Recommendations to Strengthen Nutrient Management Planning on Virginia Farms

Virginia Nutrient Management Leadership Team

August 2017

Team Members and Acknowledgments

Virginia Nutrient Management Leadership Team members include:

Agricultural/Industry Organizations: Virginia Agribusiness Council, Virginia Biosolids Council, Virginia Cattlemen's Association, Virginia Farm Bureau, Virginia Grain Producers Association, Virginia Poultry Federation, Virginia State Dairymen's Association

Conservation Groups: Chesapeake Bay Foundation, Headwaters LLC, James River Association, Sustainable Chesapeake, Virginia Association of Conservation Districts

State and Federal Agencies: Virginia Department of Agriculture and Consumer Services, Virginia Department of Conservation and Recreation, Virginia Department of Environmental Quality, USDA Natural Resources Conservation Service

Land Grant/State Universities: Virginia Tech

Administration and facilitation of the Virginia Nutrient Management Leadership Team (VNMLT) were provided by Sustainable Chesapeake's Kristen Hughes Evans (overall coordination) and the University of Virginia's Institute for Environmental Negotiation's Tanya Denckla Cobb, Judie Talbot, and Dorothy Baker (meeting facilitation and assessment oversight and administration)

Acknowledgements

The VNMLT would like to offer thanks to the Virginia Environmental Endowment, the National Fish and Wildlife Foundation, and the Campbell Foundation for providing funding for this effort. We would also like to thank the 223 farmers and industry professionals that took their time to offer their feedback on challenges and opportunities to expand participation in Virginia's Nutrient Management Program.

The VNMLT would also like to offer our appreciation to Virginia Department of Conservation and Recreation (DCR) leadership and staff for their support of this process and their willingness to work collaboratively with the VNMLT to improve Virginia's Nutrient Management Program. VNMLT members also thank DCR for sharing the assessment with nearly 400 of Virginia's certified nutrient management planners. Thanks to DCR's outreach efforts, 67 certified nutrient management planners participated and offered valuable feedback to VNMLT members.

Table of Contents

Executive Summary 1

Purpose of the Virginia Nutrient Management Leadership Team 1

Why Focus on Nutrient Management Plans? 2

Current Status of Nutrient Management in Virginia 2

Gathering Feedback from Farmers and Agricultural Industry Professionals 3

Summary of Recommendations 4

Introduction 6

Purpose of the Virginia Nutrient Management Leadership Team 6

Members of the Virginia Nutrient Management Leadership Team 7

Nutrient Management Planning in Virginia 10

Feedback from Farmers and Industry Professionals 10

Summary of Assessment Methods 10

Summary of Farmer and Industry Professional Feedback 11

Recommendations to Expand Nutrient Management Plan Implementation on Virginia Farms 14

Next Steps: Implementing Recommendations 18

Appendix: Farm and Agricultural Industry Assessment Summary of Findings 19

Case Studies

Case Study 1: Jamie Shenk, Beauregard Farm 6
Case Study 2: Nelson Rodes and sons, Riverhill Farm 10
Case Study 3: Mark Reiter, Virginia Tech Eastern Shore 12
Case Study 4: Jimmy Crosby, Cros-B-Crest Farms 13
Case Study 5: Tim Woodward, Tellus Agronomics 14

Executive Summary

Purpose of the Virginia Nutrient Management Leadership Team

The Virginia Nutrient Management Leadership Team (VNMLT) was convened in June of 2016 for the purpose of strengthening nutrient management planning efforts on farms throughout Virginia. The VNMLT is a collaborative effort comprised of agricultural and conservation organizations, and state and federal agencies, with the following specific objectives:

Agriculture is Virginia's largest industry by far. With an economic impact of $52 billion annually, Virginia's 46,000 farms provide nearly 311,000 jobs in the Commonwealth. The combined employment and value-added economic impact of agriculture and forestry together make up 8.1 percent of the state's total gross domestic product.

Pictured above: A farmer harvests wheat with a combine and blows it into a grain truck on the Eastern Shore of Virginia. Photo by Lynda Richardson, courtesy of USDA Natural Resources Conservation Service.

- Gather feedback from farmers and industry professionals to identify challenges to and opportunities to expand participation
- Develop recommendations to improve farmer participation
- Highlight nutrient management success stories
- Communicate results and support efforts to implement recommendations

Members of the VNMLT include:

Agricultural/Industry Organizations: Virginia Agribusiness Council, Virginia Biosolids Council, Virginia Cattlemen's Association, Virginia Farm Bureau, Virginia Grain Producers Association, Virginia Poultry Federation, Virginia State Dairymen's Association

Conservation Groups: Chesapeake Bay Foundation, Headwaters LLC, James River Association, Sustainable Chesapeake, Virginia Association of Conservation Districts

State and Federal Agencies: Virginia Department of Agriculture and Consumer Services, Virginia Department of Conservation and Recreation, Virginia Department of Environmental Quality, USDA Natural Resources Conservation Service

Land Grant/State Universities: Virginia Tech

Why Focus on Nutrient Management Plans?

Nutrient management plans (NMPs) have been identified as a high-priority conservation practice proposed for widespread adoption in Virginia because of their potential to support farm profits and water quality. A NMP minimizes the cost of supplying nutrients and avoids wasted spending on unnecessary or unused nutrients. In Virginia, widespread adoption of NMPs – 95 percent of Virginia's farmlands by 2025 – has been proposed as part of a comprehensive regional effort to restore the Chesapeake Bay and its tidal tributaries. Unlike other states in the Chesapeake Bay region, with the exception of large animal feeding operations, nutrient management planning is voluntary for Virginia's farmers.

Current Status of Nutrient Management in Virginia

Pursuant to § 10.1-104.2 of Virginia, Virginia's Nutrient Management Program is administered by the Department of Conservation and Recreation (DCR), which provides program oversight, and training and certification for Virginia nutrient management planners. Virginia's Land Grant Universities provide guidance on recommended fertilizer application rates that is incorporated into Virginia's Nutrient Management Program. Most planners use Nutman 3.0 Software (which DCR is currently in the process of revising and updating) to develop NMPs.

As of 2016, DCR reports approximately 7,000 current NMPs written for Virginia farms, which encompass half of the 2 million acres in crop and hay production. Adoption rates of NMPs are even higher in the Chesapeake Bay watershed portion of Virginia, where 75% of crop and hayland acres are covered by NMPs (exceeding Virginia's 2016 Chesapeake Bay Watershed Implementation Plan milestone goal of 65% acres).

DCR also notes that there are about 12,000 farms in Virginia with 140 or more acres, and nearly 60% of these farms currently have NMPs that meet state regulatory requirements. Of the 12,034 farms that are at least 140 acres in size, nearly 7,000 of them currently have NMPs. Additional progress with smaller farms is being pursued by DCR. For example, DCR has contracted with Virginia Tech to hire staff to focus specifically on small farms. Also, DCR is working closely with the Virginia State University Small Farms Outreach Program and their thirteen extension specialists who are working with more than 1300 small, disadvantaged, and beginning farmers. So far, this program has made great strides in promoting nutrient management practices: fifty-five farmers have developed new plans in the past six months.

Over the past year, DCR has worked to determine whether plans developed by farmers are actually implemented. To date, with the support of certified nutrient management planners and 295 crop and livestock farmers managing 106,595 acres, DCR reports that farmers with NMPs are achieving high rates of implementation (82%). Virginia was the first state in the Chesapeake Bay region to verify NMP implementation. This data suggests that Virginia farmers are committed to and successfully using nutrient management practices on their farms.

Gathering Feedback from Farmers and Agricultural Industry Professionals

The VNMLT used an assessment tool to gather feedback from 223 farmers and agricultural industry professionals. Questions asked participants about benefits of nutrient management plans and services provided by planners as well as challenges to participation. Results highlighted strengths of Virginia's program as well as areas for improvement.

Strengths identified include:

- Participating farmers indicated that they were working with *certified nutrient management planners* to develop NMPs;
- Farmers indicated that *having a plan facilitates participation in cost share programs* and in some cases, helps to meet regulatory requirements;
- Farmers identified *agronomic and cost savings benefits of NMPs*;
- Farmers appreciated *environmental benefits* of NMPs;
- Farmers and industry professionals say that *planners are helpful in plan implementation*; and
- Farmers value *services provided by nutrient management planners* including: helping to keep the plan updated, expertise in agronomy and crop production, and clear explanations of how to implement the plan

Farmers and industry professionals also identified areas where Virginia's nutrient management program can be improved:

- Farmers and industry professionals recommended *improvements to the software used to develop nutrient management plans* including making the plan recommendations easier to understand and updating the software [note DCR is currently in the process updating the software].
- Farmers and industry professionals also offered *recommendations around flexibility.* Specifically, one suggestion was that DCR "make it easier and quicker to change and update the plan." Similarly, "concerns that NMPs are too inflexible" ranked as one of the top challenges to program participation.
- *"Concerns that NMPs may result in future regulations"* was ranked by farmers as the 2nd highest of 14 potential challenges or challenges to plan development and implementation.
- *Potential impacts on yields:* Farmer respondents indicated that promoting good yields was the least valuable benefit of the NMP process: while 21% rated this as 'highly valuable,' 47% rated it as 'somewhat valuable,' and 29% rated it as 'not valuable."
- *Practicalities of implementation:* Although not related to any specific question, several general areas of comments/feedback provided by both industry stakeholders and farmers related to feasibility of plan implementation including: concerns about recommended rates and timing; concerns about high soil phosphorus levels and limitations on the use of manure/poultry litter; concerns about using different blends of granulated fertilizer for a small portion of the total farm acreage; and concerns about the compatibility of the nutrient management program with precision nutrient management techniques.
- *Communication and programmatic responsiveness* was mentioned as an area of concern by industry stakeholders participating in one-on-one conversations. They conveyed optimism that the VNMLT would help to improve the program in areas where they feel previous feedback had not been addressed.

Summary of Recommendations to Strengthen Nutrient Management Planning in Virginia

After seeking feedback from farmers and agricultural industry stakeholders on strengths and opportunities to improve Virginia's Nutrient Management Program, the VNMLT developed recommendations to expand adoption and implementation of nutrient management plans and practices on farms throughout Virginia. The VNMLT agreed to focus recommendations on those that: i) would not require changes to Virginia's regulations or Land Grant University guidelines, ii) were feasible (legally and financially), and iii) that could be implemented in a reasonable timeframe. Recommendations are summarized as follows:

- **Establish a Nutrient Management Stakeholder Advisory Group** to foster communication between stakeholders (including DCR, farmers, certified nutrient management planners, regulators, researchers and extension professionals, the Natural Resources Conservation Service (NRCS), Virginia Department of Environmental Quality (DEQ), and environmental NGOs). The stakeholder advisory group will focus on enhancing participation in nutrient management training and implementation, not regulations.

- **Develop a "self-prepared nutrient management plan" for farmers that use only commercial fertilizer.** The VNMLT supports and affirms DCR's efforts to develop a self-prepared nutrient management planning tool and agrees that it will facilitate expanded farmer participation in Virginia's Nutrient Management Program. The VNMLT also recommends that DCR consider a "self-prepared NMP" using fertility recommendations based on current soil tests and documentation of actual nutrient application rates.

- **Improve the format and presentation of completed NMPs to make them easier to read.**

- **Develop tools and processes to help farmers keep their plans updated.** While NMPs are typically developed for a three-year timeframe, changes in weather or fluctuations in commodity prices necessitate plan updates throughout the life of the plan to keep them current. The following recommendations are offered to streamline this process:
  - Develop a spreadsheet or other reporting tool that farmers can use to report changes in planned crop rotations to their nutrient management planner.
  - Encourage farmers to authorize their crop advisor/agronomist to communicate with the nutrient management planner to keep the plan updated.
  - The VNMLT supports DCR inclusion of language in state contracts with nutrient management planners that requires them to meet annually with the farmer to support plan implementation.
  - Invite industry or non-profit partners (non-state agency) to establish an online rating system that invites farmers to rate the performance of their nutrient management planner.

- **Clarify the level of flexibility producers have regarding nutrient application rates.** To facilitate plan approval and help farmers who currently do not have historical yield records achieve yield goals while meeting NMP requirements, it is important that DCR provide additional clarity about the degree of flexibility producers have in regards to nutrient application rates.

- **Create a "safe way in" to the nutrient management plan program** for farmers managing fields with high soil phosphorus so that they can eventually implement a certified NMP. For example, one option could be to use a "continuous improvement" strategy for planning designed to move the farm incrementally over time towards full implementation of a NMP that meets Virginia's Nutrient Management Program Standards and Criteria in the future.

- **Publish a report on Virginia's Nutrient Management Program success and efforts to be used for education and outreach purposes.** An annual or biennial report focused on Virginia's Nutrient Management Program would support outreach efforts and provide information on growth in participation over time.

- **Promote Resource Management Plans (RMPs) as a way of increasing NMP participation *and* promote NMPs as the foundational building block of the RMP program.**

- **Develop a public relations/outreach campaign to build on farmer participation and express the benefits of NMP adoption.** Specifically:

  - Host or secure opportunities that feature farmer testimonials and support for peer-to-peer mentoring and exchange. These opportunities should be inclusive and diverse, featuring the range of producers from varying operations, individuals who may initially have been skeptical of implementation, top producers, etc. and showcase their individual success stories.
  - Initiate an award program highlighting top producers using Virginia's Nutrient Management Program that would prove beneficial for sharing the message. Award winning farmers could be featured at events such as industry association meetings and/or field day events.
  - Capitalize on existing field day events to highlight nutrient management planning as a component of soil health and farm conservation efforts.
  - As a follow-up to a nutrient management program report, stakeholders, including VNMLT members, are encouraged to promote NMP participation and its benefits in publications events, in accordance with the findings from the Farm and Agricultural Industry Assessment.

- **The most successful planners are trusted by their clients and encourage NMP adoption by providing accurate, up-to-date information that addresses their client's needs and concerns. As such, the VNMLT affirms existing and encourages future DCR efforts that provide training to certified nutrient management planners that includes the following:**

  - Results of the Farm and Agricultural Industry Assessment allowing the industry to better understand perceptions and/or concerns from the producer angle.
  - Information and messaging to address farmer concerns and goals.
  - Emphasizes and further encourages the need to keep the NMP updated to ensure it is a living document and meets producer expectations.
  - Ensures planners are aware of training and education opportunities for farmers on NMP topics.

  The VNMLT also encourages DCR (with support from other stakeholders) to:
  - Cross train planners to encourage them to carry the message to producers that NMPs are a foundational practice for RMP participation and a key component of soil health.
  - Engage planners in supporting peer-to-peer farmer discussions around nutrient management.
  - Use trainers as a conduit to identify top producers using NMPs to support award programs, field day events, and farmer-to-farmer mentoring.

Introduction

Purpose of the Virginia Nutrient Management Leadership Team

The Virginia Nutrient Management Leadership Team (VNMLT) is a collaborative effort comprised of agricultural and conservation organizations, and state and federal agencies convened in 2016 to strengthen nutrient management planning efforts on farms throughout Virginia. To achieve this goal, the Team worked to:

- Identify challenges to and opportunities to expand participation: This ground-up approach engaged 223 farmers, certified nutrient management planners, and support industry stakeholders through an assessment process to shed light on challenges to adoption and seek recommendations for improved farmer engagement.

- Develop recommendations to improve farmer participation: Based on feedback from farmers and industry professionals, the VNMLT developed concrete recommendations to expand farmer participation in nutrient management planning development and implementation. The VNMLT focused on recommendations that would not require change to regulations or Land Grant University guidelines, and that were achievable (financially and legally) within a reasonable timeframe.

Case Study 1: Beauregard Farm, Culpepper VA.
Photo by Kromatic Media courtesy of Sustainable Chesapeake.

Jamie Shenk (photo, left) is the Farm Manager of Beauregard Farms. Located in Culpepper, Virginia, Beauregard farms is a 2,300-acre operation that includes pasture, hay and crop lands that produces cattle, corn, soybeans, and hay. About five years ago, Jamie realized that "fertilizer was one of our input costs that we knew we could improve on." So, in the fall of 2011, Beauregard Farms hired Tim Woodward (photo, right) from Tellus Agronomics to help identify opportunities to save money on fertilizer.

Jamie explains that with Tim's guidance, they started making "strategic investments in new technology. First, we tackled one problem, then we moved onto the next." For example, "First we broke the larger fields into management zones. Then we invested in a combine with a GPS system so we could develop yield maps. Then we invested in variable rate fertilizer application and on-farm blending equipment. Now we can purchase phosphorus and potash at wholesale cost, and since we can store it on the farm and make our own blended fertilizer, we can buy at times of the year when demand and prices are at their lowest." The fertilizer blender also allows them to weigh out fertilizer, and better calibrate the spreader, avoiding over-application.

Jamie says that so far, the investment in variable rate fertilizer and on-farm blending equipment has reduced fertilizer input costs for Beauregard Farms. Jamie says that this past spring was the first year that they did variable rate seeding. "The bottom line is that we did this for the economics of it. We want to avoid over-seeding our less productive areas, while reaching full potential in our highly productive areas."

Both Jamie and Tim noted that nutrient management is a key component to the farm's overall commitment to managing for both soil health and water quality. Jamie uses rye cover crops to capture excess nitrogen, cover the soil, and increase soil moisture capacity. Beauregard Farms is also enrolled in Virginia's Resource Management Plan program, and according to the Culpepper Soil and Water Conservation District, in addition to implementing a NMP, planting cover crops, and implementing rotational grazing on the farm, they have installed 6.2 miles of livestock exclusion fencing, and 37.7 acres of riparian buffers.

Jamie observed that Beauregard Farms "didn't jump into using precision agriculture all at once. We started on small plots. Once we saw what worked, we expanded that. The cost savings we generated from one piece of new equipment helped us to justify investment in the second piece. So, this process has been one step at a time for us." He also notes that "Soil is our main focus. We can't create good yields out of poor soil."

- Highlight nutrient management success stories: Throughout Virginia, many farmers are using nutrient management plans as a critical tool to support farm profits and protect water quality. VNMLT members provided examples of farms where nutrient management plans are being implemented successfully.

- Next Steps: communicate results and implement recommendations. Leadership team members have committed to sharing recommendations with policy makers and stakeholders in Virginia and throughout the Chesapeake Bay region. Leadership team members will also work to identify strategies (and funding resources if necessary) to support implementation of the recommendations.

Nutrient Management Planning in Virginia

Virginia's Nutrient Management Planning Program is administered by the Department of Conservation and Recreation (DCR), which provides program oversight, and training and certification for Virginia nutrient management planners. Virginia's Nutrient Management Program delivers plans based on Nutrient Management Training and Certification Regulations and Virginia's Nutrient Management Planning Standards and Criteria. Only planners certified by DCR are eligible to develop plans that meet this criterion. Software (NutMan 3.0, released January 18, 2013) developed with support from DCR is frequently used by planners to support nutrient management planning. DCR is currently in the process of updating the NutMan software. Fertilizer application rates incorporated into Virginia's Nutrient Management Program are based on recommendations developed by Virginia's Land Grant Universities.

Why focus on Nutrient Management Plans?

In many regions of Virginia and elsewhere in the U.S., agricultural production is a predominant land use as well as a cornerstone of local and regional economies. Nutrient management plans (NMPs) were initially developed by economists and soil fertility/crop production specialists as a tool to optimize financial returns on fertilizer investments. The goal of a NMP is to take field-specific information on potential yields, and recommend a fertilizer program that achieves maximum farm profit. Because fertilizer that crops do not remove can be carried by rainwater to surface and groundwater, NMPs were also recognized as a way to minimize fertilizer losses from agricultural lands. Figure 1 illustrates these key concepts: 1) NMPs recommend fertilizer at rates that optimize economic returns based on yield response to additional fertilizer application; and 2) nitrogen loss increases at higher fertilizer application rates. A Virginia study evaluated the impact of nutrient management planning on net farm income and nutrient losses and found that on average, NMP adoption increased farm net income (by $395 to $4,593) and reduced nitrogen (from 23 to 45 percent) and phosphorus (from 23 to 66 percent) loss.[1]

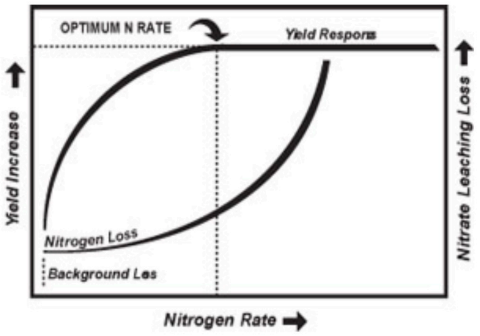


Figure 1: Impact of nitrogen (N) rate on crop yield and nitrate loss from a corn production system (University of Minnesota Extension).

In Virginia, DCR in consultation with stakeholders, has proposed widespread adoption of NMPs – 95 percent of Virginia's farmlands by 2025 – as part of a comprehensive regional effort to restore the Chesapeake Bay and its tidal tributaries. Unlike other states in the Chesapeake Bay region, with the exception of large animal feeding operations, nutrient management planning is voluntary for most of Virginia's farmers.

1. VanDyke, L., J. Pease, D. Bosch, and J. Baker. 1999. Nutrient management planning on four Virginia livestock farms: impacts on net income and nutrient losses. J. of Soil and Water Cons. Vol 54:2; pp. 499-505.

Current status of NMP adoption in Virginia

Despite the potential benefits of nutrient management planning, even greater adoption and implementation of NMPs in Virginia could be achieved. The United States Department of Agriculture's 2013 Conservation Effects Assessment Project found that "the most critical conservation need in the region is the need for complete and consistently applied nutrient application management following … appropriate rate, timing, method, and form of nitrogen and phosphorus application...About 40 percent of cropped acres in the region have a high or moderate need for additional nutrient management for nitrogen and/or phosphorus."

In Virginia, DCR reports that of the 12,034 farms that are at least 140 acres in size, nearly 7,000 (approximately 60%) currently have NMPs that meet state requirements. DCR also notes that according to the latest imaging analysis by the U.S. Geological Survey and EPA, there are approximately 2 million acres of crop and hayland acres in Virginia. The 7,000 plans that DCR has on file represent approximately 1 million of these acres.

DCR is also working in partnership with Virginia's Land Grant Universities to engage small farms in nutrient management planning efforts. For example, DCR has contracted with Virginia Tech to hire staff to focus specifically on small farms. Also, DCR is working closely with the Virginia State University Small Farms Outreach Program and their thirteen extension specialists who are working with more than 1300 small, disadvantaged, and beginning farmers. So far, this program has made great strides in promoting nutrient management practices: fifty-five farmers have developed new plans in the past six months.

In summary, NMPs currently cover 50% of the crop and hayland acres throughout Virginia, and 75% of the crop and hayland acres in the Chesapeake Bay watershed portion of Virginia. This level of implementation exceeds Virginia's 2017 milestone goal for the Chesapeake Bay Watershed Implementation Plan, which set a target of achieving nutrient management planning on 65% of farmland acreage in Virginia's Chesapeake Bay watershed.

Further, as part of the Chesapeake Bay Watershed Implementation Plan effort, Bay states were encouraged to "verify" NMP implementation to document the agricultural sector's contributions towards nutrient and sediment pollution reductions. Virginia was the first state in the Chesapeake Bay region to develop a voluntary verification procedure, and the first state to begin documenting plan implementation. Over the 2017 fiscal year, 295 livestock and crop farmers managing 106,595 acres volunteered to meet with their planners to determine what percent of their NMP recommendations were actually implemented. DCR reports that participating farmers implemented their NMPs on 82% of the acres covered by their plans.

According to DCR, the willingness of Virginia farmers to participate in this effort, along with the positive data generated from this verification process, demonstrates Virginia farmers' interest and ability to adopt nutrient management practices on their operations. DCR suggests that this high rate of NMP implementation has been accomplished, in part, by delivery of Virginia's Nutrient Management Program by certified planners, many of whom are also Certified Crop Advisors and Certified Professional Agronomists.

