Minnesota Ag Water Quality Certification Program

Knowledge, Attitudes and Practices (KAP) Study
Final Report

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Consultant's Report

Executive Summary

1. To better inform the implementation process of the Minnesota Agricultural Water Quality Certification Program (MAWQCP), the University of Minnesota (UMN) carried out a longitudinal KAP (knowledge, attitudes and practices) study process in three pilot watersheds. The purpose was to

a) Provide MAWQCP with baseline information about the knowledge, attitudes and practices of farmers in the pilot watersheds;

b) Assess the capacity of the producers, communities and local organizations and to understand motivational and incentive actions for each; and

c) Enable MAWQCP to better scope communications and outreach efforts.

In addition, the study was intended to help MDA and its partners plan, target and evaluate the MAWQCP. The major focus of this study is individual agricultural producers in three pilot Minnesota watersheds: Middle Sauk, Whiskey Creek and Whitewater. The three watersheds differ in crops and production systems, agronomic practices, topography, rainfall and other environmental parameters. These were taken into account in the survey, and variables were adapted to local conditions.

2. First-round formative KAP studies were completed in 2014, and second-round summative studies in 2016. Methodology included a modified KAP study (knowledge, attitudes, practices) (Eckman *et al* 2013; Eckman 2013) using the Dillman Total Design Method (Dillman 2008). IRB exemption was obtained for the study from the University of Minnesota Office of the Vice President for Research. 1453 respondents were included in the sample, and the combined pre/post total response rate was 66%. In general, one would expect to see improvements in knowledge, attitude and practices variables over time in the program. Those values showing mixed results or a decline are flagged in the report, as they indicate the need for more information, outreach, or other programmatic strategies.

3. Study findings revealed that ownership and land tenancy patterns are complex, with the number of owner-operators in decline and cash-rent producers increasing. Less than half of agricultural landowners in Whitewater and Whiskey Creek actively farm their own land. Many producers simultaneously farm their own land, rent land from others, and rent out parcels to other producers. There are significant differences between owner-operators and land owners renting their land to others in their knowledge, attitudes and practices. It is likely that the two groups will not respond equally to the same messages. That is, informational messages should be developed that are tailored to each group. Owners renting their land to others do not appear to be familiar with the practices of their renters. There has been little prior research on tenancy in Minnesota, and MDA should consider a study to better understand the needs and priorities of non-owner operators.

4. Knowledge questions

- There may be confusion by some respondents between the MAWQCP and the Corporate Farm Certificate Renewal process, for those respondents who have registered corporate farms (http://www.mda.state.mn.us/licensing/licensetypes/corpfarmreport.aspx), as suggested in some respondent comments.

- In general there was improvement in the knowledge variables in all three watersheds. There were mixed results in Middle Sauk and Whiskey Creek on respondents' ability to identify the biggest water

quality challenge in their watershed. For Middle Sauk, there were mixed results on the ability of respondents to identify the primary pollutant of concern.

• There were unusually high frequencies of "Don't know" responses in all three watersheds in both 2014 and 2016 surveys, suggesting considerable uncertainty in knowledge and especially attitudes. There were also very high "Don't know" responses from landowners who rent their land to others, with landowners apparently unaware of what their tenants are doing. In fact the study sampling frame did not include renters, who may now constitute more than half of all producers in the pilot watersheds.

• A significant number of respondents could not identify the biggest surface water quality challenge in their watershed (44% in Middle Sauk and 63% in Whiskey Creek). Whitewater had much higher awareness of water quality challenges than did either Middle Sauk or Whiskey Creek. This suggests a clear opportunity and need for outreach and education on the status of local water bodies, especially for Middle Sauk and Whiskey Creek.

5. Attitudes questions

• As expected, attitudes were very mixed in this study. Attitudes are among the most complex variables to measure, since they are influenced by many factors (weather, the economy, etc.). Several constructs did show positive trends in the two-year period (most important factor being concern for water quality and reducing soil erosion; public perception of agriculture' barriers and constraints, etc.). Other constructs showed mixed (both positive and negative) changes within a single question, and were more difficult to interpret.

• Perception of responsibility in the Whitewater watershed for water quality ranked very high in both 2014 and 2016, and even increased slightly over time. Producers in all three watersheds had declining values when considering their own impact on local streams and rivers.

• Reducing soil erosion was the strongest influence on adoption of water quality practices, along with profitability and need for a cost-share or financial incentive. Soil erosion and water quality were important concerns for producers. Paradoxically, producers in Whiskey Creek apparently have the lowest concern for water quality but have high adoption rates of clean water practices.

6. Practices questions

• In general, there were positive changes in at least two practices in every watershed. There were also many constructs with mixed (both positive and negative) changes.

• The only negative trends in practices in the survey were seen in the Whitewater watershed, which related to manure and pesticide practices.

7. Recommendations

• As noted, it is advised that MDA consider a survey of renters to understand their production decisions with regard to water quality, particularly if the program decides to include renter-operators in the future.

• The relatively high and consistent numbers of "Don't know" responses in all watersheds suggests considerable uncertainty about water quality, decision-making, and knowledge about the MAWQCP program, especially from landowners who rent their land to others. There is also high and consistent numbers of respondents indicating a need for education and technical assistance. These two outcomes highlight a need for scaling up the MAWQCP's programmatic capacity for education, training and outreach when communicating with producers. This recommendation is seen as a fundamental step toward improving programmatic outcomes in the future.

• Given that the program has been rolled out statewide, and may play a larger national role in water quality efforts in the future, it is advisable that MDA review its evaluation strategy for various program elements as the MAWQCP is scaled up. It will be important to show evidence of positive impact as additional resources are invested in the program. A practical, "evaluation-ready" strategy will greatly facilitate this process as the program expands within Minnesota and beyond.

Acknowledgements

The author thanks the Minnesota Department of Agriculture (MDA) for the opportunity to conduct this very interesting study. Special thanks to Marcie Weinandt, Brad Redlin, Margaret Wagner, Whitney Place, Craig McDonnell, and the technical staff at MDA for guiding the focus of this study. Marcie's team at MDA, along with University of Minnesota students and interns, were instrumental in administering the survey. Alec Albright, Jack Achhamer and Qi Wang played a key role in survey logistics and data analysis in the 2014 and 2016 surveys.

Three Minnesota watershed organizations took part in this study. Their staff participated in gap exercises in 2014, and reviewed the survey questionnaires. They were also instrumental in providing the sampling frames for the Whitewater, Middle Sauk and Whiskey Creek watersheds. The support and collaboration of Dennis Fuchs and Mark Lefebvre at Stearna County Soil and Water Conservation District, Sheila Harms of the Whitewater watershed Joint Powers Board, and Bruce Albright at the Buffalo-Red River Watershed District was critical to the organization of this study.

This survey could not have been done without their contribution. Support from the University of Minnesota Department of Forest Resources and Department Head Alan Ek are gratefully acknowledged. Finally, nearly five hundred agricultural land owners in three rural Minnesota watersheds took the time to respond to this survey. Their participation resulted in extraordinary response rates, and they contributed a large number of useful comments and suggestions.

Table of Contents

Acronyms

Avg	Average
BRRWD	Buffalo-Red Watershed District
CATA	Check all that apply
CFANS	College of Food, Agricultural and Natural Resources Sciences
COOR	Check only one response
DNR	Minnesota Department of Natural Resources
HSR	Human subjects research
IRB	Internal review board
KAP	Knowledge, attitudes and practices
MAWQCP	Minnesota Ag Water Quality Certification Program
MDA	Minnesota Department of Agriculture
n	number
N	Nitrogen
NSBI	Native Shoreland Buffer Incentives Project
P	Phosphorus
SWCD	Soil and water conservation district
UMN	University of Minnesota

Section 1: Introduction

The Minnesota Agricultural Water Quality Certification Program (MAWQCP) is a voluntary program for farmers and agricultural landowners to implement conservation practices that protect our water. Those who implement and maintain approved farm management practices are certified and in turn obtain regulatory certainty for a period of ten years. Through this program, certified producers receive:

- **Regulatory certainty**: certified producers are deemed to be in compliance with any new water quality rules or laws during the period of certification
- **Recognition**: certified producers may use their status to promote their business as protective of water quality
- **Priority for technical assistance**: producers seeking certification can obtain specially designated technical and financial assistance to implement practices that promote water quality

Through this program, the public receives assurance that certified producers are using conservation practices to protect Minnesota's lakes, rivers and streams. A full description of the program can be found at http://www.mda.state.mn.us/protecting/waterprotection/awqcprogram.aspx.

To inform the planning, implementation and evaluation of the program, a *knowledge, attitudes and practices (KAP) study* was conducted in three pilot watersheds: Whitewater, Middle Sauk and Whiskey Creek. A baseline (formative) KAP study was conducted in the three watersheds in 2014, and repeated as a summative study in 2016. The purpose of the KAP study was to:
a) Provide MAWQCP with baseline information about the knowledge, attitudes and practices of farmers in the pilot watersheds;
b) Assess the capacity of the producers, communities and local organizations and to understand motivational and incentive actions for each; and
c) Enable MAWQCP to better scope communications and outreach efforts.
The major focus of the study was agricultural producers and the pilot watershed communities and partners. The KAP study process focused on the social/civic engagement aspects of the MAWQCP, and explored how and why producers in the pilot watersheds adopt (or do not adopt) best management practices. The study also explored constraints and barriers to adopting recommended practices.

This report begins with a brief introduction to the MAWQCP, an explanation of the KAP study and the KAP study methodology. Section 2 compares the results of the 2014 and 2016 Middle Sauk watershed KAP studies. Section 3 compares the results of the 2014 and 2016 Whitewater watershed KAP studies. Section 4 presents a comparison of the 2014 and 2016 Whiskey Creek KAP studies. Finally, Section 5 gives a comparison of findings for all three watersheds for those questions that contained the same constructs.

Methods

The KAP study method was selected to carry out a baseline social survey on producer knowledge, attitudes and practices. This method is a customized, focused social research and evaluation tool that has been extensively used in international water, health, education and other disciplines since the 1930s (Eckman 2011; FAO undated, 1994 and 1998). However, it is relatively unknown in North America, and is a relatively new approach to measuring social outcomes in water quality projects in the United States. It has been piloted by the University of Minnesota on more than forty water quality and other

environmental projects since 2006. Benefits of the KAP method are that it is comparatively quick and cost-effective to develop and administer. It is described in Eckman (2013), and has been successfully applied as an evaluation method in other projects in Minnesota (see for example Eckman *et al* 2013; Eckman 2011; and Eckman, Fortin, Nuckles and Were 2011).

This two-time KAP study can be characterized as a *longitudinal survey,* because it featured repeated studies of the same respondents and variables over nearly three years. Longitudinal studies track a single sample of individuals, so the differences observed in those people are less likely to be the result of other external factors. Longitudinal studies make observing changes more accurate and are often applied in many disciplines and fields. The sample of producers in the three pilot MAWQCP watersheds remained the same during both KAP studies, that is, the same cohort of respondents was surveyed twice. Random probability sampling was not possible because the total numbers of producers in the watersheds was too small to allow for probability sampling. Given the relatively small sample sizes in these watersheds only descriptive statistics were used.

We performed additional statistical analyses to be certain that longitudinal data trends and two-time survey results were accurate, and were not caused by differences in sample sizes over the nearly three-year period. We performed means equivalents tests (t tests) to ensure that results from the samples could be directly compared.

Prior to beginning this study with agricultural producers, the researcher submitted a request to the University of Minnesota Internal Review Board (IRB) for exemption from Human Subjects Research review. IRB exemption was granted in 2014, allowing the KAP study to move forward. HSR IRB and federal law require that all data obtained through this study in the three watersheds be kept strictly confidential and securely stored, and that data and comments obtained not be shared or publicized.

The pilot watershed studies began in 2014 with a "gap exercise," a brainstorming session with local SWCD and MDA staff and local stakeholders that focused on identifying gaps in the team's knowledge about producers and their practices in that specific pilot watershed. The gap exercise resulted in a long list of issues that various team members felt should be investigated in the study. This list was prioritized, refined and converted into a draft questionnaire in Microsoft Word for discussion and further refinement among team members. The draft questionnaire was then entered into a draft Survey Monkey format. The draft questionnaire was reviewed and pre-tested by team members, adapted for each pilot watershed, pre-tested and finalized. In total twenty-four questions were asked. The questions were split between knowledge questions, attitudinal questions, and questions about agricultural practices. The following table summarizes the questions developed for the local context prevailing in each pilot watershed.

Figure 1: Questionnaire constructs

Question and format	Whitewater	Middle Sauk	Whiskey Creek
Knowledge questions	- Awareness of landscape features - Manure management - Calculating N rates - WQ challenges - Primary pollutant of concern - Awareness of MAWQCP	- Awareness of landscape features - N recs for corn - Calculating N rates - BMP for corn on sandy soils - Fall application of anhydrous ammonia - WQ challenges - Primary pollutant of concern - Awareness of MAWQCP	- N recs for corn and sugar beets - WQ challenges - Primary pollutant of concern - Awareness of MAWQCP
Attitudes questions	- What influences N decisions - What influences WQ decisions - Most important factor in decision-making - Your operation's WQ impact on local waters? - Public perception - Responsibility for WQ - Barriers to WQ practices - Fostering WQ practices - Interest in joining MAWQCP	- Most important WQ issue - Your operation's WQ impact on local waters? - Most important factor in decision-making - What influences WQ decisions - Barriers to WQ practices - Fostering WQ practices - Interest in joining MAWQCP	- Consider drainage water mgmt? - Conflict resolution - Most important factor in decision-making - What influences WQ decisions - Most important WQ issue - Your operation's WQ impact on local waters? - Barriers to WQ practices - Fostering WQ practices - Interest in joining MAWQCP
Practices questions	- Use of conservation structures - Livestock grazing - Manure practices - Nitrogen practices - N rate - Pesticide practices - Do you affect renter practices	- Tillage practices - Pesticide practices - Phosphorus practices - N management practices - Manure practices	- Tillage practices - Pesticide practices - N management practices - UMN Extension N recs - Stream buffer - Use of drainage water mgmt
General/demographic	- Type of ag operation and ownership - Production system/crops - Information sources	- Type of ag operation and ownership - Participation in WQ programs - Information sources	- Type of ag operation and ownership - Participation in WQ programs - Information sources

The sampling frames for each pilot were provided by the three local watershed districts, and included property owners of agricultural land in the watershed. Following the Dillman Tailored Design Method (Dillman 2008), an introductory letter from the local watershed board was then mailed to those identified in the sampling frame, informing them that a survey would be sent to them. HSR exemption had already been granted by the University of Minnesota Internal Review Board, so the survey could proceed. A survey packet with another letter, the questionnaire, and a self-addressed stamped envelope was sent to respondents, and followed up with a reminder postcard. An on-line survey open was also given to respondents.

The data were entered into Survey Monkey, then downloaded and analyzed. Numerous comments were also entered into an on-line survey link by many respondents. Comments were downloaded in a separate file, which has been safeguarded to protect respondent anonymity.

In 2016 questionnaire packets were sent only to those producers who had participated in the 2014 survey, to enable direct comparison of results. For this reason response rates in 2016 were lower than in 2014. Summary statistics for this two-time KAP study are given in Figure 1 below.

Figure 2: Summary statistics

Pilot	Round 1 sample (2014)	# Responses	Response rate	Round 2 sample (2016)	# Responses	Response rate	Avg RR
Middle Sauk	537	140	26%	137	89	65%	46%
Whitewater	615	208	39%	188	134	71%	55%
Whiskey Creek	301	131	44%	120	76	63%	
Totals	1,453	479	36% (average)	445	299	66% (average)	54%

The number of respondents in the second study (2016) was significantly less than the 2014 study. A major reason is attributed to demographic changes in farm ownership in Minnesota. Many mailed survey packets were returned as undeliverable due to changes in land ownership. A statewide study on longitudinal demographic, ownership, tenancy and operator trends has not yet been done, but many researchers have observed several trends that make farm ownership and tenancy more complex:

- Death of male farmers, passing agricultural holdings on to widows who cease agricultural operations
- Absentee ownership of holdings by non-resident widows or heirs, who lease acreage to non-resident operators but are no longer involved in agricultural operations or decisions.
- Retirement of older farmers who lease their land to nonresident operators, and who are no longer involved in agricultural operations or decisions.
- Retired farmers with land in CRP or other conservation programs, taking land out of production
- Widespread renting of acreage to non-owner operators on an annual cash basis. In some areas non-owner operators outnumber owner-operators. Involving non-owner operators (cash-rent tenants) in programs such as MAWQCP is a major challenge.
- Sale of farms to larger nonresident operators
- Co-ownership of agricultural holdings by siblings, cousins and unrelated neighbors
- Increased size of holdings, often with greater complexity of agribusiness operations (farmers may also offer a variety of goods and services to other operators)

There was a visible change in demographics over the two-year period as many questionnaires were marked and returned as "Dead" or "Assisted living."

First-round KAP Study Results

Results for the 2014 KAP studies were described in detail in the three previous survey reports as follows:

Middle Sauk First-Round KAP Study Report (March 2015)
Whitewater First-Round KAP Study Report (May 2015)
Whiskey Creek First-Round KAP Study Report (May 2015)

This report will compare 2014 and 2016 results for each question by watershed in the following sections. Note that a few questions posed in 2014 were not repeated in 2016, as they were for baseline purposes and not needed in the 2016 surveys. A few questions were asked in only one watershed, as they pertained to practices or issues not common in the other watersheds. Therefore this report focuses mainly on those questions where longitudinal comparison (two-time study) can be made.

Section 2: Middle Sauk Watershed

This chapter presents a comparison of 2014 and 2016 KAP study data for questionnaires mailed to landowner operators in the Middle Sauk River watershed. For each question, tables show aggregate data (*n* and %) for each variable for the 2014 and 2016 surveys. In addition, an Excel graph is included that compares two-year data. Key points are briefly summarized in narrative form for each question.

Type of operation/ownership

Figure 1: Please indicate your type of agricultural operation in the Middle Sauk watershed (%). CATA – 2016

Answer Choices	Response	
I own and operate land in the Middle Sauk watershed	76.14%	67
I own land in the Middle Sauk watershed but don't farm it (CRP easement, retired, etc.)	15.91%	14
I lease land to others in the Middle Sauk watershed	5.68%	5
I lease land from others in the Middle Sauk watershed	11.36%	10
Other (please specify)	5.68%	5
Total Respondents: 88		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	5.00	1.00	1.73	1.22

This question was not asked in the 2014 survey. In 2016, 76% (n = 67) reported owning and operating land in the Middle Sauk watershed. 16% own land but do not farm it. 6% lease land to others, and 11% lease land from others. 6% checked "Other" but did not enter any comments.

Awareness of landscape features

Figure 2: Do you have any areas with sandy soils on your fields or farm? (%) COOR – 2014

Answered: 148 Skipped: 9

Answer Choices	Responses	
Yes (1)	49.32%	73
No (2)	44.59%	66
Don't know (3)	2.70%	4
Other (please specify) (4)	3.38%	5
Total		**148**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	4.00	2.00	1.60	0.70

49% (*n* = 73) responded affirmatively in 2014. 45% checked "No." 3% (*n* = 4) checked "Don't know." 3% (*n* = 5) checked "Other" but offered no comments. This question was not repeated in the 2016 survey. Rather the following question was posed (see Figure 13 below):

Figure 3: Which of the following landscape features exist on your farm? (%) CATA – 2016

Answered: 85 Skipped: 4

Answer Choices	Responses	
Highly erodible soils	**34.12%**	29
Steep slopes	**24.71%**	21
Waterways, lakes or streams	**56.47%**	48
Sandy soils	**30.59%**	26
None of the above	**14.12%**	12
Don't know	**1.18%**	1
Other (please specify)	**8.24%**	7
Total Respondents: 85		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.01	1.52

In 2016, the most frequently-reported response was "Waterways, lakes or streams" at 57%; followed by "Highly erodible soils" at 34%; "Sandy soils" (31%); "Steep slopes" (25%); and "None of the above" (14%). Only 1% (n = 1) did not know. 8% checked "Other), offering the following comments:

Clay loam, Gunvih
Mostly heavy ground
Some hills, mostly flat
Private ditch
Gravel
No comments

Interestingly, while 49% reported having sandy soils in 2014, only 31% checked "Sandy soils" in 2016.

Participation in WQ programs

Figure 4: Do you currently participate in any water quality conservation programs such as EQUIP, CSP, or CRP? (%) COOR – 2014

Answered: 154 Skipped: 3

Answer Choices	Responses	
Yes (please specify in comments box below)	40.26%	62
No	53.90%	83
Don't know	5.84%	9
Total Respondents: 154		

Basic Statistics				
Minimum	**Maximum**	**Median**	**Mean**	**Standard Deviation**
1.00	3.00	2.00	1.66	0.59

The majority of respondents in this watershed (54%) indicated that they do not participate in any water quality program. 40% do participate, while 6% checked "Don't know." This question was not repeated in 2016.

Farming practices

Figure 5: Which of the following practices do you use in your farming operation? Check all that apply – 2014

Answered: 151 Skipped: 6

Answer Choices	Responses	
Mulch tillage	17.88%	27
Chisel plowing	66.23%	100
Disking for primary tillage	17.88%	27
Moldboard plowing	50.99%	77
No till/strip till	7.95%	12
Water and sediment control basin	13.25%	20
Soil retention/erosion control	20.53%	31
Don't know	4.64%	7
Other (please specify)	16.56%	25
Total Respondents: 151		

Basic Statistics				
Minimum	**Maximum**	**Median**	**Mean**	**Standard Deviation**
1.00	9.00	4.00	3.97	2.34

Figure 6: Which of the following practices do you use in your farming operation? Check all that apply (%) - 2016

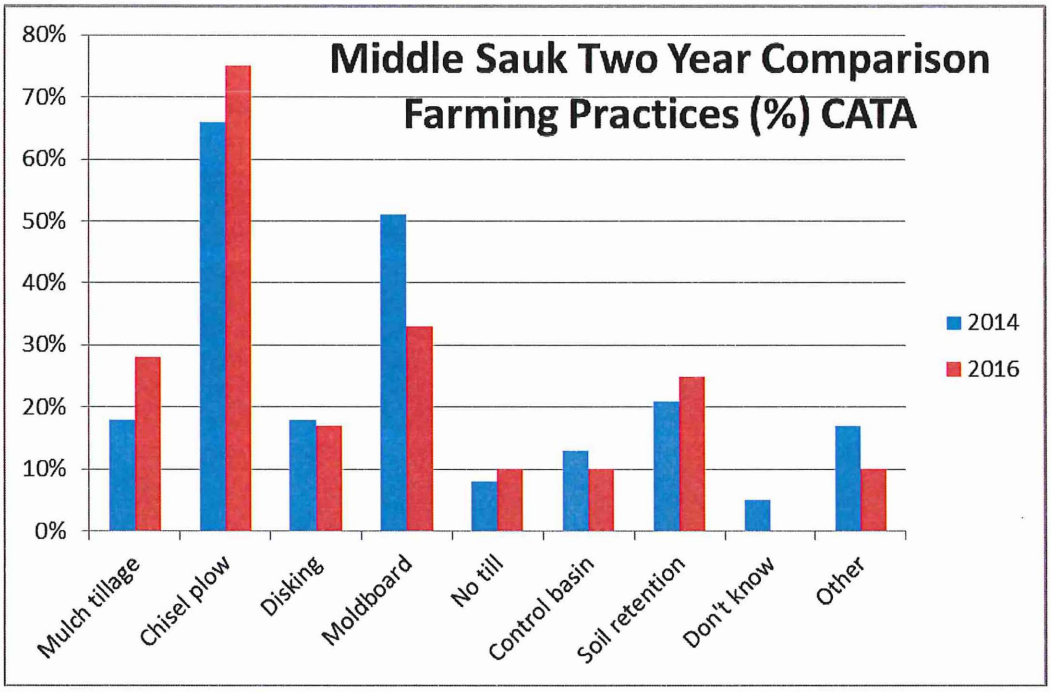
Answered: 82 Skipped: 7

Answer Choices	Responses	
Mulch tillage (1)	26.83%	22
Chisel plowing (2)	74.39%	61
Disking for primary tillage (3)	17.07%	14
Moldboard plowing (4)	32.93%	27
No till/strip till (5)	9.76%	8
Water and sediment control basin (6)	10.98%	9
Soil retention/erosion control (7)	24.39%	20
Don't know (8)	0.00%	0
Other (please specify) (9)	9.76%	8
Total Respondents: 82		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	9.00	3.00	3.55	2.24

Figure 7: Two-year comparison - Which of the following practices do you use in your farming operation? (%) CATA



The most frequently reported farming practice in 2014 was chisel plowing (66%, *n* = 100), which increased to 74% (*n* = 61) in 2016. The next most frequently reported practice in 2014 was moldboard plowing (51%, *n* = 77). This number declined in 2016 to 33% (*n* = 27). "Soil retention/erosion control" was reported by 21% of farmers in 2014, which increased slightly to 24% in 2016. "Mulch tillage" was reported by 18% of producers in 2014, increasing to 27% in 2016. "Disking for primary tillage" was checked by 18% in 2014 and 17% in 2016. "Water and sediment control basin" use was checked by 13% in 2014 and 11% in 2016. Use of "No till/strip till" was reported by 8% in 2014, increasing slightly to 10% in 2016. In all, there were increased trends in the use of mulch tillage, chisel plowing, no till and soil retention. There was a declining trend in the use of disking, moldboard plowing and control basins. 5% checked "Don't know" in 2014, and none in 2016. Comments included the following:

Rotational cover crop
Also have some in CRP
Cover crops where possible.
CRP
Grassed waterway
CRP
Vertical Tillage
Grass-covered pasture land
Rotational cover crop
Also have some in CRP
Cover crops where possible.
CRP
Grassed waterway
CRP
Vertical Tillage
Grass-covered pasture land

Pesticide management practices

Figure 8: Which of the following pesticide management practices do you use? (%) CATA – 2014

Answered: 151 Skipped: 6

Answer Choices	Respons	
Rotate crops to reduce pest population carry over	77.48%	117
Scout for threshold weed, insect or fungus populations	52.32%	79
Map pest infestations to determine long-term pest management strategies	5.30%	8
Rotate chemical modes of action	39.74%	60
Follow pesticide label instructions	63.58%	96
Install vegetative buffers such as filter strips near water bodies	29.80%	45
Avoid using pesticides that are concerns to water quality (Atrazine, Acetochlor, Chlorpirofos)	35.76%	54
Use of a soils specific loss rating screening tool (WinPST)	3.97%	6
Don't know	5.96%	9
Other (please specify)	13.91%	21
Total Respondents: 151		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	4.00	4.05	2.55

Figure 9: Which of the following pesticide management practices do you use? (%) CATA – 2016

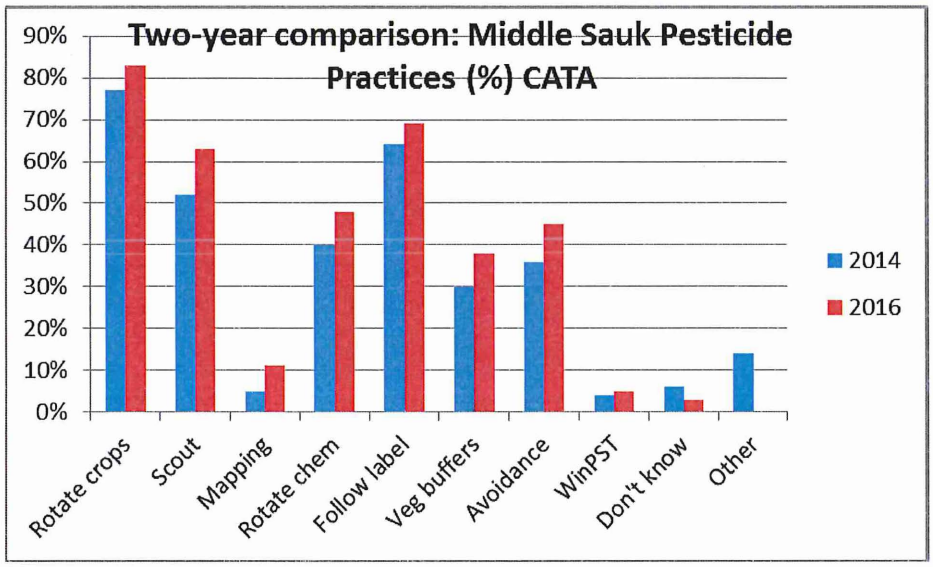
Answered: 80 Skipped: 9

Answer Choices	Responses	
Rotate crops to reduce pest population carry over. (1)	82.50%	66
Scout for threshold weed, insect or fungus populations. (2)	62.50%	50
Map pest infestations to determine long-term pest management strategies. (3)	11.25%	9
Rotate chemical modes of action. (4)	47.50%	38
Follow pesticide label instructions. (5)	68.75%	55
Install vegetative buffers such as filter strips near water bodies. (6)	37.50%	30
Avoid using pesticides that are concerns to water quality (Atrazine, Acetochlor, Chlorpirofos). (7)	45.00%	36
Use of a soils specific loss rating screening tool (WinPST) (8)	5.00%	4
Don't know (9)	2.50%	2
Other (please specify) (10)	7.50%	6
Total Respondents: 80		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	4.00	3.93	2.35

Figure 10: Two year comparison: Which of the following pesticide management practices do you use? (%) CATA



In 2014, 77% of respondents (*n* = 117) reported rotating crops to reduce pest population carry-over, which increased to 83% in 2016 (*n* = 66). In 2014 64% (*n* = 96) reported following pesticide label instructions in 2014, increasing slightly to 69% (*n* = 55) in 2016. 52% (*n* = 79) reported scouting for threshold weed, insect or fungus populations in 2014, increasing to 63% (*n* = 50) in 2016. 40% (*n* = 60) reported rotating chemical modes of action in 2014, increasing to 48% (*n* = 38) in 2016. In 2014 36% (*n* = 54) of producers checked "Avoid using pesticides that are of concern to water quality (Atrazine, Acetochlor, Chlorpirifos). This number increased to 45% (*n* = 36) in 2016. 30% (*n* = 45) reported installing vegetative buffers such as filter strips near water bodies, compared to 38% (*n* = 30) in 2016. 5% (*n* = 8) reported mapping pest infestations in 2014 to determine long-term pest management strategies, compared with 11% (*n* = 9) in 2016. 4% (*n* = 6) reported using a soils specific loss rating screening tool (WinPST) in 2014; in 2016 four producers (5%) reported doing so. 6% checked "Don't know" in 2014, compared with 3% in 2014. Comments received for this question included the following:

Spot spray thistles
Organic
No pesticides
No pesticides
Work with local co-op
Manual removal

All practices showed an increase in use during the two-year period.

Phosphorus practices

Figure 11: What practices do you use to keep phosphorus on your fields? (%) CATA – 2014

Answered: 148 Skipped: 9

Answer Choices	Responses	
Conservation practices such as grass waterway, residue management (mulch/strip/no till), water & sediment control basins/terraces, cover crops	**58.11 %**	86
Banding fertilizer	**25.00 %**	37
incorporation of manure and/or MAP, DAP, or MEZ	**63.51 %**	94
Don't know	**10.81 %**	16
Other (please specify)	**10.14 %**	15
Total Respondents: 148		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	5.00	3.00	2.34	1.19

Figure 12: What practices do you use to keep phosphorus on your fields? (%) CATA – 2016

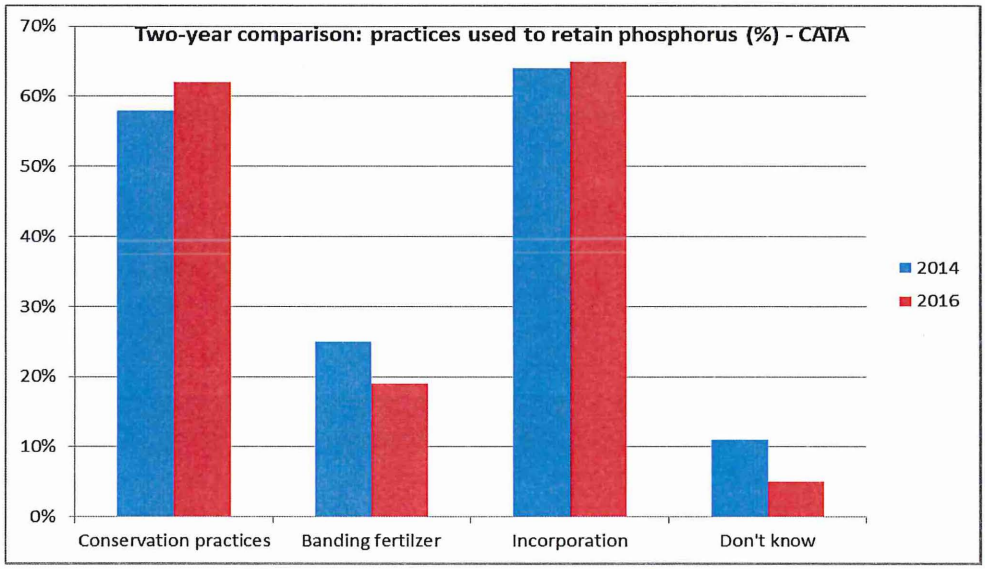
Answered: 78 Skipped: 11

Answer Choices	Responses	
Conservation practices such as grass waterway, residue management (mulch/strip/no till), water & sediment control basins/terraces, cover crops. (1)	**61.54 %**	48
Banding fertilizer (2)	**19.23 %**	15
Incorporation of manure and/or MAP, DAP, or MEZ (3)	**65.38 %**	51
Don't know (4)	**5.13%**	4
Other (please specify) (5)	**11.54 %**	9
Total Respondents: 78		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	5.00	3.00	2.30	1.21

Figure 13: Two-year comparison:
What practices do you use to keep phosphorus on your fields? (%) CATA



The most commonly reported practice for both years was "Incorporation of manure and/or MAP, DAP or MEZ," at 64% (*n* = 94) in 2014 and 65% (*n* = 51) in 2016. This was followed closely by "Conservation practices such as grass waterway, residue management (mulch/strip/no till), water and sediment control" at 58% (*n* = 86) in 2014 and 62% (n = 48) in 2016. 25% (*n* = 37) reported "Banding fertilizer" in 2014, compared with 19% (*n* = 15) in 2016. 11% reported "Other" in 2014, compared with 12% in 2016. 11% checked "Don't know" in 2014, compared with 5% in 2016. Comments included the following:

None
Manure management plan
Try to manage residue to prevent erosion over winter
CRP + 600 trees planted (2016)
Liquid manure
Do not use
CRP
CRP
Grass land

Nitrogen management practices

Figure 14: What practices do you use to manage nitrogen? (%) CATA – 2014

Answer Choices	Responses	
Split application (1)	27.40%	40
Spring application (2)	56.16%	82
Slow release products (3)	32.19%	47
Variable rate application (4)	13.70%	20
Other precision agricultural technologies (5)	4.79%	7
Incorporation (6)	48.63%	71
Irrigation scheduling (7)	4.79%	7
Cover crops (8)	22.60%	33
Nitrogen credits for manure (9)	50.00%	73
Don't know (10)	10.27%	15
Other (please specify) (11)	8.90%	13
Total Respondents: 146		

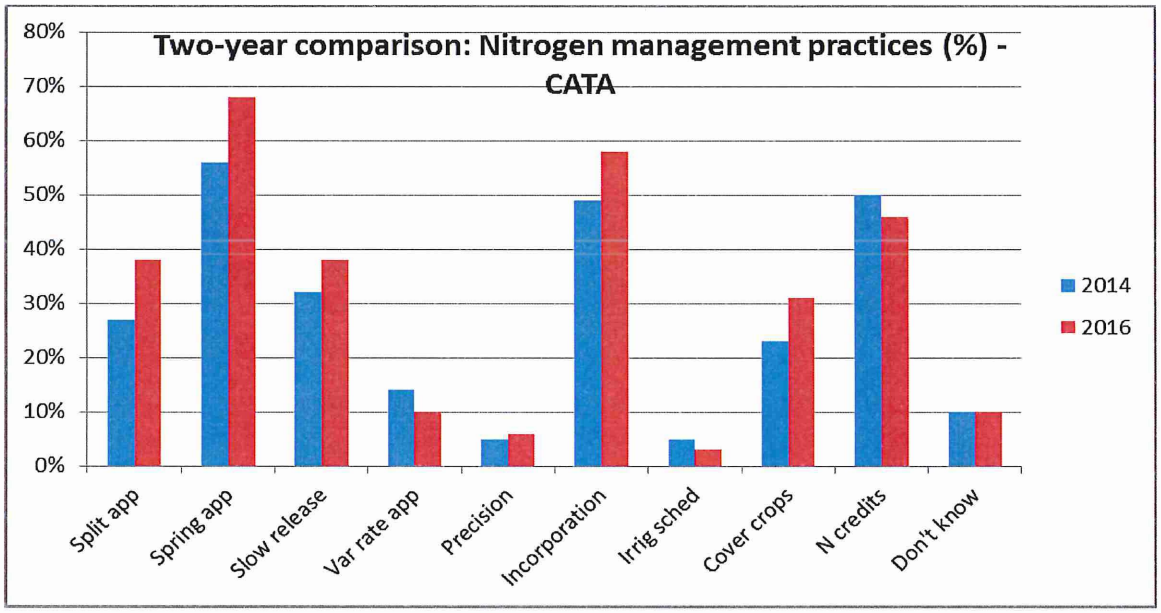
Basic Statistics				
Minimum	**Maximum**	**Median**	**Mean**	**Standard Deviation**
1.00	11.00	6.00	5.27	3.12

Figure 15: What practices do you use to manage nitrogen? (%) CATA – 2016

Answer Choices	Responses	
Split application (1)	38.46%	30
Spring application (2)	67.95%	53
Slow release products (3)	38.46%	30
Variable rate application (4)	10.26%	8
Other precision agricultural technologies (5)	6.41%	5
Incorporation (6)	57.69%	45
Irrigation scheduling (7)	2.56%	2
Cover crops (8)	30.77%	24
Nitrogen credits for manure (9)	46.15%	36
Don't know (10)	3.85%	3
Other (please specify) (11)	10.26%	8
Total Respondents: 78		

Basic Statistics				
Minimum	**Maximum**	**Median**	**Mean**	**Standard Deviation**
1.00	11.00	5.00	4.92	3.06

Figure 16: Two-year comparison - What practices do you use to manage nitrogen? (%) CATA



A two-year comparison of nitrogen management practices shows an increasing trend in the use of split application, spring application, slow release products, precision technologies, incorporation, and cover crops. Declining trends included variable rate application, irrigation scheduling and nitrogen credits. Spring application increased from 56% in 2014 to 68% in 2016. Nitrogen credits for manure decreased from 50% in 2014 to 46% in 2016. Incorporation increased from 49% in 2014 to 58% in 2016. Use of slow release products increased from 32% in 2014 to 38% in 2016. Split application slightly decreased from 27% in 2014 to 38% in 2016. Cover crops increased from 23% in 2014 to 31% in 2016. Variable rate application decreased from 14% in 2014 to 10% in 2016. Irrigation scheduling dropped slightlyy from 5% in 2014 to 3% in 2016. Other precision agricultural technologies increased slightly from 5% in 2014 to 6% in 2016. 10% checked "Don't know" in 2014, compared with 4% in 2016. Those checking "Other" provided the following comments:

None
Want to try split application. Usually apply and work it in
No
No not use
Don't use commercial fertilizer
CRP
CRP
Soil testing

Knowledge of Nitrogen practices

Figure 17: Which of the following nitrogen fertilizer practices are NOT recommended for corn? (%) CATA – 2014

Answered: 146 Skipped: 11

Answer Choices	Responses	
Spring pre-plant applications of anhydrous ammonia and urea (1)	3.42%	5
Fall application of N to coarse - textured (sandy) soils (2)	66.44%	97
Fall application of urea and ammonia without N-serve (3)	50.00%	73
Split application of anhydrous ammonia, urea, or UAN (4)	3.42%	5
Don't know (5)	26.03%	38
Other (6)	0.00%	0
Other (please specify) (7)	9.59%	14
Total Respondents: 146		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.13	1.46

The majority (66%, *n* =97) checked "Fall application of N to coarse-textured (sandy) soils, followed by "Fall application of urea and ammonia without N-serve (50%, *n* = 73). One quarter of respondents (26%, *n* = 38) checked "Don't know." 3% (*n* = 5) checked "Spring pre-plant applications of anhydrous ammonia and urea," and the same number (3%, *n* = 5) checked "Split application of anhydrous ammonia, urea or UAN." Ten percent (*n* = 14) checked "Other," and entered the following comments:

Don't use
Don't use anhydrous ammonia
We don't use anhydrous ammonia
Why would you want to do that -- isn't that part of general knowledge to not do that?
No
Not involved
Do not use anhydrous ammonia
Never use it
Under 50 degrees F plus N-serve.
Don't use it
Do not apply Anhydrous
NEVER DONE IT ON THIS FARM
Don't use anhydrous ammonia
I do not and will not apply anhydrous ammonia

This question was not repeated in the 2016 survey.

Figure 18: When considering your nitrogen fertilizer rates, which of the following do you take into account? (%) CATA – 2014

Answered: 147 Skipped: 10

Answer Choices	Responses	
Manure used in rotation (1)	74.83%	110
Previous legume crops (2)	72.79%	107
Price of nitrogen and corn (3)	21.09%	31
N contributions from phosphorus fertilizers such as MAP and DAP (4)	33.33%	49
Don't know (5)	16.33%	24
Other (please specify) (6)	4.76%	7
Total Respondents: 147		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	2.36	1.38

Figure 19: When considering your nitrogen fertilizer rates, which of the following do you take into account? (%) CATA - 2016

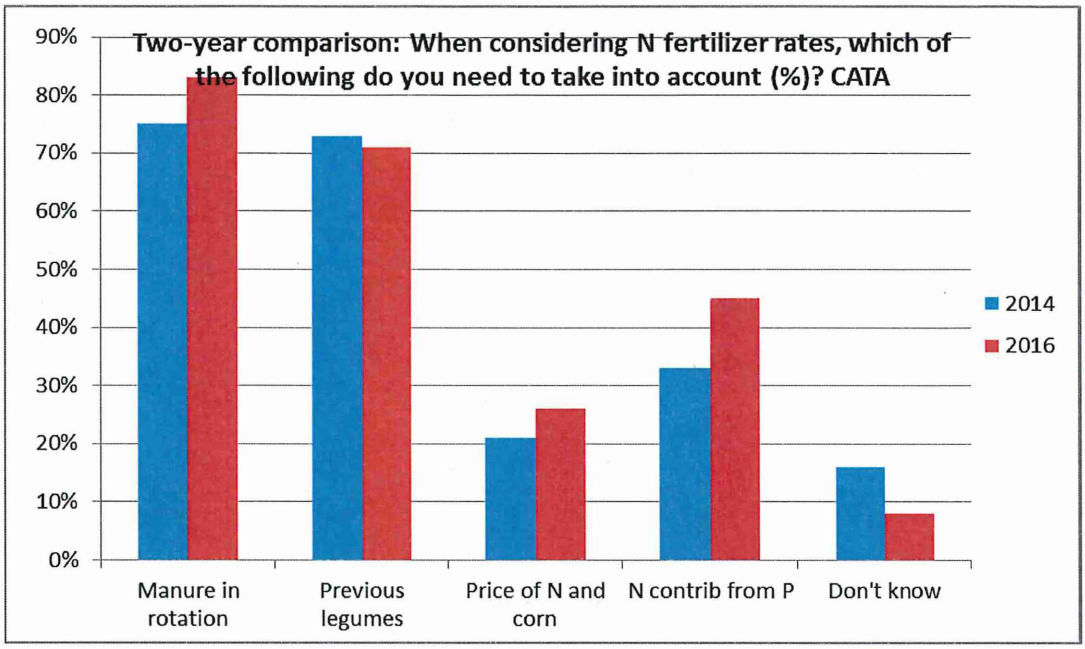
Answered: 80 Skipped: 9

Answer Choices	Responses	
Manure used in rotation (1)	82.50%	66
Previous legume crops (2)	71.25%	57
Price of nitrogen and corn (3)	26.25%	21
N contributions from phosphorus fertilizers such as MAP and DAP (4)	45.00%	36
Don't know (5)	7.50%	6
Other (please specify) (6)	6.25%	5
Total Respondents: 80		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	2.34	1.34

Figure 20: Two-year comparison - When considering your nitrogen fertilizer rates, which of the following do you take into account? (%) CATA



"Manure used in rotation" was the most often-checked response in) 2014 at 75% (*n* = 11), and in 2016 (83%, *n* = 66). "Previous legume crops" ranked at 73% in 2014 (*n* = 107), declining slightly to 72% in 2016 (*n* = 57). "N contributions from phosphosus fertilizers such as MAP and DAP" was checked by 33% (*n* = 49) in 2014 and 45% (*n* = 36) in 2016. "Price of nitrogen and corn" was checked by 21% (*n* = 31) in 2014 and 26% *(n* = 21) in 2016. "Don't know" was checked at 16% (*n* = 24) and 8% in 2016 (*n* = 6). "Don't know responses were 5% in 2014 and 6% in 2016. No comments were entered.

Figure 21: Which of these is a best management practice for corn on sandy soils? (%) CATA – 2014

Answered: 145 Skipped: 12

Answer Choices	Responses	
Fall application of nitrogen fertilizer (1)	2.76%	4
Take appropriate credit for legumes and manure (2)	48.28%	70
Nitrogen application in a split application (3)	66.21%	96
Don't know (4)	20.69%	30
Other (please specify) (5)	10.34%	15
Total Respondents: 145		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	5.00	3.00	2.92	0.90

Two-thirds (66%, *n* = 96) checked "Nitrogen application in a split application," followed by "Take appropriate credit for legumes and manure (48%, *n* = 70). 21% (n = 30) checked "Don't know." 3% (*n* = 4) checked "Fall application of nitrogen fertilizer." Ten percent checked "Other." This question was not repeated in the 2016 survey.

