhat familiar with it (2)	Know how to use it; not using it (3)	Currently use it (4)	Not relevant for my operation (5)	n*	Mean *(sd)**
		Frequency (%)						
a. Filter strips or other buffers (grass strips used along field boundaries)	250	2.0	22.0	15.6	48.8	11.6	221	3.3 *(0.910)*
b. Saturated buffers (retain water in the soil of field buffers by using a water control structure to divert tile water, which results in reduction of nitrate levels)	247	17.0	37.7	18.6	8.1	18.6	201	2.2 *(0.890)*
c. Bioreactors (subsurface trench filled with a carbon source, usually wood chips, through which drainage water flows)	249	42.6	20.9	16.5	0.0	20.1	199	1.7 *(0.797)*
d. Drainage water management (uses control structures on drainage pipe to hold water back to adjustable levels during the year and has been shown to reduce drainage water volume and amount of nitrate in drainage water)	246	13.4	37.0	22.4	9.8	17.5	203	2.3 *(0.890)*
e. Blind inlet (structure that is placed in the lowest point of farmed depression to minimize sediment transported to receiving ditches and streams)	245	30.6	30.6	9.8	12.2	16.7	204	2.0 *(1.038)*
f. Grassed waterways (grass strips that convey concentrated flow of water)	245	1.2	13.9	12.7	61.2	11.0	218	3.5 *(0.805)*
g. Wetland development (wetlands are areas that are saturated with water all or part of the year. Wetlands filter nutrients and sediments)	247	6.5	33.6	23.1	10.1	26.7	181	2.5 *(0.841)*
h. Nitrogen stabilizers (extend nitrogen availability during key growth stages and prevent nitrogen loss occurring through leaching and/or denitrification)	248	5.2	16.9	12.5	56.0	9.3	225	3.3 *(0.970)*

* Not calculated with "Not relevant for my operation" responses.

3.7 Section VII – About Your Farming Operation

Table 48. Length of farm operation
Corresponds to Q47: "How many years have you been farming? *Please enter a numeric value."*

Years farming	Years (N=239)
Range	0-80
Mean *(sd)*	39.5 *(14.839)*
Median	42

Table 49. Days of working off farm operation
Corresponds to Q48: "How many days did you work at least 4 hours per day off your farm operation for pay in the past year? (Include work on someone else's farm for pay)**"**

Days worked off farm	Frequency (%; N=245)
None	57.1
1 - 49 days	11.0
50 - 99 days	3.7
100 - 199 days	5.3
200 days or more	22.9

Table 50. Farmed acres
Corresponds to Q49: "In 2017, how many acres of each of the following did you manage in the portion of the Upper White River watershed (indicated as the blue map area on page 2)? *Please enter a numeric value. If none, please enter a zero.*"

Farmed acres	N	Acres Mean *(sd)*	Acre Range
44.1 Corn acres	218	495.8 *(796.2)*	0-7,150
a. Corn acres with no-till, strip-till or ridge till	206	204.2 *(410.1)*	0-2,800
b. Corn acres with cover crops	196	74.9 *(279.6)*	0-2,200
44.2 Soybean acres	218	482.1 *(585.1)*	0-3,000
a. Soybean acres with no-till, strip-till or ridge till	212	347.3 *(486.7)*	0-2,800
b. Soybean acres with cover crops	196	68.4 *(250.0)*	0-2,200
44.3 Other acres (please specify)*	90	95.5 *(347.4)*	0-3,000
44.4 Total conservation acres set aside (e.g., Conservation Reserve Program, Wetland Reserve Program)	186	6.5 *(23.1)*	0-270

* Other includes: pasture, hay, wheat, alfalfa, tomatoes, woods, trees, and wildlife habitat.

Table 51. Livestock owned

Corresponds to Q50: "How many of the following animals are part of your farming operation in the portion of the Upper White River watershed (indicated as the blue map area on page 2)? *Please enter a numeric value. If none, please enter a zero."*

Livestock	N	Number of individuals Mean *(sd)*	Number of individuals Range
Dairy cattle (including heifers and young stock)	173	0.3 *(3.2)*	0-40
Beef cattle (including young stock)	198	14.4 *(52.8)*	0-600
Hogs (including contract hog barns)	179	330.8 *(1,564.2)*	0-10,000
Poultry	174	4.3 *(38.2)*	0-489
Horses	175	0.4 *(1.7)*	0-15
Other livestock (please specify)*	144	3.2 *(17.6)*	0-185

*Other livestock include: sheep, goat, mule, and rabbit.
(Respondents included dogs as livestock, but were not incorporated into this analysis).