It is also important to consider that NMPs are typically not the only conservation practice implemented on a farming operation. Rather, Virginia farmers typically use NMPs as one component of a comprehensive suite of conservation practices designed to support farm profits and protect natural resources. Farmers such as those featured in this report use NMPs in combination with other conservation practices to reduce input costs, prevent soil and nutrient loss, and maximize profits. These farmers are also good examples of the partnership role that public and private certified nutrient management planners play in supporting NMP development and implementation on farms throughout Virginia.

Given the progress made to date and the opportunity to expand NMP development and implementation on farming operations in Virginia, an important objective of VNMLT is to identify challenges to farmer adoption of NMPs as well as opportunities to expand farmer participation in the program. To date, a comprehensive evaluation of challenges to participation in Virginia's Nutrient Management Program has not been conducted. However, research evaluating the efficacy of different NMPs has been conducted in the Chesapeake Bay watershed and elsewhere. In an effort to evaluate the effect of state difference in NMP development, ten poultry growers from Virginia's Eastern Shore (who are required to implement NMPs) participated in Chesapeake Bay region survey. All ten agreed with the statement "The nutrient recommendations in my NMP are too conservative" for their crop production acreage.[2] A study conducted in North Carolina identified challenges to NMP implementation such as: 1) lack of trust in recommended nitrogen application rates; 2) view of abundant nitrogen as a form of crop insurance; and 3) used recommendations obtained from other industry professionals, such as fertilizer dealers.[3]

2. Perez, M. 2015. Regulating farmer nutrient management: A three-state case study on the Delmarva Peninsula. JEQ 44:402-414.
3. Osmond, D., D. Hoag, Al E. Luloff, D. Meals, and K. Neas. 2014. Farmers' use of nutrient management: lessons from watershed case studies. JEQ 44: 382-390.

Feedback from Farmers and Industry Professionals

As part of this process, the VNMLT sought feedback from farmers and agricultural industry stakeholders in Virginia on strengths and opportunities to improve Virginia's Nutrient Management Program. The University of Virginia's Institute for Environmental Negotiation provided oversight and management of responses and, with support from Sustainable Chesapeake and other VNMLT members, developed a final report of assessment findings (see Appendix). The intention of the VNMLT was to use feedback provided by farmers and industry stakeholders to develop recommendations to encourage more farmers to participate in the program.

Summary of Assessment Methods

To gather feedback from farmers and industry stakeholders, the VNMLT developed an assessment that included questions and invited participation from December of 2016 through February of 2017. Farmers and agricultural industry stakeholders were asked for their opinion on what they found valuable about the planning process, the role of nutrient management planners in helping farmers to implement the plans, and opportunities and challenges for expanding participation in plan development and implementation. Options for participation included a written (hard copy or on-line) questionnaire as well as one-on-one conversations with team members. University of Virginia's Institute of Environmental Negotiation led the assessment process and analyzed results.

Case Study 2: Nelson Rodes and sons, Riverhill Farm, Port Republic VA

Photo by Kromatic Media courtesy of Sustainable Chesapeake

Three generations of Rodeses make a living at the Riverhill Farm, where they produce milk, turkeys and grain crops in Port Republic, Virginia. Nelson, his three sons, and his brother Glenn, have implemented several innovative technologies and practices related to nutrient management on the farm. For example, Glenn, who manages the farm's poultry operation (in partnership with Nelson's son Justin), installed a biomass heating system that can use wood chips or poultry litter to provide heat for the turkey poult house. The system concentrates excess poultry litter nutrients and expands the distance over which poultry litter nutrients can be cost-effectively transported.

Nelson Rodes manages the crop components of the farm with his three sons. In the photo, Nelson (on the right) is standing with his sons Justin (on the left) and Gary (middle) on a barley field just planted with corn (note Adam is not shown). Nelson says he makes farming decisions with the future of his three sons in mind. Although Nelson says curiosity ultimately drives them to try new things, he and Justin explained that they are taking things slow when it comes to changes in their nutrient management program. For example, they started using precision nutrient management techniques about five years ago, with equipment that allowed them to develop yield maps. Those yield maps showed them that they have a lot of variability within their fields. This year, they tried variable rate application of lime and potash, and they planted seed using a variable rate seed planter. This fall they will be able to see whether these efforts made a difference in yields. Nelson also says that it takes time to get used to this new technology: "I'm old enough that I need to have my sons show me how to use some of this new equipment."

Nelson also recently started working with Dr. Rory Maguire, a Professor at Virginia Tech who specializes in nutrient management. Dr. Maguire helped to bring the Rodes funding through the National Fish and Wildlife Foundation to purchase a Farm Star drag hose tool bar system with Dietrich injectors mounted to it that they started using this spring to land apply a portion of their dairy manure. Crawford Patterson, with the Virginia Department of Conservation and Recreation, who has been working with the Rhodes family for 15 years to develop the farm's nutrient management plan, observed that "manure injection gets you to where you can raise your crop without any additional nitrogen application, which saves farmers money, and at the same time benefits the environment."

Over the three-month assessment timeframe, 73 farmers and 150 agricultural industry stakeholders completed online or hard copies of the assessment, and 16 participated in one-on-one conversations. Farmer participants represented a range of farming operations and sizes, and provided management for a total of 54,787 acres of farmland in Virginia. For the online/paper assessment, when participating farmers were asked what category best describes their operation, the top five responses were:

- Dairy (45%)
- Agronomic crop production (corn, soybeans, wheat, cotton) (42%)
- Beef (41%)
- Poultry (23%)
- Specialty crop production (vegetables, fruit, flowers) (15%)

Summary of Farmer and Industry Professional Feedback

The Institute for Environmental Negotiation published a complete report detailing feedback provided to the VNMLT through the assessment process that is included as an Appendix. Results are summarized as follows:

Strengths of the program *(Presented in roughly the same order of appearance as in the assessment)*

- Farmers are working with certified nutrient management planners to develop NMPs: 90% of reporting farmers with NMPs worked with certified planners to develop plans they currently have or had in the past.

- NMPs support regulatory compliance and cost-share program participation: Supporting regulatory requirements was ranked by farmers as the primary benefit of 5 options. Industry respondents ranked this the lowest priority of the 5 areas of benefit.

- Agronomic and cost savings benefits: Both farmer and industry respondents rated agronomic benefits as the 2nd most important for the 5 categories of benefits to farming operations.

- Environmental benefits of NMPs: Farmer respondents cited environmental benefits as the third most important benefit for their operations and industry respondents rated this as the 4th most important benefit.

- Planners provide assistance with plan implementation: When farmers were asked how helpful nutrient management planners were in assisting with plan implementation, 39% said their planners were 'very helpful' and 39% 'somewhat helpful.' Similarly, of the industry respondents, 48% considered planner to be 'very helpful' with implementation and 37% said planners were 'somewhat helpful.'

- Valued nutrient management planning services: The top three NMP services that farmers indicated as being most helpful were:
  - Actively involved in keeping the plan updated
  - Expertise in agronomy and crop production
  - Clear explanations on how to implement the plan

Industry respondents reported the three most important planning services as: 1) expertise in agronomy and crop production, 2) collecting in-field data and 3) advice on implementation.

Case Study 3: Mark Reiter, Virginia Tech Eastern Shore AREC
Photo courtesy of Virginia Tech

Dr. Mark Reiter, an Extension Specialist of soils and nutrient management based at the Virginia Tech Eastern Shore Agriculture Research and Extension Center and his team are helping farmers to improve yields and reduce input costs by identifying areas of the field with different production potential. In the photo, Dr. Reiter's team is mapping fields to better define nutrient management zones based on soil type. Heavier soil textures hold more water and have greater yield potential, along with different nutrient needs than drier, sandy soils.

Dr. Reiter, who lives with his family on the Eastern Shore says that "farmers are interested in improving their nutrient management - not just for cost savings, but for water quality too. There are only about 45,000 of us on the Eastern Shore, and everybody knows each other and we all love seafood, swimming and boating. We really do care about water quality."

Challenges to participating in the program (Presented in roughly the order of highest response)

- NutMan software: Farmers and industry stakeholders brought up a number of issues around the NutMan software currently used as a basis for most of Virginia's NMPs:
  - The output of the program is too complex: When asked about factors that would encourage development and/or implementation of NMPs, farmers ranked "Make plan recommendations easier to understand" as the 2nd highest out of 9 choices. Industry stakeholders ranked "Making recommendations easier to understand" as the 1st priority out of 9 choices. Assessment participants offered suggestions and comments relating to the need to simplify information in the plan so that it is easier for farmers to understand and follow.
  - The program needs to be updated: Industry stakeholders in particular expressed concerns that the software is outdated. [Note DCR is current in the process of updating this software.]

- Flexibility (plan updates and programmatic): When farmers were asked about factors that would make plan development and implementation easier, the top response out of 9 choices was "Make it easier and quicker to change and update the plan." Industry stakeholders rated "Make it easier and quicker to change and update the plan" as their second highest of 9 options. With respect to programmatic flexibility, when asked about challenges associated with developing and implementing NMPs, farmers ranked "concerns that NMPs are too inflexible" as the 1st reason out of 14 options. Industry representatives scored this as their 2nd highest of 14 options. Both farmers and industry stakeholder provided comments regarding concerns around programmatic flexibility.

- Potential for future government regulation. "Concerns that NMPs may result in future regulations" was ranked by farmers as the 2nd highest of 14 potential challenges or challenges to plan development and implementation, while industry stakeholders ranked this as the most important factor.

- Potential impacts on yields: Farmer respondents indicated that promoting good yields was the least valuable benefit of the NMP process: while 21% rated this as 'highly valuable,' 47% rated it as 'somewhat valuable,' and 29% rated it as 'not valuable." Industry respondents placed greater emphasis on yield benefits: 52% rated it as 'very valuable,' 33% said 'somewhat valuable' and 10% said it was 'not valuable.' Comments that were provided expressed concerns that fertilizer recommendations could negatively impact yields.

- Practicalities of implementation. Although not related to any specific question, several general areas of comments/feedback provided by both industry stakeholders and farmers relate to this topic:
    - Practicality of recommended rates or timing of fertilizer – farmers expressed concerns about the feasibility of implementing recommended rates. For example, recommended application rates lower than equipment settings can accommodate.
    - Concerns about high soil phosphorus and limitations on use of manure/poultry litter were expressed by farmers and industry stakeholders.
    - Issues regarding the practicality of plan implementation for farmers using blended fertilizer were raised by both farmers and planners. For example, the feasibility of using a different nutrient blend for a small portion of a farm's acreage.
    - Concerns about the compatibility of the nutrient management program with precision agriculture was expressed by both farmers and planners. Specifically, they noted that the NutMan software is not designed to accommodate precision nutrient application such as variable rate fertilizer application within fields or multiple split nitrogen applications.

- Communication and programmatic responsiveness were mentioned as areas of concern by industry stakeholders participating in one-on-one conversations. They conveyed optimism that the VNMLT would help to improve the program in areas where they feel previous feedback has not been addressed.

Industry stakeholders also provided numerous suggestions regarding the potential for outreach and education to expand producer participation.

Also included in the Summary of Findings (Appendix) is a comparison of farmer versus industry assessment responses that demonstrates a large degree of agreement between the two groups.

Case Study 4: Jimmy Crosby, Cros-B-Crest Farms
Photo by Kromatic Media courtesy of Sustainable Chesapeake

Jimmy Crosby (on the right) and his family have been farming Cros-B-Crest farm for over 100 years. The farm has diversified and expanded over the past 3-4 decades, and now produces greenhouse plants, poultry, and grains. Jimmy explained that "Because of the steep slopes on our land, we started using no-till. We had heard a lot about the benefits, plus we knew that with conventional tillage, we would lose too much soil for our crop production to be sustainable in the long-run." Jimmy, who is now president of the Virginia No-till Alliance (VANTAGE) observed that resources like VANTAGE mean that farmers don't have to re-invent the wheel. They can learn from other farmers who have been using no-till for years, and benefit from their experience.

For the Crosbys, nutrient management planning is one component of a comprehensive conservation system approach that benefits crop production, as well as soil and water quality. Richard Fitzgerald, a private certified nutrient management planner, develops the farm's nutrient management plan. "My role, as charged by the Crosbys, is to stay on course with the proven basic agronomic recommendations, while we strive to increase yield and profitability. The Crosbys are consistently producing 200 bushels corn on soils that are rated at 140 bushels or less. They accomplish this by paying attention to the details in every part of their farming operation. This is never more evident than the field shown in this photo. It has a Frederick C&D slope, and they are using strip crops, filter strips, diverse cover crops, no-till, split application of nitrogen, and both organic and inorganic sources of nutrients."

Doug Horn, with Virginia Cooperative Extension (on the left) has been working with the Crosbys to evaluate the performance of different mixes of multi-species cover crops on the farm. In the photo, Doug and Jimmy stand in corn planted into a multi-species cover crop mix. Although heavy rains and cold temperatures this spring meant that the nitrogen fixation benefits of the cover crop weren't at their maximum, the heavy cover has reduced the need for herbicide in the field, saving $30 to $65 per acre, while also improving the soil moisture retention capacity. Jimmy noted that one drawback with heavy ground cover this year is that with the wet, cool spring, slugs have been a problem. When it comes to nutrient management and cover crops, Doug notes that "there is no work book, there is no recipe, every year is different. The more experience you get, the better you can react to different situations." Jimmy says, "When I got started, my goal was to get as many bushels per acre as possible. However, at this point, my goal in implementing diverse conservation and nutrient management practices is to lower my input costs and generate greater profits, even if it means that our per acre yield is lower."

Recommendations to Expand Nutrient Management Plan Implementation on Virginia Farms

Case Study 5: Tim Woodward, Tellus Agronomics
Photo courtesy of Tellus Agronomics

Tim Woodward with Tellus Agronomics is a private nutrient management planner that helps farmers take advantage of precision agriculture technology to improve their farm profits. In the photo, he is shown scouting a wheat field in Virginia's Northern Neck, looking for disease and pest pressure. Tim says that "More than 90 percent of our clients have moved from a conventional NMP to precision agriculture. The economics just makes sense." However, Tim notes that for smaller farms, it's going to take collaboration with larger farms or custom applicators willing to provide variable rate fertilizer application to make the economics work.

At the onset of the process, VNMLT agreed to focus its recommendations on strategies that would expand producer participation in Virginia's Nutrient Management Program without requiring changes to either the state's regulations or the Land Grant University guidelines.

The VNMLT further committed to develop recommendations that are achievable (financially and legally); can be completed in a reasonable timeframe; and are inclusive of all types of agricultural operations. Additionally, the team agreed that recommendations would aim to increase farmer participation along with supporting both water quality and agricultural production goals.

Given these agreed upon criteria and based on VNMLT's deliberations with the benefit of input from the farmer and agricultural industry stakeholders through a statewide assessment process, VNMLT offers the following recommendations to expand farmer participation in Virginia's Nutrient Management Program:

- Establish a Nutrient Management Stakeholder Advisory Group Led by the Virginia Department of Conservation and Recreation (DCR), the purpose of this group is to foster communication between stakeholders (including DCR, farmers, certified nutrient management planners, regulators, researchers and extension professionals, the Natural Resources Conservation Service (NRCS), Virginia Department of Environmental Quality (DEQ), and environmental NGOs). The stakeholder advisory group will focus on enhancing participation in nutrient management training and implementation, not regulations. VNMLT members noted that DCR currently has authority to establish advisory committees. The stakeholder advisory group would be established during the FY2018 timeframe, and will convene as appropriate and as determined by members and DCR. This advisory group could also play a key role in supporting implementation of other VNMLT recommendations.

- Develop a "self-prepared NMP" for farmers that use only commercial fertilizer. The VNMLT supports and affirms DCR's efforts to develop a self-prepared nutrient management planning tool and agrees that it will facilitate expanded farmer participation in Virginia's Nutrient Management Program. The VNMLT recommends that DCR consider a "self-prepared NMP" using fertility recommendations based on current soil tests and documentation of actual nutrient application rates.

- Improve the format and presentation of completed NMPs to make them easier to read. The VNMLT recommends that DCR engage (through individual contracts or other means) professional communications experts to work with farmers, and nutrient management planners (potentially through focus groups) to develop a final NMP report that is easier for farmers to understand.

- Develop tools and processes to help farmers keep their plans updated. Most NMPs are written for a three-year timeframe. However, changes in weather or fluctuations in commodity prices often result in the need for adaptive management that influences planned crop rotations. Hence, NMPs often need to be updated throughout the life of the plan to keep them current. Based on suggestions from farmers and industry stakeholders and professional experience of VNMLT members, the following recommendations are offered to streamline this process:

  — Develop a spreadsheet or other reporting tool that farmers can use to report changes in planned crop rotations to their nutrient management planner. DCR is currently in the process of updating the NutMan 3.0 software to facilitate plan development. As part of this software update, the VNMLT recommends developing reporting tools that allows farmers to easily update their plan and communicate with their planner important information such as changes in planned crop rotations and harvested yields.

  — Encourage farmers to authorize their crop advisor/agronomist to communicate with the nutrient management planner to keep the plan updated. In some cases, the farm's crop advisor or agronomist is not involved in the development of the farm's NMP. This recommendation supports improved communication between the professionals providing the farmer with guidance on crucial agronomic inputs.

  — The VNMLT supports DCR inclusion of language in state contracts with nutrient management planners that requires them to meet annually with the farmer to support plan implementation. The VNMLT also encourages DCR to continue to pay planners for plan updates thus ensuring that the plan is up-to-date in practice and on paper. The VNMLT also affirms and encourages DCR to continue to communicate to nutrient management planners that planners are required to work with their clients to keep the plan updated.

  — Invite industry or non-profit partners (non-state agency) to establish an online rating system that gives farmers the opportunity to rate the performance of their nutrient management planner. Because keeping the plan updated is often dependent on the planner's commitment to customer service, the VNMLT envisions a rating system similar to "Yelp" for restaurants and businesses that would allow farmers to identify which planners have a reputation for delivering a high-level of customer service and to more fluidly share this information peer-to-peer.

- Clarify the level of flexibility producers have regarding nutrient application rates. To facilitate plan approval and help farmers who currently do not have historical yield records achieve yield goals while meeting nutrient management plan requirements, it is important that DCR provide additional clarity about the degree of flexibility producers have in regards to nutrient application rates. The VNMLT received extensive input from farmers and industry stakeholders about the need for flexibility associated with recommended nutrient application rates, particularly when yield records are not available. In its commitment to providing recommendations that do not call for changes to existing regulations or Land Grant University recommendations, VNMLT recommends that stakeholders work with DCR to explore the level of flexibility allowed within the existing regulations so as to: (a) encourage participation in the program; (b) facilitate plan approval and (c) help farmers without yield records achieve their yield goals. VNMLT further recommends that the outcome of this process should be summarized in a "frequently asked questions" (FAQ) page for future communication. The FAQ could also contain recommendations for methods to estimate yields for nutrient management planning purposes if nearby scales are not available.

- Create a "safe way in" to the nutrient management plan program for farmers managing fields with high soil phosphorus so that they can eventually implement a certified nutrient management plan. For example, one option could be to use a "continuous improvement" strategy for planning designed to move the farm incrementally over time towards full implementation of a NMP that meets Virginia's Nutrient Management Program Standards and Criteria in the future.

- Publish a report on Virginia's NMP program success and efforts to be used for education and outreach purposes. An annual or biennial report focused on the NMP program would support outreach efforts and provide information on growth in participation over time. The annual report DCR publishes on the Resource Management Plan (RMP) program serves as an excellent model, as it features farmer success stories and testimonials in addition to participation data. The report could include:

    — Changes to improve the program
    — Updates on the software development process
    — Bullet points explaining the benefit of NMPs from the farmers' perspective
    — NMP adoption rates throughout Virginia
    — Outcomes of DCR's NMP verification process
    — Stories featuring "award winning" farmers using NMPs
    — Top-rated planners talking about the services they provide to their clients
    — Link to farmer rankings for nutrient management planners so farmers can easily view and access top performing planners
    — Score-card approach for documenting efforts to expand farmer participation in Virginia's Nutrient Management Program

- Promote RMPs as a way of increasing NMP participation and promote NMPs as the foundational building block of the RMP program. Virginia established the Resource Management Plan program to provide farmers that met basic conservation requirements with a "safe harbor," a promise that they would not need to comply with any new regulations associated with Chesapeake Bay restoration efforts for nine years following implementation of their RMP plan. Participation in the Resource Management Plan program also affords additional consideration for cost share participation. Additionally, members suggested that stakeholders explore opportunities for marketing/branding for farmers who have fully implemented a Virginia RMP.

- Develop a public relations/outreach campaign to build on farmer participation and express the benefits of NMP adoption:

  — Host or secure opportunities that feature farmer testimonials and support for peer-to-peer mentoring and exchange. These opportunities should be inclusive and diverse, featuring the range of producers from varying operations, individuals who may initially have been skeptical of implementation, top producers, etc. and showcase their individual success stories. This outreach effort should be driven by both DCR and critical stakeholder groups and may result in formalizing a peer-to-peer farmer network. VNMLT members suggested looking to existing outreach models to tap for this outreach effort (for example, the National Association of Soil Conservation District's Soil Health Champions).
  — Initiate an award program highlighting top producers using Virginia's NM program that would prove beneficial for sharing the message. Award winning farmers could be featured at events such as industry association meetings and/or field day events.
  — Capitalize on existing field day events to highlight nutrient management planning as a component of soil health and farm conservation efforts.
  — As a follow-up to a nutrient management program report (recommendation above), stakeholders, including VNMLT members, are encouraged to promote NMP participation and its benefits in publications (industry, Soil and Water Conservation District, and Extension newsletters and events), in accordance with the findings from the Farm and Agricultural Industry Assessment.

- The most successful planners are trusted by their clients and encourage NMP adoption by providing accurate, up-to-date information that addresses their client's needs and concerns. As such, the VNMLT affirms existing and encourages future DCR efforts that provide training to certified nutrient management planners that includes the following:

  — Results of the Farm and Agricultural Industry Assessment allowing the industry to better understand perceptions and/or concerns from the producer angle.
  — Information and messaging to address farmer concerns and goals.
  — Emphasizes and further encourages the need to keep the NMP updated to ensure it is a living document and meets producer expectations.
  — Ensures planners are aware of training and education opportunities for farmers on NMP topics.

  The VNMLT also encourages DCR (with support from other stakeholders) to:
  — Cross train planners to encourage them to carry the message to producers that NMPs are a foundational practice for RMP participation and a key component of soil health.
  — Engage planners in supporting peer-to-peer farmer discussions around nutrient management.
  — Use trainers as a conduit to identify top producers using NMPs to support award programs, field day events, and farmer-to-farmer mentoring.

Next Steps: Implementing Recommendations

Continued efforts of VNMLT members, DCR, as well as the Nutrient Management Stakeholder Advisory Group will be critical to ensuring that recommendations developed with support from farmers and industry professionals are implemented. In the convening of the VNMLT, members agreed to:

- Share results of the VNMLT assessment and recommendations with stakeholders in Virginia and elsewhere in the region; and
- Support efforts to implement recommendations

Several of these recommendations will require continued collaboration and cooperation to achieve including: outreach and education, branding, and establishment of a Nutrient Management Stakeholder Advisory Group. Further, those that will be led by DCR will be more likely to be successful if VNMLT members offer support.

Virginia's agricultural production is one of the most diverse in the nation. Many Virginia commodities and products rank in the top 15 among all U.S. states. These include leaf tobacco, 3rd; fresh market tomatoes, 5th; apples, 6th; grapes and peanuts, 8th; and cotton, 15th. Livestock rankings based on number of head include turkeys, 6th in the nation and broilers, 10th.

Pictured left: Tomatoes ripen on the vine on a farm on the Eastern Shore of Virginia. Photo by Lynda Richardson, courtesy of USDA Natural Resources Conservation Service.

