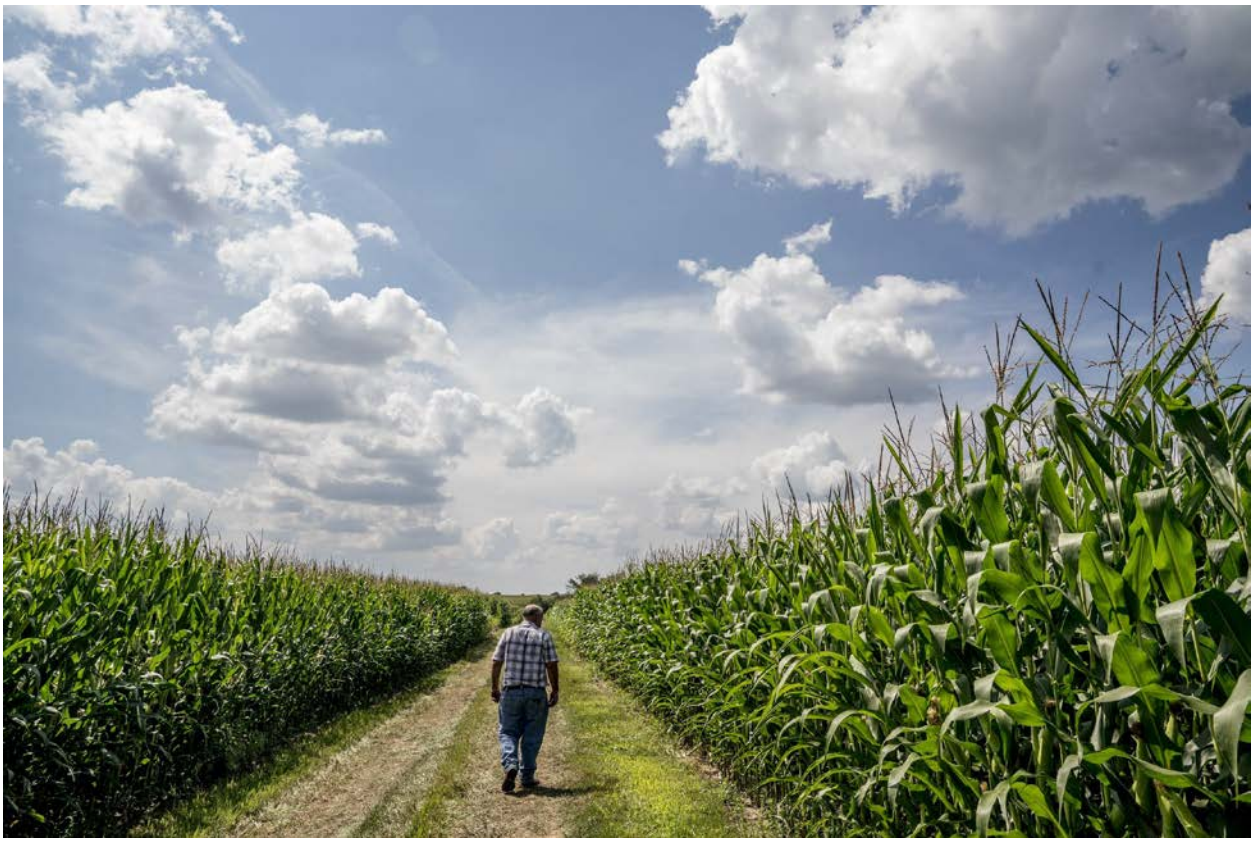
Review of Eleven U.S. Voluntary State Agricultural Stewardship Programs



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Executive Summary

U.S. inland and coastal waters are invaluable natural resources providing drinking water, food, natural habitat and recreational opportunity. In the last century, U.S. water basins have been under the pressure of intensified population growth and industrial and agricultural development which has resulted in the oversight of environmental stewardship in numerous watersheds across the country. Nonpoint source nitrogen and phosphorus pollution from agricultural lands has been identified as a main contributor to water quality degradation, especially toxic Harmful Algal Blooms (HABs). The Gulf of Mexico, Great Lakes, Chesapeake Bay, and Puget Sound are all major water basins that have suffered from harmful nutrient pollution, HABs and associated environmental, health and economic consequences because of agricultural runoff. Voluntary state agricultural stewardship programs are one strategy aimed at addressing nonpoint source agricultural pollution. These programs provide agricultural operators incentives in exchange for installing best management practices (BMPs) that improve local water quality and meet or surpass state water quality goals. Agricultural stewardship programs rely on scientifically sound practices to achieve demonstrable water quality improvements and work closely with state, federal, and cooperative extensions to implement and monitor best practices. While there are various voluntary state agricultural stewardship programs in the U.S., attempts to compare their structure, participation and efficacy have been limited. This report aims to add to the collective knowledge about voluntary state agricultural stewardship programs by examining the structure and impact of 11 existing programs in the U.S. and synthesizing program materials, interviews with program staff, and peer-reviewed literature on voluntary state agricultural initiatives.

The voluntary state agricultural stewardship programs included in this report varied in program structure, program length and inspections, which parties were eligible for enrollment, available incentives, and cost share opportunities. Operational program costs were derived from a variety of sources such as general fund allocations, RCPP awards, sales tax dollars, and state environment and water quality funds. Financial incentives like program-specific cost share were cited as a significant plus, and programs felt long-term financial support from the state legislature was important in reducing the economic burdens of BMP implementation on farmers and the programs themselves. Program partnerships typically included state and federal departments as well as university cooperative extensions. Partnerships, whether they were with governmental, non-governmental, private or academic partners, were considered valuable by most programs. All programs cite farmer-to-farmer peer networks and communication as a key factor in encouraging participation. In addition to farmer-to-farmer networks, Soil and Water Conservation Districts and private advisors were cited as successful conduits for generating interest in voluntary state agricultural stewardship programs. All programs viewed incorporating farmers and other players in the agricultural community as critical to program success. Future considerations of programs included--but were not limited to--how to effectively evaluate farmer participation and environmental outcomes of program implementation and how to navigate emergent issues in agriculture like economic decline and climate change.

The literature demonstrates that there is no silver bullet or consistent predictive model of farmer participation in voluntary state agricultural stewardship programs. Though they are important,

economic incentives are accompanied by many other factors that influence farmer participation in voluntary state agricultural stewardship programs. Age, education, income, gender socio-cultural norms, worldviews, personal goals, commodity prices, environmental policies and social networks have all been shown to influence farmer participation. The literature also highlights that while BMPs for water quality are at the center of various voluntary state agricultural stewardship programs, the efficacy of these practices has been mixed with variable adoption rates among farmers and little improvement—and even declines—in water quality in some critical watersheds. Though there is robust evidence for the efficacy of individual BMPs in protecting and improving water quality from excess discharges, there is a need to determine the efficacy of many, simultaneously implemented BMPs at the watershed scale.

These findings reinforce the notion that working towards successful balance of agricultural livelihoods and water quality protection is largely "a quest for meaningful and effective institutional integration and actor interaction across various ecological, social and political levels and scales." These results influence a series of recommendations for state programs and environmental philanthropy. State programs should consider a) improving communication among existing programs, b) acknowledge heterogeneous farmer motivations, c) developing clear and consistent messaging, d) prioritizing water quality monitoring, e) adopting consistent standards for reporting results and f) increasing program flexibility—among other recommendations. The philanthropic sector should consider a) supporting improved communication of agriculture and water quality issues, b) assisting farmer-led or farmer-serving organizations in environmental stewardship efforts, c) supporting water quality monitoring efforts, d) supporting relevant social and ecological research, e) supporting relevant and effective policy and f) increasing the accessibility of relevant resources—among other recommendations.

	California (Central Valley)	Florida	Iowa	Maryland	Michigan	Minnesota	Missouri	New York	Vermont	Virginia	Washington
Name	Irrigated Lands Regulatory Program (ILRP)	Best Management Practices Program	Soil and Water Conservation Program (SWCCP) / Water Quality Initiative (WQI)	Maryland Agricultural Certainty Program	Michigan Agriculture Environmental Assurance Program (MAEAP)	Minnesota Agricultural Water Quality Certification Program (MAWQCP)	Missouri Agricultural Stewardship Assurance Program (ASAP)	Agricultural Environmental Management (AEM)	Vermont Environmental Stewardship Program (VESP)	Resource Management Planning Program (RMP)	Voluntary Stewardship Program (VSP)
Year	2003	2000	1973, 2013	2013	1997	2013	2015	1993	2016 (Pilot Phase)	2014	2011
Funding	Annual Fees to Farmers	Excise Tax on Documentary Stamps	Gaming Taxes, Specialty License Plates	USDA Conservation Innovation Grant	Fertilizer and Pesticide Fees	State Sales Tax	Missouri Department of Agriculture	Real estate transfer taxes	USDA Conservation Innovation Grant	Federal Grants, State General Funds	-
Regulatory Certainty	No	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes
Structure	Regional Level, Coalition Based	Statewide	Statewide	Statewide	Statewide	Statewide	Statewide	Statewide	Statewide	Statewide	County Level
Enrollment Period	Indefinite, annual check-ups	Indefinite, annual check-ups	Varied by BMP	10 years, check-ups every 3 years	5 years, check-ups every 3 years	10 years, 1 check-up after certification	Indefinite, 1 check-up after certification	Indefinite, check-ups every 3 years	5 years, annual check-ups	9 years, check-ups every 3 years	Indefinite, check-ups every 2 and 5 years
Financial Assistance	No	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	No
Technical Assistance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Incentives	Monitoring Waiver	Monitoring Waiver	N/A	Field Signage, Nutrient Trading	Field Signage, RUP Credits	Field Signage, Market Access	Farm Signage, Market Access	Protection from Unexpected Discharges, Market Access	Field Signage, Free Soil Health Tests	Field Signage, Award Eligibility	Monitoring Waiver
Participation	≈ 90% of acres, % of operations unknown	≈ 42% of acres, % of operations unknown	% of operations unknown	< 1% of operations	4,673 verifications % of operations unknown	2% of operations	< 1% of operations	≈ 25 % of operations	< 1 % of operations	< 1% of operations	27 counties enrolled, % of operations unknown

Introduction

The United States' inland and coastal waters are invaluable natural resources providing drinking water, food, natural resource materials and recreational opportunity. U.S. water basins are habitat to numerous species of fish, invertebrates, and other wildlife that, like humans, depend on the quality of these waterways for their survival. In the last century, U.S. water basins have been under the pressure of rapid population growth and industrial and agricultural development. This intensification has resulted in the oversight of environmental stewardship in numerous watersheds across the country. A main contributor to the environmental degradation of inland and coastal water has been increases in point and nonpoint source nutrient pollution (Howarth et al. 2000). Nitrogen and phosphorus discharges from point and nonpoint sources have led to eutrophication, harmful algal blooms, dead zones, fish kills, shellfish poisonings and the loss of coastal ecosystems like seagrass, kelp beds and coral reefs. In fact, nearly two thirds of the U.S. coastal rivers and bays are moderately to severely degraded by nutrient pollution (U.S. Environmental Protection Agency). While the second half of the 20th century saw an increase in anti-pollution laws that greatly reduced surface water discharges of toxic substances from point sources (e.g. discharges from wastewater treatment plants; operational wastes from industries; and combined sewer outfalls) in the last half of the 20th century (Howarth et al. 2000), equal attention was not paid to nonpoint sources of nutrient pollution from urban runoff, airborne pollutants, and agricultural runoff.

Agricultural activities have been shown to dominate nonpoint source inputs of both nitrogen and phosphorous into local and regional watersheds in the United States (Sharpley et al. 1993, Carpenter et al. 1998, Howarth et al. 2002, Kerr et al 2016). Agricultural nonpoint source pollution signifies particulate and dissolved nitrogen and phosphorus losses from agricultural fields to surface and groundwater caused by excess nutrient application, fertilizer runoff and excessive application or mismanagement of animal waste (Sharpley et al. 1993). Excess fertilization and manure production especially, result in harmful levels of phosphorus accumulation in soil that can be transported to waterways as well as harmful levels of nitrogen that can leach directly into ground and surface water (Sharpley et al. 1993, Carpenter et. al 1998). These excessive nutrient inputs seriously degrade aquatic ecosystems and impair the use of water for drinking, industry, agriculture, recreation, and other purposes.

The Great Lakes, especially Lake Erie, exemplify a major U.S. water basin severely impacted by nonpoint source agricultural nitrogen and phosphorus pollution. The Great Lakes Region is a bi-national region of 8 U.S. states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin) and 1 Canadian province (Ontario) (National Oceanic and Atmospheric Administration). Agriculture occupies over one third of land in the Great Lakes region and yields 7 percent of U.S. farm production and 25 percent of Canadian farm production while producing approximately $15 billion annually in U.S. livestock, grain, dairy, and corn (Kerr et al 2016). Lake Erie is exposed to the greatest stress, which is caused by intensified urbanization, industrialization and agriculture (U.S. Environmental Protection Agency). In August 2014, more than 500,000 people were without drinking water for three days when nutrient pollution fed a harmful algal bloom that released

high levels of algal toxins that forced the Toledo drinking water treatment plant to shut off public water supply (USEPA, HABRI, TWLEB). Cyanotoxins, or toxic chemicals produced by blue-green algae species like *Microcystis aeruginosa,* from Harmful Algal Blooms (HABs) threaten liver and kidney damage as well as water treatment costs (HABRI). HABs not only threaten safe drinking water, but also contribute to hypoxia, poor water quality, and unhealthy fish and invertebrate communities. HABs have increased significantly in the past 10 years in Lake Erie and across the country partially because of detrimental nitrogen and phosphorus discharge from nonpoint sources during storm events (National Center for Water Quality Research).

The Gulf of Mexico, Chesapeake Bay, and inland and coastal waters of Florida are also major water basins proximal to areas of significant agricultural production that have suffered from eutrophication, harmful algal blooms and their environmental, health, and economic consequences. Establishing agricultural conservation nutrient management systems that address water quality degradation while balancing economic imperatives has been an ongoing challenge for U.S. states within these major watersheds (Sharpley et al. 1993, Carpenter et al. 1998, Howarth et al. 2002). Furthermore, facilitating dialogue about agriculture and environmental stewardship that not only recognizes the need for further reduction of nonpoint source pollution through improved agricultural management practices but also acknowledges the efforts of producers who already act as environmental stewards has proven difficult.

One strategy that addresses these challenges are voluntary state agricultural stewardship programs. Voluntary state agricultural stewardship programs provide agricultural operators incentives in exchange for installing best management practices (BMPs) that improve local water quality and meet or surpass state water quality goals. Such incentives can include technical assistance for conservation planning, cost-share for BMP implementation, increased marketing opportunities, or assumed compliance with current and new state regulations (regulatory certainty). Programs that provide regulatory certainty are also known as "agricultural certainty programs," which fall under the umbrella of voluntary state agricultural stewardship programs for the purposes of this report. Voluntary state agricultural stewardship programs typically provide producers with confidentiality about management and environmental data specific to their farms. These programs often heavily rely on Soil and Water Conservation Districts (SWCDs) to prioritize water quality areas of concern and provide technical assistance to producers to help them reduce their impacts on the critical areas through BMP implementation. Agricultural stewardship programs also rely on scientifically sound practices to achieve demonstrable water quality improvements, working closely with state, federal, and cooperative extension partners to implement and monitor BMPs.

While there are various voluntary state agricultural stewardship programs in the U.S., attempts to compare their structure, participation, and efficacy have been limited. This report aims to add to the collective knowledge about voluntary state agricultural stewardship programs by examining the structure and impact of 11 existing voluntary state agricultural stewardship programs in the U.S. (California, Florida, Iowa, Maryland, Michigan, Minnesota, Missouri, New York, Vermont, Virginia,

Washington). This report also aims to promote increased discussion among existing agricultural stewardship programs about how to critically and effectively address the intersection of agriculture and water quality in the U.S.

Methods

The purpose, structure, incentivization, farmer participation, perceived farmer experience, challenges and success of each program are included in this report. Data was collected from program materials, phone interviews with program representatives and a literature review of voluntary agricultural stewardship initiatives. Program summaries were constructed for each state, consisting of information from program materials and interviews, and these summaries were shared back with program representatives for review and feedback. A literature review about program structure, participation, and impact consists of findings from peer-reviewed journal articles from the U.S. and Europe. These journal articles were identified through database searches of "agricultural stewardship programs," "agricultural certainty programs," and "agricultural best management practices." The report concludes with a series of recommendations to state programs and environmental grantmakers based on the research, interview, and literature review findings.

Program Summaries

California

Name: Irrigated Lands Regulatory Program (IRLP) (Central Valley)

Year Established: 2003

Relevant Water Basins: Sacramento River, San Joaquin River, Sacramento and San Joaquin Delta, and Tulare Lake

Description:
With over 400 commodities, California produces almost half of U.S-grown fruits, nuts and vegetables. Agriculture is most prevalent in the Central Valley, which makes up almost 40 percent of California state lands and houses, and about 75 percent of California's agricultural land. California's Central Valley also supplies over 50 percent of California's total water supply and two thirds of the state's drinking water. Groundwater in the Central Valley and other areas in the state have suffered pesticide, nitrate, and salt contamination from agricultural lands. In 1999, the California Legislature passed Senate Bill 390, which eliminated a blanket waiver for agricultural waste discharges. It required the Water Boards to develop a program to regulate agricultural lands under the Porter-Cologne Water Quality Control Act. The Irrigated Lands Regulatory Program (ILRP) was launched in 2003 to control and assess the effects of discharges from irrigated agricultural lands to surface and groundwater.

ILRP operates through waste discharge requirements (WDRs) which require water quality monitoring to assess discharges from commercial irrigated agricultural lands as well as corrective actions when impairments are found. All commercial land that is irrigated for crops or pasture must also be enrolled in the ILRP. The program requires growers achieve compliance with WDRs either through individual, on-farm water quality monitoring or participating in a third-party local water quality coalition.

Farmers who choose to do individual monitoring are required to monitor the discharges from their farm to show compliance with WDRs and must report their findings to their regional water board as well as pay the associated costs. Third-party coalitions help farmers comply with WDRs by representing enrolled farmers, providing technical assistance, conducting outreach and education, monitoring the quality of receiving waters, evaluating effectiveness of management practices, maintaining collected data, and submitting annual reports to their Regional Water Board. Farmers that do not enroll in ILRP as an individual or part of a coalition can be administered penalties as high as $1,000 per day for every day of violation. Lastly, California state and regional Water Boards evaluate water quality data every two years to ensure they are meeting protective water quality criteria and standards.