Figure 22: Fall application of anhydrous ammonia should be done under what conditions? (%) COOR -2014

Answered: 141 Skipped: 16

Answer Choices	Respons	
When soil temperature is above 50°F at 6 inches (1)	5.67%	8
When soil temperature is below 50° F at 6 inches (2)	53.19%	75
Soil temperature does not matter when you use N-serve or another nitrogen stabilizer (3)	2.84%	4
Don't know (4)	26.95%	38
Other (please specify) (5)	11.35%	16
Total		**141**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	5.00	2.00	2.85	1.21

Figure 23: Fall application of anhydrous ammonia should be done under what conditions? (%) COOR -2016

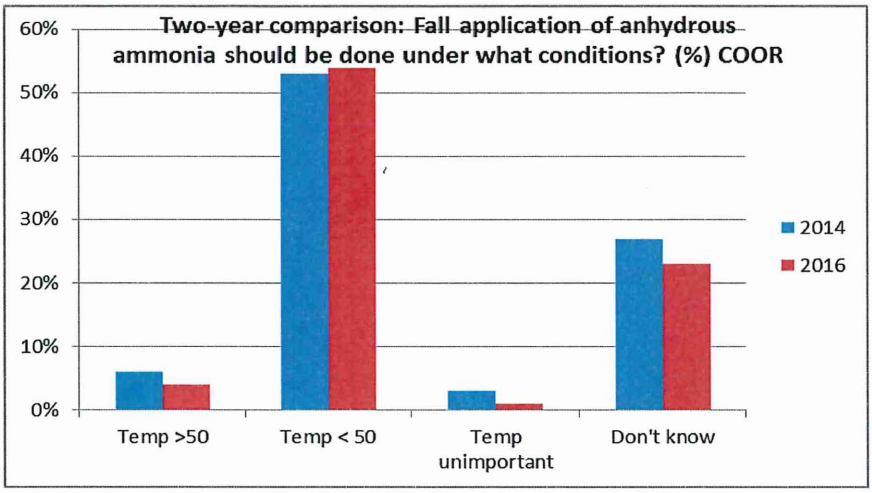
Answered: 79 Skipped: 10

Answer Choices	Respons	
When soil temperature is above 50°F at 6 inches (1)	3.80%	3
When soil temperature is below 50° F at 6 inches (2)	54.43%	43
Soil temperature does not matter when you use N-serve or another nitrogen stabilizer (3)	1.27%	1
Don't know (4)	22.78%	18
Other (please specify) (5)	17.72%	14
Total		**79**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	5.00	2.00	2.96	1.28

Figure 24: Two-year comparison: Fall application of anhydrous ammonia should be done under what conditions? (%) COOR



Two-year comparisons show little change in values. The majority in both surveys checked "When soil temperature is below 50 degrees F at 6 inches" (53%, *n* = 75 in 2014; 54%, *n* = 43 in 2016). The next highest response was "Don't know" at 27% (*n* = 38 in 2014 and 23%, *n* = 18 in 2016). 6% (*n* = 8) checked "When soil temperature is above 50 degrees F at 6 inches" in 2014; this decreased to 4% (*n* = 3) in 2016. Respondents checking "Other" provided the following comments:

- Don't use
- Don't use anhydrous ammonia
- We don't use anhydrous ammonia
- Why would you want to do that -- isn't that part of general knowledge to not do that?
- No
- Not involved
- Do not use anhydrous ammonia
- Never use it
- Under 50 degrees F plus N-serve.
- Don't use it
- Do not apply Anhydrous
- NEVER DONE IT ON THIS FARM
- Don't use anhydrous ammonia

I do not and will not apply anhydrous ammonia

Figure 25: How are UMN Extension recommended practices for corn determined? (%) CATA – 2014

Answered: 145 Skipped: 12

Answer Choices	Responses	
Based on the nitrogen price:corn value ratio, minus any legume and manure credits (1)	19.31%	28
Based on yield goal (2)	28.97%	42
Based on nutrient management plan developed by local NRCS/SWCD office (3)	22.76%	33
Based on field trials and history (4)	31.03%	45
Don't know (5)	42.07%	61
Other (please specify) (6)	6.21%	9
Total Respondents: 145		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	4.00	3.44	1.49

The most frequently reported response to this question was "Don't know" at 43% (*n* = 61). 31% (*n* = 45) checked "Based on field trials and history" followed by 29% (*n* = 42) "Base on yield goal." 23% (*n* = 33) checked "Based on nutrient management plan developed by local NRCS/SWCD office. 19% (*n* = 28) checked "Based on the nitrogen price : corn ratio, minus any legume and manure credits. This question was not repeated in the 2016 survey.

Source of agronomic or conservation information

Figure 26: Where do you get agronomic or conservation information? (%) CATA – 2014

Answer Choices	Responses	
Family/Neighbors (1)	**30.61%**	45
Crop consultant (2)	**54.42%**	80
Agricultural Dealers (3)	**46.26%**	68
Farm magazines (4)	**47.62%**	70
NRCS/SWCD/County Environmental Offices (5)	**44.22%**	65
University of Minnesota Extension (6)	**23.81%**	35
Internet (7)	**25.17%**	37
Minnesota Department of Agriculture (8)	**25.17%**	37
Don't know (9)	**4.76%**	7
Other (please specify) (10)	**4.08%**	6
Total Respondents: 147		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	4.00	4.23	2.26

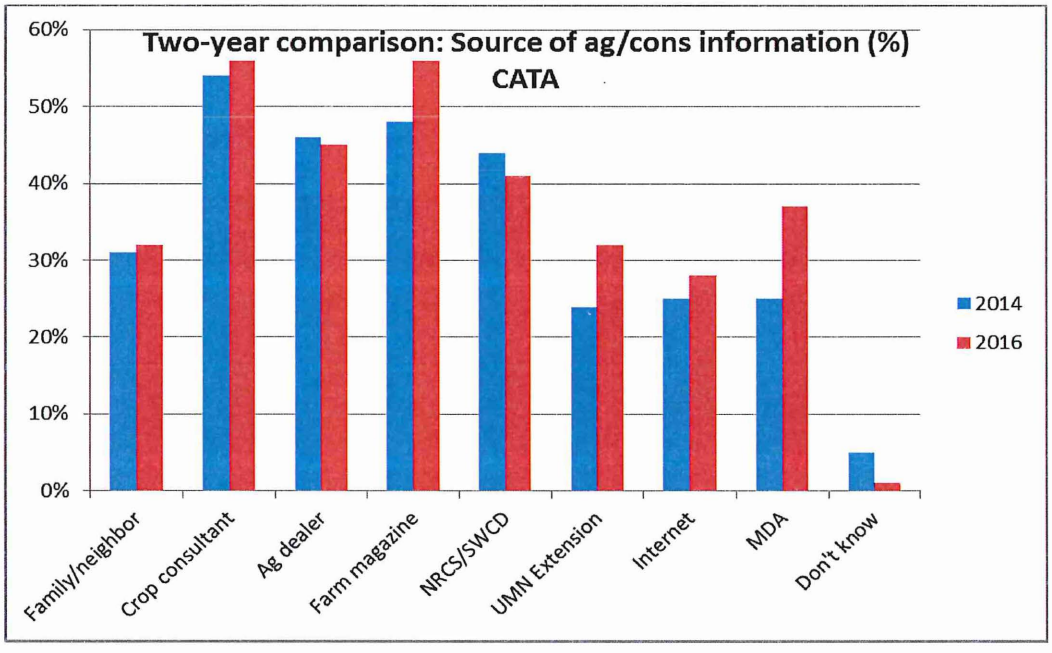
Figure 27: Where do you get agronomic or conservation information? (%) CATA – 2016

Answer Choices	Responses	
Family/Neighbors (1)	31.71%	26
Crop consultant (2)	56.10%	46
Agricultural Dealers (3)	45.12%	37
Farm magazines (4)	56.10%	46
NRCS/SWCD/County Environmental Offices (5)	41.46%	34
University of Minnesota Extension (6)	31.71%	26
Internet (7)	28.05%	23
Minnesota Department of Agriculture (8)	36.59%	30
Don't know (9)	1.22%	1
Other (please specify) (10)	4.88%	4
Total Respondents: 82		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	4.00	4.36	2.28

Figure 28: Two-year comparison - Where do you get agronomic or conservation information? (%) CATA



This check-all-that-apply question suggests that producers seek information from a wide variety of sources. There was a slightly increasing trend toward family/neighbor, crop consultant, farm magazines, UMN Extension, the Internet and Minnesota Department of Agriculture. There was a slight decreasing trend for ag dealers and NRCS/SWCD. In 2014 respondents most frequently checked "Crop consultant" (54%, *n* = 80), compared with 56% (*n* = 46) in 2016. Farm magazines were reported in 2014 at 48% (*n* = 70), and 56% (*n* = 46) in 2016. Ag dealers were checked at 46% (*n* = 68) in 2014, compared with 45% (*n* = 37) in 2016. NRCS/SWCD/County Environmental Offices were checked at 44% (*n* = 65) in 2014, and 42% (*n* = 34) in 2016. In 2014 31% (*n* = 45) consulted family and neighbors for information, compared with 32% (*n* = 26) in 2016. The Internet was used by 25% (*n* = 37) in 2014, compared with 28% in 2016. Minnesota Department of Agriculture was consulted by 25% (*n* = 37) in 2014, compared with 37% (*n* = 30) in 2016. UMN Extension was checked by 24% (*n* = 35) in 2014, compared with 32% (*n* = 26) in 2016. 5% checked "Don't know" in 2014, compared with 1% in 2016. Of those who checked "Other," the following comments were entered:

Don't
Radio talk shows
None

Manure management

Figure 29: What are the most important things to consider in manure management? (%) CATA – 2014

Answered: 146 Skipped: 11

Answer Choices	Responses	
Time until next growing season (1)	16.44%	24
Soil temperature in fall (2)	13.70%	20
Field availability and proximity to manure storage (3)	24.66%	36
On-farm storage capacity (4)	41.10%	60
Laboratory analysis of manure and your soil tests (5)	56.16%	82
Current soil test results (6)	68.49%	1 0
Weather forecast prior to application (7)	28.08%	41
Don't know (8)	15.75%	23
Other (please specify) (9)	6.16%	9
Total Respondents: 146		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	9.00	5.00	5.00	1.87

Figure 30: What are the most important things to consider in manure management? (%) CATA – 2016

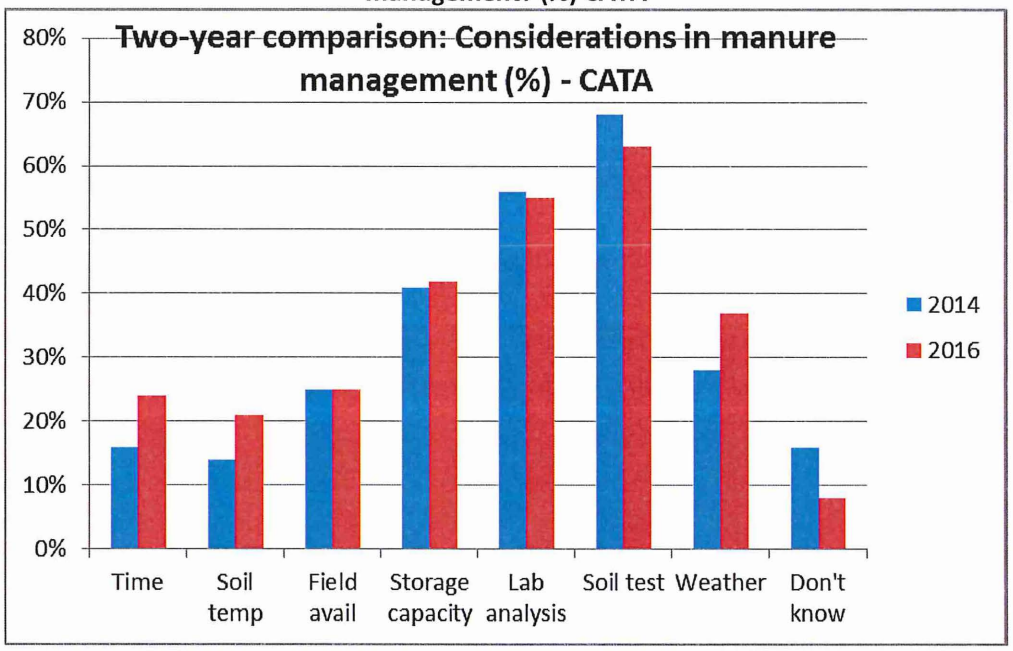
Answered: 76 Skipped: 13

Answer Choices	Responses	
Time until next growing season (1)	23.68%	18
Soil temperature in fall (2)	21.05%	16
Field availability and proximity to manure storage (3)	25.00%	19
On-farm storage capacity (4)	42.11%	32
Laboratory analysis of manure and your soil tests (5)	55.26%	42
Current soil test results (6)	63.16%	48
Weather forecast prior to application (7)	36.84%	28
Don't know (8)	7.89%	6
Other (please specify) (9)	6.58%	5
Total Respondents: 76		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	9.00	5.00	4.78	1.96

Figure 31: Two-year comparison: What are the most important things to consider in manure management? (%) CATA



In 2014 the most frequently reported factor was "Current soil test results" (68%, *n* = 100), compared with 63% (*n* = 48) in 2014. The second-most frequently checked result in 2014 was "Laboratory analysis of manure and your soil test result" 56% (*n* = 82), compared with 55% (*n* = 42) in 2016. The third-most checked response in 2014 was "On-farm storage capacity" (41%, *n* = 60), compared with 42% (*n* = 32) in 2016. "Weather forecast prior to application" ranked next at 28% (*n* = 41) in 2014, compared with 37%

(n = 28) in 2016. "Field availability and proximity to manure storage" ranked next in 2014 at 25% (n = 36), compared with25% (n = 19) in 2016. "Time until next growing season" was ranked at 16% (n = 24) in 2014, increasing to 24% (n = 18) in 2016. "Soil temperature in the fall" was ranked at 14% (n = 20) in 2014, compared with 22% in 2016 (n = 16). "Don't know" ranked at 16% (n = 23) in 2014, declining to 8% (n = 6) in 2014. No comments were entered for this question, and interestingly no one entered concerns about fecal coliuform bacteria.

Awareness of water quality

Figure 32: What is the biggest surface water challenge in your area? (%) COOR – 2014

Answered: 134 Skipped: 23

Answer Choices	Responses	
Bacteria (fecal coliform) (1)	0.00%	0
Nitrogen (2)	18.66%	25
Phosphorus (3)	14.93%	20
Sediment (4)	14.93%	20
Don't know (5)	44.03%	59
Other (please specify) (6)	7.46%	10
Total		**134**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
2.00	6.00	5.00	4.07	1.28

Figure 33: What is the biggest surface water challenge in your area? (%) COOR – 2016

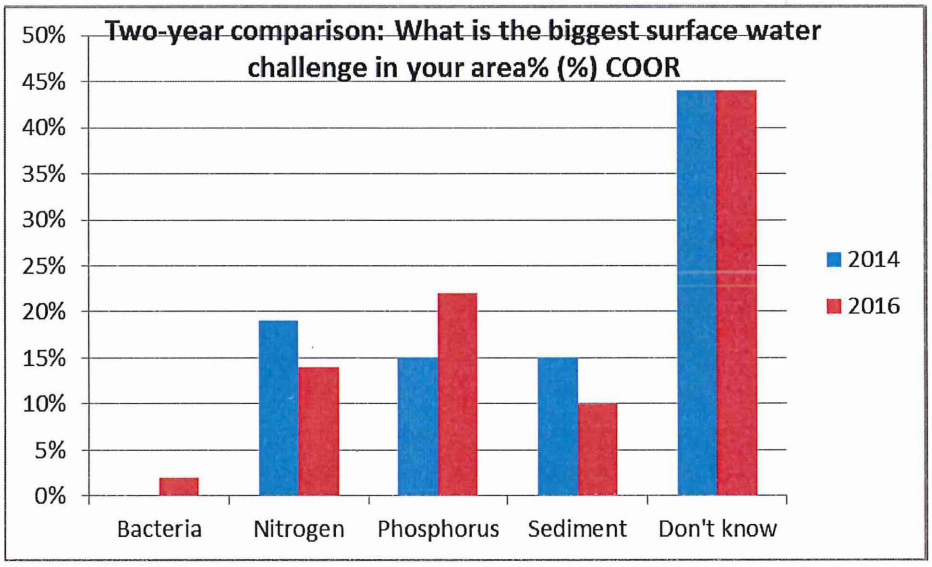
Answered: 81 Skipped: 8

Answer Choices	Responses	
Bacteria (fecal coliform) (1)	2.47%	2
Nitrogen (2)	13.58%	11
Phosphorus (3)	22.22%	18
Sediment (4)	9.88%	8
Don't know (5)	44.44%	36
Other (please specify) (6)	7.41%	6
Total		**81**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	5.00	4.02	1.31

Figure 34: Two-year comparison - What is the biggest surface water challenge in your area? (%) COOR



The most frequently checked response in both surveys was "Don't know," which was consistent at 44% in both 2014 and 2016. 15% checked "Phosphorus" in 2014, increasing to 22% in 2016. 19% checked "Nitrogen" in 2014, decreasing to 14% in 2016. 15% checked "Sediment" in 2014, decreasing to 10% in 2016. None checked "Bacteria (fecal coliform)" in 2014, compared with 2% in 2016.

Figure 35: What is the primary pollutant of concern in tile drainage water? (%) COOR – 2014

Answered: 144 Skipped: 13

Answer Choices	Responses	
Phosphorus (1)	25.69%	37
Nitrogen (2)	31.94%	46
Micronutrients (like Zinc and Sulfur) (3)	0.69%	1
Sediment and soil particles (4)	6.94%	10
Don't know (5)	29.17%	42
Other (please specify) (6)	5.56%	8
Total		**144**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	2.99	1.76

Figure 36: What is the primary pollutant of concern in tile drainage water? (%) COOR – 2016

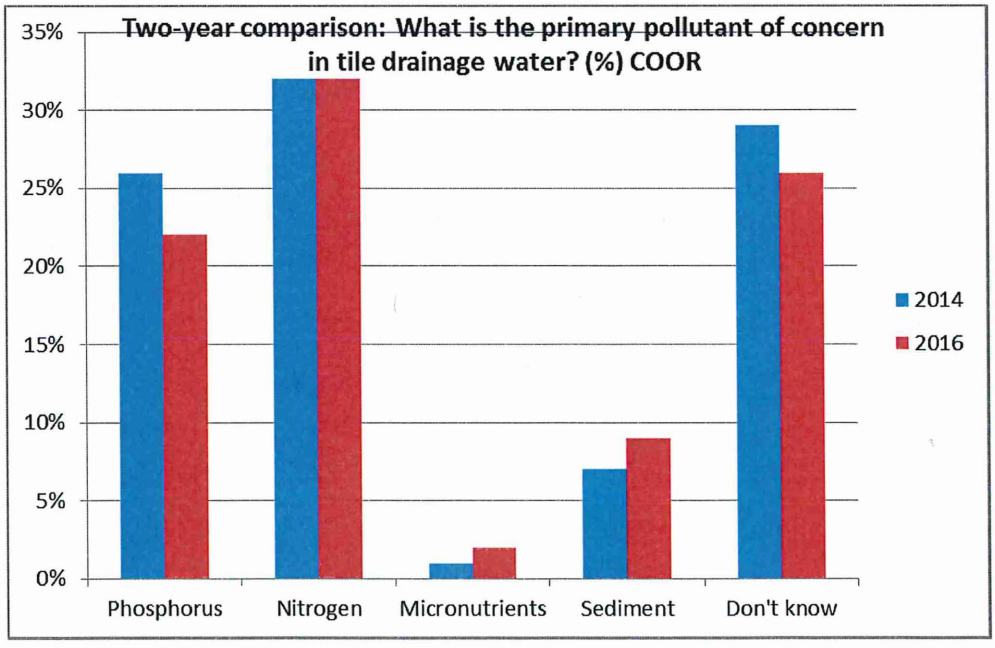
Answered: 82 Skipped: 7

Answer Choices	Responses	
Phosphorus (1)	21.95%	18
Nitrogen (2)	31.71%	26
Micronutrients (like Zinc and Sulfur) (3)	2.44%	2
Sediment and soil particles (4)	8.54%	7
Don't know (5)	25.61%	21
Other (please specify) (6)	9.76%	8
Total		**82**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	3.13	1.78

Figure 37: Two year comparison: What is the primary pollutant of concern in tile drainage water? (%) COOR



Respondents most frequently checked "Nitrogen" at 32% in both 2014 and 2016. "Don't know" was the next most frequently checked response, at 29% in 2014 and 2016. This was followed by "Don't know" at 29% in 2014, declining to 26% in 2016. "Phosphorus" was checked by 26% of respondents in 2014 and 22% in 2016. "Sediment and soil particles" was checked by 7% in 2014 and 9% in 2016. "Micronutrients" was checked by 1% in 2014 and 2% in 2016. The following comments were entered by respondents:

Phosphorus, Nitrogen
I have no tile
No
Phosphorus, sediment and soil particles
Almost none on heavy ground with stabilizer
Checked "Phosphorus," "Sediment and "soil particles"
Checked "Nitrogen," "Sediment" and "soil particles"
Don't have drainage tile

Figure 38: Which water quality issue is most important to you? (%) COOR – 2014

Answered: 141 Skipped: 16

Answer Choices	Responses	
Sediment in Middle Sauk River (1)	17.02%	24
Algae blooms in local lakes (2)	14.89%	21
High nitrate levels in municipal and/or private wells (3)	36.88%	52
Hypoxic zone in the Gulf of Mexico (4)	1.42%	2
None of these (5)	7.09%	10
Don't know (6)	17.02%	24
Other (please specify) (7)	5.67%	8
Total		**141**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.40	1.84

Figure 39: Which water quality issue is most important to you? (%) COOR - 2015

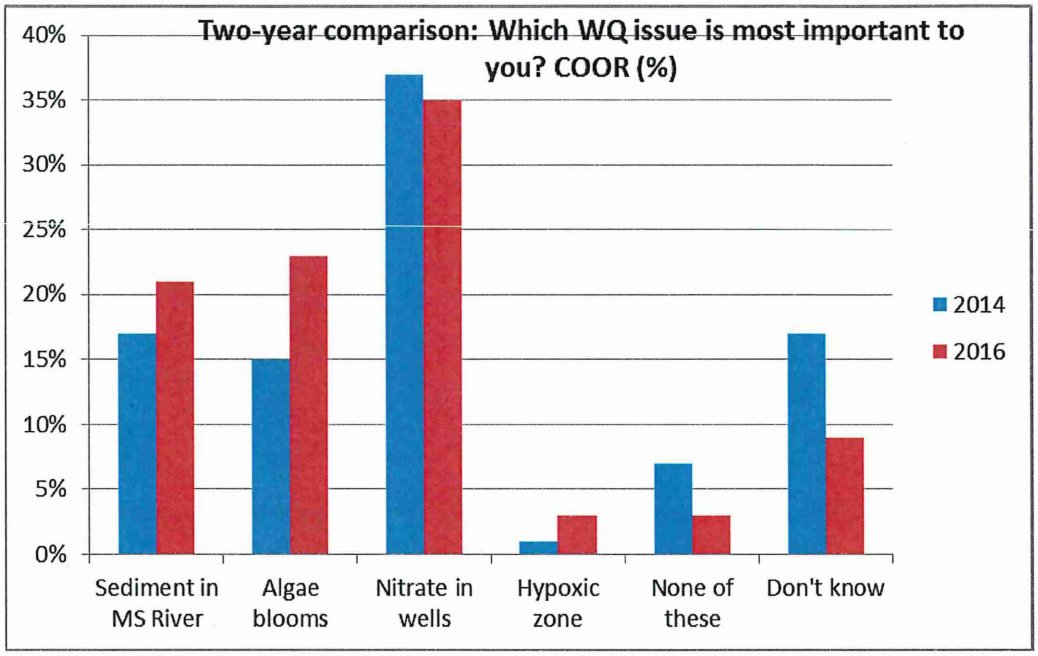
Answered: 80 Skipped: 9

Answer Choices	Responses	
Sediment in Middle Sauk River (1)	21.25%	17
Algae blooms in local lakes (2)	22.50%	18
High nitrate levels in municipal and/or private wells (3)	35.00%	28
Hypoxic zone in the Gulf of Mexico (4)	2.50%	2
None of these (5)	2.50%	2
Don't know (6)	7.50%	6
Other (please specify) (7)	8.75%	7
Total		**80**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.00	1.81

Figure 40: Two-year comparison:
Which water quality issue is most important to you? (%) COOR



"High nitrate levels in municipal and/or private wells" ranked highest at 37% in 2014 and 35% in 2016. "Sediment in the Middle Sauk River" ranked second at 17% in 2014, increasing to 21% in 2016. 14% checked "Algae blooms in local lakes" in 2014, compared with 23% in 2016. In 2014 8% checked "None of these," compared with 3% in 2016. 17% said "Don't know" in 2014, compared with 8% in 2016. 6% checked "Other " in 2014 and 9% in 2016. The following comments were entered by respondents:

Sediment in Middle Sauk River
Algae blooms in local lakes
High nitrate levels in wells
All of the above are important
Keeping water quality good everywhere
They are all issues of challenge, may good sense rule.
All of the above
Algae blooms
High nitrate levels
Cold spring wellhead protection

Figure 41: Do you think that your farm operation contributes nutrients, sediment or bacteria to local lakes, streams or rivers? (%) COOR – 2014

Answered: 148 Skipped: 9

Answer Choices	Responses	
Yes (1)	**20.95%**	31
No (2)	**50.00%**	74
Don't know (3)	**20.27%**	30
Other (please specify) (4)	**8.78%**	13
Total		**148**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	4.00	2.00	2.17	0.86

Figure 42: Do you think that your farm operation contributes nutrients, sediment or bacteria to local lakes, streams or rivers? (%) COOR - 2016

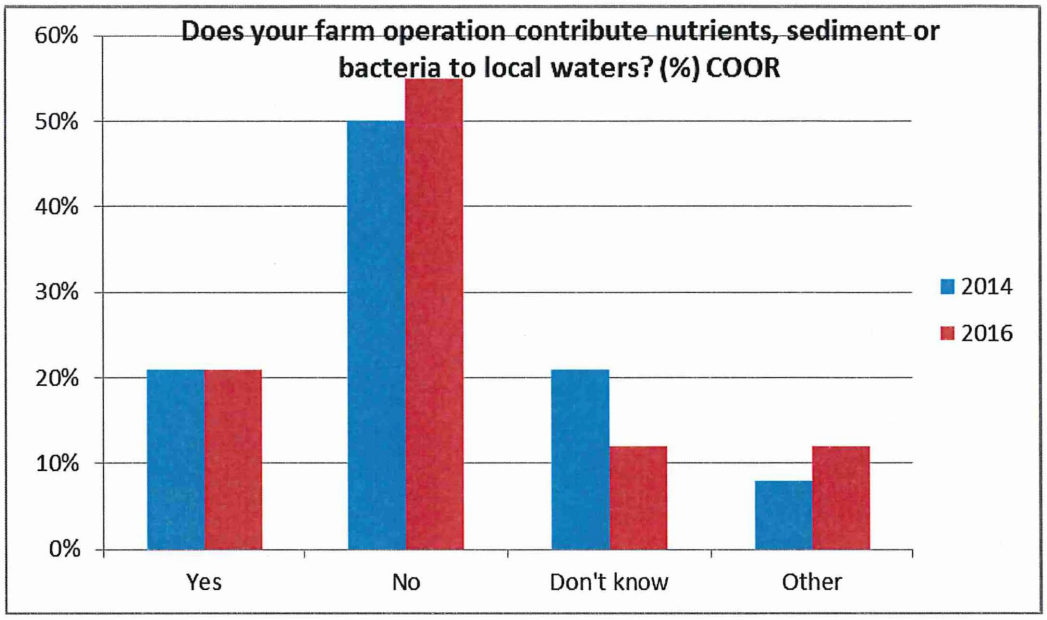
Answered: 82 Skipped: 7

Answer Choices	Responses	
Yes (1)	**20.73%**	17
No (2)	**54.88%**	45
Don't know (3)	**12.20%**	10
Other (please specify) (4)	**12.20%**	10
Total		**82**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	4.00	2.00	2.16	0.89

Figure 43: Two-year comparison: Do you think that your farm operation contributes nutrients, sediment or bacteria to local lakes, streams or rivers? (%) COOR



The most frequent response was "No" for half of the 2014 respondents and 55% of 2016 respondents. "Yes" responses remained unchanged at 21% in both 2014 and 2016. "Don't know" responses were 20% in 2014, declining to 13% in 2016. "Other" was checked by 9% in 2014 and 12% in 2016. The following comments were given by respondents:

Compared to crop farmers in area - very little i.e. poultry manure application
Only if we get 5" plus rain events
If anyone checks "No", they're crazy
We do what we feel is right for the environment
Hopefully only a very small amount
Very little
Yes if heavy rain event. No if average rain event
Very little
Not much
I have to say yes. Although I do a large amount of conservation, I don't think you can stop all nutrients from escaping your property

Decision-making

Figure 44: What is the most important factor in your agricultural decision-making process? (%) COOR -2014

Answered: 131 Skipped: 26

Answer Choices	Responses	
Water quality (1)	18.32%	24
Profitability (2)	38.93%	51
Consistent yield (3)	9.92%	13
Farm legacy (4)	10.69%	14
My retirement plans (5)	0.00%	0
Don't know (6)	10.69%	14
Other (please specify) (7)	11.45%	15
Total		**131**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	2.00	3.13	2.00

Figure 45: What is the most important factor in your agricultural decision-making process? (%) COOR -2016

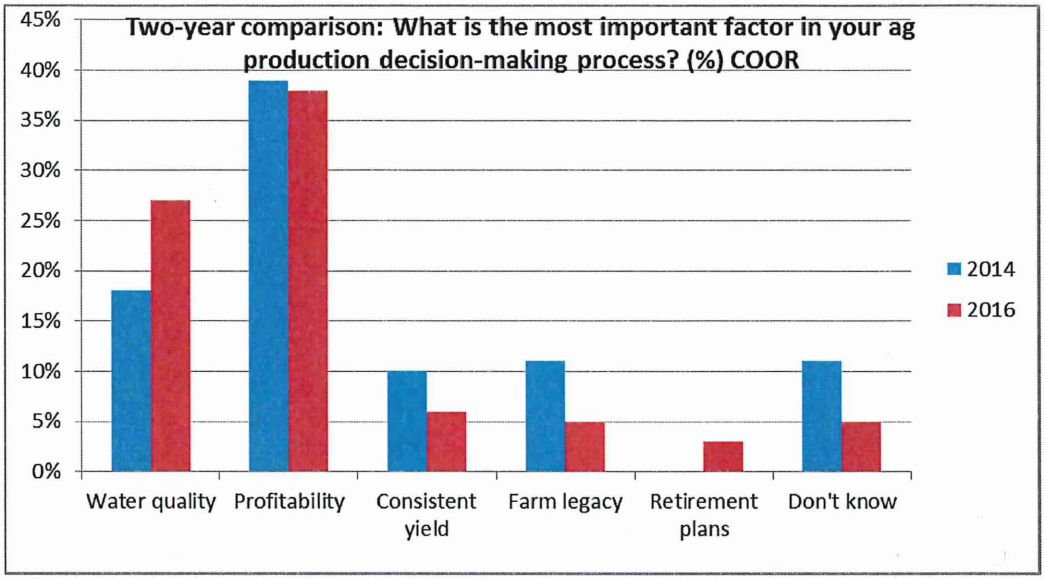
Answered: 77 Skipped: 12

Answer Choices	Responses	
Water quality (1)	27.27%	21
Profitability (2)	37.66%	29
Consistent yield (3)	6.49%	5
Farm legacy (4)	5.19%	4
My retirement plans (5)	2.60%	2
Don't know (6)	5.19%	4
Other (please specify) (7)	15.58%	12
Total		**77**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	2.00	2.96	2.14

Figure 46: Two-year comparison: What is the most important factor in your agricultural decision-making process? (%) COOR



"Profitability" was the single most important factor in both surveys, checked by 39% of respondents in 2014 and 38% in 2016. "Water quality" ranked next at 18% in 2014, increasing to 27% in 2016. There was a slight downward trend in all other categories. "Farm legacy" was checked by 11% in 2014 and 5% in 2016. "Consistent yield" was checked by 10% in 2014 and 6% in 2016. None checked "Retirement plans" in 2014, but 3% did so in 2016. 11% checked "Don't know" in 2014, declining to 5% in 2016. 11% checked "Other" in 2014 and 16% in 2016. The following comments were entered:

All of above
Profitability and consistent yield
What is best for the land in the long term
I feel all are important
Without profit you can't do anything
Farm legacy and my retirement plans
Profitability and consistent yield
We don't farm
We don't farm
The top three
Water quality, profitability and farm legacy
Water quality and Profitability

Figure 47: Which of the following influence your decision to adopt clean water practices? (%) CATA – 2014

Answered: 145 Skipped: 12

Answer Choices	Responses	
Time (1)	42.76%	62
Money (money spent and net return) (2)	55.86%	81
Will it make my life or work easier? (3)	30.34%	44
Yields (4)	45.52%	66
My retirement plans (5)	5.52%	8
Risk (6)	13.10%	19
Reducing soil erosion (7)	66.21%	96
Don't know (8)	10.34%	15
Other (please specify) (9)	4.14%	6
Total Respondents: 145		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	9.00	4.00	4.08	2.39

Figure 48: Which of the following influence your decision to adopt clean water practices? (%) CATA - 2016

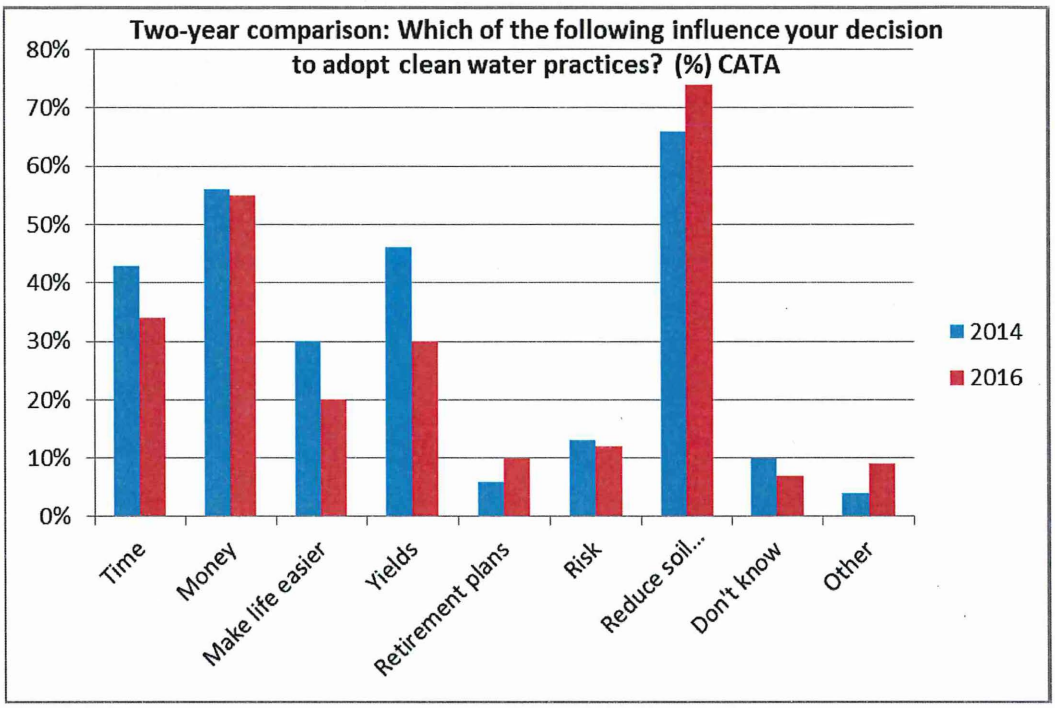
Answered: 82 Skipped: 7

Answer Choices	Responses	
Time (1)	34.15%	28
Money (money spent and net return) (2)	54.88%	45
Will it make my life or work easier? (3)	19.51%	16
Yields (4)	30.49%	25
My retirement plans (5)	9.76%	8
Risk (6)	12.20%	10
Reducing soil erosion (7)	74.39%	61
Don't know (8)	7.32%	6
Other (please specify) (9)	8.54%	7
Total Respondents: 82		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	9.00	4.00	4.39	2.50

Figure 49: Two-year comparison: Which of the following influence your decision to adopt clean water practices? (%) CATA



"Reducing soil erosion" was the most frequent response at 66% in 2014, increasing to 74% in 2016. "Money (money spent and net return" was next at 56% in 2014 and 55% in 2016. "Yields" was checked by 46% in 2014, declining to 30% in 2016. "Time" was ranked next at 43% in 2014, but declining to 34% in 2016. "Will it make my life or work easier" was checked by 30% in 2014, declining to 20% in 2016. "Risk" held nearly constant at 13% in 2014 and 12% in 2016."My retirement plans" was checked by 6% in 2014, increasing to 10% in 2016. "Don't know" was checked by 10% in 2014 and 7% in 2016. In total, the factors declining in important during the period were time, money, making life easier, yields and risk. The factors increasing with time were retirement plans and reducing soil erosion.

4% checked "Other" in 2014 and "9% in 2016. The following comments were recorded:

No response
Water quality for the future
Because it is the right thing to do
Always have farmed to keep my land from eroding
# of tillable acres taken out of production
Animal habitat
Animal habitat

Adoption of WQ practices

Figure 50: What prevents you from implementing additional clean water practices in your farming operation? (%) CATA – 2014

Answered: 137 Skipped: 20

Answer Choices	Responses	
I need to know more about it (1)	**30.66%**	42
Takes too much time (2)	**5.84%**	8
Too much paperwork (3)	**18.25%**	25
Potential cost (4)	**34.31%**	47
No need to modify practice (5)	**10.95%**	15
Yield reduction concern (6)	**17.52%**	24
Reduction of tillable acres (7)	**26.28%**	36
Don't want to take part in a government program (8)	**15.33%**	21
Don't know (9)	**16.79%**	23
Other (please specify) (10)	**16.06%**	22
Total Respondents: 137		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	5.00	5.27	2.86

Figure 51: What prevents you from implementing additional clean water practices in your farming operation? (%) CATA – 2016

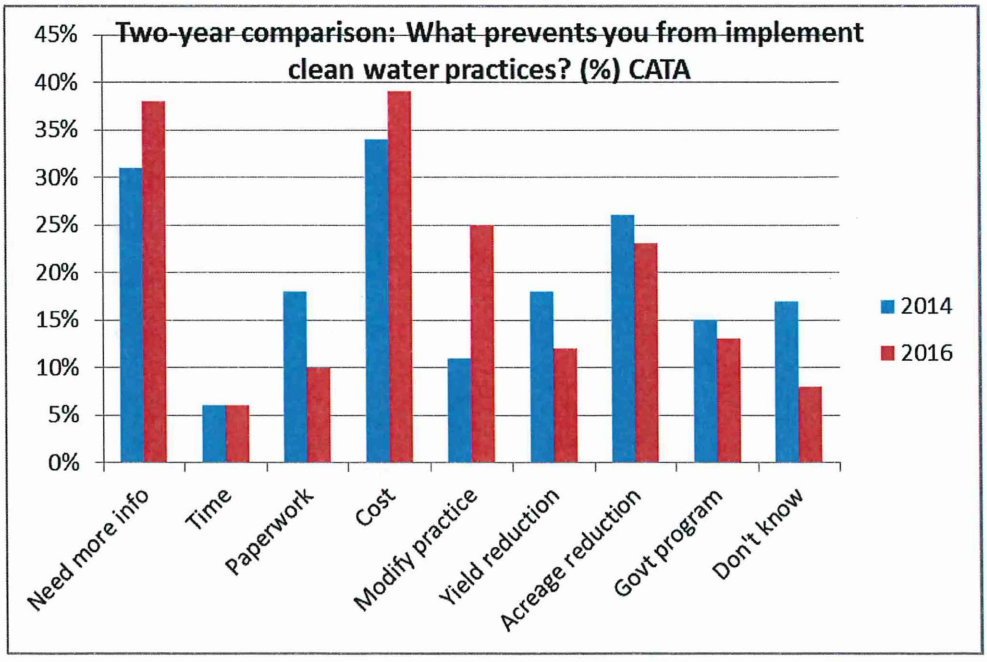
Answered: 77 Skipped: 12

Answer Choices	Responses	
I need to know more about it (1)	37.66%	29
Takes too much time (2)	6.49%	5
Too much paperwork (3)	10.39%	8
Potential cost (4)	38.96%	30
No need to modify practice (5)	24.68%	19
Yield reduction concern (6)	11.69%	9
Reduction of tillable acres (7)	23.38%	18
Don't want to take part in a government program (8)	12.99%	10
Don't know (9)	7.79%	6
Other (please specify) (10)	11.69%	9
Total Respondents: 77		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	4.00	4.77	2.72

Figure 52: Two-year comparison - What prevents you from implementing additional clean water practices in your farming operation? (%) CATA



"Potential cost" ranked highest in both surveys, with 34% (*n* = 47) in 2014 and 39% (*n* = 30) in 2016. 31% (*n* = 42) checked "I need to know more about it," compared with 38% (*n* = 29) in 2016. "Reduction of tillable acres" ranked third in 2014 at 26% (*n* = 36), compared with 23% (*n* = 18) in 2014. "Too much paperwork" ranked fourth in 2014 at 18% (*n* = 25) compared with 10% (*n* = 8) in 2016. "Yield reduction concern" was checked by 18% (*n* = 24) in 2014, compared with 12% (*n* = 9) in 2016. "Need to modify practice was checked by 11% (*n* = 95), which increased significantly in 2016 to 25% (*n* = 19). "Don't want to take part in a government program" was checked by 15% (*n* = 21) in 2014, compared with 13% (*n* = 10) in 2016. 6% (*n* = 8) checked "Takes too much time" in 2014, approximately the same in 2016. 17% checked "Don't know" in 2014, compared to 8% in 2016. 16% checked "Other" in 2014, compared with 12% in 2016. The following comments were entered:

Probably wouldn't do it if I knew up front that it would reduce yield. If it was going to reduce yield, I would probably take it out of production all together with prices like this.
Most of my water ways and ponds are protected by buffers
No
Organic
We'll fine tune as needed.
All CRP
Try the best as I can
No comments
I do the best I can

Figure 53: What would help you to adopt additional management practices to protect local streams and lakes? (%) Check all that apply – 2014

Answered: 145 Skipped: 12

Answer Choices	Responses	
Education and training on specific practices (1)	**48.28%**	70
Cost-share or financial incentives (2)	**58.62%**	85
Seeing my neighbors or friends get involved (3)	**21.38%**	31
Support from my ag dealer and/or crop consultant (4)	**18.62%**	27
Technical assistance (5)	**33.79%**	49
Access to equipment (6)	**21.38%**	31
Don't know (7)	**13.79%**	20
Other (please specify) (8)	**8.97%**	13
Total Respondents: 145		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	3.00	3.42	2.11

Figure 54: What would help you to adopt additional management practices to protect local streams and lakes? (%) Check all that apply - 2016

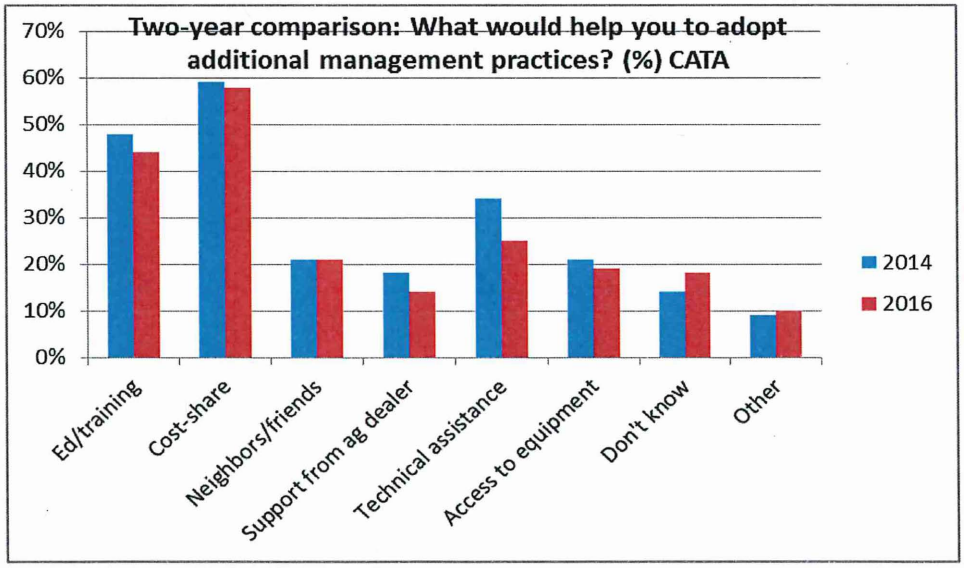
Answered: 80 Skipped: 9

Answer Choices	Responses	
Education and training on specific practices (1)	43.75%	35
Cost-share or financial incentives (2)	57.50%	46
Seeing my neighbors or friends get involved (3)	21.25%	17
Support from my ag dealer and/or crop consultant (4)	13.75%	11
Technical assistance (5)	25.00%	20
Access to equipment (6)	18.75%	15
Don't know (7)	17.50%	14
Other (please specify) (8)	10.00%	8
Total Respondents: 80		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	3.00	3.46	2.20

Figure 55: Two-year comparison: What would help you to adopt additional management practices to protect local streams and lakes? (%) Check all that apply



The most frequently checked response was "Cost-share or financial incentives" (59% in 2014 and 58% in 2016). This was followed by "Education and training on specific practices" (48% in 2014 and 44% in 2016). "Technical assistance" was ranked third at 34% in 2014, declining to 25% in 2016. "Seeing my neighbors or friends get involved" was ranked at 21% in both 2014 and 2016. "Access to equipment" was also ranked at 21% in 2014, declining slightly to 19% in 2016. "Support from my ag dealer and/or

crop consultant" was next at 17% in 2014, declining to14% in 2016. "Don't know" responses were 14% in 2014, increasing to 18% in 2016. 9% checked "Other in 2014 and 10% in 2016. The following comments were entered by respondents:

- Cost share of cement slab for 12 months storage
- I feel I do a lot but get run off from neighbors
- Tax credit incentives
- Comments on "Education and training on specific practices" and "Cost-share or financial incentives:" They work together. If you give financial incentives and prove that it really works, you're making progress. Other comments: It's nice that if you decide to take acres out of production. That you could benefit some of your other acres as a result, for example creating a wetland or restoring one by tiling other areas of your field to enhance the rest of the field, and still doing something good.
- That my crop would be worth more than other farmers' crops because the crop is grown with conservation.
- ?
- Higher crop prices
-Farmers shouldn't need cost share to improve water quality. They get enough government ag. subsidies

Awareness of MAWQCP

Figure 56: Have you heard about the MAWQCP? If so, where did you hear about it? (%) CATA

Answered: 79 Skipped: 10

Answer Choices	Responses	
I haven't heard about it (1)	27.85%	22
SWCD (2)	32.91%	26
News article (3)	11.39%	9
Radio (4)	5.06%	4
Sign (5)	0.00%	0
Crop consultant (6)	0.00%	0
Neighbor (7)	3.80%	3
Other (please specify) (8)	18.99%	15
Total		79

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	2.00	3.27	2.60

The majority of respondents (33%) had heard about the MAWQCP through their SWCD. Less than a third (28%) had not heard about the program. 11% heard about the program through a news article, followed by radio at 5% and 4% from a neighbor. None had heard about the program through a sign or a crop consultant. 20% checked "Other." The following comments were entered:

Literature from the county
I am in it

This question was not posed in 2014.