APPENDIX

Virginia Nutrient Management Leadership Team

Farm and Agricultural Industry Assessment

Summary of Findings

Prepared by the University of Virginia Institute for Environmental Negotiation with support from Sustainable Chesapeake and the Virginia Nutrient Management Leadership Team

April 19, 2017

Executive Summary

The Virginia Nutrient Management Leadership Team (VNMLT) is a collaborative effort comprised of agricultural and conservation organizations, and state and federal agencies, working to strengthen nutrient management planning efforts on farms throughout Virginia. As part of this process, the VNMLT sought feedback from farmers and agricultural industry stakeholders in Virginia on strengths and opportunities to improve Virginia's Nutrient Management Program. The intention of the VNMLT is to use feedback provided by farmers and industry stakeholders to develop recommendations to encourage more farmers to participate in the program.

With oversight from the Virginia Department of Conservation and Recreation (DCR), Virginia's Nutrient Management Program is based on statutory code and Land Grant University guidelines for crop production and water quality protection. For most Virginia farmers, development and implementation of a nutrient management plan (NMP) is voluntary. Larger animal feeding operations (including most poultry farms and some dairy operations) are required to develop and implement a NMP. Also, participation in state and federal cost share programs sometimes requires that an NMP be developed for enrolled acreage.

To gather feedback from farmers and industry stakeholders, the VNMLT developed an assessment and invited participation from December of 2016 through February of 2017. Farmers and agricultural industry stakeholders were asked for their opinion on what they found valuable about the planning process, the role of nutrient management planners in helping farmers to implement the plans, and opportunities and challenges for expanding participation in plan development and implementation.

Over the three-month assessment timeframe, 73 farmers and 150 agricultural industry stakeholders completed online or hard copies of the assessment, and 16 participated in one-on-one conversations. Feedback provided by farmers and industry stakeholders highlighted strengths of Virginia's Nutrient Management Planning program, as well as opportunities for improvement.

Strengths of the program include the following (presented in roughly the same order of appearance as in the assessment):

a) Farmers are working with certified nutrient management planners to develop NMPs: 90% of reporting farmers with NMPs worked with certified planners to develop plans they currently have or had in the past.

b) Supports regulatory compliance and cost-share program participation: On Question #5 of the farmer assessment, supporting regulatory requirements was ranked the primary benefit of 5 options. Industry respondents ranked this the lowest priority of the 5 areas of benefit (see Question #2 of industry assessment).

c) Agronomic and cost savings benefits: Both farmer (Question 5) and industry (Question 2) respondents rated agronomic benefits as the 2nd most important for the 5 categories of benefits to farming operations.

d) Environmental benefits of NMPs: Farmer respondents (Question 5) cited environmental benefits as the third most important benefit for their operations and industry respondents (Question 2) rated this as the 4th most important benefit.

e) Assistance with plan implementation: Question #7 of the farmer assessment asked how helpful nutrient management planners were in assisting with plan implementation; 39% of the farmer respondents said their planners were 'very helpful' and 39% of farmer participants said 'somewhat helpful.' Similarly, of the industry respondents, 48% considered planner to be 'very helpful' with implementation and 37% said planners were 'somewhat helpful' (see Question #5 of industry assessment).

f) Valued nutrient management planning services: The top three NM planning services that farmers indicated as being most helpful (see Question #8 in farmer assessment) were:

1. Actively involved in keeping the plan updated
2. Expertise in agronomy and crop production
3. Clear explanations on how to implement the plan

Industry respondents reported the three most important planning services as: 1) expertise in agronomy and crop production, 2) collecting in-field data and 3) advice on implementation. (See Question #6 in industry assessment.)

Challenges to participating in the program (presented in roughly the order of highest response) include:

- **NutMan software**: Farmers and industry stakeholders brought up a number of issues around the NutMan software currently used as a basis for most of Virginia's NMPs:

    - The output of the program is too complex: When asked about factors that would encourage development and/or implementation of NMPs, farmers ranked "Make plan recommendations easier to understand" as the 2nd highest out of 9 choices (see Question #10). Industry stakeholders ranked "Making recommendations easier to understand" as the 1st priority out of 9 choices (see Question #7). Assessment participants offered suggestions and comments relating to the need to simplify information in the plan so that it is easier for farmers to understand and follow.
    - The program needs to be updated: Industry stakeholders in particular expressed concerns that the software is outdated.

- **Flexibility (plan updates and programmatic):** When farmers were asked about factors that would make plan development and implementation easier (Question 10), the top response out of 9 choices was "Make it easier and quicker to change and update the plan." Industry stakeholders rated "Make it easier and quicker to change and update the plan" as their second highest of 9 options (Question 7). With respect to programmatic flexibility, when asked about challenges associated with developing and implementing NMPs, farmers ranked "concerns that NMPs are too inflexible" as the 1st reason out of 14 options (Question 9). Industry representatives scored this as their 2nd highest of 14 options (Question 4). Both farmers and industry stakeholder provided comments regarding concerns around programmatic flexibility.
- **Potential for future government regulation**. "Concerns that NMPs may result in future regulations" was ranked by farmers as the 2nd highest of 14 potential challenges or challenges to plan development and implementation (Question 9), while industry stakeholders ranked this as the most important factor (Question 4).
- **Potential impacts on yields:** Farmer respondents indicated that promoting good yields was the least valuable benefit of the NMP process (see Question 5)**:** while 21% rated this as 'highly valuable,' 47% rated it as 'somewhat valuable,' and 29% rated it as 'not valuable." Industry respondents (Question 3) placed greater emphasis on yield benefits: 52% rated it as 'very valuable,' 33% said 'somewhat valuable' and 10% said it was 'not valuable.' Comments that were provided expressed concerns that fertilizer recommendations could negatively impact yields.
- **Practicalities of implementation**. Although not related to any specific question, several general areas of comments/feedback provided by both industry stakeholders and farmers relate to this topic:
    - Practicality of recommended rates or timing of fertilizer – farmers expressed concerns about the feasibility of implementing recommended rates. For example, recommended application rates lower than equipment settings can accommodate.
    - Concerns about high soil phosphorus and limitations on use of manure/poultry litter were expressed by farmers and industry stakeholders.

    - Issues regarding the practicality of plan implementation for farmers using blended fertilizer were raised by both farmers and planners. For example, the feasibility of using a different nutrient blend for a small portion of a farm's acreage.
    - Concerns about the compatibility of the nutrient management program with precision agriculture was expressed by both farmers and planners. Specifically, they noted that the NutMan software is not designed to accommodate precision nutrient application such as variable rate fertilizer application within fields or multiple split nitrogen applications.

- **Communication and programmatic responsiveness** were mentioned as areas of concern by industry stakeholders participating in one-on-one conversations. They conveyed optimism that the VNMLT would help to improve the program in areas where they feel previous feedback has not been addressed.

Industry stakeholders also provided numerous suggestions regarding the potential for outreach and education to expand producer participation.

Included in the Summary of Findings is a comparison of farmer versus industry assessment responses that demonstrates a large degree of agreement between the two groups.

Introduction

The Virginia Nutrient Management Leadership Team (VNMLT) is a collaborative effort comprised of agricultural and conservation organizations, and state and federal agencies working to strengthen nutrient management planning efforts on farms throughout Virginia. Informed by feedback from farmers and industry professionals, the VNMLT will develop recommendations designed to increase the number of Virginia farmers voluntarily working to develop and implement nutrient management plans.

Members of the Virginia Nutrient Management Leadership Team include:
Chesapeake Bay Foundation – Matt Kowalski
Headwaters LLC – Kristen Saacke-Blunk
James River Association – Adrienne Kotula and Pat Calvert
Sustainable Chesapeake – Kristen Hughes Evans and Dale Gardner
Virginia Agribusiness Council – Katie Frazier
Virginia Association of Conservation Districts – Kendall Tyree
Virginia Biosolids Council – Robert Crockett
Virginia Cattlemen's Association – Jason Carter
Virginia Department of Agriculture and Consumer Services – Darrell Marshall
Virginia Department of Conservation and Recreation – Darryl Glover and David Kindig
Virginia Department of Environmental Quality – Neil Zahradka
Virginia Farm Bureau – Wilmer Stoneman III
Virginia Grain Producers Association – Ben Rowe and Katie Hellebush
Virginia Poultry Federation – Hobey Bauhan
Virginia State Dairymen's Association – Eric Paulson
Virginia Tech – Dr. Rory Maguire
USDA Natural Resources Conservation Service – Chris Lawrence

Administration and facilitation of the VNMLT were provide by Sustainable Chesapeake (overall coordination) and the University of Virginia's Institute for Environmental Negotiation's Tanya Denckla Cobb, Judie Talbot, and Dorothy Baker (meeting facilitation and assessment oversight and administration)

The VNMLT would like to thank the 223 farmers and agricultural industry professionals who participated in the assessment process and the Virginia Environmental Endowment, the National Fish and Wildlife Foundation, and the Campbell Foundation for funding support.

Background Information

Virginia's Nutrient Management Planning Program is administered by DCR, which provides program oversight, and training and certification for Virginia nutrient management planners. Authorized by §10.1-104.2 of the Code of Virginia, Virginia's Nutrient Management Program delivers plans based on Nutrient Management Training and Certification Regulations (4VAC50-85) and Virginia's Nutrient

Management Planning Standards and Criteria. Only planners certified by DCR are eligible to develop plans that meet this criterion. Software (NutMan 3.0, released January 18, 2013) developed with support from DCR is frequently used by planners to support nutrient management planning. DCR is currently in the process of updating this software. Fertilizer application rates incorporated into Virginia's Nutrient Management Program are based on recommendations developed by Virginia's Land Grant Universities.

Assessment Methods

This effort did not involve random sampling and does not claim statistical validity in the results. This effort involved two questionnaires to create a significant qualitative assessment based on broad outreach and participation – with 73 farmer respondents representing the breadth of farming and 150 responses from agricultural industry representatives. The responses indicate the benefits and challenges that influence decisions to develop and implement NMPs consistent with Virginia's Nutrient Management Program. The questionnaires were created with the assistance of Virginia Nutrient Management Leadership Team members.

In the winter of 2016, the VNMLT asked farmers and industry professionals to provide feedback about nutrient management plans (NMPs) through a short assessment (online via Survey Monkey or paper copy) and through one-on-one conversations with team members. In addition to completing the assessment, participants were offered the opportunity to provide comments through the assessment (where spaces were left for comments) and by speaking to VNMLT members directly. In conversations with farmers and agricultural industry professionals, participants were asked to share their ideas for making the nutrient management planning program a more useful tool for those farmers with plans, as well as ways to encourage more farmers to participate.

With support from VNMLT members, Sustainable Chesapeake reached out to both farmers and industry leaders at agricultural conferences, farmer meetings, and farm visits throughout Virginia to encourage assessment participation and one-on-one interviews. The Institute for Environmental Negotiation, at the University of Virginia, compiled all assessment responses and provided assessment administration oversight.

Over the three-month assessment timeframe, 73 farmers and 150 agricultural industry stakeholders completed online or hard copies of the assessment, and 16 participated in one-on-one conversations. Farmer participants represented a range of farming operations and sizes, and provided management for a total of 54,787 acres of farmland in Virginia. For the online/paper assessment, when participating farmers were asked what category best describes their operation, the top five responses were:

- Dairy (45%)
- Agronomic crop production (corn, soybeans, wheat, cotton) (42%)
- Beef (41%)
- Poultry (23%)
- Specialty crop production (vegetables, fruit, flowers) (15%)

Largely due to DCR's leadership (agency staff sent the link to the online assessment to nearly 400 certified nutrient management planners registered in Virginia), 67 of the industry stakeholder responses are from those who identified as certified nutrient management planners.

Summary of Findings

Feedback from farmers and industry stakeholders provide valuable insight into opportunities to improve Virginia's Nutrient Management Program and expand farmer participation. Additionally, farmers shared what they value about the nutrient management planning process and services that nutrient management planners provide. These strengths and opportunities for improvement are summarized below. It is worth noting that many of these findings likely apply to nutrient management programs in other states, whether plans are voluntary or required by regulations.

Raw data for the farmer assessment is provided in Attachment A and for the agricultural industry assessment in Attachment B, and a summary of comments from one-on-one interviews is provided in Attachment C. The discussion below synthesizes findings from the assessment, the assessment comments, and the interview comments focusing on what the program is getting right and what opportunities there are to improve the program and encourage more farmers to participate. Note that the summaries of responses may not total 100% as all questions had an option to indicate "no opinion or not sure."

Nutrient Management Plan Program Strengths

Farmer and industry stakeholder feedback, regarding benefits associated with participating in Virginia's Nutrient Management Program, covered six general areas (presented in roughly the same order of appearance as in the assessment):

a) Farmers are working with certified nutrient management planners to develop NMPs
b) Supports regulatory compliance and cost-share program participation
c) Agronomic and cost-savings benefits
d) Environmental benefits
e) Assistance with plan implementation
f) Valued nutrient management planning services

Farmers are working with certified nutrient management planners to develop NMPs

90% of reporting farmers with NMPs worked with certified planners to develop plans they currently have or had in the past (see Questions #1 and #6).

a) Supports regulatory compliance and cost-share program participation

When asked about aspects of an NMP that were valuable for their operation, farmers ranked 'supports regulatory requirements' as having the most value. Specifically, 49% of farmers rated support for regulatory compliance as 'very valuable,' 29% said it was 'somewhat valuable' and 17% said it was 'not valuable.' When farmers that either had or previously had an NMP developed by a certified nutrient management planner were asked what motivated them to develop the plan, 58% indicated 'required for cost share program' and 42% indicated 'required for a permit.' (See Questions 5 and 4 of farmer assessment.)

Agricultural industry stakeholder perceptions about the value of NMPs for regulatory compliance were similar to farmers (38% said 'very valuable,' 39% said 'somewhat valuable' and 15% said 'not valuable'), but they ranked other potential benefits of NMPs (such as cost savings, agronomic benefits, good yields, and environmental benefits) higher than support for regulatory compliance. (See Question 3 of industry assessment.)

b) Agronomic benefits

Both farmer and industry respondents rated agronomic benefits as the 2nd most important for the 5 categories of benefits to farming operations. Of farmer responses, 34% reported agronomic benefits as 'very valuable,' 47% said 'somewhat valuable' and 15% said 'not valuable.' (See Question 5 of farmer assessment.) Also, 31% of farmers checked "it's a good planning tool" as a motivating factor for NMP development (Question 4). Of industry responses, 55% saw agronomic benefits as 'very valuable,' 37% said somewhat valuable' and 10% said not valuable.' (See Question 3 of industry assessment.)

Farmers who reported a value in agronomic benefits commented that nutrient management planning:

- "Helps plan crop rotation in the long-term."
- "Prevents over-fertilizing"
- "Knowing which fields need lime. Helps with planning on which crops to plant where."
- "Helps plan for animal waste and crop nutrients."
- "Most important benefit is the overall result of building soil health (and not wasting money).
- "Promotes record keeping, which in turn helps us understand the balance between nutrient application and yields."
- "Prioritize where to spend money on nutrient and prioritize nutrients across fields."

One planning professional noted that "it is the economics that drives decision making." Another noted that planning "provides a whole-farm template to stay organized through the growing season."

c) Environmental benefits

Farmer respondents cited environmental benefits as the third most important benefit for their operations and industry respondents rated this as the 4th most important benefit. Environmental benefits were cited by farmer respondents as 'very valuable' (38%), or 'somewhat valuable' (38%) or not valuable (22%) to their operation (see Question 5 of farmer assessment). Industry responses rated environmental benefits as 'very valuable' (40%), 'somewhat valuable' (50%) or 'not valuable' (6%). (See Question #3 of industry assessment.)

With respect to environmental benefits, one farmer commented that NMPs provide "peace of mind from doing the right thing." Another said: "If I get out synch with the environment, then I'm losing nutrients or buying nutrients that have no value, then this is just a cost deficit that I need to get rid of."

Comments provided by several farmers regarding the environmental benefits associated with NMPs make it clear that they want the public to understand their commitment to protecting the environment and view NMPs as a way to demonstrate that commitment. One farmer noted that nutrient management planning "allows the public to understand we are good stewards," while another said that nutrient management plans "are a good discussion starter with non-farm people." Another farmer said that nutrient management plans are a "proof point when advocating that protecting the environment is important to farmers."

d) Assistance with plan implementation

Question #7 of the farmer assessment asked how helpful nutrient management planners were in assisting with plan implementation: 39% of the farmer respondents said their planners were 'very helpful,' another 39% said 'somewhat helpful' and 16% said 'not helpful.' Similarly, of the industry respondents, 48% considered planner to be 'very helpful' with implementation and 37% said planners were 'somewhat helpful' and 7% said 'not helpful." (See Question #5 of industry assessment). Part of the planner's role in implementation relates to the outputs and recommendations from the NutMan software, discussed further in the section on challenges to participation.

e) Valued nutrient management planning services

The top three NM planning services that farmers indicated as being most helpful (see Question #8 in farmer assessment) were:

1. Actively involved in keeping the plan updated
2. Expertise in agronomy and crop production
3. Clear explanations on how to implement the plan

Industry respondents reported the three most important planning services as: 1) expertise in agronomy and crop production, 2) collecting in-field data and 3) advice on implementation. (See Question #6 in industry assessment.)

Challenges to Participation in Virginia's Nutrient Management Program

Industry stakeholder and farmer feedback, regarding challenges associated with participating in Virginia's Nutrient Management Program, cover six general areas (presented in roughly the order of highest response):

a) NutMan software
b) Flexibility
c) Potential for future government regulation
d) Yields
e) Practicalities of implementation
f) Communication and programmatic responsiveness

a) NutMan software

Opportunities to improve the NutMan software that serves as the basis of most of Virginia's Nutrient Management Plans fall generally into two categories: 1) updating the software; and 2) simplifying the software output to make the plan easier to understand.

<u>Need to Update NutMan Software</u>

While plan complexity was directly addressed in the assessment, no questions in the assessment specifically asked about the NutMan software, yet planners and farmers mentioned the software specifically in assessment comments and in one-on-one conversations. In general, planners and farmers provided examples of how the program is outdated and cumbersome to use:

- "This is an antiquated program, difficult to use, not Excel-based. … [you need to be able to] copy, paste, sort and utilize the information it creates."
- "[Develop] computer program or spreadsheet forms to work in conjunction with the NutMan software, so data would be easier to transfer and keep – without having to repeat data entry for both farmer and planner."
- "The current Nut Man program is very outdated and time consuming."

Several assessment participants made suggestions for improvements to NutMan as follows:

- "I'd base the whole NutMan program on an Excel type program so you can see everything and do what you need to do. I use Excel for field records. Every time I go into a field I copy and paste from one field to another. If it was in Excel, you could see everything and keep it set in your head instead of clicking okay and going back and forth all the time."

- "Please consider using more up-to-date options such as Mapshots-Agstudio."
- "I'm still looking forward to the online nutrient management planner tool."
- "The NutMan computer program is a series of mathematical computations that defaults to the mid-point of any range. I spent most of my time adjusting these defaults just to give the farmer a plan that is anywhere close to agronomically matching his operation."
- "Make NutMan more-user friendly."

b) Plan Complexity

Question 10 on the farmer assessment and Question 7 on the industry stakeholder assessment asks about factors that would encourage NMP development and/or make it easier for farmers to implement their plan. Farmers ranked "Make plan recommendations easier to understand" as the 2nd highest out of 9 choices. Of the farmer responses, 83% rated this aspect as 'very important' (61%), 'somewhat important' (32%) or 'not important' (5%).

Industry stakeholders ranked "Making recommendations easier to understand" as the 1st priority out of 9 choices on what would be helpful. Across industry responses, a 60% rated this as 'very helpful' or 30% said 'somewhat helpful' and 6% said 'not helpful.'

Most of the comments regarding plan complexity came from industry stakeholders, including the following:

- "Plans need to be greatly simplified" and "make NutMan more user friendly."
- The planning format is described as "too complicated… too technical… and difficult to follow."
- "My customers don't want printouts of maps that show environmentally sensitive areas. They already know where those areas are. They just want information that tells them what they need to do."
- NMPs come across as "a confusing regulatory document being foisted upon the farmer, rather than some helpful guidance a farmer can use to figure out how to most efficiently use his available nutrients. NM Planning needs to be something the farmer wants to do themselves to become more efficient farmers, not something that DCR/DEQ does AT them."
- "Other states hold training for farmers to understand and write their own plans. It seems to me that the Virginia system is made too onerous, too overbearing, and excludes farmers, making them feel put down. It isn't rocket science, and shouldn't be made to feel like rocket science. Farmer training creates more interest and buy-in if they are participants."

  This quote captured the essence of several other comments to

  - Simplify the process and encourage more farmers to write and implement their own plans

- Provide training on the "hows and whys" of the plan
- Reformat the layout of the recommendations: Present them in a table and streamline the information. "I don't really include all that's on the balance sheet."
- Be mindful of time and efficiency: "Farmers are business people and they are not prone to waste time. If you waste their time, you are going to have a hard time building back that relationship. But if you try to walk through this overly complicated document, it's hard not to waste time."

Regarding the role that planners can play in helping farmers deal with plan complexity, industry stakeholders offered the following comments:

- "There is almost no chance of the farmer understanding their plan, let alone implementing it, without the planner THOROUGHLY explaining it to them from the beginning, and most likely working closely with them on a continuing basis. This almost never happens. Planners MUST do better with this, and/or the format of the plans needs to become much more user/friendly. [Otherwise, the inability] to even comprehend the plan will continue to be one of the major challenges to implementation of nutrient management plans."
    - The majority of growers don't understand the NMP document, which is "cryptic and difficult to interpret' without training
    - Planners need to interpret the printouts and provide understandable recommendations on a field by field basis
    - "I work with my farmers to come up with a fertilizer plan for the farm that is practical and cost-effective."

c) Flexibility

Comments around flexibility overlapped to some degree with comments on software (NutMan) and yields. The discussion around flexibility here will focus on two aspects of flexibility: 1) the ease at which the plan can be changed and updated; and 2) programmatic flexibility.

<u>Keeping the plan updated</u>

When farmers were asked about factors that would make plan development and implementation easier (Question 10), the top response out of 9 choices was "Make it easier and quicker to change and update the plan." Farmer responses rated this as 'very important' (64%), 'somewhat important' (28%) or 'not important' (3%).

Industry stakeholders rated "Make it easier and quicker to change and update the plan" as their 2nd highest of 9 options in what would help encourage participation in the program (Question 7): 54% rated it 'very helpful,' 37% said 'somewhat helpful' and 3% said 'not helpful.'

Farmer respondents provided the following comments regarding keeping the plan updated:

- "The plan is an ever-changing, living document. It is often outdated because things change."
- "It is a PLAN, not set in stone. We all do the best we can in day-to-day situations."
- "Many checkmarks for 'Make it easier and quicker to change'..."
- "NMPs are good. They need to be flexible and farmer friendly. [It needs to be] easy to implement."

Industry stakeholders made the following comments related to keeping the plan updated:

- "Being immediately available to assist and manage the plan as farm objectives change" requires "continual conversation throughout the life of the plan."
  - Planners need to follow-up. They will "clearly update plans when called by the producer, but the planners do not go out to the farms to see if the plan needs to be updated."
  - "Communication is the main thing. Farmers tend to change their mind on which crop goes into which field – and that changes the NMP."
- "Development and implementing a NMP should all be an inclusive process. One without the other is of very little (if any) value. a NMP should not be considered a "strict" plan but rather a constantly evolving and ongoing endeavor."