Funding:
ILRP is funded through annual fees paid by farmers enrolled in the program. Typically, farmers pay a membership fee set by their coalition (for example, East San Joaquin Water Quality Coalition farmers pay $100 per year) plus parcel fees that can range from $3 to $8 per acre. Farmers participating in ILRP on an individual basis (i.e. not as a part of a coalition) can pay anywhere between $404 and $4,715 for up to 500 acres; there is no maximum fee for farms larger than 500 acres.

Key Partners:
State:

- California Department of Food and Agriculture (CDFA)
- California State Water Resources Control Board

Federal:

- USDA Natural Resources Conservation Service (NRCS)

Regulatory Certainty:
The ILRP does not provide regulatory certainty to its participants.

Other Incentives:

- Farmers enrolled in ILRP through a local coalition pay lower fees than farmers not enrolled through a coalition.
- Farmers enrolled in ILRP through a local coalition receive assistance from their coalition to meet WDR requirements.
- Farmers enrolled in ILRP through a local coalition do not have to conduct individual, on-farm water quality monitoring.

Program Length: Indefinite

Inspection Rate:
Annually; Coalitions survey members about what practices they have implemented and monitor regional surface waters. Region Water Quality Control Boards conduct on-farm inspections on a small percentage of farms.

How Do Farmers Find Out About the Program?
In addition the ILRP website, ILRP staff conduct the majority of outreach to educate farmers about the program and to require regulatory compliance when appropriate. Third party coalitions also reach out to farmers in their area. SWCDs, farm bureaus, and Regional Water Boards are also sources of information about ILRP and help publicize the program through mailings, advertisements in local newspapers, and outreach meetings with farmers every year.

Enrollment Process:

Steps differ by region and coalition. The general steps for ILRP enrollment are as follows.

1. Identify which coalition(s) serves the farm.
2. Submit a new membership application to the local coalition.
3. Submit an electronic Notice of Intent (eNOI) to the Regional Water Board.
4. Send in a copy of the completed eNOI along with the enrollment fee to the Regional Water Board (if the coalition does not process enrollment fees).
5. Receive a Notice of Applicability (NOA) from the Water Board confirming the farm has the required regulatory coverage through membership in a local coalition.

After joining a coalition, member farms are subject to the jurisdiction of their coalition and must comply with recommendations deemed necessary for compliance, including a required farm evaluation for all farms.

Cost Share:

There is no program-specific cost share for BMP implementation. The program instead promotes the use of several state and federal funding options.

Other Cost Share Opportunities:

State:

- Agricultural Water Quality Grants Program
- Health Soils Program

Federal:

- Conservation Stewardship Program (CSP)
- Environmental Quality Incentive Program (EQIP)

Best Management Practices:

All farmers are required to have a nitrogen management plan and farms in high vulnerability areas for sediment erosion are required to have sediment plans. The most common voluntary management techniques include vegetative buffers and cover crops because they address numerous management issues. More efficient irrigation systems, such as micro sprinklers, are commonly used, too.

Participation:

There are around 30,000 agricultural operations enrolled in ILRP in the Central Valley Region and about six million acres. Tactics cited as helpful for encouraging participation in the program included ensuring those doing outreach have credibility with farmers (i.e. coalition leaders or the cooperative extension), having farmers explain their experience in the program to other farmers, identifying early adopters who are willing to take on risks and model success for their peers, and promoting incentives like reduction in fees and technical assistance.

Perceived Farmer Likes and Dislikes:

Likes:

- Nitrogen management planning for their farm
- Operating as a part of a coalition reduces the amount of time spent interacting with government regulators

Dislikes:

- The amount of paperwork
- No regulatory waiver or regulatory certainty

Challenges:

- Farmers, coalitions, and ILRP staff adjusting to new regulations and requirements after already starting down a path to meet antecedent regulations
- Focusing outreach to small farm operations, especially those with non-English speaking operators
- Farmers avoiding enrolling in the program
- Managing push-and-pull from different stakeholders (i.e. farmers think ILRP requires too much of them while environmental organizations think ILRP is not requiring enough)

Success and Future Directions:

- The Central Valley Water Board's comprehensive public outreach and education program has resulted in close to 90 percent of the irrigated acres within its jurisdiction enrolled in ILRP.
- Third parties build on relationships already in place with growers; third parties can also engender a high level of trust and more effectively reach out to growers to increase BMP planning and implementation.
- The program and its partners are in the process of developing and implementing nitrogen coefficients to measure what proportion of applied nitrogen is removed by crops, sequestered into trees or discharged through runoff.

Other State Programs and Initiatives:

- Office of Environmental Farming & Innovation programs:
    - Dairy Digester Research & Development Program
    - Healthy Soils Program
    - State Water Efficiency and Enhancement Program
    - Office of Pesticide Consultation & Analysis
    - Small Dairy Climate Change Research
- Nonpoint Source Encyclopedia
- Grassland Bypass Project

Florida

Name: Florida Department of Agriculture and Consumer Services (FDACS) BMP Program

Year Established: 2000

Relevant Water Basin: Lake Okeechobee

Description:
FDACS BMP Program was developed as an alternative way for farmers to meet watershed quality requirements prescribed in Basin Management Action Plans (BMAPs).

The Florida Department of Environmental Protection develops BMAPs to meet Total Maximum Daily Loads (TMDLs) for groundwater nitrogen and surface water phosphorus for Florida watersheds. Currently, 60 percent of Florida is under a BMAP with more BMAPs in the development stages. BMAPs focus on critical areas with impaired water quality, such as the Lake Okeechobee Watershed.

BMAPs prescribe the management strategies that should be implemented including schedules, funding strategies, and monitoring. BMAPs also determine the roles and responsibilities of each entity it governs, including counties, cities, utilities, developments as well as agricultural producers. There are two ways in which Florida farmers can meet the plan designated by their BMAP: monitor their discharge at their expense to prove they are not in violation of water quality standards or implement BMPs through the FDACS BMP Program.

Funding:
The FDACS BMP Program is currently funded by the Florida Water and Land Conservation Amendment which is derived from 33 percent of the net revenues from the existing excise tax on documentary stamps.

Key Partners:
State:

- Florida Department of Agriculture and Consumer Services (FDACS)
- Florida Department of Environmental Protection (FDEP)
- Water Management Districts (WMDs)
- Soil and Water Conservation Districts (SWCDs)

Federal:

- USDA Natural Resources Conservation Service (NRCS)

Regulatory Certainty:

Farmers who participate in the FDACS BMP Program and implement verified, rule-adopted BMPs receive a presumption of compliance with state water quality standards for the pollutants addressed by the BMPs installed. Additionally, farmers implementing BMPs are precluded from recovering costs or damages for contamination related to pollutants targeted by their BMPs.

Other Incentives:

- Demonstrate agriculture's commitment to water resource protection vs the regulatory approach for dealing with water quality and conservation concerns.
- BMPs reduce costs and improve efficiency.
- Prevents duplicative regulation at the county level.
- Baseline eligibility for other programs around the state.
- Cost share funding for BMP implementation.

Program Length:

Farmers' enrollment under the FDACS BMP Program is statutorily indefinite as long as they demonstrate that they continue to implement BMPs. BMAPs go through a formal re-evaluation every five years to determine the effectiveness of the plan at watershed level.

Inspection Rate:

Farmers receive an annual notification to perform a Common Practices Verification, either online or in conjunction with an FDACS representative, about their status of BMP implementation. An Implementation Assurance site visit also collects information on producer adherence to applicable BMPs and status of any practices that may have been cost shared. Follow up site visits are prioritized using an algorithm based on several factors.

How Do Farmers Find Out About the Program?

Farmers make initial contact with the FDACS BMP Program through word of mouth from other farmers, direct contact with FDACS field staff, their interactions with the University of Florida Extension service, producer organizations, and WMDs.

Enrollment Process:

1. Farmers request assistance for a site assessment from FDACS representatives.
2. FDACS representatives conduct an on-farm site assessment guided by the rule-adopted BMP manuals to identify the BMPs currently being implemented and to determine if additional BMPs are applicable to the farmer's operation.
3. FDACS representatives denote the farmer's current BMPs and any applicable new BMPs on a checklist.
4. The farmer signs a Notice of Intent to Implement (NOI) the BMPs listed on the checklist and file it with FDACS.
5. The NOI formally enrolls the farmer's operation under the BMP program.

6. The farmer implements all applicable BMPs as soon as practicable, but no later than 18 months after submitting the NOI, including record keeping on installed practices per FDACS standards.

Cost Share:

The FDACS BMP Program has program specific funds to support the implementation of BMPs. These funds cover up to 75 percent of the cost for implemented BMPs and can be combined with NRCS cost share funds.

Other Cost Share Opportunities:

State:

- The Tri-County Agricultural Area Water Management Partnership
- Facilitating Agricultural Resource Management Systems (FARMS) and Mini-FARMS program
- SFWMD Payment for Environmental Storage and Water Farming

Federal:

- Environmental Quality Incentives Program (EQIP)
- Conservation Stewardship Program (CSP)
- Agricultural Conservation Easement Program (ACEP)

Best Management Practices:

FDACS has adopted management and structural BMPs for most commodities in the state including citrus, vegetable-row crop, container nursery, sod, cow-calf, equine, dairy, poultry and specialty fruit and nut operations. Commodity-specific BMP manuals can be found here.

Some of the of BMPs funded under the FDACS BMP Program are technological BMPs such as soil-moisture-sensor technology, weather stations, remote sensing, GPS, grid sampling and variable rate technology. Traditional BMPs are often funded through the program as well including strip till, no till, well and trough systems, water control structures, retention/detention/tailwater recovery systems, stream crossings and fencing.

Participation:

Participation in the FDACS BMP Program varies by BMAP region. Currently there are almost 14 million watershed acres under BMAP active basin management and there are over 11,000 NOIs representing around 4 million agricultural acres on file. Areas with recently developed BMAPs tend to have less enrollment. Contrarily, the flagship Lake Okeechobee Watershed BMAP has 75 to 80 percent of agricultural operations enrolled.

Before the creation of the FDACS BMP Program in the Lake Okeechobee Watershed, agricultural water quality management was heavily regulatory and punitive for farmers. The contrast of regulatory and voluntary options is thought to have helped drive the early success of the program. Peer-to-Peer discussions about the FDACS BMP Program are also attributed to increasing interest and participation. The cost share incentive has also been beneficial to promoting adoption of FDACS

BMPs, and so has the program's willingness to fund technological BMPs. Similarly, the financial savings associated with some technological BMP implementation has been attributed to positive behavior change in farmers' management practices as well as increased interest in the FDACS BMP Program.

Perceived Farmer Likes and Dislikes

Like:

- The program funds technological BMPs
- Water and fertilizer savings associated with BMPs
- Optional recognition program allows farmers to be honored for their stewardship efforts

Dislike:

- Required record keeping after enrollment
- Interaction with the government

Challenges:

- Farmers who delay fulfilling their BMAP requirement (i.e. not submitting a NOI for FDACS BMP Program or Individual Monitoring). As of July 1, 2018, however, DEP established a new rule to regulate these delays.
- How to help farmers return to BMAP compliance after their operations and installed practices are damaged by extreme weather events.
- Difficulty in showing nutrient reduction progress on a watershed level, especially given the amount of legacy phosphorus in Florida's soils.

Success and Future Directions:

- BMAP watersheds have started to see positive trends in reduction of phosphorus loads.
- The program has received positive feedback from farmers about technological BMPS and the associated savings.
- Starting in 2018, the program will publish annual progress reports for all BMAPs.
- Piloting a cover crop cost share program.

Other State Programs and Initiatives:

- State Research on BMPs
- BMP Success Stories
- Mobile Irrigation Lab (MIL) Funding
- FDACS Mini-grants to IFAS for BMP demonstration projects

Iowa

Names: Soil and Water Conservation Cost Share Program (SWCCP); Water Quality Initiative (WQI)

Year Established: 1973, 2013

Relevant Water Basin: Upper Mississippi River

Description:
There are two main programs dedicated to agricultural stewardship of water quality funded by the Iowa Department of Agriculture and Land Stewardship (DALS). They are the Soil and Water Conservation Cost Share Program (SWCCP) and the Clean Water Iowa Water Quality Initiative (WQI).

SWCCP was established in 1973 to "protect production of Iowa's agriculture land." With an original focus on soil erosion, SWCCP now promotes and funds conservation practices that reduce sedimentation and keep nitrogen and phosphorus out of the water. WQI was developed in 2013 as a part of the Iowa Nutrient Reduction Strategy and the Clean Water Iowa Initiative. The goal of WQI is to reduce nitrogen and phosphorus losses from agricultural lands into ground and surface waters by 40 percent.

In both programs, state, federal, or district technicians work with farmers to determine best conservation practice for their operations and assist them in securing a contractor and cost share funding to implement these practices. In return, farmers sign maintenance agreements for the practices they install and are committed - including any future land owners - to maintain the proper function of the BMPs for a predetermined agreement period.

Funding:
The Environment First Fund, which is allocated from state racing and gaming revenue, funds SWCCP and WQI through a subsidiary fund called Resource Enhancement and Protection (REAP), which provides money for projects through state agency budgets or grants.

Key Partners:
State:

- Iowa Department of Agriculture and Land Stewardship (DALS)
- Soil & Water Conservation Districts (SWCD)
- State Soil Conservation Committee (SSCC)
- Drainage districts
- Levee districts
- ISU Cooperative Extension Service

Federal:

- USDA Natural Resources Conservation (NRCS)
- USDA Farm Services Agency (FSA)
- USDA Rural Development

Regulatory Certainty:
Neither SWCCP or WQI provide regulatory certainty to their participants.

Other Incentives:
- Cost share funding.

Program Length:
For both SWCCP and WQI, commitment to the programs is determined by the required maintenance agreements for the BMPs implemented. The maintenance agreements differ based on whether temporary or permanent practices are funded and can range from one year to 20 years of committed BMP implementation and upkeep.

Inspection Rate:
There are no formal inspections after maintenance agreements are signed. Instead, the program relies on notifications from SWCDs and other entities about the removal or poor maintenance of a SWCCP or WQI practice.

How Do Farmers Find Out About the Program?
The Soil and Water Conservation Districts are typically farmers' first point of contact about SWCCP and WQI. In addition to SWCDs, farmers also learn about both programs through peer-to-peer networks, field-based outreach, and advertisements in magazines and other publications.

Enrollment Process:
1. The farmer completes an application requesting funds from either the Soil and Water Conservation Cost Share Fund or WQI online or in person with his/her local SWCD.
2. SWCD evaluates each application using the priority system adopted for disbursement of allocated funds.
3. If selected, the farmer agrees to a maintenance agreement with SWCD to implement and maintain funded conservation practice.
4. The farmer hires a local contractor to implement the practices.
5. SWCD conducts a spot check on the installed practices.
6. SWCD distributes cost-share funds.

Cost Share:
SWCC and WQI will fund up to 50 percent of approved BMPs. Cost share funds are distributed to Iowa's SWCDs who can put local caps and priorities on the funds. For all districts, cover crop, tillage, and fertilizer cost share funds are available to farmers. Farmers new to planting cover crops receive

$25 per acre (repeat cover crop users receive $15 per acre), farmers new to no till or strip till receive $10 per acre and farmers using a nitrapyrin nitrification inhibitor when applying fall fertilizer receive $3 per acre.

Other Cost Share Opportunities:

State:

- Iowa Water Quality Loan Fund

Federal:

- Conservation Reserve Enhancement Program (CREP)
- Conservation Stewardship Program (CSP)
- Conservation Reserve Program (CRP)
- Environmental Quality Incentives Program (EQIP)

Best Management Practices:

Each of Iowa's 100 SWCDs can choose which BMPs they want to fund. Many SWCDs have put emphasis on terraces, which has resulted in being the most commonly implemented BMP statewide. Vegetated waterways and sediment control basins are the next most common BMPs implemented. WQI specifically promotes the adoption of cover crops, no till or strip till, and edge of field practices such as bioreactors and nitrogen reducing wetlands.

Participation:

Though the level of participation for SWCC could not be identified, the demand for the program is typically three times more than the allotted funding each year. WQI also experiences more demand than available funding can support. In 2017, 650,000 acres participated in the WQI and one million acres participated in 2018. The financial incentive of cost share funding has been the most successful tactic to increase interest and participation in both programs. The private agricultural sector has also been helpful in encouraging landowners to put cover crops on their acres through the SWCCP and WQI programs.

Perceived Farmer Likes and Dislikes:

Like:

- Cost Share

Dislike:

- Amount of paperwork
- Working with the government

Challenges:

- Demand for the program outweighs the available annual funds.
- Difficulty in convincing farmers of the long-term value of implementing water quality BMPs, especially edge of field practices, when these practices provide no direct benefit or return on investment to the farmer.

Success and Future Directions:

In January 2018, the Legislature passed and Governor Kim Reynolds signed into law SF 512, which provides more than $250 million ($28 million) for water quality efforts in Iowa over the next 12 years.

Other State Programs and Initiatives:

- Farm Management Demonstration Program
- Iowa Buffer Initiative
- Agricultural Drainage Well Closure Program
- Farm Demonstration Program
- State Watershed Protection Practices
- Iowa Farm Environmental Leader Award

Maryland

Name: Maryland Agricultural Certainty Program

Year Established: 2013

Relevant Water Basin: Chesapeake Bay

Description:
The Maryland Agricultural Certainty Program is a voluntary program that gives Maryland farmers a 10-year exemption from new environmental laws and regulations in return for having installed BMPs that enable their farms to already meet the 2025 Chesapeake Bay Total Daily Maximum Load (TMDL) goals. The program permits participants to conduct business in a predictable regulatory setting while accelerating BMP implementation to meet the Chesapeake Bay's water quality protection goals.

To participate in the Maryland Agricultural Certainty Program, farmers must already be in compliance with state and federal regulations including the implementation of both a Nutrient Management Plan (NMP) and a Soil Conservation and Water Quality Plan (SCWQP). Additionally, every field on operation must meet the applicable baselines, some of which are stricter than the Bay TMDL. Farmers can apply to the Maryland Agricultural Certainty Program for "Full Certainty" or a "Farm Evaluation Only." Under the "Full Certainty" track, the Maryland Department of the Environment (MDE) works along with Certainty program and MDA staff to evaluate the farm to determine compliance and eligibility for the program. Under the "Farm Evaluation" track, MDE is not involved in the review process to determine if a farm meets current TMDL baselines and other requirements to participate in the program. During the evaluation process for either track, each farm must be assessed using the online nutrient tracking tool which operates at a farm-scale and calculates nitrogen, phosphorus, and sediment loads specific to each field and uses that information to further determine eligibility for agricultural certainty program certification. Farms that are certified under the Certainty program are also pre-qualified to participate in nutrient trading if desired.