Table 52. Livestock access to water

Corresponds to Q51: "Do your livestock access any water body (steam, river, lake, or wetland) in the Upper White River watershed (indicated as the blue map area on page 2)?"

Access to water	Frequency (%; N=101)
Yes	23.8
No	76.2
Don't know	0

Table 53. Crop advisor or agronomist relations

Corresponds to Q52: "Do you currently use a crop advisor or agronomist?"

Crop advisor or agronomist relationship	Frequency (%; N=237)
No, I have never used a crop advisor or agronomist.	30.8
No, I do not currently use a crop advisor or agronomist, but have used one in the past.	19.0
Yes, I currently use a crop advisor.	50.2

Table 54. Conservation practice testing

Corresponds to Q53: "Would you be willing to do side-by-side testing of conservation practices on a small acreage of your farm?"

Willingness	Frequency (%; N=240)
Yes	16.7
Maybe	50.0
No	33.3

Table 55. Farm operation outlook on farm size
Corresponds to Q54: "Five years from now, which statement will best describe your farm operation?"

Outlook	Frequency (%; N=244)
It will be about the same size as it is today	39.8
It will be larger	30.7
It will be smaller	4.9
I don't know	24.6

Table 56. Farm operation outlook on farm operator
Corresponds to Q55: "How likely is it that any family member will continue farm operations when you retire or quit farming?"

Likelihood	Frequency (%; N=244)
Definitely will not happen	10.7
Probably will not happen	21.7
Probably will happen	40.6
Definitely will happen	27.0

Appendix A – 2018 Upper White River Watershed Social Indicator Questionnaire

Your Views on Local Water Resources - Upper White Watershed

Dear agricultural producer and/or landowner,

Purdue University is conducting this survey in coordination with local partners to understand soil and water quality issues in the Upper White Watershed. Your insights are particularly important in helping us understand and facilitate technical and financial assistance for local conservation efforts.

There are two ways in which you can complete our survey:

1. The most convenient way is for you to enter the following website address into your web browser and provide your responses securely online:

https://tinyurl.com/UpperWhite2018

If you choose to complete the survey online you will need to enter the following code:_____. This will indicate that you completed the survey and we will stop sending reminders.

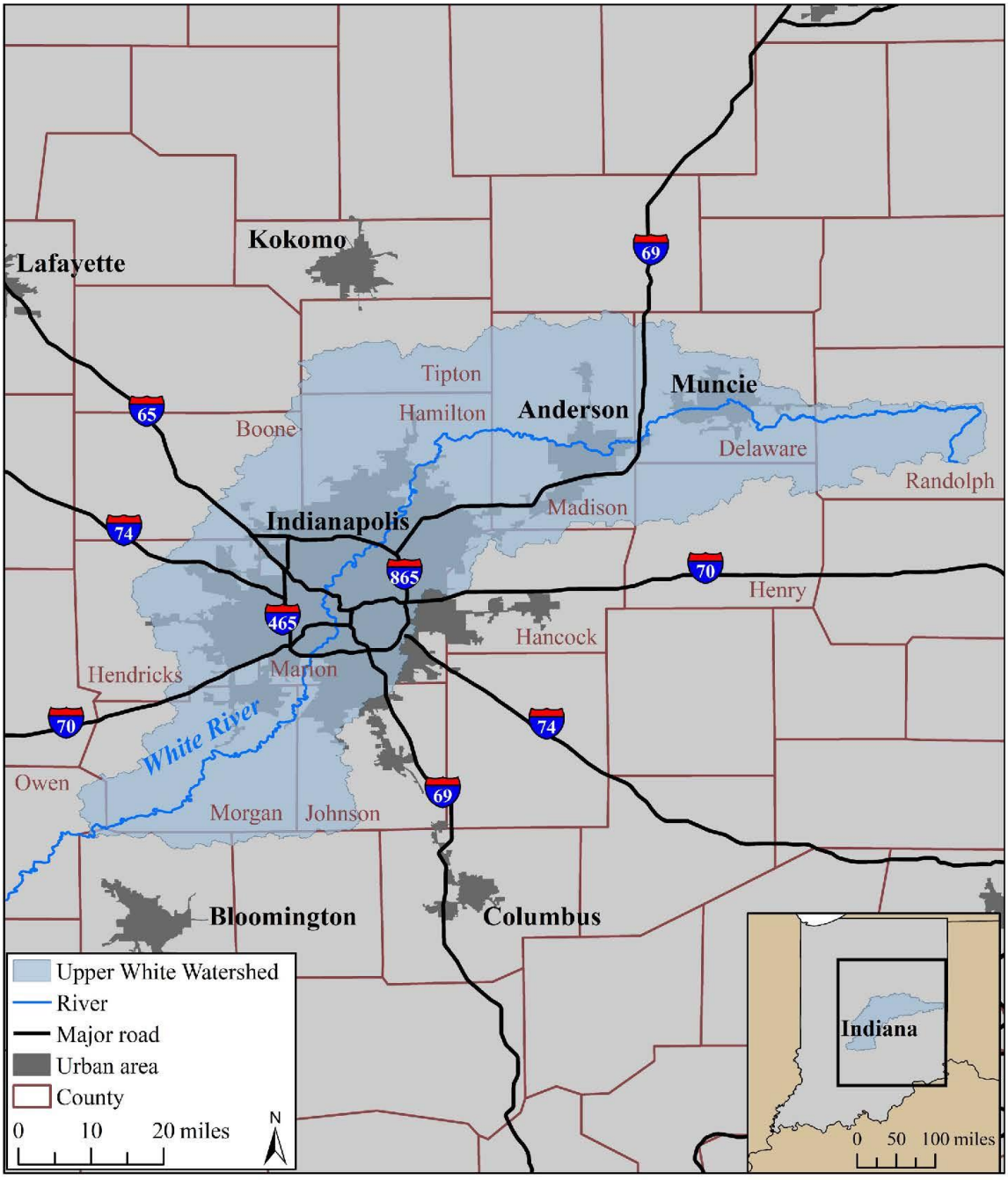
2. We have also included a postage-paid return envelope if you prefer to respond by mail.