Industry stakeholders also offered comments about the level of follow-up required and the constraints on providing that level of service:

- "I'm going to be there 3-4 times per year during the growing season. I'll be there to review the plans and make adjustments and help with record keeping. If there is a significant enough change in what they are doing, we update the plan. I describe it as helping them to stay eligible for the program. If there is just a minor adjustment – like changing from corn to soybeans – we make a minor adjustment, but no big deal."
- "I don't think this happens right now...there's just not enough DCR plan writers and the TSPs [Technical Service Providers] writing for SWCDs [Soil and Water Conservation Districts] aren't getting paid enough for extensive follow up. But I do believe this could help tremendously."
- "These services would be good but what planner has that kind of time, and most farmers don't want to spend that kind of time trying to catch up with a planner."
- "My experience is they write the plan and it is filed by farmer. Checked off as meeting compliance. No follow up. Plans do not allow for changes in weather and market forces. They must be "revised" (rewritten) which is a hassle. No financial support built in for that."
- "The free planner doesn't have enough time, and the fertilizer dealer doesn't have enough incentive to make these kinds of time investments."
- "Proper implementation of the plans requires more one-on-one work with the nutrient management planner than current staffing levels (government and private) allow."

Programmatic flexibility

On the farmer assessment, Question 9 asked about challenges associated with developing and implementing NMPs. Farmers ranked "concerns that NMPs are too inflexible" as the 1st reason out of 14 options. Farmer responses indicated that the inflexibility of NMPs was 'very important' (44%), 'somewhat important' (34%) or 'not important' (16%). **Comments provided by farmers about programmatic flexibility are as follows:**

- "Too inflexible. Limits fall manure application."
- "DCR approval inflexible."
- "Need more flexibility. Only gives limits, never allows you to go over."
- "DCR planner just delivers the plan and I have no say."

Similarly, industry respondents ranked "concerns that NMPs are too inflexible" as the 2nd reason out of 15 options (see Question 4 of industry assessment). Industry responses rated the inflexibility of NMPs as 'very important' (44%), 'somewhat important' (33%) or 'not important' (14%). Industry stakeholders offered the following comments on programmatic flexibility:

- "It's harder for me to get the plan approved than it is for me to get the plan implemented."
- "Allow the trained individual working seasonally with the farmer to use the flexibility allowed in the Standards & Criteria, but made difficult through the review process."
- "Lots of checkmarks on 'Concerns that certified NMPS are inflexible'."

d) Potential for future government regulation

Both farmers and industry stakeholders mentioned grower concerns that participation in a nutrient management plan would invite future regulation or interference from government. "Concerns that NMPs may result in future regulations" was ranked by farmers as the 2nd out of 14 potential challenges or challenges to plan development and implementation (see Question 9 on the farmer assessment). Farmer respondents rated this aspect as either 'very important' (44%), 'somewhat important' (30%) or 'not important' (18%). One farmer explicitly stated in the comments section "I don't trust government and I don't want them involved in my process."

Industry respondents rated 'concerns about future regulatory requirements' (Question 4 of the industry assessment) as the 1st out of 15 potential challenges or challenges to plan development and implementation. Industry responses rated this as 'very important' (46%), 'somewhat important' (30%), or 'not important' (14%). One industry stakeholder observed that "Some farmers see getting a nutrient management plan as a move towards regulation. They fear that if they get a nutrient management plan, even if they are not required to do so, they will be forced to follow the plan exactly. In some communities, this is a major barrier."

e) Yields

Question 5 on the farmer assessment specifically addressed yields, in the context of asking "what aspects of an NMP do you find valuable for your operation?" Of the five factors offered, farmers ranked "promotes good yields" as the lowest of the five options. Of the farmer responses, 21% rated 'promotes good yields' as a 'very valuable' aspect of an NMP, 47% reported this as 'somewhat valuable,' and 29% indicated that promoting good yields was not a valuable aspect of the NMP process. Industry respondents (Question 3) placed greater emphasis on yield benefits: 52% rated it as 'very valuable,' 33% said 'somewhat valuable' and 10% said it was 'not valuable.' Comments that were provided expressed concerns that fertilizer recommendations could negatively impact yields. Some farmers and industry stakeholders expressed concerns that fertilizer recommendations associated with Virginia's Nutrient Management Program negatively impacts yields. These concerns were expressed in the comments section of the survey as well as in one-on-one conversations. Some industry comments about yields were posted to Question 4 of the industry assessment, and related to plan inflexibility.

Farmers who expressed concerns about NMPs and yields offered the following comments:

- "Starves my crop yields."
- "NMPs don't allow for nutrients to increase yields."
- "Yields too low" and "If I went by the yields they suggest, I'd go broke."
- "The plan is out of touch with present day production economics."

Industry professionals also commented on NMPs and yields:

- "NMPs starve the soil."
- "NMP recommendations for many corn fields miss today's yield averages by a significant margin. Historic written records of yields are often scarce, so farmers see NMPs as severely limiting on N inputs."
- "I find that when I plug in information into NutMan is that the computer will default down to the productivity class that is one notch below that soil type. Well, if you have a good farm manager, I find that I constantly have to do yield adjustments that are already within acceptable ranges. However, because this is a change to NutMan, it triggers a requirement for yield records. It has to be three out of the highest of five years of yields to justify those yield goals. I am noticing that as you start to go to those higher numbers, DCR starts reviewing the plans with a fine-tooth comb."
- "Often, on-farm yields are much higher than what is written into a plan and therefore the nutrient applications are much lower than what is needed for optimal yield."
- "VALUES is way outdated and needs to be updated. It is a good system; however, its crops yields are too low for 21st century agriculture in the Commonwealth. Farmers are not wanting NMPs because they feel like they will be heavily restricted on N application rates due to the lower

yields in the outdated VALUES system and the applicable proportionate N application rates. Also, current policy is starving many crops for nutrients (reducing yields) and is subsequently mining soils of organic matter and other minerals over time. Policy should be updated to allow nutrient applications to help build organic matter for long term benefits."

- "More people would actually obtain and use their plans if it allowed for realistic applications of key nutrients like N."
- "No one can farm with DCR's strict interpretation of the Standards to reduce nutrient loading at all costs."
- "I do not think most farmers think an NMP written by a certified planner provides them any more benefit than following the recommendations on their soil test results or from their fertilizer salesman. In fact, they most often think an NMP is most likely to REDUCE their yields. Farmers DO care about environmental benefits; but since they are already doing everything possible to save money, they feel this will already be enough to prevent over-application (to put it in somewhat overly-simplistic terms)."
- "Some farmers perceive plans as something that will limit their production. They have heard false news stories or bad information, which travels just as fast as good information."

Several industry stakeholders made suggestions regarding yields such as:

- Planners should "Utilize the flexibility within the Standards to make the NMP appropriate for the farmer's operation."
- "The proof is in the pudding- continuing to showcase graduated nitrogen applications in a uniform crop and soil exercises wherein the crop yield tops out and shows that no matter how much more N is applied the crop response remains the same."
- "Show the farmer the savings and yield increase with solid record keeping."
- "Allow the trained individual working seasonally with the farmer to use the flexibility allowed in the Standards & Criteria, but made difficult through the review process."

f) Practicalities of implementation

Although not related to any specific question, several general areas of comments/feedback provided by both industry stakeholders and farmers related to this topic:

- Practicality of recommended rates or timing of fertilizer
- Concerns about high soil phosphorus and limitations on use of manure/poultry litter
- Practicality of plan implementation for farmers using blended fertilizer
- Compatibility of the nutrient management program with precision agriculture

Practicality of recommended rates or timing of fertilizer

In addition to comments regarding constraints on fall manure application, previously noted in the discussion on flexibility, farmers said:

- "They want me to use 30lb split apply but the co-op machine will not go below 50lb."
- “Our application times are impractical. You cannot apply manure in February with an airway applicator without damaging the crop that you are required to harvest.”
- “NMPs don't allow application at right time for small grains and hay.”
- “Sometimes the manure rates are too hard to follow. For example, one field is 1.6 t/a, another is 1.8, still another is 2.1. Need to keep it simple: 1.0, 1.5, or 2.0 t/a.”

Impact of high soil phosphorus on nutrient management plan implementation and limitations on manure/poultry litter use

Farmer comments included statement such as:

- “I am already working with a soil consultant on lowering my P levels for the last 5 years with good results ... too unsure of impact of high soil phosphorus [on NMP recommendations].”
- “I have grave concerns about phosphorus levels being high and yet unavailable to crops. I don't understand why some fields that are not close to the cut-off for P get designated as zero P. As a continuous no-till operation, I have concerns about P building up in the soil-sample zone.”

Industry stakeholders also expressed concerns about writing nutrient management plans for farms with high soil phosphorus levels.

- One planner noted that his company no longer writes certified nutrient management plans because they were concerned about liability associated with writing plans for clients that had high soil phosphorus but still needed to apply manure. They still write fertilizer and manure management plans for these clients, even though the plans don’t meet Virginia’s Nutrient Management Program criteria. Their approach is for the farmer to draw down soil phosphorus levels over time, so that eventually the farmer is in a position to implement a nutrient management plan according to Virginia’s Nutrient Management Standards and Criteria.
- Another planner noted that “Poultry litter is another issue. It’s hard to tell a customer they can’t use their poultry litter. Sometimes I recommend a rate of 2 tons per acre because they can use the nitrogen, potash and micronutrients even if they don’t need the phosphorus. It doesn’t make economic sense to move it [poultry litter] off the farm where they aren’t getting paid for it, and turn around and pay for commercial fertilizer.”
- One farmer suggested that “we go back to a nitrogen-based plan…farmers aren’t the only ones contributing to phosphorus in the Bay. The metropolitan areas are also contributing…When your soil phosphorus levels get high, they want to limit your manure application to a level that is so

low that it doesn't really help, and you are forced to buy commercial nitrogen. And the levels are high because of the poultry litter, but it's been a wonderful fertilizer for us in the Valley."

Practicality of plan implementation for farmers using blended fertilizer

Blended fertilizer is a mixture of dry fertilizer materials that farmers can custom order to meet their fertilizer goals. Practical implementation issues arise when a small portion of a farm's acreage requires a different blend than the majority of acreage. For example, one industry stakeholder said:

> "Say in one field, I have 3 or 4 subsamples that don't need any phosphorus, but other areas of the field that do need phosphorus. My clients don't have enough acreage to justify custom fertilizer blends for each field. So, we need to come up with a blended fertilizer that works for their whole farm. That means some parts of the field that don't need phosphorus get phosphorus."

Another farmer who uses blended fertilizer addressed the practicality of compliance with a certified nutrient management plan this way:

> "We aren't field specific; we are farm specific. Even though one field is high in phosphate, it's going to get some phosphate because it's hard to get site specific when you are farming at that magnitude. I drive 60 miles and do 200 acres. I'm not driving an extra 60 miles to get an extra load of fertilizer for a 10-acre field."

Compatibility of the nutrient management program with precision agriculture[1]

According to both farmers and industry stakeholders, farmers using precision agriculture methods realize few if any benefits from participating in the Virginia's nutrient management planning process. One farmer who uses precision agriculture techniques noted that: "DCR writes all of our plans and I look at them but we don't use them. We use precision agriculture and apply less fertilizer than the NMP recommends. We are going way beyond the NMP so we have them, but they aren't useful for us."

A nutrient management planner gave an example of this limitation with respect to split application of nutrients:

> "What I have seen is the intention to apply multiple split applications per year - doing three sidedress applications even to when corn is up to their head. I can't put that in the plan. The guys doing this are not Johnny-come-lately. They knew we wouldn't be able to accommodate this approach in the plan. It makes us look bad – like we are driving a model T and they are in a

[1] Precision agriculture is defined by Virginia Tech as the process used to vary management of crop production across a field. In precision agriculture, the farm field is broken into "management zones" and management decisions are based on the requirements of each zone. Traditional farming methods use a "whole field" approach where the field is treated as a homogeneous area. Decisions are based on field averages and inputs are applied uniformly across a field in traditional farming.

Lamborghini. It also creates an attitude of okay, let's get this over with because you aren't really helping me."

Another farmer said:

> "We are using some of the precision nutrient management now – grid soil sampling – two compartment spreader – pre-program everything – apply phosphorus and potash according to that program. Nothing in NutMan allows for precision nutrient management. Actually, you farm in zones. So, the fertilizer spreader will change from one zone to another. The NutMan program focuses on field averages. So, they are behind the times. To me it's frustrating. They preach all this stuff about we have to do this and we have to do that, but it's already been done."

g) Communication and programmatic responsiveness

Issues around communication and programmatic responsiveness were mentioned as areas of concern by industry stakeholders participating in one-on-one conversations. The respondents conveyed optimism that the VNMLT process would help to improve the program in areas where they feel previous feedback or suggestions has not been addressed. Specific examples are presented in the summary of interview comments and summarized below:

- Comments brought to DCR that individuals felt were not addressed in a satisfactory manner
- Innovation or new technology (e.g. use of Excel. spreadsheets to facilitate plan updating and/or use of tractor yield monitoring to gather yield data) not being accepted as valid tools for NMP updating and/or development
- Expressing frustration at not having any opportunities to provide feedback on the NutMan software development or opportunities to keep the program updated with innovative nutrient management tools

Recommendations from Industry Stakeholders on Outreach and Education

Industry stakeholders offered numerous suggestions regarding the opportunity to expand farmer participation in Virginia's Nutrient Management Program through outreach and education efforts:

- "More outreach should come from within the farming community." and "Have respected local farmers who are successfully using nutrient management speak at meetings and field days and describe how it has helped them and their operation."
- Emphasize operational benefits: Don't ignore the environmental benefits, but these will happen as a result of good nutrient management.
- "[Engage in] more direct outreach. For those agencies dealing with agriculture, the offer of help and info about NMPs should be as important as saying "you want fries with that" at fast food. I'm not really joking. Those folks who have a direct contact should say "do you have or need help with a NMP as part of every conversation. Then of course an easy way to get one."

- “Improving awareness for farmers that aren't required to have a plan and the benefits of doing so. Perhaps working with the various extension office functions and various organization field days. Many of the smaller/part time farmers aren't familiar with the program at all. Especially on the horse side of things, nutrient management of any sort for pastures seems to be minimal.”
- “Providing resources/examples of how the lack of Nutrient Management Plans and implementation negatively impact others downstream or can cause significant issues to the environment.”
- “Help people understand the advantages of nutrient management planning …Getting Extension, NRCS [the Natural Resources Conservation Service], and DCR shoulder-to-shoulder on this would really help. Extension is in a good position to influence opinion leaders in the farming community and to help educate farmers about the benefits of nutrient management. DCR can complement NRCS and Extension outreach programs by discussing cost share funding available to implement practices.”

Other Sources for Information on Nutrient Management

The assessment results and comments indicate that both planners and farmers are working outside of Virginia’s Nutrient Management Program framework to implement nutrient management best management practices. Question 9 on the farmer survey looked at factors that influence farmers to not develop or implement an NMP. Farmer responses indicate that farmers don’t feel that participation in Virginia’s program is necessary because they are already implementing best management practices related to nutrient management, or in some cases, working with industry stakeholders to develop fertilizer recommendations. Specifically, 26% of farmers said ‘nutrient management practices already in place’ was a very important factor which might influence a decision to not develop an NMP, 39% said it was ‘somewhat important’ in their decision and 23% said this was ‘not important.’ Further, 33% of farmers participating said ‘fertilizer recommendations obtained from other sources’ was a ‘very important’ factor that might discourage a decision to develop an NMP, 42% said it was ‘somewhat important’ and 13% said this was ‘not important.’ Farmers offered the following comments that illustrate that while they may not be an implementing an NMP, they are paying attention to nutrient management:

- “On my farm, very few nutrients are imported. Manure application is based on the idea of nutrient cycling and is applied to fields per crop removal and soil test for potassium. I do not purchase additional fertilizer other than micronutrients and a little compost – not enough to swing a soil test for NPK. My plan usually tells me what I already know and do.”
- “I am already working with a soil consultant on lowering my P levels for the last 5 years with good results.”
- “Nutrient management practices are already in place… so don't see the value in having an NMP.”

- “The nutrient management planning we do for farms where we don’t have a certified NMP comes from our planning tools – proven tools we’ve been using all along – like Virginia Tech guidelines. The farmer now is so far ahead of this nutrient management thing it’s not even funny. They are doing cover crops – and with the help of land grant universities we are taking things to the next level. They aren’t wasting money on over-applying fertilizer.”

Comparison of farmer and agricultural industry responses

What aspects of an NMP are most valuable for farmers?

(Farmer Question #5, Ag Industry Question #3) Weighted average (how important factor is): 2 = very important, 1 =somewhat important, 0 = not important. Ranking is according to weighted average.

Farmer Ranking Order	Farmer Response Weighted Average	Description	Ag Industry Response Weighted Average	Ag Industry Ranking Order
1	1.27	Supports regulatory requirements	1.15	5
2	1.15	Provides agronomic benefits	1.47	2
2	1.14	Provides environmental benefits	1.31	4
4	1.02	Saves money on fertilizer	1.49	1
5	0.89	Promotes good yields	1.38	3

Possible take-away:

It appears that ag industry reps do not think that farmers find compliance with regulatory requirements to be a valuable aspect of NMPs, while farmers rated regulatory compliance as the number one aspect as to why an NMP is valuable. It is also interesting to note that industry stakeholders ranked saving money on fertilizer as the most valuable benefit of an NMP, while farmers ranked fertilizer cost savings 4th out of 5 factors. Neither farmers nor industry stakeholders view the primary value of NMPs as achieving good crop yields.

How Helpful / Important is the nutrient management planner in helping farmers IMPLEMENT their plan?

(Farmer Question #7, Ag Industry Question #5)

Farmer Response Weighted Average	Description	Ag Industry Response Weighted Average
1.16	Value of planner in implementation	1.34
39%	Very important	49%
39%	Somewhat important	37%
23%	Not important/unsure	14%

What services provided by the nutrient management planner are more (or less) helpful?

(Farmer Question #8, Ag Industry Question #6) Weighted average (how important factor is): 2 = very important, 1 =somewhat important, 0 = not important. Ranking is according to weighted average.

Farmer Ranking Order	Farmer Response Weighted Average	Description	Ag Industry Response Weighted Average	Ag Industry Ranking Order
1	1.08	Actively involved in keeping plan updated	1.43	6
2	1.00	Expertise in agronomy and crop production	1.64	1
3	0.98	Clear explanations on plan implementation	1.57	3
4	0.83	Assistance with collecting in-field data	1.59	2
5	0.80	Follow-up for implementation	1.47	5
6	0.78	Support for record-keeping	1.34	7
7	0.72	Information on how NMPs can save money	1.47	4

Possible take-away:

For most factors, there is not a wide spread difference in terms of weighting between factors. ranking. (E.g. Only a 0.36 spread across weighted averages for farmer response, with a 0.30 difference seen in ag industry responses). Weighted averages indicate that agricultural industry stakeholders placed a higher value on these services than did farmers.

What concerns/factors deter having or implementing a plan?

(Farmer Question #9, Ag Industry Question #4): Weighted average (how important factor is): 2 = very important, 1 =somewhat important, 0 = not important. Ranking is according to weighted average.

Farmer Ranking Order	Farmer Response Weighted Average	Description	Ag Industry Response Weighted Average	Ag Industry Ranking Order
1	1.23	That NMPs are too inflexible	1.21	2
2	1.18	That NMPs may result in future regulations	1.22	1
3	1.08	Fertilizer recommendations from other sources	1.16	3
4	1.00	NM planning is overly complicated	1.10	4
5 (t)	0.98	Costs to implement the plan	0.94	10
5 (t)	0.98	Process seems too time-consuming	1.06	6
5 (t)	0.98	Constraints on applying manure/amendments	1.00	8
8	0.92	Nutrient mgmt. practices already in place	0.97	9
9	0.83	Certified NMPs seem too technical	1.02	7
10 (t)	0.76	Lack of familiarity with NM planning program	1.07	5
10 (t)	0.76	Cost-share funding not available	0.64	14
12	0.69	Not aware of cost-share funding	0.86	13
13	0.40	NMP is not recommended by trusted sources	0.74	12
14	0.33	Lack of interest	0.89	11

Possible analysis: The first three factors are ranked and weighted very close to the same. The middle factors are also rated and weighted similarly. And the last 4 factors fill the bottom 4 slots for both farmers and industry. It is interesting that farmers report that lack of interest is NOT a reason why farmers don't have an NMP, whereas the industry stakeholders think lack of interest is a somewhat important reason why farmers don't participate in the nutrient management planning program.

What factors would encourage/improve having or implementing a plan?

(Farmer Question #10, Ag Industry Question #7); Weighted average (how important factor is): 2 = very important, 1 =somewhat important, 0 = not important. Ranking is according to weighted average.

Farmer Ranking Order	Farmer Response Weighted Average	Description	Ag Industry Response Weighted Average	Ag Industry Ranking Order
1	1.55	Making it easier to update or change plan	1.45	2
2	1.54	Plan recommendations are easier to understand	1.49	1
3	1.22	Provide more cost-share for IMPLEMENTATION	1.39	4
4	1.21	Demonstrating financial impacts of NMPs	1.43	3
5	1.13	More info on how NMPs help grow better crops	1.35	5
6	1.12	More cost-share funding for WRITING	1.15	6
7	1.09	Better use of technology for IMPLEMENTATION	1.14	7
8	1.00	More planners for WRITING plans	0.83	9
9	0.91	More planners/agronomists for plan IMPLEMENTATION	1.11	8

Possible take-away: Overall ordering and spread of weighted averages are close for both groups.

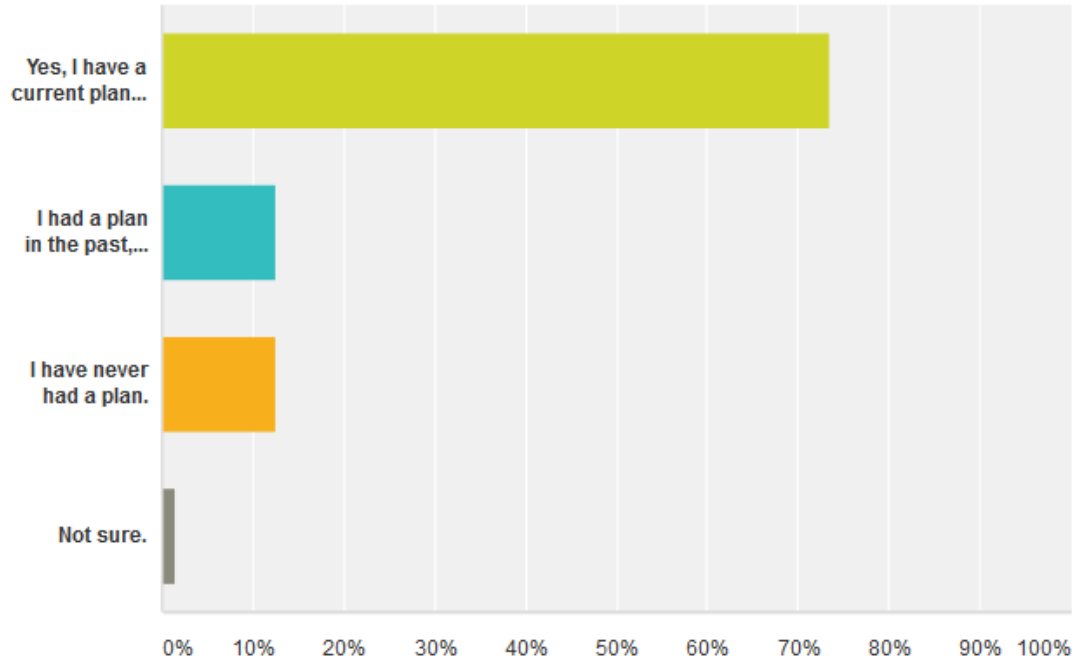
Appendix 1A. Statewide Farmer Assessment Responses

Survey Monkey and paper copy responses from a statewide farmer assessment collected from December 2016 through February 2017 by the Virginia Nutrient Management Leadership Team.

Question 1

Do you have a nutrient management plan (NMP) for your farm?