Funding:
USDA Conservation Innovation Grant (CIG) ($600,000; for program development), state general operating funds.

Key Partners:
State:

- Maryland Department of Agriculture (MDA)
- Maryland Department of the Environment (MDE)
- University of Maryland Center for Environmental Science
- Maryland Grain Producers Association
- Maryland Soil and Water Conservation Districts (SWCDs)

Federal:

- USDA Natural Resources Conservation Service (NRCS)
- U.S. Environmental Protection Agency (EPA)

Other:

- Chesapeake Bay Foundation
- Chesapeake Bay Commission

Regulatory Certainty:

Farmers certified under the Maryland Agricultural Certainty program receive a 10-year exemption from meeting new state and local regulations on nitrogen, phosphorus or sediment runoff.

Other Incentives:

- Pre-qualification for nutrient trading program.
- Public recognition as a Maryland Agricultural Certainty Certified Farm.

Program Length: 10 years

Inspection Rate:

Self-reporting by the farmer annually and on-farm inspection by a certified verifier every three years.

How Do Farmers Find Out About the Program?

Considerable effort was given to publicizing the initial launch of the Maryland Agricultural Certainty Program including mailing postcards and brochures to every farm in Maryland. The program also self-advertised at field days and other agriculture-related events where certified verifiers distributed handouts and spoke with farmers about the Certainty program. The program thinks most introductions to the program are by word of mouth from farmers or others in the agricultural industry. In addition to word-of-mouth and in-person contact, information about the Maryland Agricultural Certainty program can be found through the program website and local soil conservation districts.

Enrollment Process:

1. Farmer asks his/her local SWCD or the MDA for a pre-application and eligibility checklist.
2. Farmer determines what type of review to request ("Full Certainty" or "Farm Evaluation Only").
3. MDA sends the farmer an application and checklist to begin the application process.
4. Farmer completes the application and checklist.
5. A certified verifier:
    a. Conducts a brief interview to discuss current crop rotations, tillage, and fertilizer application.
    b. Reviews the farmer's Soil Conservation Water Quality Plan.
    c. Visits the farm to review the operation.
    d. Contacts a nutrient management specialist to evaluate the Nutrient Management Plan.

    e. Uses the Maryland Nutrient Trading Tool to evaluate each parcel to ensure that they meet baseline requirements.
    f. Submits a completed certainty report and accompanying documents to MDA for review and approval.
6. MDE reviews the verifier's report.
7. If "Full Certainty," MDE approves the operation for participation in the program or outlines conditions that need to be addressed, possibly with further field inspection.
8. If "Farm Evaluation Only," MDE will notify the farmer of the reviewer's results.
9. MDA completes the review and makes a final determination on whether it receives approval.
10. If approved, the farmer and MDA sign a 10-year certainty agreement.

Cost Share:

There is no program-specific cost share for the Maryland Agricultural Certainty Program. The program promotes the use of several state funding options, like the Maryland Agricultural Water Quality Cost-Share Program (MACS), and some federal funding options.

Other Cost Share Opportunities:

State:

- Maryland Agricultural Water Quality Cost-Share Program
- Cover Crop Program
- Low-Interest Loans for Agricultural Conservation (LILAC)
- Maryland Income Tax Subtraction Modification for Conservation Equipment
- Manure Matching Service
- Maryland Manure Transport Program
- Manure Injection Cost Share

Federal:

- Conservation Reserve Enhancement Program (CREP)
- Agricultural Conservation Easement Program (ACEP)
- Agricultural Management Assistance (AMA)
- Conservation Reserve Program (CRP)
- Conservation Stewardship Program (CSP)
- Conservation Technical Assistance (CTA)
- Environmental Quality Incentives Program (EQIP)

Best Management Practices:

As required by law, all Maryland farmers are prohibited from putting down manure six months out of the year, must have stream-line fencing, and 10 to 35 feet setbacks for manure or fertilizer application. The most common voluntary BMPs implemented under both the Maryland Agricultural Certainty Program and MACS are cover crops, no till, and buffers (including grassed, forested, wetlands and filter strips). Enhanced nutrient management is also on the rise (including split applications, developing water plans, incorporating field residuals, optimizing fertilizer reduction, precision agriculture and GPS technologies).

Participation:

Since the program launch in 2016, two farms have enrolled in the Maryland Agricultural Certainty Program. Both farms are mixed operations with both crops and animals. As the program grows, it is aiming for at least 10 percent participation with one participating farm in each of Maryland's 23 counties.

One possible reason for the slow participation rate is that Maryland farmers are considered to already be progressive when it comes to protecting and improving water quality. For example, over 50 percent of Maryland's farmers plant cover crops while the national rate is around two percent. Demonstrating the Maryland Agricultural Certainty Program to recognize farmers for what they are already doing is one of the ways to further promote participation. Likewise, having credible sources on water quality, such as the Chesapeake Bay Foundation, endorse the Maryland Agricultural Certainty Program by enrolling one of their farms is another tactic intended to further promote participation in the program.

Perceived Farmer Likes and Dislikes

Likes:

- Assessment tool eliminates "guessing game" about whether a field complies.

Dislikes:

- Amount of Paperwork.
- Pre-approval and approval process is time consuming and redundant.

Challenges:

- Limited program staff.
- Limited state and program funds.
- Economic instability of the agricultural sector.
- Demonstrating to farmers how additional BMPs will improve their bottom line.
- Structuring incentives in a way that doesn't require giving out cash payments (e.g. discounts, tax credits).

Success and Future Directions:

- Designing a new relaunch for the Maryland Agricultural Certainty Program to reignite interest and participation.
- Intention to incorporate agroforestry into agricultural environmental stewardship programs.

Other State Programs and Initiatives:

- Phosphorus Management Tool
- Maryland Department of Agriculture's Animal Waste Technology Fund
- Healthy Soils Program
- Carbon Sequestration Pilot Program

Michigan

Name: Michigan Agriculture Environmental Assurance Program (MAEAP)

Year Established: 1997

Relevant Water Basin(s): Western Lake Erie Basin, Saginaw Bay

Description:
The Michigan Agriculture Environmental Assurance Program (MAEAP) is "a comprehensive, proactive and voluntary agricultural pollution prevention program" that takes a systems approach to assisting producers in evaluating their farms for environmental risks. MAEAP helps farmers of all sizes and commodities voluntarily prevent or minimize agricultural pollution risks through cost-effective pollution prevention practices and assistance with compliance to state and federal environmental regulations. The program was first developed in 1997 by a coalition of farmers, commodity groups, state and federal agencies, and conservation and environmental groups. MAEAP's goal was to educate farmers about management options that would help protect and enhance the quality of natural resources throughout Michigan. The program completed their first verification in 2002, and Michigan Governor Rick Snyder codified MAEAP into law as the first legislation of his new administration in 2011.

MAEAP consists of three phases:

1. Education
2. Farm-specific risk assessment and practice implementation
3. On-farm verification

Additionally, MAEAP consists of four program areas: Livestock, Farmstead, Cropping, and Forest Wetlands and Habitat (FWH). The livestock system reviews management practices of manure storage, feed storage, transfer and land application, record-keeping, and lot management related to livestock production. The farmstead system reviews potential risks at the farm site including chemical, fuel, pesticides, and manure storage. The cropping system assesses crop production sites for risks regarding how pesticides and nutrients are applied, erosion is controlled, and records are kept. The FWH system assesses management practices related to on-the-farm woodlands, wetlands, and other habitat types. MAEAP allows for farmers to pick and choose the system areas that fit their farms, and farmers can have multiple verifications.

Funding:
Water Quality protection fees from pesticide and fertilizer use contribute to the Freshwater Protection Fund which funds the majority of MAEAP's operational costs. MAEAP also receives $1.15 million in

state general funds. Technical assistance is provided through grants to fund Michigan's SWCDs' work in Phase Two of MAEAP.

Key Partners:

State:

- Michigan Department of Agriculture and Rural Development (MDARD)
- Michigan Soil and Water Conservation Districts (SWCDs)
- Michigan Association of Conservation Districts (MACD)
- Michigan Water Stewardship Program (MWSP)

Federal:

- USDA Natural Resources Conservation Service (NRCS)

Regulatory Certainty:

Participation in MAEAP gives producers protection from civil fines and penalties for accidental pollution discharges into waterways during accidental discharge or an "Act of God Weather Event" so long as they act promptly to correct the condition upon discovery and report the situation to the Michigan Department of Environmental Quality (MDEQ). Producers are still responsible for natural resources damages. Beyond these protections, the owner of a MAEAP verified farmstead can be confident his/her farm meets applicable Right to Farm Generally Accepted Agricultural Management Practices and is positioned to comply with state and federal environmental laws.

Other Incentives:

- Recognition as environmental leader from peers and neighbors.
- Farm signage.
- Eligibility for Restricted Use Pesticide credits.
- Higher rankings and increased access to EQIP funds.
- Rebates, low-cost loans, and reduced liability insurance premiums from participating companies, organizations, and associations.

Program Length: 5 years

Inspection Rate:

Producers are eligible to complete a risk assessment every three years or contact MAEAP technicians anytime there are changes to the farm.

How Do Farmers Find Out About the Program?

Farmers learn about MAEAP most commonly through farmer-to-farmer networks, local seed dealers, local equipment dealers, and other local dealers and advisors. Interested farmers can also talk with their local MAEAP Conservation District staff, local SWCD, county Farm Bureau office, or Michigan Milk Producers Association field staff about MAEAP.

Enrollment Process:

1. Farmers attend an educational meeting to learn more about MAEAP and associated environmental topics. Alternatively, producers can watch educational videos for Phase One credit.
2. Farmers work with their local Conservation District in Phase Two to complete a farm-specific risk assessment for the program area(s) of their choice using the A*Syst tools, which determines where the farm can minimize environmental risks and agricultural pollution.
3. At their own pace, farmers develop a plan to make necessary improvements that follow procedures based on the A*Syst system for the program area in which the farmer is seeking verification (i.e. Farm*A*Syst, Crop*A*Syst, Livestock*A*Syst, Forest, Wetland and Habitat*A*Syst).
4. Local SWCDs provide information about education, technical, and financial assistance including cost share funds for practice implementation.
5. Farmers implement their A*Syst plan including recommended environmentally sound practices.
6. The farmer requests a third-party verifier visit from MDARD to ensure the farmer has implemented environmentally sound practices and has appropriate records and management strategies in place.
7. After verifying implementation and records management strategies, the third-party verifier officially verifies the operation.

Cost Share:

There is no program-specific cost share for BMP implementation. The program instead promotes the use of several state and federal funding options for large implementation projects. MAEAP also provides small grants to cover the cost of sample collection and delivery, drain plugs, spill kits, or other small projects that need to be completed before a farmer can be MAEAP verified.

Other Cost Share Opportunities:

State:

- Michigan Department of Environmental Quality 319 grants

Federal:

- Natural Resource Conservation Service (NRCS)
- Agricultural Conservation Easement Program (ACEP)
- Conservation Reserve Program (CRP)
- Conservation Stewardship Program (CSP)
- Environmental Quality Incentives Program (EQIP)

Best Management Practices:

MAEAP promotes the idea that the right BMPs and interventions vary from farm to farm and encourages implementing a system of BMPs versus a single practice on an operation. The most widely adopted BMPs include conservation tillage, cover cropping, buffer strips, and nutrient management.

Additionally, drainage water management that improves the capacity and efficacy of drain tiles has been strongly implemented in the Western Lake Erie Basin of Michigan and is starting to spread across the state. Increasingly, Michigan farmers are using saturated buffers and phosphorous-capture BMPs (which trap dissolved reactive phosphorus in phosphorous-absorbing materials) to combat nutrient pollution.

Participation:

There were 4,673 verifications as of August 2018. MAEAP is committed to maintaining a minimum of an 85 percent re-verification rate for farms currently verified in the Western Lake Erie Basin. It should be noted that one farm can have multiple verifications, and these values do not represent the total number of participating farms.

Perceived Farmer Likes and Dislikes

Likes:

- Participation is voluntary at all stages.
- Producers can work through the phases of verification at their own pace.
- Producers develop relationships with local technicians and SWCDs.
- Producers enjoy telling their peers and neighbors about their beneficial environmental practices.

Dislikes:

- None identified.

Challenges:

- Difficulty in tracking consistency of implementation, farmer experience, success metrics, and program outcomes as a mature program with four program areas and thousands of verifications.
- High rate of technician turnover because of limited benefits or technicians using the position as a springboard to other opportunities.
- Declines in the farm economy lead to declines in the ability of farmer to make recommended changes.
- Commitment to protecting farmer data can limit the nature and extent of partnering with organizations, especially research institutions.
- Grants are an inconsistent source of financial support for Phase Two, and many SWCDs feel that more consistent base funding is necessary.
- Non-participants are concerned about receiving scrutiny of their farms if they participate in MAEAP.
- Difficulty in conveying to non-participants that MAEAP is a partnership effort and not a "typical" government program.

Success and Future Directions:

- The number of verified farms increases every year.
- MAEAP partners with over 100 agricultural organizations, university, state and federal agencies, local government, and conservation groups, which is a level of industry participation unique to Michigan.
- Blueberry growers successfully use their MAEAP certification in green marketing efforts.
- As a mature program with four program areas and thousands of verifications, the program is considering how it can remain flexible and adapt to change.
- Consumers want to buy sustainable products. MAEAP is working to grow the marketing connection between verification and sustainable farming practices that consumers demand.
- MAEAP is working to increase the breadth and depth of partnerships, ensuring that program development and implementation reflects the diversity of interests and stakeholders of the program.
- MAEAP is working to partner with MDEQ and Michigan State University to provide edge-of-field monitoring to better understand and demonstrate the effectiveness of conservation practices.

Other State Programs and Initiatives:

- Clean Sweep Pesticide Disposal
- Pesticide Container Recycling

Minnesota

Name: Minnesota Agricultural Water Quality Certification Program (MAWQCP)

Year Established: 2013

Relevant Water Basins: Upper Mississippi River, Lake Superior

Description:
The Minnesota Department of Agriculture describes MAWQCP as: "a voluntary opportunity for farmers and agricultural landowners to take the lead in implementing conservation practices that protect our water." The program is a state-federal partnership which was initiated through a memorandum of understanding in 2012, piloted in three small sub-watersheds in 2014, given statutory order for statewide dispatch in 2015, and fully operational in 2016. MAWQCP provides producers with regulatory certainty, recognition, and priority technical assistance while providing consumers with assurance that certified producers will protect Minnesota's watersheds through on-farm conservation practices.

Funding:
MAWQCP is funded through Minnesota's Clean Water, Land, and Legacy Amendment which is a 100 percent public, constitutionally dedicated funding source. On average, $100 million dollars of the Land Legacy Fund goes to water protection annually including $2 million that is dedicated to MAWQCP. The program also received a 5-year USDA-NRCS Regional Conservation Partnership Program (RCPP) award (consisting of $7 million in financial assistance available to growers for implementing conservation practices) to further develop and expand MAWQCP as a model for other states.

Key Partners:
State:

- Minnesota Board of Water & Soil Resources (MBWSR)
- Minnesota Department of Agriculture (MDA)
- Minnesota Department of Natural Resources (MDNR)
- Minnesota Pollution Control Agency (MPCA)
- Minnesota Soil and Water Conservation Districts (SWCDs)

Federal:

- USDS Natural Resources Conservation Service (NRCS)

Regulatory Certainty:
Once certified, producers receive regulatory certainty and are deemed to be in compliance with any new water quality rules or laws in the state of Minnesota during the 10-year period of certification.

This certainty is a commitment provided by Minnesota Department of Agriculture, Minnesota Department of Natural Resources, Minnesota Board of Water and Soil Resources, and Minnesota Pollution Control Agency. However, prior to recertification, or upon expiration or termination of this agreement, producers are required to comply with all current water quality laws and regulations. The MAWQCP certification does not preclude enforcement of a local rule or ordinance by a local unit of government.

Other Incentives:

- Field signs and use of the MAWQCP logo.
- Use of certification status to promote business as protective of water quality.
- Priority for dedicated financial assistance.
- Comprehensive review of farm management practices.

Program Length: 10 years

Inspection Rate:

Producers and landowners are expected to contact their local certifier to update their certification records at any time land is added or practices are changed during the certification period. All MAWQCP-certified operation will receive at least one random audit during the ten-year certification period.

How Do Farmers Find Out About the Program?

The MAWQCP is designed to provide services locally for producers and utilize local expertise via staffing and supporting eight regional service areas. Thus, in addition to the program website, the Minnesota Department of Agriculture recommends that producers considering MAWQCP contact their local SWCD or a local certifying agent. There is also access to program updates through the MAWQCP Email List.

A January 2017 survey of certified growers (50 percent response rate) reflects MDA recommendations for learning about MAWQCP. Eighty percent of respondents learned about MAWQCP through their Soil and Water Conservation Districts. MAWQCP also has a formal Memorandum of Understanding with Land O'Lakes, Inc. and contracts with two independent crop consultant businesses that work to inform their clients about the program and get them certified.

Enrollment Process:

Enrollment in MAWQCP is a 3-step process:

1. Self-verification: Producers are expected to maintain compliance with existing regulations at the time of certification as a part of the program. Producers self-verify that they are meeting existing MN laws and regulations regarding water quality (i.e. shoreland setbacks, feedlot permits, disposal of waste).

2. Assessment: Each field within the operation is evaluated using the Assessment Tool. The assessment tool supports a risk assessment model that collects and analyzes data inputs from the following categories for every crop grown on every parcel within the entire farming operation: physical field characteristics, nutrient management, tillage management, pest management, irrigation and tile drainage management, and conservation practices. Further explanations are listed here. The output is a unitless index score (1-10) that identifies potential risk to water quality on a scale of 1 as highest risk. Negative score adjustments are made for practices that negatively affect water quality and positive score adjustments are made for practices that positively affect water quality. MAWQCP-licensed certifiers use the resultant risk assessment data for identifying treatment targets and strategies to mitigate water quality risks on crop-by-crop, field-by-field basis across the entire farm.
3. Verification: On-farm field-by-field verification by a MAWQCP-licensed certifier to identify any further WQ-related issues.
4. If an operation mitigates all identified risks for every cropping scenario on every parcel, the changes are input into the assessment tool to record those new practices and a resulting assessment score of 8.5 or higher is recorded. Upon recording all mitigation actions, clearing on-site inspection, and verifying compliance with current regulations, the producers and landowners then have the opportunity to enter into a 10-year certification contract that ensures regulatory certainty from the State of Minnesota.

