

CATCHING WAVES: FARMERS GAUGE RISK TO ADVANCE WATER QUALITY IN IOWA



A REPORT BY
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WITH RESEARCH ASSISTANCE FROM STEPHANIE ENLOE



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RURAL AFFAIRS

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Farmers face risks to their production systems when adopting new practices, and often need technical and financial support to counter those risks. This support helps farmers implement conservation techniques, such as improving waterways in corn fields. | Photo by Kylie Kai

I. INTRODUCTION

Water quality is a contentious issue in Iowa, where high nitrogen, phosphorous, bacteria, and sediment levels in surface waters threaten public health and outdoor recreation. The Iowa Nutrient Reduction Strategy, released in late 2012, aims to provide a framework for how sources of both point and non-point pollution¹ can reduce nutrient and sediment loading in Iowa surface waters. Despite a continued increase in investment from state, federal, and private sources, the best path toward achieving Nutrient Reduction Strategy goals remains uncertain for many farmers and landowners.

This lack of clarity is particularly pronounced within agriculture. Many farmers feel they are under attack by urban stakeholders and environmental advocates. Such criticism creates social pressure on farmers to engage with Nutrient Reduction Strategy farm conservation practices. However, farmers face risks, real and perceived, to their production systems when adopting a new practice, and often need technical and financial support to counter those risks.

1 “Iowa Nutrient Reduction Strategy: A science and technology-based framework to assess and reduce nutrients to Iowa waters and the Gulf of Mexico.” Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources, and Iowa State University College of Agriculture and Life Science, September 2016, <http://www.nutrientstrategy.iastate.edu/sites/default/files/documents/INRSfull-161001.pdf>. Accessed April 2018.

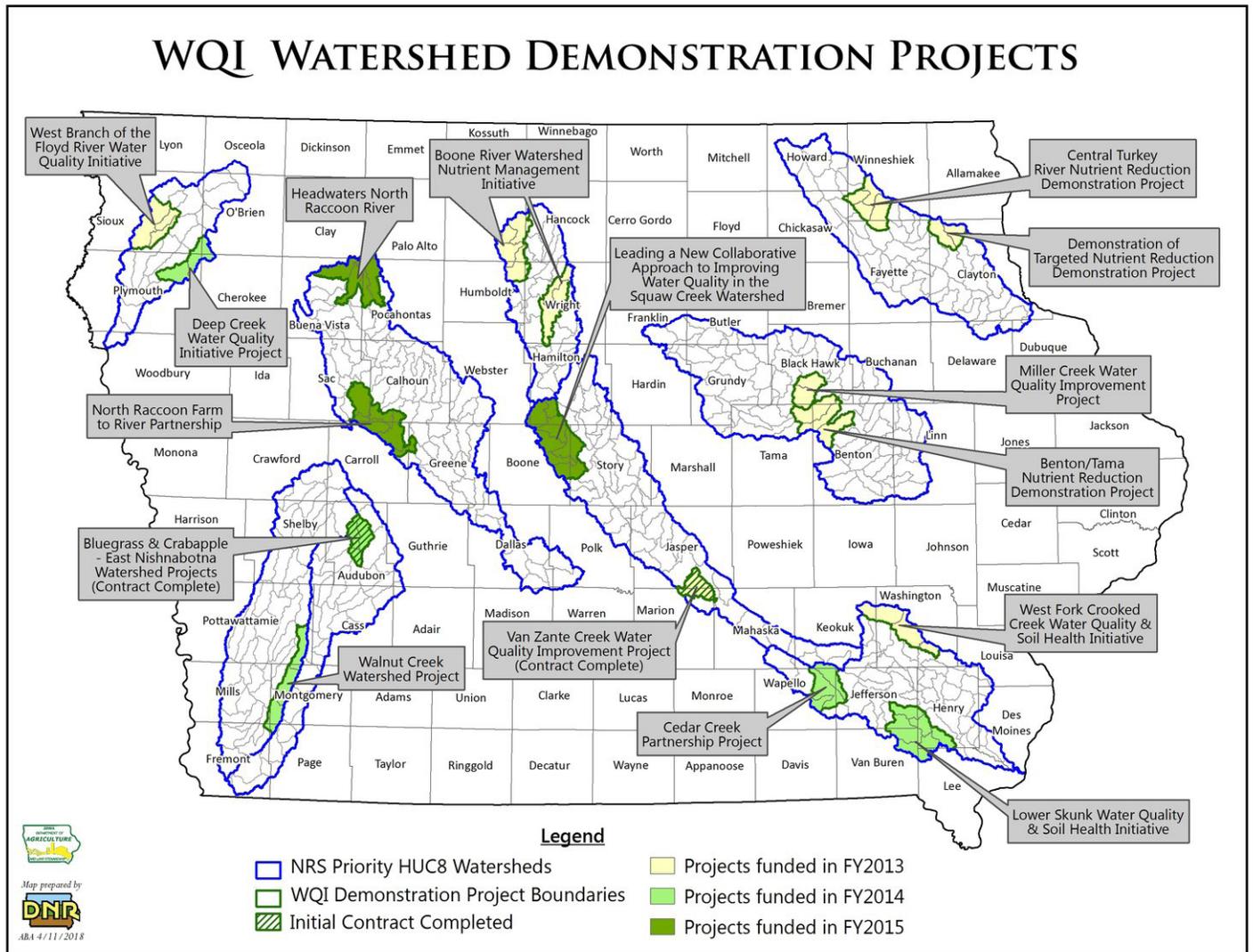
In early 2017, the Center for Rural Affairs received funding from the U.S. Department of Agriculture (USDA) Extension Risk Management Education exploratory grant program to study how Iowa farmers perceive production risks when transitioning to new production systems and social risks when failing to transition. Our objective was to understand how to best provide outreach and educational opportunities that can help farmers minimize risk while also engaging with Nutrient Reduction Strategy practices and water quality programming.

We utilized a farmer survey to identify specific Nutrient Reduction Strategy-related educational needs and demands. Throughout the survey process, we interviewed Water Quality Initiative leaders and Watershed Management Authority board members to provide additional insight into trends among farmers located in respective watersheds. We reviewed existing research, including farmer surveys from Iowa watershed projects,² to further understand farmers’ risk management needs.

Our primary goal for this project was to inform a larger outreach and extension project. With better insight from farmers, outreach and education efforts for the Nutrient Reduction Strategy can be tailored to reduce farmers’ production and social risks.