We ask that this survey be completed by the person in your home who **makes most of the agricultural management decisions** and is at least 18 years old. Your participation in this survey is voluntary. The information you provide will be kept confidential. It will be linked to the code provided above and not to your name.

Unless otherwise instructed, please check the selection that **best describes your situation or opinion** for the agricultural operation located **within the portion of the Upper White watershed indicated on the map on page 2, highlighted in blue.** The survey should take approximately 20 minutes to complete.

For more information regarding the survey, please contact Linda Prokopy at lprokopy@purdue.edu or at (765) 494-0825. *Thank you in advance for your help!*

Linda Prokopy
Purdue University



This map shows the Upper White watershed (highlighted in blue). The map includes city and county names and major U.S. and interstate highways for your reference.

SECTION I - Water Resources and Impairments

1. Below is a list of water pollutants and conditions that are generally present in water bodies to some extent. The pollutants and conditions become a problem when present in excessive amounts. **In your opinion, how much of a problem are the following water impairments in the Upper White watershed (indicated as the blue map area on page 2)?**

	Not a problem	Slight problem	Moderate problem	Severe problem	Don't know
a. Sediment/silt	○	○	○	○	○
b. Nitrate/nitrogen	○	○	○	○	○
c. Phosphorus	○	○	○	○	○
d. Bacteria in the water (such as *E. coli*)	○	○	○	○	○
e. Pesticides	○	○	○	○	○

2. The items listed below are sources of water quality pollution across the country. **In your opinion, how much of a problem are the following sources in the Upper White watershed (indicated as the blue map area on page 2)?**

	Not a problem	Slight problem	Moderate problem	Severe problem	Don't know
a. Discharges from industry into streams and lakes	○	○	○	○	○
b. Discharges from wastewater treatment plants	○	○	○	○	○
c. Soil erosion from farm fields	○	○	○	○	○
d. Soil erosion from shorelines and/or streambanks	○	○	○	○	○
e. Lawn fertilizers and/or pesticides	○	○	○	○	○
f. Commercial fertilizers or manure used for crop production	○	○	○	○	○
g. Improperly maintained septic systems	○	○	○	○	○
h. Littering/illegal dumping of trash	○	○	○	○	○
i. Pesticides or herbicides used for crop production	○	○	○	○	○
j. Animal feeding operations	○	○	○	○	○
k. Urban stormwater runoff (e.g., highways, rooftops, parking lots)	○	○	○	○	○
l. Removal of streambank vegetation	○	○	○	○	○
m. Golf courses	○	○	○	○	○

3. Poor water quality can lead to a variety of consequences for communities. **In your opinion, how much of a problem are the following issues in the Upper White watershed (indicated as the blue map area on page 2)?**