Cost Share:

MAWQCP supports Minnesota SWCDs financially to provide technical assistance to producers seeking certification. There is no fee to the producer. MAWQCP also provides program specific cost-share funds to producers through the Minnesota Agricultural Water Quality Certification Program Financial Assistance Grant. These funds are available to Minnesota producers who are actively seeking certification as evidenced by a signed MAWQCP Producer Application or are already certified and need mitigation actions on newly acquired land or for new forms of production. The grant awards up to $5,000 to eligible producers implementing agricultural BMPs. This grant may fund individual conservation practices or serve as an add-on after other public funds are applied, not to exceed a total public payment cost of 75 percent. This pool of funds allows growers to save money and time on implementation when compared to the costs and processing periods of federal programs.

Other Cost Share Opportunities

State:

- Agricultural Best Management Practices Loan Program

Federal:

- Conservation Stewardship Program (CSP)
- Environmental Quality Incentives Program (EQIP)
- Regional Conservation Partnership Program Award (RCPP)

Best Management Practices:

A comprehensive inventory of agricultural BMPs (ag-BMPs) that address water quality impairments in Minnesota can be found in the ag-BMP Handbook. The most common surface BMPs include buffers, grassed waterways and cover crops implemented to USDA NRCS practice standards. The most common subsurface BMPs include field inlet treatments (filtering or closing off drainage systems, switching out field drains for perforated subsurface tile) and adopting University of Minnesota BMPs for fertilizer source, application rate and timing prescribed for each cropping system.

Participation:

So far MAWQCP has achieved a two percent participation rate in the state. These operations are widespread across the state in over 70 counties. Farmer peer-to-peer networks were cited as the most successful way of encouraging participation in MAWQCP. Farmers hearing from certified farmers and how the program has added value to their experience was said to build on program participation. Likewise, these conversations were said to reduce the understandable wariness about participating in a government program. In a survey of enrolled producers, 99 percent said they were at least very likely to recommend the program to farmers (50 percent response rate).

Perceived Farmer Likes and Dislikes:

Likes:

- Farmers appreciate the on the ground, whole-farm service assessment individualized to their fields, crops, geographies, and economic opportunities. This site-specific assessment is preferred to an alternative "one-size fits all" approach to conservation plans prescribed to all farms. Some growers even were said to describe the assessment process as a "farm check-up" where they can get a no-risk professional prescription to address any issues.

Dislikes:

- Though the vast majority of growers said they spent 10 hours or less on the program, farmers dislike the time involved in getting certified. This includes the window of time between beginning an application and receiving a certification. For example, a combination of difficulty in coordinating assessments with growers' schedules, accounting for changes in crop type, or changes in land ownership could result in some operations taking 2 years to get certified.

Challenges:

- Effectively communicating that enrollment in MAWQCP will not put them at risk for negative consequences from the government but instead will provide benefits like regulatory certainty and financial assistance.
- Effectively Communicating what regulatory certainty means for a farmer.
- Determining the best method to certify farms (MAWCQP ultimately decided to use an acre-by-acre risk assessment and mitigation process).
- There is not enough funding available to support the number of farms interested in getting certified.

Successes and Future Directions:

- The creation of the $5,000 MAWQCP Financial Assistance Grant has assisted in developing site specific, cost effective approaches to cover cropping and other BMP implementation that are comparable to NRCS standards but operate outside of the federal framework.
- Relationships formed with the private sector have proven to be beneficial for certifying farmers and fine-tuning assessment processes.
- Piloting business use of the MDA initial assessment process to add an environmental component to their sales regimen. Businesses who run their sales scenarios through them can show their clients which products and services will be more or less risky for the environment.
- Positive relationships with agricultural and commodity organizations like dairy producers and corn growers have led to pledges by cooperators to have members certified under MAWQCP as a way of achieving the environmental goals for their membership.
- As a multi-agency project, the MN Pollution Control Agency monitors the state waters and provides official records of changes in water quality associated with MAWQCP certifications.
- The MAWQCP certification process provides landlords with complete, written production guidelines for every crop on every field they own that can readily be included in lease agreements with their renters. In essence, professionally developed "conservation leases."
- Historically, conservation delivery has endured a challenge where producers may adopt and implement conservation only if, and only for so long as, they receive public payment to do so. The MAWQCP certification overcomes that challenge by legally contracting producers to perform comprehensive conservation for 10 years without corresponding ongoing payment for doing so.
- Concerns among some constituencies about credit/payment programs functioning to "pay to the polluter" are overcome by MAWQCP functioning as a threshold whereby an entire farming operation must mitigate all its water quality risks in order to be eligible to participate in a credit/eco-payment project.

Missouri

Name: Missouri Agricultural Stewardship Assurance Program (ASAP)

Year Established: 2015

Relevant Water Basin: Upper Mississippi River

Description:
The Missouri Department of Agriculture describes ASAP as: "A certification program that officially recognizes Missouri farmers and ranchers who strive to be responsible stewards of the land. It's meant to acknowledge and reward those who proactively protect the environment, employ sound management practices and use science-based technology to produce safe food, fuel and fiber for consumers."

ASAP has seven program areas in which farmers can be verified: grassland, livestock, forestry, specialty crops, farmstead, energy, and/or cropland.

Grassland focuses on grazing management, nutrient management, and noxious weed and brush management. Livestock focuses on health management, waste management, livestock mortality management, and the management of sensitive areas. Forestry focuses on general management, timber sales & management, and invasive species and forest pests. Farmstead focuses on drinking well water condition, abandoned wells, preventing backflow or back siphoning, abandoned wells, pesticide and fertilizer storage, petroleum product storage, and recycling waste products annually. Energy focuses on efficient lighting management, efficient water management, efficient buildings, efficient machinery use, and efficient farming techniques.

Funding:
ASAP is operationally funded through Missouri Department of Agriculture (MDA).

Key Partners:
State:

- Missouri Department of Natural Resources' Soil and Water Conservation Program (SWCP)
- Missouri Soil and Water Conservation Districts (SWCD)
- Missouri Department of Conservation (MDC)
- University of Missouri Extension (MU)

Federal:

- USDA Natural Resources Conservation Service (NRCS)

Regulatory Certainty:
ASAP does not provide regulatory certainty to its participants, but instead is a stewardship program model that provides producers the ability to market themselves as a farm that uses sound, sustainable practices to consumers and addresses consumer concerns about production management practices.

Other Incentives:
- Provision of a "Media Kit" with farm signage and a news release template.
- Physical and digital stamp for marketing materials.
- Recognition on ASAP website.
- Early access to educational programs.
- Access to and competitive advantage in national and international markets.

Program Length: Indefinite

Inspection Rate:
There is one on-site check after an application is submitted and no spot checks after verification.

How Do Farmers Find Out About the Program?
The program website recommends producers contact their local SWCD or MDA office to learn more about and participate in ASAP. Producers can also submit information about their operation for verification through an online application, by printing the application and mailing it, or calling to have an application sent via mail.

Producers also make made first contact with ASAP through in-person marketing at events such as the Missouri State Fair, Farm Bureau annual meetings, and other agriculture and commodity group conventions and conferences around the state. The program has been described as gaining a lot of traction from marketing efforts at these events, especially because applications are made available at the ASAP booth for farmers to pick up and submit in person.

Enrollment Process:
Each of the seven program areas has its own list of best practice criteria that should be met before certification. Featured here are the prerequisite criteria listed for the cropland and livestock programs. Criteria for the cropland program area include implementing a nutrient management plan accordant with the 4R framework, implementing an irrigation water management plan, and maintaining records of nutrient and water inputs utilized for each field. Criteria for the Livestock program area include implementing a herd health management plan and applying livestock waste in accordance with a nutrient management plan. The steps are as follows:

1. Producer fills out an application (online or print) for the desired certifications designating if prerequisite BMPs are "Fully Implemented," "Partially Implemented," "Not Implemented," or "Not Applicable".
2. MDA representative reviews application and schedules a farm visit.

3. MDA representative performs a two to three-hour farm visit.
4. MDA representative provides a preliminary finding at the conclusion of the farm visit.
5. MDA follows up with an official letter stating if the operation meets the program certification requirements.
6. Once approved, MDA provides farm with ASAP signage.
7. If a farm is not approved, they are encouraged to contact the Soil and Water Conservation Program, establish an eligible conservation plan, then return and apply to ASAP.

Cost Share:

There is no program-specific cost share for implementation of BMPs. The program promotes the use of several state and federal funding options, especially the Missouri Soil and Water Conservation Program (SWCP). The SWCP was established by farming communities and urban centers in Missouri in the 1980s to pass a parks and soils sales tax. One half of this tax is used for funding soil erosion and water quality conservation practices for producers (about $40 million per year).

Other Cost Share Opportunities:

State:

- The Missouri Soil and Water Conservation Program
- Missouri Agricultural and Small Business Development Authority (MASBDA) Bridge Loan Program
- MASBDA Single-Purpose Animal Facilities Loan Guarantee Program

Federal:

- Environmental Quality Incentives Program (EQIP)
- Conservation Reserve Program (CRP)
- RCCP Cover Crops for Soil Health and Water Quality Program

Best Management Practices:

Each program area (Grassland, Livestock, Forestry, Specialty Crops, Farmstead, Energy, and Cropland) has a specific list of desired BMPs organized by the organization that will fund them. The most commonly used BMPs focused on addressing soil loss, including terraces and ponds to address erosion.

Participation:

Missouri has close to 100,000 farms and is second in the nation for agriculture. While the number of enrolled operations compared to total number of farms is low, ASAP has participation from all regions in the state. The initial program launch was described as strong in terms of the rate of subsequent applications. At the time of writing however, the program is reducing the number of applications they are accepting to reassess their verification model.

Tactics cited as helpful for encouraging participation in the program included the SWCDs marketing plan which not only markets the importance of water and soil management in MO, but also how MO

fits into the bigger picture in the Midwest, and the importance of producers leaving their farms and natural resources in better condition than what they inherited them for the next generation of farmers.

Perceived Farmer Likes and Dislikes:

Likes:

- Promotional signage for their operation.
- Positive feedback from neighbors and people in their community.

Dislikes:

- None identified.

Challenges:

- Establishing a rigorous verification model.
- Recruiting enough persons with expertise to conduct verifications across the state.
- Little interest from industry groups.
- Verifying farms requires a large amount of human and capital resources (travel, application review, cost of signage).
- Focus on commodity trade issues in the industry can overshadow the need to prioritize a program like ASAP.

Success and Future Directions:

- Developing an all-inclusive approach that incorporates not only the Missouri Department of Agriculture but the Department of Natural Resources, industry, groups, commodity associations, and other partners and stakeholders.
- Tying ASAP into the "Missouri Grown" Program as an extra marketing incentive for participation in ASAP.
- Preparing the next generation for agricultural jobs coming out of Missouri.
- Streamlining the program structure from seven program areas to a few more focused areas
- Building a base of certifiers with strong credentials to sign off on verifications.
- Developing a model or tool that can be used to help certifiers and farmers complete the assessment and verification process.

Other State Programs and Initiatives:

- Missouri Nutrient Reduction Strategy
- Missouri Nutrient Trading Workgroup

Important Note: At the time of writing, ASAP was in the process of re-evaluating its program structure. With consideration of a more rigorous verification process, implementing a certification length, and identifying diversified funding sources. Shortly after this state summary was completed, the ASAP program was discontinued due to "a lack of funding to implement the program effectively."

New York

Name: Agricultural Environmental Management (AEM)

Year Established: 1993

Relevant Water Basins: Catskill/Delaware and Croton Watersheds

Description:
The New York State Department of Agriculture and Markets describes the Agricultural Environmental Management (AEM) program as: "a voluntary, incentive-based program that helps farmers make common-sense, cost-effective and science-based decisions to help meet business objectives while protecting and conserving the State's natural resources."

New York State farmers work with local AEM resource professionals to develop comprehensive farm plans that ensure healthy water quality standards for New York's watersheds. Twenty three percent of land in New York state is dedicated to over 36,000 farms that produce over $5.7 billion in agricultural sales annually. New York State has more than 500 Concentrated Agricultural Feeding Operation (CAFO) farms, most of which are dairy farms with 300 or more cows. Meanwhile, New York City, where the drinking source is unfiltered, relies heavily on watershed and land use management to ensure that water stays clean enough to avoid filtration. Assuring safe drinking water supply upstream of New York City and other city centers like Syracuse was influential in the development of AEM. The New York State Department of Agriculture and Markets thus designed a program that was accessible to producers across the state of New York, and AEM operates based on a state-wide framework.

AEM describes its core concepts as voluntary, watershed-based, customized farm-by-farm, a team approach, cost effective, statewide, locally-led and implemented, tested and science-based, and confidential. Farmers choose whether to participate in the AEM. The program is carried out within the context of holistic watershed planning, and natural resource and business conditions unique to each farm are considered throughout the AEM process. AEM also coordinates technical assistance from state, federal & local government programs, and the private sector, while targeting program resources to farms with the greatest potential for impacting the environment.

AEM's program structure consists of 5 Tiers:

- Tier 1 – Inventory current activities, future plans and potential environmental concerns.
- Tier 2 – Document current land stewardship; assess and prioritize areas of concern.
- Tier 3 – Develop conservation plans addressing concerns and opportunities tailored to farm goals.
- Tier 4 – Implement plans utilizing available financial, educational and technical assistance.
- Tier 5 – Evaluate to ensure the protection of the environment and farm viability, look at how well they've minimized risk, and make sure conservation practices are being maintained.

Funding:
AEM is funded through the Environmental Protection Fund which is derived from Real estate transfer taxes. From this fund, as of 2014, over $43 million had been committed for non-point source abatement and control projects with about $1.5 million provided annually to help farms implement an Agricultural Environmental Management plan.

Key Partners:
State:

- NYS Department of Agriculture & Markets
- New York State Soil and Water Conservation Committee
- County Soil and Water Conservation Districts (SWCDs)

Federal:

- USDA Natural Resources Conservation Service (NRCS)

Regulatory Certainty:
Participation in AEM gives producers assurance that if there is a significant, unexpected runoff event beyond what their AEM plan is designed to accommodate, they will not face fines or regulatory action.

Other Incentives:

- Access to cost share funding.
- Access to market share.
- Eligibility for NY Grown and Certified marketing program with Tier 2 compliance.
- Eligibility for the Agricultural Environmental Management Award.

Program Length: Indefinite

Inspection Rate: 3 years for farms with Tier 2 level of participation.

How Do Farmers Find Out About the Program?
Local Soil and Water Conservation Districts are the most common means by which farmers find out about AEM and are the most heavily involved in recruiting producers to AEM. Farmers are also recruited to the program through peer-to-peer recommendations, AEM promotion at field days and other outreach events, and the Cornell University cooperative extension.

Enrollment Process:
The process of participating in AEM's 5 Tiers include:

1. A short questionnaire summarizes current farm activities, future plans and identifies environmental conservation interests (Tier 1).
2. Worksheets help farmers understand and document current environmental practices while assessing potential environmental concerns (Tier 2).

3. Local teams of resource professionals help farmers develop environmental farm plans to address concerns identified in Tier 1 and Tier 2 (Tier 3).
4. AEM partners provide technical, educational, and/or financial assistance to help farmers implement priority practices from their Tier 3 environmental farm plans (Tier 4).
5. Opportunity to evaluate and update plans and/or implemented practices to ensure continued environmental conservation and farm viability (Tier 5).

Cost Share:

AEM has a program-specific fund to support technical assistance for farmers called the AEM Base Funding Program. The AEM Base Funding Program provides non-competitive funding to all interested districts in providing farm-level technical assistance for planning, implementing and evaluating conservation practices based on local priorities and individual farm needs.

Within the AEM framework is another pool of program-specific funding call the Ag NonPoint Source Abatement and Control Program (AgNPS). AgNPS is a competitive grant program that awards cost-share funding to farmers to implement BMPs to reduce and prevent agricultural sources of pollution into New York State watersheds.

Other Cost Share Opportunities:

State:

- None identified.

Federal:

- Agricultural Conservation Easement Program (ACEP)
- Agricultural Management Assistance (AMA)
- Emergency Conservation Program (ECP)
- Continuous Enrollment Conservation Reserve Program (CCRP)
- Conservation Loan Program (CL)
- Conservation Reserve Enhancement Program (CREP)
- Conservation Stewardship Program (CSP)
- Environmental Quality Incentives Program (EQIP)

Best Management Practices:

Comprehensive descriptions of BMPs supported by AgNPS can be found in the Agricultural Best Management Practice Systems Catalogue. Likewise, the system description, purpose, pollutants controlled, effectiveness, cost, and available cost share opportunities for 19 operational, structural, and vegetative BMP system types are available through the EBM guide.

For many years mostly, structural practices were implemented under AEM. This trend then shifted to increase cropland conservation systems. There is a focus on nutrient management for surface and subsurface runoff under the AEM framework including comprehensive nutrient planning, increasing biofiltration of tile drain systems, waste management systems, no till, and conservation crop rotation.

Soil health is a priority as well with an increase in the adoption lot of cover crops, riparian buffers and nutrient management systems in recent years.

Participation:

About 25 percent of farms are enrolled statewide with 12,000 to 14,000 farmers participating at a Tier 1 level and 10 to 15 percent of farmers in higher tiers. All CAFOs and large dairy farms are required to participate in AEM.

Perceived Farmer Likes and Dislikes

Likes:

- Can work with SWCDs with ease
- Prefer working with SWCDs instead of directly with the government

Dislikes:

- The amount of paperwork
- Navigating bureaucracy
- Standardized BMPs can be outside of farmers' price range or vision for implementation which leads to farmers addressing water quality issues outside of the AEM framework.

Challenges:

- Declines in the farm economy tend to lead to declines in the level of interest and participation in cost share practices.
- Navigating generational differences in program interest and participation.
- Identifying changes and opportunities in farm family dynamics to recommend and implement a recommendation.