Figure 57: Willingness to participate in MAWQCP (%) (COOR) – 2014

Answered: 141 Skipped: 16

Answer Choices	Response	
I am ready and willing to participate (1)	11.35%	16
I might be interested but need more information (2)	28.37%	40
I might be interested but would need a cost-share or financial incentive (3)	22.70%	32
I'm not very interested in participating (4)	12.77%	18
Not at all interested (5)	12.06%	17
Don't know (6)	8.51%	12
Other (please specify) (7)	4.26%	6
Total		**141**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.28	1.65

Figure 58: Willingness to participate in MAWQCP (%) (COOR) - 2016

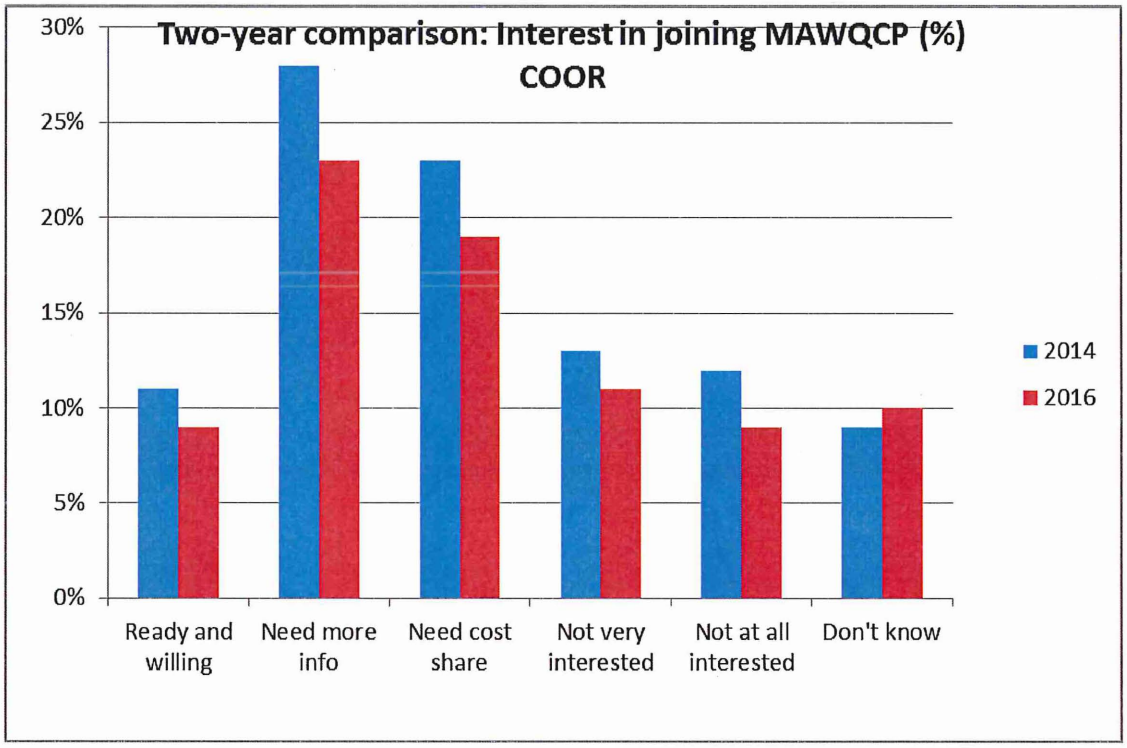
Answered: 81 Skipped: 8

Answer Choices	Responses	
I am ready and willing to participate (1)	8.64%	7
I might be interested but need more information (2)	23.46%	19
I might be interested but would need a cost-share or financial incentive (3)	18.52%	15
I'm not very interested in participating (4)	11.11%	9
Not at all interested (5)	8.64%	7
Don't know (6)	9.88%	8
Other (please specify) (7)	19.75%	16
Total		**81**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.96	2.04

Figure 59: Two-year comparison – Interest in joining MAWQCP (%) COOR



The most frequently checked response in both years was "I might be interested but need more information" (28% in 2014 and 23% in 2016). The next highest response was "I might be interested but would need a cost-share or financial incentive" at 23% in 2014 and 19% in 2016. 11% checked "I am ready and willing to participate" in 2014, and 9% in 2016. 13% checked "I am not very interested in participating" in 2014, and 11% in 2016. 12% in 2014 were "Not at all interested in participating," declining to 9% in 2016. "Don't know" was checked by 9% in 2014 and 10% in 2016. "Other" was checked by 4% in 2014 and 20% in 2016. Comments were entered by those checking "Other" in 2016:

- I might be interested but need more information I own 42 acres, 9 of which is zoned ag. We take one cutting of upland hay off of it a year. Our property is mainly managed for wildlife. We have a couple of small food plots. I'm not sure if I need to be included in this.
- More regulations? -USDA milk -Environmental services MMP -USDA pesticide license -SWCD regulations wetlands/waterways -Environmental services sceptic -Township building permits for trailers + spreaders - Full position dealing with regulations
- I feel like The A6 WQCP grants certification, but this may cause producers to quit implementing cons. practices on their land if they are certified. I feel like it promotes the "okay your farm is good enough" and won't stimulate them to continue to make it better. Chances are, if they are already that proactive, they won't need that feeling of being certified to do sound practices. These are my thoughts, maybe it has changed since I last heard about the program.
- I'm in. #28
- I might be interested but need more information; I might be interested but would need a cost-share or financial incentive

- Not at all interested. Do not like the govt. telling me how to farm. Nobody cares about my land more than I do
- Already in the program
- NOT IN THIS WATERSHED
- I'm already certified
- I am certified
- Retiring
- Already a participant
- We checked and are not qualified to participate.

Section 3: Whitewater Watershed

This chapter presents a comparison of 2014 and 2016 KAP study data for the Whitewater watershed. For each question, tables show aggregate data (*n* and %) for each variable for the 2014 and 2016 surveys. In addition, an Excel graph is included that compares two-year data. All fractional data has been rounded upwards. Key points are briefly summarized in narrative form for each question.

Land ownership patterns

Figure 1 below summarizes the responses on land ownership patterns in 2014. 2016 responses are shown in the figure below. The two-year comparison is shown in Figure 5.

Figure 60 (2014): Please indicate your type of agricultural operation in the Whitewater watershed. Check all that apply.

Answered: 203 Skipped: 0

	Tracking number:	Total
Q2: I own and operate land in the Whitewater watershed	100.00% 99	48.77% 99
Q2: I own land in the Whitewater watershed but don't farm it (CRP easement, retired, etc.)	100.00% 58	28.57% 58
Q2: I lease land to others in the Whitewater watershed	100.00% 89	43.84% 89
Q2: I lease land from others in the Whitewater watershed	100.00% 13	6.40% 13
Total Respondents	203	203

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	4.00	2.00	2.06	0.96

Figure 61 (2016): Please indicate your type of agricultural operation in the Whitewater watershed. Check all that apply.

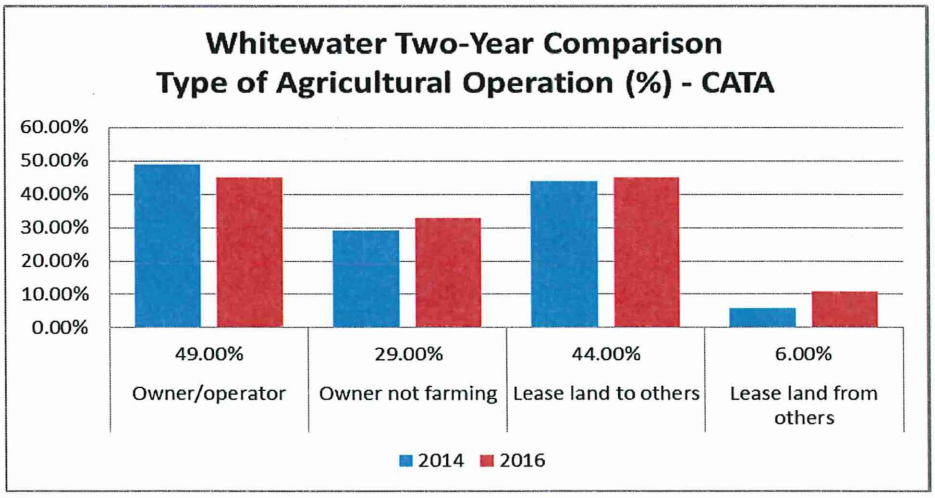
Answered: 130 Skipped: 4

	Responses	
I own and operate land in the Whitewater watershed	45.38%	59
I own land in the Whitewater watershed but don't farm it (CRP easement, retired, etc.)	33.08%	43
I lease land to others in the Whitewater watershed	45.38%	59
I lease land from others in the Whitewater watershed	10.77%	14
Don't know	0.00%	0
Total Respondents: 130		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	4.00	2.00	2.16	0.98

Figure 62: Two-year comparison of land ownership and tenancy in the Whitewater watershed



In 2014, owner-operators comprised the largest segment of producers at 49%. Landowners leasing land to others followed closely at 44%. 29% of land was not being farmed. 6% of respondents indicated that they lease land from others. In 2016, owner-operators declined to 45%, equal to the number of owners who leased their land to others. Acreage of land not being farmed increased to 33%. The number of respondents renting land from others increased to 11%. The following comments were entered:

- I rent it out an with need to no-till it.
- Rent 12 acres alfalfa ground
- Retired
- 5 acre hay field - 35 acres hills and pasture including homesite
- 20 acres rim program
- remnt farm to my son and help with all the cropping operations. he helped fill this out
- neighbor plants 2.5 acres of corn to help weed and varmet control on some pasture that is not used
- 60 ac crp 60 ac tillable
- Have it as a "tree farm" - 60 acres and a friend who puts six head out to pasture to keep weeds down at barn and house
- neighbor farms all of my 8 tillable acres at no charge

Consistent with landownership trends observed by the team, the number of owner-operators in the watershed has slightly declined in two years from 49% to 45%. The percentage of landowners who are no longer farming has increased from 29% in 2014 to 33% in 2016. The number of landowners who lease their land to others slightly increased from 44% in 2014 to 45% in 2016. The number of operators who lease land from others has increased from 6% in 2014 to 11% in 2016. A key point is that fewer than half of all producers in the Whitewater watershed are farming their own land, and that ownership and tenancy patterns are more complex than in previous generations.

Cropping systems

In 2014 a check-all-that-apply question was posed to respondents about their cropping systems.

Figure 63: What makes up your farming operation? (%) - Check all that apply (2014)

Answered: 197 Skipped: 11

Answer Choices	Responses	
I do not farm my land (1)	41.12%	81
Organic crops (2)	3.55%	7
Corn (3)	67.01%	132
Soybean (4)	54.82%	108
Small grains (5)	22.34%	44
Alfalfa (6)	41.62%	82
Commercial canning crops (7)	15.74%	31
Fruit (8)	1.02%	2
Vegetables (9)	4.57%	9
Dairy (10)	11.17%	22
Beef (11)	23.35%	46
Poultry (12)	3.55%	7
Hogs (13)	2.03%	4
Sheep (14)	1.02%	2
Don't know (15)	0.00%	0
Total Respondents: 197		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	14.00	4.00	4.92	3.04

- 67% of respondents produce corn, followed by soybeans (55%) and alfalfa (42%). The next tier included beef (23%), small grains (22%), commercial canning crops (16%) and dairy (11%). All other types of production were under 5%. Notably, 41% of respondents do not farm their land. The following comments were entered:
  - CRP - prairie grass
  - Pasture for commercial grazing April through October, no herbicides or pesticides or GMO pasture plants used
  - Trees, shrubs and prairie
  - Timber
  - Occasionally raise and sell beef, poultry, eggs. On and off again hobby farming.
  - Dairy is for dairy goats not cows
  - Rented out

- Rent alfalfa ground
- Farm is LLC & Sons Farms. Have CRP amd woods I work on; tillable son farms
- CRP
- 5 acres alfalfa; 50-100 poultry; 3 sheep; 2 goats
- horses
- tree farm
- i own 2 farms, both are rented to organic farmers
- horses
- 75 head beef
- organic dairy goats
- Unless it is to trees
- Pasture
- Horses

Landscape features

In 2014, producers were asked about their knowledge of landscape features in a check-all-that-apply question. Responses are given in Figure 5 below, and the results were cross-tabulated with ownership data.

Figure 64: Which of the following landscape features exist on your farm? (2014) Check all that apply.

Answered: 194 Skipped: 9

	Highly erodible soils	Steep slopes	Waterways and/or streams	Karst features such as sinkholes	None of the above	Don't know	Total
Q2: I own and operate land in the Whitewater watershed	64.29% 63	45.92% 45	70.41% 69	4.08% 4	7.14% 7	1.02% 1	97.42% 189
Q2: I own land in the Whitewater watershed but don't farm it (CRP easement, retired, etc.)	50.00% 27	53.70% 29	70.37% 38	9.26% 5	7.41% 4	3.70% 2	54.12% 105
Q2: I lease land to others in the Whitewater watershed	44.05% 37	41.67% 35	72.62% 61	7.14% 6	8.33% 7	3.57% 3	76.80% 149
Q2: I lease land from others in the Whitewater watershed	69.23% 9	23.08% 3	69.23% 9	0.00% 0	0.00% 0	7.69% 1	11.34% 22
Total Respondents	103	86	136	10	15	6	194

	Other (please specify)	Total
Q2: I own and operate land in the Whitewater watershed	6	6
Q2: I own land in the Whitewater watershed but don't farm it (CRP easement, retired, etc.)	2	2
Q2: I lease land to others in the Whitewater watershed	7	7
Q2: I lease land from others in the Whitewater watershed	0	0

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	2.34	1.15

This question was repeated in 2016, yielding the following results (without crosstabs).

Figure 65: Which of the following landscape features exist on your farm? (2016)
Check all that apply.
Answered: 125 Skipped: 9

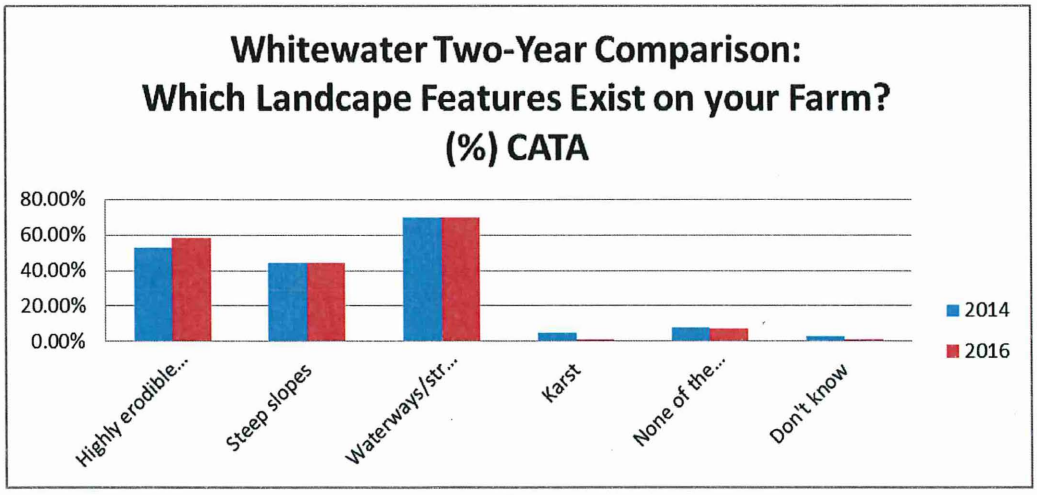
Answer Choices	Responses	
Highly erodible soils	58.40%	73
Steep slopes	44.00%	55
Waterways and/or streams	70.40%	88
Karst features such as sinkholes	0.80%	1
None of the above	7.20%	9
Don't know	0.80%	1
Total Respondents: 125		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	2.21	1.05

Figure 7 below compares the 2014 and 2016 data.

Figure 66: Two-year comparison:
Which of the following landscape features exist on your farm? Check all that apply (%)



In all categories there is fairly high awareness of waterways and streams that is consistent in the two-year periods, and to a lesser extent awareness of highly erodible soils. There was a slight (5%) increase in awareness of highly erodible soils, and a slight decrease in awareness of karst features. Otherwise responses are essentially unchanged over the two-year period. The following comments were entered by respondents:

- CRP and planted trees
- Not sure, some slope
- Erodible soils but not highly erodible

- Peas
- None
- Farmers don't manage their runoff next to our property. Many perennial streams and runoff.
- Grassed waterways
- Terraces and flat land
- Some terraces
- we use buffer all along our stream
- woodlands
- farm is mostly pasture and hay
- springs and hillside seeps
- all but two acres is woodland

Use of conservation structures

Producers in 2014 and 2016 were asked about the conservation structures that they use. Given their length (70+ pages of tables) they are not reproduced here. However, a summary two-year comparison is given below.

Figure 67: What conservation structures do you use? Check one response per row (%) - (2014)

Answered: 179 Skipped: 29

	Already use (1)	Willing to try (2)	Not applicable for my land (3)	Total
Grade stabilization structures	**83.33%** 35	**9.52%** 4	**7.14%** 3	42
Grassed waterways	**95.73%** 157	**2.44%** 4	**1.83%** 3	164
Vegetative buffers	**92.31%** 48	**3.85%** 2	**3.85%** 2	52
Stream bank restoration	**50.00%** 8	**31.25%** 5	**18.75%** 3	16
Contour strip cropping	**94.90%** 93	**1.02%** 1	**4.08%** 4	98
Filter strips	**88.24%** 30	**2.94%** 1	**8.82%** 3	34
Controlled drainage	**94.44%** 34	**2.78%** 1	**2.78%** 1	36
Terracing	**91.49%** 43	**2.13%** 1	**6.38%** 3	47
Water/sediment basin	**83.33%** 30	**8.33%** 3	**8.33%** 3	36
Wood chip bioreactor	**0.00%** 0	**50.00%** 3	**50.00%** 3	6
Don't know	**60.00%** 3	**20.00%** 1	**20.00%** 1	5

Basic Statistics

	Minimum	Maximum	Median	Mean	Standard Deviation
Grade stabilization structures	1.00	3.00	1.00	1.24	0.57
Grassed waterways	1.00	3.00	1.00	1.06	0.31
Vegetative buffers	1.00	3.00	1.00	1.12	0.42
Stream bank restoration	1.00	3.00	1.50	1.69	0.77
Contour strip cropping	1.00	3.00	1.00	1.09	0.41
Filter strips	1.00	3.00	1.00	1.21	0.58
Controlled drainage	1.00	3.00	1.00	1.08	0.36
Terracing	1.00	3.00	1.00	1.15	0.50
Water/sediment basin	1.00	3.00	1.00	1.25	0.60

Wood chip bioreactor	2.00	3.00	2.50	2.50	0.50
Don't know	1.00	3.00	1.00	1.60	0.80

Figure 68: What conservation structures do you use? Check one response per row (%) CATA (2016)

Answered: 128 Skipped: 6

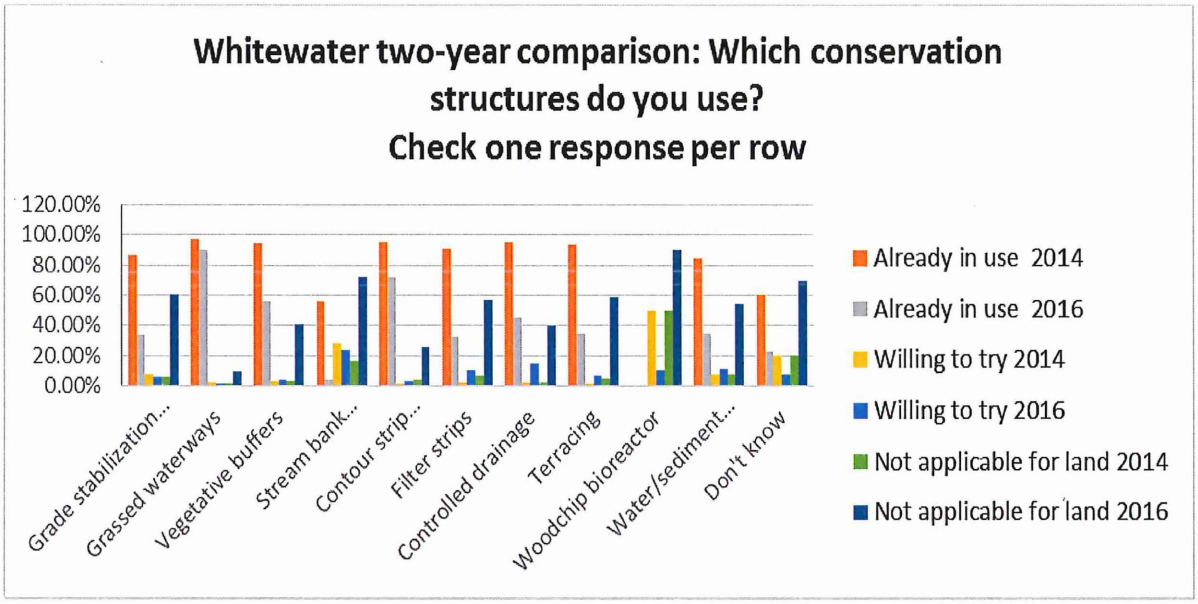
	Already use	Willing to try	Not applicable for my land	Total
Grade stabilization structures	33.82% 23	5.88% 4	60.29% 41	68
Grassed waterways	90.16% 110	0.82% 1	9.02% 11	122
Vegetative buffers	56.10% 46	3.66% 3	40.24% 33	82
Stream bank restoration	4.35% 3	23.19% 16	72.46% 50	69
Contour strip cropping	71.74% 66	3.26% 3	25.00% 23	92
Filter strips	32.84% 22	10.45% 7	56.72% 38	67
Controlled drainage	45.33% 34	14.67% 11	40.00% 30	75
Terracing	34.62% 27	6.41% 5	58.97% 46	78
Water/sediment basin	34.72% 25	11.11% 8	54.17% 39	72
Wood chip bioreactor	0.00% 0	10.34% 6	89.66% 52	58
Don't know	23.08% 3	7.69% 1	69.23% 9	13

Basic Statistics

	Minimum	Maximum	Median	Mean	Standard Deviation
Grade stabilization structures	1.00	3.00		2.26	0.93
Grassed waterways	1.00	3.00		1.19	0.58
Vegetative buffers	1.00	3.00		1.84	0.97

Stream bank restoration	1.00	3.00		2.68	0.55
Contour strip cropping	1.00	3.00		1.53	0.87
Filter strips	1.00	3.00		2.24	0.92
Controlled drainage	1.00	3.00		1.95	0.92
Terracing	1.00	3.00		2.24	0.94
Water/sediment basin	1.00	3.00		2.19	0.92
Wood chip bioreactor	2.00	3.00		2.90	0.30
Don't know	1.00	3.00		2.46	0.84

Figure 69: Two-year comparison: Which conservation structures do you use? COOR



A significant majority of producers indicated that they were already using all of the conservation structures in 2014. For each practice a small number of producers indicated that the practices were not applicable for their land in 2014. Those reporting that the practice was not suitable for their land went up significantly in 2016. The number of producers reporting use of the structures in 2016 went down very significantly in 2016. Grassed waterways were the most commonly reported practice in both surveys, although they declined somewhat in 2016. Contour strip cropping was the second most common practice reported in both surveys, followed by vegetative buffers, controlled drainage, terracing and grade stabilization structures. The following comments were entered:

- None
- Contour (not strip)
- It's all pasture, no bare soils only perennial plants
- Ponds No till Contour farm - no strips :)
- None
- None
- None
- Waterways should be regraded or recline buffer strips on each side
- Participate in CREP Savannah or pasture Berm/swale/keylines on homesite
- Dikes Pond
- None
- None
- None
- All tillable land reduced tillage and corn
- 50 foot buffer from stream
- CRP
- none
- i am not sure what most of these are

- What is stream band restoration
- Ponds
- Cropland between waterway 2 crp
- none
- all land worked on contours
- none
- Do not till soil. pasture and trees
- Contour crop land

Livestock practices

The next question asked about livestock practices related to water bodies. The 2014 responses are given in Figure 9 as crosstabs; the 2016 results are presented in Figure 10 (without crosstabs); and two-year comparison in Figure 11.

Figure 70: Do you graze livestock? If so, which practices do you use? Check all that apply (2014) CATA

Answered: 193 Skipped: 15

Answer Choices	Responses	
I don't graze livestock	65.80%	127
Access control to water bodies	5.18%	10
Alternative water supplies	12.95%	25
Prescribe-control grazing	10.88%	21
Open range grazing	17.10%	33
Using streams as a water source for livestock	12.44%	24
Don't know	1.55%	3
Total Respondents: 193		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	1.00	2.62	1.92

Figure 71: Do you graze livestock? If so, which practices do you use? Check all that apply (2016)

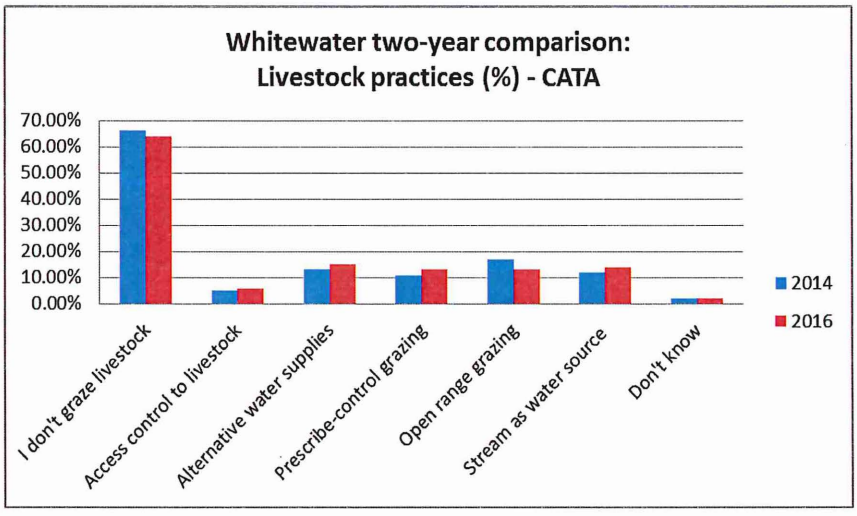
Answered: 126 Skipped: 8

Answer Choices	Responses	
I don't graze livestock	64.29%	81
Access control to water bodies	5.56%	7
Alternative water supplies	15.08%	19
Prescribe-control grazing	13.49%	17
Open range grazing	12.70%	16
Using streams as a water source for livestock	14.29%	18
Don't know	1.59%	2
Total Respondents: 126		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	1.00	2.64	1.91

Figure 72: Whitewater Livestock Practices 2014-2016



Consistent with Question 2, the majority (two-thirds of respondents) do not graze livestock, and this remained consistent during the two-year period. There is a slight increase in controlling access to water

bodies and alternative water supplies. There was a slight increase in prescribed control grazing, and about a 5% decrease in open range grazing. There was a slight increase (<2%) in using streams as a water source for livestock. The following comments were entered:

- No head choppers - chisel plow whole stalks
- No cattle
- When we raise livestock <40 head.
- No livestock in areas where manure can sit in waterway or pollute water
- We rent our pastures out
- horses in summer
- open range in fenced pasture no access to streams or and body of water
- no
- waterers
- pasture land is leased to someone else

Manure practices

Turning to manure practices, survey results for 2014 and 2016 are given in Figures 12 and 13, and a two-year comparison is found in Figure 14.

Figure 73: Do you spread manure? If so, what are important considerations to be aware of In manure management? Check all that apply (2014)

Answered: 193 Skipped: 15

Answer Choices	Responses	
I don't spread manure	62.18%	120
Time until next growing season	15.54%	30
Soil temperature in fall	6.22%	12
Field availability and proximity to manure storage	20.21%	39
On-farm storage capacity	13.47%	26
Laboratory analysis of manure	12.95%	25
Current soil test results	21.76%	42
Weather forecast prior to application	11.92%	23
Don't know	3.63%	7
Total Respondents: 193		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	9.00	3.50	3.68	2.62

Figure 74: Do you spread manure? If so, what are important considerations to be aware of in manure management? Check all that apply (2016)

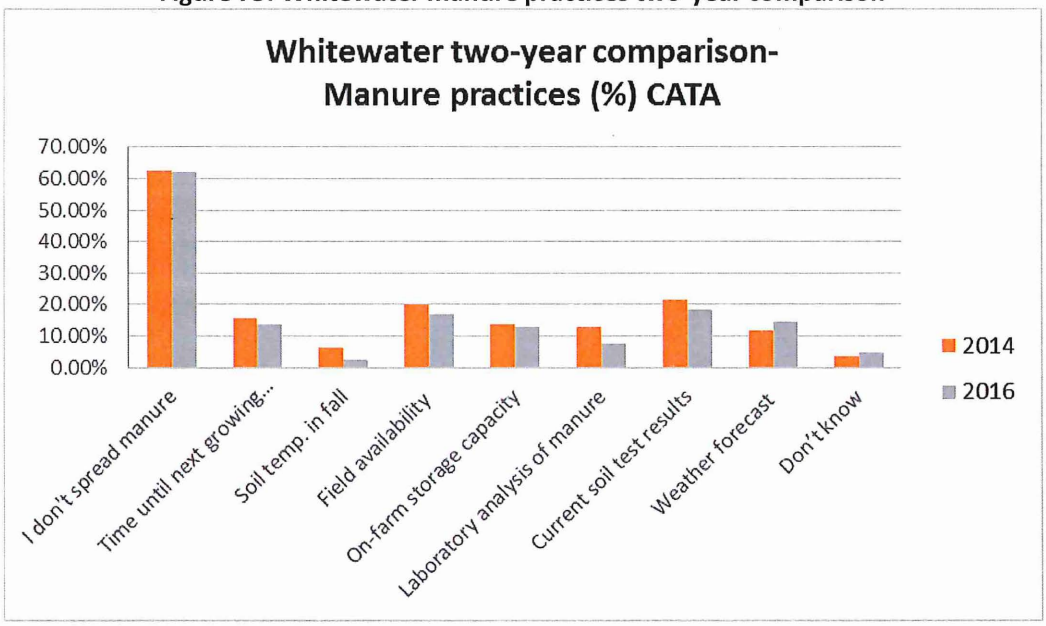
Answered: 124 Skipped: 10

Answer Choices	Responses	
I don't spread manure	62.10%	77
Time until next growing season	13.71%	17
Soil temperature in fall	2.42%	3
Field availability and proximity to manure storage	16.94%	21
On-farm storage capacity	12.90%	16
Laboratory analysis of manure	7.26%	9
Current soil test results	18.55%	23
Weather forecast prior to application	14.52%	18
Don't know	4.84%	6
Total Respondents: 124		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	9.00	3.00	3.67	2.75

Figure 75: Whitewater manure practices two-year comparison



Responses for "I don't spread manure" remained essentially constant in both surveys at 62%. There was a very slight decline in the use of all practices except "weather forecast prior to application." The following comments were entered:

- next crop to be planted is a factor
- Leave up to renter
- Not for five years
- I don't have cattle but sometimes I get manure from other farmers
- Renter spreads manure
- Spread manure in the spring and fall only on corn ground
- No manure spread on farm this year
- Renter decides
- Incorporate/drag line
- no manure in pastures
- spread lot clean up on hay fields
- Renter does once a year

Nitrogen management practices

The next question concerned fertilizer management practices. Figures 19 to 21 below summarize the 2014, 2016 and combined values.

Figure 76: What practices do you use to manage Nitrogen fertilizer? Check all that apply (%) 2014 - CATA

Answered: 192 Skipped: 16

Answer Choices	Responses	
I do not apply nitrogen fertilizer (1)	27.60%	53
Split application (2)	6.25%	12
Nitrogen stabilizer (3)	15.63%	30
Spring application (4)	45.83%	88
Soil testing (5)	36.98%	71
Slow release products (6)	16.15%	31
Variable rate application (7)	13.02%	25
Other precision agricultural technologies (8)	7.29%	14
Incorporation (9)	21.35%	41
Cover crops (10)	14.06%	27
Nitrogen credits from previous crops and manure (11)	33.85%	65
Don't know (12)	18.75%	36
Total Respondents: 192		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	12.00	5.00	6.35	3.47

Figure 77: What practices do you use to manage nitrogen fertilizer? Check all that apply (%) 2016- CATA

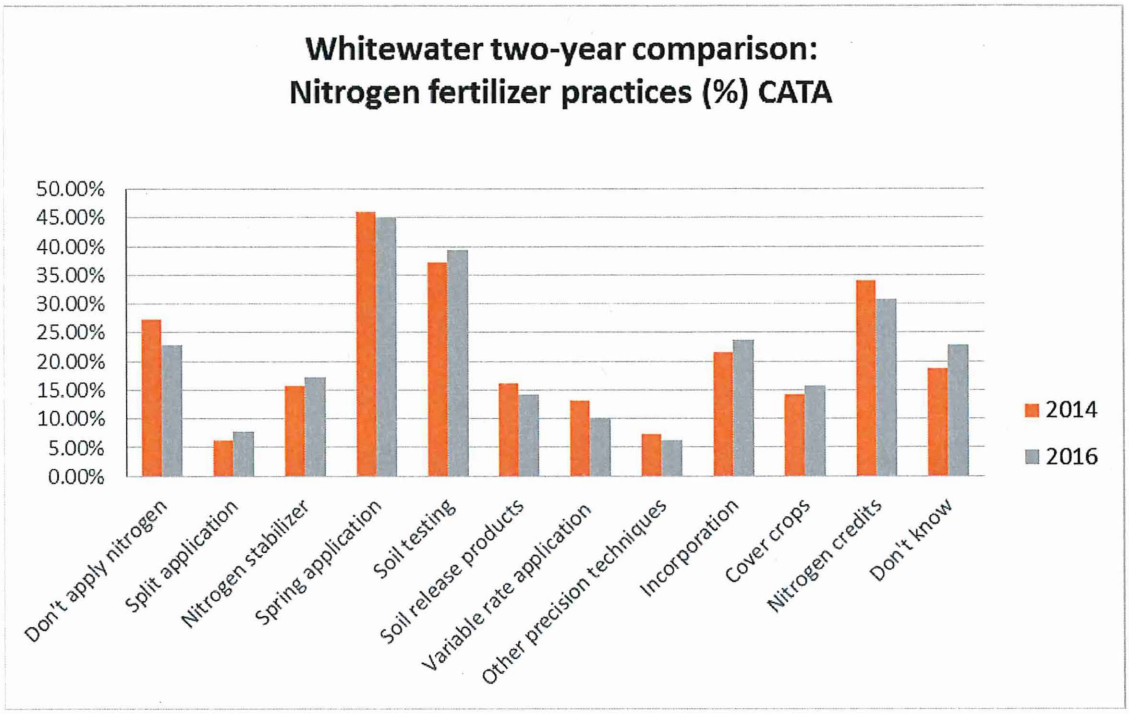
Answered: 127 Skipped: 7

Answer Choices	Responses	
I do not apply nitrogen fertilizer (1)	22.83%	29
Split application (2)	7.87%	10
Nitrogen stabilizer (3)	17.32%	22
Spring application (4)	44.88%	57
Soil testing (5)	39.37%	50
Slow release products (6)	14.17%	18
Variable rate application (7)	10.24%	13
Other precision agricultural technologies (8)	6.30%	8
Incorporation (9)	23.62%	30
Cover crops (10)	15.75%	20
Nitrogen credits from previous crops and manure (11)	30.71%	39
Don't know (12)	22.83%	29
Total Respondents: 127		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	12.00	5.00	6.47	3.48

Figure 78: Fertilizer practices (two-year comparison)



There was a two-year slight decline in the use of spring application, soil release products, variable rate application, precision technologies and nitrogen credits. There was a slight increase in the use of split application, nitrogen stabilizer, soil testing, incorporation and cover crops. There was also a drop from 28% to 28% of those reporting that they do not apply nitrogen fertilizer. Those reporting "Don't know" increased from 19 to 23%. Respondents included the following comments:

- Leave up to renter
- Rent land out
- Rent out
- I'm the owner; don't apply; renter does
- Rent it out
- We use native legumes in our CREP
- Left up to renter
- I use ammonium sulfate for a nitrogen sources and slow release urea. This farm has never had anhydrous ammonia. I believe the use of anhydrous hurts the biological health of soil and therefore causes more runoff of pollutants. I also use minimum tillage and leave crop residue.
- Never apply more than 100 lb nitrogen
- Renter takes care of all fertilizing
- corn land is rented out
- the farmer who rents our crop land takes care of all that
- Renters use nitrogen
- tenant make those decisions

Figure 79: When considering your nitrogen fertilizer rates, which of the following do you need to take into account? (%) Check all that apply (2014)

Answered: 188 Skipped: 20

Answer Choices	Responses	
I do not apply nitrogen fertilizer (1)	28.19%	53
Manure used in rotation (2)	30.32%	57
Previous legume crops (3)	43.09%	81
Price of nitrogen and corn (4)	22.87%	43
Nitrogen contributions from phosphorus fertilizers such as MAP and DAP (5)	31.38%	59
Soil testing (6)	47.87%	90
Don't know (7)	16.49%	31
Total Respondents: 188		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	4.00	3.95	1.89

Figure 80: When considering your nitrogen fertilizer rates, which of the following do you need to take into account? (%) Check all that apply (2016)

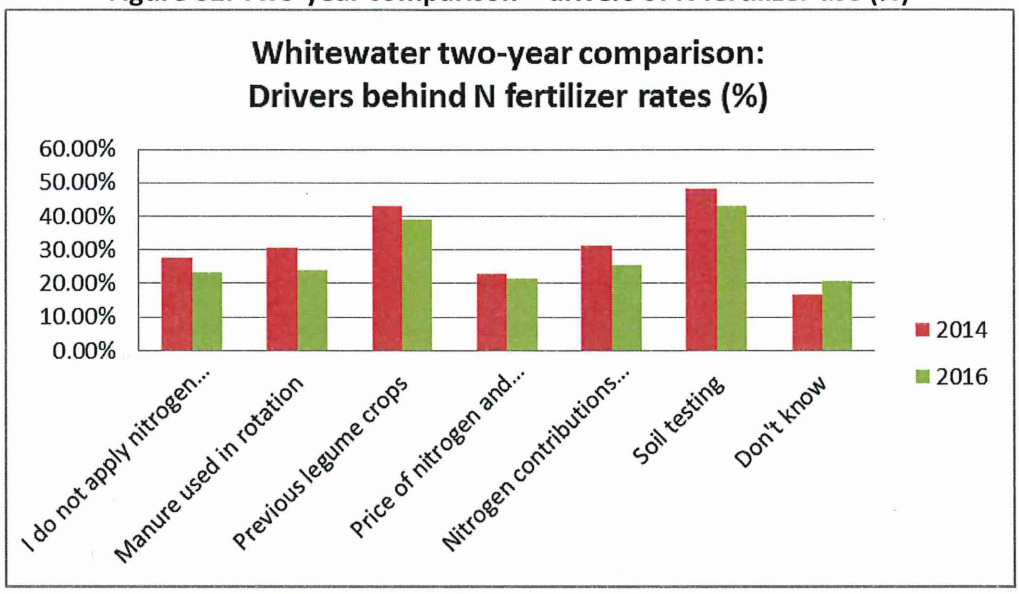
Answered: 125 Skipped: 9

Answer Choices	Responses	
I do not apply nitrogen fertilizer (1)	23.20%	29
Manure used in rotation (2)	24.00%	30
Previous legume crops (3)	39.20%	49
Price of nitrogen and corn (4)	21.60%	27
Nitrogen contributions from phosphorus fertilizers such as MAP and DAP (5)	25.60%	32
Soil testing (6)	43.20%	54
Don't know (7)	20.80%	26
Total Respondents: 125		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	4.00	4.09	1.92

Figure 81: Two-year comparison – drivers of N fertilizer use (%)



Comparing data sets, there was a slight decline in all categories except "Don't know," which increased from 16% to 21%. Fifteen comments were added by respondents that their land is rented out. The apparent increased rate of leasing cropland to renters could explain that the "Don't know" value increased. Comments provided by respondents included:

- Leave up to renter
- Rent land out
- Rent out
- Grid testing samples
- Renter applies
- Left up to renter
- Renter does this
- See above
- corn land rented out
- rent out
- Apply 100 # Actual for sweet corn
- tenant makes those decisions

Figure 82: What influences how much nitrogen that you apply to corn? (%) Check all that apply (2014)

Answered: 184 Skipped: 24

Answer Choices	Responses	
I don't plant corn (1)	**24.46%**	45
Nutrient management plan (2)	**27.17%**	50
Agronomist or consultant recommendation (3)	**47.83%**	88
My own experience (4)	**32.61%**	60
Neighbors (5)	**3.80%**	7
Don't know (6)	**19.57%**	36
Total Respondents: 184		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	3.00	3.15	1.49

Figure 83: What influences how much nitrogen you apply to corn? (%) Check all that apply (2016)

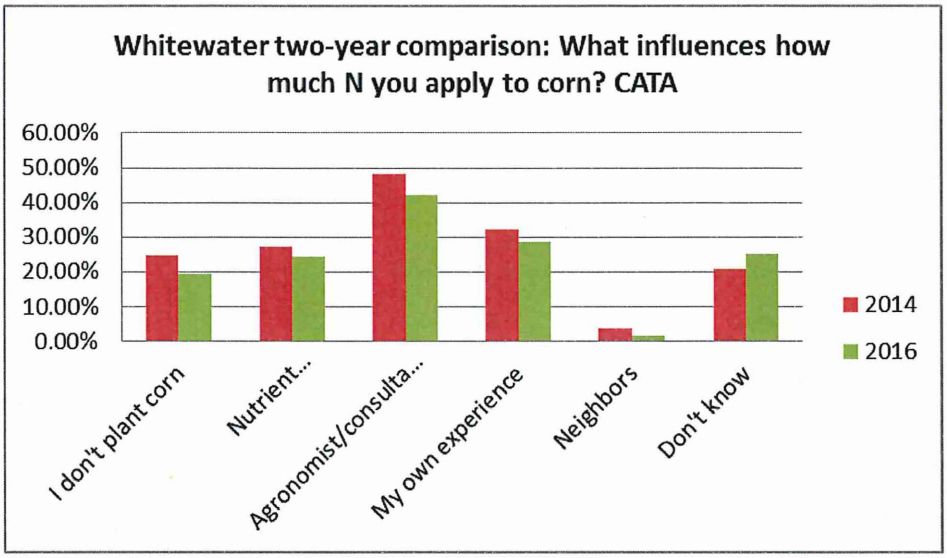
Answered: 123 Skipped: 11

Answer Choices	Responses	
I don't plant corn (1)	**19.51%**	24
Nutrient management plan (2)	**24.39%**	30
Agronomist or consultant recommendation (3)	**42.28%**	52
My own experience (4)	**28.46%**	35
Neighbors (5)	**1.63%**	2
Don't know (6)	**25.20%**	31
Total Respondents: 123		

Basic Statistics

Minimum	*Maximum*	*Median*	*Mean*	*Standard Deviation*
1.00	*6.00*	*3.00*	*3.31*	*1.57*

Figure 84: Two-year comparison:
What influences how much Nitrogen you to apply to corn?