2 Terry, Jennifer. “Iowa’s Nutrient Reduction Strategy, what is the ‘rest of the story?’” *The Gazette*, Sept. 7, 2014, <http://www.thegazette.com/subject/opinion/guest-columnists/iowas-nutrient-reduction-strategy-what-is-the-rest-of-the-story-20140830>. Accessed April 2018.

FIGURE 1. WATER QUALITY INITIATIVE WATERSHED DEMONSTRATION PROJECTS IN IOWA



II. BACKGROUND

The state of Iowa has completed the first iteration of the Nutrient Reduction Strategy – a science-based framework to reduce nitrogen and phosphorus in Iowa surface waters.³ Four annual progress reports have been filed since the strategy’s first publication in 2012. The Nutrient Reduction Strategy sets point and nonpoint source nutrient reduction goals as well as provides recommendations for how to meet those goals. The strategy also contains information

3 “Iowa Water Quality Initiative: 2017 Legislative Report.” Iowa Department of Agriculture and Land Stewardship, 2017, <https://static1.squarespace.com/static/586bfd13be65947270902ac5/t/58c6c6e9e6f2e1378fd96913/1489422075318/WQILegislativeReport-2017-READ.pdf>. Accessed April 2018.

on practices farmers can use to reduce nitrogen and phosphorus loss from their land. The Nutrient Reduction Strategy has been criticized for failing to set local benchmarks, provide timelines, or require monitoring activities to measure progress toward nutrient reduction goals.⁴

To spur progress toward Nutrient Reduction Strategy goals, the Iowa Legislature created the Water Quality Initiative in 2013. This program provides statewide cost-share funding to Soil and Water Conservation Districts for farmers who are trying no-till, strip-till, cover crops, or a nitrogen inhibitor for the first time. In 2016, the state allocated

4 Ibid.

\$3.8 million in cost-share funding, which leveraged an estimated \$6 million in private investment in these practices.⁵

The Water Quality Initiative also provides financial support to watershed demonstration projects. Through the initiative, the state directs additional dollars to targeted watersheds where stakeholders are testing new practices, program delivery methods, and partnership structures.⁶ These demonstration projects are intended to provide insight into how best to implement the Nutrient Reduction Strategy. See Figure 1⁷ on page 2.

While the Nutrient Reduction Strategy began in 2012 and the Water Quality Initiative began in 2013, multi-stakeholder groups were engaged in watershed management efforts before that time. In 2010, in an effort to ease watershed-scale collaboration among states, cities, and Soil and Water Conservation Districts, the state of Iowa passed enabling legislation for Watershed Management Authorities.⁸ By forming a Watershed Management Authority, eligible entities can work across political subdivisions to create a structure for collaborative watershed planning and to implement the project. A number of Watershed Management Authorities overlap with Water Quality Initiative projects; however, the state has yet to allocate substantial funding for Watershed Management Authorities to implement existing watershed management plans.

Even as diverse private and public entities work to create successful, multi-stakeholder Water Quality Initiative projects and Watershed Management Authorities, farmers continue to experience barriers while engaging with Nutrient Reduction Strategy practices. A number of these barriers were

5 “Watershed Management Authorities.” Iowa Department of Natural Resources, 2017, <http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Watershed-Management>. Accessed April 2018.

6 Nowatzke, Laurie and J. Gordon Arbuckle, Jr. “Iowa Farmers and the Iowa Nutrient Reduction Strategy: 2015 Survey Results.” Department of Sociology, Iowa State University, October 2016, http://www.nutrientstrategy.iastate.edu/sites/default/files/documents/INRS_2015_NRSFarmerSurvey_20161004.pdf. Accessed April 2018.

7 “Watershed Demonstration Projects.” Clean Water Iowa, <https://www.cleanwateriowa.org/farm-1>. Accessed April 2018.

8 Evelsizer, Ross. “Turkey River Watershed Management Authority Survey Report.” Northeast Iowa Resource Conservation and Development Council, December 2013, <http://turkeyriver.org/presentations/>. Accessed April 2018.

identified in a farmer survey conducted in 2015 to gauge farmers’ experiences working toward the goals of the Nutrient Reduction Strategy.⁹ Our project aims to analyze how farmers weigh the risks of adopting new practices or failing to adopt new practices. We will use this research to shape our future outreach and education programming with farmers.

III. METHODS

In spring 2017, we utilized Center for Rural Affairs constituents and worked with partner organizations to distribute a survey via email to Iowa farmers. We asked respondents to provide basic information about their farm operations, conservation practices they use, and federal or state cost-share programs they have utilized. We then asked a series of questions to provide insight into how farmer respondents evaluate production and social risk when determining whether to try a new resource management practice. We also asked about farmers’ top priorities for managing risk on their operations.

In addition, we conducted phone interviews containing similar questions with Water Quality Initiative staff and Watershed Management Authority board members from across the state. These qualitative interviews provided a higher-level perspective on the types of trends watershed professionals see among farmers with whom they work. We asked respondents to discuss their watersheds and the watershed plan formation process. We then asked how farmers seem to manage various types of risk when thinking about water and soil quality management, and professionals’ primary needs for helping farmers engage with the Nutrient Reduction Strategy. Interviewees directed us to past survey results from within their watersheds, which further informed how we think about farmer preferences and beliefs regarding the Nutrient Reduction Strategy.

9 Nowatzke, Laurie and J. Gordon Arbuckle, Jr. “Iowa Farmers and the Iowa Nutrient Reduction Strategy: 2015 Survey Results.” Department of Sociology, Iowa State University, October 2016, http://www.nutrientstrategy.iastate.edu/sites/default/files/documents/INRS_2015_NRSFarmerSurvey_20161004.pdf. Accessed April 2018.

IV. FARMER SURVEY FINDINGS

A. FARM DEMOGRAPHICS

We received 52 responses to our farmer survey. Of these farmers, the majority manage small (n=20) or mid-sized (n=27) operations. Only five manage more than 1,280 acres. See Figure 2.

We asked farmers to describe their operations, and they could check all categories that applied. A majority of respondents (n=32) grow corn and soybeans, either within a two-crop or extended rotation. Of the farmers who answered “other” when describing their farm operation, six have Conservation Reserve Program land, five grow hay or forage crops, four are using an “alternative” livestock system, three are growing trees or tree crops, and one is growing native plant species. See Figure 3.

We received survey responses from farmers who manage land in 41 counties. See Figure 4 on page 5. Sixteen of those who responded have participated or currently participate in watershed management projects.