Success and Future Directions:

- Farmers invest their time in the program at no financial cost unless they decide to implement practices.
- State and county appropriations support AEM efforts.
- Dedicated cost share funds support help offset the cost to farmers.
- Reaching out to new and young farmers has been beneficial in promoting conservation and other BMPs.
- The tiered program structure and regular farm check-ups have allowed the program to establish long-term relationships with AEM participants.
- In the short term, the program wants to increase participation.
- In the long term, the program wants to improve quantification tools such as watershed modeling, edge of field monitoring, evaluating carbon storage and measuring nutrient and soil decreases in waterways.
- Given the success of the program, the program is considering whether to make participation in at least Tier 1 of the program a requirement or to keep the program voluntary.

Other State Programs and Initiatives:

- Good Agricultural Practices (GAP)
- New York State Grown & Certified Program
- The Farmland Implementation Grant Program (FPIG)
- Climate Resilient Farming (CRF) Program
- The Land Trust Grants Program

Vermont

Name: Vermont Environmental Stewardship Program (VESP)

Year Established: 2016

Relevant Water Basin(s): Lake Champlain

Description:
The Vermont Environmental Stewardship Program (VESP) is "a voluntary program that encourages and supports local agricultural producers to achieve environmental and agricultural excellence." VESP aims to accelerate the improvement of Vermont's water quality through implementing BMPs and celebrating farmers who already demonstrate a high level of environmental stewardship.

VESP was developed as a result of a 2013 Vermont Agricultural Working Group which provided a forum for a diversity of farms to share their input on the conservation programs they felt were most needed. Almost all of the participants expressed the need for a program that provided public recognition for farmers that already go above and beyond what Vermont's Required Agricultural Practices (RAPs) require of farmers to protect and improve water quality in the state. Farmers must meet high nutrient management, sediment and erosion control, soil health, greenhouse-gas emissions and carbon sequestration, and pasture health standards to be VESP certified. VESP identifies three program characteristics that set it apart from other voluntary agricultural stewardship programs: 1) VESP certification may not require any management changes by the farmer, 2) soil health is a key indicator for VESP certification, and 3) public recognition is the main incentive for VESP certification.

VESP's piloting process was from 2016 to 2018 in which a diverse set of 10 to 12 farms from various geographic locations work with VESP technicians to assess the workload, time, and costs necessary to support a farm through the VESP certification process. The pilot process also helped establish an environmental baseline of various agricultural management styles. At the end of the pilot period, recommendations will be made for VESP's full program structure.

Funding:
VESP is funded by a USDA Conservation Innovation Grant, VAAFM clean water grants ($200,000) and the Vermont Department of Environmental Conservation ($600,000)

Key Partners:
State:

- Vermont Agency of Agriculture, Food and Markets (VAAFM)
- Vermont Association of Conservation Districts
- Vermont Department of Environmental Conservation (VDEC)

- University of Vermont Cooperative Extension

Federal:

- USDA Natural Resources Conservation Service (NRCS)

Regulatory Certainty:

VESP does not provide regulatory certainty to its participants, but instead utilizes recognition-based incentives to promote a culture of high-quality environmental stewardship among farmers.

Other Incentives:

- Technical assistance
- Financial assistance
- On-farm signage recognizing VESP certification
- 10 free soil health tests from the Cornell extension

Program Length: 5 years

Inspection Rate: Annually

How Do Farmers Find Out About the Program?

The most common form of communication about VESP is by word of mouth from farmer-to-farmer networks. Another successful promotion tactic was hosting a field day dedicated to the launch of VESP where the governor was in attendance. Farmers also learn about VESP by word of mouth during water quality and other required on-farm inspections.

Enrollment Process:

At the time of writing, VESP is in its pilot stage. General steps for the full VESP program include:

1. Farmer fills out a VESP application.
2. Farmer schedules an on-farm assessment with VESP technicians.
3. A team of conservation planners and technical service providers conduct an on-farm assessment by using the Resource Stewardship Evaluation Tool and Cornell extension soil health tests.
4. If certified, the farm undergoes an annual third-party verification to ensure continued implementation of practices meet VESP standards.
5. If not certified, the farmer continues to work with VESP technicians to develop and implement plans to meet and exceed current environmental standards.

Cost Share:

There is no program-specific cost share for the VESP. The program promotes the use of several state funding options, like the VAAFM Best Management Practice Program (BMP), and some federal funding options. Funding is prioritized for VESP certified farmers where possible.

Other Cost Share Opportunities:

State:

- The Agricultural Clean Water Initiative Program
- The Farm Agronomic Practices Program (FAP)
- VAAFM Grassed Waterway and Filter Strip Program (GWFS)
- Pasture and Surface Water Fencing Program (PSWF)
- Capital Equipment Assistance Program (CEAP)

Federal:

- Agricultural Conservation Easement Program (ACEP)
- Agricultural Management Assistance Program (AMA)
- Environmental Quality Incentives Program (EQIP)
- Conservation Stewardship Program (CSP)

Best Management Practices:

While the most common BMPs implemented under VESP are not known, the most common BMPs implemented under the VAAFM BMP Program include waste storage structures (e.g. manure pits, solid manure stacking facilities, and silage leachate management systems), waste transfer systems (e.g. holding tanks, pumps and plumbing from waste collection points to waste storage points), and heavy use area protection (e.g. barnyards and improving high-traffic, erosion-prone surfaces).

Participation:

Under the pilot program, 12 farms of diverse commodities and sizes participate in VESP. After the pilot program, VESP anticipates that it will continue to certify 10 to 12 farms a year given funding is analogous to the pilot program.

The most helpful tactic in garnering the 12 pilot farms' participation was a promotional event with the governor to debut VESP. During this event, VESP pilot program applications were available and many were completed and turned into VESP staff at the event.

Perceived Farmer Likes and Dislikes:

Likes:

- Open forums for farmers to express challenges; they were appreciative of that.
- Social recognition and being able to show their neighbors the high standard they have taken to improve water quality.

Dislikes:

- Amount of time it took for the VESP program to be launched.

Challenges:

- Determining whether herbicide use should or should not be allowed under VESP.
- Economic uncertainty and threatened livelihoods in the dairy industry in Vermont.

- Not enough capacity to serve customer needs for the BMP, CREP and CEAP Programs.
- Navigating the financial challenges of implementing BMPs.
- Demand for the program outweighs available funding.

Success and Future Directions:

- Farmers were an instrumental part of the planning process for VESP.
- Farms of different sizes and commodities were interested in participating in the pilot program.
- New RAPs regulations concerning tile drainage.
- Continued expansion and support of subsurface tile drain research in Vermont.

Other State Programs and Initiatives:

- VT Phosphorus Index Tool
- Phosphorus Innovation Challenge
- goCrop web and mobile application
- UVM Extension Water Quality Business Analysis
- VHCB Vermont Farm & Forest Viability Program

Virginia

Name: Virginia Resource Management Planning Program (RMP)

Year Established: 2014

Relevant Water Basin(s): Chesapeake Bay

Description:
The Virginia Department of Conservation and Recreation describes Virginia Resource Management Planning Program as: "a voluntary way to promote the use of conservation practices that improve farming operations and water quality." Plans under the Virginia Resource Management Planning Program are designed to encourage farmers to use a "high level" of BMPs that reduce nutrient and other polluting runoff into local watersheds. Section 10.1-104.8 of the Code of Virginia and the Resource Management Plan regulations (4VAC50-70) establish certain minimum standards for BMP implementation depending on the type of farm operation. The Virginia Resource Management Planning Program and Resource Management Plans are not only tools to encourage BMP implementation but also document practices in use and provide data to verify the agricultural sector's level of conservation implementation in Virginia.

Resource Management Plans (RMPs) can be developed for cropland, hayland or pasture. Likewise, a farm owner or operator can choose to have a RMP on the whole farm, a tract or just one field. Currently, the majority of RMPs developed under the Virginia Resource Management Planning Program are located within the Chesapeake Bay watershed, and water quality goals, marketing, and funding for the RMP Program focus on the Chesapeake Bay watershed. Interest in developing RMPs throughout other regions of the state is increasing.

Funding:
Funding for RMP comes from a variety of state and federal sources including The Water Quality Improvement Fund (sourced from recordation fees for real estate transactions), State general funds, and U.S. EPA and Department of Environmental Quality Chesapeake Bay grants. Funds from the U.S. EPA have also been leveraged to directly contract private consultants as RMP plan developers in the Chesapeake Bay watershed.

Key Partners:
State:

- Virginia Department of Environmental Quality (DEQ)
- Virginia Department of Conservation and Recreation (DCR)
- Virginia Soil and Water Conservation Districts (SWCDs)

Federal:

- USDA Natural Resources Conservation Service (NRCS)
- U.S. EPA

Regulatory Certainty:

If a farm owner or operator fully implements a RMP under the Virginia Resource Management Planning Program, they receive assurance that they are in compliance with any new state nutrient, sediment and water quality standard that goes into effect after implementation. They are also deemed to be in compliance with all local stream segment or Chesapeake Bay TMDLs so long as the plan holder continues to implement the RMP for the duration of the certification. Permit requirements for pollution abatement and pollutant discharge elimination systems still apply. Likewise, the RMP certificate does not exempt farms from requirements in the Chesapeake Bay Act or U.S. Environmental Protection Agency regulations.

Other Incentives:

- Eligibility to purchase farm signage recognizing RMP-certification.
- Eligibility for the Clean Water Farm Award.
- Eligibility for the Bay Friendly Farm Award.
- Priority status for cost share program.

Program Length: 9 years

Inspection Rate: Local Districts conduct compliance inspections on certificate holders every three years. The Virginia Department of Conservation and Recreation review each District at least once every five years.

How Do Farmers Find Out About the Program?

The RMP program website recommends farmers can learn more about the program through their local SWCD. However, because of the program's contracts with crop consultants, the majority of farmers have found out about RMP through private crop consultants. Other means of informing farmers about RMP include printed articles or advertisements in Farm Bureau and commodity group publications.

Enrollment Process:

1. A certified RMP developer visits the farm and conducts an onsite assessment of the parcels the farmer wants RMP certified.
2. The certified RMP developer creates an RMP based on the onsite assessment.
3. After the RMP is developed, the farmer agrees to the associated BMP implementation schedule and the RMP is submitted to the district SWCD or DCR.
4. The District Technical Review Committees (TRCs) review the RMP.
5. The District approves RMP after TRC review and recommendation.

6. Once the RMP is approved, the farmer installs and implements the agreed upon BMPs.
7. Once BMPs have been implemented, the farmer requests a verification inspection by the plan developer and the SWCD.
8. The plan developer and the SWCD informs DCR who then issues a Certificate of Implementation for the RMP program.

Cost Share:

The Virginia Agriculture Cost-Share Program (VACS) is the main source of cost share funding for the RMP program. Though VACS is not RMP program specific, farmers seeking RMP certification receive priority for VACS cost share funding. VACS also supports two types of cost share funds specific to the RMP program: funds for costs related to the development of an RMP (RMP -1) and funds for fully implementing an RMP (RMP-2). RMP-1 provides $10 per acre with a total maximum funding amount of $6,500 per plan. RMP-2 provides $5 per acre with a total maximum funding amount of $3,250 per plan. The long-term average for VACS funding from 2016 to 2018 has been around $20 million dollars annually.

The RMP program also provides financial incentives for Plan Developers and gives $100 per plan plus $0.50 per acre as operational support for the initial RMP review process. The operational support package is approximately $204.50 for an average-sized RMP.

Other Cost Share Opportunities:

State:

- Conservation Tillage Equipment Tax Credit
- Virginia Poultry Litter Transport Incentive Program

Federal:

- Conservation Reserve Enhancement Program (CREP)
- Conservation Reserve Program (CRP)
- Conservation Stewardship Program (CSP)
- Environmental Quality Incentives Program (EQIP)

Best Management Practices:

All resource management plans, at minimum must include 35 feet buffers on perennial streams on crop and hayland, livestock exclusion from perennial streams, a soil conservation plan, and nutrient management plan. The most common voluntarily implemented BMPs include stream fencing, buffers, cover crops, and precision nutrient application technology.

Participation:

The Virginia RMP program has 388 plans covering over 92,000 acres. Of these plans, 10 have been fully implemented and are certified covering 2,335 acres. The average RMP plan consists of 209 acres. The most common operations participating in RMP include cash grain and livestock operations. The

majority of plans are clustered in the Chesapeake Bay drainage area, specifically the Northern Piedmont and Eastern regions of the Virginia Commonwealth. However, the program has expanded into 10 counties outside of the Chesapeake Bay watershed in recent years.

The most successful tactic for encouraging farmer participation lies in the work of the private crop consultants contracted as RMP developers. While there are 15 certified plan developers in the Commonwealth the vast majority of RMPs have been developed by two private-sector plan developers.

Perceived Farmer Likes and Dislikes

Likes:

- Priority consideration for the cost share program
- RMP records BMPs implemented both before and after the program so that they can be credited in the Bay Model
- Social recognition and credit for management practices

Dislikes:

- Interacting with the government
- Amount of time required to develop and implement an RMP
- Not enough details given about the remainder of RMP process after a plan is developed
- Figuring out who to contact to request certification once the plan is fully implemented

Challenges:

- Long inspection and review times lead to a lengthy certification process (i.e. 388 plans, only 10 certified).
- The limited number of plan developers also restricts the areas of the state where RMPs are actively being developed.
- There are not enough funds to support farmer interest and demand for the program.

Success and Future Directions:

- All available contract dollars are utilized.
- Adoption of a new conservation plan development program specific to Virginia that will train more plan developers for RMP.
- Intention to increase the number of RMPs in the southern and western areas of the Commonwealth (outside the Chesapeake Bay watershed).

Other State Programs and Initiatives:

- Precision Agricultural Equipment Tax Credit

Washington

Name: Voluntary Stewardship Program (VSP)

Year Established: 2011

Relevant Water Basin(s): Puget Sound

Description:
The Washington Conservation Commission describes VSP as: "an optional, incentive-based approach to protecting critical areas while promoting agriculture."

Prior to the creation of VSP in 2011, the main tool for Washington State counties to ensure protection of critical areas that intersect with agricultural activities was regulation. In 1990, the Washington Legislature passed the Growth Management Act (GMA), which requires state and local governments to manage growth by identifying and protecting critical areas (i.e. wetlands, frequently flooded areas, critical aquifer recharge areas, geologically hazardous areas and fish and wildlife habitat conservation areas) through adopting Critical Areas Ordinances (CAOs). The passing of the GMA and CAO requirements were met with years of conflict and lawsuits, especially when it came to adopt CAOs for agricultural lands. Therefore, in 2007 the Washington Legislature addressed the conflict between protecting agricultural land and protecting critical areas under the GMA framework with the help of the Ruckelshaus Center. Based on recommendations of the Ruckelshaus Center, the Washington State Legislature created VSP in 2011 as an alternative approach for counties to protect critical areas that intersect with agricultural activities while maintaining agricultural viability in the county. Instead of utilizing a parcel-scale regulatory approach, VSP utilizes a watershed-based, collaborative stewardship planning process with incentivized practices that protect GMA critical areas while maintaining agricultural viability. The Washington State Conservation Commission was charged by the Legislature with administering VSP.

VSP is focused at the local (i.e. county) level of government so there is a closer relationship between those administering the VSP on a day-to-day basis then at the state level. Each county workgroup sets the goals and benchmarks unique to its own local agricultural community, crops, and conditions. Likewise, each VSP work plan has an outreach and education component, which includes feedback through the technical service providers and the county VSP workgroup. An important part of the VSP is maintaining agricultural viability, and though each county defines agricultural viability slightly differently, elements common to all include a welcoming business environment and appropriate levels of regulation such that farmers are not being driven out of agriculture through participation in the VSP.

Participation in VSP is voluntary for the county and for the landowner to participate. A county must opt-in for a landowner to be able to participate. If counties choose to opt-in to the program, they receive funding to develop a watershed-scale work plan that: 1) identifies critical areas and resource concerns, 2) identifies agricultural activities in critical areas, (3) protects critical areas, (4) maintains agricultural viability in the county and 5) creates a plan for targeted outreach to assist landowners in developing farm plans that minimize risk to critical areas on their property while maintaining their agricultural operation.

Funding:

The Washington State legislature funds VSP through the state general fund. VSP was funded at $7.6 million for FY 15-17 and at $7.2 million for FY 17-19. Every fiscal year the SCC must request continued funding for VSP from the Washington State Legislature.

Key Partners:

State:

- Washington State Conservation Commission (SCC)
- Washington Department of Ecology (WDE)
- Washington Department of Fish and Wildlife (WDFW)
- Washington Department of Agriculture (WSDA)
- Washington State Counties

Federal:

- USDA Natural Resources Conservation Service (NRCS)

Regulatory Certainty:

Agricultural operators implementing an individual stewardship plan under a VSP work plan are presumed to be fulfilling their responsibilities to protect and enhance critical areas under the Growth Management Act. Landowners in VSP counties who choose not to implement an individual stewardship plan are not subject to other local critical area regulations, however, other land use laws, codes and regulations do still apply. Landowners in counties without a VSP workgroup and plan are subject to the GMA regulatory framework. Additionally, the state Technical Panel, which consists of staff from SCC, WDE, WDFW and WSDA, may disagree with the workgroup about their progress toward meeting their work plan goals and benchmarks. If the county workgroup is deemed to not achieve their goals, they may fail out of VSP and must return to a "traditional GMA approach."

Other Incentives:

None identified.

Program Length: Indefinite

Inspection Rate:

VSP Workgroups must monitor their goals and benchmarks annually, and report on progress every two and five years.

How Do Farmers Find Out About the Program?

Producers have learned about VSP through a variety of mechanisms including in-person and online contact with their local soil and water conservation district, the VSP program website, word of mouth from other farmers, field demonstration days, and program brochures and other print materials.

Enrollment Process:

1. A county opts into VSP.
2. The county workgroup develops a work plan that must:
    a. Seek input from tribes, agencies, and stakeholders.
    b. Identify critical areas and agricultural activities.
    c. Identify economic viability of agriculture in county.
    d. Identify outreach plan to contact landowners.
    e. Identify an entity to provide landowner assistance.
    f. Identify measurable participation and implementation goals and benchmarks.
    g. Establish baseline monitoring for participation, stewardship activities, and the effects on critical areas and agriculture.
3. The county workgroup submits the work plan to the SCC where it is reviewed and approved by the VSP Technical Panel.
4. Local technical assistance providers conduct outreach in priority areas.
5. Local technical assistance provider creates individual stewardship plans for agricultural landowners who choose to participate.
6. Existing voluntary, incentive-based programs are used to help landowners implement stewardship plans.
7. The county workgroup delivers status reports every two years to the SCC about participation, measurable benchmarks, and how the group has accounted for any withdrawals from individual stewardship programs. If adaptive management triggers in the work plan are met, the work group must create an adaptive management plan.
8. Every five years the county workgroup must report to the SCC its success at meeting its goals and benchmarks for protecting critical areas while maintaining agricultural viability.