As in the previous question, there were declining values for all practices except "Don't know," which increased from 20% to 25%. Additional comments entered by respondents included:

-Leave up to renter
- Rent land out
- Rent out
- Renter plants and fertilizes
- Lease takes care of
- Left up to renter
- Renter
- See #7
- corn land rented out
- u of mu recommendations
- corn is bad for the land
- other organic farmers
- i do not apply N after alfalfa and use 60lb. credit after soybeans
- my neighbor planted 2.5 acre on an area he used for access to other fields
- renter
- tenant makes those decisions
- Recommendations from Lakeside Packing (Sweetcorn)

Pesticide management

Figure 85: Which of the following pesticide management practices do you use? (%) Check all that apply (2014)

Answered: 184 Skipped: 24

Answer Choices	Response	
I don't apply pesticides (1)	32.07%	59
Rotate crops to reduce pest population carry over (2)	45.65%	84
Scout for threshold weeds, insect or fungus populations (3)	36.41%	67
Map pest infestations to determine long-term pest management strategies (4)	5.43%	10
Rotate chemical modes of action (5)	27.17%	50
Follow pesticide label instructions (6)	39.67%	73
Maintain vegetative buffers such as filter strips near water bodies (7)	13.59%	25
Maintain setbacks from tile intakes and points of runoff (8)	11.41%	21
Use of a soils specific loss rating screening tool (9)	0.54%	1
Don't know (10)	19.02%	35
Total Respondents: 184		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	4.00	4.37	2.68

Figure 86: Which of the following pesticide management practices do you use? (%) Check all that apply (2016)

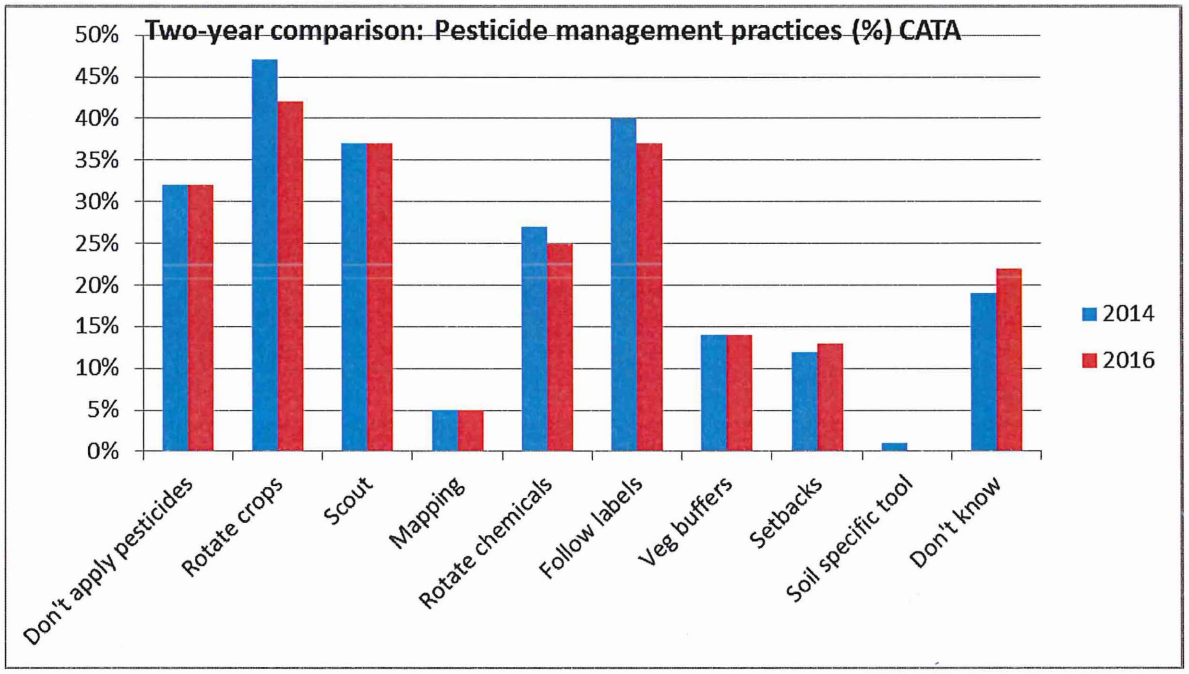
Answered: 126 Skipped: 8

Answer Choices	Responses	
I don't apply pesticides (1)	31.75%	40
Rotate crops to reduce pest population carry over (2)	42.06%	53
Scout for threshold weeds, insect or fungus populations (3)	36.51%	46
Map pest infestations to determine long-term pest management strategies (4)	4.76%	6
Rotate chemical modes of action (5)	24.60%	31
Follow pesticide label instructions (6)	37.30%	47
Maintain vegetative buffers such as filter strips near water bodies (7)	13.49%	17
Maintain setbacks from tile intakes and points of runoff (8)	12.70%	16
Use of a soils specific loss rating screening tool (9)	0.00%	0
Don't know (10)	22.22%	28
Total Respondents: 126		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	4.00	4.48	2.78

Figure 87: Two year comparison: Pesticide management practices



The number of producers not applying pesticides remained constant at 32%. The number of producers who scout for pest infestations also remained constant at 37%. Producers reported a slight decrease in crop rotation, rotating chemical modes of action and following pesticide label instructions. There was a slight increase in the use of setbacks. Due to a coding error in the database, the variable "Avoid using pesticides that are concerns to water" was omitted. Twenty-four respondents checked this option. The percentage of respondents reporting "Don't know" increased from 2014 (19%) to 22% in 2016. Eight respondents commented that their land is rented out. Those checking "Other" provided the following comments:

- Leave up to renter
- Rent land out
- None
- Rent out
- Renter applies
- Lease takes care of
- Consultant recommendations CHS
- My renter is a GMO farmer :(
- Left up to renter
- Renter does this
- Renter takes care of pesticide appls
- renter does this
- tenant makes those decisions
- Land renter does very good land use practices

Water quality

Figure 88: What are the challenges to protecting water quality in the Whitewater watershed? (2014) CATA

Answered: 185 Skipped: 23

	On your farm (1)	In the Whitewater watershed (2)	Total Respondents
Manure management	47.1 49	73.08% 76	104
Livestock with uncontrolled access to streams	29.5 18	80.33% 49	61
Local geology (karst topography and steep slopes)	55.1 43	88.46% 69	78
Intense rains	78.1 93	71.43% 85	119
Lack of cost share or funding resources	78.7 37	72.34% 34	47
None	88.2 15	29.41% 5	17
Don't know	89.2 25	53.57% 15	28

Basic Statistics

	Minimum	Maximum	Median	Mean	Standard Deviation
Manure management	1.00	2.00	2.00	1.61	0.49
Livestock with uncontrolled access to streams	1.00	2.00	2.00	1.73	0.44
Local geology (karst topography and steep slopes)	1.00	2.00	2.00	1.62	0.49
Intense rains	1.00	2.00	1.00	1.48	0.50
Lack of cost share or funding resources	1.00	2.00	1.00	1.48	0.50
None	1.00	2.00	1.00	1.25	0.43
Don't know	1.00	2.00	1.00	1.38	0.48

Figure 89: What are the challenges to protecting water quality in the Whitewater watershed? (2016) CATA

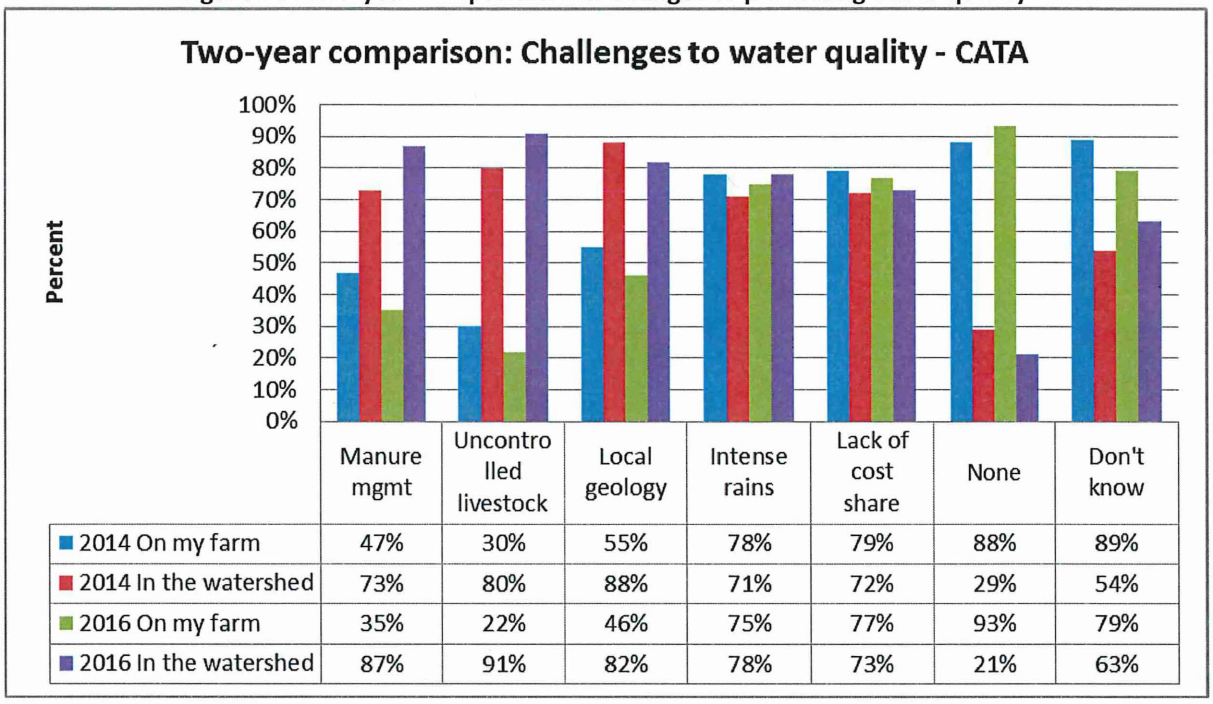
Answered: 125 Skipped: 9

	On your farm (1)	In the Whitewater watershed (2)	Total Respondents
Manure management	35.2 25	87.32% 62	71
Livestock with uncontrolled access to streams	22.2 12	90.74% 49	54
Local geology (karst topography and steep slopes)	46.4 26	82.14% 46	56
Intense rains	75.3 55	78.08% 57	73
Lack of cost share or funding resources	76.9 20	73.08% 19	26
None	92.8 13	21.43% 3	14
Don't know	79.1 19	62.50% 15	24

Basic Statistics

	Minimum	Maximum	Median	Mean	Standard Deviation
Manure management	1.00	2.00	2.00	1.71	0.45
Livestock with uncontrolled access to streams	1.00	2.00	2.00	1.80	0.40
Local geology (karst topography and steep slopes)	1.00	2.00	2.00	1.64	0.48
Intense rains	1.00	2.00	2.00	1.51	0.50
Lack of cost share or funding resources	1.00	2.00	1.00	1.49	0.50
None	1.00	2.00	1.00	1.19	0.39
Don't know	1.00	2.00	1.00	1.44	0.50

Figure 90: Two-year comparison – challenges to protecting water quality



	Manure mgmt	Uncontrolled livestock	Local geology	Intense rains	Lack of cost share	None	Don't know
2014 On my farm	47%	30%	55%	78%	79%	88%	89%
2014 In the watershed	73%	80%	88%	71%	72%	29%	54%
2016 On my farm	35%	22%	46%	75%	77%	93%	79%
2016 In the watershed	87%	91%	82%	78%	73%	21%	63%

Challenges presented by on-farm manure management declined from 47% in 2014 to 35% in 2016. However, respondents perceived that manure management challenges increased in the watershed from 73% in 2014 to 87% in 2016. On-farm uncontrolled livestock declined from 30% in 2014 to 22% in 2016. Local geology on-farm was viewed as a challenge by 55% in 2014, declining to 46% in 2016. Similarly, local geology was seen as a challenge by 88% in 2014 and 82% in 2014. Intense rains were viewed as a challenge by 78% of respondents in 2014, declining slightly to 75% in 2016. Lack of cost share (on-farm) was seen as a challenge by 79% in 2014, declining slightly to 77% in 2016. 88% of respondents said that they had no water quality issues in 2014, increasing to 93% in 2016. "Don't know" responses on-farm declined from 89% in 2014 to 79% in 2016. "Don't know" challenges in the watershed increased from 54% in 2014 to 63% in 2016.

Additional comments provided by respondents included the following:

- The original CSP program to reward farmers doing a good (and) thorough job; needs to be put back in place
- I have very little runoff
- Fall tillage. Keep the ground covered during winter
- Excessive tillage is a problem in the watershed
- Farm land runoff all over the watershed
- Chemicals #1
- Good water ways; buffer strip; CRP
- Renter is required to be in compliance with FSA office
- Other issues in Whitewater watershed: chemical herbicides+fungicides, GMO crops, row crop farming on erodible land, + degraded soils that can't infiltrate rain fast enough
- Large operators who use straight row farming techniques w/o contour management

Figure 91: What are the pollutants of concern in drinking water in the Whitewater watershed? (%) (2014) – CATA

Answered: 189 Skipped: 19

Answer Choices	Responses	
Nitrate (1)	66.67%	126
Phosphorus (2)	26.46%	50
Bacteria (3)	41.27%	78
Arsenic (4)	8.47%	16
Pesticides (5)	40.74%	77
There are no pollutants of concern (6)	8.47%	16
Don't know (7)	26.46%	50
Total Respondents: 189		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.28	2.08

Figure 92: What are the pollutants of concern in drinking water in the Whitewater watershed? (%) (2016) – CATA

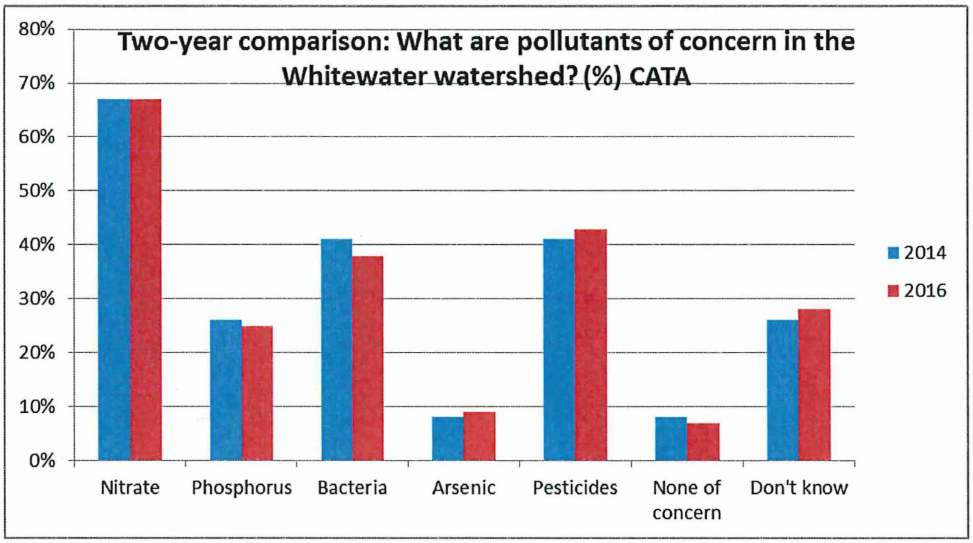
Answered: 127 Skipped: 7

Answer Choices	Responses	
Nitrate (1)	66.93%	85
Phosphorus (2)	25.20%	32
Bacteria (3)	37.80%	48
Arsenic (4)	9.45%	12
Pesticides (5)	43.31%	55
There are no pollutants of concern (6)	7.09%	9
Don't know (7)	28.35%	36
Total Respondents: 127		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.33	2.11

Figure 93: Two-year comparison – pollutants of concern in drinking water



Respondents were unchanged in their identification of Nitrate as a pollutant in drinking water, at 66% in 2014 and 2016. Phosphorus was named as a pollutant of concern by 26% of respondents in 2014 and 25% in 2016. Bacteria was identified as a pollutant by 38% in 2014 and 41% of responednts in 2016. 8% of respondents identified arsenic in 2014, and 9% in 2016. Pesticides were named in 2014 by 41% of respondents in 2014 and 43% in 2016. 8% said that there were no pollutants of concern in drinking water in 2014, compared to 7% in 2016. 26% responded "Don't know" in 2014, contrasted with 28% in 2016. In addition, respondents added the following comments:

- There are others
- Corn fertilizer
- NITRATE TEST IS O ON WELL
- I am not sure what this question is asking. From whose perspective?
- Comments on "Nitrate:" only an indicator of surface water contamination *herbicides*
- In my area I know of more
- Herbicides

Figure 94: Do you think that your farm operation contributes nutrients, sediment or bacteria to local streams and rivers? (%) (2014) – COOR

Answered: 188 Skipped: 20

Answer Choices	Responses	
Yes (1)	**24.47%**	46
No (2)	**49.47%**	93
Don't know (3)	**26.06%**	49
Total		**188**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	3.00	2.00	2.02	0.71

Figure 95: Do you think that your farm operation contributes nutrients, sediment or bacteria to local streams and rivers? (%) (2016) – COOR

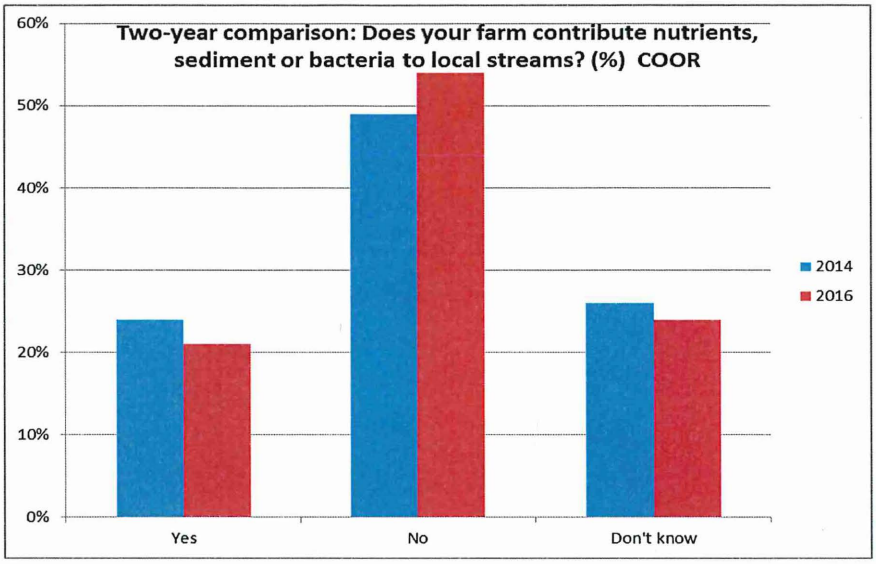
Answered: 127 Skipped: 7

Answer Choices	Responses	
Yes (1)	**21.26%**	27
No (2)	**54.33%**	69
Don't know (3)	**24.41%**	31
Total		**127**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	3.00	2.00	2.03	0.68

Figure 96: Two year comparison – Does your farm contribute nutrients to local streams?



There was a decline in agreement that the respondent's farm contributed nutrients to water bodies, from 24% in 2014 to 21% in 2016. Similarly, 49% checked "No" in 2014, and 54% in 2016. "Don't know" declined slightly from 26% in 2014 to 24% in 2016. Those checking "Other" provided the following comments:

- maybe in intense rainfall events
- Rent my land out
- Everything contributes even in small amounts but I do not think my farm is a point source - or would be considered to need anything but fine tuning
- I don't believe my farm is a problem, but all areas contribute in some manner, even the wooded areas of the Whitewater wildlife management area contribute from rotting leaves and decaying wood in the area
- All do
- Limited
- Don't think fertilizer and bacteria can get into streams because waterway is damaged and needs to be cleaned out before ever gets to a stream
- I do everything in my power to minimize pollutants from entering our streams, lake and rivers.
- Only in abnormal rain
- I feel that we have alot less runoff because of (illegible) than 10 years ago. There is alot better job of residue management.
- we have buffer strips along our streams
- 95% of the time
- try not to
- not much if at all
- Very little because i am not near a stream or lake

Public perception

Figure 97: Does public perception of agriculture's contribution to water quality issues concern you? (%) Check only one response (2014)

Answered: 195 Skipped: 13

Answer Choices	Responses	
Very much (1)	31.28%	61
Somewhat (2)	41.03%	80
Neutral (3)	14.87%	29
Not very much (4)	5.13%	10
Not at all (5)	2.05%	4
Don't know (6)	5.64%	11
Total		195

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	2.23	1.30

Figure 98: Does public perception of agriculture's contribution to water quality issues concern you? (%) Check only one response (2016)

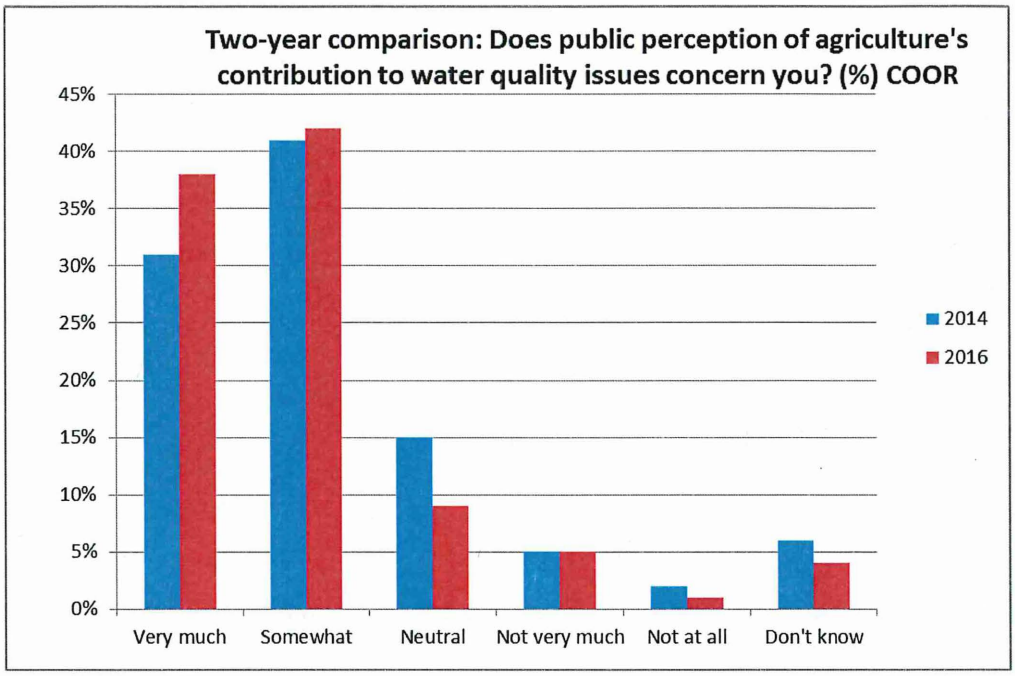
Answered: 128 Skipped: 6

Answer Choices	Responses	
Very much (1)	38.28%	49
Somewhat (2)	42.19%	54
Neutral (3)	9.38%	12
Not very much (4)	5.47%	7
Not at all (5)	0.78%	1
Don't know (6)	3.91%	5
Total		128

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	2.00	1.18

Figure 99: Two-year comparison: Does public perception of agriculture's contribution to water quality issues concern you? (%) COOR



There was an increase from 2014 to 2016 of those responding that they are concerned about public perception of agriculture's contribution to water quality issues. 31% said that they were "Very concerned" in 2014, increasing to 38% in 2016. 41% were "Somewhat concerned" in 2014, compared with 42% in 2016. 15% were neutral in 2014, dropping to 9% in 2016. Respondents checking "Not very much" remained at about 5% in both surveys. Those "Not at all concerned" dropped from 3% in 2014 to less than 1% in 2016. "Don't know" responses dropped from 6% in 2014 to 4% in 2016. Those checking "Other" provided the following comments:

- Not enough concern
- Because city people do not understand "Farming"
- The general public thinks farmers and ag are doing all the things that is affecting water quality I think cities have more issues with intense rain since they allow wide areas where rain can not soak into. water runs into storm sewers... 9i have a problem when i see rochester city sewers trucks putting sewer on farm fields. is this 100% safe?
- Non farm people can be very ignorant of farming
- They continue to haggle over Nitrates, manure, city runoff and miss the toxic chemicals entering our water source which have half lives that will outlast generations

Responsibility for water quality

Figure 100: Who is responsible for improving water quality? (%) 2014 CATA

Answered: 185 Skipped: 23

Answer Choices	Responses	
Crop farmers (1)	88.11%	163
Livestock farmers (2)	87.03%	161
State and local officials (3)	60.00%	111
Individual homeowners (4)	80.00%	148
Myself (5)	71.35%	132
Don't know (6)	4.32%	8
Total Respondents: 185		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	3.00	2.93	1.47

Figure 101: Who is responsible for improving water quality? (%) 2016 CATA

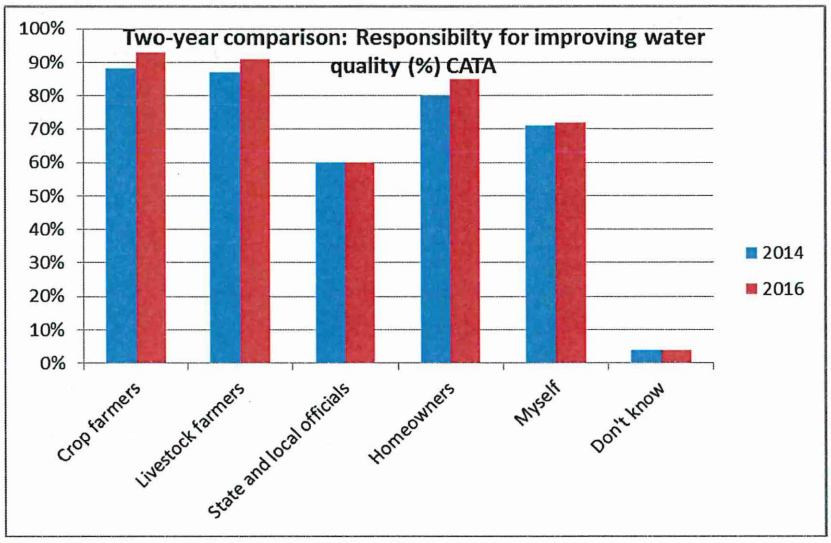
Answered: 124 Skipped: 10

Answer Choices	Responses	
Crop farmers (1)	92.74%	115
Livestock farmers (2)	91.13%	113
State and local officials (3)	60.48%	75
Individual homeowners (4)	84.68%	105
Myself (5)	71.77%	89
Don't know (6)	4.03%	5
Total Respondents: 124		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	3.00	2.91	1.46

Figure 102: Two year comparison: Who is responsible for improving water quality? (%) CATA



Perceptions of responsibility remained very high in 2014, increasing slightly in 2016. Respondents assigned highest responsibility to crop farmers and livestock farmers in both surveys, followed closely by homeowners. "Crop farmers" ranked at 88% in 2014 and 93% in 2016. 87% indicated "Livestock farmers" in 2014 and 91% in 2016. "Homeowners" were checked by 80% of respondents in 2014, and 85% in 2016. "Myself" was checked at 71% in both 2014 and 2016. "State and local officials" ranked lowest at 60% in both 2014 and 2016. "Don't know" was consistent at 4% in both surveys. Those checking "Other" provided the following comments:

- everyone
- everyone
- Everyone
- All
- N.A.
- Not active in improvements
- Everyone is responsible but crop and livestock farmers do more to solve the problems than anyone else!
- Everyone
- It should only be allowed so many pounds of these chemicals to be used depending on soil types.
- All of us
- Everyone
- Everyone is
- Land owners
- everyone
- everyone
- everyone
- Everyone
- EVERYONE

Barriers and constraints to implementing WQ practices

Figure 103: What prevents you from implementing additional practices that protect water around your farming operation? (%) 2014 – CATA

Answered: 182 Skipped: 26

Answer Choices	Responses	
Nothing prevents me (1)	48.35%	88
Lack of knowledge about clean water practices (2)	10.99%	20
Takes too much time (3)	4.40%	8
Too much paperwork (4)	14.29%	26
Potential cost (5)	40.66%	74
Need to modify practice (6)	7.14%	13
Yield reduction concerns (7)	6.59%	12
Reduction of tillable acres (8)	12.09%	22
Don't want to take part in government programs (9)	12.09%	22
Don't know (10)	8.79%	16
Total Respondents: 182		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	5.00	4.39	2.91

Figure 104: What prevents you from implementing additional practices that protect water around your farming operation? (%) 2016 – CATA

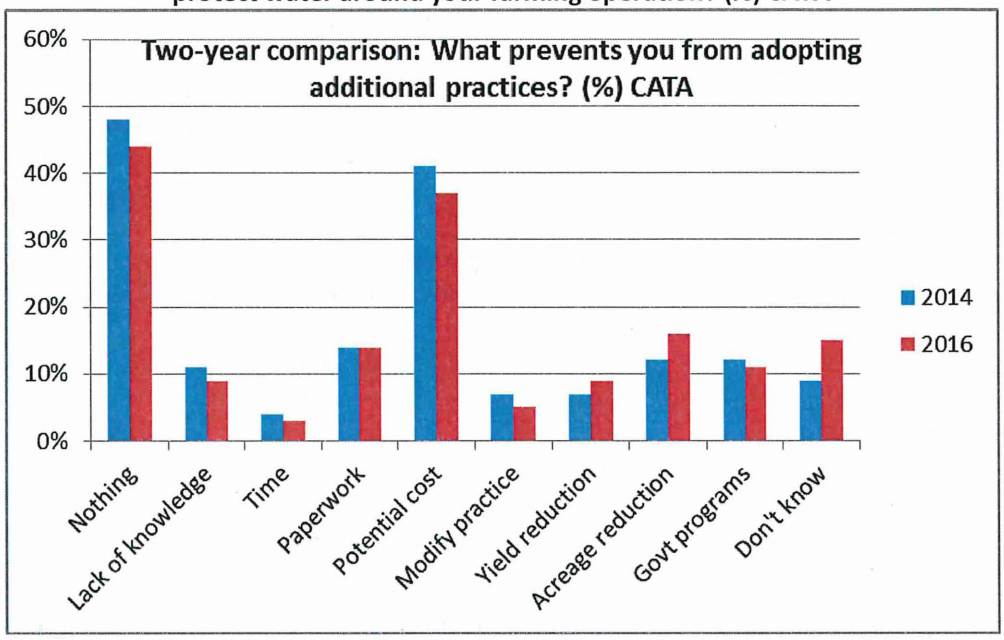
Answered: 117 Skipped: 17

Answer Choices	Responses	
Nothing prevents me (1)	44.44%	52
Lack of knowledge about clean water practices (2)	8.55%	10
Takes too much time (3)	2.56%	3
Too much paperwork (4)	13.68%	16
Potential cost (5)	36.75%	43
Need to modify practice (6)	5.13%	6
Yield reduction concerns (7)	9.40%	11
Reduction of tillable acres (8)	16.24%	19
Don't want to take part in government programs (9)	11.11%	13
Don't know (10)	15.38%	18
Total Respondents: 117		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	5.00	4.83	3.09

Figure 105: Two year comparison: What prevents you from implementing additional practices that protect water around your farming operation? (%) CATA



The most significant response in both 2014 and 2016 was "Nothing prevents me" at 48% in 2014 and 44% in 2016. Potential cost followed next at 41% in 2014 and 37% in 2016. All other constraints were ranked much lower by producers. Other constraints included "Too much paperwork" (14% in 2014 and 2016); "Reduction of tillable acres" (12% in 2014 and 15% in 2016); "Don't want to take part in government programs" (12% in 2014 and 11% in 2016); "Lack of knowledge about clean water practices (11% in 2014 and 9% in 2016); "Need to modify practice" (7% in 2014 and 5% in 2016); "Yield reduction concerns" (7% in 2014 and 9% in 2016); and "Takes too much time" (4% and 3% in 2016). 9% of respondents checked "Don't know" in 2014 and 15% in 2016. Of those checking "Other," the following comments were provided by respondents:

- I do not run the land
- I don't farm the land
- Often a project will interfere with crop production, and will wait for best opportunity (weather, timing etc)
- Nothing left to do, permanent pasture and no cattle access to stream covers it, also controlled grazing so no area overgrazed (rotational grazing)
- Many fear programs that try to be "perfect" instead of taking steps to improve
- Natural climate occurrences
- I could put it all in grass (CPR) but I don't want to do that. Selling no till is more important!
- (Name of respondent withheld) died 6-28-14
- Cooperation of farmers to begin upstream - some sort of natural barrier to the high rainfalls
- Have discussed matter with soil conservation service they just don't seem to know how to deal with it or don't want to deal with it. Have signed up a couple different times for cost share to get waterway redone and discussed buffer strips with them
- I'm old

- Don't farm my land. Just finished 15(?) years of a CRP contract
- Keep government out of our farming operation
- I do alot of practices that protect water like alfalfa, small grains, contour strips, do not chop bean stalks, plant right into bean ground not tilling it. Do not do any tilling in fall.
- Paying taxes on land we can no longer get a income
- I have found that implementing conservation practices on our farm can sometimes be time consuming and very very expensive. What I have found to be the most frustrating is dealing with NRCS conservationists that are incompetent and not knoweldgeable of procedures and practices and that can cost you more money than was originally quoted. That, in my opinion, is NOT hoe to promote conservation!!
- My farms are farmed organic, with ponds and waterways using cover crops, crop rotation, minimum tillage, soil testing, turkey or choice pellets, no pesticides. always looking for better ways to keep our water supply clean.
- Was approved to do project. cancelled it on me because of nov 1st date will do on my own for less money then getting cost share which is wrong
- not significant need
- I have already established waterways and tiling

Fostering the implementation of water quality practices

Figure 106: What would help you to adopt additional management practices to protect local streams and rivers? (%) CATA- 2014

Answered: 177 Skipped: 31

Answer Choices	Response	
Education or training (1)	20.90%	37
Cost share or financial resources (2)	51.98%	92
Seeing my friends and neighbors adopt (3)	20.34%	36
Support from my ag dealer, crop consultant or agronomist (4)	9.60%	17
Technical assistance (5)	19.77%	35
Access to equipment (6)	12.43%	22
Better understanding about my operation's impact on local streams and rivers (7)	22.03%	39
Don't know (8)	27.12%	48
Total Respondents: 177		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	3.00	4.17	2.46

Figure 107: What would help you to adopt additional management practices to protect local streams and rivers? (%) CATA- 2016

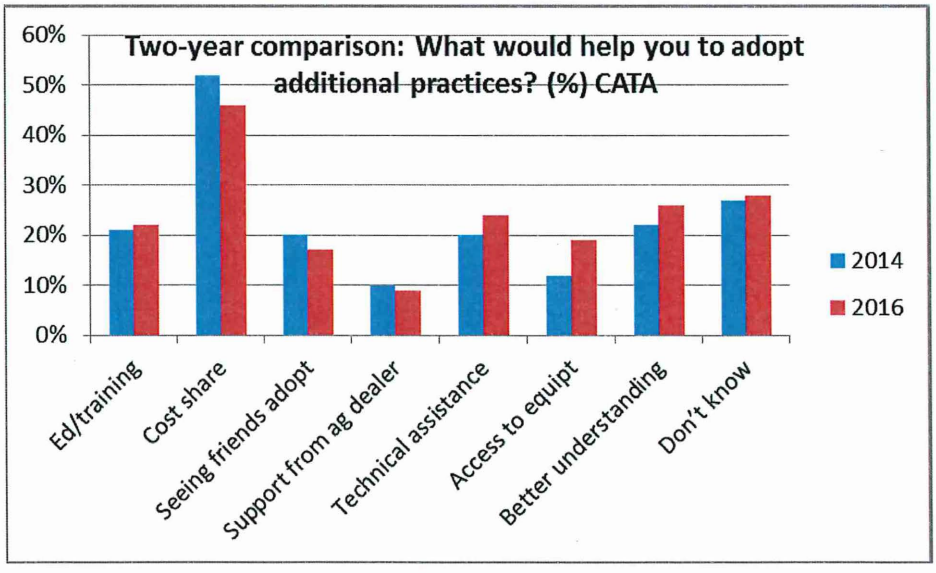
Answered: 117 Skipped: 17

Answer Choices	Response	
Education or training (1)	22.22%	26
Cost share or financial resources (2)	46.15%	54
Seeing my friends and neighbors adopt (3)	17.09%	20
Support from my ag dealer, crop consultant or agronomist (4)	9.40%	11
Technical assistance (5)	23.93%	28
Access to equipment (6)	18.80%	22
Better understanding about my operation's impact on local streams and rivers (7)	25.64%	30
Don't know (8)	28.21%	33
Total Respondents: 117		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	5.00	4.39	2.45

Figure 108: Two year comparison: What would help you to adopt additional management practices to protect local streams and rivers? (%) CATA



Three variables decreased in importance over the two-year period. "Cost-share" dropped from 52% in 2014 to 46% in 2016. "Seeing friends and neighbors adopt" went from 20% in 2014 to 17% in 2016. "Support from an ag dealer" decreased slightly from 10% in 2014 to 9% in 2016. All other variables

increased. "Education or training" increased slightly from 21% in 2014 to 22% in 2016. "Technical assistance" increased from 20% in 2014 to 24% in 2016. "Access to equipment" increased from 12% in 2014 to 19% in 2016. "Better understanding about my operation's impacts on local streams and rivers" increased from 22% in 2014 to 26% in 2016. "Don't know" responses increased from 27% in 2014 to 28% in 2016. Those checking "Other" provided the following comments:

- Is the main concern drinking water quality or to make things better for the city sportsmen at the farmers expense
- I don't farm the land
- Convince renters to leave more residue. No canning crops
- N.A.
- Like many farmers, I care about the environment. I don't need to be "encouraged" to do more practices. Government should not over-regulate.
- Cooperate with land renter
- I am not so much concerned about local lakes, streams or rivers as I am about local drinking water.
- Don't have a farm plan
- We're not aware of additional practices we could do, but want to be informed if we're missing something
- Feel we are doing what is practical
- Support existing good conservation practices instead of rewarding poor ones. Polluters need to pay instead of getting paid.

Information sources

Figure 109: Where do you get agronomic or conservation information? (%) CATA – 2014

Answered: 185 Skipped: 23

Answer Choices	Responses	
I do not seek agronomic or conservation information from other sources (1)	21.08%	39
Family/neighbors (2)	24.32%	45
Crop consultant (3)	37.84%	70
Agricultural dealers (4)	16.22%	30
Farm magazines (5)	37.30%	69
NRCS/SWCD (6)	38.92%	72
County environmental office (7)	15.68%	29
University of Minnesota Extension (8)	28.11%	52
Feedlot officer (9)	0.54%	1
Internet (10)	23.24%	43
Minnesota Department of Agriculture (11)	24.86%	46
Don't know (12)	6.49%	12
Total Respondents: 185		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	12.00	6.00	5.80	3.14

Figure 110: Where do you get agronomic or conservation information? (%) CATA – 2016

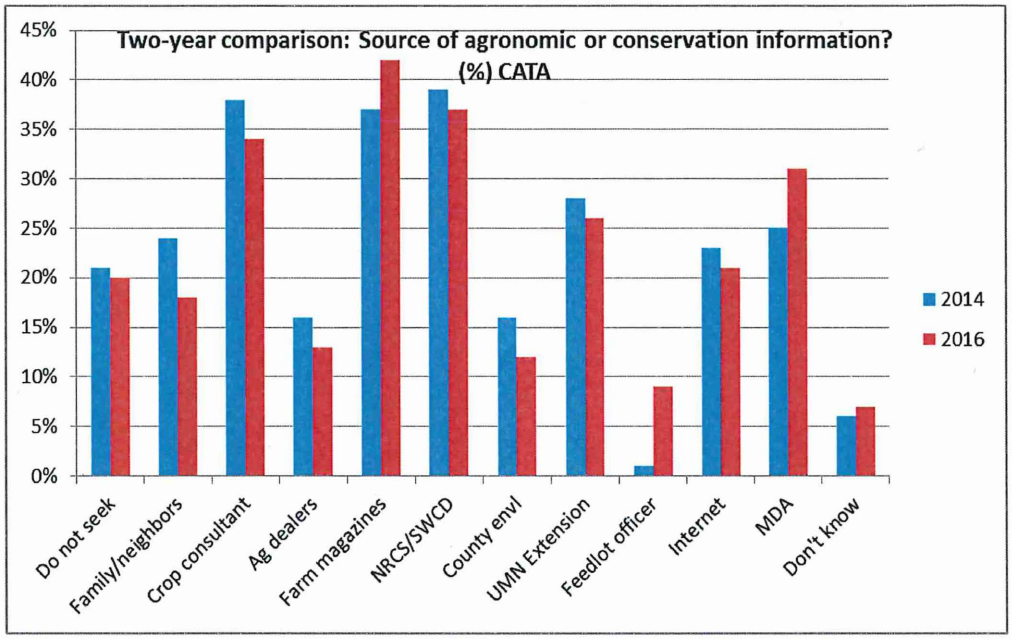
Answered: 122 Skipped: 12

Answer Choices	Responses	
I do not seek agronomic or conservation information from other sources (1)	**19.67%**	24
Family/neighbors (2)	**18.03%**	22
Crop consultant (3)	**34.43%**	42
Agricultural dealers (4)	**13.11%**	16
Farm magazines (5)	**42.62%**	52
NRCS/SWCD (6)	**36.89%**	45
County environmental office (7)	**12.30%**	15
University of Minnesota Extension (8)	**26.23%**	32
Feedlot officer (9)	**9.02%**	11
Internet (10)	**21.31%**	26
Minnesota Department of Agriculture (11)	**31.15%**	38
Don't know (12)	**7.38%**	9
Total Respondents: 122		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	12.00	6.00	6.13	3.19

Figure 111: Two-year comparison:
Where do you get agronomic or conservation information? (%) CATA



Producers clearly seek information from a wide variety of sources. Farm magazines, NRCS/SWCD, crop consultants, MDA and UMN Extension were most commonly checked in both 2014 and 2016. Decreasing trends included "Family and neighbors" (24% in 2014 to 18% in 2016); "Crop consultant" (38% in 2014 to 34% in 2016); "Ag dealers" (16% in 2014 to 13% in 2016); "NRCS/SWCD" (39% in 2014 to 37% in 2016); "County environmental" (16% in 2014 and 12% in 2016); "UMN Extension" (28% in 2014 to 26% in 2016); and "Internet" (23% in 2014 to 21% in 2016). Increasing trends included "Farm magazines" (37% in 2014 to 43% in 2016); "Feedlot officer" (1% in 2014 to 9% in 2016); and Minnesota Department of Agriculture (25% in 2014 to 31% in 2016). "Don't know" comments remained low and nearly constant at 6% in 2014 and 7% in 2016. Respondents checking "Other" provided the following comments:

- Leave up to renter
- N.A.
- Rent out
- Nature Conservancy and Audubon
- Ran the Whitewater Valley Demo Farm in the late 1970s and have continued to learn from observation.
- Watershed group
- Soil conservation service
- Conservation and prairie conferences, prairie enthusiasts, Nature Conservancy, Winona State, MN Horticultural Society, BOOKS, Prairie Moon, Prairie Restoration, DNR, broad network of knowledgeable people and resources
- I would contact U of M Extension or local FSA if needed

Decision-making

Figure 112: Which of the following influences your decision to adopt practices that protect or improve water quality? (%) CATA – 2014

Answered: 185 Skipped: 23

Answer Choices	Responses	
Time (1)	**33.51%**	62
Money (2)	**50.81%**	94
Will it make my life or work easier? (3)	**16.76%**	31
Public perceptions (4)	**15.14%**	28
Yields (5)	**25.95%**	48
My retirement plans (6)	**14.59%**	27
Risk (7)	**7.57%**	14
Reducing soil erosion (8)	**65.95%**	122
Don't know (9)	**14.05%**	26
Total Respondents: 185		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	9.00	5.00	4.79	2.81

Figure 113: Which of the following influences your decision to adopt practices that protect or improve water quality? (%) CATA – 2016

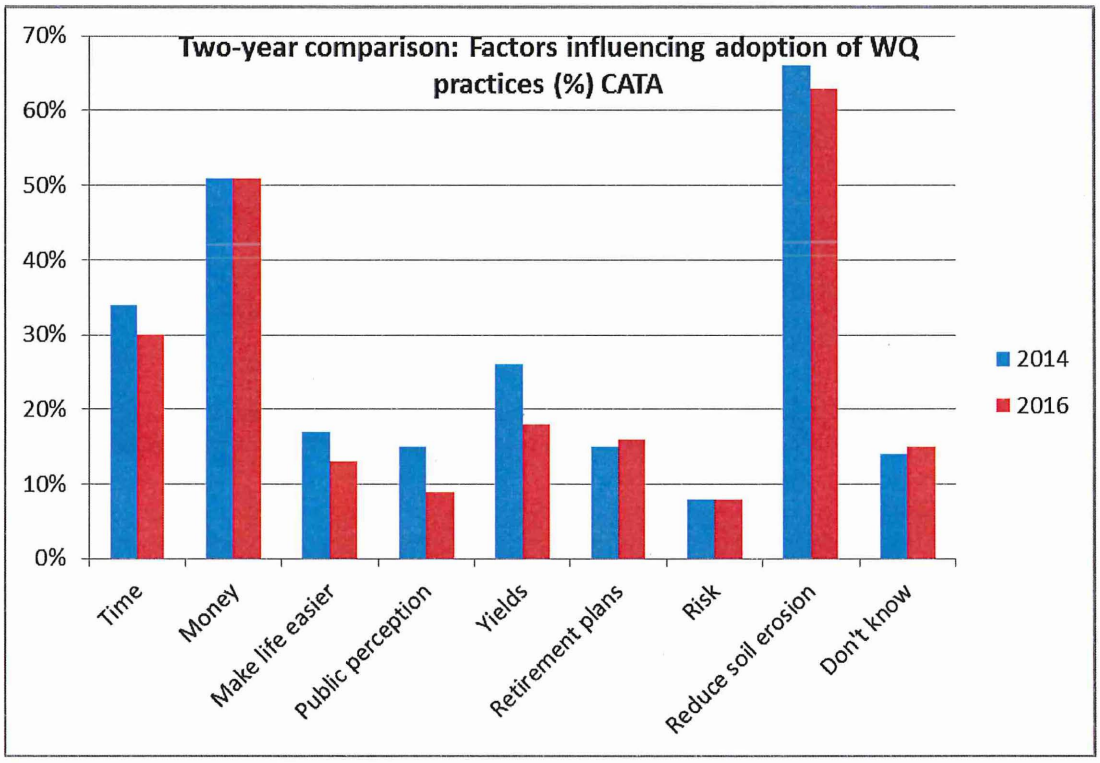
Answered: 121 Skipped: 13

Answer Choices	Responses	
Time (1)	**29.75%**	36
Money (2)	**51.24%**	62
Will it make my life or work easier? (3)	**13.22%**	16
Public perceptions (4)	**9.09%**	11
Yields (5)	**18.18%**	22
My retirement plans (6)	**15.70%**	19
Risk (7)	**8.26%**	10
Reducing soil erosion (8)	**62.81%**	76
Don't know (9)	**14.88%**	18
Total Respondents: 121		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	9.00	5.00	4.87	2.88

Figure 114: Two-year comparison: Which of the following influences your decision to adopt practices that protect or improve water quality? (%) CATA



"Reducing soil erosion" ranked highest in both surveys, although it was slightly higher in 2014 (66%) than 2014 (63%). "Money" was the second most important factor, and remained constant in both surveys at 51%. "Time" was the third most important factor, at 34% in 2014 and 30% in 2016. "Yields" was the fourth most important factor at 26% in 2014 and 18% in 2016. "Will it make my life or work easier" followed at 17% in 2014 and 13% in 2016. "My retirement plans" was next at 15% in 2014 and 16% in 2016. "Risk" ranked last at 8% in both years. "Don't know" was 14% in 2014 and 15% in 2016.

