



Social Science Findings Report for the Western Lake Erie Basin

Prepared summer 2015 by:

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This report details the key findings from in-depth interviews and surveys conducted with farmers in the Western Lake Erie Basin of Indiana, including portions of the St. Mary's, Upper Maumee, and Auglaize watersheds. This area was identified by the Natural Resources Conservation Service (NRCS) as critical for increasing the uptake of farmers' conservation practices because of the area's connection to water quality problems in Lake Erie. Data were collected in early 2015 and focused on agricultural producers' perceptions of local and broader water quality concerns, current use of agricultural conservation practices, and factors which encourage and discourage the adoption of specific conservation practices. We outline the data collection methods used, the key findings that emerged surrounding these themes, and recommendations for outreach programs. These findings and recommendations can be used by conservation practitioners to better design programs that increase the uptake of conservation practices among farmers in the area.

Data Collection Methods

Survey questions were developed based upon the Social Indicators Planning and Evaluation System (SIPES) and by working with county¹ and state NRCS and county Soil and Water Conservation District (SWCD) staff to ensure content was relevant to the area. Questions on the survey included characteristics of the farming operation and farmer, opinions about water quality and sources of pollution, usage and opinions about various conservation practices, farmers' sense of community, and usage and trust in various information sources (see Appendix A for the full survey).

Both English (e.g., non-Amish) and Amish² farmers in the area were initially contacted about our survey at the end of January 2015. English farmers were first sent an advance letter to familiarize them with the project and inform them that a paper version of the survey would be mailed to them shortly. The letter also provided each recipient with a confidential code number and instructions for taking the survey online. Amish farmers were contacted by way of social networks. A local businessman who has worked extensively with the Amish in the area, and has developed a good working relationship with them, mailed a letter to local bishops and deacons

¹ The targeted area includes portions of Adams, Allen, and Wells counties.

² While we surveyed English farmers in all three watersheds, we only surveyed Amish farmers in the St. Mary's watershed. This is because we could not easily obtain a list of Amish farmers in the Upper Maumee watershed (there are no Amish settlements in the portion of the Auglaize watershed that was targeted).

informing them of the survey and encouraging them to speak to their congregations about the upcoming survey and the importance of completing it. After two weeks, a paper copy of the survey was mailed to all English and Amish farmers along with an addressed, stamped return envelope (not including the English farmers who had taken the survey online using a confidential code). A reminder postcard was then sent to all farmers who had not yet completed the survey. We continued using our standard survey mailing protocol³ for the English farmers, sending 2nd and 3rd copies of the survey to those who had not yet completed the survey by mail or online. After sending the first paper copy of the survey and the reminder postcard, we found that our response rate for the Amish farmers was relatively low. To boost the response rate, and because the sample of Amish farmers was relatively small (N=146), we personally delivered the 2nd copy of the survey. If residents were home, we asked them if they had any questions about the survey and let them know we would be back in a few days to pick it up. If they were not home, we left a copy of the survey in a plastic bag on the door and a note explaining we would be back to pick it up in a few days. This method boosted our response rate among Amish farmers considerably to 54% (N=67)⁴. In the end, the total response rate to the survey (including both English and Amish farmers) was 50% (N=719 complete out of 1,435 sent (not including bad addresses)).

Addresses for English farmers in the targeted area came from a Freedom of Information Act (FOIA) request through each county's Farm Service Agency (FSA) office. This list (provided by all counties) included all individuals registered with the FSA and was then narrowed down by zip code to include only those in individuals in the target watersheds. The *2013 Adams and Jay Counties and Vicinity Amish Directory, Volume 8* was used for the Adams County (St. Mary's watershed) Amish mailing list. Male heads of families living in the targeted watershed with agricultural related occupations were mailed the survey.

From March until June we conducted 35 in-depth interviews with farmers in the area. The purpose of the interviews was to gain a more comprehensive understanding of and context for farmers' perceptions of water quality issues, conservation practices being used in the area, what some of the barriers were for further conservation practice adoption, and what practices they might be willing to adopt (see Appendix B for interview questions). Thirteen interviews were

³ Our five-wave mail survey protocol is based off of the Dillman Tailored Design Method (Dillman, D.A., 2000. *Mail and Internet Surveys: The Tailored Design Method*, 2nd edition. John Wiley Co., New York.)

⁴ Sixty-seven Amish farmers took all or part of the survey. We removed those with bad addresses (e.g., said they did not live in the targeted area or whose surveys were returned by the post office) and those who said they had no farming experience or did not operate any acres to calculate the percentage completed.

conducted with male English farmers whose operations were located in St. Mary's, Upper Maumee, and Auglaize watersheds. We obtained names and phone numbers for English farmers from local NRCS and SWCD offices. Farmers were then contacted by phone to schedule an interview. Because of their contact with the local NRCS and SWCD, these interviewees were likely more conservation-minded than the average farmer in the area. Interviews were conducted at the farmers' residences or the local NRCS office. All were recorded and transcribed.

We also interviewed 22 Amish farmers (including one woman) in the St. Mary's watershed. A disproportionate number of Amish farmers in the area were interviewed because relatively less is known about them than non-Amish farmers, the smaller number of surveys collected, and because of the challenges local and state conservation practitioners have had working with this population in the past. We used convenience, purposive, and snowball sampling to find Amish farmers to interview. We found that when dropping off surveys, some were eager to talk with us about farming issues, so we asked some if they would also be willing to do an interview. After doing the interview we then asked if they knew other Amish farmers in the area who might be willing to speak with us. We also asked the local NRCS office and Purdue Extension agents to provide the names and addresses of Amish farmers that they had worked with and thought might be willing to do an interview. Again, we asked these farmers if they knew others in the community who might be willing to participate. Lastly, after an in-person meeting with two local Amish community leaders about the project, we asked them for names and addresses of people in their community they thought would be willing to be interviewed. Because most Amish do not have access to telephones, our primary method of contact was to visit a home without a previous appointment scheduled to ask if they would be willing to participate in an interview. Many were open to being interviewed at that time, but some preferred to schedule an interview for a later date or time. Most interviews were in the homes of the Amish farmers, a few outside on their property, and one at a local produce auction. Two interviews included more than one farmer. All but one interview were recorded and transcribed. Detailed notes were taken in lieu of the recording.

We begin discussing each theme by sharing key findings from the survey. We provide key takeaways from all survey respondents (English and Amish farmers in all three watersheds) and then discuss some of the key differences between English and Amish survey respondents. Quotes from interviews (in italics) with both English and Amish farmers are interspersed with survey results to provide additional context and detail for the key survey findings.

Key Findings

Farmer and Farm Characteristics

On average, survey respondents had been farming for 33 years. Amish farmers who responded to the survey were less experienced (23 years) than English farmers (34 years). The average acreage owned was 170 and the average rented acres was 293. Most farmers anticipated that their farm would be the same size in five years, however, Amish farmers were more likely to believe this. Amish farmers owned significantly less land and were less likely to rent land from others to farm. Corn and soybeans were the most common crops for both English and Amish farmers. Almost all respondents were male (92%), with an average age of 61.1 years, and had a high school diploma or higher level of education (90%). Amish farmers were more likely to be male, younger, and to have lower education levels (Amish schooling is typically finished upon completion of the 8th grade). Most (57%) farmers worked at least one day off the farm in the past year. Amish farmers were more likely to work off farm.

Perceptions and Attitudes about Water Quality Concerns

Views about Water Quality Impairments

Most survey respondents did not see common water impairments, including sedimentation/silt, nitrate, phosphorus, or bacteria, as *severe* problems in their area. However, the majority did see these impairments as at least a problem (e.g., slight, moderate, or severe). In interviews, farmers also usually expressed some level of concern about water issues related to farming:

"Well, I guess I'm always concerned about water quality. I mean, water is probably our number one natural resource. It's just very, so yes, I'm very concerned about how we, what will we discharge into our streams, how we use our chemicals." (English Farmer #1)

It should be noted that the farmers we interviewed were likely more conservation-minded than farmers in the area in general. This is because we obtained most contact information for interviewees from local SCWD and NRCS staff who were often in contact with these farmers because they participated in government conservation programs. Notably, a high percentage (20-36%) of survey respondents also *did not know* whether the four common water pollutants we asked about were a problem in their area indicating a need for conservation outreach.

Amish farmers were significantly⁵ less concerned than English farmers about all four impairments in the area and were much more likely to say they did not know whether they were problems. When asked an open-ended question in the interviews about whether they were concerned about any water or environmental issues related to farming, few Amish farmers mentioned any of the four specific issues asked about in the survey. As in the surveys, many indicated that they didn't know if there were any problems:

"You ask about water. No, not really. I mean, I don't see no... I don't see it in here. I'm not saying some other places." (Amish Farmer #3)

Again, this indicates that outreach, especially among the Amish farmers in the area, is needed with regards to providing basic information about the existence of some common water quality impairments like phosphorus, nitrates, bacteria, or sedimentation. Amish farmers did, however, raise concerns in the interviews about other types of environmental and health problems related to agricultural practices:

"I don't know. It's not an issue I want to close my eyes and say 'no and never' but I don't know. You know, I am concerned about overuse of pesticides and insecticides, that sort of thing." (Amish Farmer #4)

"I don't have erosion here. It's all pretty flat right around here. The main thing I'm concerned about is, I shy away from, I don't know, you hear about all this cancer stuff and I don't know where it all comes from. But I shy away from trying to use chemicals and insecticides and pesticides. I don't know. Those things kind of scare me. I always wish I had some sort of manure where I can use as fertilizer, and now I have it." (Amish Farmer #14)

Many Amish farmers specifically mentioned their concerns about the linkages between cancer and some agricultural chemicals. This concern was a motivating factor for many to move away from using chemical fertilizers and herbicides. This concern did not arise when speaking with English farmers in the area.

In interviews, we also asked whether farmers were concerned about any broader water quality issues related to farming (e.g., not in the area). English farmers seemed to be much more aware of issues such as the hypoxic zone in the Gulf of Mexico and algal blooms in the Great Lakes than Amish farmers. As mentioned by one English farmer when asked about his concerns:

"Well, as one I said that we're all aware of is the situation we had with Lake Erie this past, last summer with the water, with the water problems they had. And I don't know

⁵ "Significant differences" between English and Amish farmers were calculated using two sample t-tests and indicate that differences are statistically significant (meaning that they are unlikely to have occurred by chance) at the $p < .05$ level. For questions with a "don't know" or not applicable response option, significance is calculated without accounting for such responses.

how familiar you are with the Saint Mary's, over here at Salida, the Saint Mary's. Grand Lake, Saint Mary's, Ohio. And then that's a very intensive livestock area in that area.....But that's been an issue for years." (English Farmer #1)

In contrast, most Amish farmers were unaware of such problems:

"Wow! Couple hundred miles [the hypoxic zone in the Gulf of Mexico]? Where would that come from, phosphorous and nitrogen?" (Amish Farmer #14)

Views about Sources of Water Quality Impairments

When considering the sources of water quality pollution in their area, farmers were *most* likely to say that urban storm water runoff (e.g., runoff from highways, rooftops, parking lots) was a *severe* problem (10%) and *least* likely to say that animal feeding operations (4%) and pesticides or herbicides used for crop production (4%) were a severe problem. Similarly, farmers were *most* likely to say that animal feeding operations (33%) and manure from farm animals (30%) were *not* problem sources in their area. They were the *least* likely to say soil erosion from farm fields (13%) was *not* a problem source. Survey respondents were the least knowledgeable about the role of industry and sewage as contributing sources of pollution in the area (24% for each of those two sources, did not know). While these findings show that farmers in the area are aware that water pollution comes from many sources, they also indicate that many farmers are generally more likely to see urban sources as severe problems than agricultural sources. Additionally, they were often quick to point out, as this farmer, that agriculture was not the only contributor to water quality problems:

"I think there's more pollutants than just agriculture, and I think everyone's aware of that. But I think we have to do our part to, at least do our part to do what we can to not pollute it anymore." (English Farmer #1)

English farmers were significantly more likely than Amish farmers to see nearly all sources (except pesticides or herbicides used for crop production) as problems in the area. A much higher percentage of Amish than English farmers also said they did not know whether certain sources were problems in the area where they own or rent their farmland. These findings again indicate the need for information about local water quality concerns, the sources in particular, among Amish farmers.