	Not a problem	Slight problem	Moderate problem	Severe problem	Don't know
a. Contaminated fish	○	○	○	○	○
b. Reduced beauty of streams	○	○	○	○	○
c. Reduced opportunities for water recreation	○	○	○	○	○
d. Reduced quality of water recreation activities	○	○	○	○	○
e. Excessive aquatic plants or algae	○	○	○	○	○
f. Fish kills	○	○	○	○	○
g. Lower property values	○	○	○	○	○
h. Human health	○	○	○	○	○

SECTION II

4. Which water body does the White River eventually drain into?

- ○ Lake Erie
- ○ Lake Michigan
- ○ Gulf of Mexico
- ○ Other

5. Does the property you own, manage, or farm in the Upper White watershed (indicated as the blue map area on page 2) touch a water body (stream, river, lake, or wetland)?

- ○ Yes
- ○ No

6. What is your gender?

- ○ Male
- ○ Female

7. What year were you born? *Please enter a numeric value.*

_____

8. What is the highest level of education you have completed?

- ○ Some formal schooling
- ○ High school diploma/GED
- ○ Some college
- ○ 2-year college
- ○ 4-year college
- ○ Post-graduate degree

9. Please estimate the acreage of your farmland in 2017.
Please enter a numeric value. If none, please enter a zero.

	Owned acres	Acres rented to others	Acres rented from others
a. Total acreage			
b. Total acreage in the Upper White watershed (indicated as the blue map area on page 2)			

SECTION III - Sources of Advice and Relationships

10. How would you describe your interaction with the following entities?

	No interaction	Receive information	Service provider	Not familiar
a. Conservation entities/government agencies (e.g., Soil and Water Conservation District (SWCD), Natural Resources Conservation Service (NRCS), Indiana State Department of Agriculture (ISDA))	○	○	○	○
b. Commodity groups (e.g., corn, soybeans, dairy)	○	○	○	○
c. Purdue Extension	○	○	○	○
d. Farm Bureau	○	○	○	○
e. Retail agronomist/Crop advisor	○	○	○	○
f. Independent agronomist/Crop advisor	○	○	○	○
g. Other farmers/Landowners	○	○	○	○
h. My family	○	○	○	○
i. My landowner	○	○	○	○
j. My tenant	○	○	○	○
k. Other (please specify):	○	○	○	○

11. Whose advice do you seek most in the list above?

☐ a ☐ b ☐ c ☐ d ☐ e ☐ f ☐ g ☐ h ☐ i ☐ j ☐ k ☐ None of these

12. Are you actively farming land in the Upper White watershed (indicated as the blue map area on page 2)?

○ Yes GO Please continue to question 13, page 6.

○ No STOP Please stop here, do not complete the following sections, and return the survey in the enclosed stamped envelope. If you have additional comments, please add them on page 16. Thank you.

SECTION IV - Water Quality

13. Please indicate your level of disagreement or agreement with the statements below.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
a. Using recommended management practices on farms improves water quality.	○	○	○	○	○
b. My actions have an impact on water quality.	○	○	○	○	○
c. I would be willing to change management practices to improve water quality.	○	○	○	○	○
d. The quality of life in my community depends on good water quality in local streams, rivers, and lakes.	○	○	○	○	○
e. I would be willing to change my management practices because I am concerned about the quality of water for my downstream neighbors.	○	○	○	○	○
f. Agriculture in this area has permanently altered the ecosystem of the Upper White Creek.	○	○	○	○	○

SECTION V - Management Decision Making

In this section, we are interested in how you think about your farm operations, including how you make land management decisions and think about unexpected problems. We are also interested in understanding what motivates you to consider adopting conservation practices.

14. When thinking about the overall management of your operation, how strongly do you disagree or agree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
a. When I make decisions on my farm, I tend to see all kinds of possible consequences for each decision.	○	○	○	○	○
b. By making plans and controlling my farm operations, I can accurately predict how successful my farm operation will be.	○	○	○	○	○
c. When I have problems on my farm, it is usually because of something out of my control.	○	○	○	○	○
d. When I have problems on my farm, I think about how I can change my operations to help reduce those problems in the future.	○	○	○	○	○
e. I always look at the interconnections and mutual influences between all of the decisions that go into my farm management.	○	○	○	○	○
f. I think continuously about how to improve my farm operations.	○	○	○	○	○