Figure 115: What is the most important factor in your agricultural production decision-making process? (%) COOR – 2014

Answered: 165 Skipped: 43

Answer Choices	Responses	
Water quality (1)	20.00%	33
Profitability (2)	32.12%	53
Consistent yield (3)	6.67%	11
Farm legacy (4)	19.39%	32
My retirement plans (5)	6.67%	11
Don't know (6)	15.15%	25
Total		**165**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	3.06	1.72

Figure 116: What is the most important factor in your agricultural production decision-making process? (%) COOR – 2016

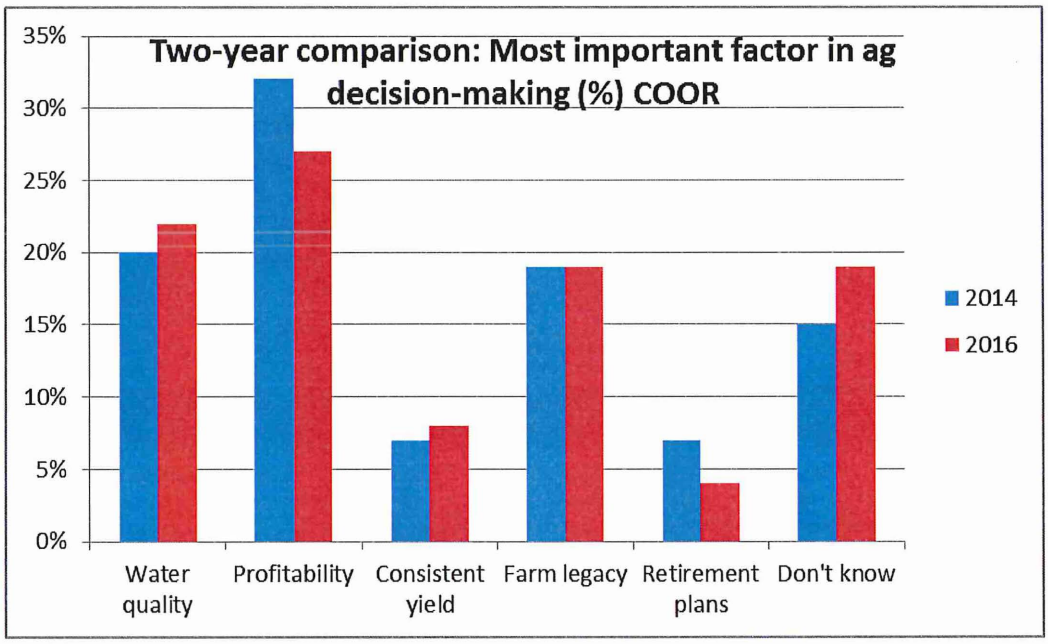
Answered: 118 Skipped: 16

Answer Choices	Responses	
Water quality (1)	22.03%	26
Profitability (2)	27.12%	32
Consistent yield (3)	7.63%	9
Farm legacy (4)	19.49%	23
My retirement plans (5)	4.24%	5
Don't know (6)	19.49%	23
Total		**118**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	3.00	3.15	1.80

Figure 117: Two-year comparison: What is the most important factor in your agricultural production decision-making process? (%) COOR



"Profitability" ranked highest in both surveys, ranking at 32% in 2014 and 27% in 2016. "Water quality ranked second at 20% in 2014, increasing slightly to 22% in 2016. "Farm legacy" held constant at 19%. "Consistent yield" increased slightly in importance from 7% in 2014 to 8% in 2016. "My retirement plans" decreased slightly from 7% in 2014 to 4% in 2016. "Don't know" increased from 15% in 2014 to 19% in 2016. The spread across these variables suggests that multiple factors influence the agricultural decision-making process, and that no single factor accounts for more than a third in making decisions.

Renters

Figure 118: How do you affect the fertilizer and tillage practices of your renters? (%) CATA – 2014

Answered: 195 Skipped: 13

Answer Choices	Responses	
I don't have renters (1)	45.13%	88
I let the renter decide (2)	37.95%	74
I require certain practices (3)	20.51%	40
I don't keep track of their practices (4)	6.15%	12
I keep track of their practices (5)	13.85%	27
Don't know (6)	2.05%	4
Total Respondents: 195		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	2.30	1.37

Figure 119: How do you affect the fertilizer and tillage practices of your renters? (%) CATA – 2016

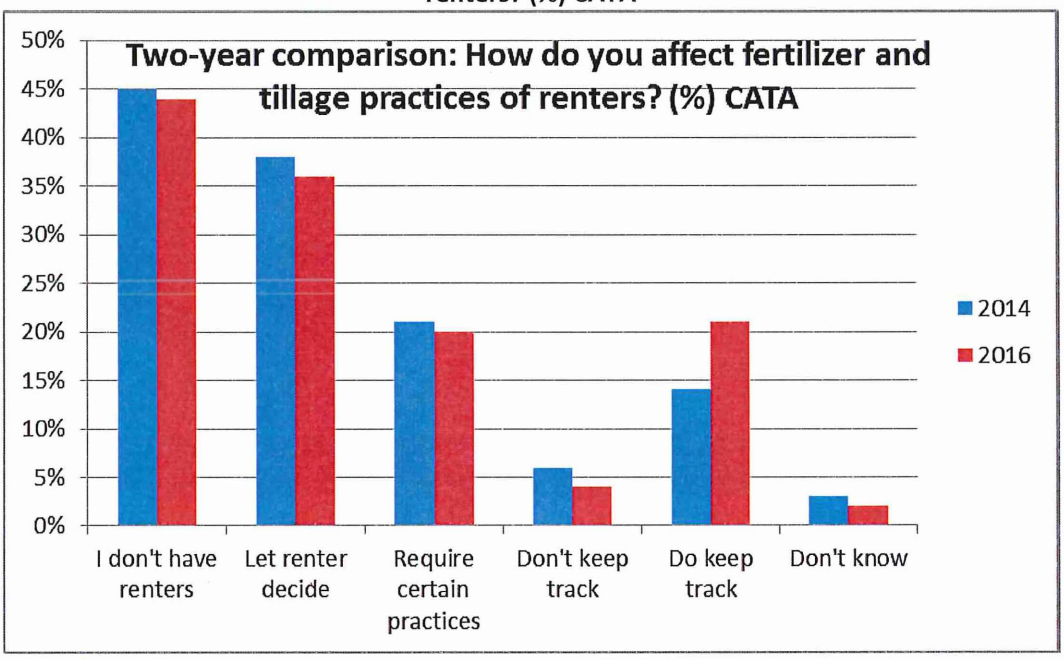
Answered: 126 Skipped: 8

Answer Choices	Responses	
I don't have renters (1)	43.65%	55
I let the renter decide (2)	35.71%	45
I require certain practices (3)	19.84%	25
I don't keep track of their practices (4)	3.97%	5
I keep track of their practices (5)	20.63%	26
Don't know (6)	1.59%	2
Total Respondents: 126		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	2.42	1.46

Figure 120: Two-year comparison: How do you affect the fertilizer and tillage practices of your renters? (%) CATA



This question suggests some interesting trends in the relationship between renters and owners. The first question in this survey shows that about half of all respondents in the survey sample rent their land out to other producers (44% in 2014 and 45% in 2016). Consistent with those responses, 45% of respondents in 2014 checked "I don't have renters;" compared with 44% in 2016. 38% of respondents in 2014 checked "I let the renter decide," decreasing slightly to 36% in 2016. 21% of landowners "Require certain practices" of their renters, compared with 20% in 2016. 6% did not keep track of renters' practices in 2014, dropping slightly to 4% in 2016. Conversely, 14% did keep track of renters' practices, increasing to 21% in 2016. "Don't know" responses remained low and virtually unchanged at 2%. The following comments were entered by respondents:

- Through soil testing and retaining water runoff
- Needs to be in compliance with FSA office
- Keep an eye on what is going on and if I have ? I ask! Otherwise they are doing a great, excellent job!
- Joint discussion and decision making

Public Perception

Figure 121: Does public perception of agriculture's contribution to water quality issues concern you? Summary statistics (2014)

Answered: 195 Skipped: 13

Answer Choices	Responses	
Very much	31.28%	61
Somewhat	41.03%	80
Neutral	14.87%	29
Not very much	5.13%	10
Not at all	2.05%	4
Don't know	5.64%	11
Total		195

Figure 122: Does public perception of agriculture's contribution to water quality issues concern you? Summary statistics (2016)

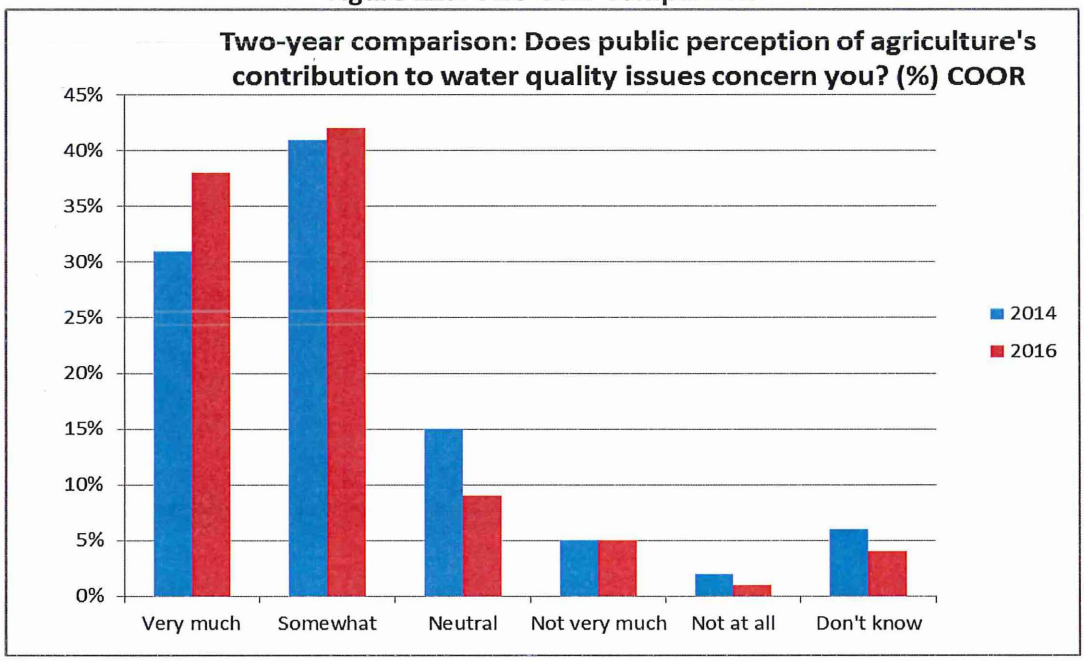
Answered: 128 Skipped: 6

Answer Choices	Responses	
Very much (1)	38.28%	49
Somewhat (2)	42.19%	54
Neutral (3)	9.38%	12
Not very much (4)	5.47%	7
Not at all (5)	0.78%	1
Don't know (6)	3.91%	5
Total		128

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	2.00	2.00	1.18

Figure 123: Two-Year Comparison



In general there is a trend toward greater concern about public opinion over the two-year period. Those responding "Very much" rose from 31% in 2014 to 38% in 2016. Those responding "Somewhat" rose slightly from 41% in 2014 to 42% in 2016. Fewer respondents were neutral, dropping from 15% in 2014 to 9% in 2016. Those responding "Not at all" dropped from 2% in 2014 to less than one percent in 2016. "Don't know" responses dropped from 6% in 2014 to 4% in 2016.

Awareness of MAWQCP

Figure 124: Awareness of MAWQCP (%) CATA (2016 only)

Answered: 125 Skipped: 9

Answer Choices	Responses	
I haven't heard about it (1)	48.00%	60
SWCD (2)	25.60%	32
News article (3)	29.60%	37
Radio (4)	0.80%	1
Sign (5)	0.00%	0
Crop consultant (6)	0.00%	0
Neighbor (7)	2.40%	3
Other (please specify) (8)	7.20%	9
Total Respondents: 125		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	2.00	2.34	1.85

This check-all-that-apply question was asked only in 2016. 48% of respondents had not heard about the MAWQCP. Of those who had, 30% learned about the program through a news article; 26% through their SWCD; 2% from a neighbor; and 1% by the radio. 7% checked "Other," noting in comments that they had heard about it through a meeting, or that they could not recall.

Figure 125: Level of interest in joining MAWQCP (%) COOR – 2014

Answered: 186 Skipped: 22

Answer Choices	Response	
I've started or completed the certification process (1)	0.54%	1
I'm ready and willing to participate (2)	6.45%	12
I am interested but need more information (3)	25.27%	47
I might be interested but would need a cost-share or financial incentive (4)	20.97%	39
I'm not interested in participating (5)	33.87%	63
I'm not aware of the program (6)	2.15%	4
Don't know (7)	10.75%	20
Total		**186**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	4.00	4.31	1.36

Figure 126: Level of interest in joining MAWQCP (%) COOR – 2016

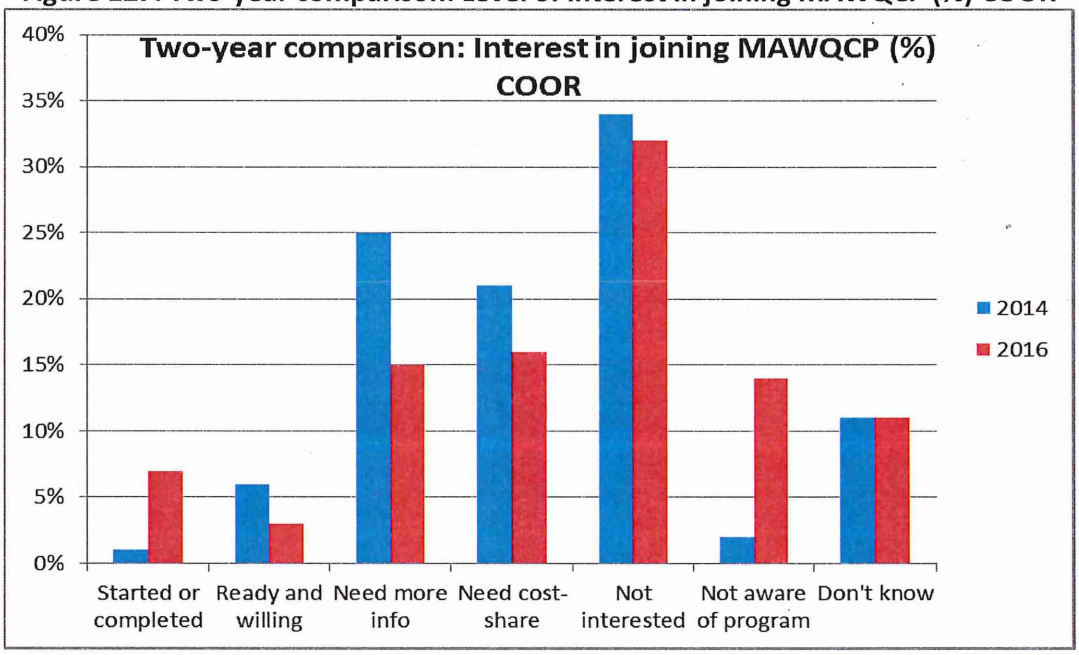
Answered: 124 Skipped: 10

Answer Choices	Response	
I've started or completed the certification process (1)	7.26%	9
I'm ready and willing to participate (2)	3.23%	4
I am interested but need more information (3)	15.32%	19
I might be interested but would need a cost-share or financial incentive (4)	16.13%	20
I'm not interested in participating (5)	32.26%	40
I'm not aware of the program (6)	14.52%	18
Don't know (7)	11.29%	14
Total		**124**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	5.00	4.52	1.61

Figure 127: Two-year comparison: Level of interest in joining MAWQCP (%) COOR



In 2014, less than 1% (one individual) had started or completed the certification process. This increased to 7% (nine individuals) in 2016. 6% (twelve respondents) were "Ready and willing to participate" in 2014, compared to 3% in 2016 (four individuals). 25% (47 individuals) were "Interested but need more information" in 2014, compared with 15% (nineteen individuals) in 2016. In 2014 21% (*n* = 39) checked "Interested but would need a cost-share or financial incentive," compared with 16% (*n* = 20) in 2016. 34% (*n* = 63) was not interested in participating in 2014, compared with 32% (*n* = 40) in 2016. 2% were

not aware of the program in 2014, compared with 15% in 2016. "Don't know" ranked at 11% in both surveys. A few comments entered by respondents suggest that some may be confusing the MAWQCP with other programs. Several respondents mentioned the 2016 Corporate Farm Certificate Renewal process. The following comments were entered by respondents:

- Education!
- I am already certified.
- No the answer
- (Name withheld) filled this out. I'm a widow.
- In 1985 our farm was conservation farm of the year in Wabasha County. Land stripped, crops rotated. Six ponds were put in.
- Am 92 years old. Rent my land out.
- Send any correspondence to: (name withheld for data privacy) Because I operate the land in this survey and also filled survey out
- From what we understand, it doesn't see to apply to conservation lands
- We have contacted people at the soil and water office to participate in the program but there is too big of a back log on other projects so they keep putting us off.
- Our farm was the first farm in Wabasha County to be water quality certified! If you have any questions on my response please feel free to call me! (Name withheld for data privacy)
- already done
- this program is a joke
- we don't have any manure as we don't have any animals around here
- Studies of the Whitewater Watershed Committee years ago showed $ investment in manure runoff would show positive benefits in only a few places in the Whitewater Watershed yet I still see a push to provide more funding in this area vs improving chemical usage. Tackle the TOUGH ONE not the petty one.

Section 4: Whiskey Creek

This chapter presents a comparison of 2014 and 2016 KAP study data for the Whiskey Creek watershed. For each question, tables show aggregate data (*n* and %) for each variable for the 2014 and 2016 surveys. In addition, an Excel graph is included that compares two-year data. Key points are briefly summarized in narrative form for each question.

Land ownership and tenancy

Figure 128: Type of agricultural operation (%) CATA - 2014

Answered: 118 Skipped: 17

Answer Choices	Responses	
I own and operate agricultural land in the Whiskey Creek Watershed (1)	46.61%	55
I own land in the Whiskey Creek Watershed, but rent my land to others (2)	52.54%	62
Don't know (3)	1.69%	2
Total Respondents: 118		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	3.00	2.00	1.55	0.53

Figure 129: Type of agricultural operation (%) CATA – 2016

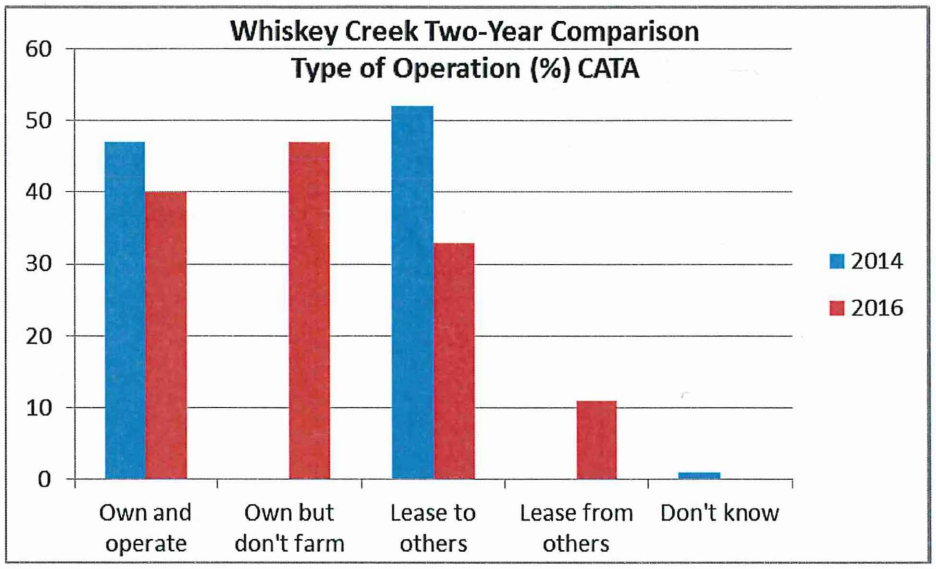
Answered: 76 Skipped: 0

Answer Choices	Responses	
I own and operate agricultural land in the Whiskey Creek Watershed (1)	40.28%	29
I own land in the Whiskey Creek Watershed, but don't farm it (2)	47.22%	34
I lease land to others in the Whiskey Creek Watershed (3)	33.33%	24
I lease land from others in the Whiskey Creek Watershed (4)	11.11%	8
Don't know (5)	0.00%	0
Total Respondents: 72		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	4.00	2.00	2.12	0.94

Figure 130: Two-year comparison – Type of agricultural operation (%) CATA



The 2014 KAP study revealed that land ownership and tenancy in the pilot watersheds are complex. To that end we added a few more variables to the second round study to better capture tenancy patterns. In 2014 47% (*n* = 56) of respondents owned and operated land in the Whiskey Creek watershed. Two years later that number declined to 40% (*n* = 29). In 2014 53% (*n* = 62) said that "I own land in the Whiskey Creek Watershed but rent my land to others." In 2016 33% (*n* = 24) checked "I lease land to others in the Whiskey Creek Watershed." In 2016 47% (*n* = 34) checked "I own land in the Whisky Creek Watershed but don't farm it." 11% (*n* = 8) checked "I lease land from others in the Whiskey Creek Watershed." In 2014 2% checked "Don't know;" none checked this option in 2016. Comments entered for this question were:

- This farm is rented to XXX (name omitted for data privacy)
- Most of my land in the WC watershed is rented out. I control 100 A. What I control is in CRP on Alfalfa.
- My land is (farmed by my sons)
- We sold this land 11/20/2013 to (name deleted for data privacy)
- Rent out
- This farm is in life estate and is leased to others in the Whiskey Creek Watershed. Only part of Farm is in it.
- Land is in WRP
- Farm enclosing the operators name and address.
- I'm only the landlord I guess you will have to talk to my renters (name deleted for data privacy)
- We have the farmstead just off of Highway 9-Southside of Creek Bruce- I will be in DC until
- April - Email me if you need more, still think there needs to be mtg of folks to the Red River. -SJ
- When eve bought this land 25 plus years ago, we planted in perennial grasses and there is no farm, no chemicals, no growing, no tillage no agriculture going on at all
- I have CRP and I rent land only.
- I am not

- I rent my land to my son, he takes care of all of the farming aspects, I support whatever he does.

Figure 131: How many tillable acres do you currently operate (own or rent) in the Whiskey Creek Watershed? Check only one response - (2014)

Answered: 125 Skipped: 10

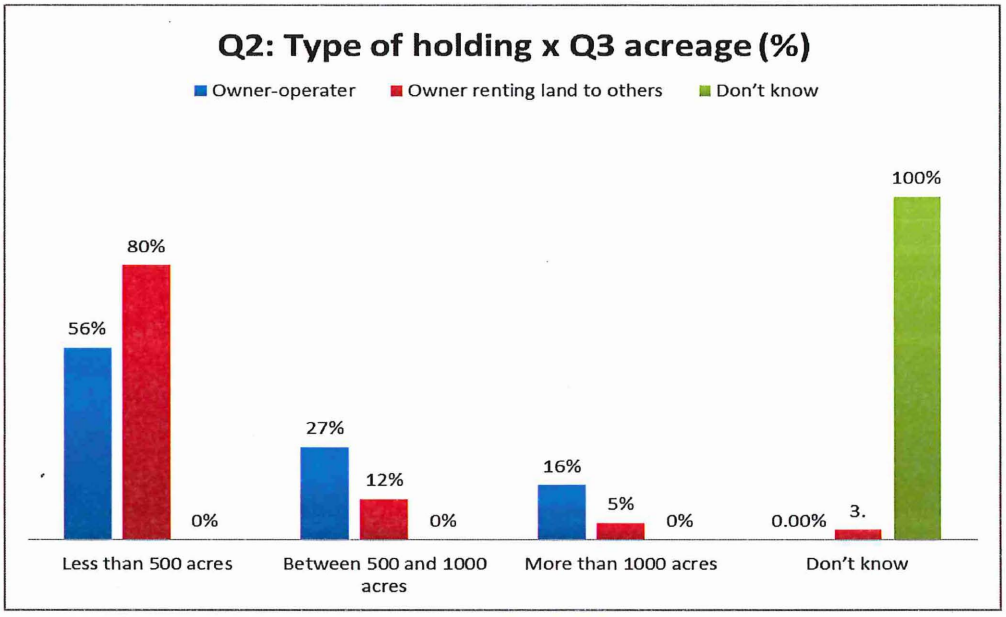
Answer Choices	Responses	
Less than 500 acres (1)	68.80%	86
Between 500 and 1000 acres (2)	18.40%	23
More than 1000 acres (3)	9.60%	12
Don't know (4)	3.20%	4
Total		**125**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	4.00	1.00	1.47	0.80

This question was not asked in the 2016 survey. However, in 2014 we cross-tabulated the size of operation by type of ownership. The resulting graph is shown below in Figure 5 below.

Figure 132: Type of Holding Cross-tabulated by Acreage (2014)



In 2014, owner-operators constituted slightly more than half of all smaller operations. However, more than half of owners rented their land out to others. This reflects the growing complexity of land

ownership in Minnesota. Renter-operators were not included in this survey, although they may constitute a growing and significant share of all producers in the pilot watersheds.

Participation in WQ or conservation programs

Figure 133: Do you currently participate in any local, state or federal water quality or conservation programs? Check only one response (2014)

Answered: 125 Skipped: 10

Answer Choices	Responses	
Yes (please specify in the comments box below) (1)	32.80%	41
No (2)	44.80%	56
Don't know (3)	22.40%	28
Total		**125**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	3.00	2.00	1.90	0.74

About one-third (33%, *n* = 41) do participate in such programs. 49% (*n* = 56) do not. 22% (*n* = 28) did not know whether they participate in water quality or conservation programs. This question was not asked in the 2016 survey.

Farming practices

Figure 134: Which of the following practices do you use in your farming operation? Check all that apply (2014)

Answered: 124 Skipped: 11

Answer Choices	Responses	
Chisel plowing (1)	75.81%	94
Disking for primary tillage (2)	7.26%	9
Moldboard plowing (3)	4.84%	6
No till (4)	16.94%	21
Erosion control structures (5)	11.29%	14
Drainage water management (6)	21.77%	27
Don't know (7)	20.16%	25
Other (please specify) (8)	8.06%	10
Total Respondents: 124		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	2.50	3.40	2.53

Figure 135: Which of the following practices do you use in your farming operation? Check all that apply (2016)

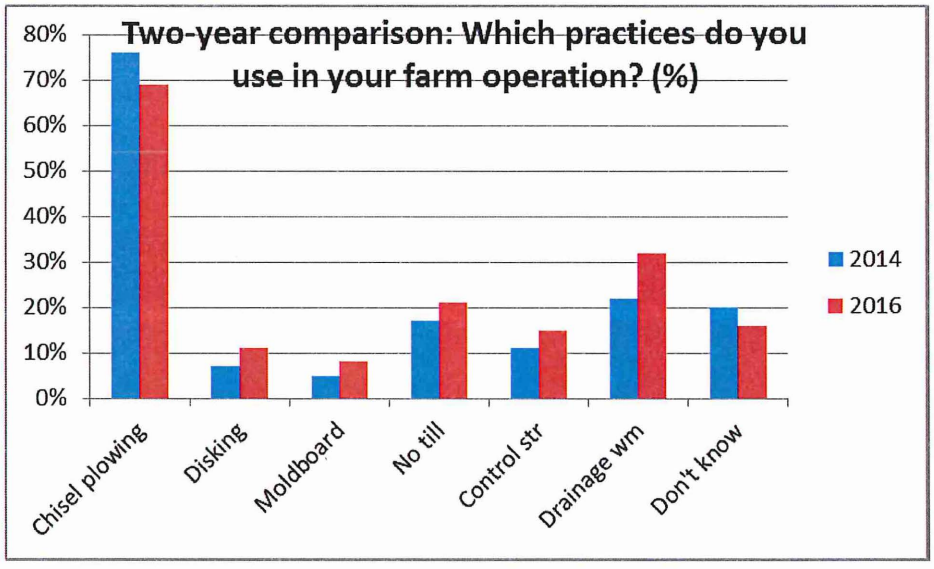
Answered: 62 Skipped: 14

Answer Choices	Responses	
Chisel plowing (1)	69.35%	43
Disking for primary tillage (2)	11.29%	7
Moldboard plowing (3)	8.06%	5
No till (4)	20.97%	13
Erosion control structures (5)	14.52%	9
Drainage water management (6)	32.26%	20
Don't know (7)	16.13%	10
Other (please specify) (8)	19.35%	12
Total Respondents: 62		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	4.00	3.82	2.57

Figure 136: Farming Practices – Two Year Comparison CATA (%)



By far the most commonly-reported practice in both surveys is "Chisel plowing," reported by 76% (*n* = 94) in 2014 declining to 69% (*n* = 43) in 2016. "Drainage water management" was the second-most commonly reported practice at 22% (*n* = 27) in 2014 and 32% (*n* = 20) in 2016. "No till" was reported by 17% (*n* = 21) in 2014, increasing to 21% (*n* = 13) in 2016. Next came "Erosion control structures" at 11% (*n* = 14) in 2014 and increasing to 15% (*n* = 9) in 2016. 7% (*n* = 9) reported "Disking for primary tillage" in

2014, compared with 11% (n = 7) in 2016. 5% (n = 6) in 2014 checked "Moldboard plowing" compared with 8% in 2016. 20% (n = 25) checked "Don't know" in 2014, compared with 16% (n = 10) in 2016. Comments for this question included the following:

- Renting out
- Salford corn stalks once in fall and one spring, then plant
- CRP
- Farmland is leased
- Mowing/CRP
- Comments next to "Moldboard plowing": sometimes
- Land is rented to neighbor
- Just signed 30 year lease with Watershed to do work on creek.
- There is no farm operation. 25 years we planted in grass fruit for wildlife
- CRP-idle
- Hay, pasture
- CRP

Pesticide management

Figure 137: Which of the following pesticide management practices do you use? Check all that apply (2014)

Answered: 123 Skipped: 12

Answer Choices	Responses	
Rotate crops to reduce pest population carry over (1)	68.29%	84
Scout for threshold weed, insect or fungus populations (2)	56.10%	69
Map pest infestations to determine long-term pest management strategies (3)	4.07%	5
Rotate chemical modes of action (4)	53.66%	66
Follow pesticide label instructions (5)	65.85%	81
Maintain vegetative buffers such as filter strips near water bodies (6)	30.89%	38
Maintain setbacks from tile intakes and points of runoff (7)	16.26%	20
Avoid using pesticides that are concerns to water (8)	39.84%	49
Use of a soils specific loss rating screening tool (9)	0.81%	1
Don't know (10)	26.83%	33
Other (please specify) (11)	7.32%	9
Total Respondents: 123		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	11.00	5.00	4.62	2.86

Figure 138: Which of the following pesticide management practices do you use? Check all that apply (2016)

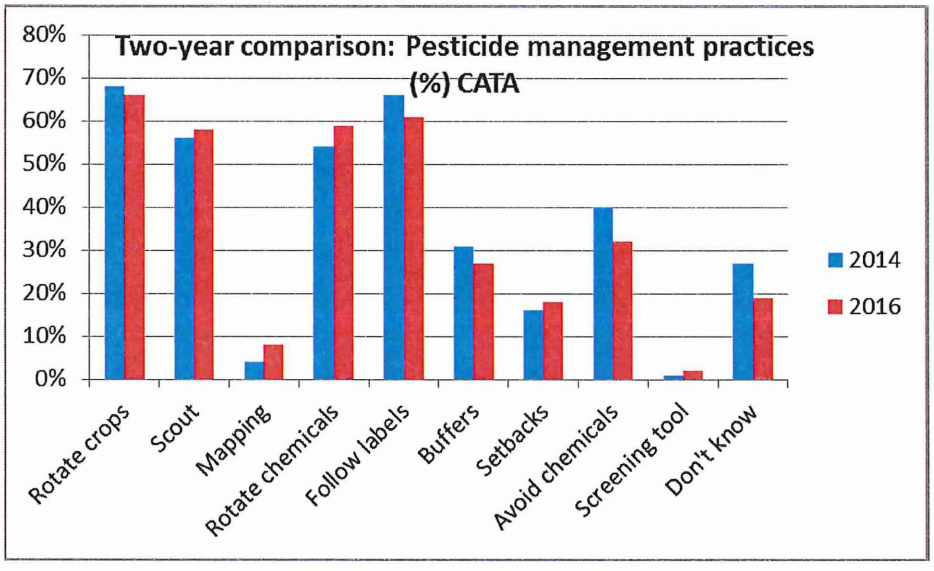
Answered: 62 Skipped: 14

Answer Choices	Responses	
Rotate crops to reduce pest population carry over (1)	66.13%	41
Scout for threshold weed, insect or fungus populations (2)	58.06%	36
Map pest infestations to determine long-term pest management strategies (3)	8.06%	5
Rotate chemical modes of action (4)	59.68%	37
Follow pesticide label instructions (5)	61.29%	38
Maintain vegetative buffers such as filter strips near water bodies (6)	27.42%	17
Maintain setbacks from tile intakes and points of runoff (7)	17.74%	11
Avoid using pesticides that are concerns to water (8)	32.26%	20
Use of a soils specific loss rating screening tool (9)	1.61%	1
Don't know (10)	19.35%	12
Other (please specify) (11)	16.13%	10
Total Respondents: 62		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	11.00	4.00	4.58	2.90

Figure 139: Two-year comparison – Pesticide management practices (%)



Crop rotation was the most commonly reported practice in both surveys, at 68% (*n* = 84) in 2014 and 66% (*n* = 41) in 2016. This was followed closely by "Follow pesticide label instructions" at 66% (*n* = 81) in 2014 and 61% (*n* = 38) in 2014. "Rotate chemical modes of action" was reported by 54% (*n* = 66) in 2014 and 60% (*n* = 37) in 2016. "Scout for threshold weed, insect or fungus populations" was reported by 56% (*n* = 69) in 2014 and 58% (*n* = 36) in 2016. "Avoid using pesticides that are of concern to water" was practiced by 40% (*n* = 49) of respondents in 2014 and 43% (*n* = 20) in 2016. "Maintain vegetative buffers such as filter strips near water bodies" was reported by 31% (*n* = 38) in 2014, declining to 27% (*n* = 17) in 2016. "Maintain setbacks from tile intakes and points of runoff" was checked by 16% (*n* = 20) in 2014, increasing slightly to 18% (*n* = 11) in 2016. Only 4% (*n* = 5) reported mapping pest infestations in 2014, compared with 8% (*n* = 5) in 2016. "Use of a soils specific loss rating screen tool" was reported by 1% (*n* = 1) in 2014, remaining the same (*n* = 1) in 2016. "Don't know" responses declined from 27% (*n* = 33) in 2014 to 19% (*n* = 12) in 2016. The following comments were entered by those checking "Other:"

- Renting out
- Only as asked
- Farmland is leased
- NONE
- Renter Controls
- WRP-no pesticide
- Watershed plan- We want to maintain shelter belt to control run off from fields
- No farming no chemicals
- Most weeds I see are in adjoining nature conservancy land.
- CRP

Pesticide practices that increased slightly in use over the two-year period included scouting, mapping, rotating chemical modes of action and maintaining setbacks. Practices that declined slightly over time included crop rotation, following pesticide label instructions, vegetative buffers and avoiding chemicals of concern to water bodies.

Nitrogen management

Figure 140: What practices do you use to manage nitrogen fertilizer? (%) CATA – 2014

Answered: 122 Skipped: 13

Answer Choices	Responses	
Split application (1)	27.87%	34
Spring application (2)	53.28%	65
Soil testing (3)	59.02%	72
Slow release products (4)	24.59%	30
Variable rate application (5)	16.39%	20
Other precision agricultural technologies (6)	11.48%	14
Incorporation (7)	49.18%	60
Cover crops (8)	13.11%	16
Nitrogen credits from previous crops (9)	45.90%	56
Don't know (10)	30.33%	37
Other (please specify) (11)	10.66%	13
Total Respondents: 122		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	11.00	5.00	5.39	3.12

Figure 141: What practices do you use to manage nitrogen fertilizer? (%) CATA – 2016

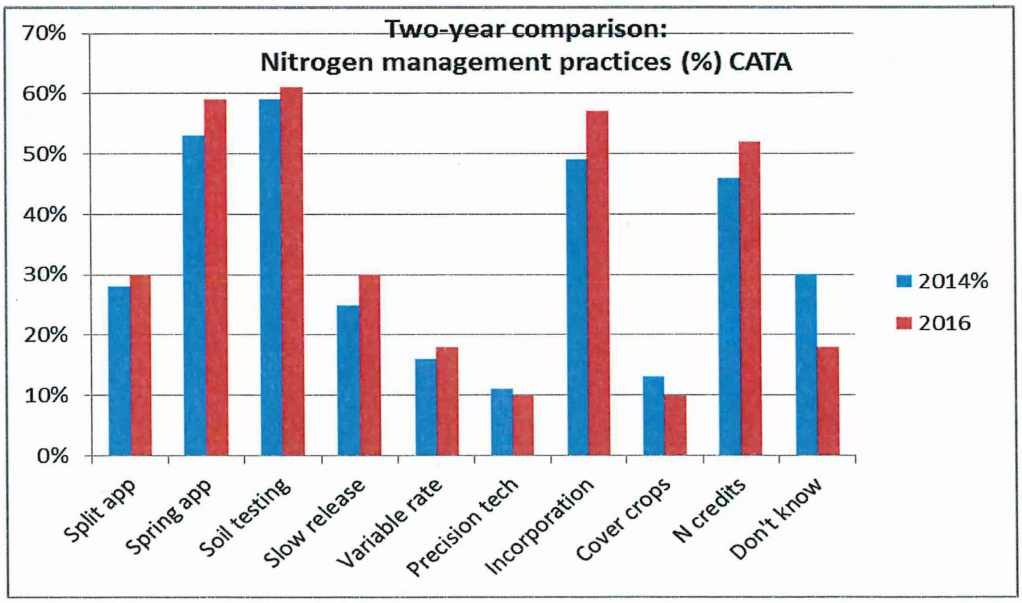
Answered: 61 Skipped: 15

Answer Choices	Responses	
Split application (1)	29.51%	18
Spring application (2)	59.02%	36
Soil testing (3)	60.66%	37
Slow release products (4)	29.51%	18
Variable rate application (5)	18.03%	11
Other precision agricultural technologies (6)	9.84%	6
Incorporation (7)	57.38%	35
Cover crops (8)	9.84%	6
Nitrogen credits from previous crops (9)	52.46%	32
Don't know (10)	18.03%	11
Other (please specify) (11)	16.39%	10
Total Respondents: 61		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	11.00	5.00	5.30	3.09

Figure 142: Two-year comparison (%) - What practices do you use to manage nitrogen fertilizer? (%) CATA



The most commonly reported practice was "Soil testing" at 59% (*n* = 72) in 2014, increasing slightly to 61% (*n* = 37) in 2016. "Spring application" followed at 53% (*n* = 65) in 2014, rising to 59% (*n* = 36) in 2016. "Incorporation" was ranked third at 49% (*n* = 60) in 2014, dropping slightly to 57% (*n* = 35) in 2016. "Nitrogen credits from previous crops" was next at 46% (*n* = 56) in 2014, increasing to 52% (*n* = 32) in 2016. "Spring application" was checked by 28% (n = 34) in 2014 and 29% (*n* = 18) in 2016. "Slow release products" was reported by 25% (*n* = 30) in 2014 and 30% (*n* = 18) in 2016. 16% of respondents (n = 20) reported using variable rate application in 2014, and 18% (*n* = 11) in 2016. 13% (*n* = 16) reported using cover crops in 2014, dropping to 10% (*n* = 6) in 2016. 11% (*n* = 14) used other precision agricultural technologies in 2014, and 10% (*n* = 6) in 2016.

All practices showed an increasing trend in use except for precision agricultural technologies and cover crops. Don't know responses declined from 33% in 2014 to 18% in 2016. Those checking "Other" provided the following comments, highlighting that many landowners in Whiskey Creek are not owner-operators:

- Renting out
- Only as asked
- Farmland is leased
- NONE
- Renter Controls
- None
- No crops
- Planted in perennial grass and trees for wildlife
- Do not use fert.
- Band all P K application in ground. No surface application.

Figure 143: Which of the following nitrogen fertilizer practices are recommended for corn and sugar beets in the Whiskey Creek watershed? (%) CATA – 2014

Answered: 121 Skipped: 14

Answer Choices	Response	
Soil nitrate test (1)	45.45%	55
Spring application of N (2)	49.59%	60
Fall application of anhydrous or urea when soil temperature is below 50°F (3)	30.58%	37
Shallow or no incorporation of urea applied in the fall (4)	3.31%	4
Account or first and second year credits from legumes (5)	23.97%	29
Don't know (6)	42.98%	52
Other (please specify) (7)	6.61%	8
Total Respondents: 121		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.33	1.99

Figure 144: Which of the following nitrogen fertilizer practices are recommended for corn and sugar beets in the Whiskey Creek watershed? (%) CATA – 2016

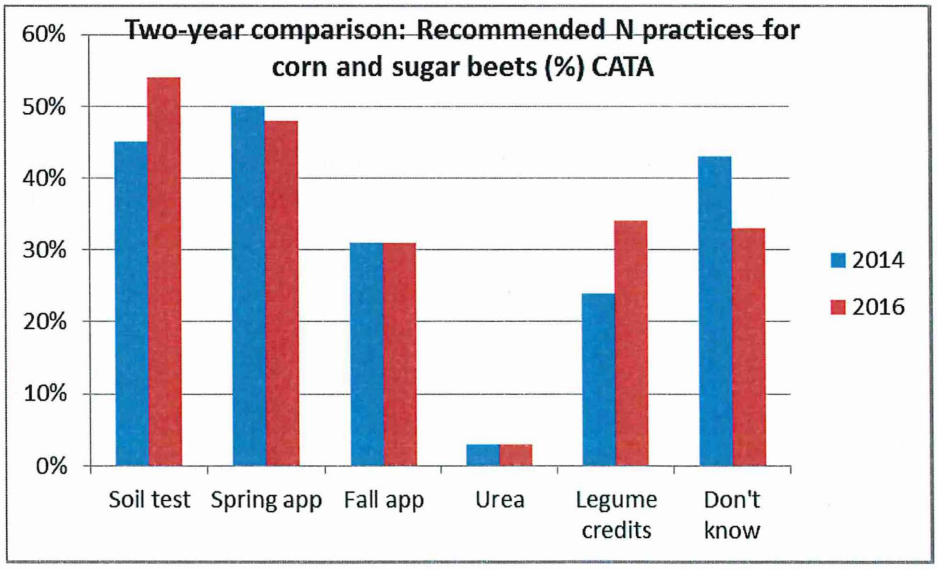
Answered: 61 Skipped: 15

Answer Choices	Responses	
Soil nitrate test (1)	54.10%	33
Spring application of N (2)	47.54%	29
Fall application of anhydrous or urea when soil temperature is below 50°F (3)	31.15%	19
Shallow or no incorporation of urea applied in the fall (4)	3.28%	2
Account or first and second year credits from legumes (5)	34.43%	21
Don't know (6)	32.79%	20
Other (please specify) (7)	11.48%	7
Total Respondents: 61		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.28	2.01

Figure 145: Two-year comparison - : Which of the following nitrogen fertilizer practices are recommended for corn and sugar beets in the Whiskey Creek watershed? (%) CATA



The most frequently reported response in 2014 was "Spring application of N" at 50% (*n* = 60), which decreased to 48% (*n* = 29) in 2016. The next most frequently reported response in 2014 was "Soil nitrate test" at 45% (*n* = 55), increasing to 54% (*n* = 33) in 2016. 31% (*n* = 37) checked "Fall application of anhydrous or urea when soil temperature is below 50 degrees F." The same percentage (*n* = 19) checked this response in 2016. "Account for first and second year credits from legumes" was checked by 24% (*n* = 29) in 2014, increasing to 34% (*n* = 21) in 2016. 3% (*n* = 4) checked "Shallow or no incorporation of urea

applied in the fall" in 2014, remaining unchanged in 2016 (n = 2). A significant percentage (43%, n = 52) checked "Don't know" in 2014, dropping to 33% (n = 20) in 2016. Comments for this question included:

- CRP
- Renter makes decisions
- Renter Controls
- I spring apply fertilizer and work it in
- But could be Fall app. too
- We do not farm corn sugar beets or any other crop
- Do not use N.

Figure 146: How are UMN Extension nitrogen practices for corn determined? (%) CATA – 2014

Answer Choices	Response	
Based on the nitrogen price:corn value ratio (1)	10.00%	12
Based on yield goal (2)	34.17%	41
Based on nutrient management plan developed by local NRCS/SWCD office (3)	8.33%	10
Based on field trials and history (4)	25.83%	31
Don't know (5)	54.17%	65
Other (please specify) (6)	5.83%	7
Total Respondents: 120		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	4.00	3.70	1.47

The most frequently checked response was "Don't know" (54%, n = 65). About a third (34%, n = 41) checked "Based on yield goal." 26% (n = 31) checked "Based on field trials and history." 10% (n = 12) checked "Based on the nitrogen price : corn value ratio. 8% (n = 10) checked "Based on nutrient management plan developed by local NRCS/SWCD office." 6% checked "Other." This question was not repeated in 2016.