In interviews, Amish and English farmers tended to blame different sources for the water quality issues that they were aware of. The Amish tended to blame the large operators ("*Big*

operations, right?" (Amish Farmer #15)), while the English tended to blame the small operators -- often with reference to their application of manure.

"I think it's livestock. The manure and then -- I don't know. I guess it's just getting a bad rap on everything. Like, they're blaming all the water quality management on the big farms, and I really think the big farms are the ones that are really doing the best job to take care of it. I don't think that's fair. And with us being grain farmers, we still, we apply some fertilizer on frozen ground and stuff and we know, hope that's going to melt in and stuff. And this spring I think we didn't have any problems with it leeching away. But I guess I don't, I don't ever want to be limited to what we can and can't do, but I know there's regulations coming, so." (English Farmer #2)

I don't know. A lot of the Amish farming practices, they, I mean, not nearly as bad as what I consider the English. I'm not saying that to put anybody down. I'm just saying. (Amish Farmer #12)

Views about Water Quality Responsibility and their Community

Survey respondents generally agreed that good water quality was something that was important for the quality of life in their community and the local economy. Interviewees also had strong agreement with the idea that changing their own practices could make a difference in local and regional water quality concerns and that it was their responsibility to do so:

"You want to take care of that because whatever flows in that, you know it's going to Toledo. That's where it's going. So yeah, it's something that crosses your mind. That's why you don't do crazy things. You farm, you manage the land accordingly. And that's one of the reasons that the tillage practices have changed through the last 20-30 years for the good. I think for the good." (English Farmer #7)

"We want to be good stewards of our land. If we don't, we feel that we want to leave it better than what we go it. That's the way we look at it because we don't feel like Jesus would have done anything like this. We want to be good stewards. That's how I feel about it." (Amish Farmer #9)

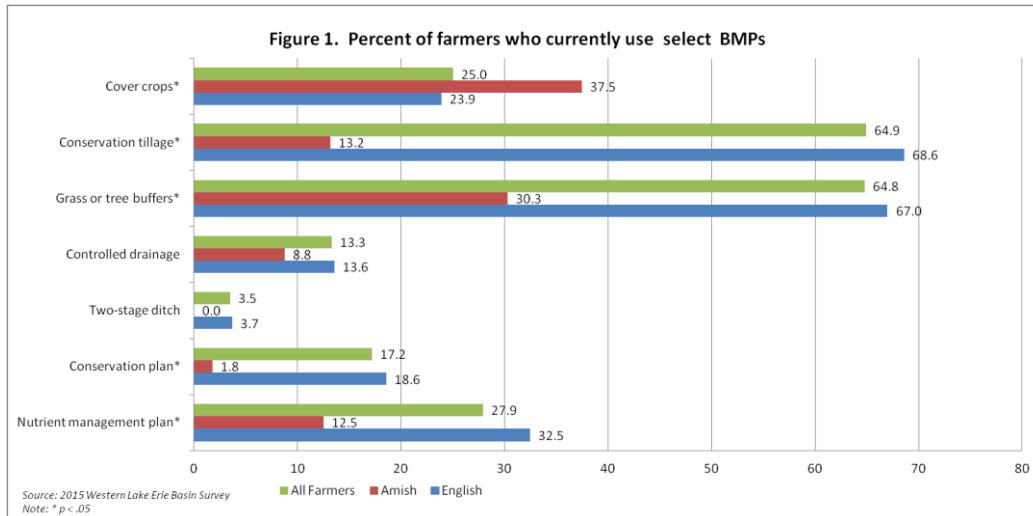
"Yeah, and I haven't been, I don't have a lot of facts and figures on the Great Lakes problems that they're having. I think anytime we have a well on the ground, it's what we drink. You know, we definitely want as good water as we can, and we want to be a steward of all that we do because we don't want to cause some other family down the stream has to drink that. So part of us being good stewards of what we have is also being a good steward of a family down the road that is going to drink it, too. So I don't know, I don't know that I have too many concerns other than that. I think we're going in the right direction. There are concerns out there. There's a lot of abuse in our county, especially in the southern part where people with beards maybe live with some negligence and abuse. And until we can kind of back up our threats, I don't think that's going to change." (English Farmer #5)

Despite the fact that many survey respondents thought that their actions could make a difference in addressing local and regional water quality concerns, survey respondents were much less likely to agree that they wanted to pay more money (e.g., through local taxes or fees) to bring about such changes in local water quality. For instance, when asked on the surveys about their willingness to pay more, 15% said that they *strongly disagreed*.

English farmers generally exhibited more positive attitudes and behavioral intentions toward water quality than Amish farmers. For instance, 21% of English farmers strongly agreed that it was their personal responsibility to help protect water quality in comparison to only 9% of Amish farmers. This is likely in part related to the finding that the Amish farmers in the area were much less aware of some of the water quality problems associated with farming practices.

Current Use of Conservation Practices

Survey respondents were asked about their usage (see Figure 1), awareness, and perceptions of limiting factors of conservation practices including cover crops, conservation tillage (e.g., no-till, strip-till, or ridge-till), grass or tree buffers, controlled drainage, two-stage ditches, conservation plans, and nutrient management plans/waste utilization. Each of the seven conservation or best management practices (BMPs) were selected by local conservation practitioners as important and relevant in the area. Overall, farmers were most likely to be using conservation tillage and grass or tree buffers, and least likely to be using two-stage ditches and controlled drainage. However, there were significant differences between English and Amish farmers in their usage of cover crops, conservation tillage, grass or tree buffers, conservation plans, and nutrient management plans, with English farmers being more likely to be using all of the listed BMPs except for cover crops. Some of the selected practices are not compatible with Amish restrictions on technology use (e.g., some types of tillage), which helps to explain some of their lower rates and likelihood of adoption. Usage of each of the seven practices will be discussed next as well as respondents' awareness of the practices and major and minor limitations to usage. We will also discuss some of the key differences between Amish and English farmers with regards to these seven BMPs. Finally, we also share some findings regarding the use of government payments to encourage the uptake of conservation practices.



Cover Crops

Of farmers with row crops, 25% were currently using cover crops. Most (57%) cover crop users were implementing them on less than 25% of their land. Only 11% were using cover crops on 76-100% of their land. In interviews, when asked why they use cover crops, farmers often commented that they helped improve the quality of their soil:

“One of the neighbors.....he’s big into those things and he’s used them on his farm. And then they just, it’s an up and coming thing, and if you want to be ahead of the trend line, I think you need to use them.....just the way that they work, like you can remove compaction and improve your organic matter and just improve soil tilth and stuff. Just seemed to make sense or at least was worth trying.” (English Farmer #2)

Only 4% of row crop farmers had *never* heard of cover crops before. Of the non-users with row crops (includes those who had never heard of cover crops, heard of cover crops, and used them in the past), 83% said they might be willing to try them in the future. This indicates an area where local conservation practitioners should work with farmers given their willingness and interest in this BMP. Cost and the lack of equipment/technology were the factors that farmers said limited their ability to implement cover crops the most (13% and 12%, respectively, said they limited them *a lot*). The least limiting factor was disapproval from others with 71% saying it was not a limiting factor at all.

Significantly *more* Amish farmers (38%) with row crops are using cover crops than English farmers (23%). When asked why in interviews, many mentioned the soil benefits:

"Because of the soil. When I bought the farm, it was so, just corn, beans, corn, beans for years and years. It needed building up. So I talked with people that used it and I just. So the first thing I did was I tried to run alfalfa in it first which really helps. And now I try to do cover crop too, it's my, green manure is better than other manure.....we just feel it does better and it helps us need less fertilizer." (Amish Farmer #9)

"The one reason was I thought if we could get it out early enough in fall where we could get some good growth yet before it freezes. I had some grazing for the sheep, you know, what our feed costs through the winter. And the other thing, in that particular field we've got drainage problems. So, and it's not tiled very far down, so maybe if we could get them roots down far enough, it might help us." (Amish Farmer #4)

As above, some mentioned the cost savings associated with using cover crops, while other Amish farmers acknowledged that it was a source of food for livestock. The no-till drill that the Adams County SWCD office had made available for a nominal renting fee also helped to make cover crops a more feasible option for some Amish farmers:

"Cost factor and time. It's so hard to make a living to keep up that it requires time to do it and extra money, and both that we're short on because it's that hard to keep up and try to make a living. The no-till drill already made it more economical, it didn't cost to go and use it." (Amish Farmer #7)

Conservation Tillage

65% of farmers with row crops are currently using conservation tillage (e.g., no-till, strip-till, or ridge-till). Of users, 70% were using conservation tillage on more than half of their cropland. Some of the benefits farmers mentioned included saving time/labor, improved yields, and more balanced soils:

"We started back in the early 2000s with just moderate success, and that's one we started working with the grounds, and bought into the theory, which in my mind has been proven, that it's important to have your calcium and magnesium balanced. ... And we have seen as we have balanced our soils that we have less variants in yields over time and that we have adjusted our management zones over time as things have come into picture." (English Farmer #12)

"Well, basically saving labor, really not seeing the yield benefit of tillage. And I guess more – and I grew up, I love to till soil. Part of being a farmer, we just love to till soil. But honestly, whenever you till soil, every time you do something, you take more of a chance of erosion, and especially when you got a crop growing on there. And I've just seen over the years, the less you can till soil, I think the more beneficial it is." (English Farmer #1)

"Well, now, when you first started talking about no-till and things like that, you talk about the fact that you're using less fuel. It's an economic thing from that standpoint." (English Farmer #9)

Only 6% of row crop farmers had *never* heard of conservation tillage before. Of non-users, 73% said they might be willing to try using conservation tillage in the future. The most limiting factor for implementing conservation tillage was the lack of equipment/technology with 8% of respondents saying that it limiting their ability *a lot*. The least limiting factors were disapproval from others and not knowing how to do it (77% for each of those two factors, said that it didn't limit them at all).