Cost Share:

There is no program-specific cost share for BMP implementation. The program instead promotes the use of several state and federal funding options.

Other Cost Share Opportunities:

State

- Department of Ecology's Water Quality Combined Funding Program

Federal:

- Conservation Reserve Enhancement Program (CREP)
- Environmental Quality Incentive Program (EQIP)
- Conservation Stewardship Program (CSP)
- Agricultural Conservation Easement Program (ACEP)

Best Management Practices:

Nineteen of the 27 county VSP work plans were recently approved and began implementation. Of the existing, approved county work plans, the intended BMP's identified varied greatly depending on specific circumstances of each county.

Participation:

Twenty-seven counties had opted into VSP and 19 of those 27 counties had approved work plans. Most of these 19 plans were approved between 2017 and 2018, and the remaining eight plans will be approved by December 2018. The majority of approved plans were in the beginning stages of implementation, which includes tracking farmer participation. Because reporting of participation rates occurs every five years after plans are approved and adopted, data on participation rates are expected to be available between 2021 and 2022. In general, the level of farmer participation is entirely up to each farmer or VSP participant and each VSP work plan must establish a mechanism to reach environmental goals and benchmarks while accommodating the gain and loss of individual participants in their VSP. Of the 19 approved plans, most anticipate or have a goal of a 10 percent participation rate.

Perceived Farmer Likes and Dislikes:

Likes:

- VSP work plans are created by a local workgroup made up of local stakeholders
- VSP allows for flexibility and customization when establishing the baseline and implementation efforts
- Agricultural viability must be provided for at the same time that critical areas are protected

Dislikes:

- None identified

Challenges:

- Lack of dedicated program funding for implementing VSP and its stewardship plans.
- Because VSP was a piece of compromise legislation when created, the program does not meet everyone's needs at all times.
    - There are conflicting interests in VSP from different stakeholder groups like planning staff, counties, agriculturalist, tribes and environmentalists.
    - There are difficulties in increasing knowledge of what VSP is about and why participation in the program is important.
- Developing a county work plan is very time intensive.
    - Requires monthly meetings involving many stakeholders.

- Difficulty scheduling workgroup meetings so that farmers can participate.

Success and Future Directions:

- Early outreach efforts by local conservation district supervisors and staff were attributed to the strength of the most successful VSP counties.
- A comprehensive assessment of how successfully the program has operated will be available after all 27 counties have approved and implemented work plans with progress reports published in 2022 and 2027.

Other State Programs and Initiatives:

- Coordinated Resource Management (CRM)
- Food Policy Forum
- Irrigation Efficiencies Grant Program (IEGP)
- Office of Farmland Preservation (OFP)
- Natural Resource Investments
- SCC Tribal Outreach Task Force
- Straight to Implementation Tool
- Dairy Nutrient Management Program

Program Findings

Program Structure

Four state programs examined in this report focused on water quality concerns in local watersheds (CA, FL, NY, VT) while other state agricultural stewardship programs focused on water quality concerns in regional watersheds including the Upper Mississippi Watershed and the Gulf of Mexico (i.e. IA, MN, MO), the Great Lakes (i.e. MI), Puget Sound (WA) or the Chesapeake Bay (i.e. MD, VA). While all programs considered themselves voluntary, some programs were more stringent in nature. California, Florida and Washington's programs were designed such that producers are motivated to participate in lieu of paying higher fees (CA), conducting individual on-farm water quality monitoring (CA, FL) or regulation at the parcel scale (WA). Across programs, those eligible for enrollment ranged from state counties or districts (WA), third party coalitions presenting farmers in an area (CA), individual farm owners or operators (IA, MD, MI, MN, MO, NY, VT, VA) or a combination (FL). Programs who required the entire operation to be assessed before verification include CA, FL, MD, MN, VT and NY. Programs that allow subsets of an operation to be verified include IA, MI and VA. Programs with specific programmatic areas in which operators can be verified include MI, MO, NY, and VA.

Program length and inspections varied across states, with five states (MD, MI, MN, VT, VA) having definite program lengths with regular inspections. Michigan and Vermont had the shortest periods of enrollment at five years and Maryland and Minnesota had the longest period of enrollment at 10 years. Iowa had definite management agreements for BMPs implemented through its programs that varied with BMP type and did not have regular inspections of participants. Lastly, five states (CA, FL, MO, NY, WA), had indefinite program lengths with at least one inspection of enrolled operations post-enrollment.

Additional interview responses about program structure include:

- Incorporating the agricultural community into program development is critical. Their buy in is important when developing a program.
- Approaching stewardship as a watershed-level activity can reduce notions of finger pointing by framing the improvement of water quality as a collective job for all people and sectors.
- Regulation (or the prospect of regulation) can be important and necessary to some extent, providing agricultural operators a push to adopt improved water quality BMPs on their own terms.
- Given that certain aspects of conserving and improving water quality are unpredictable and cannot be controlled (i.e. weather), a systems approach is better for working towards improved water quality.
- The use of quantitative models and tools can help lessen concerns about the rigorousness of a program assessment, planning and verification models.
- Voluntary programs do not want to tell farmers what to do and recognize that one-size-fits-all models of water quality BMPs are not realistic for farmers.
- Farmers appreciate site-specific and operation specific approaches or, "direct problem solving for actual conditions," as opposed to blanket regulations on their operations.

Regulatory Certainty

Of the voluntary state agricultural stewardship programs reviewed in this report, 7 states (FL, MD, MI, MN, NY, VA, WA) are also considered to be "certainty" programs. Among these states, regulatory certainty took the form of assumed compliance with state environmental and water quality regulations, a waiver from having to comply with new state regulations adopted during the certification period, protection from fines or other penalties in the event of unexpected nutrient discharges into local waterways, or a combination. The states that did not provide enrolled farmers with regulatory certainty include CA, IA, MO, and VT.

Partnerships and Funding

Program partners typically included state and federal departments as well as university cooperative extensions. The operational program costs were derived from a variety of sources ranging from general fund allocations, RCPP awards, sales tax dollars, and designated state environment and water quality funds. The availability of cost share for each program varied as well, with some programs providing program-specific cost share to their participants (FL, IA, MN, NY, VA) and other programs relying on external cost share dollars for BMPs (CA, MD, MI, MO, VT, WA). In some cases, without base funding, participation did provide farmers with a competitive advantage in accessing other state or federal cost share funds or financial incentives (MI, VT).

Best Management Practices

The most common BMPs implemented included vegetative buffers, cover crops, conservation tillage, and manure management practices. The most common BMPs to address subsurface phosphorus runoff specifically included nutrient management planning and drainage tile management. Other notable water quality BMPs included precision nutrient application technology like grid sampling and variable rate technology.

Participation

The states with lowest estimated level of participation were the Maryland Agricultural Certainty Program and the Vermont Environmental Stewardship Program, which was in the pilot stage at the time of writing. The states with the highest estimated level of participation were California (around 90 percent of acres), Florida (around 42 percent of acres) and New York (25 percent of operations).

All programs cite farmer peer-to-peer networks and communication as a key factor in encouraging participation in their programs. In addition to peer-to-peer networks, SWCDs and private advisors have also been successful conduits for generating interest in participating in voluntary certainty and stewardship programs (IA, MI, MN, VA). In fact, private crop consultants have been the most successful at increasing participation in the Virginia Resource Management Planning Program because they have earned trust of the farmers through their pre-established, long-term working relationships. Other successful methods of garnering interest in a program included in-person marketing and application opportunities such as attending state fairs, demonstration days, or other commodity events

and in-print program marketing in Farm Bureau, commodity, and other agricultural communication outlets. Recognition, cost share, program flexibility, and reduced interactions with the government were the most common features respondents perceived farmers to like. The amount of paperwork was the most commonly perceived dislike, followed by the amount of time involved to complete verification and having to interact with the government officials.

Additional interview responses about participation include:

- Broaching a relationship with farmers then walking away from it can be detrimental. Presenting clear terms of engagement and expectations for farmers is important when requesting their participation in voluntary stewardship efforts.
- The people introducing a voluntary certainty or stewardship program to farmers should be perceived as a trusted, credible source by farmers. This is often other farmers.
- Voluntary stewardship can make systemic change difficult to achieve, so you must know who to target first to get the ball rolling on participation.
- Early adopters are said to be the best introductions to and advocates of the program for other farmers.
- The scale at which you discuss water quality issues with producers is important; the closer to home, the more likely they are to be invested in taking extra steps to improve water quality.
- Farmers were said to want recognition for the practices they implemented, especially those who already took the initiative to implement before the creation of a voluntary state program.
- Farmers were said to like the positive feedback they received from the community for their participation in a voluntary certainty or stewardship program, especially that of non-agricultural private landowners, neighbors, and consumers.

Challenges

Several programs cited challenges in encouraging farmer adoption of BMPs through their voluntary framework. These challenges included difficulty in convincing farmers of the long-term benefit of implementing water quality BMPs to their immediate lives and livelihood (IA, MD), communicating to farmers what regulatory certainty really means for their operations (MN, WA), and limited funding resulting in programs having to cap how many participants they can accept annually (IA, MD, MI, MN, MO, VT, VA, WA). Other common program challenges include limited program staff (MD, MI, MO, VT, VA) and navigating emergent issues affecting agriculture such as economic instability and extreme weather events (Fl, MD, MI, MO, NY, VT).

Success and Future Directions

Respondents' reflections on valuable lessons, program success, and future directions can be categorized into several themes: farmer input, funding, partnerships, and evaluating impact.

All programs viewed incorporating farmers into program development and implementation in the agricultural community as critical to program success. Specifically, earning farmers buy-in, allowing them to help craft the solutions, and directly working with them to develop a program that represents

their values and meets desired water quality standards is fundamental (CA, VT). When presenting voluntary agricultural stewardship to farmers, the information presented has to be perceived as meaningful by them (FL). Even in the implementation phase, it is important to utilize local partners that are long-standing and respected (e.g. SWCDs, Farm Bureau or private advisors) to help implement the program and listen to farmers about what practices and approaches they feel will be effective and feasible for their operations (NY, IA).

Financial incentives like program-specific cost shares were cited as a significant plus, and long-term financial support from the state legislature was cited as making a big difference in addressing not only the economic burdens of BMP implementation but also programmatic operations (IA, VA). Yet seven programs stated that their available annual funds are exceeded yearly, and increased funding is necessary going forward (IA, MN, MO, VT, VA, WA, MI). This lack of dedicated funding was said to make it difficult to address emergent issues and to be a barrier to programmatic success.

Partnerships, whether they were with governmental, non-governmental, private, or academic entities, have been considered valuable by the majority of programs examined (FL, IA, MN, MO, VA, NY). Notably, several states either specifically reflected on their partnership with the private sector (IA, MN, VA) or discussed their desire to incorporate the private sector into their program structure in the future (MO). These respondents suggested the need for industry buy-in is twofold: incorporating the private sector opens new avenues for encouraging farmer participation in the program and incorporating the private sector can lead to new sources of program funding.

Evaluating the participatory and/or environmental outcomes was discussed as well. Michigan and Virginia are attempting to track all BMPs put in place under their program's framework (as opposed to only recording the practices of officially certified farms). Florida, Iowa and Michigan discussed navigating the difficulty of demonstrating positive environmental impacts (i.e. nutrient reduction) of BMPs at the watershed level because of current monitoring capacity and/or masked results at the watershed scale.

Additional interview responses about program success and future directions include:

- While protecting water quality in U.S. water basins is an urgent and necessary endeavor, there are often other competing concerns (i.e. trade wars, the dairy crisis) that can take higher priorities than water quality issues in agricultural communities.
- The discussion about water quality can get absorbed into legislative and bi-partisan debates, which can hinder efforts to establish or promote a voluntary agricultural certainty or stewardship program to various groups.
- Climate change, increased rates and intensity of natural disasters, and sea level rise are factors that can and already have affected growers regardless of whether they are participating in a voluntary certainty or stewardship program.

Literature Review

Program Structure

Funding and Partnerships

Sowa et al. (2016) found that funding from existing government programs in the U.S. is insufficient to address agricultural conservation concerns. Additionally, cost to participants was identified as one of the most common restraints from successfully applying to an agricultural stewardship program (Hejnowicz et al 2016, Fales et al. 2016). UK researchers Falconer (2000), Mettepenningen et al. (2009) and Hejnowicz et al. (2016) highlight the need for public agencies to ensure sufficient funding for both operational costs and direct costs to farmers for agricultural stewardship programs. In the meantime, knowing where and how to invest limited financial resources into program implementation is a challenge (Kalcic et al. 2016).

Collaboration among a diversity of partners (e.g. agencies, industries, stakeholders, conservation actors) has been identified as an important characteristic of successful voluntary agricultural stewardship programs (Beckmann et al. 2009, Pascual et al. 2010, Legrand et al. 2013, Hejnowicz et al. 2016). In addition to collaboration across sectors and institutional levels, utilizing relevant stakeholder knowledge and expertise and creating "inter-organizational" leadership that includes stakeholders are considered important factors in coordinating stewardship efforts (Ferreyra and Beard 2007, Ferreyra et al. 2008).

Farmer Interest and Participation

No Silver Bullet

There is no silver bullet or consistent predictive model of farmer participation in voluntary state agricultural stewardship programs. The factors underlying farmer participation are complex, intersecting, and can be contrary to popular assumptions (Belknap and Saupe 1988, Napier and Bridges 2002, Prokopy et al. 2008, Greiner et al. 2009, Baumgart- Getz et al. 2012, Reimer et al. 2012, American Farmland Trust 2013, Mills et al. 2013, Schaible et al. 2015, Hejnowicz et al. 2016, MACD 2017, Schall et al. 2018). Though they are important, economic incentives are accompanied by many other factors that influence farmer participation in voluntary state agricultural stewardship programs (Schaible et al. 2015). Demographics such as age, education, income and family dynamics play a role in agricultural management decisions including participation in agricultural stewardship programs. (Lambert et al. 2006a, Lambert et al. 2006b, Wilson et al. 2013, Burnett et al. 2015, Swinton et al. 2015, Carlisle 2016, MACD 2017) Intrinsic factors such as socio-cultural norms, worldviews, and personal goals can also influence the "participation-spectrum" of state agricultural stewardship programs (Morris and Potter 1995, Ingram et al., 2013; Mills et al., 2013, Hejnowicz et al. 2016). Likewise, extrinsic factors such as commodity prices, environmental policies and social networks have been shown to play a role in farmer participation in voluntary state agricultural stewardship programs (Mills et al. 2013, Schaible et al. 2015, Hejnowicz et al. 2016). This diversity of factors is discussed in more detail below.

Economics

Farmers are assumed to be "economic rational actors" when making decisions involving their operation and the environment (Burton et al. 2008, Hanley et al. 2012, Home et al. 2014, de Krom 2017). Therefore, financial incentives, such as cost share for BMPs or bottom-line improvements, make good business sense for farmers (Smith and Weinberg 2004, Hopkins and Johansson 2004, Robertson and Swinton 2005, Bowman and Zilberman 2013, Schaible et al. 2015). In some cases, financial incentives have been shown to work best to motivate farmers to participate in voluntary agricultural stewardship programs (Ruto and Garrod 2009, Hejnowicz et al. 2016). However, technical assistance can outweigh financial assistance. Schaible et al. (2015) found that while cost share payments were effective for encouraging capital-intensive land-management practices, technical assistance and educational tools were more effective incentives for adopting practices involving human-capital, like nutrient or pest management. Financial payments may even promote "adverse selection" where participants adopt management practices that require little change, possibly reducing their operation's environmental stewardship potential (Fraser 2009, Hodge and Reader 2010, Quillérou et al. 2011, Hejnowicz et al. 2016).

Demographics

Age, education, income, gender, and other demographic factors can influence agricultural management decisions, including participation in voluntary state agricultural stewardship programs (Lambert et al. 2006a, Lambert et al. 2006b, Wilson et al. 2013, Burnett et al. 2015, Swinton et al. 2015, Carlisle 2016, Hejnowicz et al. 2016, MACD 2017). D'Souza et al. (1993) found that age and education were significant predictors of BMP adoption among West Virginia farmers while farm size and income were not significant. In the Great Lakes Region, younger farmers have been more receptive to installing BMPs than their older counterparts (Wilson et al 2013, Burnett et al 2015, MACD 2017). In fact, Kerr et al (2016a) found that cover crop, storm delay broadcasting, and injection application adopters were significantly younger than non-adopters. Farmers with higher incomes and those who owned or rented more acres have also been shown to adopt BMPs more often than farmers with lower incomes or acreage (Baumgart-Getz et al. 2012, Wilson et al. 2013, Burnett et al. 2015, Kerr et al. 2016a). The same trend is seen in education where farmers who are more educated adopt BMPs more often than farmers who are less educated in some cases (Rahm and Huffman 1984, Davey and Furtan 2008, Schaible et al. 2015). Female farmers are more likely than male farmers to be interested in installing BMPs but often lack the resources necessary for implementation (Baumgart-Getz et al. 2012, MACD 2017).

Farm Characteristics

Farm characteristics can be significant determinants of BMP adoption. Farmers take into consideration how much suggested BMPs align with existing farm practices on and conditions (e.g. available resources, commodities grown, landscape position, and soil type (CCRI, 2012). Iowa corn farmers' adoption of reduced tillage technology significantly depended on soil characteristics, cropping systems, and the size of the farming operation (Rahm and Huffman 1984, Davey and Furtan 2008). Maumee Valley (Ohio) farmers perceived cover crops to be risky due to timing, weather, and their

potential to interfere with planting and were less likely to adopt this practice as a result (Wilson et al. 2013). When land is highly productive, farmers are more likely to install BMPs. On the other hand, farmers are less interested in investing in BMPs for land that is less profitable or may be sold in the near future (Wilson et al. 2013, MACD 2017). Despite the notion that farmers tend to be "risk averse", in some cases the majority of farmers who have expressed intentions to adopt BMPs in the future have been new adopters (Wilson et al. 2013, Burnett et al. 2015, Kerr et al 2016a).