15. Please indicate your level of disagreement or agreement with the statements below.

I would be motivated to implement a conservation practice.....	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
a. If it improves soil health on the land I farm.	○	○	○	○	○
b. If it decreases soil erosion on the land I farm.	○	○	○	○	○
c. If it reduces my input costs.	○	○	○	○	○
d. If it increases my crop yields.	○	○	○	○	○
e. If I think it is the right thing to do.	○	○	○	○	○
f. If it is compatible with my existing farm operations.	○	○	○	○	○
g. If cost-share is available.	○	○	○	○	○
h. If it reduces my risk from potential drought.	○	○	○	○	○
i. If it reduces my risk from a potentially very wet year.	○	○	○	○	○
j. If it improves soil health on my less productive land.	○	○	○	○	○

SECTION VI - Management Practices

This section contains a set of questions that refer to specific best management practices.
For each question, please select the answer choice that best represents your experience or opinion.

Cover Crops: Cover crops include grasses, legumes, and other broadleaf plants established for winter cover, increased soil organic matter, and other conservation purposes.

16. How familiar are you with this practice?

- Never heard of it *(skip to question 20, page 9)*
- Somewhat familiar with it
- Know how to use it; not using it
- Currently use it *(skip to question 18, below)*

17. Are you willing to try this practice?

Yes Maybe No

18. How much do the following factors limit your ability/willingness to implement cover crops?

	Not a problem	Slight problem	Moderate problem	Severe problem	Don't know
a. Time or management required					
b. The physical features of my property make it difficult (e.g., soil types, drainage, and/or topography)					
c. Desire to continue traditional farming practices/methods					
d. Disapproval from others					
e. Lack of equipment/technology					
f. Insufficient proof of erosion protection, soil health benefit, and/or water quality benefit					
g. Lack of information on economic benefits					
h. My landowner					
i. My tenant					

19. Please indicate your level of disagreement or agreement with the statements below.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
a. In a **corn and soybean rotation**, cover crops work well when combined with **no-till.**					
b. In a **corn and soybean rotation**, cover crops work well when combined with **a livestock operation.**					
c. Cover crops can reduce the need for pesticides.					
d. Cover crops can reduce weeds.					

Conservation Tillage: Conservation tillage manages the amount, orientation, and distribution of crop and other plant residues on the soil surface year-round, while limiting soil disturbing activities (e.g., no-till, strip-till or ridge-till. **Mulch till is not included**)

20. How familiar are you with this practice?

- Never heard of it *(skip to question 23, below)*
- Somewhat familiar with it
- Know how to use it; not using it
- Currently use it *(skip to question 22, below)*

21. Are you willing to try this practice?

Yes Maybe No

22. How much do the following factors limit your ability/willingness to implement conservation tillage?

	Not a problem	Slight problem	Moderate problem	Severe problem	Don't know
a. Time or management required					
b. The physical features of my property make it difficult (e.g., soil types, drainage, and/or topography)					
c. Desire to continue traditional farming practices/methods					
d. Disapproval from others					
e. Lack of equipment/technology					
f. Insufficient proof of erosion protection, soil health benefit, and/or water quality benefit					
g. Lack of information on economic benefits					
h. My landowner					
i. My tenant					

23. What type of tillage do you currently use before planting <u>corn</u> on the majority of your acres?

- No-till
- Strip-till
- Conventional tillage less than 2 in. depth (akin to vertical tillage) – fall + spring
- Conventional tillage less than 2 inch depth – spring only
- Conventional tillage greater than 2 inch depth – fall + spring
- Conventional tillage greater than 2 inch depth – spring only

24. What type of tillage do you currently use before planting <u>soybeans</u> on the majority of your acres?

- No-till
- Strip-till
- Conventional tillage less than 2 in. depth (akin to vertical tillage) – fall + spring
- Conventional tillage less than 2 inch depth – spring only
- Conventional tillage greater than 2 inch depth – fall + spring
- Conventional tillage greater than 2 inch depth – spring only

Your Views on Local Water Resources

Conservation Plan: A conservation plan is a customized document that outlines the resource concerns and solutions for the natural resources on your farm. This plan is a written record of your management decisions as well as the conservation practices and systems you plan to use to maintain your farm.