Amish farmers were significantly *less* likely to be using conservation tillage with only 13% of Amish farmers using conservation tillage in comparison to 69% of English farmers in the Western Lake Erie Basin. This large discrepancy is due in part to the technological restrictions of the Amish:

"I think they generally fall moldboard plow a lot more. That'd be one big difference. And conventional tillage. I don't know that they're putting in much no-till crop because the equipment is somewhat of a hindrance for them, given that. The equipment, it's heavy, it can be expensive. I think they're pretty much all conventional tillage."
(English Farmer #6)

Their lack of usage of this BMP also has to do with their reluctance to change how things have always been done:

"I agree that a lot of Amish farmers, a lot of people have this mindset and they say this is the way we always do. And a story they used to tell about this guy. This guy was driving down the road and he seen this guy plowing out in the field. He wasn't hooked up right, he was pulling at an angle. He stopped and he told the guy if you would move this over here, it'll pull straighter for you. He could see what his trouble was. The guy looked at it. He said this is how my grandpa plowed, this is how my dad plowed, and this is how I'm going to plow. If I wasn't so curious I wouldn't be doing some the things I'm doing." (Amish Farmer #7)

Grass or Tree Buffers

65% of farmers with row crops in the Western Lake Erie Basin are currently using grass or tree buffers. Of users, more than half (56%) were using grass or tree buffers on more than 50% of their field or ditch borders. Interviewees noted a variety of reasons for using this BMP including the natural amenity value:

"There's like 100-150 foot of trees between the creek and then fields. Plus, I have about 10-15 buffer grass buffer outside of that yet, on top of it..... the grass buffer wasn't on until I started farming it. The English farmer that was renting, he got every ounce of ground he could get, you know. And that's not a big issue. It's not going to make me or break me, the way I look at it. And I love wildlife. I love trees. So that's why I just keep away from it. Stuff doesn't grow out there anyhow." (Amish Farmer #9)

"I have it in CRP, the filter strips. And so the buffers along the woods, yeah. There's usually ten or fifteen feet. I just did them because the deer, the raccoons and everything were eating out six rows anyway in the shade, so I put it in the grass and clover. Fed the bees and the, and everybody else, let them eat it." (English Farmer #4)

Some even implemented this practice without government assistance:

"We have an open ditch on one side of the farm that my great-great-grandpa built, had dug. We're not even in the program but we put a water filter strip along the side of it. So that's the only open ditch we have. I think there's more that I'd like to do. We haven't quite got there yet." (English Farmer #5)

Few (8%) had *never* heard of the practice before. Of non-users, 76% said they might be willing to try using the practice in the future. The most limiting factor was cost with 45% saying it limited their ability to use grass or tree buffers at least somewhat (a little, some, or a lot). The least limiting factors were not knowing how to do it and disapproval from others.

Only about one-third (30%) of Amish farmers use grass or tree buffers in comparison to about two-thirds (67%) of English farmers, a significant difference. Part of this difference is likely because of the smaller size of Amish farms which means they are also less likely to have water sources to buffer on their property.

Controlled Drainage

Of survey respondents, 13% currently use controlled drainage. About one-half (53%) of users had controlled drainage structures installed on more than half of their cropland. A relatively high percentage (39%) had not heard of the practice before. As noted by one farmer who is currently using controlled drainage structures, even users have much they could still learn about this relatively new practice:

"Last year was the first farm year, so it's fine. I have no problems with it. We're still learning, you know. There's no book on them yet, no real book, just like everything else we do." (English Farmer #4)

69% of non-users said that they might be willing to try using the practice at some point in the future. By far the most limiting factor in implementation was cost with 25% of respondents saying that it limited them *a lot*. The least limiting factor was disapproval from others with only 3% saying this limited them *a lot* in implementing controlled drainage.

There was not a significant difference between English and Amish farmers in their adoption of this practice (14% and 9% currently use, respectively).

Two-stage Ditches

A small percentage (4%) of survey respondents currently have two-stage ditches installed on the property they farm. Of the few farmers who have two-stage ditches, the majority (57%) only have them implemented on 1-25% of their ditches. More than one-half (56%) have never heard of the practice indicating an area where conservation practitioners could inform farmers. However, 66% of non-users said that it is a practice that they would consider using in the future. As one farmer told us when we asked about his interest:

"Yeah, I mean, it would be, I'd need to get....XXX just put one in, and I would, he's the one, he was telling me about it. And so that would be neat to go see it before because it looked like it was a pretty big ditch. And it would have to be in the right spot, you know, that it wouldn't take up too much, too much ground where we have a lot of water running across in our farms, and we don't have too many of them. But there would be certain spots. And it would be interesting to see if it would work.... but it would be nice to have, to know a little bit more about it." (English Farmer #3)

As this interviewee noted, more information would be helpful. The survey data also indicated again, however, that cost was by far the most limiting factor in adoption with 40% of survey respondents saying it limited them *a lot*. Disapproval from others again was the least limiting factor with only 4% saying it limited them *a lot*.

The difference between Amish and English farmers in the adoption of two stage ditches was not significant (0% and 4% respectively).

Conservation Plans

17% of survey respondents currently use a conservation plan. Of those with a conservation plan, 80% agreed or strongly agreed that they followed all of the guidelines set forth in the plan. Many, almost half (47%), of respondents are unfamiliar with what a conservation plan is. Despite their lack of familiarity with the BMP, 67% of non-users said that they would be willing to try using a conservation plan in the future. Cost again was the most limiting factor (11% said it limited them *a lot*) and disapproval from others was the least (1% said it limited them *a lot*).

There was a significant difference between Amish and English farmers with 19% of English farmers currently using a conservation plan in comparison to only 2% of Amish farmers.

Nutrient Management Plans/Waste Utilization

Finally, of livestock owners, 30% currently use a nutrient management plan for dealing with their manure. The highest percentage (63%) of respondents received assistance with developing their plan by a private sector agronomist or crop consultant, while the fewest (4%) had been assisted by Purdue University Extension. The most common nutrients included in plans were livestock manure (79%) and commercial nutrients (67%). About four-fifths (79%) agreed or strongly agreed that they followed all of the guidelines set forth by their plan. The majority (85%) also agreed that they felt they had enough storage space for their manure and could apply it when needed. Nearly one-third (32%) of livestock owners had not heard of nutrient management plans, but 64% said they would be willing to consider using one in the future. The cost and time required were the most limiting factors for farmers in implementing such a plan (9% and 5%, respectively said they limited them *a lot*). There was a significant difference in use between Amish and English farmers with 13% of Amish farmers having a nutrient management plan in comparison to 33% of English farmers.

In interviews, many English farmers were concerned with how the Amish farmers were dealing with the manure on their smaller farms:

"I said [to some Amish], like, 'You guys need to watch what you're doing because you're going to end up, like, screwing it up and losing it for everybody'. And then they're like, 'Well, it's our land. We should be able to do with it what we want'.....And I don't know why no one wants to accept the fact that they need to learn to manage manure'. And they just automatically think it's their land, they can do what they want to do, and if they want to spread the manure on five acres every single year. I said, 'Well, that's not the best practice'. I said, 'That's the wrong mindset. Just because it's your ground doesn't mean that you should be able to do whatever you want with it'." (English Farmer #2)

On the other hand, many Amish farmers didn't seem to see it as an issue:

"And we don't have to worry about as much erosion because it's flat. Some places where it's more hilly then they have more runoff. That's another thing about manure. We don't hardly have any runoffs..... We try to stay away from the ditches you know and all of that with manure. But you know we get a hard rain like 3-4 inches it's, things are going to wash.....It's very hard for us to incorporate it into the soil with our mean of farming it's hard to get the manure you know and imbedded under the ground. You know it's kind of hard to do for us. You know what I mean? (Amish Farmer #18)

Government Payments for Conservation Practices

Although we did not explicitly ask about government payments aimed at encouraging conservation practices or insuring against crop loss, this topic emerged as an important one in the interviews. English farmers often mentioned that government financial support was helpful in swaying them to try a new conservation practice:

"Like, it just makes, like, if you're on the edge about trying something, it kind of pushes you over the edge. They're like, 'Here's the money that could help do that', so then that's why we take the time and do that and do the practices." (English Farmer #2)

"Probably what really started, of course the programs through NRCS. They were paying for the seeding and that type of thing. And you know, I read a considerable amount about it and we're seeing some benefits and whenever they came up they were paying so I thought, you know, this isn't going to cost us a lot. Why not try it and see if there are some benefits? And probably combination of giving us some incentive. But I think between the two, that's probably the reason we did that." (English Farmer #1)

On the other hand, along with their religious opposition to taking government payments of any type (e.g., Social Security, Medicare, etc.), many Amish farmers saw government financial assistance as being counter-productive in incentivizing conservation practices:

"No because if the corn just stayed \$2.80 and they pay up to \$3.50 or something like, I feel it shouldn't be because, oh, if the government is going to help them, they're going to keep growing because they ain't losing them, like the insurance. This one farmer XXX. They live right out here. They farm this right here. I ask him, 'How much do you get if you get 50 bushels or 100 bushels or 75 bushels?' He said, 'It don't matter. We get it all the same. It comes out the same.' But I don't think that should be....Once they would quit, if they would shut off the government subsidies on the farming, they would change their practices. That I can tell you. That's the only way to stop them. Because the moment they get the government subsidies, they don't have - which, I think they're getting less than they used to, but there shouldn't be none." (Amish Farmer #12)

They also saw them as providing English farmers with an unfair advantage that was contributing to the increasingly large size of English farms in the area. When asked about whether they might be willing to take payments to help address local and regional environmental problems, many still said they would be unlikely to do so. They did, however, offer some alternatives:

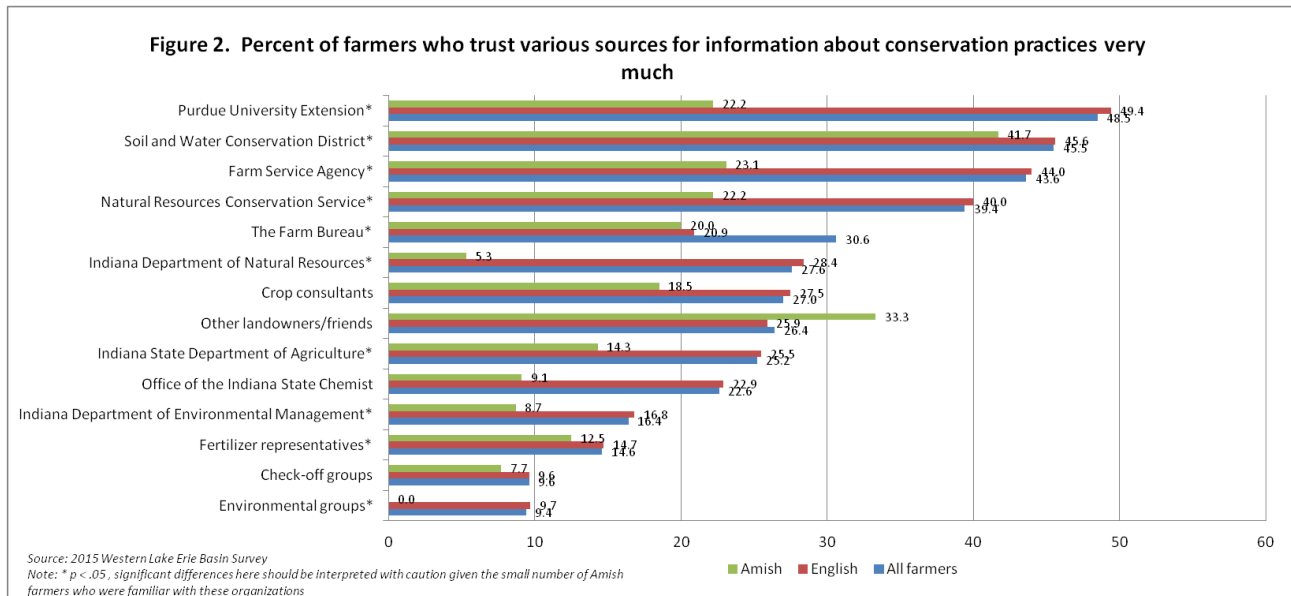
"Because I don't really, I think as a whole we would be uncomfortable with taking money from the government for something like that [environmental conservation]. But if there is a problem, I think the best way would be to somehow just make us aware of it. Tell us what's happening. That's what you're trying to do. I can feel that, that you probably feel we have problems like that with our people." (Amish Farmer #14)

Thus information was something that most Amish were open to receiving rather than financial assistance. Many also mentioned the no-till drill that was available for a negligible cost and that they saw it as a positive asset available for their use.