Answered: 70 Skipped: 3

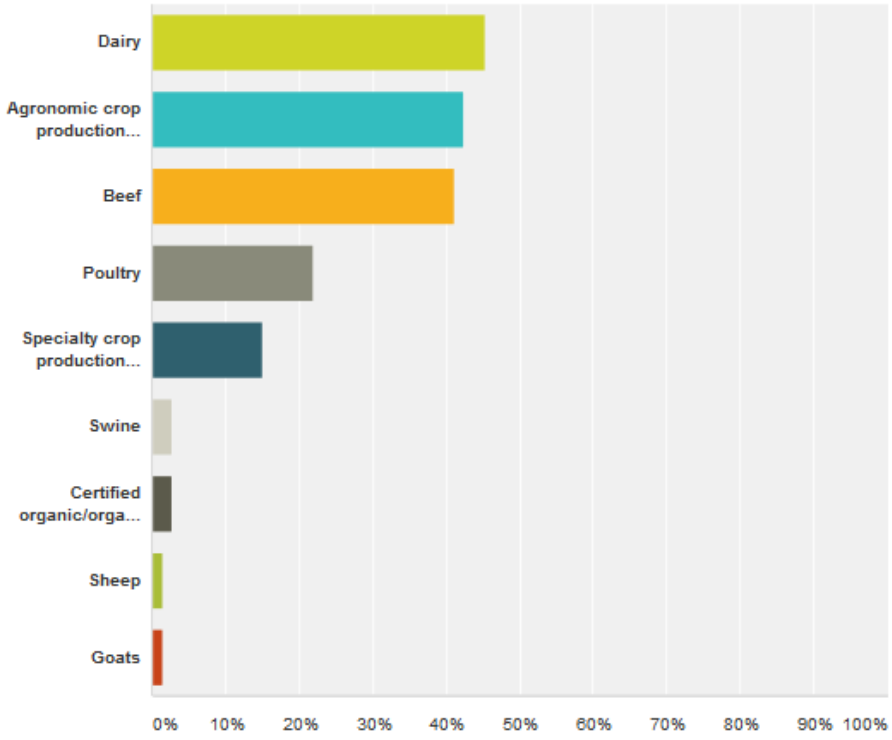


Answer Choices	Responses	
Yes, I have a current plan for my farm.	75.71%	53
I had a plan in the past, but it is not up to date.	11.43%	8
I have never had a plan.	11.43%	8
Not sure.	1.43%	1
Total		70

Question 2

Which category best describes your operation?

Answered: 173 Skipped:0

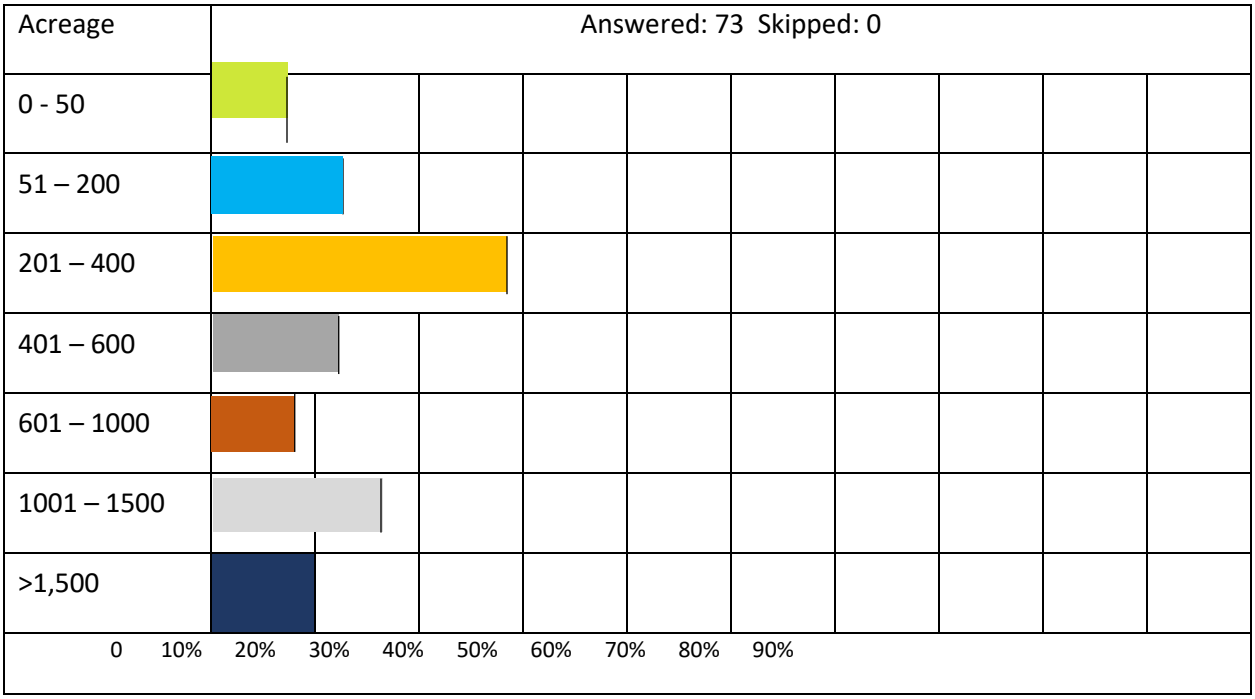


Answer Choices	Responses	
Dairy	45.21%	33
Agronomic crop production (corn, soybeans, wheat, cotton)	42.47%	31
Beef	41.10%	30
Poultry	21.92%	16
Specialty crop production (vegetables, fruit, flowers)	15.07%	11
Swine	2.74%	2
Certified organic/organic production	2.74%	2
Sheep	1.37%	1
Goats	1.37%	1
Total Respondents: 73		

Other responses: String beans (1), uncertified organic (1), hay (1), beef cattle and 3 hog houses (1)

Question 3

Approximately how many acres do you farm?



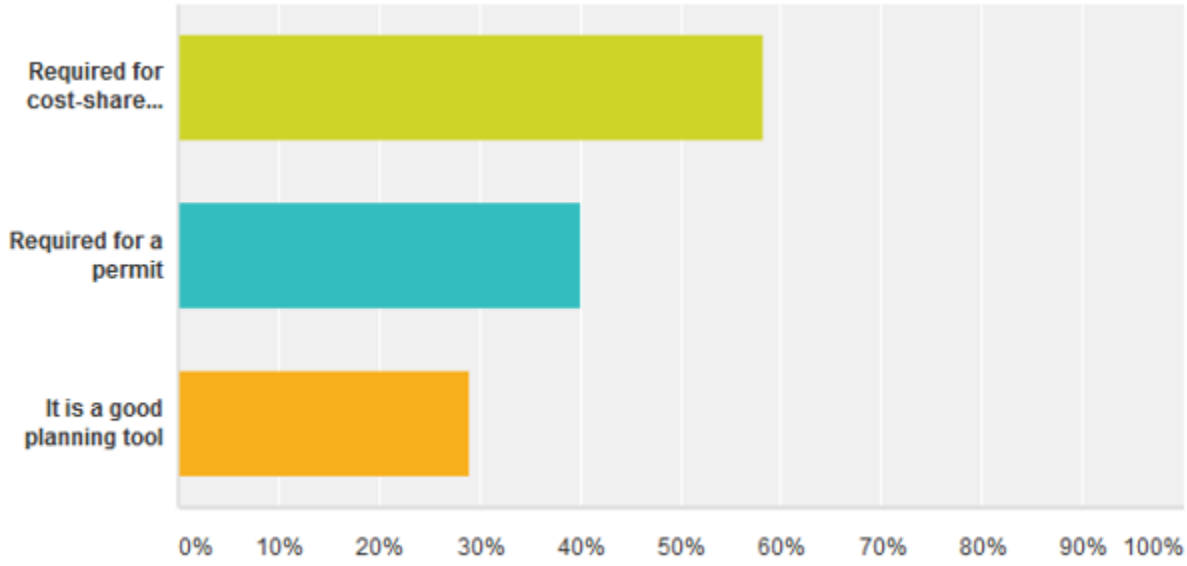
Responses: Farm Size, in Acres (73 responses in total ranging from 9 to 7,000. Total of all 73 = 54,787)

9
12
25
25
30
30
30
50
98
125
130
140
150
151
180
200
200
200
220
230
232
242
244
250
250
250
250-300
250-300
300
300
300
300
300
350
380
400
400
400
400
430
431
500
500
500
500
550
575
600
690
700 (140 crop, 560 pasture)
800
900
1000
1000
1076
1100
1100
1100
1300
1300
1300
1350
1400
1400
1500
1500
1800
2000
2000
2000
3302
3500
7000

Question 4

If you have (or previously had) an NMP developed by a certified nutrient management planner, what motivated you to develop it? Check all that apply:

Answered: 62 Skipped: 11

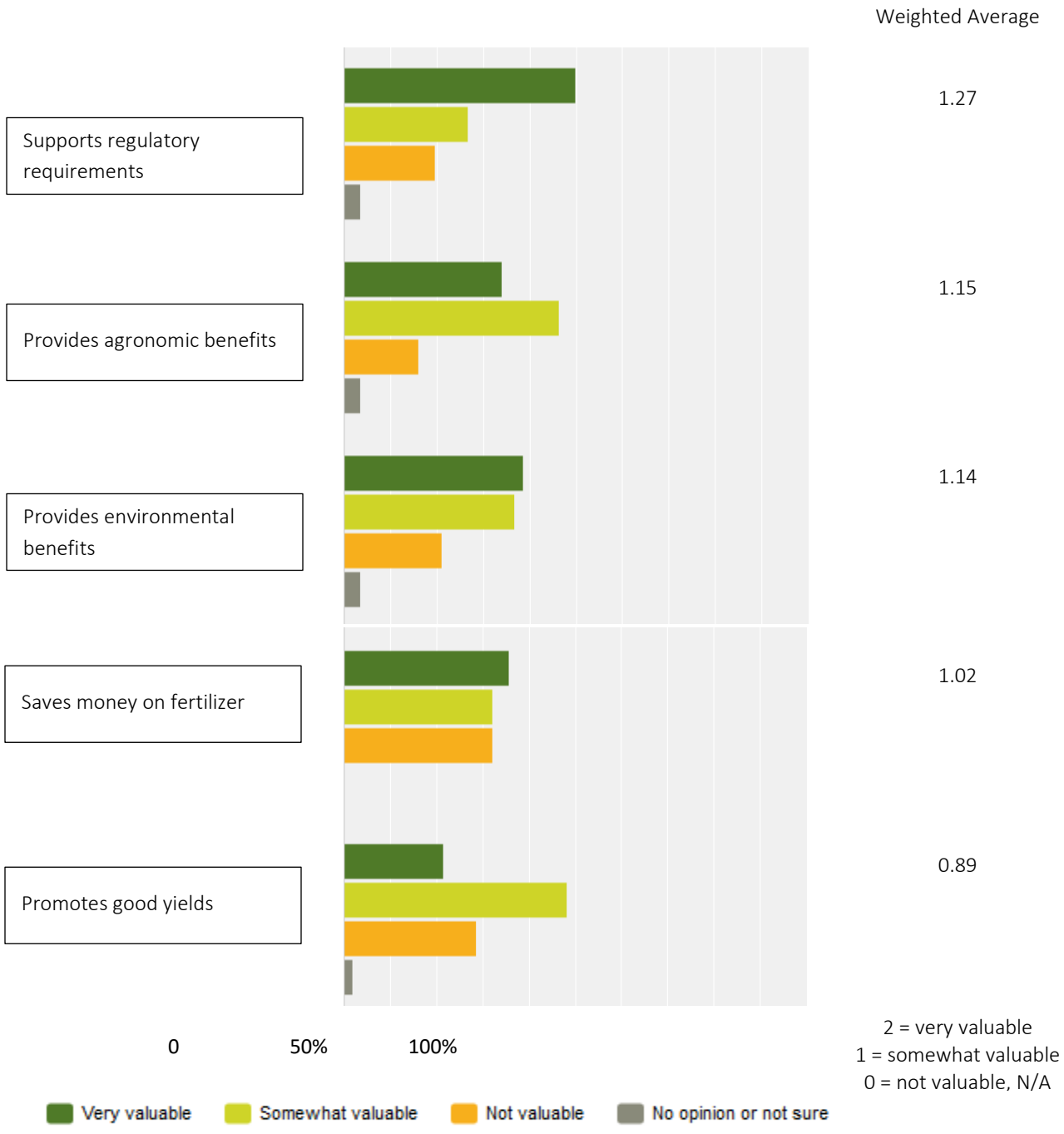


Answer Choices	Responses	
Required for cost-share program	58.06%	36
Required for a permit	41.94%	26
It is a good planning tool	30.65%	19
Total Respondents: 62		

Question 5

What aspects of an NMP do you find valuable for your operation?

Answered: 64 Skipped: 9



Question 5 Response breakdown

	Very valuable	Somewhat valuable	Not valuable	No opinion or not sure	Total	Weighted Average
Supports regulatory requirements	49.21% 31	28.57% 18	17.46% 11	4.76% 3	63	1.27
Provides agronomic benefits	33.87% 21	46.77% 29	14.52% 9	4.84% 3	62	1.15
Provides environmental benefits	38.10% 24	38.10% 24	19.05% 12	4.76% 3	63	1.14
Saves money on fertilizer	34.92% 22	31.75% 20	31.75% 20	1.59% 1	63	1.02
Promotes good yields	20.97% 13	46.77% 29	29.03% 18	3.23% 2	62	0.89

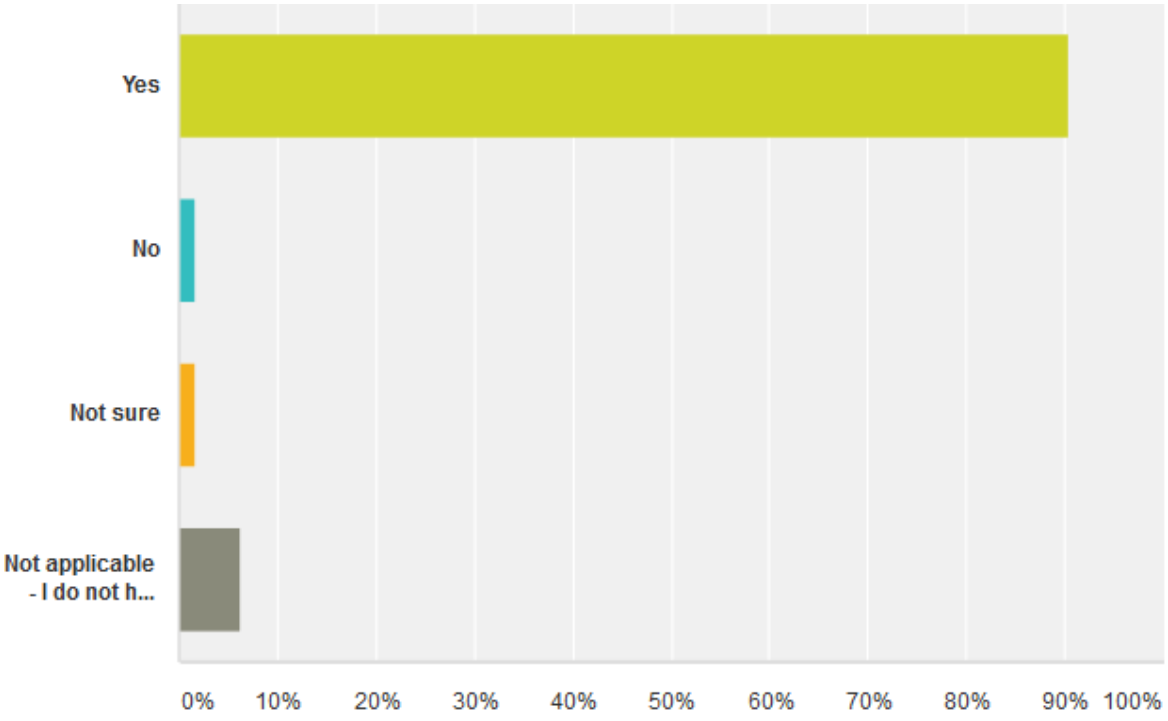
Comments:

- Helps plan crop rotation long term.
- Balances the nutrient load.
- It is good for public relations.
- Knowing which fields need lime. Helps with planning on which crops to plant where.
- Peace of mind from doing the right thing.
- Proof point when advocating that protecting the environment is important to farmers.
- Helps plan for animal waste and crop nutrients.
- We are participants in ESS WCD cover crop program. It is required.
- Most important benefit is the overall result of building soil health (and not wasting money).
- Promotes record keeping, which in turn helps us understand the balance between nutrient applications and yields.
- To build soil health, requires nutrients
- Allow public to understand we are good stewards.
- Guide discussion starter with non-farm people.
- Prioritize where to spend money on nutrients and prioritize nutrients across fields.
- Prevents over-fertilizing.
- Matching soil type and productivity group to fertilizer rate and yield is the most valuable benefit to me. However, yield records provide the most valuable information for planning inputs. Promoting good yields are not enough. We need to anticipate the maximum yield for every given situation.
- Yes, there are benefits, but sometimes the manure rates are too hard to follow. For example, one field is 1.6 t/a, another is 1.8, still another is 2.1. Need to keep it simple: 1.0, 1.5, or 2.0 t/a.
- Following an NMP is costing my farm with record keeping and yield documentation.
- Starves my crop yields.
- What I saved on fertilizer, I spent on application and service charges.

Question 6

If you have a current NMP, was it developed by a certified nutrient management planner?

Answered: 63 Skipped: 10

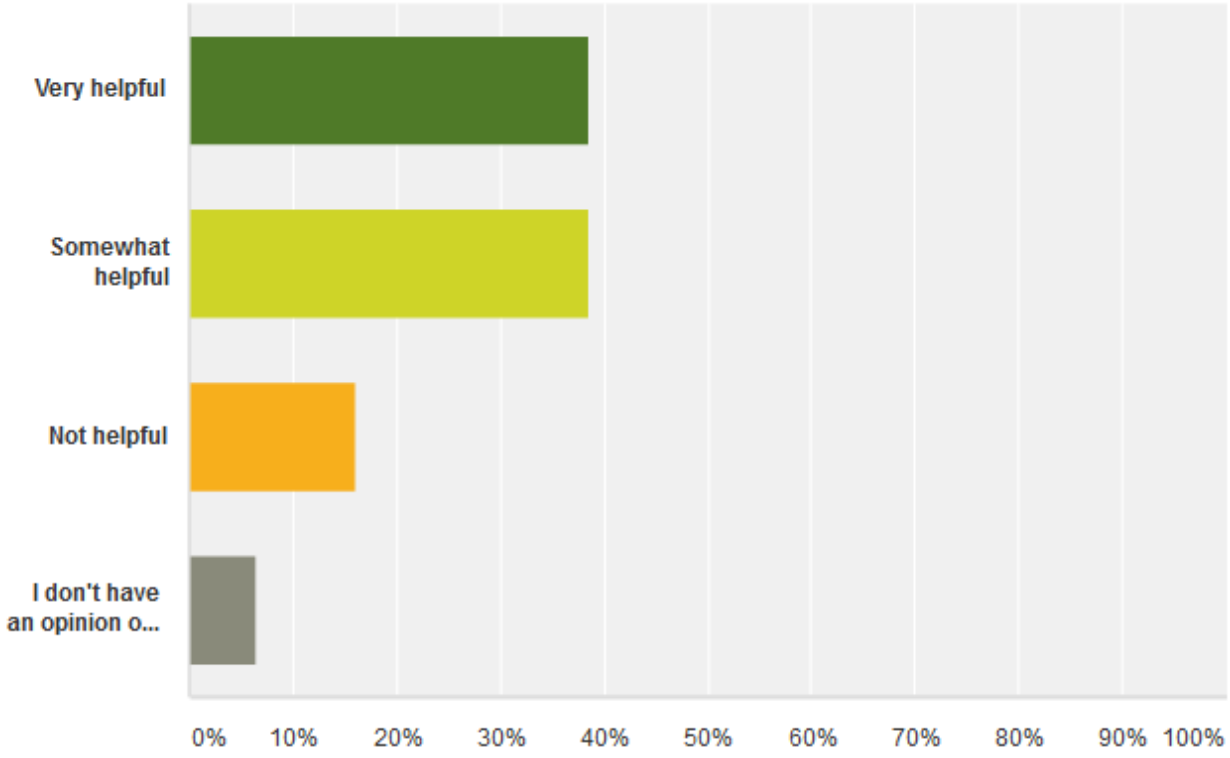


Answer Choices	Responses	
Yes	90.48%	57
No	1.59%	1
Not sure	1.59%	1
Not applicable - I do not have a current nutrient management plan	6.35%	4
Total		63

Question 7

How helpful is your nutrient management planner in assisting you IMPLEMENT the plan?

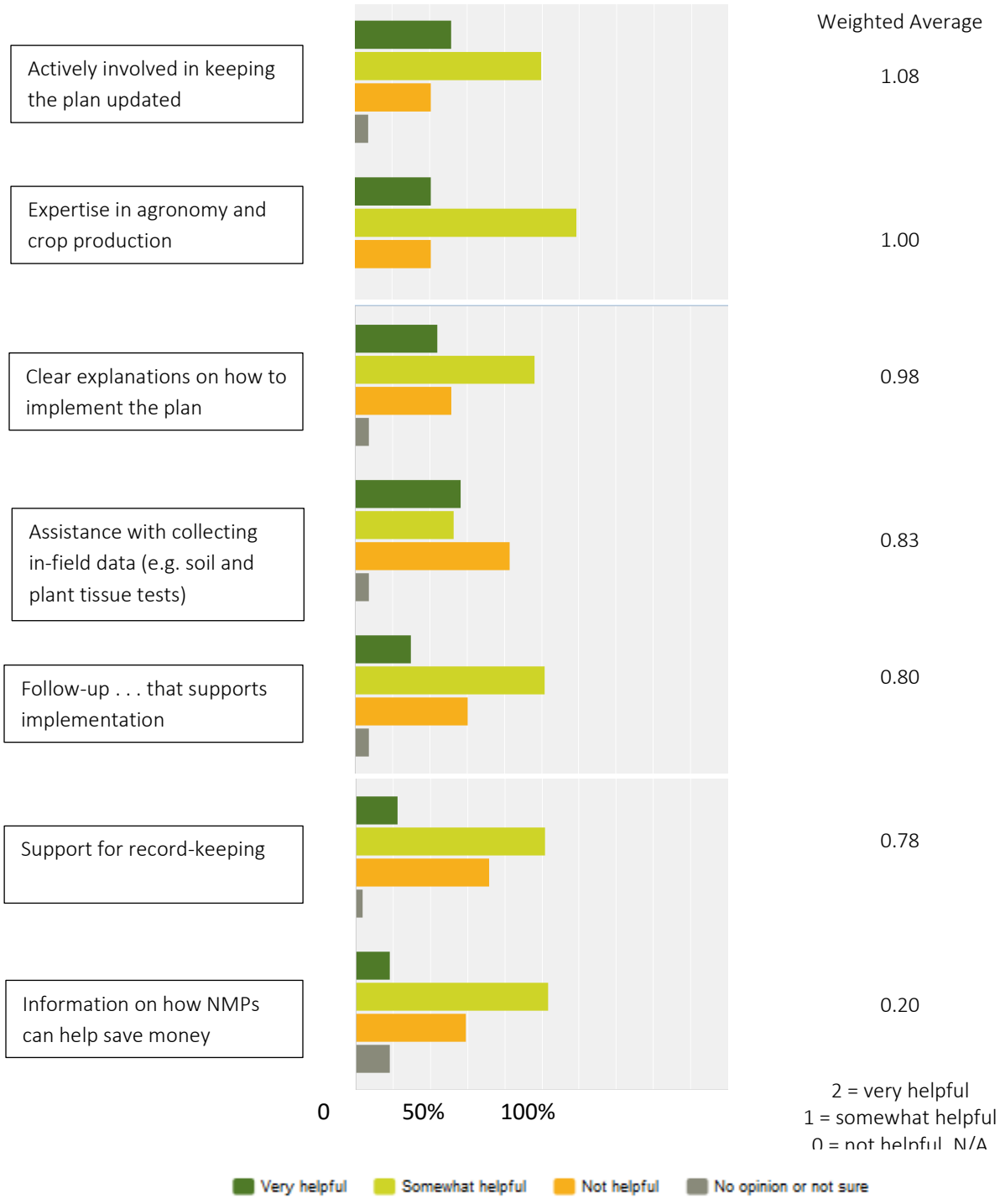
Answered: 62 Skipped:11



Answer Choices	Responses	
Very helpful	38.71%	24
Somewhat helpful	38.71%	24
Not helpful	16.13%	10
I don't have an opinion on this question	6.45%	4
Total		62

Question 8

What services provided by the nutrient management planner are more (or less) helpful?