FIGURE 2: AMOUNT OF FARM GROUND MANAGED BY SURVEYED FARMERS

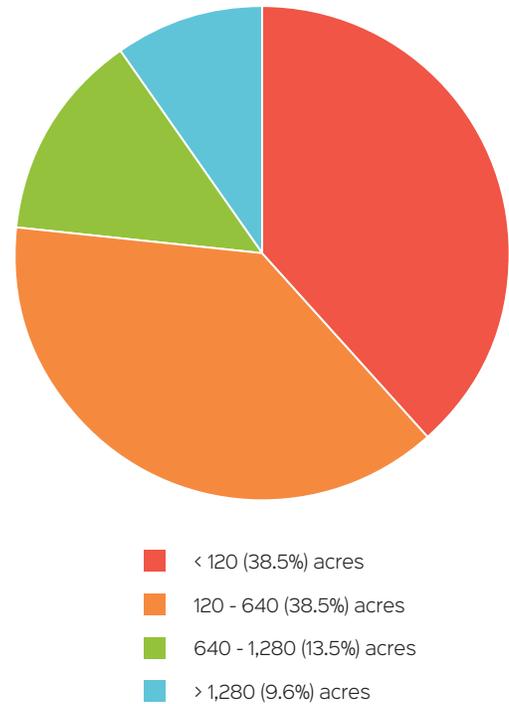


FIGURE 3: TYPES OF PRODUCTION SYSTEMS MANAGED BY RESPONDENTS

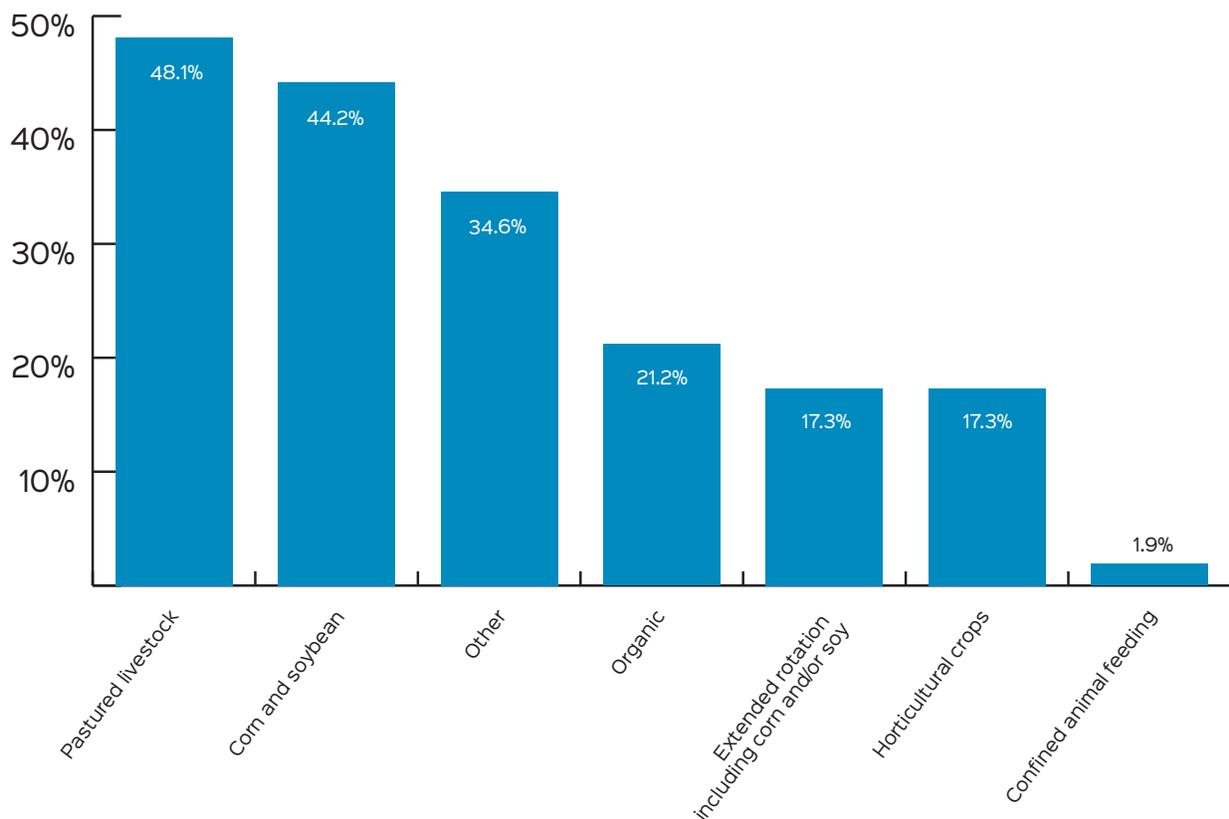
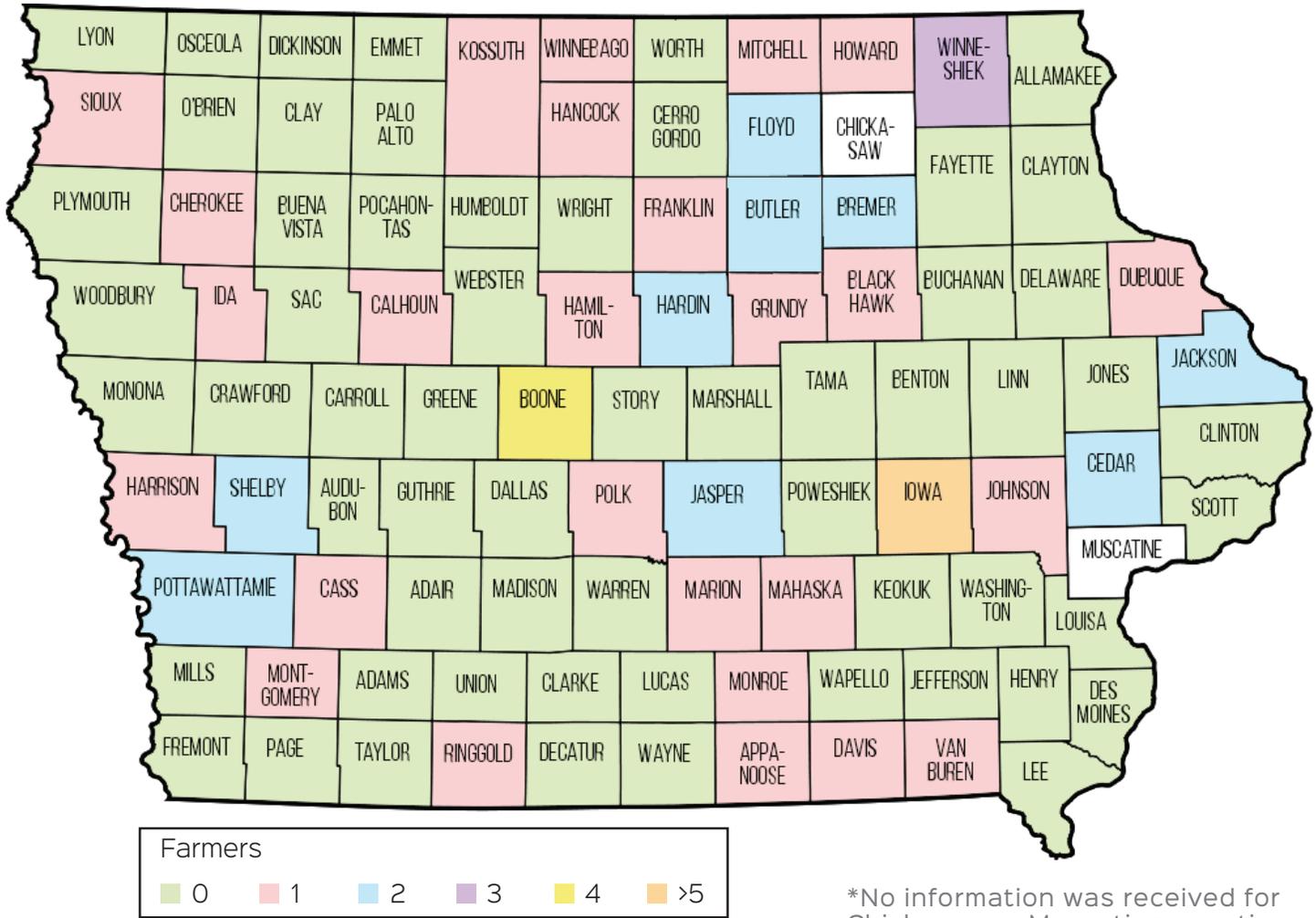