Information and Outreach

Survey respondents were also asked how much they trusted various sources for information about conservation practices (see Figure 2). Of those who were familiar with the organizations, farmers trusted information about conservation the most from Purdue University Extension (49% trusted very much), Soil and Water Conservation Districts (46% trusted very much), and the Farm Service Agency (44% trusted very much). They had the least amount of trust in environmental groups and check-off groups (9% and 10% trusted very much, respectively). One Amish farmer discussed his trust in Purdue Extension and his distrust in crop consultants:

“That’s why he’s [Purdue Extension Agent] there and it’s free service. I know it’s from the government. We know that. But it’s service that is very, we can use, so to speak. Even though we use a lot from the feed mills and the chemicals, they do a lot of consulting as well because they sell the product. But the thing we don’t like about them is they will just give us what they sell. They’ll recommend what they sell.” (Amish Farmer #9)



Many farmers, the Amish in particular, also said they were unfamiliar with some sources of information. The most were unfamiliar with environmental groups (27%), check-off groups (25%),

and the Indiana State Department of Agriculture (24%). They were most familiar with Soil and Water Conservation Districts (90% were *familiar with*). Although the results should be interpreted with caution (because of the small number of Amish farmers familiar with these organizations), English farmers were generally much more familiar with organizations that can be sources of information about conservation practices than Amish farmers in the area (see Figure 2).

Because of the difficulty some conservation practitioners voiced in working with Amish farmers on conservation, in interviews, we asked Amish farmers how they would prefer to get information about conservation practices. Many discussed that meetings were often held at bad times or that they were too busy to attend:

"I have always wanted to go [to informational meetings] but I have never.....[bad timing] or I don't find when they are at until when they are. Or I forget about it. Typical farmer. Always on the go. I've got so many irons on the fire, so to speak."
(Amish Farmer #9)

The reason I couldn't attend is because we had so many meetings going. Actually, the pasture walk that they planned, it was like once a month, and produce meeting was the same night. I was kind of in producing at the time, and it didn't work out. There were just too many meetings..... If something comes in the mail, I probably look at it. Just some informational stuff. (Amish Farmer #14)

Many Amish farmers work other "off the farm" jobs meaning juggling each of their responsibilities can be difficult. When planning meetings conservation practitioners need to be aware of the time constraints that Amish farmers face because of this trend.

Farmers' Sense of Place

Farmers were also asked a series of questions pertaining to their sense of place as it relates to both their community and the land they farm (including place attachment, place identity, and place dependence). Respondents generally expressed strong sentiments of attachment to both their community and the land they farm. For instance, 90% said that they planned to continue living in their community even if they are no longer farming there. Interviewees expressed similar feelings:

"I don't know. Just where I grew up, I guess. It would be tough for me to move out, that's for sure. I like the farm, the farm and how the land lays, the farm ground. I don't like hills, I like the nice flat ground." (Amish Farmer #13)

Similarly, many (65%) planned to continue to live on their land even if they were no longer making money from farming it. Many also identified strongly with the land that they farm and the community that they live in. For instance, 80% said that their farm was an important part of who they were. Similar sentiments were reflected in the interviews:

"Well, it started with our grandfather and great-grandfather built this. They built the community because there was nothing here. So our homestead would be a good example. The brothers all started out here about four miles out, five brothers, and our great-grandfather was one of the five.....And there's other families like that. There's a lot of multi-generational families right in this area.....So yes, the connection is inherited, genetic." (English Farmers #6 and #7)

87% said that they identify strongly with the community that they live in. Lastly, farmers also depended upon their communities and farmland which contributes to their overall strong sense of place. 66% said that they really depend on their community for the important things in their life and many agreed that farming in another place would not be better (42%).

Although generally high, on some measures, Amish farmers expressed a weaker sense of place to their communities and farms than English farmers. As expressed by one Amish farmer:

"I love working soil, so to speak, yeah. In that way, yeah. But I don't feel connected enough, I don't feel like I couldn't walk away from it. Because I guess I feel more connected to Jesus, so that's my priority." (Amish Farmer #9)

In fact, many Amish families in the area had moved away because of the high cost of land in the area and others feared they might have to do the same in the future as their families expand.

Recommendations

General Outreach Recommendations

- A high percentage of survey respondents and interviewees (the Amish Farmers especially) did not know whether specific water quality impairments such as nitrates, phosphorus, or bacteria were a problem in the area. This indicates that more outreach should be done to inform local farmers about these concerns and also inform them about specific management practices that can address and ameliorate the impairments. If farmers do not know about such water quality impairments, they will be less likely to consciously address them.
- While our findings show that farmers in the area are aware that water pollution comes from many sources, they also indicate that many farmers are more likely to see urban sources as severe problems than agricultural sources. Attempts should be made to inform farmers that while urban sources do contribute to water quality impairments, agricultural actors of all sizes also play a significant role. Additionally, some English farmers considered the Amish to be the biggest contributors to agricultural problems (and vice versa), and took little responsibility for their contributions. Thus educating farmers about the roles that different types of farming practices play in contributing to environmental problems is necessary.
- Survey respondents generally agreed that good water quality was something that was important for the local community and economy, changing their own practices could make a difference in local water quality, and that it was their responsibility to do so. This means that when working with farmers, conservation practitioners should highlight the variety of *local* benefits there can be to using some BMPs as well as farmers' ability and responsibility to make efforts to improve the quality of life in their community. Additionally, many farmers have longstanding ties in the community and expressed a strong sense of place meaning focusing on the benefits of using conservation practices now for future generations could be beneficial.
- Many of the non-users of the specific conservation practices asked about in the survey said they might be willing to try them in the future. This indicates that if local conservation practitioners can work with non-users to overcome the barriers they face to adoption, there is the potential for many more farmers to adopt BMPs.

- A relatively high percentage of farmers in the area had *never* heard of some of the conservation practices asked about on the survey, including controlled drainage, two-stage ditches, conservation plans, and nutrient management plans. Information simply about what these practices are and how farmers who are interested might go about implementing them should be a priority.
- A lack of access to equipment/technology and cost appear to be the biggest obstacles for farmers in the Western Lake Erie Basin when considering using or expanding a BMP. Therefore, cost share programs and information about, and access to, needed equipment/technology should continue to be priorities for conservation practitioners in the area.
- Purdue University Extension, the FSA, the local SWCD, and the NRCS are all highly trusted sources of information about conservation practices for farmers in the area. Funneling information about conservation practices, especially those that are novel, through these venues, Extension in particular, might be the best way to reach potential future adopters.

Recommendations for Amish Farmer Outreach⁶

- Meeting face-to-face with Amish farmers is ideal. After sending out the first draft of our mail survey along with a follow-up postcard, our response rate was far below what we were getting from English farmers. To boost the response rate we decided to use a drop-off/pick-up survey delivery method with the Amish farmers. This increased our response rate considerably. In-person meetings were also useful because some Amish farmers were not sure how to fill out portions of the survey so we were able to sit down with them and go through the survey together. Face-to-face interactions also gave us a chance to ask some of the Amish farmers if they would be willing to do an in-depth interview at a later date. Thus, stopping by, fostering relationships, and building rapport is essential in working with the Amish community.

⁶ Additional recommendations for encouraging Amish farmers to use conservation practices will be provided in a forthcoming Purdue Extension publication focused on working with Amish farmers in Indiana and more broadly.

- It is best to work with community leaders if possible *before* initiating a program or outreach. Before sending out the first copy of the mail survey, a local business leader who had worked extensively with the Amish community prior to this project, sent a letter to all of the bishops and deacons letting them know about the survey and to encourage their congregations to fill it out. Although we are unclear to what degree this helped with our response rate, we believed it was important to take this step so that community leaders were aware of the project and were therefore prepared if any of members in their district asked them about the project. We also met face-to-face with these leaders to discuss our intentions to interview members of the community. These leaders informed us that this meeting was beneficial in providing them with a better sense of what we were doing. They then were able to directly introduce us to members of the community to interview. When working with Amish farmers on increasing their uptake of conservation practices, we also feel working first with the community leaders is key. Related to this, try to establish partnerships with individuals already working with Amish farmers and ask for their insights about the community.
- Let potential BMP adopters know that other Amish in their community are also working, or have worked, with you. Given their tendency to blend in, it is useful to remind those who you approach to participate in projects that other Amish have participated and that you are trying to work with a group of them. For instance, when we met with a group of Amish leaders after already conducting a few interviews, they mentioned that the Amish would not allow us to audio record the interviews. We let them know that the majority had let us use recorders already. After telling them this, they seemed more open to being recorded themselves. Perhaps then mentioning that others in the community are implementing the BMPs and/or working with local the SWCD or NRCS might be beneficial to increasing participation among this population (assuming others are actually implementing the BMPs).
- Use language that they can understand. Don't use acronyms for organizations or practices that other non-Amish farmers might readily know. This was apparent when talking to Amish farmers about the wording on our surveys and their reported experiences attending meetings put on by local conservation groups.

- Clarify what you mean with concepts when possible. For instance, when going over the mail survey in-person with a few farmers we found that some didn't understand what some concepts such as sedimentation/silt were. Once we described these concepts to them, they understood what we meant, but they tended to use slightly different terminology. If talking with them in person, try explaining an idea/concept in a couple of different ways if it seems like they are not understanding. They typically will know what you are talking about, but may have different ways of phrasing it.
- While all farmers expressed a certain level of concern about environmental problems related to farming, important differences existed between Amish and English farmers in a number of areas including, but not limited to: conservation practice usage, views on using BMPs in the future, attitudes towards government payments, awareness of information sources, appropriate usage of livestock manure, primary agricultural contributors to water quality impairments, and sense of place. Tailored approaches for increasing BMP uptake are thus needed when working with the two populations.
- Although many do some form of farming, they don't necessarily see themselves as "farmers." We had a number of interviewees who did not consider themselves to be farmers, yet did daily activities that would suggest otherwise. For instance, a few helped run family businesses, but then had small livestock operations that they were also involved with. Thus, do not limit your outreach to only those who are full-time farmers. Many have off-the-farm jobs, but are also highly involved in agriculture and/or livestock.
- Focus on the goal of preventing future regulations on farmers when approaching Amish farmers. While this is certainly a motivating factor among many English farmers, it also appears to be important for Amish farmers. Nobody wants to be told what they have to do, and this is true for the Amish. Talking about voluntarily adopting practices to prevent future regulations seemed appealing to many.
- Remind them they are not being singled out. When we mentioned that we were talking to all kinds of farmers in the area, including the bigger English farmers, this appeared to make them feel more at ease regarding talking about their own operation.