Question 8 Response summary

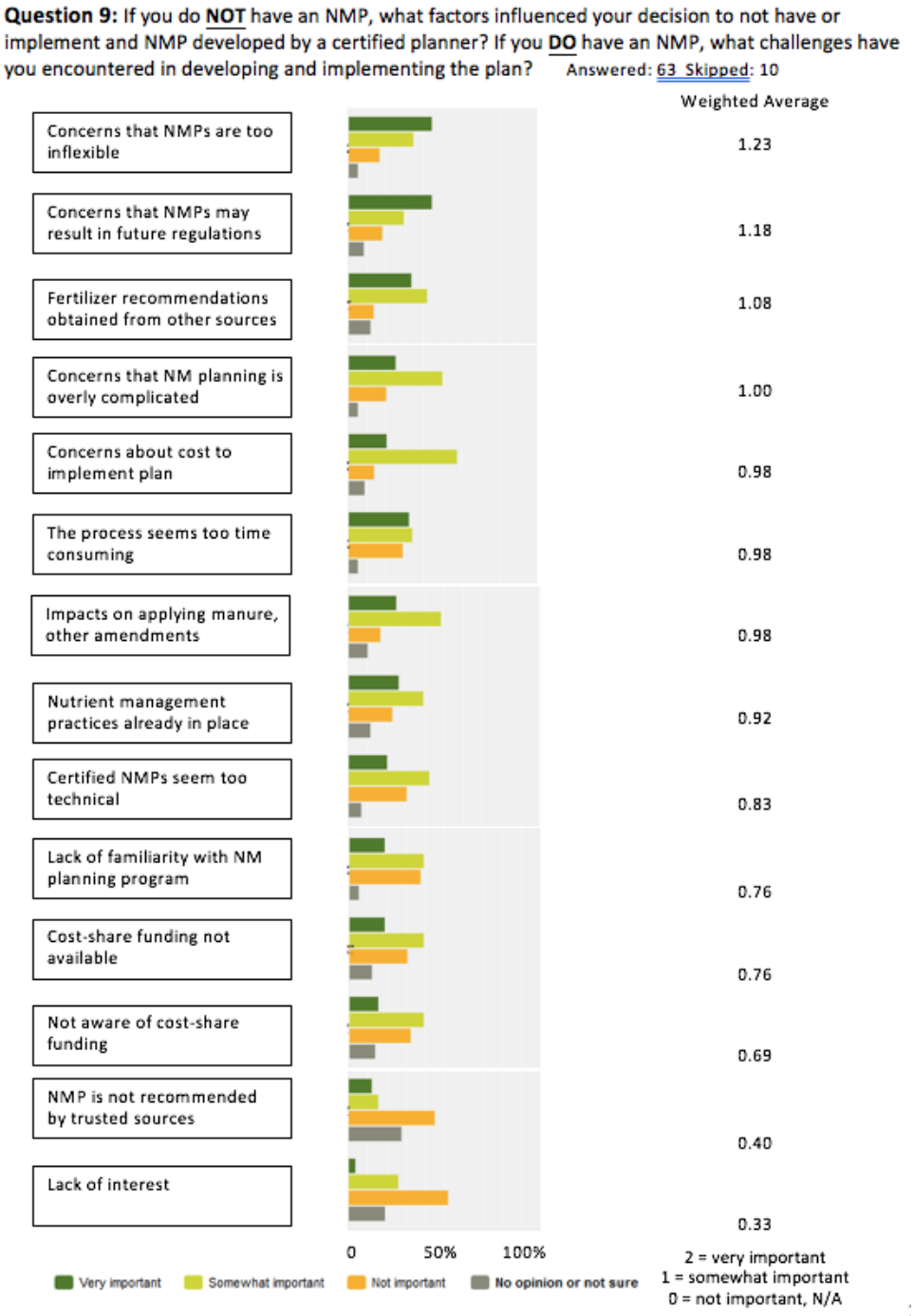
	Very helpful	Somewhat helpful	Not helpful	No opinion or not sure	Total	Weighted Average
Keeping plan updated	31.15% 19	45.90% 28	19.67% 12	3.28% 2	61	1.08
Expertise in agronomy and crop production	21.31% 13	57.38% 35	21.31% 13	0.00% 0	61	1.00
Explanation on implementation	25.00% 15	48.33% 29	23.33% 14	3.33% 2	60	0.98
Help with in-field data	28.33% 17	26.67% 16	41.67% 25	3.33% 2	60	0.83
Follow-up for implementation	15.00% 9	50.00% 30	30.00% 18	5.00% 3	60	0.80
Support for record keeping	15.00% 9	48.33% 29	33.33% 20	3.33% 2	60	0.78
Info on NMPs & cost-savings	11.48% 7	49.18% 30	31.15% 19	8.20% 5	61	0.72

Comments – What other services are provident by the NM Planner that you find helpful?

- Manure sampling.
- Takes some manure samples.
- Takes manure samples if needed.
- Always available to answer questions.
- General knowledge and common sense.
- No cost.
- Too costly.
- Keeping up on programs to be enrolled in.
- Soil testing results explained.
- The plan is an ever-changing, living document. It is often outdated because things change. Some government agencies look at it as a fixed document. Planners don't have time to do updates all the time. If producers consult with planners about the management of nutrients and meet the principles – but the change has not been made in writing – the plan should still meet the program requirements. Follow up visits: if they had more time. (Relates to need for more staff.)
- Spend time with the farmer as to how to implement the plan.
- Use of crop protectants, foliar feeding, seed selection and seed treatments that will ensure the best chance at maximum yield.
- Pre-dress Soil Nutrient Test.
- Just a paperwork exercise.
- DCR planner just delivers the plan and I have no say.
- At least it was free.
- Not really any. I would do anyway!

Question 9: If you do **NOT** have an NMP, what factors influenced your decision to not have or implement and NMP developed by a certified planner? If you **DO** have an NMP, what challenges have you encountered in developing and implementing the plan?

Answered: 63 Skipped: 10



Appendix 1A. Farmer Assessment Responses

Question 9: Additional comments or recommendations:

- Who can afford to fertilize? I can barely afford to apply lime.
- I have no idea what it is. I don't trust government & don't want them involved in my process.
- Weather and cropping conditions can and often do complicate implementation of NMPs, but do serve as a guideline. Currently most of my poultry litter is being transferred to Franklin County area of Virginia.
- Needs to be based on soil science.
- On my farm, very few nutrients are imported. Manure application is based on the idea of nutrient cycling and is applied to fields per crop removal and soil test for potassium. I do not purchase additional fertilizer other than micronutrients and a little compost – not enough to swing a soil test for NPK. My plan usually tells me what I already know and do.
- Question about recommendations on fertilizer unclear.
- I was advised that having an NMP would be an unnecessary liability. I am already working with a soil consultant on lowering my P levels for the last 5 years with good results. * stars instead of checkmarks for nutrient management practices, too unsure of impact of high soil phosphorus.
- I have grave concerns about phosphorus levels being high and yet unavailable to crops. I don't understand why some fields that are not close to the cut-off for P get designated as zero P. As a continuous no-till operation, I have concerns about P building up in the soil-sample zone.
- Our application times are impractical. You cannot apply manure in February with an airway applicator without damaging the crop that you are required to harvest.
- It is a PLAN, not set in stone. We all do the best we can in day-to-day situations.
- Lots of checkmarks on “nutrient management practices are already in place... so don't see the value in have an NMP.”
- Questions could be re-worded.
- Beef operation is too small.
- Keep the plans free. Need more planners that are farmers too, because they need to understand what the real world is.
- DCR promotes MEY, but read any economics textbook and you will see that the most profit comes at one increment of inputs past MEY.
- Plan is a worthless document. When did a healthy growing crop become a risk to the environment?
- The plan is out of touch with present day production economics.
- Offers nothing new. Too inflexible. Limits fall manure application. Limits soil samples to 20 acres, should be larger.
- The nutrient management program is antiquated and should be donated to the Smithsonian. It should be based on an excel program where you can copy, paste, sort, and utilize the information that it creates.
- It’s not fair that I am required to have a plan, just because I have poultry, while others don’t.
- It’s not important to me, waste of government money!!

Question 9 Response summary

	Very Important	Somewhat Important	Not Important	No opinion or not sure	Total	Weighted Average
Concerns that NMPs are too inflexible	44.26% 27	34.43% 21	16.39% 10	4.92% 3	61	1.23
Concerns that NMPs may result in future regulations	44.26% 27	29.51% 18	18.03% 11	8.20% 5	61	1.18
Fertilizer recommendations obtained from other sources	33.33% 20	41.67% 25	13.33% 8	11.67% 7	60	1.08
Concerns that NM planning is overly complicated	25.00% 15	50.00% 30	20.00% 12	5.00% 3	60	1.00
The process seems too time consuming	20.34% 12	57.63% 34	13.56% 8	8.47% 5	59	0.98
Concerns about cost to implement plan	32.20% 19	33.90% 20	28.81% 17	5.08% 3	59	0.98
Impacts on applying manure, other amendments	25.00% 15	48.33% 29	16.67% 10	10.00% 6	60	0.98
Nutrient management practices already in place	26.23% 12	39.34% 24	22.95% 14	11.48% 7	61	0.92
Certified NMPs seem too technical	20.34% 12	42.37% 25	30.51% 18	6.78% 4	59	0.83
Lack of familiarity with NM planning program	18.64% 11	38.98% 23	37.29% 22	5.08% 3	59	0.76
Cost-share funding not available	18.64% 11	38.98% 2	30.51% 18	11.86% 7	59	0.76
Not aware of cost-share funding	15.25% 9	38.98% 23	32.20% 19	13.56% 8	59	0.69
NMP is not recommended by trusted sources	12.07% 7	15.52% 9	44.83% 26	27.59% 16	58	0.40
Lack of interest	3.45% 2	28.56% 15	51.72% 30	18.997% 11	58	0.33

Question 9: **What challenges discourage participation in having an NMP? Breakout according to whether or not farmers have/previously had/never had an NMP.** Answered: 63 Skipped: 10

Note: Weighted averages are not intended for statistical analysis. This is a quantitative description of farmer responses from an assessment which did not involve random sampling.

Question 9 Farmer Responses	Farmers with current NMP		Farmers with previous NMPs		Farmers who never had NMPs	
	Weighted Average	Rank	Weighted Average	Rank	Weighted Average	Rank
Concerns that NMPs may result in future regulations	1.12	1	1.29	2	1.50	2 (t)
Fertilizer recommendations obtained from other sources	1.11	2	0.86	9	1.17	8 (t)
Impacts on applying manure or other amendments	0.96	3	1.17	4 (t)	1.00	10
Concerns that NM planning is overly complicated	0.94	4 (t)	1.17	4 (t)	1.30	7
Concerns about cost to implement plan	0.94	4 (t)	1.00	6 (t)	1.33	4 (t)
The process seems too time consuming	0.88	6	1.20	3	1.67	1
Certified NMPs seem too technical	0.81	7 (t)	1.00	6 (t)	0.83	11 (t)
Cost-share funding not available	0.81	7 (t)	0.40	13 (t)	0.83	11 (t)
Concerns that NMPs are too inflexible	0.78	9	1.33	1	1.33	4 (t)
Nutrient management practices already in place	0.71	10	1.00	6 (t)	1.17	8 (t)
Lack of familiarity with NM planning program	0.69	11	0.80	10 (t)	1.33	4 (t)
Not aware of cost-share funding	0.60	12	0.40	12	1.50	2 (t)
NMP is not recommended by trusted sources	0.33	13	0.80	10 (t)	0.57	14
Lack of interest	0.28	14	0.40	13 (t)	0.67	13

2 = very important 1 = somewhat important 0 = not important/not sure

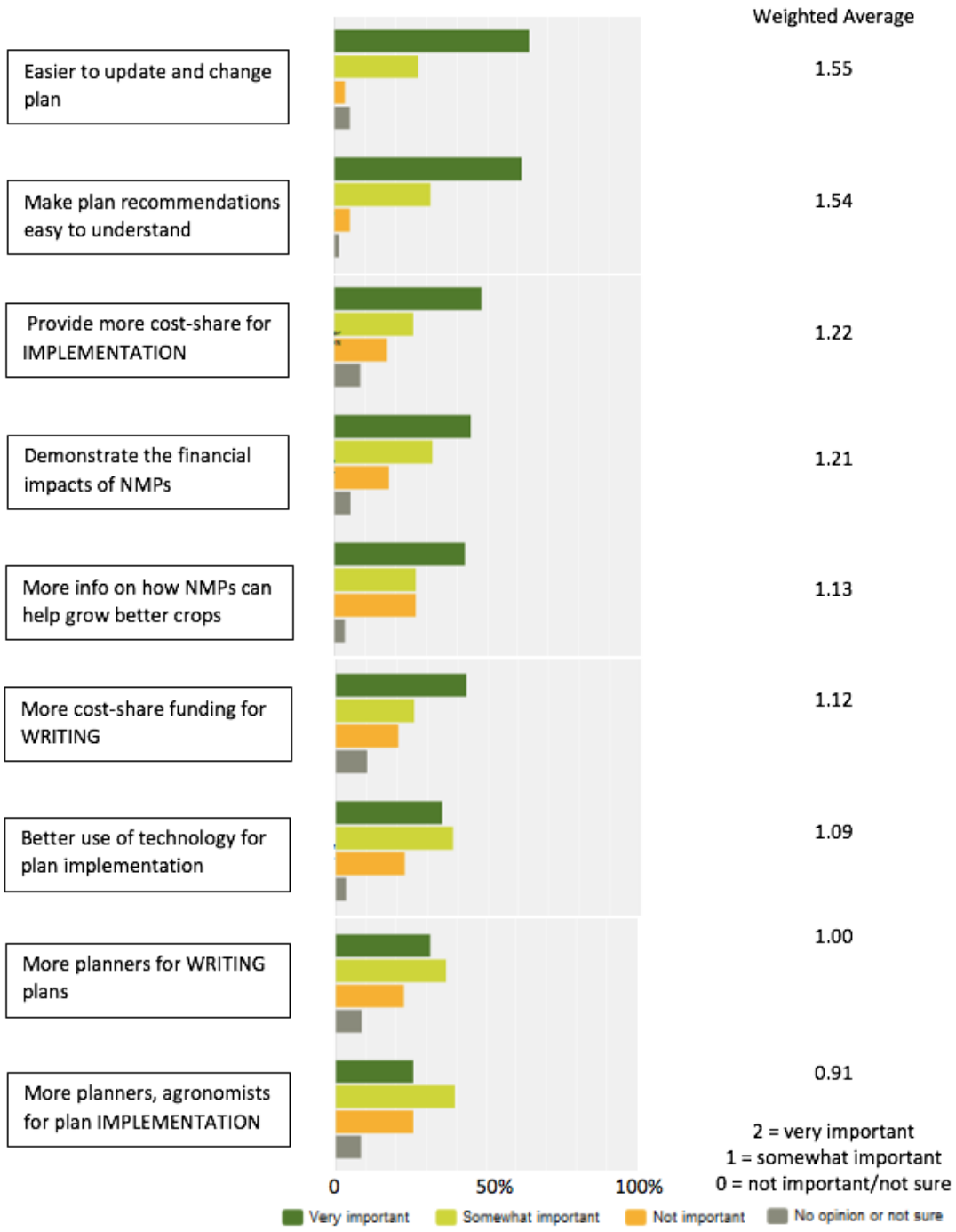
Arbitrary coding:

Very important: 1.60 and higher
Moderately important: 1.20 to 1.59
Somewhat important: 0.80 to 1.19
Less important: 0.40 to 0.79
Not important: less than 0.39

Question 10

- If you do **NOT** have an NMP, what would encourage you to work with a certified management planner to develop and implement an NMP?
- If you **DO** have an NMP, what would make it easier for you to develop and implement your plan?

Answered: 59 Skipped: 14



Question 10 Response summary

	Very Important	Somewhat Important	Not Important	No opinion or not sure	Total	Weighted Average
Easier to update and change plan	63.79% 37	27.59% 16	3.45% 2	5.17% 3	58	1.55
Make plan recommendations easy to understand	61.40% 35	31.58% 18	5.26% 3	1.75% 1	57	1.54
Provide more cost-share for IMPLEMENTATION	48.28% 28	25.86% 15	17.24% 10	8.62% 5	58	1.22
Demonstrate the financial impacts of NMPs	44.64% 25	32.14% 18	17.86% 10	5.36% 3	56	1.21
More info on how NMPs can help grow better crops	42.86% 24	26.79% 15	26.79% 15	3.57% 2	56	1.13
More cost-share funding for WRITING	43.10% 25	25.86% 15	20.69% 12	10.34% 6	58	1.12
Better use of technology for plan implementation	35.09% 20	38.60% 23	23.82% 13	3.51% 2	57	1.09
More planners for WRITING plans	31.58% 18	36.84% 21	22.81% 13	8.77% 5	58	1.00
More planners, agronomists for plan IMPLEMENTATION	25.86% 15	39.66% 23	25.86% 15	8.62% 5	58	0.91

Comments

- I would need a cost share to just apply the nutrients. Lol
- Need more education. Maybe schedule an informational workshop to explain what it is.
- I see great value of having a plan on farms with high levels of livestock per acre and that purchase a lot of nutrients through feed and fertilizer.
- Questions somewhat confusing.
- If you have a plan, this does not apply.
- I think everyone should have a nutrient management plan regardless of size.
- On-farm software to keep good records.
- Until it is mandatory for all to have a plan, I'm afraid most will not entertain the idea at all.
- Yields too low.
- Lots of checkmarks by "Better use of technology to support plan implementation."

- Need staff to follow up on plans with PSONT and decision making tools to maximize value of plan.
- Many checkmarks for 'Make it easier and quicker to change...'
- DCR approval inflexible.
- I was told by the SWCD that my voluntary practice were not good enough.
- The plan is a worthless document to my farm operation. It is delivered for me to accept as written.
- Need more flexibility. Only gives limits, never allows you to go over. Limits fall manure application.
- Farmers are going to follow the money. Put your money where you want participation and do not over regulate.

Question 10: What would encourage participation in having and NMP? Breakout according to whether or not farmers have/previously had/never had an NMP

Answered: 59 Skipped: 14

Note: Weighted averages are not intended for statistical analysis. This is a quantitative description of farmer responses from an assessment which did not involve random sampling.

Question 10 Farmer Responses	Farmers with current NMP		Farmers with previous NMPs		Farmers who never had NMPs	
	Weighted Average	Rank	Weighted Average	Rank	Weighted Average	Rank
Simplify plan recommendations	1.61	1	1.33	2 (t)	1.20	6
Make it easier and quicker to update plan	1.60	2	1.17	4	1.60	4 (t)
Demonstrate the financials impacts of and NMP	1.22	3	0.80	6	1.60	4 (t)
Better use of technology for IMPLEMENTATION	1.15	4 (t)	0.60	8	1.00	7
More cost-share funding for IMPLEMENTATION	1.15	4 (t)	1.40	1	1.80	2 (t)
More information about growing better crops	1.11	6	0.40	9	2.00	1
Increase number of certified planners for WRITING	1.04	7	0.83	5	0.80	8 (t)
More cost-share funding for WRITING	1.02	8	1.33	2 (t)	1.80	2 (t)
Increase staff to assist with IMPLEMENTATION	0.96	9	0.67	7	0.80	8 (t)

2 = very important 1 = somewhat important 0 = not important/not sure

Arbitrary coding:

Very important: 1.60 and higher
Moderately important: 1.20 to 1.59
Somewhat important: 0.80 to 1.19
Less important: 0.40 to 0.79
Not important: less than 0.39

Question 11: **Other Comments**

- Cost share programs cost farmers too much because of the tech and engineering. NMPs don't allow for nutrients to increase yields. NMPs don't allow application at right time for small grains and hay. Cover crop programs don't work in Northwest Valley.
- I took out a $50,000 operating loan to keep this farm going this year due to low milk price. Until we are paid for what we do, I will do what I can - but nothing extra.
- It all comes down to owner's commitment to BMPs in all areas of agriculture: rate applied of insecticide, herbicide, and nutrients - cover crops, soil health and wise use of N, P, K.
- If we were not required to be permitted as a poultry grower, we would not have an NMP. "They want me to use 30lb split apply but the coop machine will not go below 50lb."
- This is an antiquated program, difficult to use, not excel based.
- NMPs are good. They need to be flexible and farmer friendly. Farming is a dying breed and young farmers are not willing to work as hard as us older guys! So you need to make this easy to implement.
- Too flexible.
- Only focused on reduction.
- Computer program or spreadsheet forms to work in conjunction with the Nutrient Management Software, so data would be easier to transfer and keep - without having to repeat data entry for both farmer and planner.
- Just as usual. You have no one on your advisory team that actually writes plans daily. No wonder you do not know what is going on.
- Do not expect a plan to be a permit.

Appendix 1B. Statewide Agriculture Industry Stakeholder Assessment Responses

Survey Monkey and paper copy responses to a statewide agricultural industry stakeholder assessment collected from December 2016 through February 2017 by the Virginia Nutrient Management Leadership Team.

Question 1

Which category best describes your profession? Please check all that apply.

Answered: 144 Skipped: 6

Answer Choices		Responses	
Certified nutrient management planner		40.97%	59
Certified crop advisor		5.56%	8
Fertilizer industry/sales		1.39%	2
Fertilizer application/equipment		0.69%	1
Cooperative extension		4.17%	6
Land Grant University/research		0.69%	1
Biosolids industry		3.47%	5
Certified organic fertilizer industry/sales		0.00%	0
Other (please specify)	Responses	43.06%	62
Total			144

Question 1 Open-ended responses

- Certified NMP planner/ certified crop advisor
- Pesticide industry
- Certified NMP planner, conservationist, government employee
- SWCD, conservationist
- Conservationist/water management
- Conservationist
- Certified nutrient management planner, conservationist, ag consultant, organic grain farmer

Appendix 1A. Farmer Assessment Responses

Question 1 Open-ended responses cont.

- Government
- NRCS District Conservationist. I am a Certified Nutrient Management Planner because if was required for my job, but I don't write plans on a regular basis.
- NRCS Soil Conservationist
- Government employee
- NRCS District Conservationist
- Conservation specialist
- NRCS District Conservationist, Certified NMP & Farmer
- State Agency Employee
- Soil and Water Conservation District
- Farmer
- Personally understanding nutrient importance and consulting work.
- Federal Conservation Professional
- Federal Government-USDA
- Seed Production and Cleaning
- Federal Conservation Agency
- NRCS (8 responses)
- Environmental Consultant.
- Area Parks Manager
- Turf/ golf/ lawns
- SWCD
- I quit doing nutrient management plans years ago. So much for a great idea.
- CNMP, VPA biosolids permit writer with DEQ
- Local Government- Director of Environmental Programs
- Government
- SWCD
- Agricultural Loans
- Cooperative manager
- urban forestry
- State Inspector
- State Environmental
- Certified Nutrient Management Planner, primarily for the golf course that I manage. Golf Course Superintendent.
- Soil& Water Conservation District
- Grounds Manager
- NRCS employee and certified nutrient management planner

Question 1 Open-ended responses cont.