25. Do you have a conservation plan?

○ Yes ○ No *(skip to question 27, below)*

26. Please indicate your level of disagreement or agreement with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
a. Developing my conservation plan was easy.	○	○	○	○	○
b. I had enough help to develop my conservation plan.	○	○	○	○	○
c. Local conservation district staff help me determine conservation practices by looking at my conservation plan.	○	○	○	○	○
d. I look at my conservation plan to determine which new practice or program to implement.	○	○	○	○	○
e. My conservation plan addresses all of the resource concerns (soil erosion, manure storage, soil compaction, water quality, etc.) **on my farm**.	○	○	○	○	○
f. My conservation plan addresses all of the resource concerns (soil erosion, manure storage, soil compaction, water quality, etc.) **of my watershed**.	○	○	○	○	○

27. How regularly do you conduct soil testing?

○ Never ○ Every year ○ Every 2-3 years ○ Every 4 years or longer ○ Don't know

28. Do you apply nutrients based on the results of your current soil testing?

○ Yes ○ No ○ Don't know

29. Do you use variable rate technology to apply nutrients?

○ Yes ○ No ○ Don't know

30. Which of the following do you consider in the application of nutrients and soil amendments?

Check all that apply.

☐ Source ☐ Amount ☐ Placement ☐ Timing ☐ None of these

31. Do you feel you have enough storage space for manure so that you can apply when needed?

○ Yes ○ No ○ Not applicable because I do not have livestock. ○ Don't know

32. How many months of manure storage do you have?

○ No storage ○ 1-3 months ○ 4-6 months ○ More than 6 months ○ Don't know

33. How often do you apply nutrients on frozen and/or snow covered ground?

○ Never ○ Occasionally ○ Regularly ○ Only as a last resort ○ Don't know

Plan for Nutrient Management: A plan for nutrient management (either a non-certified plan for nutrient management and/or a certified plan, such as a Comprehensive Nutrient Management Plan, Manure Management Plan, or Fertilizer Action Plan) is a customized document that describes a farm's production practices and outlines strategies for managing nutrient losses to the air and water resources.

34. How familiar are you with this practice?

- ○ Never heard of it *(skip to question 40, page 12)*
- ○ Somewhat familiar with it
- ○ Know how to use it; not using it
- ○ Currently use it *(skip to question 36, below)*

35. Are you willing to try this practice?

○ Yes ○ Maybe ○ No

36. How much do the following factors limit your ability/willingness to implement a plan for nutrient management?

	Not a problem	Slight problem	Moderate problem	Severe problem	Don't know
a. Time or management required	○	○	○	○	○
b. The physical features of my property make it difficult (e.g., soil types, drainage, and/or topography)	○	○	○	○	○
c. Desire to continue traditional farming practices/methods	○	○	○	○	○
d. Disapproval from others	○	○	○	○	○
e. Lack of equipment/technology	○	○	○	○	○
f. Insufficient proof of erosion protection, soil health benefit, and/or water quality benefit	○	○	○	○	○
g. Lack of information on economic benefits	○	○	○	○	○
h. My landowner	○	○	○	○	○
i. My tenant	○	○	○	○	○

If you currently have a plan for nutrient management, please ***continue to question 37, below.***

- OR -

If you do not have a plan for nutrient management, please ***skip to question 40, page 12.***

37. Which of the following entities were integral to the development of your plan for nutrient management? *Check all that apply.*

- ☐ I created my own plan without help from others.
- ☐ Soil and Water Conservation District (SWCD) or Natural Resources Conservation Service (NRCS)
- ☐ Purdue Extension
- ☐ Retail agronomist/Crop advisor
- ☐ Independent agronomist/Crop advisor
- ☐ Tri-state fertilizer recommendations
- ☐ Other (Please specify): _____

38. What is included in your plan for nutrient management? *Check all that apply.*

- ☐ Commercial nutrients
- ☐ Septic waste
- ☐ Other (Please specify): _____
- ☐ Livestock manure
- ☐ Don't know

39. What percentage of the recommendations in your plan for nutrient management do you follow?
Please enter a numeric value.

_____ %

Soil Health Management Systems: Soil health management systems encompass a variety of conservation practices that incorporate ways to improve the soil's chemical, physical, and biological properties by minimizing disturbance, providing continuous living roots, and maximizing biodiversity and soil cover.