- If holding meetings, send out mail invitations with the opportunity for them to respond via mail (include addressed and stamped return envelope). Also, consider providing transportation. Also consider the timing of the meeting both in terms of the time of the year (e.g., not during planting season or harvest) and the time of day (e.g., consider that many Amish also have other jobs). Advertising that a meal will be provided is also beneficial. Additionally, don't make the meetings too long or technical. Pictures can be a great tool given the absence of such educational tools within their community.
- There is a high degree of diversity *within* the Amish community in the Western Lake Erie Basin. Don't assume that all Amish are the same and have the same proclivity for change or adopting new practices. Be aware of some of the differences you might encounter before approaching them.
- Don't assume that they know a water quality problem exists. While some were aware of local and national water issues, many had no idea about problems like hypoxia in the Gulf of Mexico or algae in the Great Lakes. Outreach on the existence of these issues and their relation to agricultural practices will be key in working with this population.
- Emphasize to them that even small operations can make a difference with regards to water quality. Some seemed to assume that just because they were smaller operations that their farming practices don't matter as much as the larger acreage farming operations.
- When working with Amish farmers try to connect conservation practices with health. Rather than environmental motivators, health seemed to be one of the top reasons that Amish farmers adopted certain practices such as non-chemical pesticides or herbicides (e.g., Roundup). Many mentioned growing rates of cancer within their communities and concern with drifting chemical sprays. Thus by emphasizing the health benefits of adopting conservation practices, Amish may be more motivated to adopt them.
- Emphasize the collective nature of the environmental problem(s). Some Amish seemed more willing to consider cost-share money when we phrased the acceptance of it or of using conservation practices as being good for the environment and people in general. We think that perhaps some Amish in the area may be willing to accept financial assistance (maybe

not directly through government programs) for larger structural conservation practices (e.g., rebuilding streambanks) especially if it was emphasized that this would not compromise their tax exempt status.

- When recommending types of conservation practices, be mindful of Amish restrictions on technology. Provide tools and technologies that are appropriate for Amish farmers to use. The no-till drill for example, was highly regarded. Additionally, remember that Amish farmers are not generally motivated by government subsidies or other external, English incentives.
- Cover crops appear to be a relatively widely accepted practice among the Amish farmers in the area. Given many are already using cover crops and that it fits with the type of farming they do and their beliefs, finding ways to increase their usage or make the practice easier for them could prove beneficial.

Appendix A - Full Survey Summary

Methods

Mail Survey

- 1706 Surveys distributed
- 271 Bad addresses (including those who rent out all land)
- 719 50.1% Completed (% not including bad addresses)

I. Water Impairments

Below is a list of water pollutants that can become a problem when present in excessive amounts. In your opinion, how much of a problem are the following water impairments in your area?

	Not a Problem (1)	Slight Problem (2)	Moderate Problem (3)	Severe Problem (4)	Don't Know (5)	Mean (Without 5) (n)
1. Sedimentation/silt (n=693)	17.5%	28.9%	26.8%	6.5%	20.4%	2.3 (n=552)
2. Nitrate (n=692)	17.5%	26.2%	20.5%	2.8%	33.1%	2.1 (n=463)
3. Phosphorus (n=693)	17.6%	24.5%	20.1%	4.0%	33.8%	2.2 (n=459)
4. Bacteria in the water (such as E. coli) (n=693)	24.1%	19.2%	13.6%	7.4%	35.8%	2.1 (n=445)

II. Sources of Water Pollution

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 area where you own or rent farmland?

	Not a Problem (1)	Slight Problem (2)	Moderate Problem (3)	Severe Problem (4)	Don't Know (5)	Mean (Without 5) (n)
1. Discharges from industry into streams and lakes (n=698)	27.9%	22.5%	21.4%	4.4%	23.8%	2.0 (n=532)
2. Discharges from sewage treatment plants (n=697)	25.8%	21.0%	21.1%	8.6%	23.5%	2.2 (n=533)
3. Soil erosion from farm fields (n=695)	12.7%	44.3%	27.8%	4.3%	10.9%	2.3 (n=619)
4. Soil erosion from shorelines and/or streambanks (n=697)	22.5%	32.3%	24.3%	5.9%	15.1%	2.2 (n=592)

5.	Lawn fertilizers and/or pesticides (n=695)	24.5%	26.9%	23.6%	8.6%	16.4%	2.2 (n=581)
6.	Fertilizers or manure used for crop production (n=695)	21.7%	36.8%	22.7%	4.8%	14.0%	2.1 (n=598)
7.	Improperly maintained septic systems (n=699)	22.2%	30.6%	19.2%	8.7%	19.3%	2.2 (n=564)
8.	Manure from farm animals (n=695)	30.1%	33.8%	17.4%	5.0%	13.7%	2.0 (n=600)
9.	Littering/illegal dumping of trash (n=698)	23.8%	38.11%	18.6%	7.2%	12.3%	2.1 (n=612)
10.	Pesticides or herbicides used for crop production (n=698)	20.3%	42.3%	16.2%	3.7%	17.5%	2.0 (n=576)
11.	Animal feeding operations (n=696)	32.9%	31.6%	14.7%	3.6%	17.2%	1.9 (n=576)
12.	Urban stormwater runoff (e.g. highways, rooftops, parking lots) (n=696)	23.1%	23.4%	25.7%	10.3%	17.4%	2.3 (n=575)
13.	Removal of streambank vegetation (n=695)	27.5%	27.3%	19.1%	6.9%	19.1%	2.1 (n=562)

III. Water Quality

For each statement, please select the answer choice that best represents your opinion.

		Strongly Disagree (1)	Disagree (2)	Neither (3)	Agree (4)	Strongly Agree (5)	Mean
1.	The economic stability of my community depends upon good water quality. (n=700)	1.1%	3.3%	19.4%	61.4%	14.7%	3.9
2.	Using recommended management practices on farms improves water quality. (n=698)	1.2%	1.9%	10.9%	69.2%	16.9%	4.0
3.	It is my personal responsibility to help protect water quality. (n=701)	0.4%	1.4%	8.0%	70.5%	19.7%	4.1
4.	It is important to protect water quality even if it slows economic development. (n=698)	0.7%	5.2%	26.7%	55.6%	11.9%	3.7

5.	What I do on my land doesn't make much difference in overall water quality. (n=702)	10.8%	50%	20.2%	17.7%	1.3%	2.5
6.	Investing in water quality protection puts the farmer at an economic disadvantage. (n=697)	4.5%	26.3%	44.1%	23.5%	1.7%	2.9
7.	Farm management practices do not have an impact on water quality. (n=698)	15.0%	63.6%	10.6%	9.3%	1.4%	2.2
8.	My actions have an impact on water quality. (n=696)	1.3%	4.2%	14.7%	70.3%	9.6%	3.8
9.	Taking action to improve water quality is too expensive for me. (n=694)	3.6%	29.5%	52.3%	12.8%	1.7%	2.8
10.	It is okay to reduce water quality to promote economic development. (n=696)	18.4%	59.2%	19.8%	2.2%	0.4%	2.1
11.	It is important to protect water quality even if it costs me more. (n=695)	1.7%	11.5%	44.8%	38.3%	3.7%	3.3
12.	I would be willing to pay more to improve water quality (for example: through local taxes or fees). (n=700)	14.9%	30.3%	38.3%	14.6%	2.0%	2.6
13.	I would be willing to change management practices to improve water quality. (n=699)	2.2%	6.0%	33.1%	55.8%	3.0%	3.5
14.	The quality of life in my community depends on good water quality in local rivers and streams. (n=698)	1.3%	5.4%	22.4%	61.2%	9.7%	3.7

IV. Management Practices

1. Cover Crops

A. Please select the option that best describes your experience with cover crops. (n=676)

- 13.0% Not relevant – don't have row crops
- 1.6% Never heard of it and not willing to try it
- 2.2% Never heard of it, but might be willing to try it
- 7.8% Heard of it and not willing to try it
- 33.6% Heard of it and might be willing to try it
- 1.3% Used it in the past and not willing to try it again
- 18.6% Used it in the past and might be willing to try it again
- 21.8% Currently use it

B. On what percentage of your farmed land do you use cover crops? (n=159)

- 57.2% 1-25%
- 20.1% 26-50%
- 12.0% 51-75%
- 10.7% 76-100%

How much do the following factors limit your ability to implement cover crops?

	Not at all (1)	A little (2)	Some (3)	A lot (4)	Don't Know (5)	Mean (Without 5) (n)
C. Don't know how to do it (n=524)	51.0%	23.7%	12.2%	1.0%	12.2%	1.6 (n=460)
D. Time required (n=521)	22.7%	28.8%	31.3%	7.3%	10.0%	2.3 (n=469)
E. Cost (n=528)	16.5%	26.3%	32.8%	12.5%	11.9%	2.5 (n=465)
F. The physical features of my property make it difficult (n=523)	57.4%	19.1%	9.2%	2.3%	12.1%	1.5 (n=460)
G. Lack of information about effects on yields (n=520)	34.0%	24.0%	18.1%	5.0%	18.9%	1.9 (n=422)
H. Desire to continue traditional farming practices/methods (n=518)	44.0%	21.6%	14.5%	3.3%	16.6%	1.7 (n=432)
I. Disapproval from others (n=517)	71.4%	9.5%	2.7%	1.4%	15.1%	1.2 (n=439)
J. Hard to use with my farming operation (n=529)	34.6%	25.0%	21.9%	6.1%	12.5%	2.0 (n=463)
K. Lack of equipment/technology (n=521)	28.8%	26.5%	22.3%	12.3%	10.2%	2.2 (n=468)
L. Insufficient proof of erosion protection (n=518)	46.5%	20.7%	13.3%	3.5%	16.0%	1.7 (n=435)
M. Insufficient proof of soil health benefit (n=521)	46.8%	20.5%	11.7%	4.0%	16.9%	1.7 (n=433)
N. Insufficient proof of water quality benefit (n=522)	43.5%	21.7%	13.6%	3.3%	18.0%	1.7 (n=428)

2. Conservation Tillage (e.g., no-till, strip-till, or ridge-till)

A. Please select the option that best describes your experience with conservation tillage. (n=670)

- 16.3% Not relevant – don't have row crops
- 2.2% Never heard of it and not willing to try it
- 3.1% Never heard of it, but might be willing to try it
- 4.5% Heard of it and not willing to try it

- 6.1% Heard of it and might be willing to try it
- 1.2% Used it in the past and not willing to try it again
- 12.2% Used it in the past and might be willing to try it again
- 54.3% Currently use it

B. On what percentage of your cropland do you use conservation tillage? (n=376)

- 8.2% 1-25%
- 21.8% 26-50%
- 29.8% 51-75%
- 40.2% 76-100%

How much do the following factors limit your ability to implement conservation tillage?