- conservation specialist with soil and water district
- State Government Employee
- DEQ - CAFO Inspector
- Residential landscape maintenance
- Local Government
- Soil & Water Conservation District
- USDA NRCS District Conservationist
- state employee
- Manager at a conservation agency - heavily involved in nutrient management.
- USDA – government
- Certified crop adviser, fertilizer industry/sales, certified organic fertilizer industry sales
- Ag lime production/sales
- Certified crop advisory, fertilizer industry/sales, fertilizer application/equipment

Question 2

Approximately how many Virginia farmers do you work with each year, regarding nutrient management planning decisions?

Answered: 139 Skipped: 11

0 plans	32
1-2 plans	7
3-9 plans	20
10-20 plans	21
21-30 plans	14
31-50 plans	9
51-60 plans	0
61-70 plans	0
71-80 plans	4
81-90 plans	1
91-100 plans	5
over 100 plans	9

Question 2, individual responses:

None, I work with biosolids companies
None, certified for turf and landscape NMPs
5 golf courses
0 (31)
1
1
1
1
1
2
2
2
3
3
3
3

4
5
5
5
5
5
5
5
5
6
8
8
8
10
10
10
10
10
10
10
10
12

12
12
15
15
17
20
20
20
20
20
20
22
25
25
25
25
25
30
30
30
30
40
40
40
50

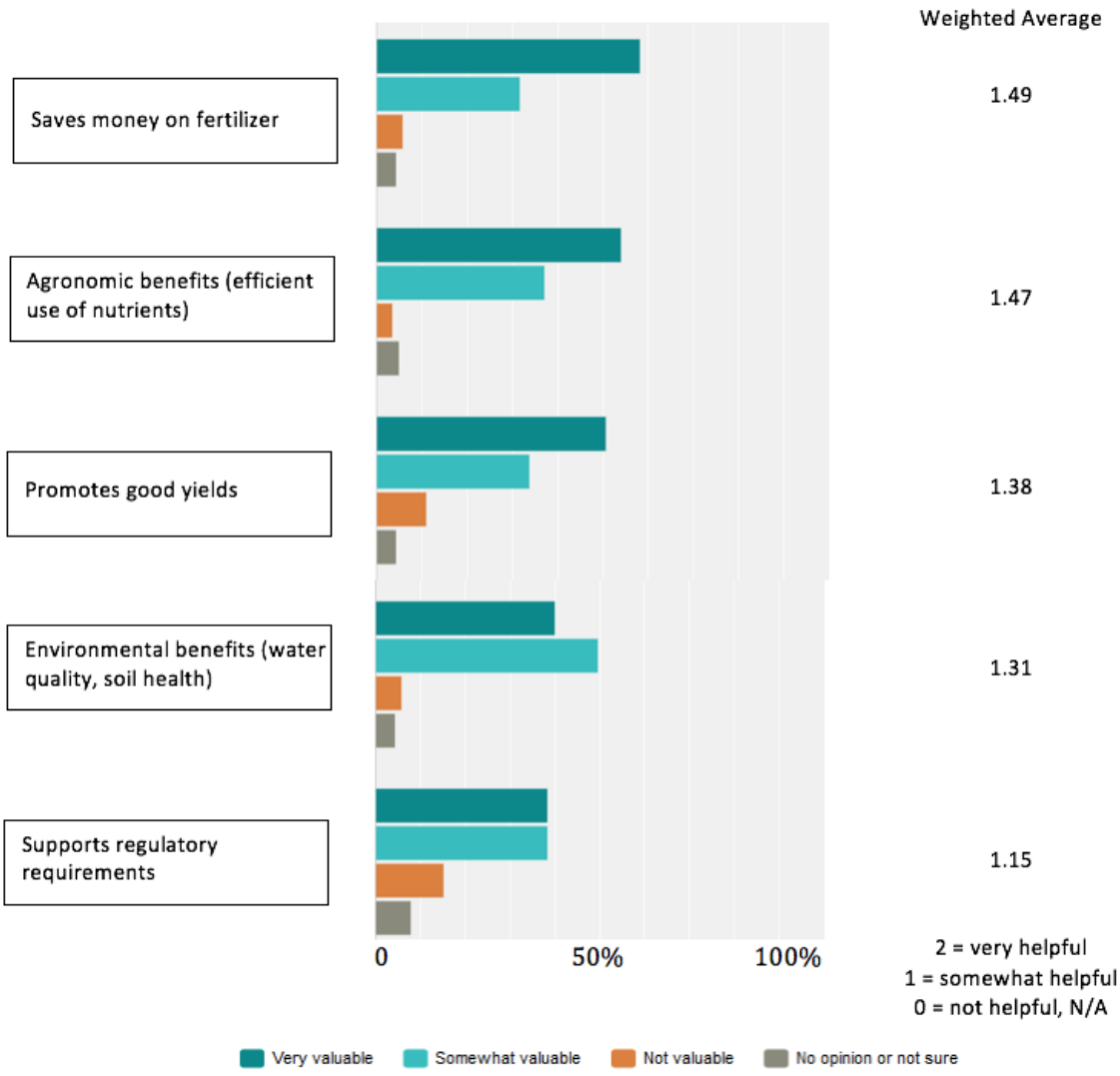
50
50
50
75
75
75
90
100
100
100
100
100
100+
115
160
200
200
300
500
700
1000
Several, not sure of the number

10-50?
20-30
25-30
25-50 (Not writing plans but looking at fertilizer needs)
25/Year. Works closely with the DCR NMP
30-40
30-40
30-60
40-50
Up to 50
50-60
75-80
Approx. 100-250

Question 3

In your opinion, what are the primary benefits that encourage farmers to adopt nutrient management plans realize (NMPs)?

Answered: 147 Skipped: 3



NOTE: A large number of ag industry respondents wrote in the benefit of qualifying for cost-chare programs.

- 7 saying it is very important
- 12 saying it is somewhat important
- 15 saying it is a benefit (without indicating the level of importance)
- 1 saying it is not important

	Very valuable	Somewhat valuable	Not valuable	No opinion or not sure	Total	Weighted Average
Saves money on fertilizer	58.90% 86	31.51% 46	5.48% 8	4.11% 6	146	1.49
Agronomic benefits (efficient use of nutrients)	54.86% 79	36.81% 53	3.47% 5	4.86% 7	144	1.47
Promotes good yields	52.45% 75	32.87% 47	10.49% 15	4.20% 6	143	1.38
Environmental benefits (improves water quality, soil health)	40.28% 58	50.00% 72	5.56% 8	4.17% 6	144	1.31
Supports regulatory requirements	37.93% 55	39.31% 57	15.17% 22	7.59% 11	145	1.15

Question 3 Open-ended responses (primary benefits of NMPs)

- Some farmers realize long term benefits (higher land values, sustainable cropping systems, etc.)
- Year over year analysis of nutrients, crop performance, etc.
- *emphasis on 'Saves money on fertilizer'
- it is the economics that drives decision making
- Keeps regulatory agencies at bay. Provided at no cost. Not required to follow, just have in hand when needed.
- Cost share and soil health are the main NMP motivators
- Can save time by reducing the need to apply product on areas/fields where they are not required

Question 3 Open-ended responses (primary benefits of NMPs), cont'd.

- Shows good stewardship, added bonuses in programs such as RMPs, etc.
- Allows/requires them to take good records
- Better understanding of their overall fertility program and why they apply what and when.
- While working with a soil and water conservation district, I would say ~60% of producers have an NMP because of cost share requirements. Many of these producers already limit their nutrient applications regardless of what their NMP says
- To be honest a lot of the farmers realize that a NMP is required to qualify for the State BMP Cover Crop program and WP4. They also realize that to get any assistance from NRCS dealing with AG Waste Resource Concerns, an up to date NMP is required.
- Required by agencies to participate in federal programs
- Opens door for additional funding for cost-share programs-renders farmers "eligible".
- Very different uses for crop versus pasture. No-one is over-fertilizing pasture-
- Frequent soil sampling
- Better ranking in different state or federal programs
- Better ground cover and healthier benefits.
- Federal and state cost assistance or incentive payments.
- I am expanding my answer above. An NMP allows them to qualify for monetary aid.
- Provides a whole-farm template to stay organized throughout the growing season.
- Ultimately farmers do not want NMPs. They want to be the most efficient with their fertilizer applications as possible to optimize profitability (and this efficiency is very good for water quality). They know they need to do their part to protect water quality which includes meeting P regulations.
- Provides pathways or a requirement for State and Federal Cost Share Programs
- Financial assistance/benefits to adopt nutrient management plans and enhanced techniques.
- Cost Share
- The availability of a soils expert to help identify and solve issues that effects their crops.
- NMPs allow farmers to participate in certain state and federal cost share programs.
- It is not a benefit to comply with NM plans, it's a requirement. Any benefit has been regulated to death.
- Correlate manure application with crop requirements
- Cost more in management, application charges, etc. If the timing is off the yield suffers.
- Biosolids are free fertilizer for farmers, but require an NMP
- I tend to think that farmers/producers participate in the NMP process to be eligible for cost-share opportunities or to meet the regulatory expectations of VPA permitting.
- Helps to dispel the myth that farms are major cause of pollution.

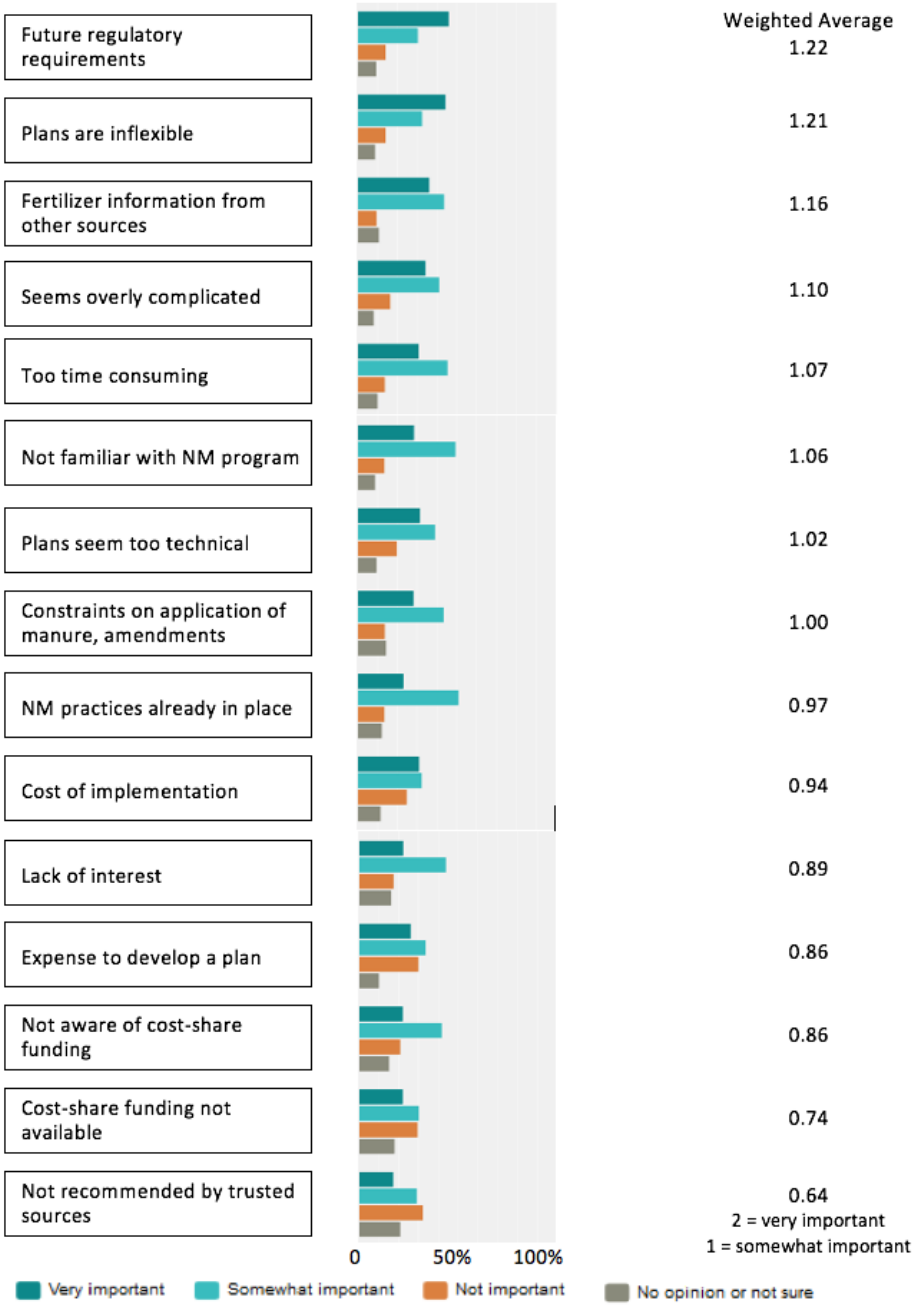
Question 3 Open-ended responses (primary benefits of NMPs), cont'd.

- Access to poultry litter
- I feel the only reason why producers have NMPs is because it is a requirement for many programs. I feel most don't realize the many benefits it has, nor do they pay attention to the good information it contains.
- In present cropping systems, any efficiency gained comes at the cost of higher management and expense for the farmer with more applications, machinery purchases and agronomic services.
- I'm not sure if this question asks about why farmers OBTAIN NMPs, or the primary benefits farmers actually REALIZE they obtain from having NMPs. Either way, I would say the answer is almost always to support regulatory requirements (and/or fulfill requirements to receive financial assistance from state and/or federal programs). I do not think most farmers still think an NMP written by a certified planner provides them any more benefit than following the recommendations on their soil test results or from their fertilizer salesman. In fact, they most often think an NMP is most likely to REDUCE their yields. Farmers DO care about environmental benefits; but since they are already doing everything possible to save money, they feel this will already be enough to prevent over-application (to put it in somewhat overly-simplistic terms).
- Many of the plans I write are to comply with county land use requirements for small landowners. Larger farmers normally have plans written by consultants or DCR for BMP or RMP compliance
- In some cases, results in monetary assistance.
- NMPs starve the soil

Question 4

Based on your experience, what factors influence farmers who choose not to have or implement an NMP developed by a certified planner? Alternately, for farmers who have NMPs, what challenges do they experience in developing and implementing their plans?

Answered: 149 Skipped: 1



	Very important	Somewhat important	Not important	No opinion or not sure	Total	Weighted Average
Future regulatory requirements	45.95% 68	30.41% 45	14.19% 21	9.46% 14	148	1.22
Plans are inflexible	44.22% 65	32.65% 48	14.29% 21	8.84% 13	147	1.21
Fertilizer info from other sources	36.05% 53	43.54% 64	9.52% 14	10.88% 16	147	1.16
Seems overly complicated	34.25% 50	41.10% 60	16.44% 24	8.22% 12	146	1.10
Time consuming	30.82% 45	45.21% 66	13.70% 20	10.27% 15	146	1.07
Not familiar with NMP program	28.38% 42	49.32% 73	13.51% 20	8.78% 13	148	1.06
Plans seem too technical	31.51% 46	39.04% 57	19.86% 29	9.59% 14	146	1.02
Constraints on application of manure, other amendments	28.28% 41	43.45% 63	13.79% 20	14.48% 21	145	1.00
NM practices already in place	23.13% 34	51.02% 75	13.61% 20	12.24% 18	147	0.97
Cost of implementation	31.03% 45	32.41% 47	24.83% 36	11.72% 17	145	0.94
Lack of interest	22.30% 33	43.92% 65	17.57% 26	16.22% 24	148	0.89
Expense to develop a plan	26.03% 38	33.56% 49	30.14% 44	10.27% 15	146	0.86
Not aware of cost-share funding	22.22% 32	41.67% 60	20.83% 30	15.28% 22	144	0.86
Cost-share funding not available	22.07% 32	30.34% 44	29.66% 43	17.93% 26	145	0.74
Not recommended by trusted sources	17.36% 25	29.17% 42	32.64% 47	20.83% 30	144	0.64

Appendix 1A. Farmer Assessment Responses

Question 4 Open-ended responses (challenges with NMPs)

- The current plan format used in VA is difficult to follow and most farmers aren't going to spend the time necessary to understand it and implementation thereof; the preciseness required in the plans over a three year period does not reflect the reality often encountered in diverse ag environments; proper implementation of the plans requires more one on one work with the NM planner than current staffing levels (government and private) allow; I feel that many farmers get a plan because they have to due to a regulation and truly don't understand the many benefits to their operation and to the environment
- In our area, many producers will not take cost share due to religious beliefs. Others have a big concern that if they do one they will not be able to spread manure, or federal regulators will come on farms.
- Checkmarks on Concerns that certified NMPS are inflexible, very important
- Separate funding source for just NMP is needed. very hard to tell producers pla is required for bmp cost share programs yet not have funds available to pay for pla if all allocated with other practices
- Regulation and having information written down is a big concern; privacy issues
- Record keeping not included after crop year to refine and allow flexibility. Also so much information can be gleaned from better record keeping that is not being captured
- Provide oysters and crabs and fish at the planning meeting for the meals.
- Coming from other states where training was held for farmers to understand and unite write their own plans, it seems to me that the Virginia system is made too onerous, too overbearing, and excludes farmers, making them feel put down. It isn't rocket science, and shouldn't be made to feel like rocket science. Farmer training creates more interest and buy-in if they are participants
- Many producers get a NMP written to meet cost share requirements but then never look at it. Most producers are already cutting back on nutrient application due to the cost of nutrients.
- Not aware of cost-share funding: cost-share is cumbersome
- Nutrient management practices already in place: most think they are already doing a good job
- The Virginia process is too complex, too fertilizer-centric, and too inflexible to adapt to in-season weather events. The agency administering the process acts like it is too difficult for farmers to understand, excluding people from the training by effectively talking down to them rather than engaging them in the process and making them actual participants.
- NMPs are another overreach by government. Most farmers use soil analysis and crop advisors to determine fertilizer needs. It is not cost effective to over-apply fertilizer. Cost dictates actions.
- All of the farmers that I service utilize NMPs. Too often there are contradicting recommendations from fertilizer dealers, neighbors, Extension, and lab recommendations from soil analysis.
- Most farmers are taking soil samples and applying fertilizer based on the results of them, or get Southern states or crop production services, etc. to take samples and apply fertilizer. Farmers are not going to spend any more money than needed on fertilizer.

Question 4 Open-ended responses (challenges with NMPs), cont'd.

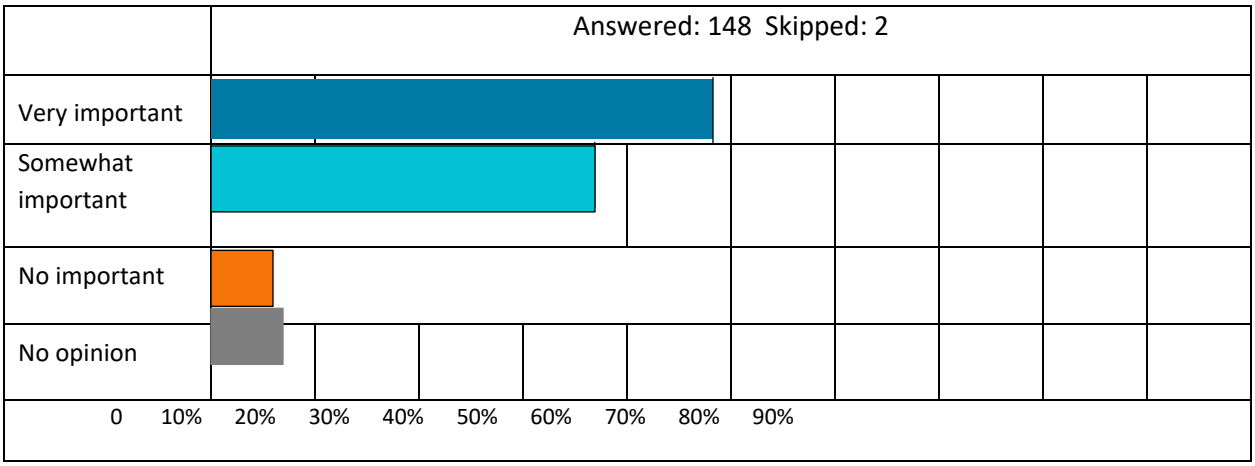
- There needs to be more cost-share funding opportunities for farmers to apply for to not only get a plan done by a local plan writer they trust and have easy access to, but also funding to help them implement the plan.
- NMP recommendations for many corn fields miss today's yield averages by a significant margin. Historic written records of yields are often scarce, so farmers see NMPs as severely limiting on N inputs.
- We need to develop a prescription based approach. The three-year plans are too cumbersome. Twenty years ago the three year plans were important but we have moved beyond this phase.
- VALUES is way outdated and needs to be updated. It is a good system; however, its crops yields are too low for 21st century agriculture in the Commonwealth. Farmers are not wanting NMPs because they feel like they will be heavily restricted on N application rates due to the lower yields in the outdated VALUES system and the applicable proportionate N application rates. Also, current policy is starving many crops for nutrients (reducing yields) and is subsequently mining soils of organic matter and other minerals over time. Policy should be updated to allow nutrient applications to help build organic matter for long term benefits.
- A plan has out of date science and management.
- Farmers appear interested in managing their crops to the best of their experience and not be second-guessed by someone that does not have the same financial investment that they have. A planner gains credibility and support of their NMP product when that plan incorporates improvements or modifications offered by the farmer; successful planners develop a delivery that incorporates farmer recommendations compliant with the regulations. That middle ground is 'art'. Farmers are not anti-environment but appear to be focused on bottom-line production rather than water quality.
- I expect that most farmers don't see why they need a NMP when the way they are doing things now works just fine. I would push the education aspect of getting a NMP for ag. Applications in order to reduce fertilizer costs as opposed to informing them that it is required by the state. Most farmers don't like change, especially change that is pushed on them by govt. entities.
- NMP more important on farms where organic fertilizer is applied. For chemical fertilizer applications, NMP less needed, as farmer usually under applies per recommendations of soils tests. Still a good tool for all in regard to teaching about fertility, and maintaining proper pH.
- Nutrient efficiency does not build soil fertility.
- It's not that my producers don't care about the environment, but I would say it's not really on their radar that over-application could have a negative impact. Most producers don't give a lot of time and energy to understanding what is needed, what is there, and do a cost analysis to make a management decision as whether or not, or how much to apply.
- I took this question as "what challenges do farmers have with nutrient management plans that are important?" I had a little trouble wrapping my brain around this question.
- While cost share funding is technically available....other programs have a priority over nutrient management planning and so funding might not be available

Question 4 Open-ended responses (challenges with NMPs), cont'd.

- In many cases, the larger farmers are targeted but many of the smaller farms are not.
- Often, on farm yields are much higher than what is written into a plan and therefore the nutrient applications are much lower than what is needed for optimal yield.
- An NMP is a great planning tool to make sound agronomic and environmental decisions, but are too often used as a regulatory requirement to ensure that over-applications are not occurring. This has resulted in the lack of flexibility of the plan and the program.
- In the area of the state I work in (and I know this is true of at least some other areas of the state as well), which is southeastern Virginia, a huge deterrent is the amount of time it takes to have a plan written. Planners are in such demand, they can pretty much name their price; and they have a constant stream of work, so it can take a very long time to get a plan written. Most producers in this area receive state cost-share funds for plans being written, because it is a priority for local SWCDs. Producers in this area primarily obtain these plans to meet requirements to receive financial assistance for other conservation practices (state and federal), but most would almost certainly not get a plan if that were not the case. There is definitely a concern that having a plan will put them "on the government radar," potentially leading to heightened regulations.
- The planning yields (VALUES) do not reflect 21st century crop management. Practices that increase organic matter and soil tilth influence a soil's productivity as documented by soil scientists in every soil survey. Therefore, this management will increase the average long-term yield. Ironically, the greatest change will exist on the marginally productive fields using VALUES.