FIGURE 4: COUNTIES WHERE SURVEY RESPONDENTS MANAGE FARM GROUND



B. RESOURCE MANAGEMENT PRACTICES

Because we surveyed farmers who are connected to organizations that promote conservation and alternative cropping systems, we expected respondents, on average, to participate in on-farm resource management practices. Our findings are consistent with that expectation. Respondents report using a wide array of resource management practices, and more than half of respondents report using grassed waterways, cover crops, and/or no-till. See Figure 5 on page 6.

In addition to asking about resource management practices, we wanted to know how many respondents had implemented new practices since the Nutrient Reduction Strategy was released and since the state designated Water Quality Initiative

projects. See Figure 6 on page 6. Of the 47 respondents who answered this question, 32 said they had implemented a new practice within the past five to six years, and seven said they were planning for a new practice. Only two respondents believe there are too many barriers or risks involved to implement new practices. Those who responded, “No, I don’t feel the need to manage my ground differently,” are already moderately to heavily engaged with resource management practices or are utilizing a perennial crop-based farming system.

C. WEIGHING RISK

We asked respondents a series of questions about how they weigh risk on their operations and when deciding to adopt new resource management practices.

FIGURE 5: RESOURCE MANAGEMENT PRACTICES UTILIZED BY RESPONDENTS

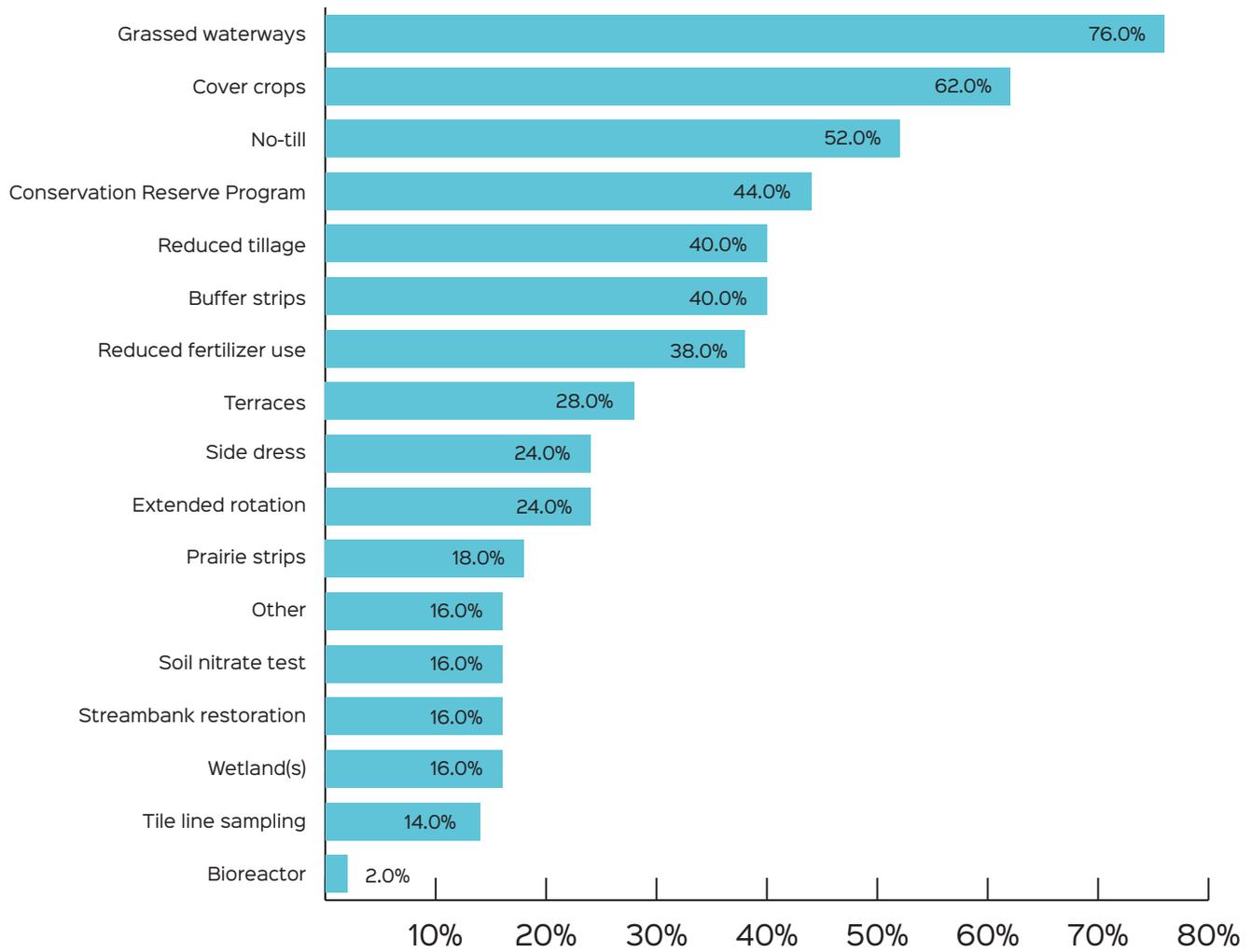


FIGURE 6: RESPONDENTS WHO HAVE IMPLEMENTED NEW CONSERVATION PRACTICES IN THE PAST SIX YEARS

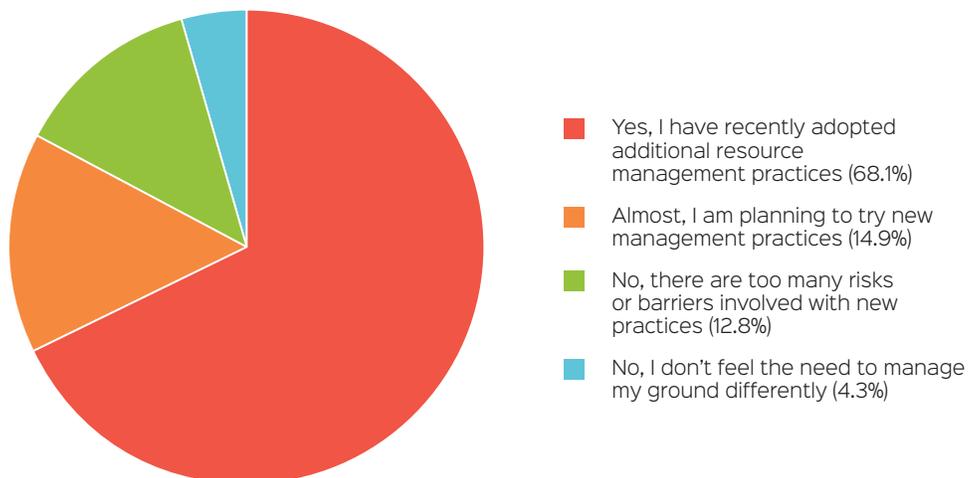
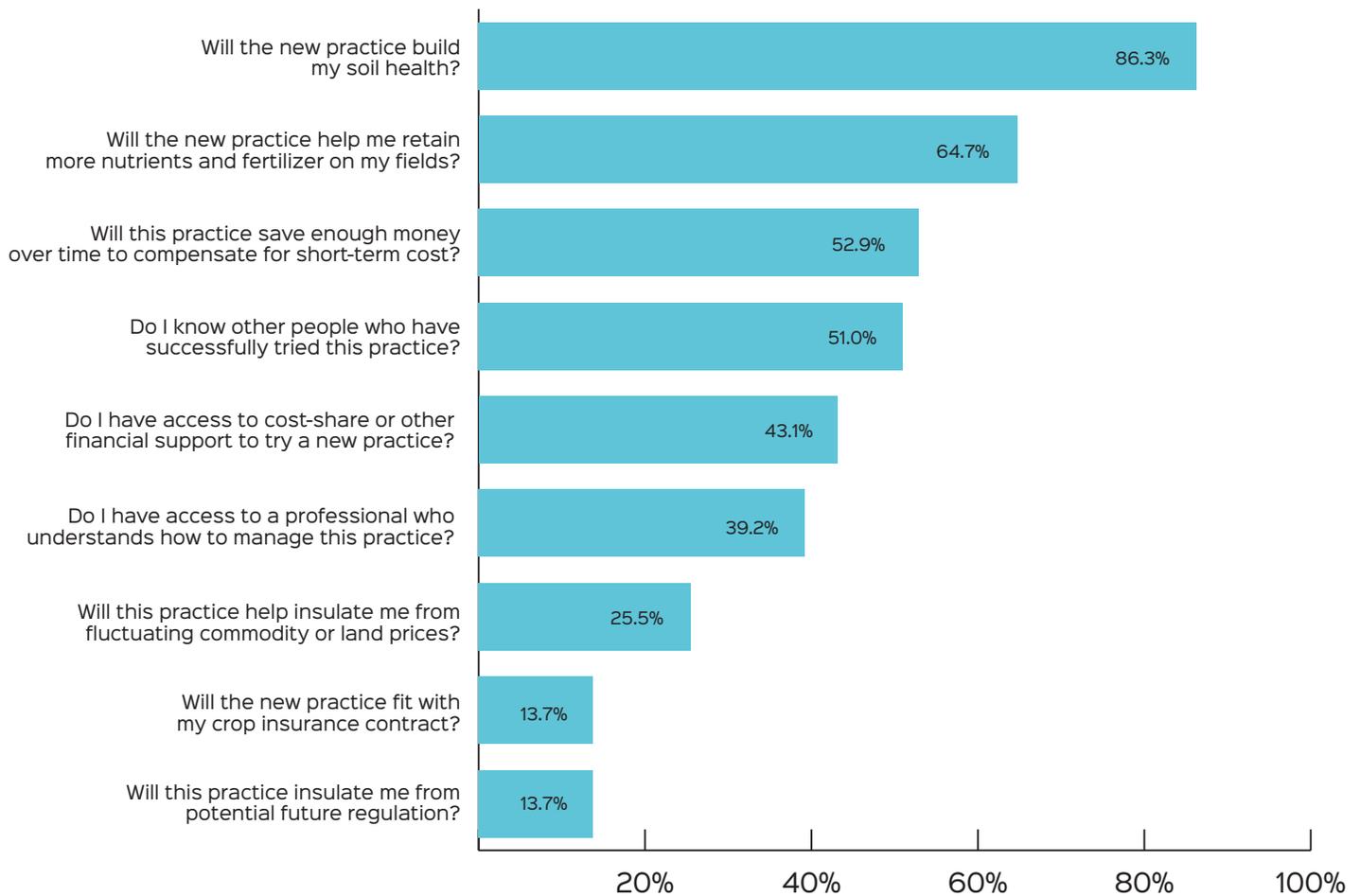


FIGURE 7: RESPONDENT PRIORITIES WHEN DETERMINING WHETHER A NEW PRACTICE WILL DECREASE OPERATIONAL RISK



When asked what factors are used to determine whether a new resource management practice might decrease risk on their operations, a majority of respondents (n=44) indicated soil health is a top priority, closely followed by a practice that helps retain nutrients and fertilizer on the field.

See Figure 7. More than half of respondents also indicated a priority of knowing someone who has tried the practice and saved money over time.