	Not at all (1)	A little (2)	Some (3)	A lot (4)	Don't Know (5)	Mean (Without 5) (n)
C. Don't know how to do it (n=489)	76.5%	12.7%	2.7%	0.4%	7.8%	1.2 (n=451)
D. Time required (n=484)	68.8%	14.3%	9.3%	0.6%	7.0%	1.4 (n=450)
E. Cost (n=482)	53.9%	18.9%	14.7%	4.8%	7.7%	1.7 (n=445)
F. The physical features of my property make it difficult (n=485)	70.5%	13.6%	6.6%	1.9%	7.4%	1.4 (n=449)
G. Lack of information about effects on yields (n=485)	57.3%	17.9%	12.2%	2.7%	9.9%	1.6 (n=437)
H. Desire to continue traditional farming practices/methods (n=483)	58.2%	18.2%	12.2%	3.7%	7.7%	1.6 (n=446)
I. Disapproval from others (n=484)	76.9%	9.7%	3.1%	0.6%	9.7%	1.2 (n=437)
J. Hard to use with my farming operation (n=483)	61.7%	18.6%	9.5%	3.1%	7.0%	1.5 (n=449)
K. Lack of equipment/technology (n=483)	49.1%	19.5%	15.9%	8.3%	7.3%	1.8 (n=448)
L. Insufficient proof of erosion protection (n=483)	64.0%	16.8%	7.0%	1.5%	10.8%	1.4 (n=431)
M. Insufficient proof of soil health benefit (n=485)	60.0%	18.8%	7.6%	2.3%	11.3%	1.5 (n=430)
N. Insufficient proof of water quality benefit (n=479)	58.5%	19.6%	8.1%	1.9%	11.9%	1.5 (n=422)

3. Grass or Tree Buffers

A. Please select the option that best describes your experience with grass or tree buffers. (n=652)

- 16.9% Not relevant – don’t have row crops
- 3.4% Never heard of it and not willing to try it
- 3.2% Never heard of it, but might be willing to try it
- 3.7% Heard of it and not willing to try it
- 14.9% Heard of it and might be willing to try it
- 4.1% Used it in the past and might be willing to try it again
- 53.8% Currently use it

B. On what percentage of your field or ditch borders do you use grass or tree buffers? (n=363)

- 32.0% 1-25%
- 12.4% 26-50%
- 13.2% 51-75%
- 42.4% 76-100%

How much do the following factors limit your ability to implement grass or tree buffers?

	Not at all (1)	A little (2)	Some (3)	A lot (4)	Don't Know (5)	Mean (Without 5) (n)
C. Don't know how to do it (n=459)	78.4%	10.7%	4.6%	1.1%	5.2%	1.2 (n=435)
D. Time required (n=456)	61.4%	18.4%	11.6%	2.9%	5.7%	1.5 (n=430)
E. Cost (n=454)	47.4%	18.9%	18.5%	7.5%	7.7%	1.8 (n=419)
F. The physical features of my property make it difficult (n=454)	67.8%	13.7%	9.3%	3.3%	6.0%	1.4 (n=427)
G. Lack of information about effects on yields (n=452)	65.0%	13.5%	9.3%	1.6%	10.6%	1.4 (n=404)
H. Desire to continue traditional farming practices/methods (n=457)	69.2%	12.7%	9.4%	2.0%	6.8%	1.4 (n=426)
I. Disapproval from others (n=453)	80.6%	8.4%	2.7%	0.9%	7.5%	1.2 (n=419)
J. Hard to use with my farming operation (n=456)	69.1%	14.7%	8.8%	1.8%	5.7%	1.4 (n=430)
K. Lack of equipment/technology (n=453)	65.6%	15.7%	8.8%	3.8%	6.2%	1.5 (n=425)
L. Insufficient proof of erosion protection (n=454)	72.9%	13.4%	4.9%	0.7%	8.2%	1.3 (n=417)
M. Insufficient proof of soil health benefit (n=455)	70.3%	13.2%	5.7%	0.9%	9.9%	1.3 (n=410)

N.	Insufficient proof of water quality benefit (n=453)	72.2%	11.3%	5.7%	0.7%	10.2%	1.3 (n=407)
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4. Controlled Drainage

A. Please select the option that best describes your experience with controlled drainage. (n=639)

- 16.3% Not relevant – don't have row crops
- 12.2% Never heard of it and not willing to try it
- 20.2% Never heard of it, but might be willing to try it
- 10.3% Heard of it and not willing to try it
- 27.7% Heard of it and might be willing to try it
- 0.3% Used it in the past and not willing to try it again
- 1.9% Used it in the past and might be willing to try it again
- 11.1% Currently use it

B. On what percentage of your cropland drains through controlled drainage? (n=76)

- 27.6% 1-25%
- 19.7% 26-50%
- 18.4% 51-75%
- 34.2% 76-100%

How much do the following factors limit your ability to implement controlled drainage?

	Not at all (1)	A little (2)	Some (3)	A lot (4)	Don't Know (5)	Mean (Without 5) (n)
C. Don't know how to do it (n=309)	41.1%	22.3%	18.8%	6.8%	11.0%	1.9 (n=275)
D. Time required (n=304)	28.0%	25.7%	26.3%	6.9%	13.2%	2.1 (n=264)
E. Cost (n=305)	17.1%	17.1%	30.5%	24.6%	10.8%	2.7 (n=272)
F. The physical features of my property make it difficult (n=304)	37.8%	20.7%	18.1%	10.9%	12.5%	2.0 (n=266)
G. Lack of information about effects on yields (n=305)	35.1%	23.3%	22.0%	5.6%	14.1%	2.0 (n=262)
H. Desire to continue traditional farming practices/methods (n=303)	58.8%	16.9%	10.2%	2.6%	11.6%	1.5 (n=268)
I. Disapproval from others (n=301)	72.1%	9.6%	4.3%	2.7%	11.3%	1.3 (n=267)
J. Hard to use with my farming operation (n=304)	43.4%	25.3%	8.2%	10.5%	12.5%	1.8 (n=266)
K. Lack of equipment/technology (n=303)	34.7%	22.1%	17.2%	15.8%	10.2%	2.2 (n=272)

L.	Insufficient proof of erosion protection (n=303)	47.5%	19.1%	14.9%	4.6%	13.9%	1.7 (n=261)
M.	Insufficient proof of soil health benefit (n=302)	47.7%	17.9%	13.9%	4.0%	16.6%	1.7 (n=252)
N.	Insufficient proof of water quality benefit (n=302)	50.0%	18.5%	13.3%	3.6%	14.6%	1.7 (n=258)

5. Two-Stage Ditch

A. Please select the option that best describes your experience with two-stage ditches. (n=664)

- 22.0% Not relevant – don't have ditches
- 15.7% Never heard of it and not willing to try it
- 27.7% Never heard of it, but might be willing to try it
- 9.9% Heard of it and not willing to try it
- 20.9% Heard of it and might be willing to try it
- 0.3% Used it in the past and not willing to try it again
- 0.8% Used it in the past and might be willing to try it again
- 2.7% Currently use it

B. On what percentage of your ditches do you use two-stage ditches? (n=21)

- 57.1% 1-25%
- 23.8% 26-50%
- 4.8% 51-75%
- 14.3% 76-100%

How much do the following factors limit your ability to implement two-stage ditches?

	Not at all (1)	A little (2)	Some (3)	A lot (4)	Don't Know (5)	Mean (Without 5) (n)
C. Don't know how to do it (n=223)	33.6%	25.6%	13.9%	9.9%	17.0%	2.0 (n=185)
D. Time required (n=219)	21.5%	17.8%	29.7%	14.6%	16.4%	2.4 (n=183)
E. Cost (n=217)	9.7%	8.3%	28.1%	39.6%	14.3%	3.1 (n=186)
F. The physical features of my property make it difficult (n=220)	30.0%	17.3%	24.1%	13.6%	15.0%	2.3 (n=187)
G. Lack of information about effects on yields (n=218)	34.9%	17.9%	18.8%	10.6%	17.9%	2.1 (n=179)
H. Desire to continue traditional farming practices/methods (n=217)	47.9%	20.3%	11.5%	5.1%	15.2%	1.7 (n=184)
I. Disapproval from others (n=217)	61.8%	11.1%	7.4%	4.2%	15.7%	1.5 (n=183)

J.	Hard to use with my farming operation (n=214)	37.4%	24.8%	18.2%	4.2%	15.4%	1.9 (n=181)
K.	Lack of equipment/technology (n=215)	28.8%	15.4%	21.4%	17.2%	17.2%	2.3 (n=178)
L.	Insufficient proof of erosion protection (n=218)	39.9%	18.8%	17.0%	6.4%	17.9%	1.9 (n=179)
M.	Insufficient proof of soil health benefit (n=216)	39.4%	19.4%	16.7%	6.5%	18.1%	1.9 (n=177)
N.	Insufficient proof of water quality benefit (n=215)	41.4%	16.7%	16.7%	6.5%	18.6%	1.9 (n=175)

6. Conservation Plan

A. Please select the option that best describes your experience with a conservation plan. (n=647)

- 19.5% Never heard of it and not willing to try it
- 27.5% Never heard of it, but might be willing to try it
- 7.1% Heard of it and not willing to try it
- 23.8% Heard of it and might be willing to try it
- 0.6% Used it in the past and not willing to try it again
- 4.3% Used it in the past and might be willing to try it again
- 17.2% Currently use it

B. I follow all of the guidelines set forth by my conservation plan. (n=132)

- 21.2% Strongly agree
- 59.1% Agree
- 16.7% Neither agree or disagree
- 2.3% Disagree
- 0.8% Strongly disagree

How much do the following factors limit your ability to implement a conservation plan?

	Not at all (1)	A little (2)	Some (3)	A lot (4)	Don't Know (5)	Mean (Without 5) (n)
C. Don't know how to do it (n=326)	44.8%	23.6%	12.3%	3.4%	16.0%	1.7 (n=274)
D. Time required (n=322)	30.1%	24.8%	22.1%	6.5%	16.5%	2.1 (n=269)
E. Cost (n=324)	26.2%	21.9%	24.4%	11.1%	16.4%	2.2 (n=271)
F. The physical features of my property make it difficult (n=320)	47.8%	17.8%	13.3%	3.4%	17.8%	1.7 (n=263)
G. Lack of information about effects on yields (n=315)	41.9%	18.1%	14.0%	4.4%	21.6%	1.8 (n=247)

H.	Desire to continue traditional farming practices/methods (n=315)	57.1%	15.6%	10.5%	2.5%	14.3%	1.5 (n=270)
I.	Disapproval from others (n=316)	69.6%	8.5%	2.9%	1.0%	18.0%	1.2 (n=259)
J.	Hard to use with my farming operation (n=316)	51.0%	17.7%	10.1%	2.9%	18.4%	1.6 (n=258)
K.	Lack of equipment/technology (n=318)	40.3%	17.6%	16.7%	6.6%	18.9%	1.9 (n=258)
L.	Insufficient proof of erosion protection (n=317)	49.2%	19.2%	9.5%	2.2%	19.9%	1.6 (n=254)
M.	Insufficient proof of soil health benefit (n=317)	51.4%	17.4%	9.2%	1.9%	20.2%	1.5 (n=253)
N.	Insufficient proof of water quality benefit (n=316)	51.0%	17.4%	8.5%	2.5%	20.6%	1.5 (n=251)

7. Nutrient Management Plan/Waste Utilization

A. Please select the option that best describes your experience with a nutrient management plan. (n=664)

- 63.3% Not relevant – don't have livestock
- 6.0% Never heard of it and not willing to try it
- 5.9% Never heard of it, but might be willing to try it
- 3.3% Heard of it and not willing to try it
- 8.3% Heard of it and might be willing to try it
- 0.3% Used it in the past and not willing to try it again
- 2.7% Used it in the past and might be willing to try it again
- 10.2% Currently use it

B. Who helped you develop your nutrient management plan?

- 31.0% Soil and Water Conservation District (SWCD) or Natural Resources Conservation Service (NRCS) (n=22)
- 4.4% University Extension (n=3)
- 62.5% A private sector agronomist or crop consultant (n=45)
- 28.4% I created my own plan (n=21)
- 5.6% Don't know (n=4)
- 8.8% Other (please specify) (see Appendix A) (n=6)

C. What is included in your nutrient management plan?

- 67.1% Commercial nutrients (n=49)
- 79.2% Livestock manure (n=61)
- 2.9% Septic waste (n=2)
- 2.9% Municipal sludge (n=2)
- 0.0% Industrial sludge (n=0)
- 4.2% Don't know (n=3)

2.9% Other (please specify) (see Appendix A) (n=2)

D. I follow all of the guidelines set forth by my nutrient management plan. (n=79)

- 31.7% Strongly agree
- 46.8% Agree
- 20.3% Neither agree or disagree
- 1.3% Disagree
- 0.0% Strongly disagree

E. Do you feel you have enough storage space for manure so that you can apply when needed? (n=73)

- 15.1% Yes
- 84.9% No

F. What percentage of your manure/nutrients are applied at the following times?

	0% (1)	1-25% (2)	26-50% (3)	51-75% (4)	76-100% (5)	Mean
Winter (pre-plant) (n=46)	43.9%	39.1%	17.4%	0.0%	0.0%	1.7
Fall (pre-plant) (n=60)	13.3%	30.0%	21.7%	16.7%	18.3%	3.0
Spring (pre-plant) (n=49)	16.3%	34.7%	28.6%	6.1%	14.3%	2.7
Spring (at planting) (n=38)	26.3%	44.7%	10.5%	5.3%	13.2%	2.3
Summer (side-dress) (n=49)	20.4%	32.7%	26.5%	8.2%	12.2%	2.6

How much do the following factors limit your ability to implement a conservation plan?