Figure 147: What is the biggest water quality challenge in the Whiskey Creek Watershed? (%) COOR – 2014

Answered: 115 Skipped: 20

Answer Choices	Responses	
Bacteria (fecal coliform) (1)	0.00%	0
Nitrogen (2)	13.91%	16
Phosphorus (3)	3.48%	4
Sediment (4)	18.26%	21
Don't know (5)	63.48%	73
Other (please specify) (6)	0.87%	1
Total		**115**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
2.00	6.00	5.00	4.34	1.07

Figure 148: What is the biggest water quality challenge in the Whiskey Creek Watershed? (%) COOR - 2016

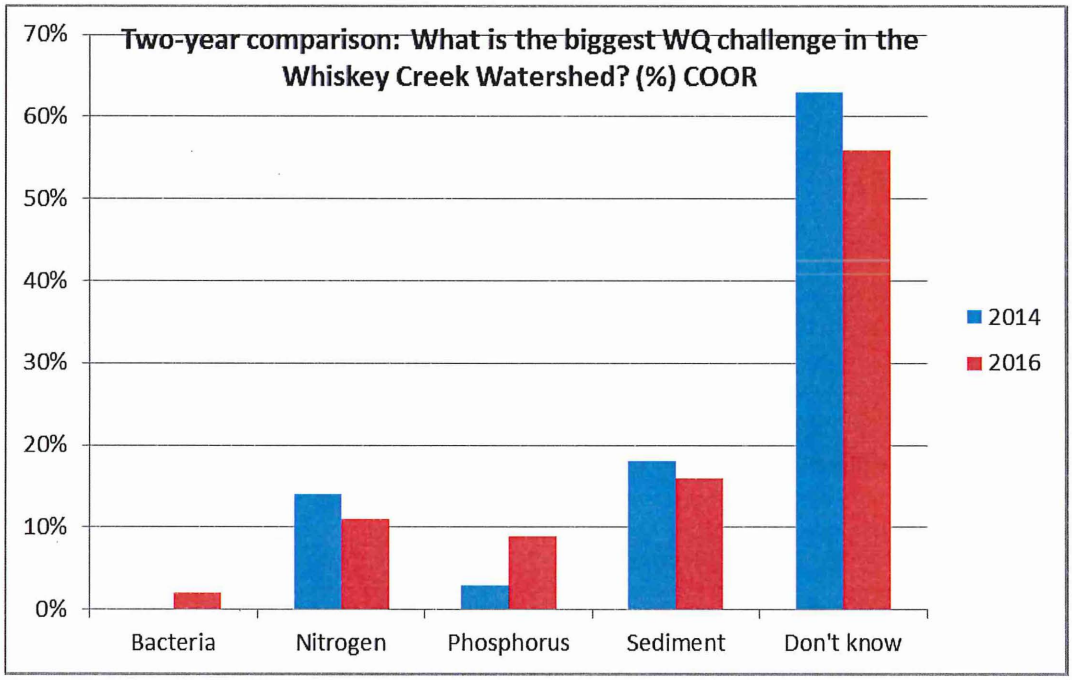
Answered: 57 Skipped: 19

Answer Choices	Responses	
Bacteria (fecal coliform) (1)	1.75%	1
Nitrogen (2)	10.53%	6
Phosphorus (3)	8.77%	5
Sediment (4)	15.79%	9
Don't know (5)	56.14%	32
Other (please specify) (6)	7.02%	4
Total		**57**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	5.00	4.35	1.18

Figure 149: Two-year comparison: What is the biggest water quality challenge in the Whiskey Creek Watershed? (%) COOR



The most significant finding of this question is the very high frequency of "Don't know" responses in both surveys, although there was improvement in 2016. 64% (*n* = 73) of respondents checked "Don't know" in 2014, decreasing to 56% (*n* = 32) in 2016. The next most frequently checked response in 2014 was "Sediment" (18%, *n* = 21), declining slightly to 16% (*n* = 9) in 2016. "Nitrogen" was chosen by 14% (*n* = 16) of respondents in 2014, declining slightly to 11% (*n* = 6) in 2016. 3% (*n* = 4) checked "Phosphorus" in 2014, rising to 9% (*n* = 5) in 2016. None chose "Bacteria (fecal coliform)" in 2014, and in 2016 one respondent selected this variable.

The following comments were entered by respondents:

- Sediment Don't know
- Checked "Bacteria (fecal coliform)," "Nitrogen" and "Sediment"
- Bacteria - Feed lots up in Rothsay? Sediment I was at mtg so the answer is bacteria but I think it is sediment.
- Not a farm

Figure 150: What is the primary pollutant of concern in tile drainage water? (%) COOR – 2014

Answered: 115 Skipped: 20

Answer Choices	Responses	
Phosphorus (1)	5.22%	6
Nitrogen (2)	21.74%	25
Micronutrients (3)	0.87%	1
Sediment and soil particles (4)	6.96%	8
Don't know (5)	62.61%	72
Other (please specify) (6)	2.61%	3
Total		**115**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	5.00	4.08	1.44

Figure 151: What is the primary pollutant of concern in tile drainage water? (%) COOR - 2016

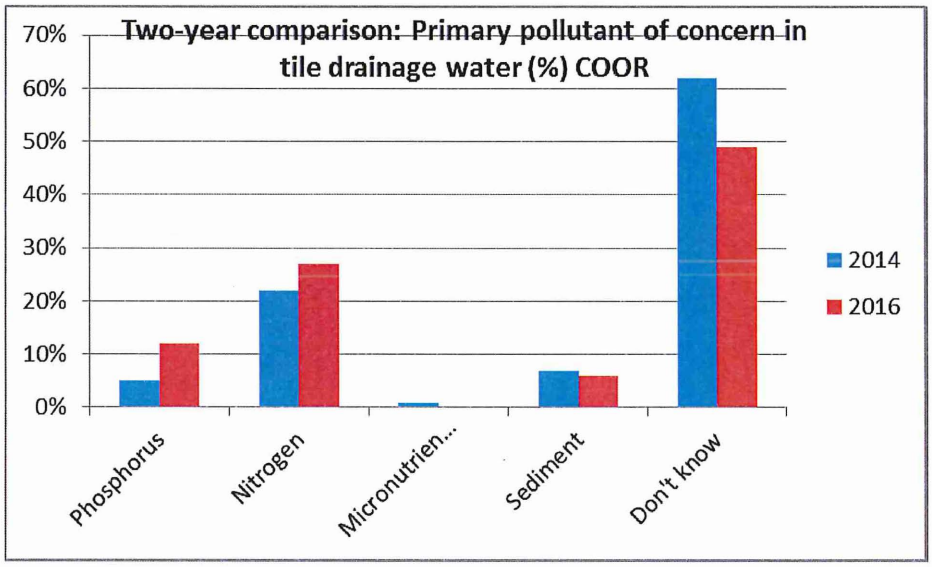
Answered: 59 Skipped: 17

Answer Choices	Responses	
Phosphorus (1)	11.86%	7
Nitrogen (2)	27.12%	16
Micronutrients (3)	0.00%	0
Sediment and soil particles (4)	5.08%	3
Don't know (5)	49.15%	29
Other (please specify) (6)	6.78%	4
Total		**59**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	5.00	3.73	1.69

Figure 152: Two-year comparison- What is the primary pollutant of concern in tile drainage water? (%) COOR



As in the preceding question, a significant majority could not identify the primary pollutant of concern in tile drainage water. In 2014, 63% (*n* = 72) checked "Don't know," compared to 49% (*n* = 29) in 2016. "Nitrogen" was checked by 22% (*n* = 25) in 2014, compared with 27% (*n* = 16) in 2016. 7% (*n* = 8) checked "Sediment and soil particles" in 2014, compared with5% (*n* = 3) in 2016. 5% (*n* = 6) checked "Phosphorus" in 2014, which increased to 12% (*n* = 7) in 2016. 1% checked "Micronutrients" in 2014, and none did so in 2016. The following comments were entered:

- NO CONCERNS... VERY HEALTHY FOR WATER QUALITY... THE SOIL IS THE BEST FILTER AVAILABLE.
- Checked "Phosphorus" "Nitrogen" " Micronutrients"
- Doesn't apply.
- No drainage implemented on the land, not a farm

Source of information

Figure 153: Where do you get agronomic or conservation information? (%) CATA – 2014

Answered: 121 Skipped: 14

Answer Choices	Responses	
Family/Neighbors (1)	35.54%	43
Crop consultant (2)	49.59%	60
Agricultural Dealers (3)	47.11%	57
Farm magazines (4)	48.76%	59
NRCS/SWCD/County Extension Offices (5)	30.58%	37
County Environmental Office (6)	10.74%	13
University of Minnesota Extension (7)	33.88%	41
Internet (8)	29.75%	36
Minnesota Department of Agriculture (9)	19.83%	24
Don't know (10)	23.14%	28
Other (please specify) (11)	8.26%	10
Total Respondents: 121		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	11.00	4.00	4.94	2.91

Figure 154: Where do you get agronomic or conservation information? (%) CATA – 2016

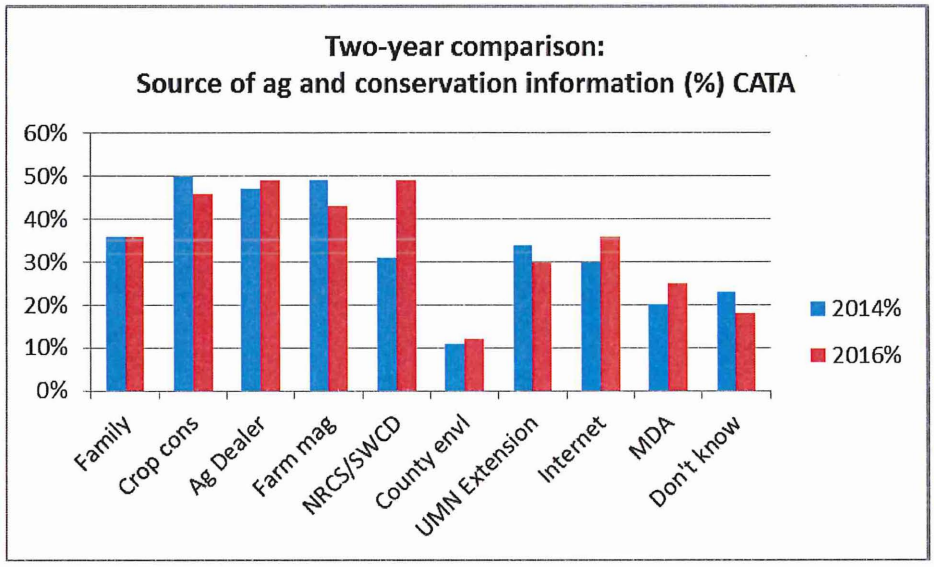
Answered: 61 Skipped: 15

Answer Choices	Responses	
Family/Neighbors (1)	36.07%	22
Crop consultant (2)	45.90%	28
Agricultural Dealers (3)	49.18%	30
Farm magazines (4)	42.62%	26
NRCS/SWCD/County Extension Offices (5)	49.18%	30
County Environmental Office (6)	11.48%	7
University of Minnesota Extension (7)	29.51%	18
Internet (8)	36.07%	22
Minnesota Department of Agriculture (9)	24.59%	15
Don't know (10)	18.03%	11
Other (please specify) (11)	13.11%	8
Total Respondents: 61		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	11.00	5.00	5.06	2.90

Figure 155: Two-year comparison: Where do you get agronomic or conservation information? (%) CATA



Responses for this check-all-that-apply question demonstrate that producers seek information from a wide variety of sources. Crop consultants were the most-frequently checked source in 2014 (50%, *n* = 60), and 46% (*n* = 28) in 2016. This was followed very closely by farm magazines in 2014 (49%, *n* = 59), decreasing to 43% (*n* = 26) in 2016. 47% (*n* = 57) sought information from agricultural dealers in 2014, rising slightly to 49% (*n* = 30) in 2016. Family and neighbors came in next at 36% in both 2014 (*n* = 43) and 2016 (*n* = 22).University of Minnesota Extension was checked by 34% (*n* = 41) in 2014 and 30% (*n* = 18) in 2016. NRCS/SWCD/County extension office was checked by 11% (*n* = 13) in 2014, jumping to 49% (*n* = 30) in 2016. The Internet was used by 30% (*n* = 36) in 2014 and 36% (*n* = 22) in 2016. Minnesota Department of Agriculture was a source of information for 20% (n = 24) of producers in 2014, rising to 25% (*n* = 15) in 2016. 23% (*n* = 28) checked "Don't know" in 2014, dropping to 18% (*n* = 11) in 2016. Sources of information with an increasing trend included agricultural dealers, NRCS/SWCD, County Environmental office, the Internet, and Minnesota Department of Agriculture. Sources with a decline in use included crop consultants, farm magazines and UMN Extension. Comments entered for this question included:

- Renters Job
- Farmland is leased
- My Agronomy Degree B.S. helps me with Agronomic Info!
- Renter Controls
- Meetings, ongoing education
- Watershed Board
- This is not a farm!
- N/A

Water management

Figure 156: What type of surface drainage is on your land? (%) CATA – 2014

Answered: 117 Skipped: 18

Answer Choices	Responses	
Public ditches (1)	52.99%	62
Private ditches (2)	42.74%	50
Manmade surface drains or field ditches (3)	58.12%	68
Natural waterways or grass waterways (4)	57.26%	67
Don't know (5)	15.38%	18
Total Respondents: 117		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	5.00	3.00	2.73	1.26

This question was not repeated in the 2016 survey. However, a related question was posed (see Figure 24 below).

Figure 157: Does your land have a one-rod wide buffer (16.5 feet) along open ditches or streams? (%) COOR – 2014

Answered: 117 Skipped: 18

Answer Choices	Responses	
Yes (1)	23.08%	27
No (2)	39.32%	46
Do not have land with open ditches or streams (3)	13.68%	16
Don't know (4)	23.93%	28
Total		**117**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	4.00	2.00	2.38	1.08

23% (n = 27) did have a one-rod wide buffer in 2014, whil 38% (n = 46) did not. 14% checked "Do not have land with open ditches or streams). 24% (n = 28) checked "Don't know." This question was not repeated in 2016.

Figure 158: Do you use subsurface (tile) drainage on land you own or operate? (%) COOR – 2014

Answered: 121 Skipped: 14

Answer Choices	Responses	
Yes (1)	46.03%	29
No (2)	49.21%	31
Don't know (3)	4.76%	3
Total		63

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	3.00	2.00	1.59	0.58

Figure 159: Do you use subsurface (tile) drainage on land you own or operate? (%) COOR – 2016

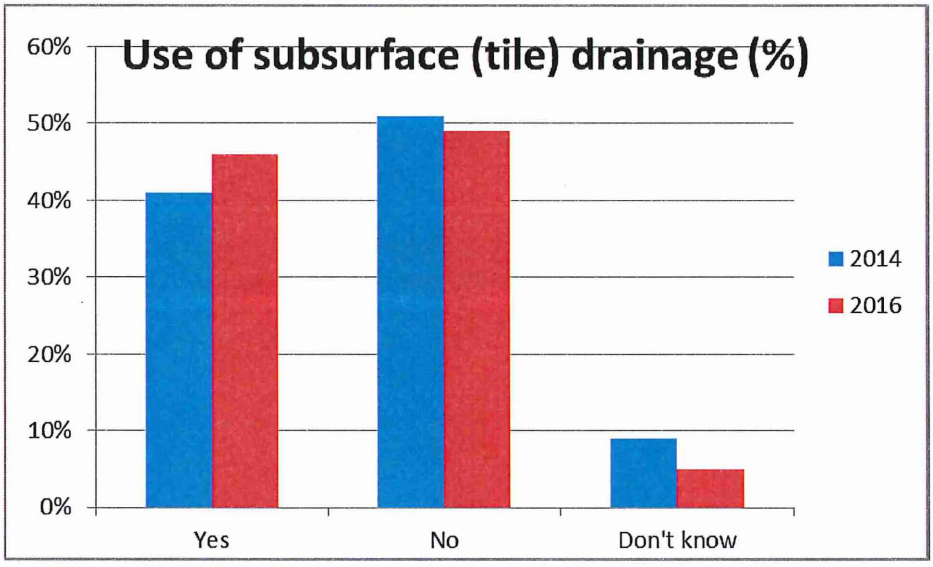
Answered: 63 Skipped: 13

Answer Choices	Responses	
Yes (1)	40.50%	49
No (2)	50.41%	61
Don't know (3)	9.09%	11
Total		121

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	3.00	2.00	1.69	0.63

Figure 160: Two-year comparison - Do you use subsurface (tile) drainage on land you own or operate? (%) COOR



In 2014 41% (*n* = 49) checked "Yes," increasing slightly to 46% (*n* = 29) in 2016. 50% (*n* = 61) checked "No," which was nearly even in 2016 at 49% (*n* = 31). 9% checked "Don't know" in 2014, compared to 5% in 2016. Comments entered for this question included:

- Renters use
- Tile put in years ago to drain lowland
- No chemicals, no tilling, no grazing. Trees and grass for wildlife only

Figure 161: Do you use or have you considered using any of the following drainage water management practices? (%) Check one box per row – 2014

Answered: 112 Skipped: 23

	Not using (1)	Currently use (2)	Consider using (3)	Don't know (4)	Other (5)	Total Respondents
Control structures/lift pumps	**60.71%** 68	**13.39%** 15	**8.93%** 10	**16.96%** 19	**0.00%** 0	112
Treatment wetlands	**62.50%** 65	**1.92%** 2	**2.88%** 3	**32.69%** 34	**0.00%** 0	104
Saturated buffers	**55.77%** 58	**6.73%** 7	**5.77%** 6	**30.77%** 32	**0.96%** 1	104
Woodchip bioreactors	**73.53%** 75	**0.00%** 0	**2.94%** 3	**24.51%** 25	**0.00%** 0	102

Basic Statistics

	Minimum	Maximum	Median	Mean	Standard Deviation
Control structures/lift pumps	1.00	4.00	1.00	1.82	1.16
Treatment wetlands	1.00	4.00	1.00	2.06	1.40
Saturated buffers	1.00	5.00	1.00	2.14	1.38
Woodchip bioreactors	1.00	4.00	1.00	1.79	1.30

Figure 162: Do you use or have you considered using any of the following drainage water management practices? (%) Check one box per row - 2016

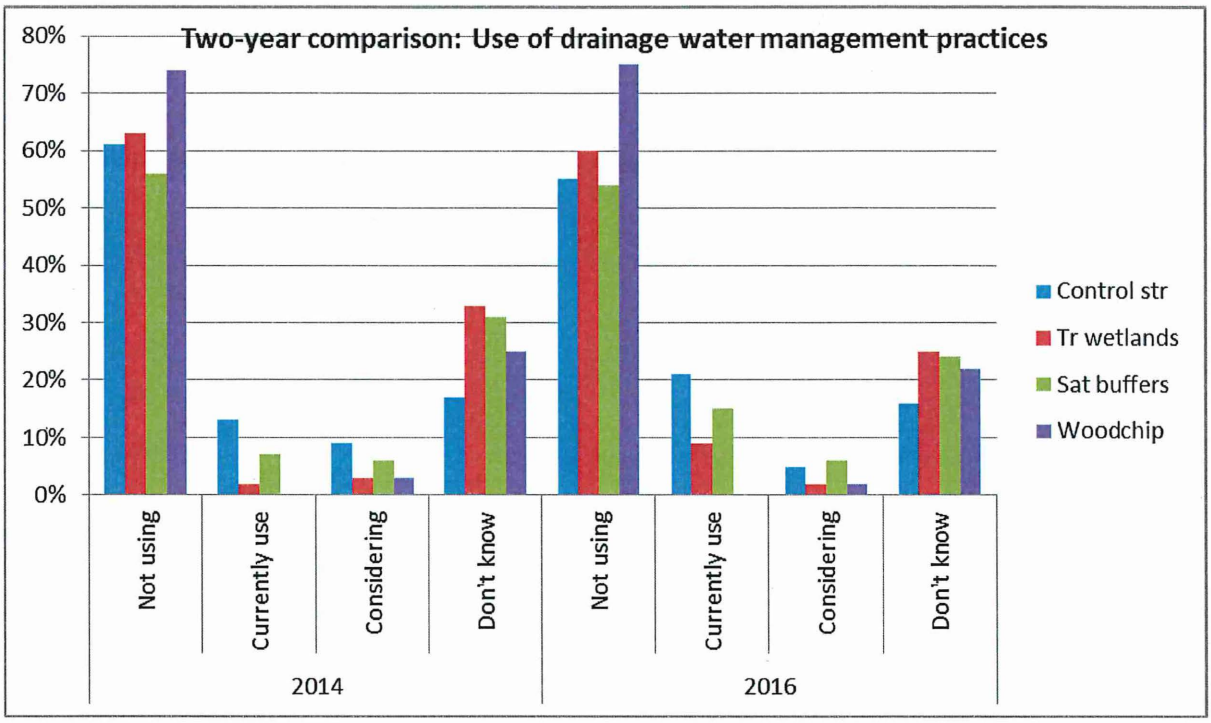
Answered: 58 Skipped: 18

	Not using (1)	Currently use (2)	Consider using (3)	Don't know (4)	Other (5)	Total
Control structures/lift pumps	55.36% 31	21.43% 12	5.36% 3	16.07% 9	1.79% 1	56
Treatment wetlands	60.38% 32	9.43% 5	1.89% 1	24.53% 13	3.77% 2	53
Saturated buffers	53.70% 29	14.81% 8	5.56% 3	24.07% 13	1.85% 1	54
Woodchip bioreactors	74.51% 38	0.00% 0	1.96% 1	21.57% 11	1.96% 1	51

Basic Statistics

	Minimum	Maximum	Median	Mean	Standard Deviation
Control structures/lift pumps	1.00	5.00	1.00	1.88	1.18
Treatment wetlands	1.00	5.00	1.00	2.02	1.39
Saturated buffers	1.00	5.00	1.00	2.06	1.31
Woodchip bioreactors	1.00	5.00	1.00	1.76	1.32

Figure 163: Two-year comparison: Do you use or have you considered using any of the following drainage water management practices? (%) Check one box per row



The majority of respondents in both surveys are not using drainage water management practices. Of those practices, **control structures/lift pumps** were used by 13% (*n* = 15) in 2014, increasing to 21% (*n* = 12) in 2016. 9% (*n* = 10) were considering the practice in 2014, decreasing to 5% (*n* = 3) in 2016. 61% (*n* = 68) were not using in 2014, compared with 55% (*n* = 31) in 2016. 17% (*n* = 19) checked "Don't know" in 2014, compared with 16% (*n* = 9) in 2016.

Treatment wetlands were not used by 63% (*n* = 65) in 2014, compared to 60% (*n* = 32) in 2014. 2% (*n* = 2) were currently using this practice in 2014, compared to 9% (*n* = 5) in 2016. 3% (*n* = 3) would consider using treatment wetlands in 2014, decreasing to 1% (*n* = 1) in 2016. 33% (*n* = 34) checked "Don't know" in 2014, compared to 25% (*n* = 13) in 2016. 4% (*n* = 2) checked "Other.

Saturated buffers were not being used by 56% (*n* = 58) in 2014, dropping slightly to 54% (*n* = 29) in 2016. 7% (*n* = 7) were using them in 2014, increasing to 15% (*n* = 8) in 2016. 6% (*n* = 6) would consider using them in 2014, remaining steady at 6% in 2016. "Don't know" was checked by 31% (*n* = 32) in 2014, compared with 24% (*n* = 13) in 2016.

Woodchip bioreactors were not used by 74% (*n* = 75) of respondents in 2014, remaining almost unchanged in 2016 at 75% (*n* = 38). No respondent checked "Currently using" in either survey. 3% (*n* = 3) checked "Consider using" in 2014, and 2% (*n* = 1) in 2016. "Don't know" was checked by 25% (*n* = 25) in 2014, and 22% (*n* = 11) in 2014.

The following comments were entered for this question:

- Farmland is leased
- Watershed plan - grass+trees
- Land is for wildlife we do not drain
- No changes being made.
- N/A

Figure 164 Have you considered using drainage water management on your tiled land? (%) CATA – 2014

Answered: 99 Skipped: 36

Answer Choices	Responses	
I currently use drainage water management (1)	7.07%	7
I am ready and willing to use drainage water management (2)	1.01%	1
I might be interested but need more information (3)	19.19%	19
I might be interested but would need a cost-share or financial incentive (4)	15.15%	15
I'm not very interested (5)	11.11%	11
Not at all interested (6)	15.15%	15
Don't know (7)	40.40%	40
Total Respondents: 99		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	6.00	5.10	1.89

Figure 165: Have you considered using drainage water management on your tiled land? (%) CATA – 2016

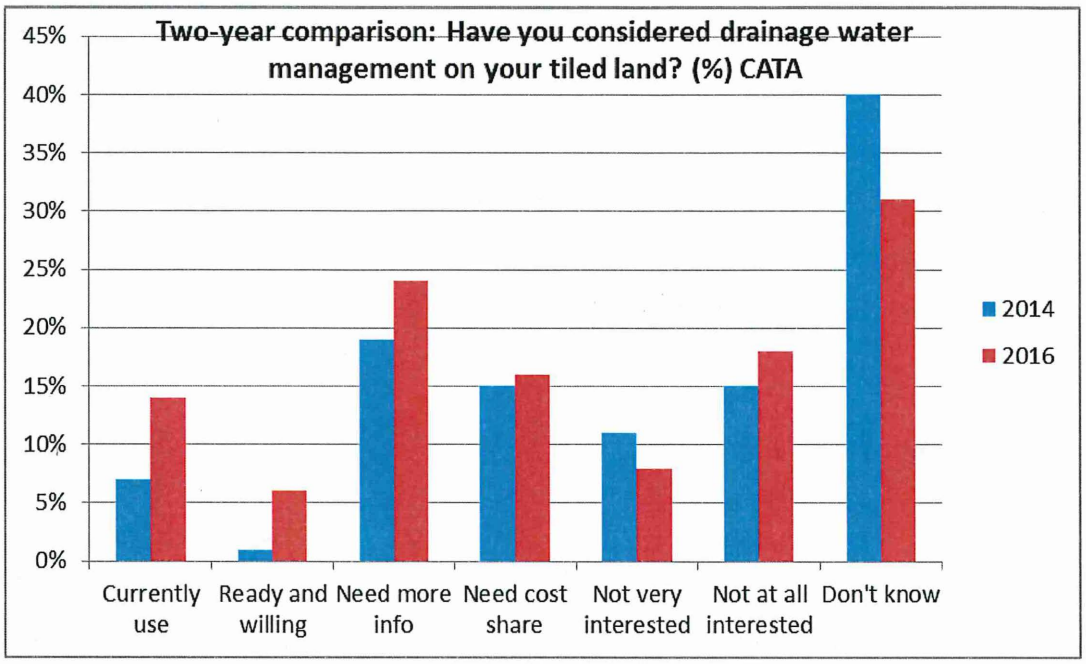
Answered: 49 Skipped: 27

Answer Choices	Responses	
I currently use drainage water management (1)	14.29%	7
I am ready and willing to use drainage water management (2)	6.12%	3
I might be interested but need more information (3)	24.49%	12
I might be interested but would need a cost-share or financial incentive (4)	16.33%	8
I'm not very interested (5)	8.16%	4
Not at all interested (6)	18.37%	9
Don't know (7)	30.61%	15
Total Respondents: 49		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	4.00	4.48	2.07

Figure 166: Two-year comparison - Have you considered using drainage water management on your tiled land? (%) CATA



The most frequent response for this question in both 2014 and 2016 was "Don't know" at 40% (*n* = 40) in 2014 and 31% (*n* = 15) in 2016. 19% (*n* = 19) checked "I might be interested but need more information" in 2014, compared with 24% (*n* = 12) in 2016. In 2014 15% (*n* = 15) checked "I might be interested but need a cost-share or financial incentive," compared with 16% (*n* = 8) in 2016. The same percentage (15%, *n* = 15) checked "Not at all interested" in 2014, and 18% (*n* = 9) in 2016. 11% (*n* = 11) checked "I'm not very interested" in 2014, compared with 8% (*n* = 4) in 2016. 7% (*n* = 7) checked "I currently use drainage water management" in 2014, and 14% (*n* = 7) in 2016. 1% (*n* = 1) checked "I am ready and willing to use drainage water management" in 2014, increasing slightly to 6% (*n* = 3) in 2016.

Comments for this question included:

- Renters choice
- No tile
- Renters may have considered
- Doesn't apply, have no tiled land!
- NA
- NA
- Does not apply
- There is no farm just fruits and grasses for wildlife
- Don't have tiled land.
- None is tiled
- No tiled land.

Figure 167: Which of the following do you use to reduce conflict over water management as surface and subsurface runoff moves through the Whiskey Creek watershed? (%) - CATA (2014)

Answered: 121 Skipped: 14

Answer Choices	Respons	
Collaborate with neighbors to minimize adverse impacts associated with water quantity and/or quality (1)	36.36%	44
Consult with the local drainage authority (2)	23.14%	28
Contact appropriate government agencies regarding any necessary permits (3)	36.36%	44
Coordinate with tiling contractor (4)	15.70%	19
Know the topography of my lands to determine the best system to manage water (5)	38.02%	46
None of these (6)	11.57%	14
Don't Know (7)	28.10%	34
Total Respondents: 121		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.76	2.03

The most frequently reported conflict reduction practice in 2014 was "Knowing the topography of my lands to determine the best system to manage water" (38%, *n* = 46). This was followed closely by "Collaborate with neighbors to minimize adverse impacts associated with water quality and/or quantity" (36%, *n* = 44); and "Contact appropriate government agencies regarding any necessary permits" (36%, *n* = 44). 23% "Consult with the local drainage authority" (23%, *n* = 28). 16% checked "Coordinate with the tiling contractor" (16%, *n* = 19). More than one-fourth (28%, *n* = 34) checked "Don't know."

Figure 168: Which water quality issue is most important to you? (%) COOR – 2014

Answered: 118 Skipped: 17

Answer Choices	Responses	
Whiskey Creek's status as an impaired water (1)	7.63%	9
Sediment in Red River (2)	11.86%	14
High nitrate levels in municipal and/or private wells (3)	21.19%	25
Hypoxic zone in Lake Winnipeg (4)	1.69%	2
None of these (5)	12.71%	15
Don't know (6)	42.37%	50
Other (please specify) (7)	2.54%	3
Total		**118**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	5.00	4.37	1.81

Figure 169: Which water quality issue is most important to you? (%) COOR – 2016

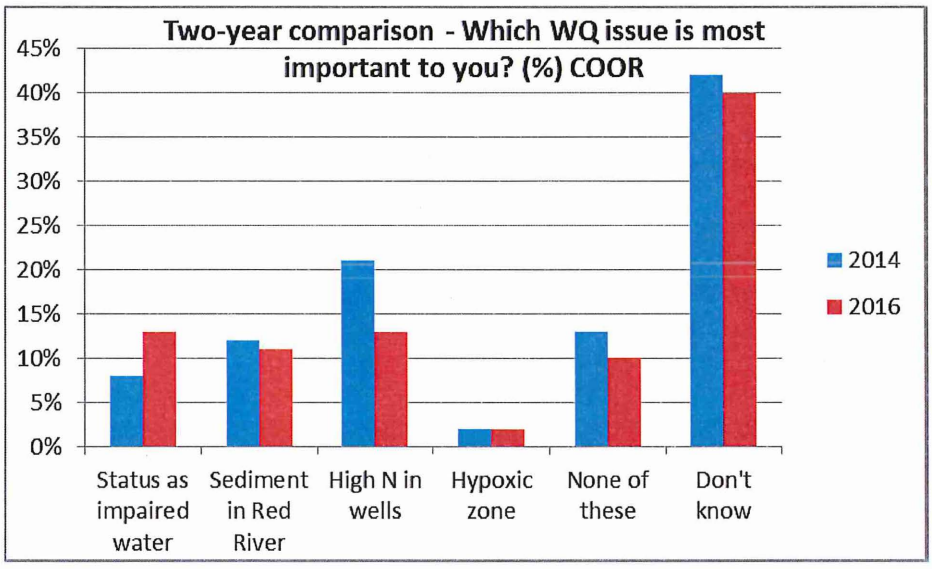
Answered: 62 Skipped: 14

Answer Choices	Responses	
Whiskey Creek's status as an impaired water (1)	12.90%	8
Sediment in Red River (2)	11.29%	7
High nitrate levels in municipal and/or private wells (3)	12.90%	8
Hypoxic zone in Lake Winnipeg (4)	1.61%	1
None of these (5)	9.68%	6
Don't know (6)	40.32%	25
Other (please specify) (7)	11.29%	7
Total		**62**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	6.00	4.50	2.05

Figure 170: Two-year comparison - Which water quality issue is most important to you? (%) COOR



The most frequently checked response in both surveys is "Don't know" at 42% (*n* = 50) in 2014 and 40% (*n* = 25) in 2016. The next highest response in 2014 was "High nitrate levels in municipal and/or private wells (21%, *n* = 25), declining to13% (*n* = 8) in 2016. "Whiskey Creek's status as an impaired water" was checked by 8% (*n* = 9) in 2014, increasing to 13% (*n* = 8) in 2016. "Sediment in the Red River" was checked by 12% (*n* = 14) in 2014 and 11% (*n* = 7) in 2016. "Hypoxic zone in Lake Winnipeg" was checked by 2% (*n* = 2) in 2014, remaining almost unchanged at 2% (*n* = 1) in 2016. "None of these" was checked by 13% (*n* = 15) in 2014 and 10% (*n* = 6) in 2014. Comments entered by respondents for this question included the following:

- Water quality is always an important concern. We try to use good farming practices and follow labels on all spray and fertilizer.
- Farmland is leased
- Sediment in all waters. Answers above should not be exclusive for Red River!
- All above plus more
- Checked both "Whiskey Creek's status as an impaired water" "High nitrate levels in municipal and/or private wells"
- Flooding downstream- Water quality. Part of total Red River Plan
- No chemicals, no fertilizers, no tilling

Figure 171: Do you think that your farm operation contributes nutrients, sediment or bacteria to local lakes, streams or rivers? (%) COOR – 2014

Answered: 120 Skipped: 15

Answer Choices	Responses	
Yes (1)	20.00%	24
No (2)	40.83%	49
Don't know (3)	35.00%	42
Other (please specify) (4)	4.17%	5
Total		**120**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	4.00	2.00	2.23	0.81

Figure 172: Do you think that your farm operation contributes nutrients, sediment or bacteria to local lakes, streams or rivers? (%) COOR – 2016

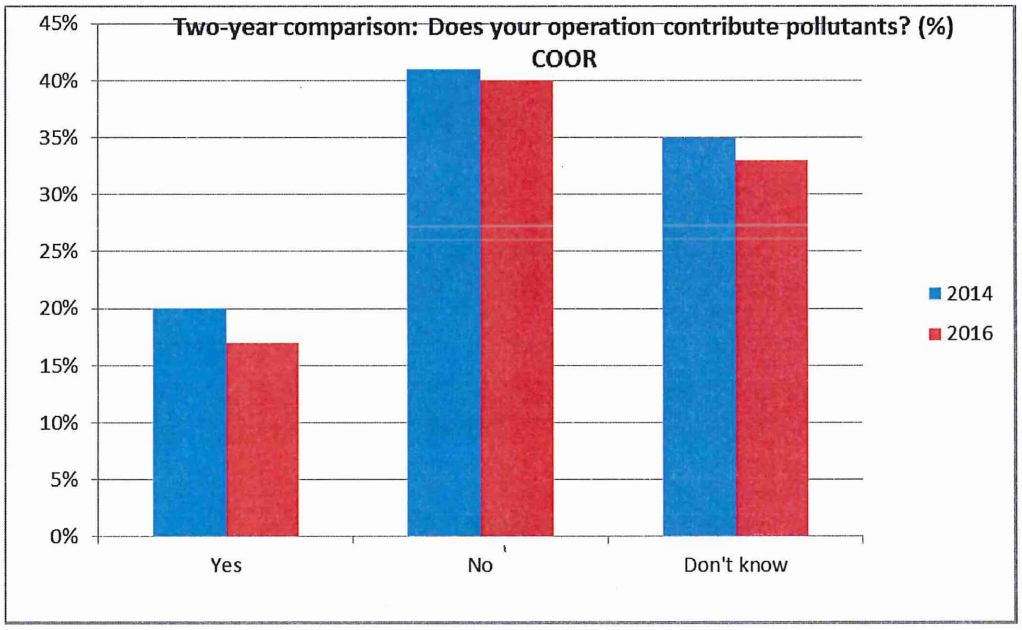
Answered: 63 Skipped: 13

Answer Choices	Responses	
Yes (1)	17.46%	11
No (2)	39.68%	25
Don't know (3)	33.33%	21
Other (please specify) (4)	9.52%	6
Total		**63**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	4.00	2.00	2.35	0.88

Figure 173: Two-year comparison: Do you think that your farm operation contributes nutrients, sediment or bacteria to local lakes, streams or rivers? (%) COOR



Most respondents do not believe that their farm operation contributes pollutants to local water bodies. 41% (*n* = 49) checked "No" in 2014, and 40% (*n* = 25) in 2016. 20% (*n* = 24) checked "Yes" in 2014, compared to 17% (*n* = 11) in 2016. 35% (*n* = 42) checked "Don't know) in 2014, compared to 33% (*n* = 21) in 2016. Of those checking "Other" the following comments were provided:

- We try to use good farming practice and keep any runoff and erosion to a minimum.
- Yes, but very little
- No; Loaded question
- No (CRP)
- Farmland is leased
- No I hope not, but the creek has been fed by ditches that have not had controls for years and farmers have farmed the creek

Decision-making

Figure 174: What prevents you from implementing additional clean water practices in your farming operation? CATA (%) 2014

Answered: 119 Skipped: 16

Answer Choices	Responses	
I need to know more about clean water practices (1)	23.53%	28
Takes too much time (2)	6.72%	8
Too much paperwork (3)	19.33%	23
Potential cost (4)	28.57%	34
Need to modify practice (5)	3.36%	4
Yield reduction concern (6)	9.24%	11
Reduction of tillable acres (7)	19.33%	23
Don't want to take part in a government program (8)	12.61%	15
Nothing prevents me (9)	22.69%	27
Don't know (10)	27.73%	33
Other (please specify) (11)	10.92%	13
Total Respondents: 119		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	11.00	7.00	6.08	3.28

Figure 175: What prevents you from implementing additional clean water practices in your farming operation? CATA (%) 2016

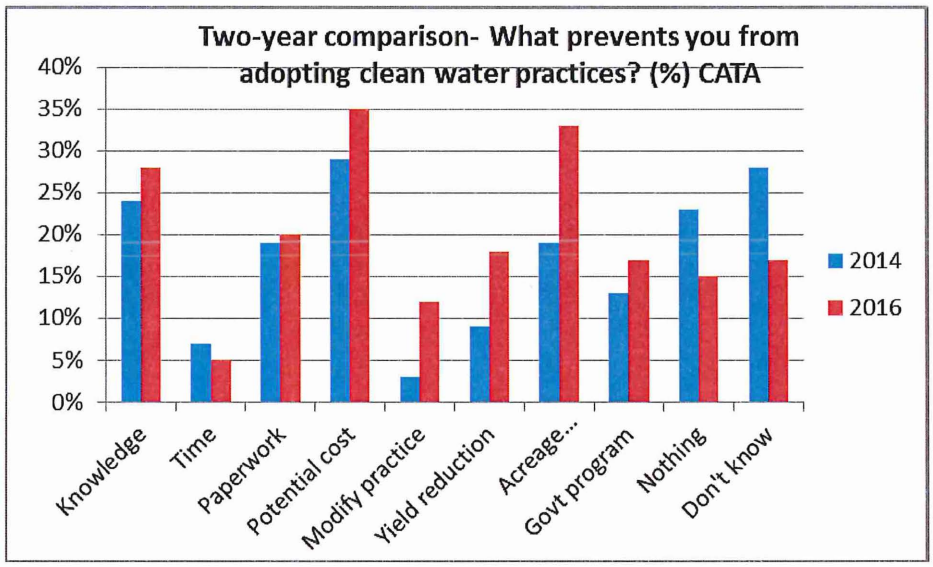
Answered: 60 Skipped: 16

Answer Choices	Responses	
I need to know more about clean water practices (1)	28.33%	17
Takes too much time (2)	5.00%	3
Too much paperwork (3)	20.00%	12
Potential cost (4)	35.00%	21
Need to modify practice (5)	11.67%	7
Yield reduction concern (6)	18.33%	11
Reduction of tillable acres (7)	33.33%	20
Don't want to take part in a government program (8)	16.67%	10
Nothing prevents me (9)	15.00%	9
Don't know (10)	16.67%	10
Other (please specify) (11)	16.67%	10
Total Respondents: 60		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	11.00	6.00	5.81	3.06

Figure 176: Two-year comparison (%) CATA –
What prevents you from implementing additional clean water practices in your farming operation?



The most frequently checked response in 2014 was "Potential cost" at 29% (*n* = 34), which increased to 35% (*n* = 21) in 2016. The next highest response was "I need to know more about clean water practices" at 24% in 2014, increasing to 28% (*n* = 17) in 2016. "Too much paperwork" ranked at 19% (*n* = 23) in 2014, increasing slightly to 20% (*n* = 12) in 2016. "Reduction of tillable acres" also ranked at 19% (*n* = 23) in 2014, climbing sharply to 33% (*n* = 20) in 2016. 13% (n = 15) checked "Don't want to take part in a government program" in 2014, increasing to 17% (*n* = 10) in 2016. 9% (*n* = 11) checked "Yield reduction concern" in 2014, which increased to 18% (**n** = 11) in 2016. "Takes too much time" was checked by 7% (*n* = 8) in 2014, dropping slightly to 5% (*n* = 3) in 2016. "Need to modify practice" was the least-most concerning factor in 2014 at 3% (*n* = 4), but this increased to 12% (*n* = 7) in 2016. 23% (*n* = 27) checked "Nothing prevents me" in 2014, dropping to 15% (*n* = 9) in 2016. "Don't know" responses were 28% (*n* = 33) in 2014, dropping to 17% (*n* = 10) in 2016. Those checking "Other" provided the following comments:

- It takes time
- Our age
- Nothing applies
- Most all of the above
- I have approached soil conservation officials several times on this matter and they seem to just not follow through with problem or just ignore it. Waterway should have been taken care of way before this date, now waterway has grown up in willow trees and so forth and will take a lot more work to straight mess out.
- We do everything we can to protect water quality.
- Renter
- Under control
- Don't need them
- Rent Out
- Can you name one thing that be an improvement over rotationally grazed permanent pasture?

- I don't farm
- We try to adapt as crops change
- Education on what would be the correct practice for our land.

Two-year trends for this question showed heightened concerns in 2016 about the need for more knowledge, paperwork, potential cost, the need to modify practices, yield reduction, reduction of tillable acreage, and participation in a government program. Factors showing a declining trend included time, nothing and don't know.

Figure 177: What is the most important factor in your agricultural production decision-making process? (%) COOR – 2014

Answered: 119 Skipped: 16

Answer Choices	Responses	
Water quality (1)	4.20%	5
Profitability (2)	33.61%	40
Consistent yield (3)	10.08%	12
Farm legacy (4)	15.97%	19
My retirement plans (5)	4.20%	5
Don't know (6)	26.89%	32
Other (please specify) (7)	5.04%	6
Total		**119**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	4.00	3.83	1.83

Figure 178: What is the most important factor in your agricultural production decision-making process? (%) COOR – 2016

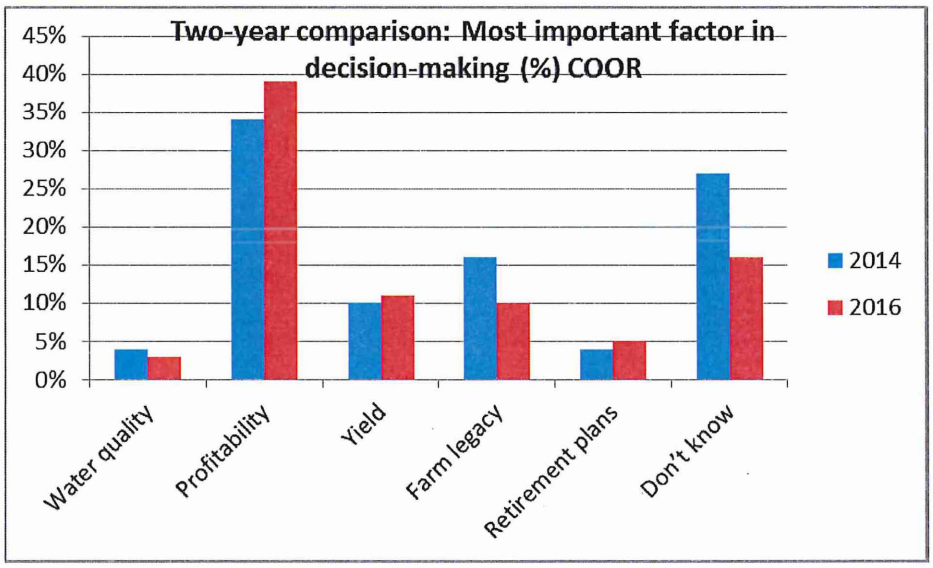
Answered: 61 Skipped: 15

Answer Choices	Responses	
Water quality (1)	3.28%	2
Profitability (2)	39.34%	24
Consistent yield (3)	11.48%	7
Farm legacy (4)	9.84%	6
My retirement plans (5)	4.92%	3
Don't know (6)	16.39%	10
Other (please specify) (7)	14.75%	9
Total		**61**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	3.00	3.82	2.00

Figure 179: Two-year comparison: What is the most important factor in your agricultural production decision-making process? (%) COOR



"Profitability" was significantly more important in decision-making to respondents than all other factors in both surveys. It was checked by 34% (*n* = 40) of respondents in 2014 and 39% (*n* = 24) in 2016. "Farm legacy" was next at 16% (*n* = 19) in 2014 and 10% (*n* = 6) in 2016. "Consistent yield" was next at 10% (*n* = 12) in 2014 and 11% (*n* = 7) in 2016. "Water quality" was checked by 4% (*n* = 5) in 2015 and 3% (*n* = 2) in 2016. "My retirement plans" was checked by 4% (*n* = 5) in 2014 and 5% (*n* = 3) in 2016. "Don't know" was checked by 27% (*n* = 32) in 2014 and 16% (*n* = 10) in 2014. Year-to-year increasing trends included "Profitability," "Consistent yield" and "My retirement plans." There was a slight declining trend for "Water quality" and "Farm legacy." Those checking "Other" provided the following comments:

- Tiling has stopped a lot of erosion and runoff.
- Profitability; consistent yield
- Farmland is leased
- We don't farm to lose money, and we use the best practices we can
- Checked" Profitability" and "Consistent yield"
- Checked "Water quality," "Profitability" and "Consistent yield"
- No agriculture production, not a farm
- HUNTING

Figure 180: What would help you adopt additional management practices to protect local streams and lakes? (%) CATA – 2014

Answered: 114 Skipped: 21

Answer Choices	Responses	
Education and training on specific practices (1)	**38.60%**	44
Cost-share or financial incentives (2)	**47.37%**	54
Seeing my neighbors or friends get involved (3)	**15.79%**	18
Support from my ag dealer and/or crop consultant (4)	**9.65%**	11
Technical assistance (5)	**22.81%**	26
Access to equipment (6)	**8.77%**	10
Don't know (7)	**37.72%**	43
Other (please specify) (8)	**4.39%**	5
Total Respondents: 114		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	3.00	3.70	2.33

Figure 181: What would help you adopt additional management practices to protect local streams and lakes? (%) CATA - 2016

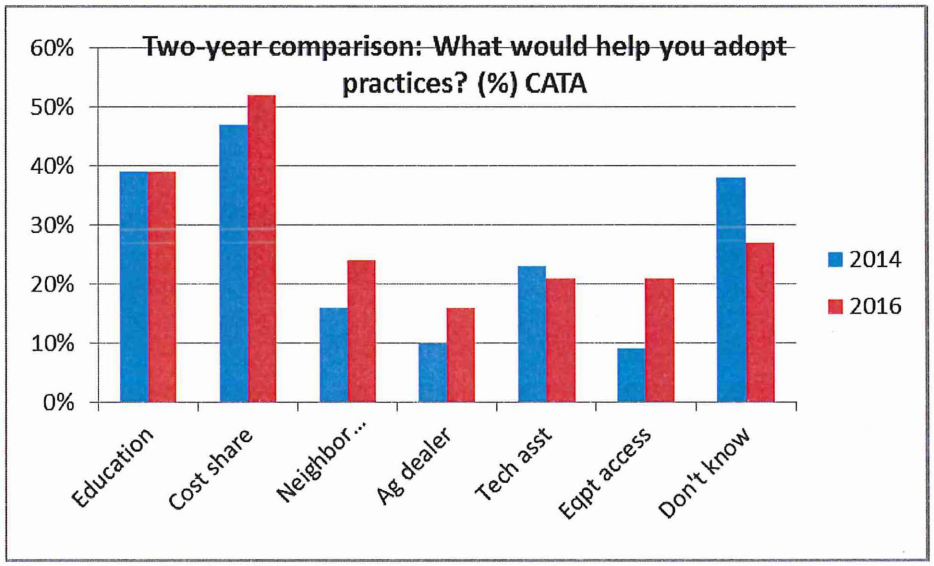
Answered: 62 Skipped: 14

Answer Choices	Responses	
Education and training on specific practices (1)	**38.71%**	24
Cost-share or financial incentives (2)	**51.61%**	32
Seeing my neighbors or friends get involved (3)	**24.19%**	15
Support from my ag dealer and/or crop consultant (4)	**16.13%**	10
Technical assistance (5)	**20.97%**	13
Access to equipment (6)	**20.97%**	13
Don't know (7)	**27.42%**	17
Other (please specify) (8)	**12.90%**	8
Total Respondents: 62		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	3.00	3.78	2.30

Figure 182: Two-year comparison: What would help you adopt additional management practices to protect local streams and lakes? (%) CATA



"Cost-share or financial incentive" was the most important variable to respondents, ranking at 47% (*n* = 54) in 2014 and increasing to 52% (*n* = 32) in 2016. "Education and training on specific practices" ranked next at 39% (*n* = 44) in 2014 and 39% (*n* = 24) in 2016. "Technical assistance" was third at 23% (*n* = 26) in 2014 and 21% (*n* = 13) in 2016. "Seeing my neighbords or friends get involved" was checked by 16% (*n* = 18) in 2014 and 24% (n = 15) in 2016. "Support from my ag dealer and/or crop consultant" was checked by 10% (*n* = 11) in 2014 and16% (*n* = 10) in 2016. 9% (*n* = 10) checked "Access to equipment" in 2014, more than doubling to 21% (*n* = 13) in 2016. "Don't know" responses numbered 38% (*n* = 43) in 2014 and 27% (*n* = 17) in 2016. Of those checking "Other" the following comments were entered:

- Our goal is to always try to improve the land for us and our landlords. By doing this there is much less runoff and erosion.
- Lake shore owners held to the same standards as ag producers.
- Farmland is leased
- See renter
- We have already signed up and are hopeful people to the river will do the same. Our small part will not have the needed impact if the others do not do the same to clean and control flooding both up and downstream.
- When we bought our 19.55 acres 25 plus years ago we took it out of production planted in perennial grasses planted fruit trees mowed for weed control there have been no chemicals or fertilizers used for 25 years and not farmed
- I think I'm doing all I can right now.
- Nothing.