We were surprised to see only seven respondents are concerned about a new practice affecting crop insurance benefits or having access to cost-share.

When asked about primary risks to their production system, more than three quarters of respondents indicated weather, and more than half responded

with shifting climatic patterns. See Figure 8 on page 8. Agricultural consolidation, nutrient and soil loss, and fluctuating commodity prices were the next most frequent responses. Only eight respondents view regulation as a top risk, and five consider public perceptions of farmers to be a top risk.

Finally, we asked respondents if they experience social pressure to change how they farm to address water quality and, if so, who or what is at the origin. As shown in Figure 9 on page 8, a majority of respondents (n=29) note they do not experience social pressure regarding water quality. Those who do were most likely to say it begins with potential future regulation, family and friends, and urban communities, or say they feel pressure but are unsure of the source.

FIGURE 8: RESPONDENTS' BELIEFS ABOUT TOP PRODUCTION RISKS TO THEIR OPERATION

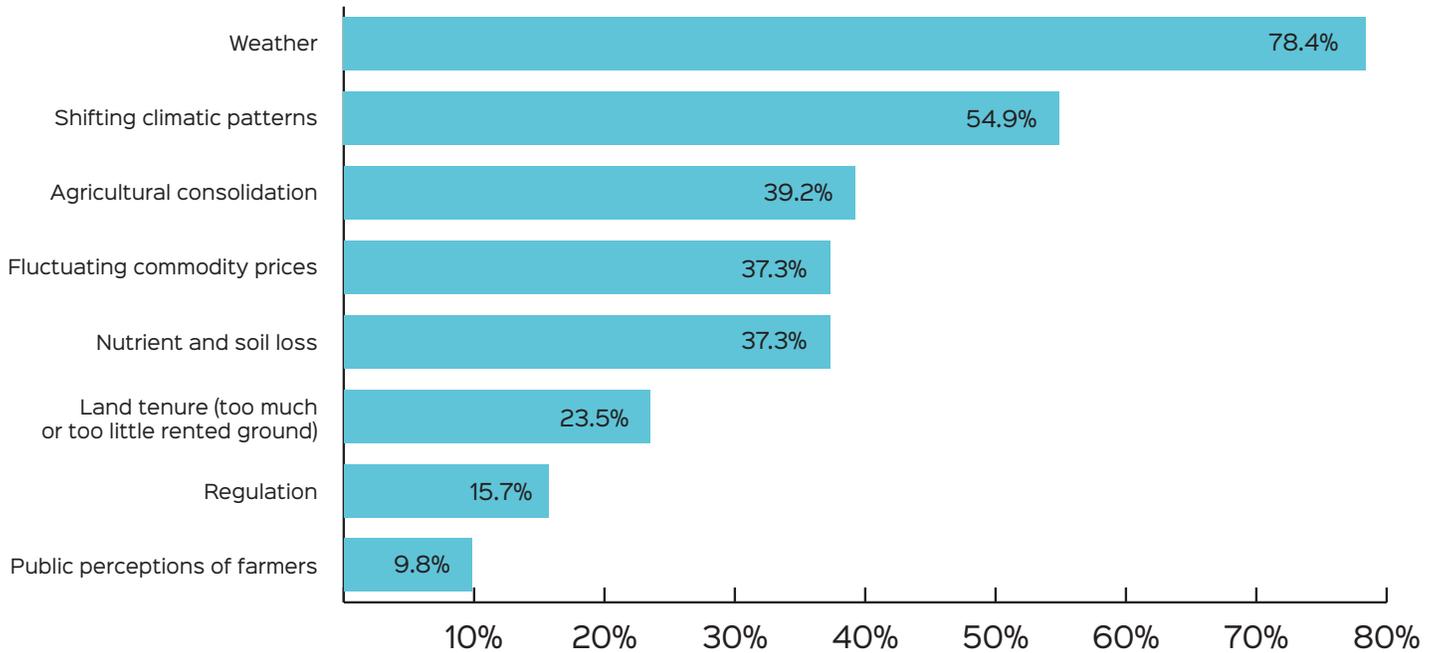
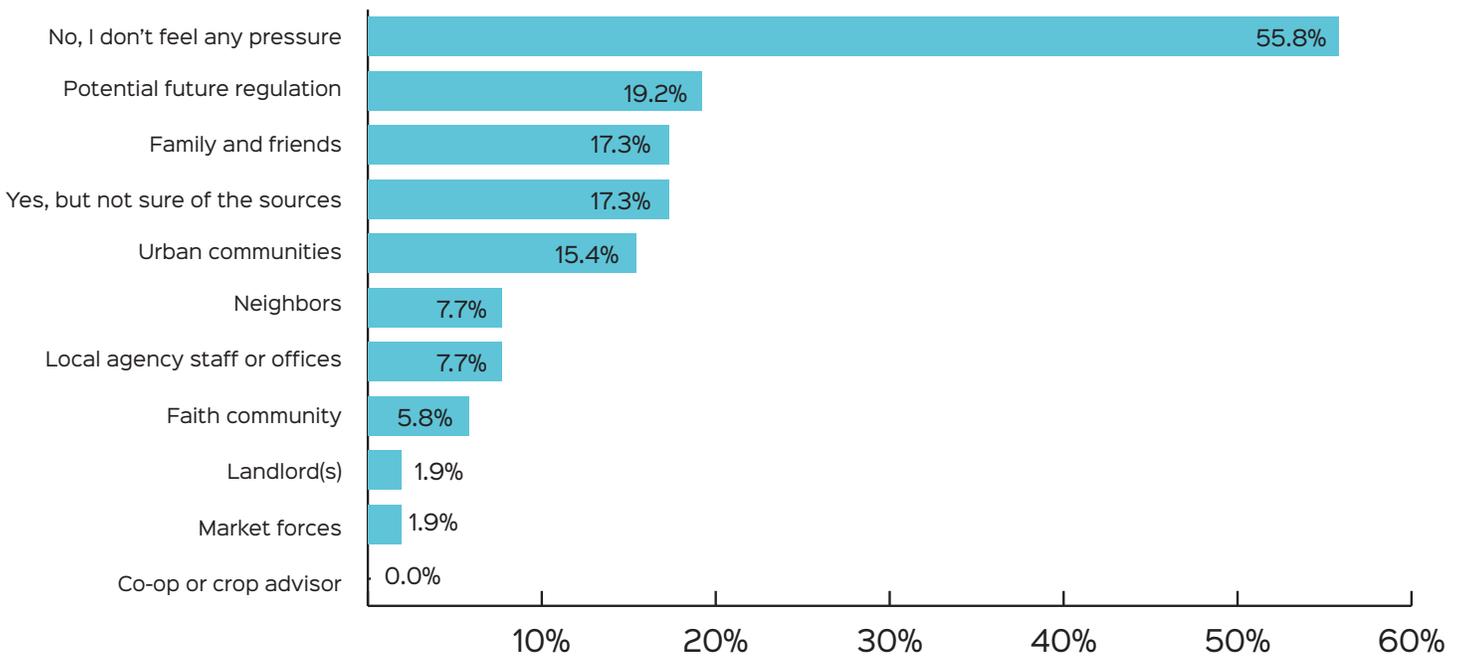