Commodity prices and the farmers proximity to or awareness of a water quality issue are other determinants of BMP adoption (Kerr et al. 2016a). When commodity prices are high, farmers are reluctant to take land out of production, often re-planting lands previously removed from production. This increase in production can possibly affect farmers' willingness to participate in conservation plans if they require removing land from production for an extended period of time. Farmers in this situation, however, may be more inclined to invest in practices that allowed continued production on profitable lands. When production prices are low, however, farmers may be less willing to install BMPs that involve investing capital and may be more motivated to install practices that remove land from production (Lambert et al. 2006a, Lambert et al. 2006b, MACD 2017). Lastly, row crop farmers were more aware of water quality issues in water bodies closer to their property than those in major, but distant, water basins (Wilson et al. 2013). The likelihood of adopting more sustainable agricultural practices has also been found depend on whether the farmers is aware that groundwater contamination exists on their farm (D'Souza et al. 1993, Schaible et al. 2015).

Intrinsic Values and Social Networks

For some farmers, financial or farm-related concerns do not drive their attitude towards voluntary state agricultural stewardship programs. Moral or social values such as environmental attitudes, perception of risks, and cultural and social capital can both encourage and discourage farmer participation (Chouinard et al. 2008, Mzoughi 2011, Sheeder and Lynne, 2011, Schaible et al. 2015, Kerr et al. 2016). Hoag et al. (2012) found that farmers who were motivated by religious or spiritual reasons adopted conservation practices outside of voluntary program participation because they believed they had a responsibility to protect the environment. Farmers with environmental attitudes that consider environmental conditions outside of their operation were more likely to implement conservation practices (Reimer et al. 2012, Schall et al. 2018). Culturally and socially derived preferences for agricultural landscape appearances also influence willingness to implement some BMPs because cultural capital related to farm appearance generates social capital that buttress a farmer's social status in their community (Burton et al. 2008, Burton and Paragahawewa 2011, Sutherland and Burton 2011, Saunders 2015, de Krom 2017). Social networks are also key to understanding farmers' decisions towards the environment. Farmers within strong social networks of other farmers who have adopted conservation practices have been shown to be more likely to adopt conservation practices (Carlisle 2016, MACD 2017). Contrarily, despite local farmer networks with perceived peer pressure to adopt BMPs, it has been shown that farmers also don't feel they need to be like other farmers in their community (Wilson et al. 2013).

The importance of social networks in influencing agricultural environmental stewardship extends beyond farmer networks as well. Private crop and nutrient advisors have also been shown to positively influence farmers to adopt conservation measures (FERA 2013, Lastra-Bravo et al. 2015, Hejnowicz et al. 2016). Beyond highly integrated and self-reliant agricultural communities, relationships between farm and non-farm residents in rural and non-rural areas also influence participation and adoption (Troughton, 1997, Smithers et al. 2004, Ferreyra et al 2008). A study of the Chesapeake Bay demonstrates that farmers and environmental professionals have similar understandings of environmental issues and even share some common ground about the utility of BMPs but interpret their knowledge through different cultural lenses concerning nature, land, and the economy related to their occupation and geography (Schall et al. 2018). Yet, non-farming stakeholders have viewed farmers' approaches and attitudes towards the environment as ones broadly grounded in ignorance, when in fact farmers exhibit a sophisticated understanding of the environment and environmental change that is mediated through their lived experience as land owners and users (Schall et al. 2018). Farmers, on the other hand, have been shown to view calls from non-farming communities for environmental regulations and other precautionary actions as treating farmers as "guilty until they prove themselves innocent" (CFFO, 2005b, Ferreyra et al 2008). Considering these social and ideological disconnects, farmers have been shown to view participation in voluntary agricultural stewardship programs as a means to remedy oppositional relationships with non-farming stakeholders (i.e. non-farming neighbors, conservationists, and consumers) through formally demonstrating their commitment to environmental stewardship (De Loë et al. 2015, Taylor and Van Grieken 2015, de Krom 2017). Additionally, in some cases farmers see participation in conservation practices and agricultural stewardship programs as an opportunity to co-plan and otherwise collaborate with program personnel to demonstrate that cooperative relationships with farmers can be much more beneficial than regulatory relationships (de Krom 2017).

Ecological Impact

Best Management Practice Implementation and Performance

While BMPs for water quality are promoted in many U.S. states and are at the center of various voluntary state agricultural stewardship programs, the efficacy of these practices has been mixed, with variable adoption rates among farmers and little improvement—and even declines—in water quality in some critical watersheds (Gillespie et al. 2007, Donner et al. 2004, Leisnham 2011, Schall et al. 2018). Though there is robust evidence for the efficacy of individual BMPs in protecting and improving water quality from excess discharges, the efficacy of many simultaneously implemented BMPs as well as their efficacy at the watershed scale is also unconfirmed (Kay et al. 2009, Deasy et al. 2010, Kay et al. 2012). Additionally, BMPs that reduce one target may not also be effective for reducing other targets (e.g. a BMP targets dissolved reactive phosphorus but not total phosphorus) (Kalcic et al. 2016). Lam et al. (2016) found reduced tillage practices did not increase losses of DRP from tile drains and recommended a combination of BMPs be used to reduce phosphorus loss from drainage tiles. Liu et al. (2016) found that cover crops and buffer strips do not impact nutrient reduction as effectively as nutrient management and wetland restoration practices, suggesting that edge of field

conservation practice, like nutrient management, must be implemented on at least 50 percent of croplands to achieve measurable benefits in water quality. Contrarily, applying a combination of conservation practices has been shown not have additive effects on water quality and even have diminishing effects (Kalcic et al. 2016).

Effective Models and Monitoring

While watershed modelling, such as SWAT, has proven to be effective at simulating the hydrology and water quality of agriculturally dominated landscapes and testing conservation scenarios, the extent to which such models are useful have also been called into question (Kay et al. 2012, Fales et al. 2016, Kalcic et al. 2016). Several studies have highlighted the need for larger water quality monitoring schemes that assess the impacts of installed agricultural BMPs on critical watersheds. Because models are only as good as the data that inform them, there is a need for monitoring schemes that involve stakeholders who can conduct monitoring at the field scale and contribute data to watershed models (Kay et al. 2012, Fales et al. 2016). Increased and improved water quality monitoring is not only important for model development but also can improve farmers' perceptions of the utility of BMP implementation. Improved opinion of BMPs can ultimately influence participation on voluntary stewardship and/or adoption of these practices (Kerr et al. 2016). For existing agricultural stewardship plans, monitoring can ensure that BMPs are properly managed by program participants and benefit impaired waters (Boatman et al. 2010, Chaplin and Radley 2010, Mountford et al. 2013, Radley 2013, Hejnowicz et al 2016).

Discussion

Study Limitations

This report on U.S. state agricultural stewardship programs has the following limitations. Firstly, the study was restricted to a time frame of 14 weeks. Given the short-term nature of this study, not all existing U.S. state agricultural stewardship programs could be included. As a result, this study focused on state programs within major U.S. watershed basins impaired by nonpoint source nutrient pollution and harmful algal blooms (i.e. Great Lakes, Chesapeake Bay, Mississippi River and Gulf of Mexico, San Francisco Bay, and Puget Sound). There are also limitations in the number and variety of respondents included in this study. Interview requests were sent to state program officials, environmental nonprofits, and state farm bureaus and to multiple relevant personnel within each organization, however consent for participation in this study was only consistently given by state program officials. Interviews with farmers, technicians, advisors or other agricultural professionals were not sought out due to time constraints. Thus, only the perceptions of program staff—with first-hand experience with their voluntary stewardship program, program participants, and agricultural sector—are represented in this study.

Summary of Findings

Even with the above limitations, the research and interview findings correspond with the body of literature about voluntary state agricultural stewardship programs. Both bodies of information report funding constraints, the utility of financial incentives, and the value of nonfinancial incentives. Findings from both sources also emphasize the importance of farmer-to-farmer networks for increasing awareness of and participation in voluntary state agricultural stewardship programs as well as the potential for these programs to improve relationships between farmers and non-agricultural actors like neighbors or consumers. Discussions of private sector partnerships and determining the impacts of BMPs at the watershed scale are also consistent across interview and literature review findings. The discussion of navigating emergent issues in agriculture was unique to the interview findings while the discussion of the role of demographics and the need for improved models and monitoring were unique to the literature included in this study. The culmination of all the above findings reinforces the notion that working towards successful balance of agricultural livelihoods and water quality and natural resource protection is largely "a quest for meaningful and effective institutional integration and actor interaction across various ecological, social and political levels and scales" (Ferreyra et al 2008).

Recommendations for Voluntary State Programs

Below is a list of recommendations for voluntary state programs. These recommendations are based on the review of 11 voluntary state agricultural stewardship programs, the interviews with relevant program staff, and the literature review of agricultural stewardship programs and BMPs included in this review.

1. **Improve communication among existing programs:** First and foremost, the above findings reveal that existing voluntary state agricultural certainty and stewardship programs are

rather siloed, but there is a desire—and likely a need—for these programs to regularly network with one another. Existing voluntary state programs should consider communicating with one another about their experiences (e.g. securing program, garnering farmer participation, and forming effective partnerships, etc.) through semi-regular conference calls, gatherings, listservs or other forms of communication. Improved inter-program communication and collaboration will be beneficial to effectively address the following recommendations.

2. **Acknowledge heterogeneous motivations among farmers:** Voluntary programs should ensure that they are accounting for the many motivational characteristics of farmers, ideally drawing from research conducted within their state. Program field staff and technicians should be aware of the diversity of factors that can influence farmers attitudes towards the environment and towards BMP adoption and aim to incorporate this knowledge into their farmer outreach plans. Consider cultivating this knowledge bases by building it into technician training. This would be especially useful because understanding the influence of economic, demographic, farm, crop, social, and cultural stewardship motivational characteristics of farmers can help identify the appropriate mix of financial, technical, reward, and educational incentives to promote BMP adoption (Schaible et al. 2015). Additionally, the cost efficiency and environmental and social impact of agricultural stewardship programs will likely improve if programs explicitly recognize farm heterogeneity and differences in farmer motivations (Schaible et al. 2015).

3. **Remove unnecessary (or simplify cumbersome) application steps:** Farmers were commonly perceived to dislike the amount of paperwork or time involved in participating in voluntary state agricultural stewardship programs, and the literature reviewed here supports this perception. While there are program areas that clearly necessitate time and documentation, the existing structure of each voluntary state program should be re-evaluated to ensure they are not requiring superfluous or redundant tasks of their participants. Simplify farm conservation plans and administratively costly application processes where possible to reduce cost and time constraints for both program participants and program staff (Mettepenningen et al. 2009, Hejnowicz et al. 2016, Sowa et al. 2016).

4. **Incorporate the private sector:** Several voluntary state programs reported budding or successfully established relationships with the private agricultural sector in which private advisors improved participation and BMP adoption among their clients. The literature also suggests that partnerships with private advisors can be a useful way to promote voluntary programs and BMPs. Voluntary state agricultural stewardship programs with established relationships with the private sector should share their methodology for incorporating this sector and the outcomes of their efforts with programs who have not yet established strong private sector partnerships.

5. **Develop clear and consistent messaging:** Numerous actors are involved in designing and implementing agricultural stewardship programs. Therefore, effective collaboration—and ultimately successful agricultural conservation—necessitates that programs and partners agree upon shared goals and messages. Furthermore, programs and their partners should coordinate with each other to ensure they are clearly and consistently communicating this message to their target audiences (e.g. farmers, non-farming communities, decision makers) (Hoag et al. 2012, MACD 2017).

6. **Prioritize water quality monitoring:** The degree of water quality monitoring conducted by each program varied from program to program. In states with limited water quality monitoring and/or published water quality data, monitoring costs, labor and confidentiality agreements were barriers to monitoring and reporting efforts. Increased water quality monitoring will ensure program water quality goals are being met, ensure that enrolled farmers are keeping their management practice commitments during certification period and confirm that their efforts are contributing to improved water quality. Programs in need of more robust monitoring should consider advocating to their legislature or other funders for support for monitoring schemes that can protect farmer data while determining nutrient discharge reductions at the watershed scale. Programs should consider how they can work with their departments and partners to collect water quality data within target watersheds at the same (or greater) rate they track data on BMP implementation. For example, consider the possibility of an opt-in option monitoring program where farmers can participate in monitoring and/or provide data from their operation to researchers and state agencies without risk.

7. **Adopt consistent units for reporting results:** Existing voluntary state agricultural certainty and stewardship programs should collaborate with one another to establish consistent national standards for reporting program participation, BMP implementation and environmental impact data. Communicating this data with consistent units will make results easily comparable and integrative, allowing for state and regional level analyses of voluntary program and BMP impact. This level of coordination would be especially useful for states working towards improving the same major watershed (e.g. Chesapeake Bay, Gulf of Mexico and Lake Erie states).

8. **Plan for emergent issues:** Interview findings highlight the numerous economic, social, political, and environmental factors that impact the agriculture sector. In fact, at the time of writing, the agricultural sector is in the midst of navigating a dairy crisis and tariffs on numerous commodities. Human-driven climate change has resulted in an increase in extreme weather events, and farmers and their operations are not immune to them. Thus, is important for voluntary state agricultural stewardship programs to plan for not only how they can withstand emergent issues in agriculture, but also how they can support participating and interested farmers through these possible challenges.

9. **Increase program creativity and flexibility:** There is a call in the literature for the exploration of increasingly creative and flexible ways to develop and implement voluntary agricultural stewardship programs, especially in ways that take pre-existing social, political, and economic landscapes into consideration (Ferreyra et al. 2008, Kerr et al. 2016a, Kerr et al. 2016b, Vollmer-Sanders et al. 2016). Voluntary state agricultural stewardship programs should regularly examine their program structure and partnerships for potential innovative opportunities to better serve the lived experiences of their participants and positively impact water quality. For example, there have been pilot efforts to exchange conservation practice installation for reductions in drain maintenance charges (Kerr et al. 2016b), to partner with private nutrient service providers to certify them to promote 4R stewardship (Vollmer-Sanders et al. 2016), and to provide farmers with payments correlated with the simulated conservation impact of the BMPs they install on their farms rather than for installation alone (i.e. pay-for-performance).

Recommendations for Philanthropy

Below is a list of recommendations for funders who support reduced agricultural runoff and improved water quality in the U.S. These recommendations are based on the review of 11 voluntary state agricultural stewardship programs, the interviews with relevant program staff, and the literature review of agricultural stewardship programs and BMPs included in this review.

1. **Recognize that the agricultural sector is a complicated social, political, and ecological landscape**: The philanthropic sector should recognize that the agricultural sector is a complicated social, political, and ecological landscape, especially as it relates to environmental stewardship. Hejnowicz et al. (2016) states "Motivations underpinning farmer and land manager decision-making processes have been identified as a complex mosaic of extrinsic and intrinsic values, as well as central to delivering effective agri-environmental programs." Therefore, it is critical for philanthropy to not only recognize these complexities but also understand that working with the agricultural sector on environmental issues is a long-term investment. Consider incorporating agricultural environmental stewardship into the foundation's strategic planning to show its commitment.

2. **Establish a relationship with state programs:** Foundation staff should develop relationships with voluntary state agricultural stewardship program staff and partners. Discuss and identify the areas where their strategies align as well as where additional program support is needed.

3. **Encourage and support improved communication among stakeholders about agriculture and water quality issues:** With a diverse set of stakeholders interested in issues pertaining to water quality and the agricultural sector (i.e. farmers, their neighbors, consumers, scientists, environmental nonprofits etc.), a fair bit of "debunking" of stakeholder groups is necessary. Philanthropy can support these efforts by acting as a convener that helps bring

diverse stakeholders together to share perceptions of water quality issues, form relationships, and break down barriers to communication (i.e. "us" versus "them" mentalities). Assist in convening mediated spaces for stakeholder groups to share with one another their lived experiences and perceptions regarding agriculture and water quality issues. Fund educational events like river walks for farmers or farm field days for non-farmers. Supporting the creation of a framework for to discussing agriculture, nonpoint source pollution, and water quality issues without relying on blame or generalizations farmers and other stakeholder groups. The goal is to assist actors in reducing the oversimplification of the complex social, political, economic, and environmental landscape underlying water quality issues in the U.S.

4. **Assist farmer-led or farmer-serving organizations in environmental stewardship efforts:** Philanthropy can assist farmer-led and/or farmer-serving grantees with a mission to help farmers be effective water and natural resource stewards. Ensure resources are dedicated to identifying and supporting groups led by and serving underrepresented farmers as well. In doing so, it will be important to avoid recreating historic injustices in the philanthropic and the agricultural sectors, and to equitably support underrepresented farmers.

5. **Assist farmer-led or farmer-serving organizations in addressing other relevant social, economic, or ecological issues in agriculture:** Philanthropy can assist farmer-led and/or farmer-serving grantees with a mission to address non-environmental issues, especially structural issues, that directly or indirectly affect agricultural communities' ability to be effective water quality stewards. Such issues include (but are not limited to) economic instability, climate change resilience, and preparing the next generation farmers. Cultivate the people you desire to join you in environmental stewardship. Support innovative ways to dismantle the larger structural issues that contribute to agricultural nonpoint source pollution and poor water quality in ways that the government and state are not able. Similar to the prior recommendation, ensure resources are dedicated to identifying and supporting groups led by and serve underrepresented farmers as well. In doing so, it will be important to avoid recreating historic injustices in the philanthropic and the agricultural sectors and to equitably support underrepresented farmers.

6. **Support improvements to water quality monitoring efforts:** When it comes to determining the impact of agricultural BMP implementation on water quality, improved monitoring (e.g. geographic scale, sampling intensity, and campaign length) is needed to fill knowledge gaps, and "even though this may be expensive, it is likely to be cheaper than the costs of water pollution" (Posthumous et al. 2011, Howarth et al. 2011, Kay et al. 2012). While philanthropy typically cannot support the cost of or conduct water quality monitoring, it can help improve the way in which this monitoring done. Emphasis should be placed on incorporating farmers and other stakeholders in monitoring efforts and testing at the field scale while assessing impacts at the watershed level. Converse with voluntary state programs, university extension programs, and other actors working to protect U.S. water basins from agricultural nutrient

pollution about what they need to enhance current monitoring efforts. Help standardize how watershed organizations and other actors collect and report water quality data so that all available data is more likely to be used by the state and other decision makers. Improve the reliability or accessibility of citizen science by funding technology that makes it less expensive, funding the expansion of citizen science programs, and ensuring citizen scientists are aware of the fruits of their labor.