Variables showing an increasing trend over the two-year period included "Cost-share," "Seeing my neighbors and friends get involved," "Ag dealer or crop consultant" and "Access to equipment." A slight

decline was seen for "Technical assistance." "Education and training" remained constant over the period.

Figure 183: Which of the following influence your decision to adopt clean water practices? (%) CATA – 2014

Answered: 116 Skipped: 19

Answer Choices	Responses	
Time (1)	**40.52%**	47
Money (2)	**50.00%**	58
Will it make my life or work easier? (3)	**22.41%**	26
Yields (4)	**50.86%**	59
My retirement plans (5)	**8.62%**	10
Risk (6)	**12.07%**	14
Public perception (7)	**15.52%**	18
Reducing soil erosion (8)	**63.79%**	74
Don't know (9)	**21.55%**	25
Other (please specify) (10)	**1.72%**	2
Total Respondents: 116		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	4.00	4.73	2.80

Figure 184: Which of the following influence your decision to adopt clean water practices? (%) CATA – 2016

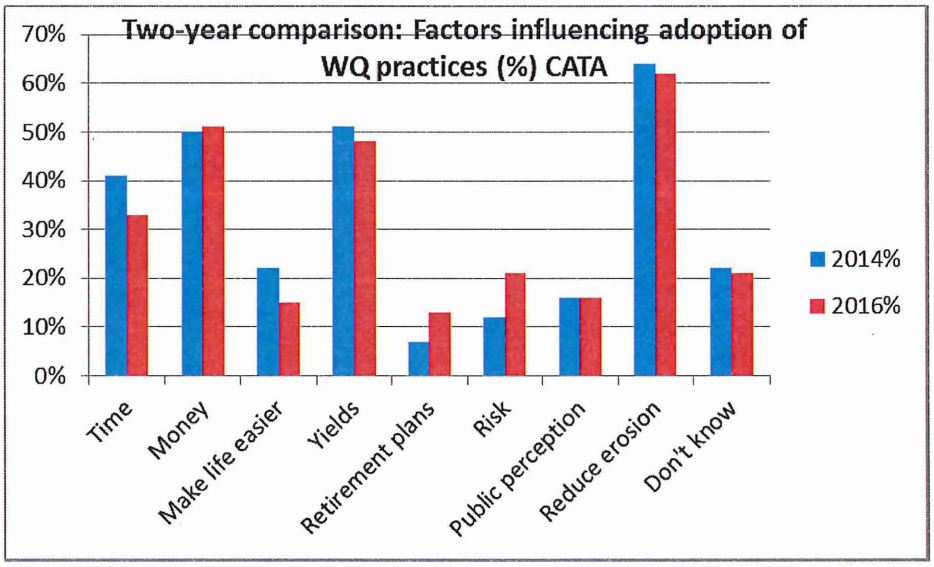
Answered: 61 Skipped: 15

Answer Choices	Responses	
Time (1)	32.79%	20
Money (2)	50.82%	31
Will it make my life or work easier? (3)	14.75%	9
Yields (4)	47.54%	29
My retirement plans (5)	13.11%	8
Risk (6)	21.31%	13
Public perception (7)	16.39%	10
Reducing soil erosion (8)	62.30%	38
Don't know (9)	21.31%	13
Other (please specify) (10)	4.92%	3
Total Respondents: 61		

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	10.00	4.00	4.97	2.78

Figure 185: Two-year comparison: Which of the following influence your decision to adopt clean water practices? (%) CATA



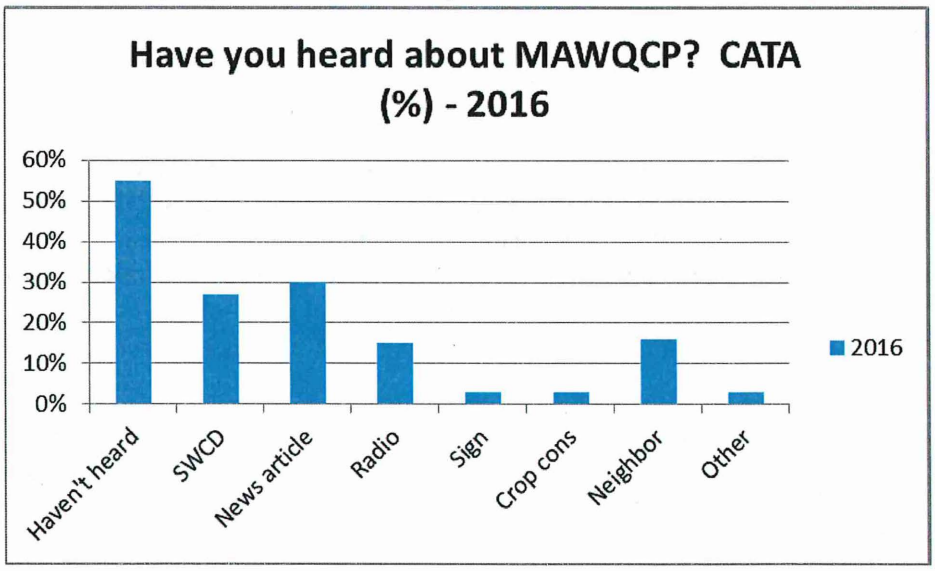
"Reducing soil erosion" was ranked highest in both surveys, at 64% (*n* = 74) in 2014 and 62% (*n* = 38) in 2016. "Yields" was checked by 51% (*n* = 59) in 2014 and 48% (*n* = 29) in 2016. "Money" was checked by 50% (*n* = 58) in 2014 and 51% (*n* = 31) in 2016. "Time" was checked by 41% (*n* = 47) in 2014 and 33% (*n* = 20) in 2016. 22% (*n* = 26) checked "Will it make my life or work easier" in 2014 and by 15% (*n* = 9) in 2016. "Public perception" was checked by 16% (*n* = 18) in 2014 and by 16% (*n* = 10) in 2016. "Risk" was checked by 12% (*n* = 14) in 2014, increasing to 21% (*n* = 13) in 2016. "Don't know" was checked by 22% (*n* = 25) in 2014 and by 21% (*n* = 13) in 2016. Those checking "Other" provided the following comments:

- Farmland is leased
- Other landowners and farmers join the project and funding from legacy fund or Red board.
- Allergic to chemicals; wanted land I can use

Variables showing an increasing trend included "Money," "Retirement plans" and "Risk." Variables showing a decline over time included "Time," "Make life easier," "Yields" and "Reduce soil erosion."

Awareness of MAWQCP

Figure 186: Have you heard about the Minnesota Agricultural Certification Program (Ag certainty program? If so, how did you hear about it? CATA (%)



This question was not asked in 2014. In 2016 a slight majority (55%, *n* = 33) had not yet heard about the program. About one-third (30%, *n* = 18) had seen a news article. 27% (*n* = 16) had heard about the program through the SWCD. 18% (*n* = 11) had heard about the program from a neighbor. 15% (*n* = 9) heard about it from the radio. 3% (*n* = 2) heard about it from a crop consultant or a sign. Of those checking "Other" the following comments were entered:

- D.N.R + Pheasants forever
- Dept. of Ag., NRCS, Watershed and I worked for congressman Peterson for 25 years. Was there at planning meetings. Most folks need to have more information and the Growers Groups need to say it's an "OK" program. Have Fun

Figure 187: Landowners and producers in the Whiskey Creek Watershed are eligible to participate in the new Minnesota Agricultural Water Quality Certification Program (%). Please indicate your level of interest in joining the program (Answer does not require participation in any way). Check only one response – 2014

Answered: 116 Skipped: 19

Answer Choices	Response	
I am ready and willing to participate (1)	3.45%	4
I might be interested but need more information (2)	20.69%	24
I might be interested but would need a cost-share or financial incentive (3)	19.83%	23
I'm not very interested in participating (4)	18.10%	21
Not at all interested (5)	8.62%	10
Don't know (6)	18.97%	22
Other (please specify) (7)	10.34%	12
Total		**116**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	4.00	4.06	1.76

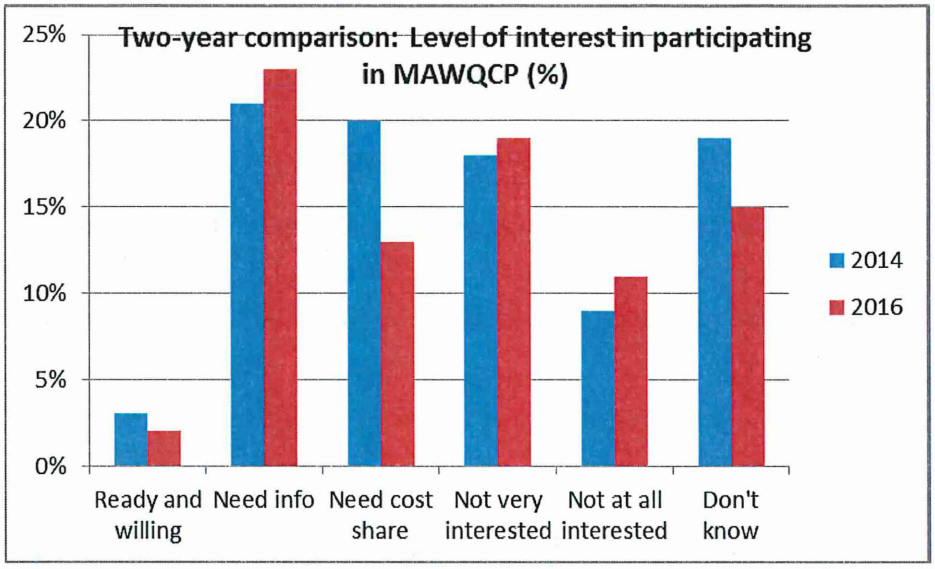
Figure 188: Landowners and producers in the Whiskey Creek Watershed are eligible to participate in the new Minnesota Agricultural Water Quality Certification Program (%). Please indicate your level of interest in joining the program (Answer does not require participation in any way). Check only one response – 2016

Answer Choices	Responses	
I am ready and willing to participate (1)	1.61%	1
I might be interested but need more information (2)	22.58%	14
I might be interested but would need a cost-share or financial incentive (3)	12.90%	8
I'm not very interested in participating (4)	19.35%	12
Not at all interested (5)	11.29%	7
Don't know (6)	14.52%	9
Other (please specify) (7)	17.74%	11
Total		**62**

Basic Statistics

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	4.00	4.31	1.84

Figure 189: Two-year comparison: Please indicate your level of interest in joining the program (%) COOR



The most frequently checked variable in both surveys was "I might be interested but need more information," at 21% (*n* = 24) in 2014 and increasing slightly to 23% (*n* = 14) in 2016. 20% (*n* = 23) checked "I might be interested but would need a cost-share or financial incentive" in 2014 and 13% (*n* = 8) in 2016. 18% (*n* = 21) checked "I'm not very interested in participating" in 2014, and 19% (*n* = 12) in 2016. 9% (*n* = 10) checked "Not at all interested" in 2014, rising slightly to 11% (*n* = 7) in 2016. 3% (*n* = 4) checked "I am ready and willing to participate" in 2014, and 2% (*n* = 1) in 2016. 19% (*n* = 22) checked "Don't know" in 2014, decreasing slightly to 15% (*n* = 9) in 2016. Those checking "Other" provided the following comments:

- I'm retired
- I might be interested but would need a cost-share or financial incentive and I'm not very
- interested in participating
- CRP
- Farmland is leased
- We have already started Buffer strips.
- I'm already working with F.S.A.T + Pheasants forever I guess the back stand
- Land may be too small. May have signed up when we owned 360 acres (name deleted)
- I did This once already
- In the process of being certified

Section 5: Comparing the 2014 and 2016 Results

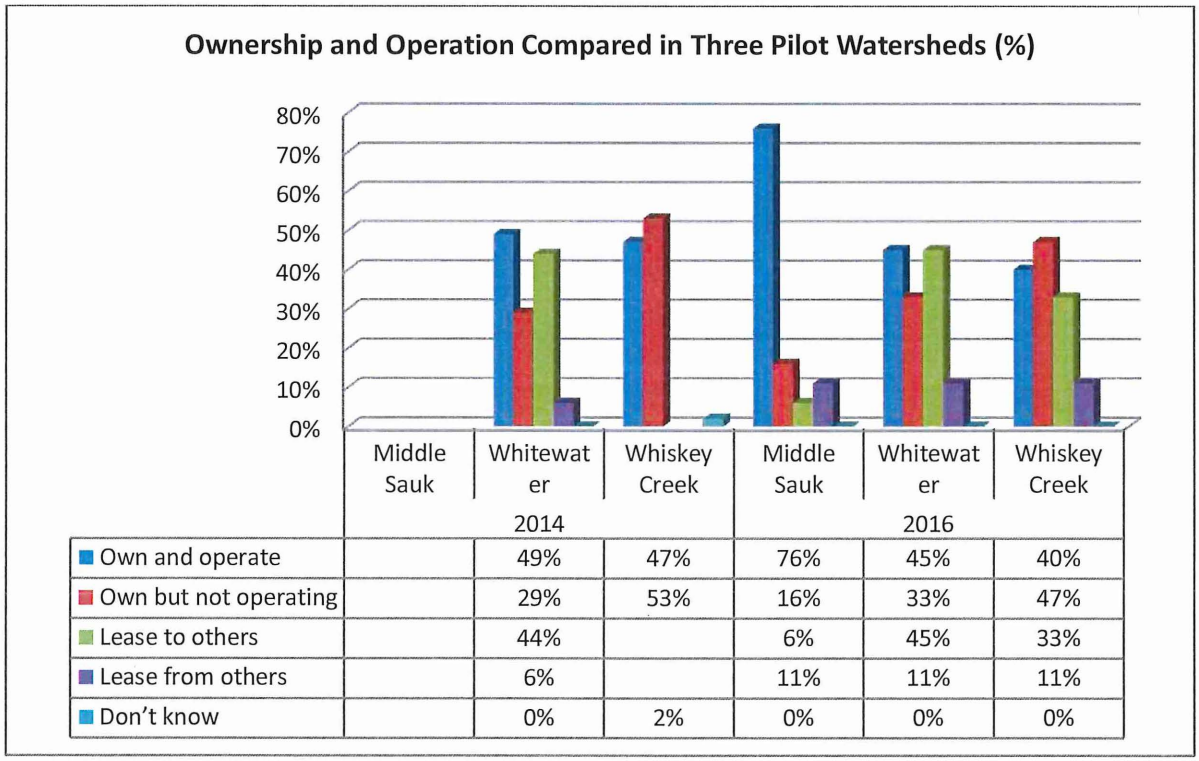
This section compares results for the three pilot watersheds for those questions that were asked in exactly the same way in 2014 and 2016.

Demographic questions

Land ownership and tenancy

Figure 187 below compares data on land ownership and tenancy for the three watersheds.

Figure 189: Comparing land ownership and operation in three pilot watersheds (%) - CATA



	Middle Sauk	Whitewater	Whiskey Creek	Middle Sauk	Whitewater	Whiskey Creek
	2014			2016		
Own and operate		49%	47%	76%	45%	40%
Own but not operating		29%	53%	16%	33%	47%
Lease to others		44%		6%	45%	33%
Lease from others		6%		11%	11%	11%
Don't know		0%	2%	0%	0%	0%

Middle Sauk has by far the most numerous owner-operators among the pilots. Although this question was not asked in Middle Sauk during the 2014 survey, the 2016 survey shows that 76% of Middle Sauk producers own and operate their own farm. There is a slight decreasing trend for owner-operators in Whitewater and Whiskey Creek, where non-operational ownership and leasing seem to be increasing.

For **Middle Sauk**, 76% of respondents are owner-operators, 16% own but are non-operational, 6% lease land to others, and 11% lease land from others. This question was not posed in 2014 because we were not yet aware of such demographic trends, so unfortunately no comparison can be made for this watershed for the two-year period.

For **Whitewater**, less than half of respondents (45%) are owner-operators, and an equal number lease from others as well (45%). 6% lease land to others. The two-year data comparison shows a 4% decrease in owner-operators, from 49% in 2014 to 45% in 2016. This corresponds to a 5% increase in those who

own but are no longer operating, from 29% in 2014 to 33% in 2016. 44% of Whitewater respondents leased land to others in 2014, increasing slightly to 45% in 2016. 6% leased land from others in 2014, increasing 5% to 11% in 2016. 2% checked "Don't know" in response to this question.

For **Whiskey Creek**, an even greater decline in the number of owner-operators occurred during the two-year period, from 47% in 2014 to 40% in 2016. Similarly, those owning but not operating declined from 53% in 2014 to 47% in 2016. Questions about leasing were not posed in the 2014 survey, but in 2016 33% of respondents leased land to others, and 11% leased land from others.

Overall, the number of owner-operators is in decline, and the number of non-operational farms is on the rise. Comments provided by respondents suggest that many are retiring and that much of their land is in CRP. In fact, the number of owner-operators is now less than 50% in both Whitewater and Whiskey Creek. Only Middle Sauk has a high number of owner-operators at 76%.

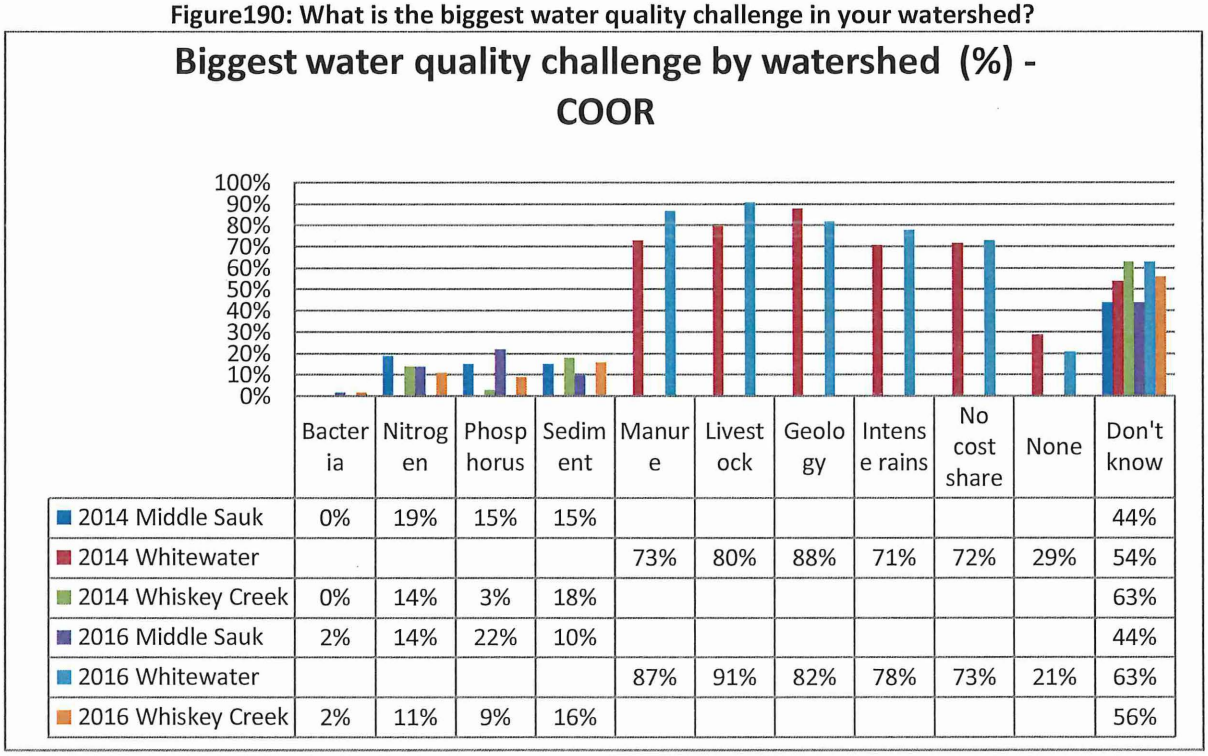
The significance of this finding is that a large portion of ag lands (45% in Whitewater and 33% in Whiskey Creek) are being managed by renters. This portion appears to be growing. To date renters have not been targeted by MAWQCP, but given their numbers they may be having an impact on water quality. Since renters were not included in this study, their knowledge, attitudes and practices related to conservation and water quality are unknown. Owners renting their land to others do not appear to be familiar with the practices of their renters. It is likely that the two groups will not respond equally to the same messages. That is, informational messages should be developed that are specific to each group.

Based upon comments and interviews, there is evidence that ownership and tenancy patterns are becoming more complex. It is not uncommon for a producer to rent land on a cash basis in multiple watersheds from different landowners, while farming his/her own land, and enrolling other owned parcels in CRP or other programs. There has been little prior research on landownership and tenancy in Minnesota. MDA might consider such a study to better understand the needs and priorities of each producer group. Such a study could inform outreach and educational efforts, and highlight gaps in specific groups for information and technology needs for the MAWQCP and other programs.

Knowledge questions

1. Knowledge/awareness of water quality challenges

Figure190: What is the biggest water quality challenge in your watershed?



	Bacteria	Nitrogen	Phosphorus	Sediment	Manure	Livestock	Geology	Intense rains	No cost share	None	Don't know
2014 Middle Sauk	0%	19%	15%	15%							44%
2014 Whitewater					73%	80%	88%	71%	72%	29%	54%
2014 Whiskey Creek	0%	14%	3%	18%							63%
2016 Middle Sauk	2%	14%	22%	10%							44%
2016 Whitewater					87%	91%	82%	78%	73%	21%	63%
2016 Whiskey Creek	2%	11%	9%	16%							56%

A check-only-one response question was asked in each pilot in 2014, and repeated in 2016. The variables were different for Whitewater than Middle Sauk and Whiskey Creek, reflecting the difference in water quality pollutants in each context. In general, awareness of water quality challenges was significantly greater in Whitewater than the other two pilots. The above figure highlights the concentration of "Don't know" responses for this question in all three pilot watersheds.

For **Whitewater,** producers ranked the variables much higher than the other two watersheds. The most frequently checked response was "Local geology (karst topography and steep slopes" by 88% of respondents in 2014, and 82% in 2016. "Livestock with uncontrolled access to streams" came next at 80% in 2014, increasing in awareness to 91% in 2016. "Manure management" was checked by 73%, increasing to 87% in 2016. "Lack of cost share or funding resources" was checked by 72% of respondents in 2014, increasing slightly to 73% in 2016. "Intense rains" was checked by 71% in 2014, increasing to 78% in 2016. 29% checked "None" in 2014, declining to 21% in 2016. "Don't know" responses were 54% in 2014, increasing to 63% in 2016. Variables showing an increase in awareness included: manure management, uncontrolled livestock, intense rains and no cost share. Variables showing a declining trend included local geology and "None."

Water quality challenges in the **Middle Sauk** focused on specific pollutants. Nitrogen was checked most frequently at 19% in 2014, declining to 14% in 2016. Phosphorus was checked by 15% in 2014, increasing in awareness to 22% in 2016. Sediment was also checked at 15% in 2014, declining to 10% in 2016. No

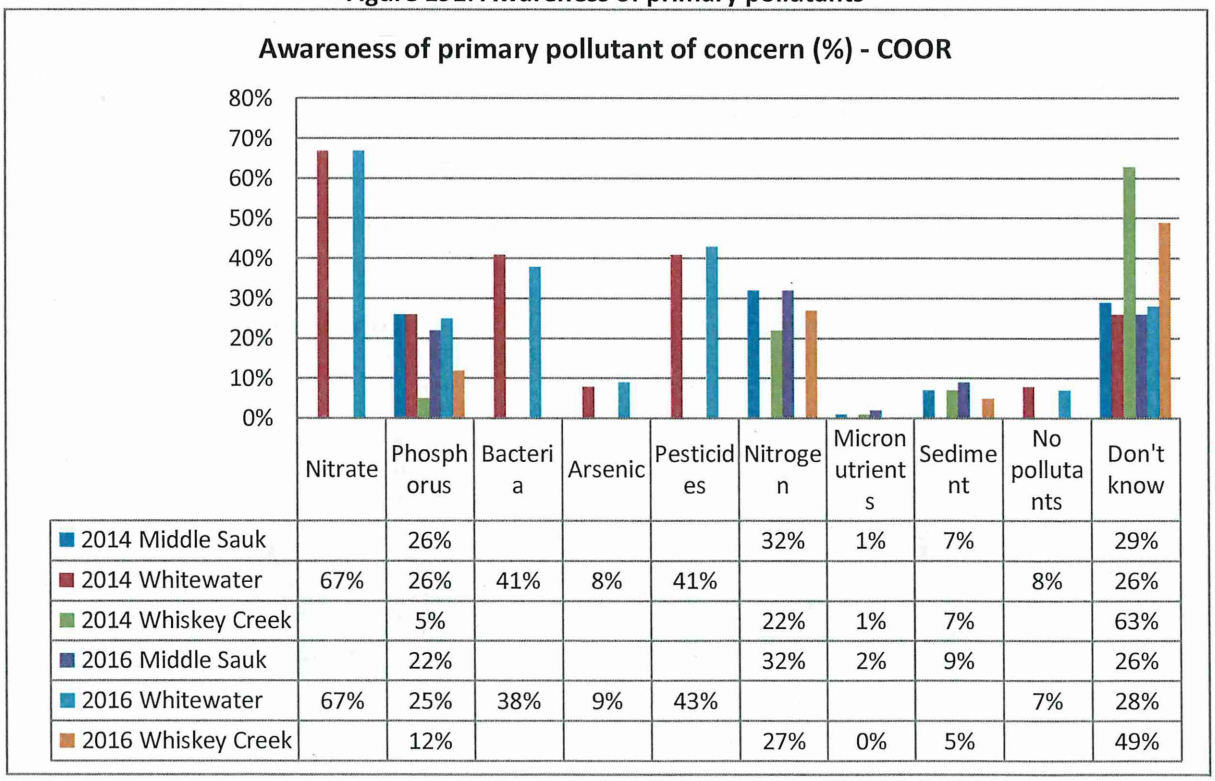
one identified bacteria as a water quality concern in 2014, rising slightly to 2% in 2016. 44% checked "Don't know" in 2014 and 2016.

For **Whiskey Creek**, the most frequently checked response in 2014 was sediment at 18%, declining slightly to 16% in 2016. Nitrogen was checked by 14% of respondents in 2014, declining to 11% in 2016. Phosphorus was checked by 3% in 2014, increasing to 9% in 2016. No one identified bacteria as a water quality concern in 2014, but 2% did in 2016. 63% of respondents checked "Don't know" in 2014, dropping to 56% in 2016.

2. Knowledge/awareness of specific pollutants in drinking water and drainage water

This check-only-one-response question listed specific pollutants of concern in each pilot watershed, and asked respondents to check the primary pollutant of concern for that watershed. Because pollutants, water quality concerns and agricultural practices differ across the three watersheds, only three knowledge questions were directly comparable. Other watershed-specific knowledge questions can be found in the preceding sections.

Figure 191: Awareness of primary pollutants



	Nitrate	Phosphorus	Bacteria	Arsenic	Pesticides	Nitrogen	Micronutrients	Sediment	No pollutants	Don't know
2014 Middle Sauk		26%				32%	1%	7%		29%
2014 Whitewater	67%	26%	41%	8%	41%				8%	26%
2014 Whiskey Creek		5%				22%	1%	7%		63%
2016 Middle Sauk		22%				32%	2%	9%		26%
2016 Whitewater	67%	25%	38%	9%	43%				7%	28%
2016 Whiskey Creek		12%				27%	0%	5%		49%

Whitewater respondents had the highest awareness of primary pollutants in drinking water, with 67% of respondents in 2014 and 2016 correctly identifying nitrate, which is the pollutant of highest priority. 41% correctly identified bacteria as the second most important pollutant (41% in 2014 and 38% in 2016). 41% checked pesticides as the primary pollutant in 2014, and 43% did so in 2016. 26% named phosphorus as the primary pollutant in 2014, declining slightly to 38% in 2016. 8% said that there were no pollutants of concern in 2014, compared with 7% in 2014. A quarter of Whitewater respondents did not know the primary pollutant in their watershed, at 26% in 2014 and 28% in 2016. 26% checked

"Don't know" in 2014, and 28% in 2016. Variables showing an increasing trend included arsenic and pesticides. Variables showing a declining trend included phosphorus and bacteria. Nitrate remained the same in both surveys. It should be noted that although this was a COOR question format, many respondents chose more than one answer.

32% of **Middle Sauk** respondents identified nitrogen as a primary pollutant in drainage water in both 2014 and 2016. 26% chose phosphorus as the primary pollutant in 2014, decreasing slightly to 22% in 2016. 7% identified sediment in 2014, rising slightly to 9% in 2016. 1% identified micronutrients in 2014 and 2% in 2016. 29% checked "Don't know" in 2014 and 26% in 2016.

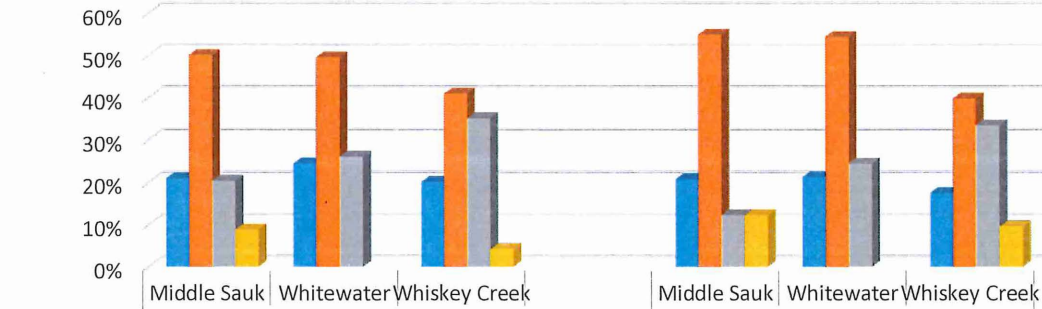
Numbers for **Whiskey Creek** were low. 22% identified nitrogen as a primary pollutant in drainage water in the watershed in 2014, rising to 27% in 2016. 7% named sediment as the primary pollutant in 2014, declining slightly to 5% in 2016. 5% named phosphorus, more than doubling in 2016 to 12%. Those checking "Don't know" were 63% of the survey sample in 2014, but dropping to 49% in 2016. Variables showing an increasing trend included phosphorus and nitrogen. Variables showing a declining trend included micronutrients and sediment.

"Don't know" responses were high in all three watersheds. Results show that educational messages about primary pollutants in each watershed are indicated and might help to inform producers about the impacts of chemicals used in production. Many producers, especially in Middle Sauk and Whiskey Creek, are not linking the use of agricultural chemicals with water quality.

3. Producer awareness of impacts of operations

A check-only-one-response question was asked to measure whether producers knew if their operation contributed to water quality issues.

Figure 192: Do you think that your farm operation contributes nutrients, sediment or bacteria to local lakes, streams or rivers? (%) COOR



	2014				2016		
Yes	21%	24%	20%		21%	21%	17%
No	50%	49%	41%		55%	54%	40%
Don't know	20%	26%	35%		12%	24%	33%
Other	9%		4%		12%		10%

24% of **Whitewater** respondents checked "Yes" in 2014, declining to 21% in 2016. 49% checked "No" in 2014, compared with 54% in 2016. 26% checked "Don't know" in 2014, declining slightly to 24% in 2016.

The number of **Middle Sauk** respondents checking "Yes" remained constant in both surveys at 21%. 50% checked "No" in 2014, rising to 55% in 2016. 20% checked "Don't know" in 2014, declining to 12% in 2016.

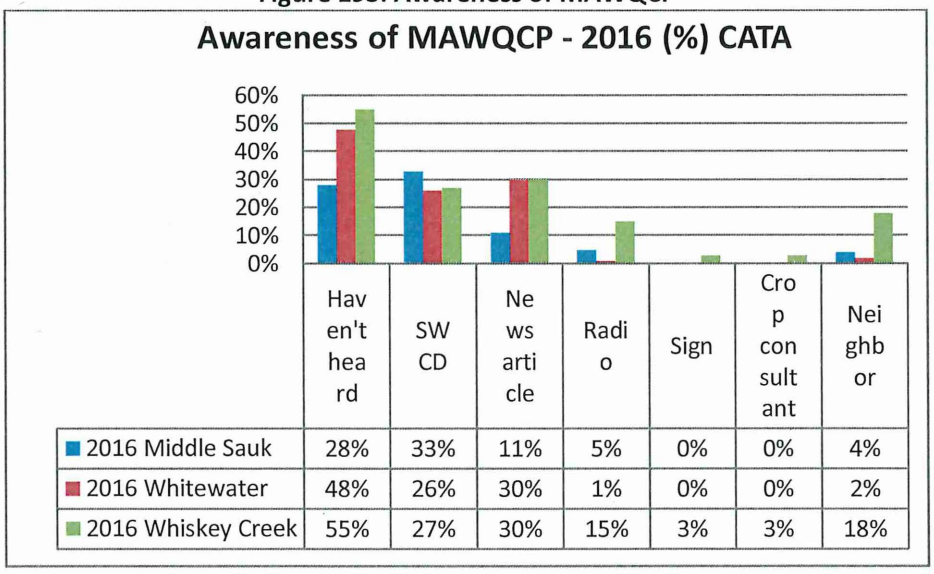
20% of **Whiskey Creek** respondents checked "Yes" in 2014, declining to 17% in 2016. 50% checked "No" in 2014, increasing to 55% in 2016. 20% checked "Don't know" in 2014, declining to 12% in 2016.

4. Awareness of MAWQCP

A check-all-that-apply question asked whether and how producers had heard about the MAWQCP (2016 only).

The figure below compares results from the three pilot watersheds.

Figure 193: Awareness of MAWQCP



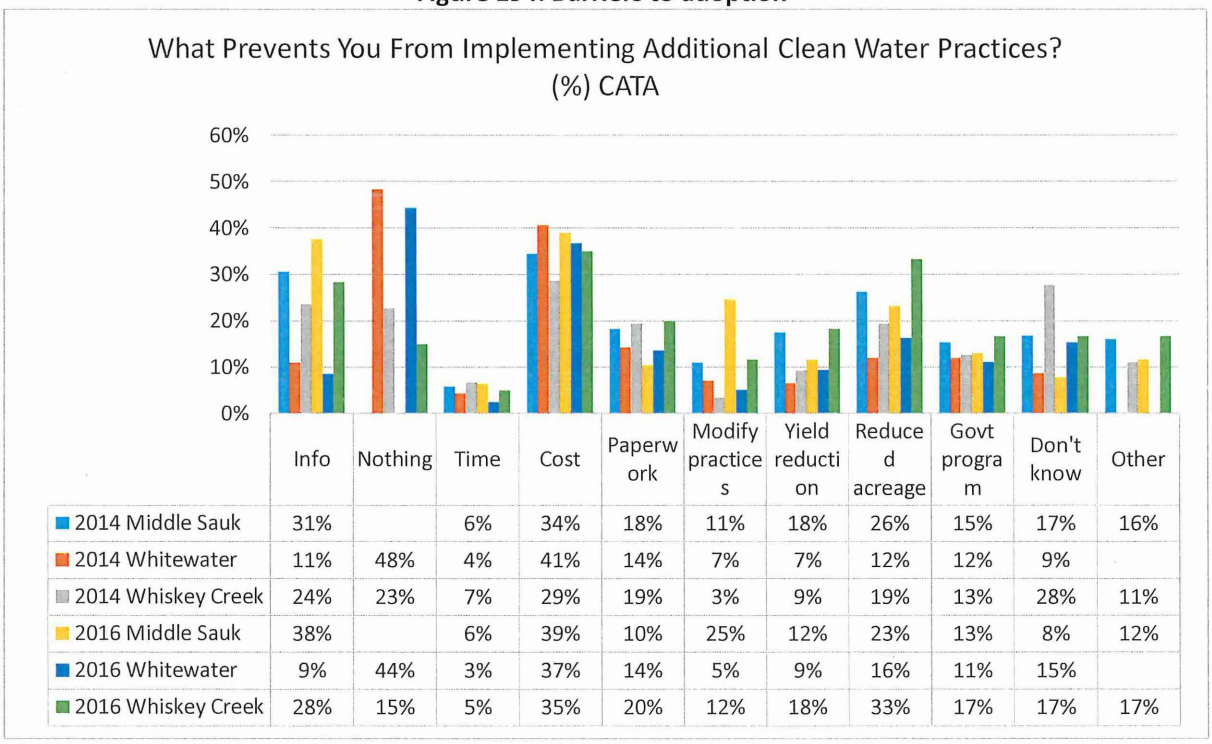
	Haven't heard	SWCD	News article	Radio	Sign	Crop consultant	Neighbor
2016 Middle Sauk	28%	33%	11%	5%	0%	0%	4%
2016 Whitewater	48%	26%	30%	1%	0%	0%	2%
2016 Whiskey Creek	55%	27%	30%	15%	3%	3%	18%

"Haven't heard about it" was the more frequently checked response for this question, with Whiskey Creek producers being least aware (55%), followed by Whitewater (48&) and Middle Sauk (33%). Of those that had heard about the program, both SWCD and news articles were the most effective means of communicating with producers about the program. 33% of Middle Sauk producers had heard about it from their SWCD, compared with 27% in Whiskey Creek and 26% in Whitewater. 30% of Whitewater and Whiskey Creek had heard about the program in a news article, compared with only 11% in Middle Sauk. Neighbors communicated information about the program for 18% of producers in Whiskey Creek, compared with 4% in Middle Sauk and2% in Whitewater. 15% in Whiskey Creek had heard about it on the radio, 5% in Middle Sauk and only 1% in Whitewater. Signs and crop consultants were least effective in raising awareness about the program, and only in Whiskey Creek.

Attitudes questions

1. Barriers to adoption of WQ practices

Figure 194: Barriers to adoption



	Info	Nothing	Time	Cost	Paperwork	Modify practices	Yield reduction	Reduced acreage	Govt program	Don't know	Other
2014 Middle Sauk	31%		6%	34%	18%	11%	18%	26%	15%	17%	16%
2014 Whitewater	11%	48%	4%	41%	14%	7%	7%	12%	12%	9%	
2014 Whiskey Creek	24%	23%	7%	29%	19%	3%	9%	19%	13%	28%	11%
2016 Middle Sauk	38%		6%	39%	10%	25%	12%	23%	13%	8%	12%
2016 Whitewater	9%	44%	3%	37%	14%	5%	9%	16%	11%	15%	
2016 Whiskey Creek	28%	15%	5%	35%	20%	12%	18%	33%	17%	17%	17%

Potential cost was the most consistently chosen variable by respondents in all watersheds in both surveys. Other factors varied by watershed.

In the **Middle Sauk**, the greatest barrier was "Potential cost" at 34% in 2014, rising to 39% in 2016. This was following closely by "I need to more about clean water practices" at 31% in 2014, rising to 38% in 2016. Next came "Reduction of tillable acres" at 26% in 2014, declining slightly to 23% in 2016. "Yield reduction concern" was checked by 18% in 2014, decreasing to 12% in 2016. "Too much paperwork" was checked by 18% in 2014, declining to 10% in 2016. "Don't want to participate in a government program" was checked by 15% in 2014, declining to 13% in 2016. 11% checked "Need to modify practice" in 2014, rising to 25% in 2016. "Time" remained constant at 6% in both surveys. Factors that increased in importance over time were cost, need for information, and the need to modify practice. Factors that decreased in importance over time were reduced acreage, yield reduction concern, and participation in a government program. "Don't know" responses declined from 17% to 8%. Nearly half of respondents (48%) checked "Nothing prevents me" in 2014, decreasing to 44% in 2016.

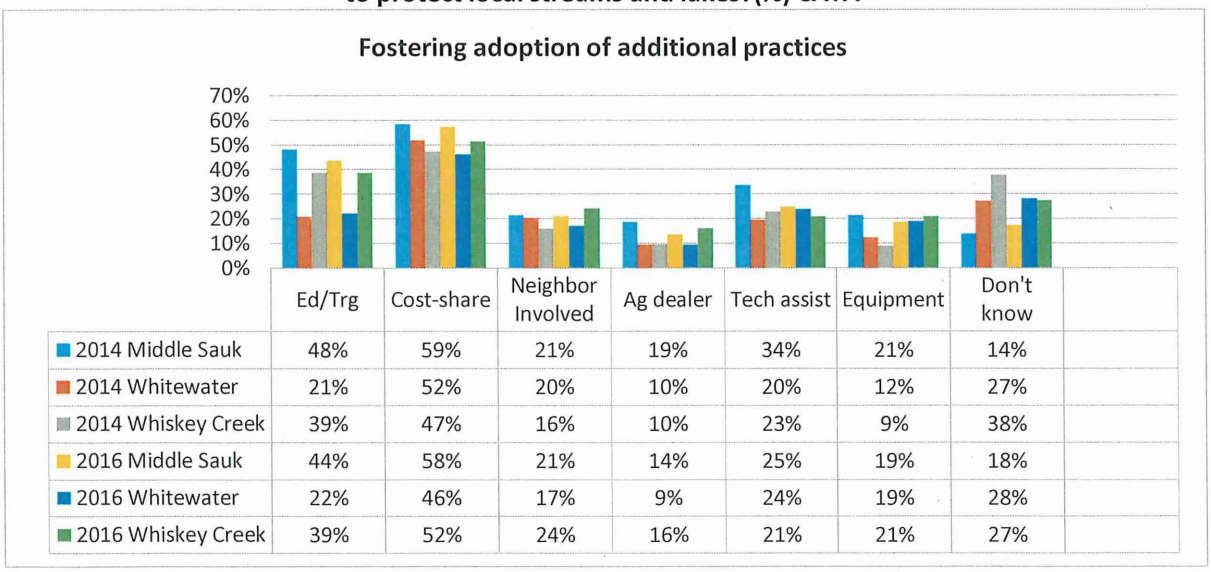
In the **Whitewater** watershed, "Potential cost" was significantly more important than all other factors at 41% in 2014, declining to 37% in 2016. "Too much paperwork" came next at a distant 14% in 2014, remaining at 14% in 2016. "Reduced acreage" was checked by 12% in 2014, rising to 16% in 2016. 12% checked "Don't want to participate in a government program," declining slightly to 11% in 2016. 11% checked "I need to know more about clean water practices" in 2014, declining slightly to 9% in 2016. "Need to modify practice" was checked by 7% in 2014, declining to 5% in 2016. "Yield reduction

concern" was checked by 7% in 2014, rising to 9% in 2016. "Time" was checked by 4% in 2014 and 3% in 2016. 9% checked "Don't know" in 2014, rising to 15% in 2016. Factors that increased in importance over time were reduced acreage concerns and yield reduction concern. Factors that decreased in importance over time were potential cost, participation in a government program, need for information, need to modify practice and time.

In **Whiskey Creek**, the most frequently checked response was "Potential cost" at 29% in 2014, rising to 35% in 2016. "Don't know" was next at 28% in 2014, declining to 17% in 2016. The next most important factor was "I need to know more about clean water practices" at 24%, rising to 28% in 2016. 23% checked "Nothing prevents me" in 2014, declining to 15% in 2016. 19% checked "Too much paperwork" in 2014, increasing slightly to 20% in 2016. 19% checked "Reduced acreage concerns" in 2014, rising steeply to 33% in 2016. 13% checked "Don't want to participate in a government program" in 2014, rising to 17% in 2016. 9% checked "Yield reduction concern" in 2014, increasing to 18% in 2016. 7% checked "Time" in 2014, declining slightly to 5% in 2016. Factors that increased in importance over time were potential cost, need to know more, paperwork, reduced acreage concerns, government programs and yield reduction concern. The only factors that decreased in importance was "Time."