FIGURE 9: SOURCES OF SOCIAL PRESSURE TO MANAGE FOR WATER QUALITY ON FARM OPERATIONS



V. WATERSHED COORDINATOR RESPONSES

We conducted qualitative, semi-structured phone interviews with six professional watershed coordinators who collectively help manage 13 watershed programs through the Water Quality Initiative and/or a Watershed Management Authority. Interviews lasted between 20 minutes and one hour. We sought to understand the level of farmer involvement with local watershed preparation and management plans, top barriers to higher levels of farmer involvement with projects, and how farmers discussed different types of risks associated with water quality management.

A. FARMER INVOLVEMENT IN PLANNING

Farmer involvement with initial watershed and project planning varied widely across the watersheds. One respondent, who helps manage multiple subwatersheds within a Watershed Management Authority in northeast Iowa, said farmers have been integral to project planning and implementation, many attend public meetings, and they serve on the Watershed Management Authority board. The respondent also said local farm groups helped design watershed plans. Project coordinators conducted a survey within their subwatersheds, and found a large majority of respondents (n=181 out of 273) were interested in learning more about how they could help reduce flooding or improve water quality.¹⁰

Another respondent indicated farmers were minimally involved in watershed planning and implementation processes for projects in which she was involved, citing low meeting turn out. Interestingly, farmer surveys distributed in one of those watersheds were returned at a low rate, even when responses were attached to an offer of a donation to a local youth organization.

Other respondents indicated a range of farmer involvement within the watersheds where they worked. One coordinator said her organization had very little farmer input on the first watershed plan they helped create, and are actively seeking more input on a second watershed plan. She believes a higher level of involvement in the

10 Evelsizer, Ross. "Turkey River Watershed Management Authority Survey Report." Northeast Iowa Resource Conservation & Development Council, December 2013, <http://turkeyriver.org/presentations/>. Accessed April 2018.

planning process will increase farmer engagement in plan implementation. Two other respondents confirmed that farmer involvement with the planning process seemed to "jump start" engagement with a watershed project.

This topic is of particular interest given that three interviewees noted farmers are or were wary of a newly formed Watershed Management Authority, believing the entity would have regulatory authority within their watershed. There was no indication that this misconception was present in watersheds where farmers were deliberately included in planning, Watershed Management Authority formation, or Watershed Management Authority or Water Quality Initiative management. Based on our interviews, farmers may perceive Watershed Management Authorities as a potential threat or risk to their operation if they are not properly included in or informed about early stages of watershed activities.

B. BARRIERS TO FARMER ENGAGEMENT

Respondents indicated primary barriers to farmer engagement with watershed management plans or new conservation practices vary across the watersheds in which they work. The top cited barriers to farmer engagement or adoption are limited cost-share or program funds, poor access to technical assistance, and lack of awareness or knowledge. According to coordinators, several watersheds contain a large number of farmers who indicate they would like to take additional steps in managing water or soil quality, but need access to cost-share or technical assistance. Other watersheds have more cost-share funding than they are able to use, either because too few farmers sign up for cost-share practices or because they do not have the staff capacity to offer farmers necessary technical assistance.

One respondent pointed out that Iowa does not have a clear picture of how many farmers would try certain practices if they had improved access to cost-share. This individual called for more research into this question.

C. WEIGHING RISK

We asked watershed coordinators about different types of risk they see farmers attempting to balance, and how perceptions of risk seem to influence their decisions regarding water or soil management. We also asked whether they or their colleagues try to "sell" practices using risk-reduction framework.



Iowa farmers discuss soil health at a field day hosted by the Miller Creek Water Quality Improvement Project in conjunction with U.S. Department of Agriculture – Natural Resources Conservation Service. | Photo by Cody Smith

Four watershed leader respondents indicated the threat of regulation seems to drive an increase in farmer knowledge of and engagement with water quality management activities. These individuals discussed the Des Moines Water Works lawsuit, which argued that regulations should not differ between point and nonpoint source pollution, as a source of anxiety for farmers. Farmers told these watershed leaders they would like to “take action” before they are forced to do so. This finding is of interest when compared to our survey responses, in which farmers tended to rank other sources of risk as a greater threat to their operations. However, of the farmer survey respondents who said they experience social pressure, the most common response regarding the source of that pressure was the potential threat of regulation.

When asked how farmers seem to weigh risks or benefits attached to new resource management practices, respondents agreed this process is highly variable across individual farmers and different watersheds. For this reason, several interviewees noted the most successful watershed coordinators have time to build individual relationships with farmers and understand how to help them implement practices to overcome top management concerns. A common theme among both watershed leaders and farmers was that practices which return value to the farm are likely to be received best. A couple of coordinators noted “value” might mean financial value; however, farmers could also find value in a practice that simplifies their management systems, allows them to experiment with new ideas, or improves environmental outcomes.

D. RETAIN KITS AND AGSOLVER

Several watershed leaders mentioned two resources to increase the interest of farmers in their watersheds. The first resource, the retain kit,¹¹ is available through the Conservation Districts of Iowa. Farmers can access these kits free of charge, and use them to test nitrogen levels in their tile-outlet discharge. Farmers are not obligated to share the results, which reduces the perception that this monitoring practice could result in future regulatory consequences. Interviewees shared anecdotes in which farmers were surprised by high nitrogen levels in their tile-line water and became more interested in learning about management strategies as a result.

Respondents also cited increased farmer interest in the AgSolver Profit Zone Manager tool.¹² Commodity grain farmers can use this tool to map parts of fields which are most likely to lose profit and represent a financial risk. A couple of these individuals indicated this tool has opened opportunities to start conversations about placing perennial land cover or other management practices in unprofitable portions of fields.

More in-depth research on how farmers utilize these resources to connect water quality management to risk management would likely be of interest to watershed groups, farm organizations, legislators, and funders.