	Not at all (1)	A little (2)	Some (3)	A lot (4)	Don't Know (5)	Mean (Without 5) (n)
G. Don't know how to do it (n=153)	63.4%	14.4%	7.2%	2.0%	13.1%	1.4 (n=133)
H. Time required (n=148)	43.2%	26.4%	14.9%	5.4%	10.1%	1.8 (n=133)
I. Cost (n=150)	42.0%	22.0%	18.0%	8.7%	9.3%	1.9 (n=136)
J. The physical features of my property make it difficult (n=147)	69.4%	11.6%	5.4%	2.7%	10.9%	1.3 (n=131)
K. Lack of information about effects on yields (n=146)	63.7%	15.8%	6.2%	2.7%	11.6%	1.4 (n=129)
L. Desire to continue traditional farming practices/methods (n=149)	67.8%	17.5%	5.4%	0.7%	8.7%	1.3 (n=136)
M. Disapproval from others (n=147)	76.9%	7.5%	2.7%	2.0%	10.9%	1.2 (n=131)

N.	Hard to use with my farming operation (n=145)	65.5%	14.9%	7.6%	2.8%	9.7%	1.4 (n=131)
O.	Lack of equipment/technology (n=146)	54.1%	22.6%	8.9%	5.5%	8.9%	1.6 (n=133)
P.	Insufficient proof of erosion protection (n=146)	58.2%	18.5%	4.8%	2.1%	16.4%	1.4 (n=122)
Q.	Insufficient proof of soil health benefit (n=146)	61.6%	17.1%	4.8%	1.4%	15.1%	1.4 (n=124)
R.	Insufficient proof of water quality benefit (n=146)	61.0%	19.2%	4.1%	1.4%	14.4%	1.4 (n=125)

V. Sources of Information

To what extent do you trust the organizations listed below as a source of information about conservation practices? For each statement, please select the answer choice that best represents your opinion.

		Not at All (1)	Slightly (2)	Moderately (3)	Very Much (4)	Not Familiar (5)	Mean (Without 5) (n)
1.	Farm Service Agency (FSA) (n=664)	3.8%	9.9%	35.7%	38.1%	12.5%	3.2 (n=581)
2.	Soil and Water Conservation District (SWCD) (n=664)	4.4%	9.8%	34.9%	41.0%	9.9%	3.2 (n=598)
3.	Natural Resources Conservation Service (NRCS) (n=660)	5.6%	12.9%	30.2%	31.7%	19.7%	3.1 (n=530)
4.	Purdue University Extension (n=668)	3.1%	10.0%	31.4%	42.1%	13.3%	3.3 (n=579)
5.	Indiana State Department of Agriculture (ISDA) (n=660)	6.2%	17.1%	33.9%	19.2%	23.9%	2.9 (n=505)
6.	Indiana Department of Natural Resources (IDNR) (n=662)	9.2%	20.4%	31.1%	23.1%	16.2%	2.8 (n=555)
7.	Indiana Department of Environmental Management (IDEM) (n=662)	18.1%	24.3%	25.2%	13.3%	19.0%	2.4 (n=536)
8.	Environmental groups (e.g., The Nature Conservancy) (n=654)	28.3%	23.4%	14.5%	6.9%	26.9%	2.8 (n=478)

9.	The Farm Bureau (n=668)	7.0%	17.2%	33.8%	25.6%	16.3%	2.9 (n=559)
10.	Fertilizer representatives (n=658)	11.6%	27.8%	32.7%	12.3%	15.7%	2.5 (n=555)
11.	Crop consultants (n=655)	7.3%	17.6%	35.3%	22.3%	17.6%	2.9 (n=540)
12.	Other landowners/friends/farmers (n=666)	4.8%	20.0%	42.2%	24.0%	9.0%	2.9 (n=606)
13.	Check-off groups (e.g., corn, soybeans, dairy) (n=656)	18.8%	22.9%	26.2%	7.2%	25.0%	2.3 (n=492)
14.	Office of the Indiana State Chemist (n=659)	12.6%	16.2%	25.3%	15.8%	30.1%	2.6 (n=461)

VI. Community

For each statement, please select the answer choice that best represents your opinion.

		Strongly Disagree (1)	Disagree (2)	Neither Agree or Disagree (3)	Agree (4)	Strongly Agree (5)	Mean
1.	I plan to continue living in this community even if I am no longer farming here. (n=678)	1.6%	1.3%	7.4%	52.7%	37.0%	4.2
2.	I feel a strong sense of attachment to the land I farm. (n=682)	0.6%	0.7%	6.6%	48.5%	43.6%	4.3
3.	I identify strongly with the community I live in. (n=675)	0.7%	0.7%	11.9%	57.8%	28.9%	4.1
4.	I really depend on my community for the important things in my life. (n=674)	1.8%	5.2%	26.9%	49.1%	17.1%	3.7
5.	The way I manage my farm says very little about who I am. (n=675)	22.1%	38.7%	18.5%	16.9%	3.9%	2.4
6.	I plan to continue living on my land even if I can't make money from farming it. (n=672)	3.1%	9.1%	22.9%	44.9%	19.9%	3.7
7.	No other place can compare to this area for the farming I do. (n=672)	2.7%	15.0%	42.3%	30.2%	9.8%	3.3

8.	The community I live in says a lot about the type of person I am. (n=675)	5.6%	16.7%	34.8%	35.4%	7.4%	3.2
9.	Farming in another place would be better. (n=673)	12.3%	29.7%	49.2%	7.0%	1.8%	2.6
10.	I do not feel a strong sense of attachment to this particular community. (n=672)	21.9%	49.0%	18.2%	8.8%	2.2%	2.2
11.	Living in another community would be better. (n=674)	22.6%	41.4%	32.9%	2.1%	1.0%	2.2
12.	I identify strongly with the land I farm. (n=670)	1.2%	2.1%	18.4%	55.1%	23.3%	4.0
13.	It is important to me to keep my community vibrant for future generations. (n=669)	0.8%	0.9%	11.4%	63.1%	23.9%	4.1
14.	I really miss my community when I am away too long. (n=673)	2.1%	6.8%	39.4%	42.9%	8.8%	3.5
15.	It is important to me to take care of the land I farm for future generations. (n=678)	0.4%	0.3%	5.3%	58.1%	35.8%	4.3
16.	I really feel that I can be myself in my community. (n=669)	0.9%	2.2%	18.7%	61.1%	17.0%	3.9
17.	As far as I am concerned, there are more ideal places to farm. (n=671)	8.6%	24.1%	47.7%	16.1%	3.4%	2.8
18.	I feel happiest when I am away from my farm. (n=669)	30.0%	50.4%	17.5%	1.4%	0.8%	1.9
19.	My farm is an important part of who I am. (n=674)	0.7%	2.7%	16.2%	55.5%	24.9%	4.0
20.	For the things I enjoy most, other communities would be preferable to live in. (n=673)	18.7%	39.7%	34.8%	5.8%	1.0%	2.3

VII. About Your Farming Operation

1. How many years have you been farming? (n=631)

Range: 0-100

Mean: 33.0

- 2. Please estimate the total acreage (owned and/or rented in any watershed) of your farming operation in 2014. (n=662)**

Total owned acres:

Range: 0-2100

Mean: 169.7

Total rented acres:

Range: 0-8000

Mean: 293.1

- 3. Please estimate the total acreage of your farming operation in 2014 (owned and/or rented) in the portion of the St. Mary's watershed indicated on the map on the front cover of this survey. (n=648)**

Owned acres in area on map:

Range: 0-1600

Mean: 125.3

Rented acres in area on map:

Range: 0-7000

Mean: 197.2

- 4. Please estimate the total acreage (owned and/or rented) of your farming operation that is located within the portion of the St. Mary's watershed indicated on the map upon which manure was spread in 2014. (n=598)**

Owned acres manure spread:

Range: 0-620

Mean: 17.9

Rented acres manure spread:

Range: 0-750

Mean: 18.4

- 5. What percentage of the manure originated from inside the portion of the St. Mary's watershed indicated on the map? (n=482)**

Range: 0-1000

Mean: 27.5

- 6. In 2014, how many acres of each of the following did you manage in the portion of the St. Mary's watershed indicated on the map? If none, please enter a zero. (n=)**

a. Corn acres (n=584)

Range: 0-1865

Mean: 128.0

Corn acres in no-till, strip-till, or ridge-till:

Range: 0-1865

Mean: 50.5

Corn acres in cover crops:

Range: 0-500

Mean: 9.5

b. Soybean acres (n=564)

Range: 0-6000

Mean: 156.4

Soybean acres in no-till, strip-till, or ridge-till:

Range: 0-6000

Mean: 143.0

Soybean acres in cover crops:

Range: 0-600

Mean: 7.7

c. Small grain acres (n=507)

Range: 0-600

Mean: 18.7

d. Canning crop acres (n=471)

Range: 0-20

Mean: 0.1

e. Clover/Alfalfa acres (n=504)

Range: 0-200

Mean: 5.7

f. Pasture acres (n=508)

Range: 0-80

Mean: 2.0

g. Forest/woodland acres (n=511)

Range: 0-170

Mean: 10.0

h. Non-row crops for energy acres (n=455)

Range: 0-9.7

Mean: 0.1

i. Total conservation acres set aside (n=461)

Range: 0-303

Mean: 4.5

Conservation Reserve Program (CRP) acres:

Range: 0-2000

Mean: 10.7

Wetland Reserve Program (WRP) acres:

Range: 0-177

Mean: 0.7

Healthy Forest Reserve Program (HFRP) acres:

Range: 0-72

Mean: 0.7

j. Other (specify): See Appendix A (n=43)

7. How many of the following animals are part of your farming operation in the portion of the St. Mary's watershed indicated on the map? If none, please enter a zero.

a. Dairy cattle, including heifers and young stock (n=533)

Range: 0-1500

Mean: 8.6

b. Beef cattle, including young stock (n=527)

Range: 0-300

Mean: 4.1

c. Hogs (n=517)