2. Fostering the adoption of water quality practices

Figure 195: What would help you to adopt additional management practices to protect local streams and lakes?(%) CATA



	Ed/Trg	Cost-share	Neighbor Involved	Ag dealer	Tech assist	Equipment	Don't know
2014 Middle Sauk	48%	59%	21%	19%	34%	21%	14%
2014 Whitewater	21%	52%	20%	10%	20%	12%	27%
2014 Whiskey Creek	39%	47%	16%	10%	23%	9%	38%
2016 Middle Sauk	44%	58%	21%	14%	25%	19%	18%
2016 Whitewater	22%	46%	17%	9%	24%	19%	28%
2016 Whiskey Creek	39%	52%	24%	16%	21%	21%	27%

"Cost share or financial assistance" was most important to respondents in all three pilots during the period, following by education and training.

In the **Middle Sauk** watershed, 59% checked "Cost share" in 2014, holding nearly steady at 58% in 2016. "Education and training on specific practices" was next at 48% in 2014 and 44% in 2016. "Technical assistance" was third at 34% in 2014 and 25% in 2016. "Seeing my neighbor or friends get involved" was checked by 21% in both 2014 and 2016. "Access to equipment" was checked by 21% in 2014, declining slightly to 19% in 2016. "Support from my ag dealer or crop consultant" was last at 19% in 2014 and 14% in 2016. No factor increased in importance during the period. Factors that decreased in importance

were cost share, education, technical assistance, access to equipment and support from ag dealer/crop consultant. "Don't know" responses increased from 14% in 2014 to 18% in 2016.

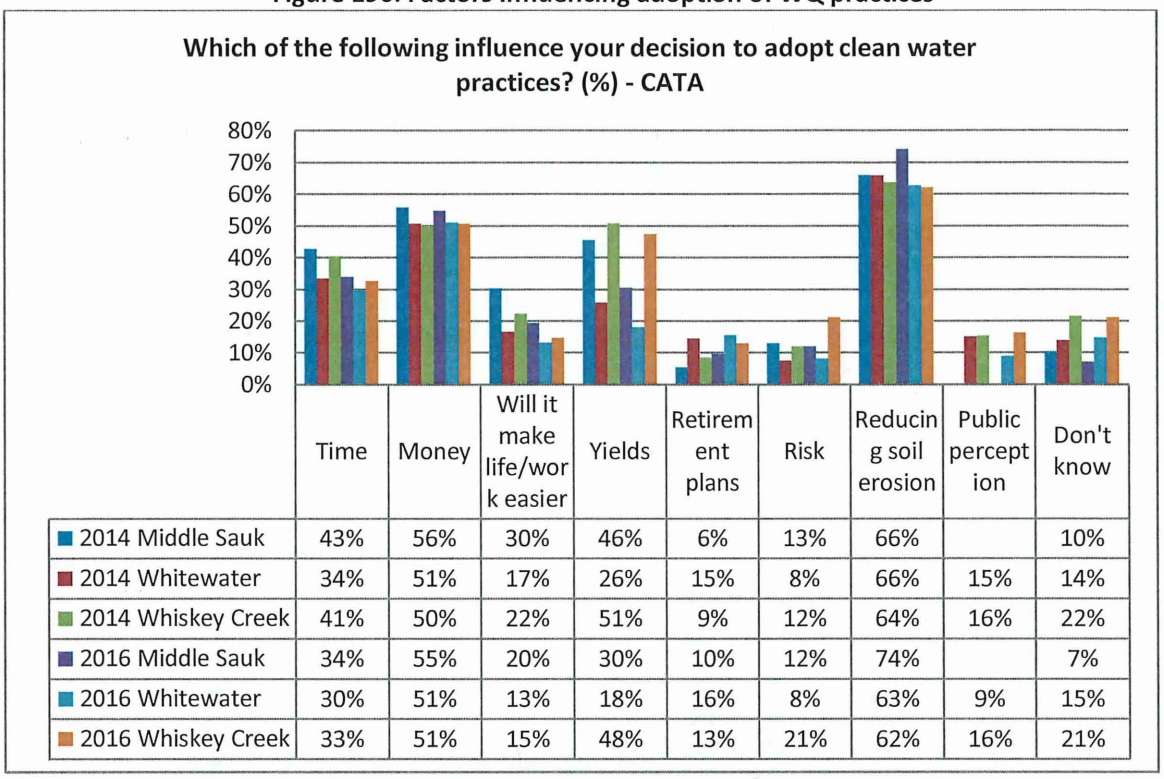
In the **Whitewater** watershed 52% checked "Cost share" in 2014, declining to 46% in 2016. "Education or training" came next at 21%, increasing slightly to 22% in 2016. Neighbor or friend involvement declined slightly from 20% to 17%. "Technical assistance" increased from 20% in 2014 to 24% in 2016. "Access to equipment" increased from 12% in 2014 to 19% in 2016. "Support from ag dealer/crop consultant" decreased from 10% in 2014 to 9% in 2016. 27% checked "Don't know" in 2014, increasing to 28% in 2016. Factors that increased in importance were education/training, technical assistance, and access to equipment. Factors that decreased in importance were cost share, neighbor involvement, and support from ag dealer/crop consultant.

In the **Whiskey Creek** watershed, cost share increased from 47% in 2014 to 52% in 2016. Education and training held steady in both surveys at 39%. "Technical assistance" was 23% in 2014 and 21% in 2016. "Seeing my neighbors or friends get involved" increased from 16% to 24% over the two-year period. "Support from my ag dealer/crop consultant" increased from 10% in 2014 to 16% in 2016. "Access to equipment" increased significantly from 9% in 2014 to 21% in 2016. "Don't know" declined from 38% to 27%. Factors that increased in importance were cost share, neighbor involvement, ag dealer support, and access to equipment. The only factor decreasing in importance was technical assistance.

3. Decision-making on WQ practices

Respondents were asked to identify the factors that influence their decision to adopt clean water practices. Results across the three pilot watersheds over the two-year period are summarized in the figure below.

Figure 196: Factors influencing adoption of WQ practices



	Time	Money	Will it make life/work easier	Yields	Retirement plans	Risk	Reducing soil erosion	Public perception	Don't know
2014 Middle Sauk	43%	56%	30%	46%	6%	13%	66%		10%
2014 Whitewater	34%	51%	17%	26%	15%	8%	66%	15%	14%
2014 Whiskey Creek	41%	50%	22%	51%	9%	12%	64%	16%	22%
2016 Middle Sauk	34%	55%	20%	30%	10%	12%	74%		7%
2016 Whitewater	30%	51%	13%	18%	16%	8%	63%	9%	15%
2016 Whiskey Creek	33%	51%	15%	48%	13%	21%	62%	16%	21%

"Reducing soil erosion" was the single most important factor in all three watersheds during the two-year period for two-thirds of all producers or higher. "Money" was the second most important factor. These two factors were consistent and quite uniform across the pilots.

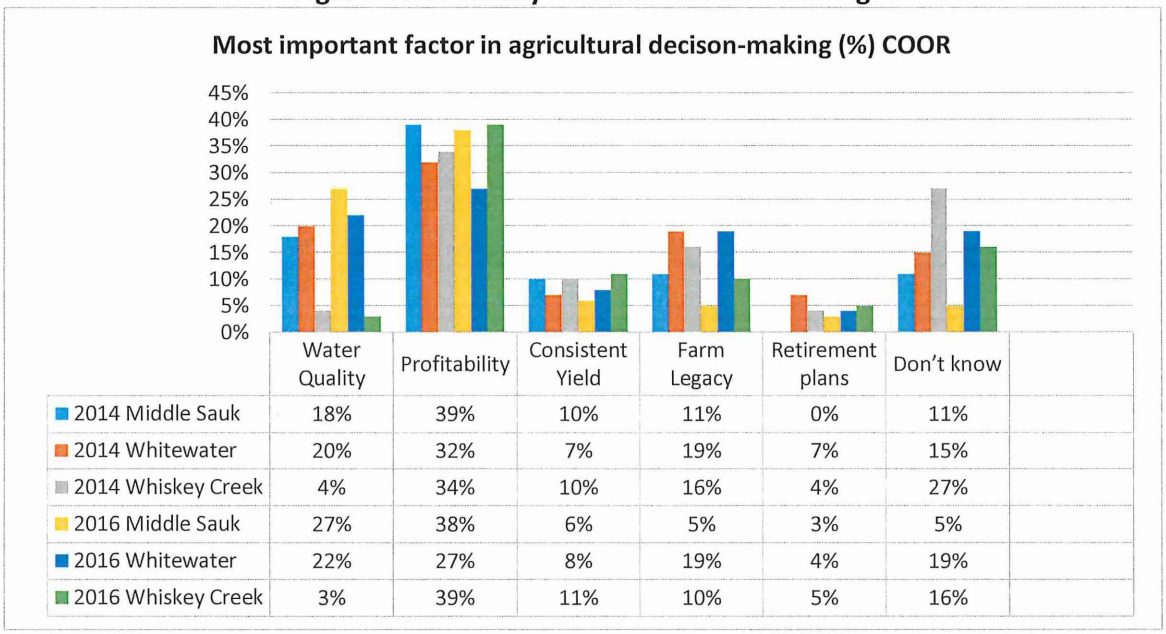
In the **Middle Sauk** watershed, 66% checked "Soil erosion" in 2014, rising to 74% in 2016. "Money" was checked by 56% in 2014 and 55% in 2016. "Yields" was third at 46% in 2014, declining to 30% in 2016. "Time" was ranked as most important by 43% in 2014, declining to 34% in 2016. 30% checked "Will it make my life/work easier" in 2014, declining to 20% in 2016. "Risk" was most important to 13% in 2014, and 12% in 2016. "Retirement plans" was the most important factor to 6% in 2014, increasing to 10% in 2016. 10% checked "Don't know" in 2014, declining to 7% in 2016. Factors increasing in importance were retirement plans and reducing soil erosion. Factors decreasing in importance were time, money, make life easier and risk.

In the **Whitewater** watershed, two-thirds (66%) rated "Reducing soil erosion" as the most important factor in their decision-making process in 2014, , declining slightly to 63% in 2016. "Money" was the most important factor at 51% in 2014 and also in 2016. "Time" was next at 34% in 2014, declining slightly to 30% in 2016. "Yields" was checked by 26% in 2014, declining to 18% in 2016. 17% checked "Will it make my life or work easier" in 2014, declining to 13% in 2016. "Retirement plans" was checked by 15% in 2014 and 16% in 2016. "Public perception' was checked by 15% in 2014, declining to 9% in 2016. "Risk was checked at 8% in both 2014 and 2016. "Don't know" was checked by 14% in 2014 and 15% in 2016. Factors increasing in importance were retirement plans and don't know. Factors decreasing in importance were reducing soil erosion, make life easier, yields and public perception.

In the **Whiskey Creek** watershed, 64% rated "Reducing soil erosion" as their most important factor in decision-making in 2014, declining slightly to 62% in 2016. "Yields" was next at 51%, declining slightly to 48% in 2016. "Money" was checked by 50% in 2014, increasing slightly to 51% in 2016. "Time" was checked by 41% in 2014, declining to 33% in 2016. 22% checked "Will it make my life easier" in 2014, declining to 15% in 2016. "Public perception held steady at 16% in both surveys. "Risk" increased from 12% in 2014 to 21% in 2016. "My retirement plans" increased from 9% in 2014 to 13% in 2016. "Don't know" was almost unchanged, from 22% in 2014 to 21% in 2016. Factors increasing in importance were money, risk and retirement plans. Factors decreasing in importance were reducing soil erosion, yields, time, and will it make my life easier.

Producers were then asked to select the single most important factor in their agricultural decision-making process, in this check-only-one-response question.

Figure 197: Primary factor in decision-making



	Water Quality	Profitability	Consistent Yield	Farm Legacy	Retirement plans	Don't know
2014 Middle Sauk	18%	39%	10%	11%	0%	11%
2014 Whitewater	20%	32%	7%	19%	7%	15%
2014 Whiskey Creek	4%	34%	10%	16%	4%	27%
2016 Middle Sauk	27%	38%	6%	5%	3%	5%
2016 Whitewater	22%	27%	8%	19%	4%	19%
2016 Whiskey Creek	3%	39%	11%	10%	5%	16%

The single most important factor in all categories and watersheds was profitability. Results for other factors varied by watershed. Water quality ranked second for producers in Middle Sauk and Whitewater, but not in Whiskey Creek, where water quality was the most important factor for only 4% of respondents.

For **Whitewater**, profitability was the most important factor in decision-making at 32% in 2014, dropping to 27% in 2016. Water quality came in second, and was the most important factor for 20% of producers in 2014 and 22% in 2016. Farm legacy was third, and constant at 19% in 2014 and 2016. Consistent yield was checked by 7% in 2014, increasing slightly to 8% in 2016. Retirement plans was also checked by 7% in 2014, declining to 4% in 2016. 15% checked "Don't know" in 2014 and 19% in 2016.

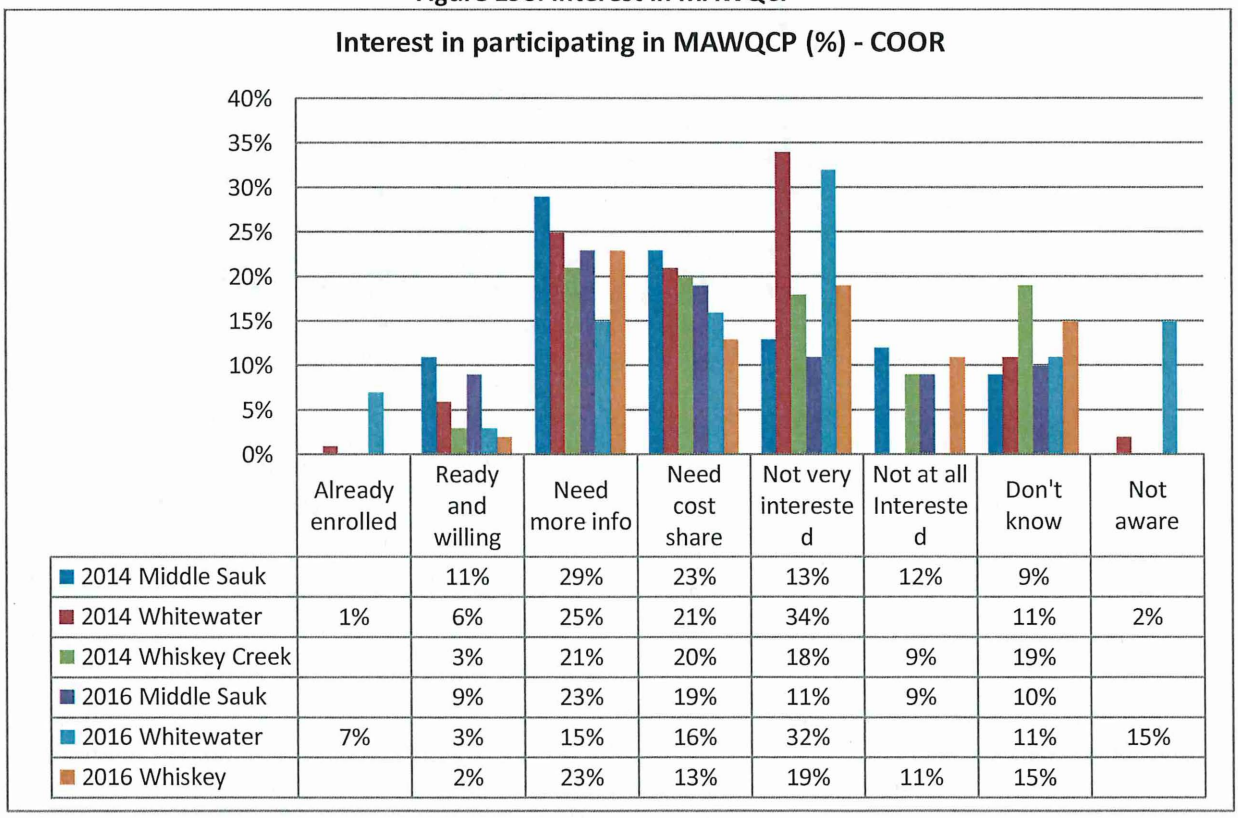
For **Middle Sauk**, profitability was most important at 39%in 2014 and 38% in 2016. The next most important factor was water quality at 18% in 2014, increasing significantly in 2016 to 27%. Farm legacy was the most important factor to 11% of Middle Sauk producers in 2014, dropping to 5% in 2016.

Consistent yield was the most important factor for 10% of producers in 2014, dropping to 6% in 2016. Retirement plans was not checked by any producer in 2014, but it was for 3% in 2016. 11% checked "Don't know" in 2014, and 5% in 2016.

For **Whiskey Creek**, 34% felt that profitability was the most important factor in agricultural decision making in 2014, rising to 39% in 2016. Farm legacy was next at 16% in 2014 and 10% in 2016. 10% checked "Consistent yield" in 2014, and 11% in 2016. Retirement plans were the most important factor for 4% in 2014 and 5% in 2016. Water quality was checked by only 4% on respondents in 2014, declining to 3% in 2016. More than one-quarter (27%) were uncertain and checked "Don't know" in 2014, dropping to 16% in 2016.

4. Interest in participation in MAWQCP

Figure 198: Interest in MAWQCP



	Already enrolled	Ready and willing	Need more info	Need cost share	Not very interested	Not at all Interested	Don't know	Not aware
2014 Middle Sauk		11%	29%	23%	13%	12%	9%	
2014 Whitewater	1%	6%	25%	21%	34%		11%	2%
2014 Whiskey Creek		3%	21%	20%	18%	9%	19%	
2016 Middle Sauk		9%	23%	19%	11%	9%	10%	
2016 Whitewater	7%	3%	15%	16%	32%		11%	15%
2016 Whiskey		2%	23%	13%	19%	11%	15%	

Producers in the **Middle Sauk** watershed had somewhat greater interest in participating than Whiskey Creek and Whitewater in both 2014 and 2016 surveys. 11% of Middle Sauk producers were ready and willing to enroll in 2014, and 9% in 2016. "I might be interested but need more information" was checked by 29% of Middle Sauk respondents in 2014, and 23% in 2016. 23% might be interested but needed a financial incentive in 2014, and 19% in 2016. 13% were not very interested in 2014, declining slightly to 11% in 2014. 12% were not at all interested in 2014, declining to 9% in 2016. 9% checked "Don't know" in 2014, and 10% in 2016.

6% of **Whitewater** producers were ready to enroll in 2014, and 3% in 2016. 25% of Whitewater respondents needed more information in 2014, and 15% in 2016. 21% needed a cost share in 2014,

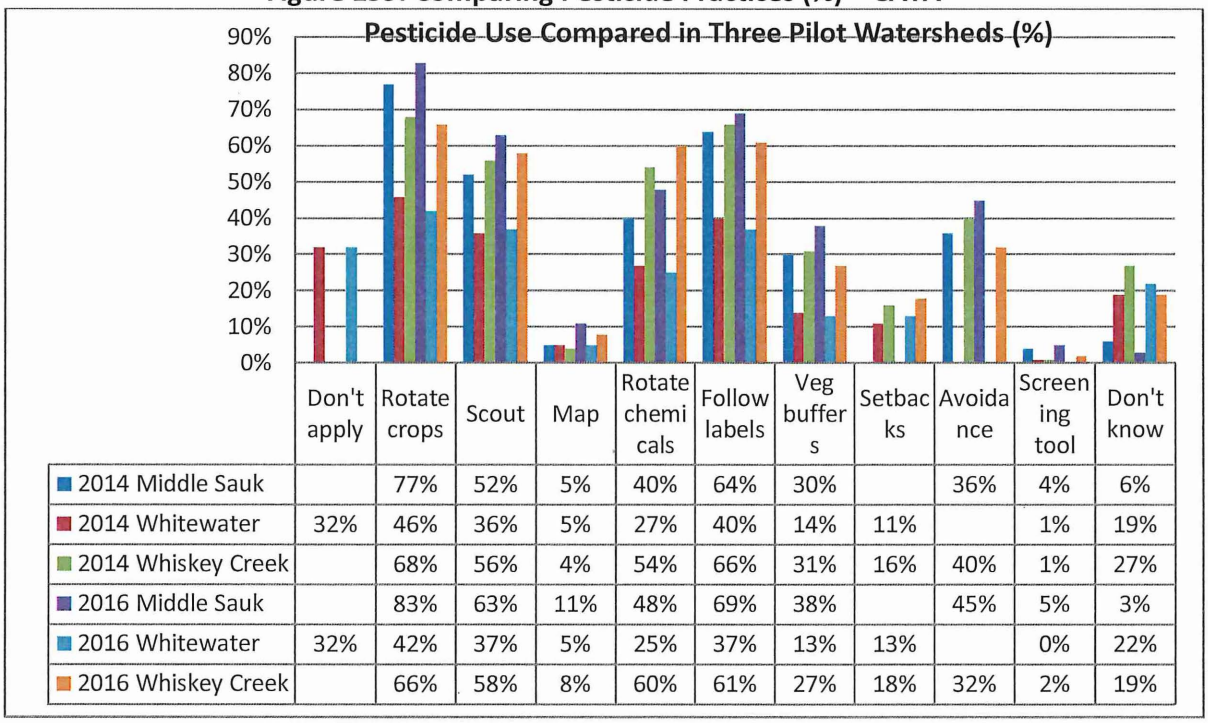
declining to 16% in 2016. 34% were not very interested in participating in 2014, and 32% in 2016. 11% checked "Don't know" in both 2014 and 2016.

3% of **Whiskey Creek** respondents were ready to enroll in 2014, and 2% in 2016. 21% of Whiskey Creek respondents were interested but needed more information in 2014, increasing slightly to 23% in 2016. 20% might be interested with a financial incentive in 2014, declining to 11% in 2016. 9% were not at all interested in 2014, and 11% in 2016. 19% checked "Don't know" in 2014, and 15% in 2016.

Practices questions

1. Pesticide Practices

Figure 199: Comparing Pesticide Practices (%) – CATA



	Don't apply	Rotate crops	Scout	Map	Rotate chemicals	Follow labels	Veg buffers	Setbacks	Avoidance	Screening tool	Don't know
2014 Middle Sauk		77%	52%	5%	40%	64%	30%		36%	4%	6%
2014 Whitewater	32%	46%	36%	5%	27%	40%	14%	11%		1%	19%
2014 Whiskey Creek		68%	56%	4%	54%	66%	31%	16%	40%	1%	27%
2016 Middle Sauk		83%	63%	11%	48%	69%	38%		45%	5%	3%
2016 Whitewater	32%	42%	37%	5%	25%	37%	13%	13%		0%	22%
2016 Whiskey Creek		66%	58%	8%	60%	61%	27%	18%	32%	2%	19%

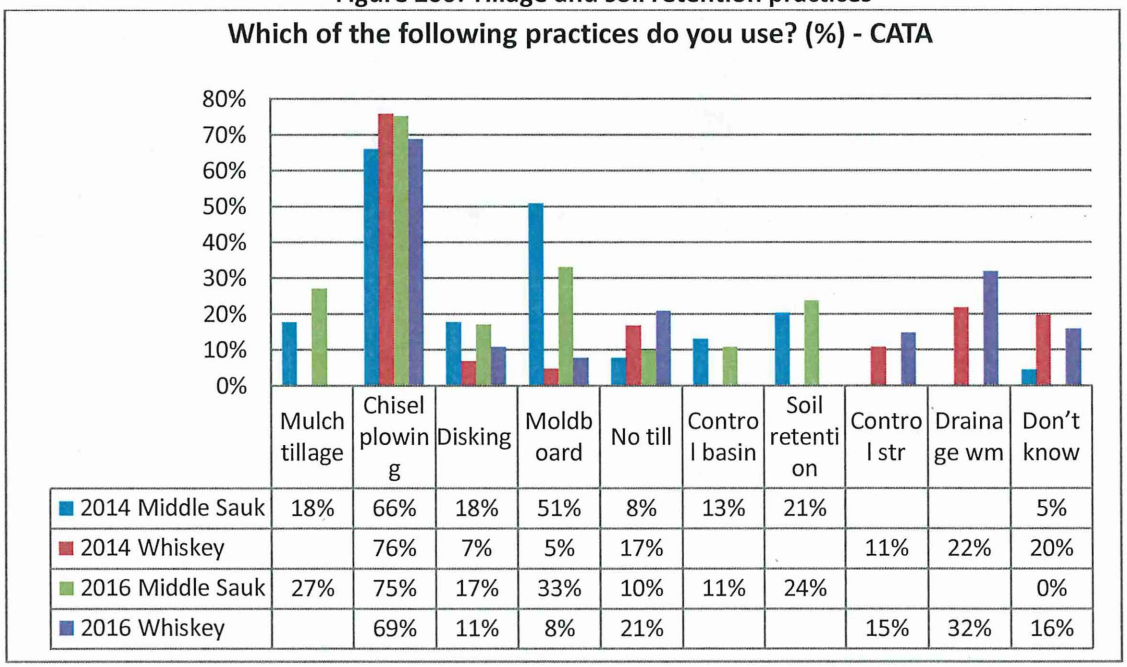
Of the three watersheds, **Middle Sauk** had generally higher use of recommended practices than the other pilots. Use of the practices generally increased over the two-year period. Middle Sauk had the highest rate of crop rotation at 77% in 2014, increasing to 83% in 2016. Scouting was reported by 52% in 2014, increasing to 63% in 2016. Mapping for pest infestations increased from 5% in 2014 to 11% in 2016. Rotating chemical modes of action increased from 40% in 2014 to 48% in 2016. Following label instruction increased from 64% in 2014 to 69% in 2016. Maintaining vegetative buffers increased from 30% in 2014 to 38% in 2016. Avoiding chemicals of concern increased from 36% in 2014 to 45% in 2016. Use of a soils specific loss rating tool increased from 4% in 2014 to 5% in 2016.

Whiskey Creek was generally second in use of recommended practices, with Whitewater having the lowest reported use of practices. Practices that increased in use over the two-year period included scouting, mapping, rotating chemical modes of action, vegetative buffers, use of setbacks and use of a soil-specific loss rating tool. Practices that decreased in use included crop rotation, reading pesticide labels, vegetative buffers and avoidance of chemicals of concern to water.

Whitewater had the lowest use of pesticide practices, which slightly *declined* over time (except for scouting and maintain setbacks). 32% of producers in the watershed do not use pesticides. Of those that do, the practices in decline include crop rotation, following label instructions, vegetative buffers and use of a soils-specific loss rating tool. Practices showing an increase in use included scouting, rotating chemical modes of action and use of setbacks. Mapping remained unchanged.

2. Tillage and soil retention practices

Figure 200: Tillage and soil retention practices



	Mulch tillage	Chisel plowing	Disking	Moldboard	No till	Control basin	Soil retention	Control str	Drainage wm	Don't know
2014 Middle Sauk	18%	66%	18%	51%	8%	13%	21%			5%
2014 Whiskey		76%	7%	5%	17%			11%	22%	20%
2016 Middle Sauk	27%	75%	17%	33%	10%	11%	24%			0%
2016 Whiskey		69%	11%	8%	21%			15%	32%	16%

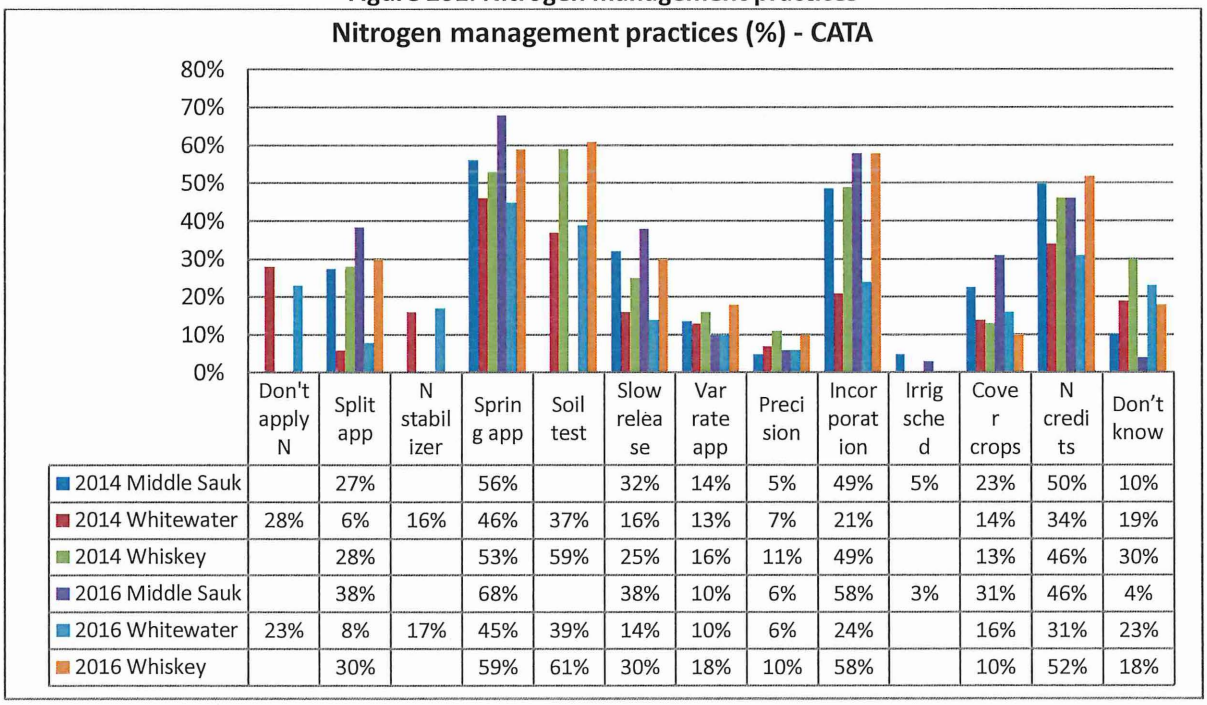
This check-all-that-apply question was posed in the Middle Sauk and Whiskey Creek watersheds. Chisel plowing was by far the most frequently reported practice in both watersheds and in both surveys.
In **Middle Sauk**, two-thirds (66%) reported chisel plowing in 2014, rising to 75% in 2016. Moldboard plowing was used by 51% in 2014, but declined to 33% in 2016. 21% checked "Soil retention/erosion control" in 2014, increasing to 24% in 2016. 18% used mulch tillage in 2014, increasing to 27% in 2016. 18% used disking for primary tillage in 2014, and 17% in 2016. 13% used water and sediment control basins in 2014, and 11% in 2016. 8% used no till/strip tilling in 2014, increasing slightly to 10% in 2016. 5% checked "Don't know" in 2014 and 0% in 2016. Trends toward increasing use included mulch tillage, chisel plowing, no till and soil retention basins. Trends showing a decline in use included disking, moldboard plowing and control basins.

In **Whiskey Creek**, chisel plowing was the most frequently reported practice at 76% in 2014, declining to 69% in 2016. All other practices were reported at much lower rates. Drainage water management came in at a distant second, at 22% in 2014, increasing to 32% in 2016. 17% used no till/strip till in 2014, increasing to 21% in 2016. 11% reported using erosion control structures in 2014, increasing to 15% in 2016. 7% used disking for primary tillage in 2014, increasing to 11% in 2016. 5% reported using moldboard plowing in 2014, rising to 8% in 2016. Trends showing an increase in use included disking, moldboard plowing, no till, control structures and drainage water management. Trends showing a decline in use included chisel plowing.

3. Nitrogen management practices

Producers were asked "What practices do you use to manage nitrogen fertilizer? Check all that apply. This question was posed in both 2014 and 2016.

Figure 201: Nitrogen management practices



	Don't apply N	Split app	N stabilizer	Spring app	Soil test	Slow release	Var rate app	Precision	Incorporation	Irrig sched	Cover crops	N credits	Don't know
2014 Middle Sauk		27%		56%		32%	14%	5%	49%	5%	23%	50%	10%
2014 Whitewater	28%	6%	16%	46%	37%	16%	13%	7%	21%		14%	34%	19%
2014 Whiskey		28%		53%	59%	25%	16%	11%	49%		13%	46%	30%
2016 Middle Sauk		38%		68%		38%	10%	6%	58%	3%	31%	46%	4%
2016 Whitewater	23%	8%	17%	45%	39%	14%	10%	6%	24%		16%	31%	23%
2016 Whiskey		30%		59%	61%	30%	18%	10%	58%		10%	52%	18%

Results show that producers use a variety of practices to manage nitrogen. Spring application, soil testing, N credits and incorporation and commonly used in all three watersheds.

In the **Middle Sauk,** the most commonly used practice was spring application at 56% in 2014 and 68% in 2016. 50% counted nitrogen credits from previous crops or manure in 2014, declining slightly to 46% in 2016. 49% used incorporation in 2014, increasing to 58% in 2016. 32% used slow release products in 2014, increasing to 38% in 2016. 27% used split application in 2014, increasing to 38% in 2016. 23% used cover crops in 2014, increasing to 31% in 2016. 18% used variable rate application in 2014, decreasing to 10% in 2016. 5% used other precision agricultural technologies in 2014, and 6% did so in 2016. 5% used irrigation scheduling in 2014, declining to 3% in 2016. "Don't know" responses were 10% in 2014 and 4% in 2016. Practices tending to increase over time included spring application, incorporation, spring application, split application and precision agricultural technologies. Practices tending to decrease over time included N credits, variable rate application and irrigation scheduling.

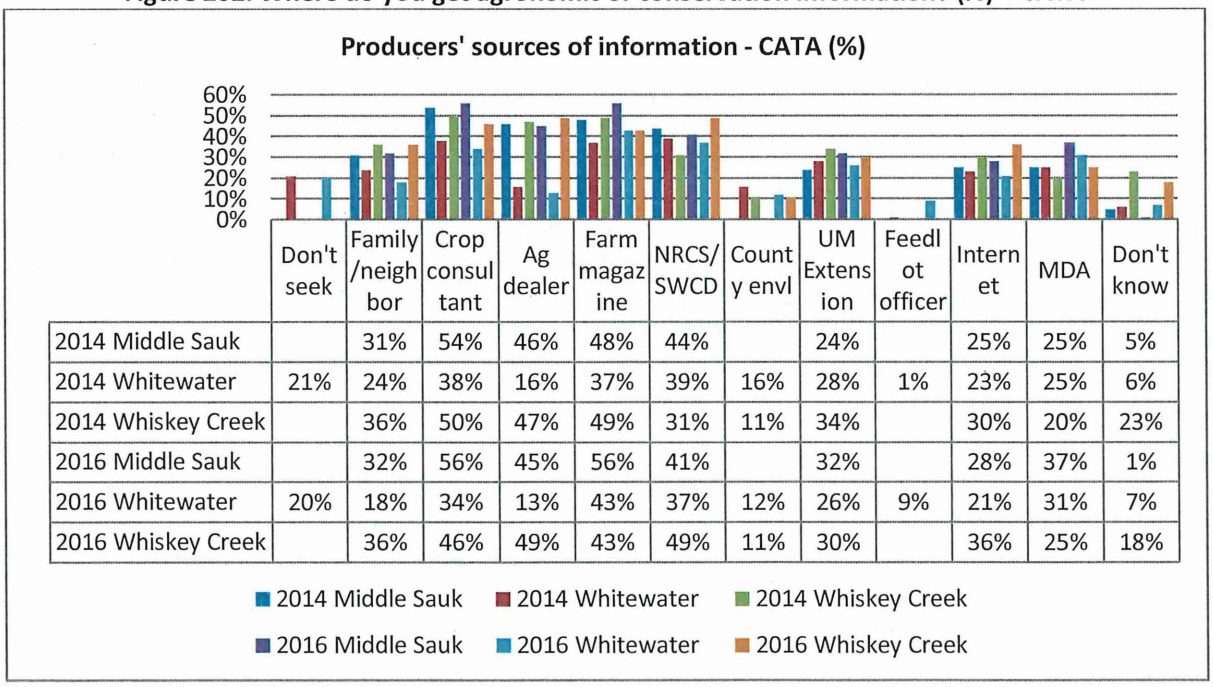
In **Whiskey Creek,** the most commonly used practice was soil testing, used by 59% in 2014 and 61% in 2016. Spring application was the next most common practice at 53% in 2014 and 59% in 2016. Incorporation followed at 49% in 2014 and 58% in 2016. N credits were used by 46% in 2014 and 52% in 2016. Split application was used by 28% in 2014 and 30% in 2016. Slow release products were used by 25% in 2014 and 30% in 2016. 11% used other precision agricultural technologies in 2013, and 10% in 2016. 30% checked "Don't know" in 2014, dropping to 18% in 2016. Practices tending to increase over time included soil testing, spring application, incorporation, N credits, split application and slow release

products. 16% used variable rate application in 2014, and 18% in 2016. 13% used cover crops in 2014, and 10% in 2016. Practices tending to decrease over time included use of cover crops and other precision agricultural technologies.

In the **Whitewater** watershed, the most common N management practice in 2014 was spring application (46%), holding nearly steady at 45% in 2016. All other practices were less frequently used than the other two pilot watersheds. 37% did soil testing in 2014, compared with 39% in 2016. 21% used incorporation in 2014, increasing to 24% in 2016. 16% used nitrogen stabilizer in 2014, and 17% in 2016. 16% reported using slow release products in 2014, declining slightly to 14% in 2016. 14% used cover crops, increasing to 16% in 2016. 13% used variable rate application in 2014, declining to 10% in 2016. 7% used other precision agricultural technologies in 2014, and 6% in 2016. 6% used split application in 2014, and 8% in 2016. 19% checked "Don't know" in 2014 and 23% in 2016. Practices tending to increase over time included soil testing, incorporation, N stabilizer, cover crops and split application. Practices tending to decrease over time included slow release products, variable rate application and precision agricultural technologies.

4. Sources of information

Figure 202: Where do you get agronomic or conservation information? (%) – CATA



	Don't seek	Family /neighbor	Crop consultant	Ag dealer	Farm magazine	NRCS/ SWCD	County envl	UM Extension	Feedlot officer	Internet	MDA	Don't know
2014 Middle Sauk		31%	54%	46%	48%	44%		24%		25%	25%	5%
2014 Whitewater	21%	24%	38%	16%	37%	39%	16%	28%	1%	23%	25%	6%
2014 Whiskey Creek		36%	50%	47%	49%	31%	11%	34%		30%	20%	23%
2016 Middle Sauk		32%	56%	45%	56%	41%		32%		28%	37%	1%
2016 Whitewater	20%	18%	34%	13%	43%	37%	12%	26%	9%	21%	31%	7%
2016 Whiskey Creek		36%	46%	49%	43%	49%	11%	30%		36%	25%	18%

Findings show that producers in all three pilot watersheds seek information from a wide variety of sources.

For **Whitewater,** the most frequently sought source of information was NRCS/SWCD at 39% in 2014, decreasing slightly to 37% in 2016. Crop consultants followed closely at 38% in 2014 and 34% in 2016. Farm magazines came next at 37% in 2014, rising to 43% in 2016. UMN Extension was consulted by 28% in 2014 and 26% in 2016. Minnesota Department of Agriculture was consulted by 25% in 2014, increasing to 31% in 2016. Family/neighbor registered at 24% in 2014, decreasing to 18% in 2016. The

Internet was a source of information for 23% in 2014, decreasing slightly to 21% in 2016. County environmental was a source of information for 16% in 2014, dropping to 12% in 2016. Ag dealers similarly declined from 16% in 2014 to 13% in 2016. Feedlot officers were a source of information for 1% of respondents in 2014, increasing to 9% in 2016. 21% did not seek information in 2014, and this percentage remained nearly steady at 20% in 2016. Increasing trends were seen for farm magazines, feedlot officers and MDA. Decreasing trends were seen for NRCS/SWCD, crop consultants, UMN Extension, family/neighbor and Internet. The "County environmental" option was discontinued in successive surveys as it is usually housed in a county NRCS/SWCD building.

In **Middle Sauk**, producers sought information most frequently from crop consultants than other sources (54% in 2014 and 56% in 2016). The next most consulted source was farm magazines at 48% in 2014, increasing to 56% in 2016. Ag dealers came next at 46% in 2014 and 45% in 2016. NRCS/SWCD was sought by 44% in 2014 and 41% in 2016. Producers sought information from family/neighbors at 31% in 2014 and 32% in 2016. The Internet was checked by25% in 2014 and 28% in 2016. Minnesota Department of Agriculture was a source of information for 25% in 2014, rising to 37% in 2016. UMN Extension was consulted by 24% in 2014, rising to 32% in 2016. 5% checked "Don't know in 2014 and 1% in 2016. Increasing trends for the two-year period were seen for family/neighbor, crop consultant, farm magazine, MN Extension, Internet and MDA. Decreasing trends occurred for ag dealers and NRCS/SWCD.

For **Whiskey Creek**, producers also sought information most frequently from crop consultants than other sources (50%) in 2014 and 46% in 2016. This was followed closely by farm magazines (49%) in 2014 and 43% in 2016. They sought information from agricultural dealers (47%) in 2014 and 49% in 2016. 36% sought information from family and neighbors in 2014, remaining at 36% in 2016. 34% sought information from UM Extension in 2014, declining slightly to 30% in 2016. 31% consulted NRCS/SWCDs in 2014, increasing to 49% in 2016.30% consulted the Internet in 2014, compared with 36% in 2016. 20% sought information from the Minnesota Department of Agriculture in 2014, rising to 25% in 2016. 11% consulted county environmental in 2014, staying nearly steady at 11% in 2016. "Don't know" responses declined from 23% to 18%. Increasing trends for the two-year period included: ag dealer, NRCS/SWCD, Internet and MDA. Decreasing trends included: crop consultant, farm magazines, UM Extension and "Don't know."

Summing up

Figure 1 in the first section of this report summarized the constructs that were measured in this study. The figure is reproduced below in Figure 201, showing general trends highlighted for each construct. Not all constructs were asked in each watershed, and some were asked in only one survey (2014 or 2016). Green highlighting shows construct values with no change or an improvement in the 2nd round study. Yellow highlighting shows construct values with a decline over the two-year period. Blue highlighting is used for construct values with mixed results, with variables showing both positive and negative changes within a single question.

Figure 203: Changes in values of KAP study constructs (2014 – 2016)*

Question and format	Whitewater	Middle Sauk	Whiskey Creek
Knowledge questions	- Awareness of landscape features - Manure management - Calculating N rates - WQ challenges - Primary pollutant of concern - Awareness of MAWQCP**	- Awareness of landscape features - N recs for corn - Calculating N rates - BMP for corn on sandy soils - Fall application of anhydrous ammonia - WQ challenges - Primary pollutant of concern - Awareness of MAWQCP*	- N recs for corn and sugar beets - WQ challenges - Primary pollutant of concern - Awareness of MAWQCP*
Attitudes questions	- What influences N decisions - What influences WQ decisions - Most important factor in decision-making - Your operation's WQ impact on local waters? - Public perception - Responsibility for WQ - Barriers to WQ practices - Fostering WQ practices - Interest in joining MAWQCP	- Most important WQ issue - Your operation's WQ impact on local waters? - Most important factor in decision-making - What influences WQ decisions - Barriers to WQ practices - Fostering WQ practices - Interest in joining MAWQCP	- Consider drainage water mgmt? - Conflict resolution - Most important factor in decision-making - What influences WQ decisions - Most important WQ issue - Your operation's WQ impact on local waters? - Barriers to WQ practices - Fostering WQ practices - Interest in joining MAWQCP
Practices questions	- Use of conservation structures - Livestock practices - Manure practices - Nitrogen practices - N rate - Pesticide practices - Do you affect renter practices	- Tillage practices - Pesticide practices - Phosphorus practices - N management practices - Manure practices	- Tillage practices - Pesticide practices - N management practices - UMN Extension N recs - Stream buffer - Use of drainage water mgmt
General/demographic	- Type of ag operation and ownership - Production system/crops - Information sources	- Type of ag operation and ownership - Participation in WQ programs - Information sources	- Type of ag operation and ownership - Participation in WQ programs - Information sources

* Constructs not highlighted were asked only once for baseline purposes. Therefore no trend could be ascertained.

** Asked in 2016 only

Overall, the constructs showing improvement outnumber those showing a decline, especially when combined with those constructs showing no change (*e.g.* blue + green outcomes). There has been progress in knowledge gains (except for Whiskey Creek), and in adoption of water quality practices (especially in Whiskey Creek). However, there is room for improvement in terms of knowledge gains and adoption of practices. KAP data and respondent comments indicate a need and desire on the part of producers for more information, technical support and education. These information/communication aspects may be as important as the need for cost-share or financial assistance. Experience from other Minnesota KAP studies show that producers will take a cost share or financial incentive if offered, but that they often adopt because they are motivated by other factors (concern for water quality, environmental stewardship, legacy, etc.). A $500 cost-share is rarely the only reason that influences

adoption. In short, a package of incentives and options including education, outreach and technical assistance is likely to have more impact than a financial incentive alone.

The following recommendations are offered for consideration:

- The relatively high and consistent numbers of "Don't know" responses in all watersheds suggests considerable uncertainty about water quality, decision-making, and knowledge about the MAWQCP program, especially from landowners who rent their land to others. There is also high and consistent numbers of respondents indicating a need for education and technical assistance. Informational content should address specific, practical steps that producers can adopt to *reduce soil erosion and to improve water quality*, which are the two key factors likely to motivate adoption. These outcomes highlight a need for scaling up the MAWQCP's programmatic capacity for education, training and outreach when communicating with producers. This is seen as a fundamental step toward improving programmatic outcomes in the future.

- As noted, it is advised that MDA consider a survey of renters to understand their production decisions with regard to water quality, particularly if the program decides to target renter-operators in the future.

- Given that the program has been rolled out statewide, and may play a larger national role in water quality efforts in the future, it is advisable that MDA rethink its evaluation strategy as the MAWQCP grows. It will be important to show evidence of positive impact as additional resources are invested in the program. What will the program look like in five, ten or twenty years? How many producers will it eventually serve? How will the MDA measure outcomes and show that producers have actually adopted recommended practices and acquired new knowledge? A practical, "evaluation-ready" strategy, budget and plan will greatly facilitate this process as the program expands within Minnesota and beyond.