11 “Retain Nitrate Testing Kits: Engaging Farmers and Landowners in Citizen Science.” Iowa Department of Agriculture and Land Stewardship, Iowa Corn Growers Association, Iowa State University Extension and Outreach, and Conservation Districts of Iowa, <http://www.water.iastate.edu/sites/www.water.iastate.edu/files/iowawatercenter/retain%202018%20water%20conf%20benning%20%282%29.pdf>. Accessed April 2018.

12 “Agronomic Planning and Sustainability.” EFC Systems, Brentwood, Tennessee, <http://www.efcsystems.com/index.php/agronomicplanningandsustainability/>. Accessed April 2018.

VI. DISCUSSION

A. REDUCING PRODUCTION RISK

These survey results are consistent with outside research demonstrating that farmers tend to prioritize soil health when considering whether to integrate a new resource management practice into their operations.¹³ By improving soil health, farmers increase water infiltration and storage, make nutrients more accessible, and reduce erosion.¹⁴ Improved soil health, therefore, serves as a mechanism of risk management, especially as Iowa experiences more extreme rain and drought events.

While farmers within our network may prioritize soil health, our results suggest they also value practices that help retain nutrients in the soil. Several practices outlined in the Nutrient Reduction Strategy, including cover crops, reduced tillage, and integration of perennials, build soil health and help reduce nutrient loss. Our results suggest outreach and education efforts should highlight practices with multiple benefits, and emphasize soil health. Because farmers ranked weather and climate change as the top threats to their operations, such efforts should also highlight the ways in which improved soil health reduces production risk from extreme weather events.

The data collected suggest farmers are likely to be most responsive to nutrient reduction practices that build soil health. Both survey and interview respondents indicate most farmers also need to see evidence that investing in a new practice will return economic value to their operations. Tools such as the retain kit and AgSolver technology may be able to help farmers identify areas where investing in a new practice can save money, nutrients, or time.

13 Arbuckle, J. and G. Roesch-McNally. “Iowa Farmers’ Perspectives on Soil Health: Predictors of knowledge and action.” Iowa State University Extension and Outreach, 2017 Soil Health Conference, Feb. 16, 2017, <https://www.extension.iastate.edu/soilmgt/files/page/files/arbuckle-iowa-farmers-perspectives-on-soil-health-predictors-of-knowledge-and-action.pdf>. Accessed April 2018.

14 Ibid.

B. REDUCING SOCIAL RISK

Our survey results indicate a majority of farmers within our network do not feel social pressure to manage for water quality. This finding may be due in part to respondents' relatively high level of engagement with alternative and conservation-based farming practices.

Of the respondents who feel social pressure to manage for water quality, potential future regulation is the most common source of that pressure. Interviewees confirmed that farmers' fear of regulation is a main source of perceived social risk. In 2013, the Minnesota Legislature developed a policy program that eases farmers' uncertainty about future regulation while offering deserved recognition to those who implement conservation practices. Farmers who develop and follow a water quality management plan receive priority for cost-share and technical assistance, and gain protection from additional requirements for 10 years.¹⁵ This policy approach combines technical assistance, voluntary compliance, risk mitigation, and a social understanding toward implementing conservation practices for water quality.

While our results do not suggest farmers experience a large amount of social risk from failing to engage with water quality management activities, we found that social networks are an important tool for outreach and education program leaders. All watershed leaders stated that long-term, personal relationships with farmers are key to successful watershed programming or water quality projects. A 2015 survey of Iowa farmers found family members and peers influenced nutrient management decisions, but were second to the technical advice of Nutrient Reduction Strategy, Soil and Water Conservation Districts, and Iowa State University Extension.¹⁶ Most farmers were also unaware if a watershed management group was active in their area. While farmers claim not to feel social pressure from their peers, they have trusted sources for technical information

15 "Moving the Needle: Improving Water Quality in Minnesota While Developing Our Agricultural Economy." Water Resources Center, University of Minnesota, Jan. 25, 2017, https://www.wrc.umn.edu/sites/wrc.umn.edu/files/moving_the_needle_final_22_may_2017.pdf. Accessed April 2018.

16 Nowatzke, Laurie and J. Gordon Arbuckle, Jr. "Iowa Farmers and the Iowa Nutrient Reduction Strategy: 2015 Survey Results." Department of Sociology, Iowa State University, October 2016, http://www.nutrientstrategy.iastate.edu/sites/default/files/documents/INRS_2015_NRSFarmerSurvey_20161004.pdf. Accessed April 2018.

and listen to their family, friends, and neighbors. This finding suggests that, when beginning, education program coordinators should partner with organizations which have existing relationships in a given community or watershed.

In addition to working alongside organizations with strong, on-the-ground relationships, our results suggest new programs should leverage the expertise of existing conservation champions. More than half of farmer survey respondents say they perceive less risk attached to a given practice if they know someone who uses it. These results are consistent with other research on trusted sources of information,¹⁷ and suggest that program leaders should facilitate interactions between farmers with experience in a particular practice and those who would like to try that practice.



Farmers tend to prioritize soil health when considering whether to integrate a new resource management practice into their operations.

17 Arbuckle, J. Gordon Jr. "Iowa Farm and Rural Life Poll: 2016 Summary Report." Iowa State University Extension and Outreach, February 2017, <https://store.extension.iastate.edu/product/Iowa-Farm-and-Rural-Life-Poll-2016-Summary-Report>. Accessed April 2018.

VII. CONCLUSION

Our research suggests farmers within our network weigh production risks more heavily than social risks when determining whether to adopt a new resource management practice. When deciding whether a new practice can help decrease risk on their operations, a majority of individuals prioritize potential benefits to soil health, improved nutrient retention, and potential economic benefits. Survey results also suggest farmer respondents are more likely to believe a practice will decrease their risk if they know another farmer who has tried the practice. Respondents believe weather and shifting climatic patterns represent the largest threat to their operations.

While a majority of farmer respondents claim not to feel social pressure to engage with additional resource management practices, those who do are most likely to feel threatened by potential future regulation. Interview responses from watershed professionals are consistent with this finding.

A project that helps farmers improve their soil health, particularly in field sections vulnerable to extreme weather events, is most likely to fit farmers' education and risk management needs. Both survey and interview results also suggest a project that draws on existing social networks and relationships is more likely to succeed.

About the Center for Rural Affairs

Established in 1973, the Center for Rural Affairs is a private, nonprofit organization with a mission to establish strong rural communities, social and economic justice, environmental stewardship, and genuine opportunity for all while engaging people in decisions that affect the quality of their lives and the future of their communities.