Range: 0-30000

Mean: 132.1

d. Poultry (n=511)

Range: 0-134000

Mean: 530.4

e. Horses (n=531)

Range: 0-50

Mean: 0.9

f. Other livestock (specify): See Appendix A (n=24)

8. Who is responsible for making decisions about the following agricultural practices on the land you rent from others?

	Primarily tenant (1)	Landowner and tenant (2)	Primarily landowner (3)	Farm management firm and landowner (4)	Farm management firm and tenant (5)	Primarily farm management firm (6)	Does not apply (7)	Mean (without 7) (n)
A. Crops grown/rotation (n=563)	37.3%	17.8%	9.1%	1.1%	0.2%	2.0%	32.7%	1.7 (n=379)
B. Tillage practices (n=560)	41.1%	14.1%	9.1%	0.9%	0.2%	2.0%	32.7%	1.7 (n=377)
C. Fertilizer application (n=556)	43.0%	12.1%	8.5%	0.9%	0.7%	2.3%	32.6%	1.7 (n=375)
D. Installation of structures (n=553)	14.7%	28.8%	17.2%	1.3%	0.4%	1.1%	36.7%	2.2 (n=350)
E. Manure management (n=543)	21.2%	8.5%	6.8%	0.6%	0.4%	0.9%	61.7%	1.8 (n=208)

9. Does the property you manage in the portion of the St. Mary's watershed indicated on the map touch a stream, river, lake, or wetland? (n=628)

58.6% Yes

41.4% No

10. Does your livestock access the stream in the portion of the St. Mary's watershed indicated on the map? (n=370)

- 3.0% Yes
- 33.0% No
- 64.1% Not applicable/no livestock

11. Five years from now, which statement will best describe your farm operation? (n=631)

- 49.6% It will be about the same size as it is today.
- 16.2% It will be larger.
- 1.9% It will be smaller.
- 32.3% I don't know.

12. Do you currently live in the portion of the watershed indicated on the map? (n=636)

- 82.4% Yes
- 17.6% No

VIII. About You

1. What is your gender? (n=699)

- 91.6% Male
- 8.4% Female

2. What is your age? (n=688)

- Range: 19-96
- Mean: 61.1

3. What is the highest level of school you have completed? (n=679)

- 10.5% Some formal schooling
- 40.4% High school diploma / GED
- 15.6% Some college
- 11.6% 2 year college degree
- 14.4% 4 year college degree
- 7.5% Post-graduate degree

4. 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) (n=690)

- 43.3% None
- 10.3% 1-49 days
- 4.9% 50-99 days
- 7.0% 100-199 days
- 34.5% 200 days or more

Appendix B - English Farmer Interview Guide

Interview Guide-WLEB Project English Farmers

In this interview I am going to be asking you some questions about your farm, your community, conservation practices, and the farming practices you use. We will use your responses to achieve a clearer picture of land management in this area. Your participation in in this interview is completely voluntary. If you choose to participate in this interview, your responses will remain confidential and your name will never be used in any report or publication. You may skip any questions you do not want to answer and you can stop the interview at any time.

Are you willing to participate in the interview? Do you mind if I record this interview for transcription purposes?

Background

1. Could you tell me about your farm?
 - a. How many acres do you own and manage (rent/manage and own/rent out)?
 - b. What do you farm? (row crops/livestock)
 - c. Does this property touch any water? (e.g., stream, wetland, ditch, etc.)

Sense of Place/Community Questions

2. How long has your family lived and been farming in this area?
 - a. If you have children, do you think they will continue farming your land? Do you want them to?
3. In what ways are you involved in your community? (school, church, local food group, etc.)
4. In what ways do you feel connected or attached to the community in which you live?
(*place/community attachment*)
5. In what ways do you feel connected or attached to the land that you farm? (*farm attachment*)
6. What do you think your land, being a farmer, and the way you take care of your land says about you as a person? (*farmer identity*)
7. What do you think the community in which you live says about you as a person?/ Do you think people infer something about you as a person because of the community that you live in?
(*place/community identity*)
8. What is it about the land you farm that makes you think it a good (or bad) place to farm? (*farm dependence*)
9. What is it about this community that makes you want to stay (or leave) here? (*place/community dependence*)
10. How would you describe your community to someone who has never been here before?
(*place/community meanings*)
11. How would you describe your farm to someone who has never been there before? (*farm meanings*)

Local/Broader Water Quality Concerns

12. Are you concerned about any water quality issues on your farm?

- a. If yes, what? What do you see as the sources of the problems?
 - i. What do you see as the major limitations or barriers to addressing these problems?
- 13. Are you concerned with any broader water quality issues? For example, in the area, regionally or nationally?
 - a. If yes, what? What do you see as the sources of the problems?
 - i. What do you see as the major limitations/barriers to addressing these problems?
- 14. What do you think is the most pressing environmental issue associated with farming?
 - a. (If applicable) Why did you rank this as worse?
 - b. Do you have any other environmental concerns related to farming?
 - i. If yes, what? Also, why do you think it is a problem?

Conservation Practice Adoption/Attitudes

- 15. What conservation practices have you adopted? (e.g., cover crops, conservation tillage, grass or tree buffers, controlled drainage, two-stage ditches, conservation plan, nutrient management plan/waste utilization)
 - a. What influenced you to adopt these practices?
 - b. What are some of the benefits to using these practices?
 - c. What are some of the challenges?
 - d. (If none) What are some of the factors limiting your adoption?
 - i. What might influence you to adopt some practices?
- 16. Are there any conservation practices you are considering adopting in the future?
 - a. If yes, what practices and why?
- 17. Is any of the land that you operate enrolled in a conservation program or has it been in the past?
 - a. If yes, what programs?
 - i. What made you decide to enroll your land?
 - b. If no, why not?
 - i. What might influence you to do so?
- 18. There are a lot of Amish farmers living in the area. How would you say the way you or other English farmers farm is different from Amish farmers in general?
 - a. What are your perceptions on their use of conservation practices?
- 19. We are also interested in the role of religion in farming practices. Do you consider yourself religious?
 - a. If yes, do your religious beliefs play a role in how you take care of your land? How so?

Marginal Land Questions

- 20. We are also interested in how farmers perceive marginal land. What do you consider to be marginal farmland? (*Poor soil, slope, river bank, environmental sensitivity*)
 - a. What do you think the advantages and disadvantages are to owning marginal land?
- 21. Do you have any marginal land? (If yes: Why marginal? *Poor soil, slope, river bank, environmental sensitivity* Acreage? Go to a, b, c) (if no: Q22)
 - a. How do you manage this (marginal) land?
 - b. Have you had marginal land enrolled in a conservation program? (if yes: what programs and for how long?)

22. Has what you consider to be marginal land changed over time? (What has changed? How? Why? Year to year? Season to season?)
- a. If crop prices were to go up, might you put some of your marginal land back in production?

Background/Demographic Questions

23. Just so I can get an overall picture of the demographics of people I am interviewing, do you mind telling me your:
- a. Age
 - b. Highest grade in school you have completed? (If college, what coursework/degree?)
 - c. **(Don't ask)** gender

Do you have any additional comments or questions?

Appendix C - Amish Farmer Interview Guide

Interview Guide-WLEB Project Amish Farmers

In this interview I am going to be asking you some questions about your farm and how you take care of it, your community, and your views on water problems. We will use your answers to get a better idea of how farmers take care of their land in this area. Your participation in in this interview is completely voluntary. If you choose to participate in this interview, your responses will not be associated with your name in any report or publication. You may skip any questions you do not want to answer and you can stop the interview at any time.

Are you willing to participate in the interview? Do you mind if I record this interview so that I can more easily remember your responses?

Background

24. Could you tell me about your farm?
 - a. How many acres do you own and manage (rent/manage and own/rent out)?
 - b. What do you farm? (row crops/livestock)
 - c. Does this property touch any water? (e.g., stream, wetland, ditch, etc.)

Sense of Place/Community Questions

25. How long has your family lived and been farming in this area?
 - a. If you have children, do you think they will continue farming your land? Do you want them to?
26. People have different ideas of what “community” means to them. When I ask about community here, I am just referring to the people you live near to that you interact with on a regular basis, so your friends, family, acquaintances, church, or businesses you frequent. In what ways are you involved in your community? (school, church, local food group, etc.)
27. In what ways do you feel connected or attached to the community in which you live?
(*place/community attachment*)
28. In what ways do you feel connected or attached to the land that you farm? (*farm attachment*)
29. What do you think your land, being a farmer, and the way you take care of your land says about you as a person? (*farmer identity*)
30. What do you think the community in which you live says about you as a person?/ Do you think people infer something about you as a person because of the community that you live in?
(*place/community identity*)
31. What is it about the land you farm that makes you think it a good (or bad) place to farm? (*farm dependence*)
32. What is it about this community that makes you want to stay (or leave) here? (*place/community dependence*)
33. How would you describe your community to someone who has never been here before?
(*place/community meanings*)
34. How would you describe your farm to someone who has never been there before? (*farm meanings*)

Local/Broader Water Quality Concerns

35. Are you concerned about any water quality issues on your farm?
 - a. If yes, what? What do you see as the sources of the problems?
 - i. What do you see as the major limitations or barriers to addressing these problems?
36. Are you concerned with any broader water quality issues? For example, in the area, regionally or nationally?
 - a. If yes, what? What do you see as the sources of the problems?
 - i. What do you see as the major limitations/barriers to addressing these problems?
37. What do you think is the biggest environmental issue associated with farming?
 - a. (If applicable) Why did you rank this as worse?
 - b. Do you have any other environmental concerns related to farming?
 - i. If yes, what? Also, why do you think it is a problem?

Conservation Practice Adoption/Attitudes

38. Can you describe your current tillage practices (if have row crops)?
39. How do you farm near the water sources on your property (if touch any)?
40. How have you changed your farming practices in the last 10 years?
 - a. Have made any of these changes to reduce erosion, improve water quality, or because of concerns about the natural environment?
 - b. Have you used any of the following practices: cover crops, conservation tillage, grass or tree buffers, controlled drainage, two-stage ditches, conservation plan, nutrient management plan/waste utilization?
 - i. If yes, what influenced you to adopt these practices?
 - ii. What are some of the benefits to using these practices?
 - iii. What are some of the challenges?
 - c. (If none) Are there any reasons why not?
 - i. Is there anything that might get you to change your farming practices?
41. Are there any new farming practices you are thinking about using in the future?
 - a. If yes, what practices and why?
42. Is any of the land that you operate enrolled in any programs aimed at improving the water or soil health or has it been in the past?
 - a. If yes, what programs?
 - i. What made you decide to enroll your land?
 - b. If no, why not and are you aware of any programs or organizations that run such programs?
 - i. What might influence you to do so?
43. How would you say the way you or other Amish farmers farm is different from English farmers in general?
 - a. What about with practices aimed at improving soil or water health?

Religion and Farming

44. Do your religious beliefs influence how you take care of your land? How so?
 - a. Do you get direction from your bishops on practices you should use?
 - b. Does the bible you use say anything about how you should take care of your land?
45. Do you think religion plays a role in your community's farming practices? (for leaders, not farmers)

Background/Demographic Questions

46. Just so I can get an overall picture of the demographics of people I am interviewing, do you mind telling me your:
 - d. Age
 - e. Highest grade in school you have completed? (If college, what coursework/degree?)
 - f. **(Don't ask)** gender

Do you have any additional comments or questions?