40. How familiar are you with this practice?

- ○ Never heard of it *(skip to question 46, page 13)*
- ○ Somewhat familiar with it
- ○ Know how to use it; not using it
- ○ Currently use it *(skip to question 42, below)*

41. Are you willing to try this practice?

○ Yes ○ Maybe ○ No

42. How much do the following factors limit your ability/willingness to use soil health management systems?

	Not a problem	Slight problem	Moderate problem	Severe problem	Don't know
a. Time or management required	○	○	○	○	○
b. The physical features of my property make it difficult (e.g., soil types, drainage, and/or topography)	○	○	○	○	○
c. Desire to continue traditional farming practices/methods	○	○	○	○	○
d. Disapproval from others	○	○	○	○	○
e. Lack of equipment/technology	○	○	○	○	○
f. Insufficient proof of erosion protection, soil health benefit, and/or water quality benefit	○	○	○	○	○
g. Lack of information on economic benefits	○	○	○	○	○
h. My landowner	○	○	○	○	○
i. My tenant	○	○	○	○	○

43. Where have you heard about soil health management systems?

44. What are the critical components of a soil health management system? *Check all that apply.*

- ☐ Conservation tillage
- ☐ Cover crops
- ☐ Nutrient management
- ☐ Conservation buffers
- ☐ Pest management
- ☐ Don't know

45. What were/are the biggest barriers for you to adopt a soil health management system?

Other Management Practices

46. How familiar are you with the following practices?

	Not relevant for my operation	Never heard of it	Somewhat familiar with it	Know how to use it; not using it	Currently use it
a. **Filter strips or other buffers** (grass strips used along field boundaries)	○	○	○	○	○
b. **Saturated buffers** (retain water in the soil of field buffers by using a water control structure to divert tile water, which results in reduction of nitrate levels)	○	○	○	○	○
c. **Bioreactors** (subsurface trench filled with a carbon source, usually wood chips, through which drainage water flows)	○	○	○	○	○
d. **Drainage water management** (uses control structures on drainage pipe to hold water back to adjustable levels during the year and has been shown to reduce drainage water volume and amount of nitrate in drainage water)	○	○	○	○	○
e. **Blind inlet** (structure that is placed in the lowest point of farmed depression to minimize sediment transported to receiving ditches and streams)	○	○	○	○	○
f. **Grassed waterways** (grass strips that convey concentrated flow of water)	○	○	○	○	○
g. **Wetland development** (wetlands are areas that are saturated with water all or part of the year. Wetlands filter nutrients and sediments)	○	○	○	○	○
h. **Nitrogen stabilizers** (extend nitrogen availability during key growth stages and prevent nitrogen loss occurring through leaching and/or denitrification)	○	○	○	○	○

SECTION VII - About Your Farming Operation

47. How many years have you been farming? *Please enter a numeric value.*

_____ years

48. How many days did you work at least 4 hours per day off your farm operation for pay in the past year? (Include work on someone else's farm for pay)

- None
- 1 - 49 days
- 50 - 99 days
- 100 - 199 days
- 200 days or more

49. In 2017, how many acres of each of the following did you manage *in the portion of the Upper White watershed* (indicated as the blue map area on page 2)?
Please enter a numeric value. If none, please enter a zero.

49.1. Corn	_____ acres
a. How many corn acres were no-till, strip-till, or ridge till?	_____ acres
b. How many corn acres were in cover crops?	_____ acres
49.2. Soybean	_____ acres
a. How many soybean acres were no-till, strip-till, or ridge till?	_____ acres
b. How many soybean acres were in cover crops?	_____ acres
49.3. Other (please specify): _____	_____ acres
49.4. Total conservation acres set aside (e.g., Conservation Reserve Program, Wetland Reserve Program)	_____ acres

50. How many of the following animals are part of your farming operation *in the portion of the Upper White watershed* (indicated as the blue map area on page 2)?
Please enter a numeric value. If none, please enter a zero.

- _____ Dairy cattle (including heifers and young stock)
- _____ Beef cattle (including young stock)
- _____ Hogs (including contract hog barns)
- _____ Poultry
- _____ Horses
- _____ Other livestock (please specify): _____

If you have livestock, please ***continue to question 51, below.*** **- OR -** *If you do not have livestock, please* ***skip to question 52, below.***

51. Do your livestock access any water body (steam, river, lake, or wetland) in the Upper White watershed (indicated as the blue map area on page 2)?

- ○ Yes
- ○ No
- ○ Don't know

52. Do you currently use a crop advisor or agronomist?

- ○ No, I have never used a crop advisor or agronomist.
- ○ No, I do not currently use a crop advisor or agronomist, but have used one in the past.
- ○ Yes, I currently use a crop advisor.
  Who? (please specify): _____

53. Would you be willing to do side-by-side testing of conservation practices on a small acreage of your farm?

- ○ Yes
- ○ Maybe
- ○ No

54. Five years from now, which statement will best describe your farm operation?

- ○ It will be about the same size as it is today.
- ○ It will be larger.
- ○ It will be smaller.
- ○ I don't know.