7. **Help identify new and creative cost share funding:** With limited program funding, there is a need for new and creative ways to strengthen financial incentives and fund program-specific cost share for water quality best management implementation. Savvy in state and regional funding landscapes, the philanthropic sector can help voluntary state programs identify untapped pools of funding for cost share and other program areas. Consider how resources like CDFI could be adapted to support agricultural BMP implementation and how philanthropy can encourage this kind of adaptation.

8. **Support relevant social and ecological research:** While we have strong research programs about what has contributed to degraded water quality in U.S. water basins, there are still important gaps in how to comprehensively resolve water quality issues that research can fill. For example, support research projects that:
    a. Improve our understanding of the impacts of agricultural stewardship at the watershed scale (Kay et al. 2012).
    b. Actively engage farmers to help develop watershed models that quantify the environmental impacts of their conservation actions and utilize their on-the-ground knowledge of in-field implementation and impacts of specific practices (Kalcic et al. 2016). Remember, models are only as good as the data that informs them.
    c. Identify increasingly creative and flexible ways of structuring agricultural stewardship program incentives that better fit within with pre-existing social, political, and economic landscapes (Ferreyra et al. 2008, Kerr et al. 2016a, Kerr et al. 2016b, Vollmer-Sanders et al. 2016).
    d. Identify possible market-based solutions that effectively reframe the water quality issues for consumer and producer audiences in ways that drive increases in voluntary adoption of water quality BMPs. Support campaigns that bring water quality issues "closer to home" for farmers, reframe BMPs in the context of soil and crop health, or market commodities as safe for rivers, lakes, and drinking water.
    e. Develop innovative and comprehensive methods of controlling nutrient pollution from manure, especially from CAFOs.

9. **Support relevant and effective policy:** Foundations should consider partnering with sustainable agriculture and other relevant organizations to develop or research policies that effectively address both the structural forces behind and residual impacts of nonpoint source agricultural pollution on water quality. Identify the figuratively upstream systems that have

rooted the average U.S. farmer at the center of the debate on who is responsible for water quality pollution and water quality stewardship and support policies that disrupt them. Improve our knowledge of the impacts of BMPs at the watershed level by supporting policies that promote standardized information and/or improved monitoring schemes and mechanisms. Support policies that promote diversified agriculture, which improves soil health and reduces potentially harmful soil erosion. Promote the de-intensification of agriculture (and excessive levels of commercial fertilizer and manure application) by tackling current ethanol policies.

10. **Increase accessibility of relevant resources**: Support projects that are dedicated to collating the large body of resources related to agriculture and water quality (e.g. stewardship programs, research findings, novel interventions, management tools) into a single, simple and accessible platform that can be used effectively by farmers, state programs, decision makers, researchers and other interested actors. Support peer-reviewed open access literature reviews and empirical research about farmer motivations, voluntary state program impact, and BMP implementation in the U.S. Assist students and researchers at academic intuitions to cover the costs of publishing their work on an open access platform. Ensure resources are dedicated to identifying and supporting research conducted by smaller universities and research that is led by or represents those in underrepresented groups.

11. **Help hold stakeholders, including yourself, in achieving water quality goals:** The philanthropic sector can provide support for monitoring, research, operations, convening and other beneficial resources. Use this flexibility to help encourage a high standard of accountability from relevant actors (i.e. non-profits, foundations, government agencies, voluntary agricultural stewardship programs, researchers, producers, consumers and the private sector). Encourage focusing on not only whether BMPs are implemented, but also whether practices are environmentally effective. Promote the use of high-quality, empirical environmental impact data to improve voluntary programs and inform policy. Encourage the equitable incorporation of underrepresented groups into voluntary agricultural stewardship and other water quality efforts. Hold your own organization accountable as well. Critically evaluate the water quality and agricultural stewardship and other water quality work your organization has funded for their environmental impact and socio-economic reach. Define a set of environmental and social impact standards for your grantmaking and adhere to them when supporting water quality and/or agricultural stewardship in the future.

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Appendix

Abbreviations

ACEP: Agricultural Conservation Easement Program

AEM: Agricultural Environmental Management

ASAP: Agricultural Stewardship Assurance Program

BMAPS: Basin Management Action Plans

BMP: Best Management Practice

CAO: Critical Areas Ordinance

CAFO: Concentrated Animal Feeding Operation

CCRP: Continuous Conservation Reserve Program

CIG: Conservation Innovation Grant

CL: Conservation Loan Program

CREP: Conservation Reserve Enhancement Program

CRP: Conservation Reserve Program

CSP: Conservation Stewardship Program

ECP: Emergency Conservation Program

EQIP: Environmental Quality Incentives Program

FDACS: Florida Department of Agriculture and Consumer Services

FSA: Farm Service Agency

GMA: Growth Management Act

GPS: Global Positioning System

HAB: Harmful Algal Bloom

ILRP: Irrigated Lands Regulatory Program

MAEAP: Michigan Agriculture Environmental Assurance Program

MAWQCP: Minnesota Agricultural Water Quality Certification Program

NMP: Nutrient Management Plan

NOA: Notice of Applicability

NOI: Notice of Intent

NRCS: Natural Resources Conservation Service

RAPS: Required Agricultural Practices

RCPP: Regional Conservation Partnership Program

RMP: Resource Management Planning Program

SCWQP: Soil Conservation and Water Quality Plan

SWCCP: Soil and Water Conservation Cost Share Program

SWCD: Soil and Water Conservation District

TMDL: Total Maximum Daily Load

USDA: United States Department of Agriculture

VESP: Vermont Environmental Stewardship Program

VSP: Voluntary Stewardship Program

WDR: Waste Discharge Requirements

WQI: Water Quality Initiative

Example Reports

Florida

Status of Implementation of Agricultural Nonpoint Source Best Management Practices (2018)

Iowa

Iowa Water Quality Initiative 2018 Legislative Report, Soil Conservation Cost Share SFY 2017 Annual Report

Virginia

Stakeholder Advisory Group Report

Example Farm Signage

Florida:

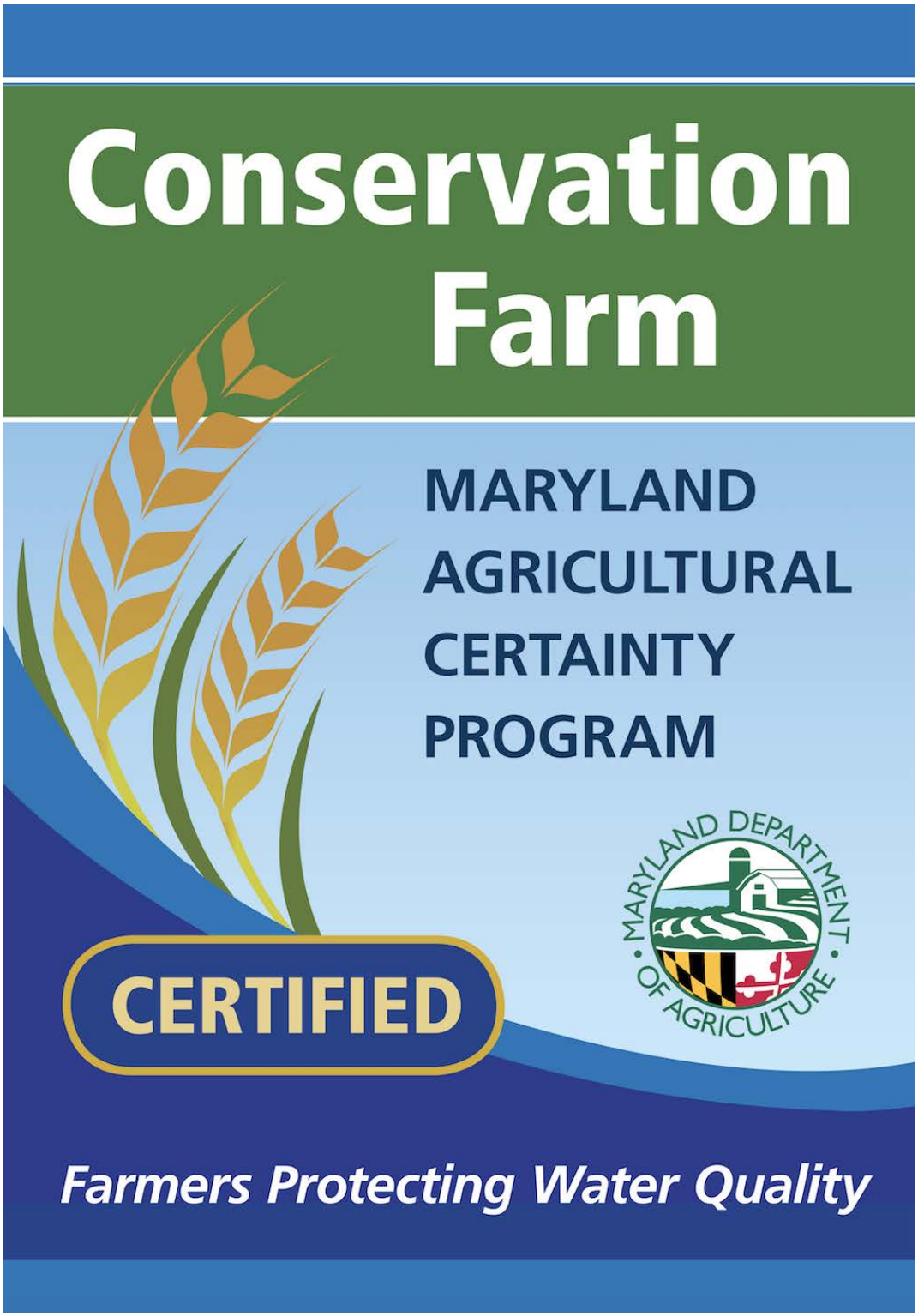
Minnesota:

MINNESOTA™
WATER QUALITY
CERTIFIED FARM

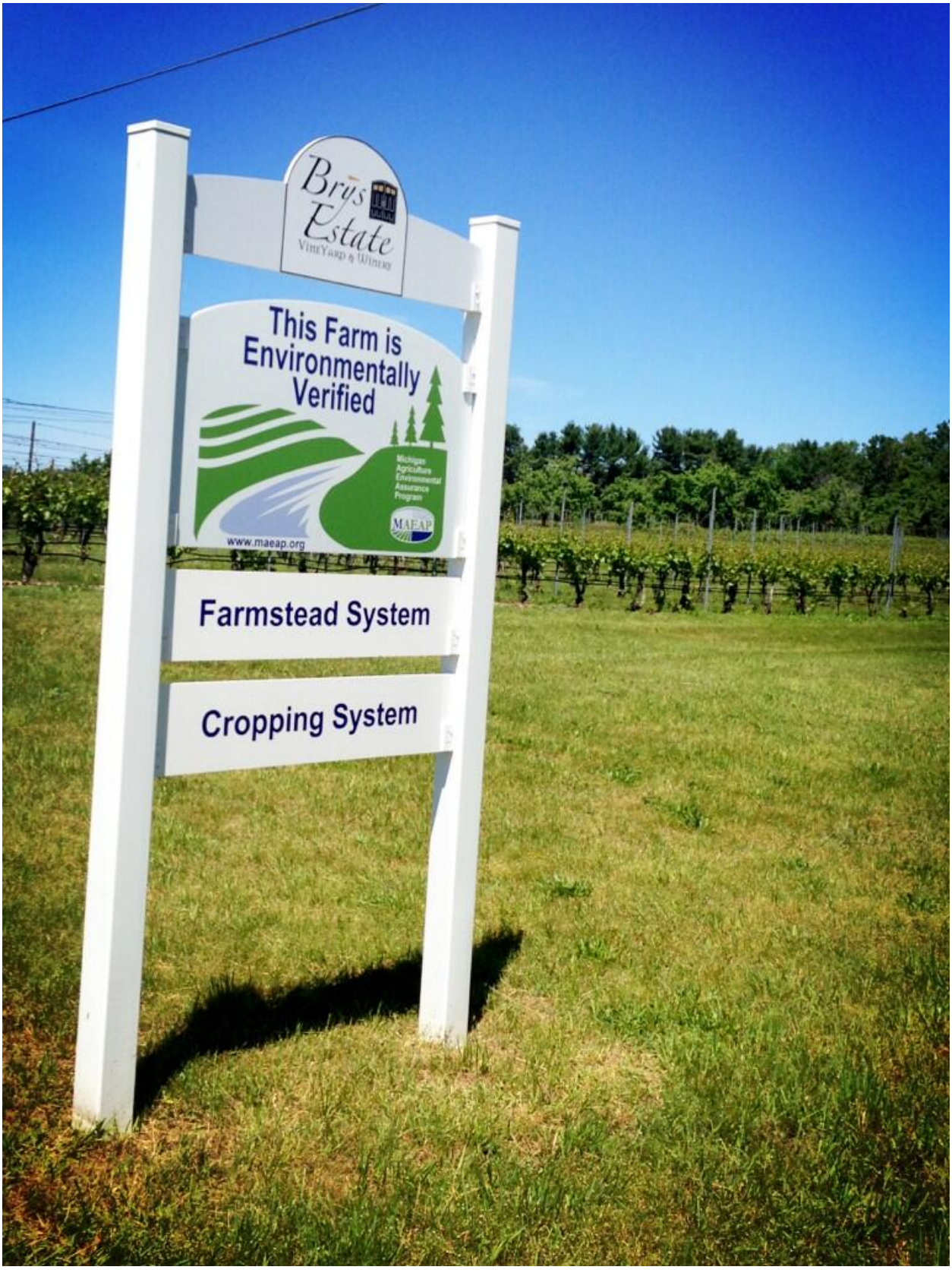
CLEAN WATER LAND & LEGACY AMENDMENT

DEPARTMENT OF AGRICULTURE

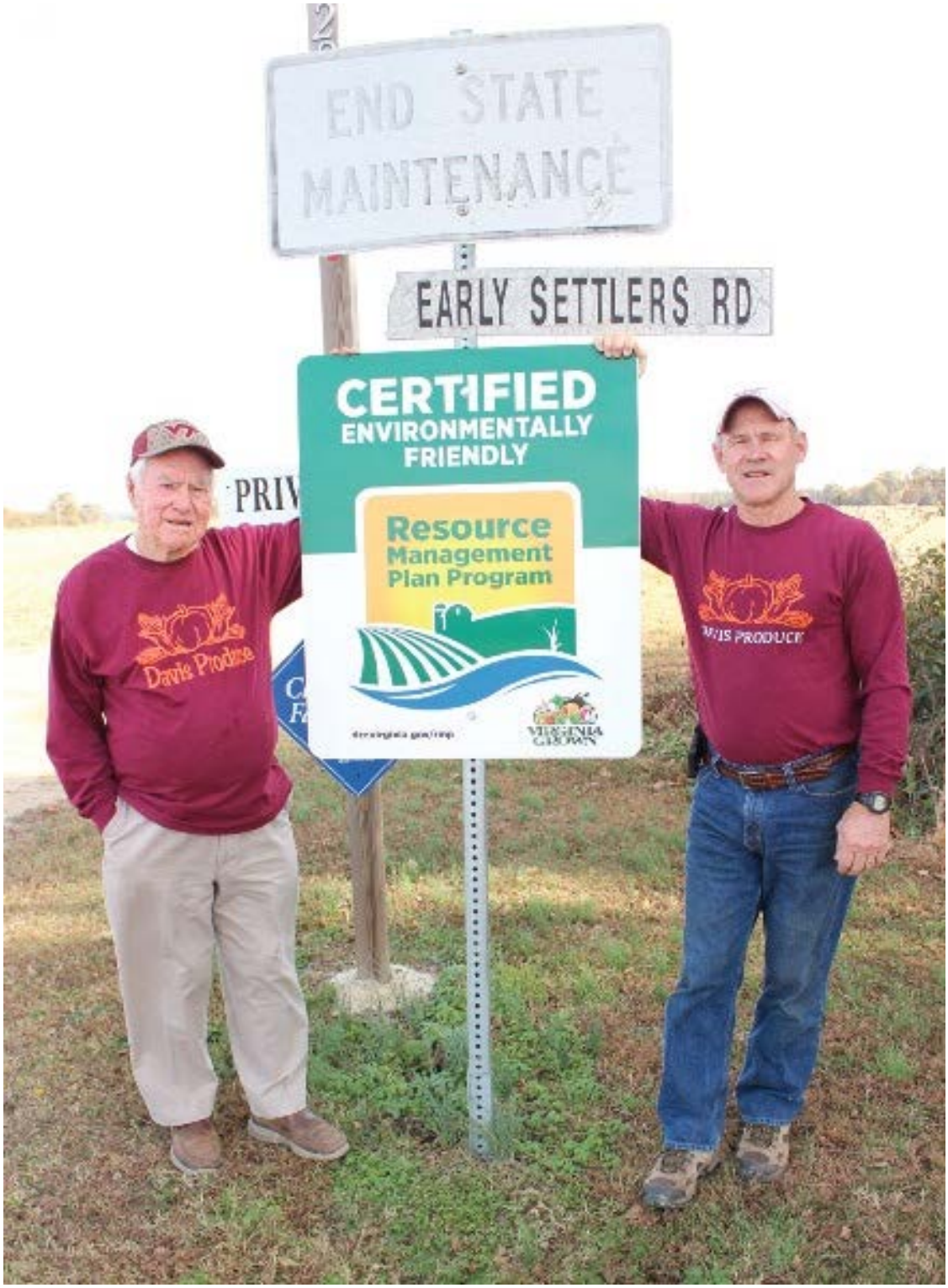
Maryland:


Conservation Farm
MARYLAND AGRICULTURAL CERTAINTY PROGRAM
MARYLAND DEPARTMENT OF AGRICULTURE
CERTIFIED
Farmers Protecting Water Quality

Michigan:


Brys Estate
Vineyard & Winery
This Farm is Environmentally Verified
Michigan Agricultural Environmental Assurance Program
MAEAP
www.maeap.org
Farmstead System
Cropping System

Virginia:


END STATE
MAINTENANCE
EARLY SETTLERS RD
CERTIFIED
ENVIRONMENTALLY
FRIENDLY
Resource
Management
Plan Program
VIRGINIA
GROWN

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