55. How likely is it that any family member will continue farm operations when you retire or quit farming?

- ○ Definitely will not happen
- ○ Probably will not happen
- ○ Probably will happen
- ○ Definitely will happen

Thank you

Please use the space below for any additional comments about this survey or water resources in your community.

Appendix B – Data Quality and Cleaning

Tracking and Data Entry
As questionnaires were returned through mail, they were processed daily. This included stamping the questionnaire with the date received, tracking receipt, and storing the hardcopy questionnaires in a fireproof cabinet. Questionnaire responses were received in several different ways: online, hardcopy, phone calls, and/or email.

If a questionnaire was completed via hardcopy, phone call, or email; then the data were entered into the online survey software (Qualtrics). The following general rules were applied as the questionnaires were entered into Qualtrics:

1.) all responses were entered as they appear on the hardcopy questionnaire,
2.) if a respondent left an item blank on the hardcopy questionnaire, the response was left blank,
3.) if a respondent had a double answer (responded twice to a single answer question), neither of their responses were included in the database,
4.) if a respondent had illegible handwriting, all legible text would be recorded and "[ILLEGIBLE]" was put in place of the illegible text, and
5.) if skip patterns were not followed, responses were still recorded for all answered questions.

Quality Assurance/Quality Control
After data entry was completed, a quality assurance/quality control (QA/QC) process was conducted. The QA/QC method verifies that the data entered for questionnaires match the questionnaire responses. Three fields; unique ID, date received, and response type were checked for 100% accuracy. After 100% accuracy was confirmed, 10% of the hardcopy questionnaires were randomly chosen and checked for data entry accuracy. Every data field (i.e., question) of the 10% questionnaire subset was reviewed. If the data entered did not match the questionnaire response, the response was corrected and the error was tracked by data field. Once the QA/QC process was finished, an analysis of the data entry errors was conducted to identify if there were any systematic data entry errors (defined as any single question having an error rate over 3%). No further QA/QC was necessary as there were no systematic errors identified.

Data Cleaning
After QA/QC process was completed, the hardcopy and online data were combined to clean the data. The following issues were addressed in data cleaning.

- Duplicate unique ID's were resolved so that the questionnaire with the earliest date received or questionnaire with the most answered questions was selected as valid data, resulting in only one response per unique ID.
- Data type issues where the respondent's answer was translated to fit the format of the questionnaire (i.e., a respondent may answer "about 5" which is then corrected to read "5"). If an answer was not translatable it was not included into the data set.
- Surveys were determined as "complete" if at least one question was answered by the respondent, unless response in the final comment box is a "refusal". Surveys were identified as a "duplicate" if an additional survey code was returned. Duplicates were reconciled during data cleaning; therefore, only one survey code is present in the data set. Surveys were identified as "Refusal" if survey respondents refused to complete the survey. Surveys were identified as "Bad address" if survey was returned unopened because it could not be delivered by the post office.

Skip Pattern

Some respondents ignored the skip pattern and answered questions that they were not applicable for. Several rules were followed during data analysis so that the data would be valid, even if skip patterns were not followed (see table below).

Question	Rules
Q12	Those who responded "Yes" or skipped Q12 were analyzed for the rest of the questionnaire.
	Those who responded "No" were only analyzed for Q1-Q12.
Q16	Those who responded "Somewhat familiar with it", "Know how to use it; not using it" or skipped Q16, but answered subsequent questions were analyzed for Q17-Q19.
	Those who responded "Currently use it" were analyzed for Q18 and Q19.
Q20	Those who responded "Somewhat familiar with it", "Know how to use it; not using it" or skipped Q20, but answered subsequent questions were analyzed for Q21-Q24.
	Those who responded "Currently use it" were analyzed for Q22-Q24.
	Those who responded "Never heard of it" were analyzed for Q23-Q24.
Q25	Those who responded "Yes" or skipped Q25 were analyzed for Q26.
Q34	Those who responded "Somewhat familiar with it" or "Know how to use it, not using it" were analyzed for Q35 and Q36.
	Those who skipped Q34, but answered subsequent questions were analyzed for Q35-Q39.
	Those who responded "Currently use it" were analyzed for Q36-Q39.
Q40	Those who responded "Somewhat familiar with it", "Know how to use it; not using it" or skipped Q40, but answered subsequent questions were analyzed for Q41-Q45.
	Those who responded "Currently use it" were analyzed for Q42-Q45.