Question 5

How important is a nutrient management planner in helping farmers IMPLEMENT their plan?



Answer Choices	Responses
Very important	48.64% 72
Somewhat important	37.16% 55
Not important	6.75% 10
No opinion or not sure	7.43% 11
Total 148	

Question 5 Open-ended Responses: **(**How do planners help farmers IMPLEMENT plans?)

- The planner is very important; planner can help farmer adjust nutrients based on change in crops grown; in conjunction with other tests (e.g. PSNT) the planner can help the farmer tweak his plan accordingly; in times of excess or deficient moisture, the planner can help change nutrient inputs accordingly
- Should be of utmost importance; writing a plan that can't be reasonable implemented is worthless
- By working with them on an ongoing basis and over time to know the operation and help with adjustments to make a plan that is implementable and flexible
- Perhaps sit down and explain in layman's terms how to follow and projected improvements/yields if followed. Sell its worth basically. Feel as though some plans are too technical for small producers to understand
- To make sure they have included all land processes, etc. NMPs know the laws/rules/regulations/etc. Can better interpret soil test regulations, etc.
- Depends on their relationship with the farmer, record keeping
- When regulatory agencies lead in providing the NMP at no cost the incentive is lost to pursue the plan objective
- -It is very important here since the farmers don't get training and the print outs are cryptic and difficult to interpret without that training.
  -Interpreting the printouts and making readable recommendations, help show them how strategic manure applications can reduce commercial fertilizer cost.
- Very important. Planner needs to make sure the farmer thoroughly understands the plan.
- More important than most farmers realize. Focus on farm benefits:
  1. yield increase 2. risk reduction 3. cost saving 4. heritage of family
- Planner needs to be involved for follow up testing/design making on what nutrients to put down in season to get most value out of plan. Other advisors are trying to sell them product
- By talking to the farmer about what is in the plan
- Virginia has made the Planner very important to the farmers by excluding too many farmers from the process. NM Planners should help educate the farmers, but should not be the farmers' only path to an NMP.
- Have an influential producer discuss the importance and benefit of NM plans at producer meetings. Going over the plan with producer is very important.
- Can’t just write plan. Need to sit down and talk through it. Compare it to what they are doing. Put into terms of common fertilizer names and rates for them.
- Communication is the main thing. Farmers tend to change their mind on which crop goes in which field and that changes the NMP.
- To provide ongoing interpretation of the NMP document, which is not understood by the majority of growers.

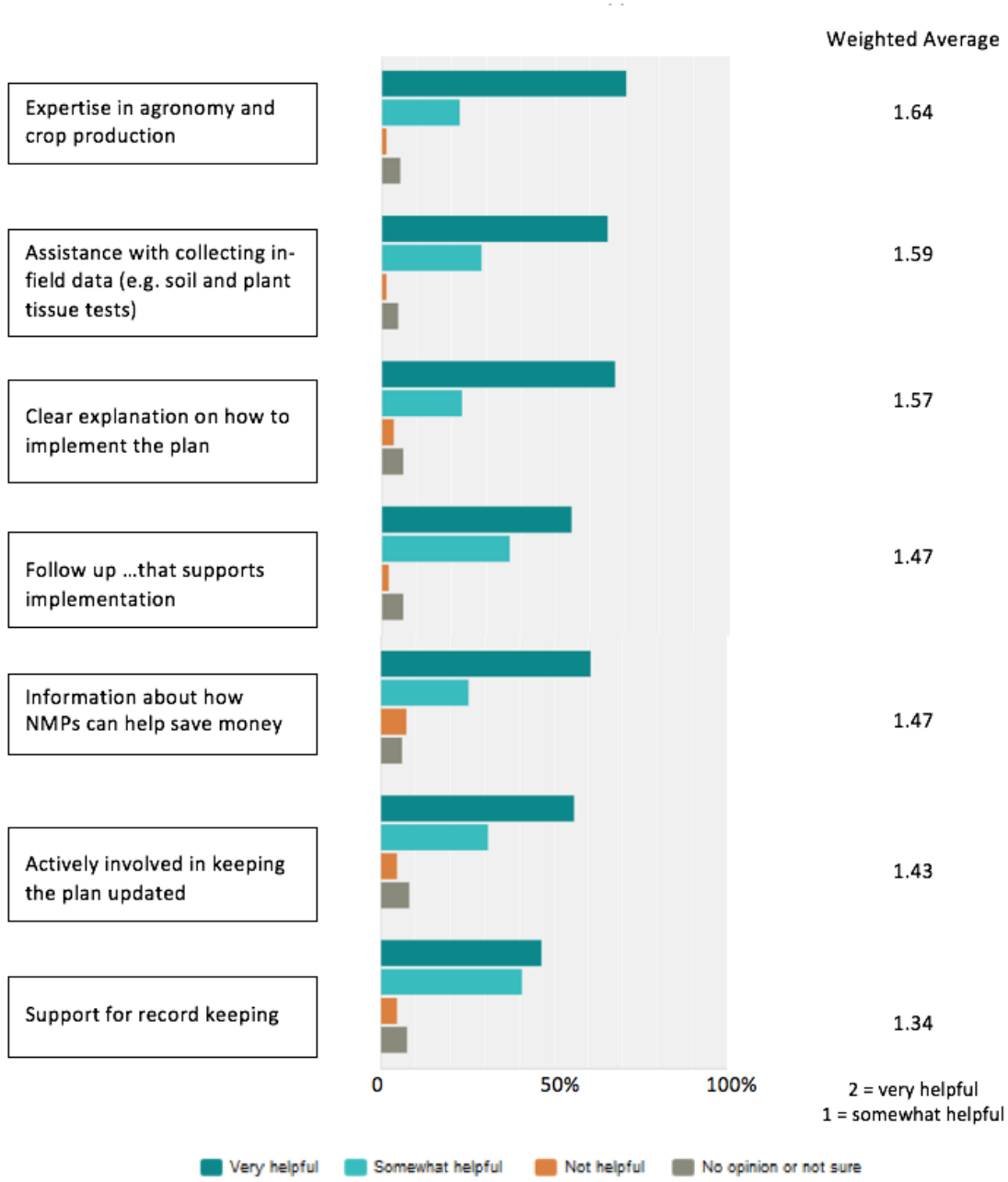
Question 5 Open-ended Responses: (How do planners help farmers IMPLEMENT plans?) cont'd.

- Private planners don't and shouldn't have regulatory oversight. Public planners as in Maryland is not a direction Virginia needs to be heading.
- Provide easy access for solutions including hands on.
- Who can spread 0.8 tons per acres and different rates on every field.
- Most farmers will always do what they want because there is minimal enforcement (no real penalty). Incentives, or tax breaks for proving adherence to an NMP are an option. Farmers hate taxes in general. Could possibly create a form of nutrient trading credit for farmers if they prove to adhere to an NMP, but would not require background info prior to determining credits produced. (Which might result in over-applying nutrients before beginning a nutrient trading program. A free market approach with dollar incentives seems to work in other industries.
- Make sure that the farmer can read and understand the plan on a field by field basis.
- VERY important. There is almost no chance of the farmer understanding their plan, let alone implementing it, without the planner THOROUGHLY explaining it to them from the beginning, and most likely working closely with them on a continuing basis. This almost never happens. Planners MUST do better with this, and/or the format of the plans needs to become much more user/friendly, or simple ability to even comprehend the plan will continue to be one of the major challenges to implementation of nutrient management plans.
- Industry professionals such as fertilizer reps and crop advisors have a larger role in implementation than district folks can have.
- Take the time to review and explain it to them, be realistic in rate development with manures, be there to service the plan (i.e. - make adjustments when rotations change)
- Very important. Planner needs to make sure the farmer thoroughly understands the plan.
- Planners spend a lot of time learning about the farmer needs/wants so that they can write a plan to fit the management plans.
- Allow the trained individual working seasonally with the farmer to use the flexibility allowed in the Standards & Criteria, but made difficult through the review process.

Question 6

What services provided by the nutrient management planner are more (or less) helpful to farmers?

Answered: 146 Skipped: 4



	Very helpful	Somewhat helpful	Not helpful	No opinion or not sure	Total	Weighted Average
Expertise in agronomy and crop production	70.55% 103	22.60% 33	1.37% 2	5.48% 8	146	1.64
Collecting in-field data (e.g., soil and plant tissue tests)	65.07% 95	28.77% 42	1.37% 2	4.79% 7	146	1.59
Advice on implementation	67.13% 96	23.08% 33	3.50% 5	6.29% 9	143	1.57
Foolow-up for implementation	54.79% 80	36.99% 54	2.05% 3	6.16% 9	146	1.47
Info on how NMPs save $	60.69% 88	25.52% 37	7.59% 11	6.21% 9	145	1.47
Keeping plan updated	55.86% 81	31.03% 45	4.83% 7	8.28% 12	145	1.43
Support for record keeping	46.53% 67	40.97% 59	4.86% 7	7.64% 11	144	1.34

Question 6 Open-ended responses (helpfulness of services provided by planners)

- The list certainly covers the major points!
- Many farms do not look at plans after they are done, or do not follow them. Some requirements in plans do not accurately reflect production yields. There is also a perception in the community (I do not know how accurate it is?) that some farms take soil samples in the fence rows and water down manure samples?
- - knowledge on regulating information
  - knowing individuals involved with getting the plans/money delivered to grower
- Just continual conversation throughout the life of the plan- follow up! Not just until the end of the plan.
- Finding cost-share options
- Not sure these are provided
- Being immediately available to assist and manage the plan as farm objectives change.
- Soil sampling, crop scouting, record keeping
- Calibration of spreaders
- Assistance with financial assistance program paperwork.
- Reviewing the plan with new clients is very important.

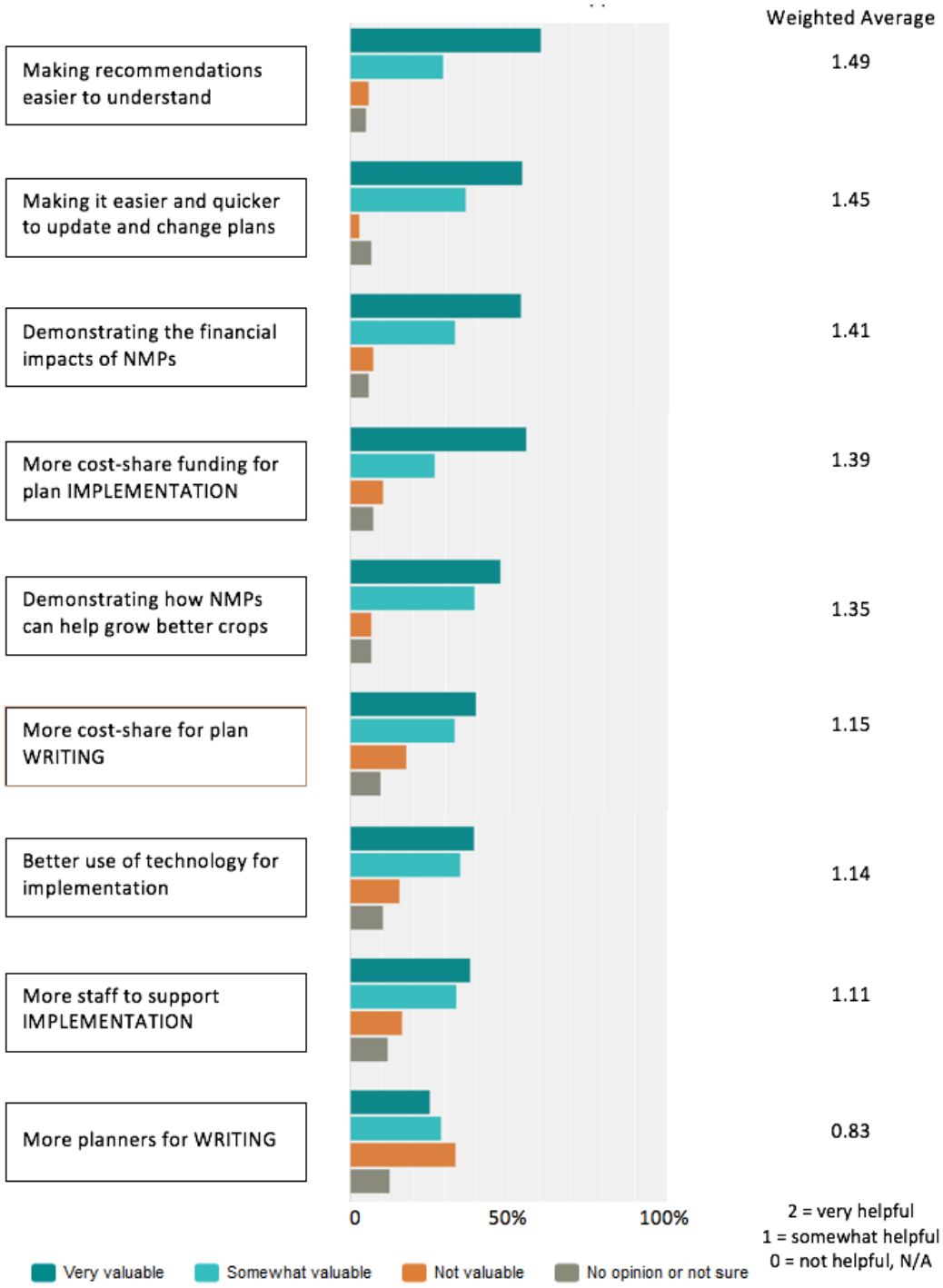
Question 6 Open-ended responses (helpfulness of services provided by planners), cont'd.

- I don't think this happens right now... there's just not enough DCR plan writers and the TSPs writing for SWCDs aren't getting paid enough for extensive follow up. But I do believe this could help tremendously.
- These services would be good but what planner has that kind of time, and most farmers don't want to spend that kind of time trying to catch up with a planner.
- NM planners generally do not do follow up services such as tissue testing etc. w/o added costs. My experience is they write the plan and it is filed by farmer. Checked off as meeting compliance. No follow up. Plans do not allow for changes in weather and market forces. They must be "revised" (rewritten) which is a hassle. No financial support built in for that.
- Serving as a buffer between farmers and regulators
- The above work is essential to an NMP functioning on the farm, BUT private industry often will only perform these duties as it pertains to being a profit center for their business. Large Private industry has to be sufficiently paid up front in order for them to invest their time in government driven NMP.
- Show the farmer the savings and yield increase with solid record keeping.
- Farmers are 100% about efficiency and profitability and doing their part to help the environment. The plans are no- really achieving any of these goals anymore.
- DCR planners only follow the Bay Model goals. Forget mine.
- Understanding and conveying the principles of soil and soil development and the interaction of residue.
- Requirement of a certified person to apply the nutrients would be a plus. Also, dollar or tax incentives to implement the plan.
- Educating farmers about BMP's and possible cost incentives through programs.
- These are value added services that the good planners offer as part of the package
- Planners are not allowed to utilize the flexibility within the Standards to move farmers forward, particularly on permitted farms.
- Keeping them updated on potential future changes to NM regulations and regulatory requirements.
- Planners clearly update plans when called by the producer, but the planners do not go out to the farm to see if the plan needs to be updated. Planers provide tools for record keeping, but I don't know how helpful that is.
- Utilize the flexibility within the Standards to make the NMP appropriate for the farmer's operation.
- Cost-share.

Question 7

What would encourage more farmers to work with a certified management planner to develop and implement an NMP? Or, what would make it easier for farmers to develop and implement NMPs?

Answered: 146 Skipped: 4



Question 7 Responses

	Very helpful	Somewhat helpful	Not helpful	No opinion or not sure	Total	Weighted Average
Simplifying plan documents so that recommendations are easier to understand	59.72% 86	29.86% 43	5.56% 8	4.86% 7	144	1.49
Make it easier and quicker to change and update the plan	54.23% 77	36.62% 52	2.82% 4	6.34% 9	142	1.45
Providing resources that demonstrate the financial impacts of nutrient management planning	53.85% 77	33.57% 48	6.99% 10	5.59% 8	143	1.41
Providing more cost-share funding for plan IMPLEMENTATION	56.03% 79	26.95% 38	9.93% 14	7.09% 10	141	1.39
Providing resources that demonstrate how nutrient management plans can help grow better crops	47.89% 68	39.44% 56	6.34% 9	6.34% 9	142	1.35
More cost-share for WRITING	40.56% 58	33.57% 48	16.78% 24	9.09% 13	143	1.15
Better use of technology (software, apps, etc.) to support plan implementation	39.44% 56	35.21% 50	15.49% 22	9.86% 14	142	1.14
Increasing the number of certified nutrient management planners/agronomists to support plan IMPLEMENTATION	38.30% 54	34.75% 49	15.60% 22	11.35% 16	141	1.11
More planners for WRITING	26.76% 38	29.58% 42	31.69% 45	11.97% 17	142	0.83

Question 7 Open-end Responses (what would encourage more used of NMPS?)

- Have respected local farmers who are successfully using nutrient mgmt. speak at meetings and field days and describe how it has helped them and their operation; while the environmental benefits are certainly important, they'll come about if enough good NM occurs; therefore, maybe emphasize the benefits to the operation even more; don't ignore the environmental benefits, but these will happen no matter what the farmer's motives for better NM are
- Development and implementing a NMP should all be an inclusive process. One without the other is of very little (if any) value. a NMP should not be considered a "strict" plan but rather a constantly evolving and ongoing endeavor.
- Many plans are "book shelved"- only developed as a requirement to receive cost share funding! Not sure how to close the gap- may be its just too technical
- In my experience the most important things are to convince the farmer that the plan will ultimately save them time and money and that creating the plan won't use too much of their time.
- With a separate funding- allocation than other BMPs as it used to be! (*for Providing more cost-share funding in the box)
- Set up classes to actively help fill out paperwork and answer questions
- Take state agencies out on the NMP preparation. Recognize the farm operation as a business and subject to the laws and regulatory requirements for operation in the COV.
- * a star for simplifying plan documents
- Provide farmer training on plan writing/implementing so that they understand it and have a stake in it, and can adjust it during the season when weather emergencies happen, without waiting for their planner to become available.
- 1. There is inefficient outreach
  2. More of the outreach should come from within the farming community
- Encourage more farmer participation in plan Development, and more training for farmers in the inner workings of the plan, the how's and whys; simplify the process so that they can write and implement their own plans. The current atmosphere is one of a confusing regulatory document being foisted upon the farmer, rather than some helpful guidance a farmer can use to figure out how to most efficiently use his available nutrients. NM Planning needs to be something the farmer wants to do themselves to become more efficient farmers, not something that DCR/DEQ does AT them.
- Although details haven't been released yet, it sounds to me like NRCS is pulling our 590 funding for more than one type of technique due to NHQ's misunderstanding of the practice?? If we truly want to help farmers implement their NMPs and be proactive in going "above and beyond" why are we pulling our funding for them? I think that farmers will follow a NMP whether they receive FA or not, but to go beyond that? I don't think it will happen without incentive...financial incentives.

Question 7 Open-ended Responses (what would encourage more used of NMPS), cont'd.

- Have regional meetings for farmers to explain the benefits of writing and implementing NMPs for "their" operations. Farmers trust local people in the community that can explain this to them.
- You could try to work with fertilizer companies (Southern States , crop production, providence, etc.) on implementing plans. They could get Farm numbers for the fields they spread and then turn in what fertilizer analysis they put for each field.
- Extension Agents need to be able to write plans and be able to write prescriptions that are recognized as being legal.
- More direct outreach. For those agencies dealing with AG, the offer of help and info about NMPs should be as important as saying "you want fries with that" at fast food. I'm not really joking. Those folks who have a direct contact should say "do you have or need help with a NMP as part of every conversation. Then of course and easy way to get one.
- STOP soil lab recommendations for N-P-K based on farmer's yield goals.
- Education that NM applies to all nutrient sources (including fertilizers labeled as organic), not just commercial dry fertilizers.
- More people would actually obtain and actually use their plans if it allowed for realistic applications of key nutrients like N.
- NMPs are very specific and not flexible. They are burdensome. No real incentive to assist farmers. NMPs push farmers to use commercial fertilizer instead of manures/litter.
- 'The proof is in the pudding'- continuing to showcase graduated nitrogen applications in a uniform crop and soil exercises wherein the crop yield tops out and shows that no matter how much more N is applied the crop response remains the same.
- Improving awareness for farmers that aren't required to have a plan and the benefits of doing so. Perhaps working with the various extension office functions and various organization field days. Many of the smaller/part time farmers aren't familiar with the program at all. Especially on the horse side of things, nutrient management of any sort for pastures seems to be minimal.
- Make sure local Extension personnel are involved
- An instant money related incentive would be the best motivation to have and implement a plan. Farmers will always have doubts that a government entity knows what is best for their farm and/or crops
- Less than 10% of farmers in my area I presume are comfortable to very comfortable with technology. Therefore, there are very few who this would benefit while others would get no benefit if time/money were spent to promote this effort.
- Having better software than Nut-Man would really help many of our workloads. My goal is to provide a plan to a farmer that is easy to understand and follow.
- The current planning format is too complicated
- Providing resources/examples of how the lack of Nutrient Management Plans and implementation negatively impact others downstream or can cause significant issues to the environment. Begin enforcing those not compliant.

Question 7 Open-ended Responses (what would encourage more used of NMPS), cont'd.

- Farmers do not believe in NM.
- More support from the private industry, research universities, and extension. NMPs are often viewed as something that HAS to be done because of a requirement (whether for cost-share or permit) rather than because it makes good business sense. This perception is more prevalent than 20 years ago. NMPs have kind of gotten a bad rap in recent years. This perception and stigma needs to change in order to have more widespread implementation. In order to do that, plans need to be greatly simplified and allowed to be more flexible in certain situations.
- VALUES should be updated for the 21st century. Va. Tech and industry yield plots should have the soil where the 3-5 acre plot exists identified and use the average yield for the plot to update the VALUES database. How could anyone believe that VALUES, with less than one yield record per soil type, could accurately reflect present cropping system management.
- Use of micro nutrients for precision health benefits to plant.
- If you farm in my area you have to have one so not sure what the issue is.

Question 8: Optional – Other Comments

- Surveys meet government requirements to re-assess their programs. Experience shows very little gets accomplished or changed. When changes do come, it's usually the stick and not the carrot.
- My nutrient management certification is for Landscape and Turf. I do not have any dealings with farmers.
- Make NUTMAN more user friendly.
- Get rid of DCR. DEQ inspectors are the regulators and are more realistic. A plan is a plan. DCR is trying to make the certified planners the de facto regulators.
- Once again almost everything is on the ag side of things and Landscaping / Turf is overlooked even in this survey
- The current Nut Man program is very outdated and time consuming. Please consider using more up to date options such as Mapshots-Agstudio.
- Still looking forward to the online nutrient management planner tool.
- I need to update a plan for BMP cost share and original plan written by a biosolids planner in 2012 and I cannot get the planner to call me back to get a digital copy so I have to start all over on the same plan.... needless redundancy....time burner...
- I think there should be more opportunities to explore urban nutrient management topics and strategies. This is an emerging field due to regulatory necessity and public interest and we need to be ready.
- No one can farm with DCR's strict interpretation of the Standards to reduce nutrient loading at all costs.
- The NUTMAN computer program is a series of mathematical computations that defaults to the mid-point of any range. I spent most of my time adjusting these defaults just to give the farmer a plan that is anywhere close to agronomically matching his operation.
- They do not want to support and certainly not pay for this "wasted time". This is especially true with plans using organic sources.

Appendix 1C. Summary of Comments from One-on-One Interviews

Sustainable Chesapeake and the Institute for Environmental Negotiation, at the University of Virginia, with support from Virginia Nutrient Management Leadership Team (VNMLT) members, initiated a process to solicit feedback from Virginia farmers and agricultural industry stakeholders in the winter of 2017. From December 2016 through February, 2017, participants were asked to complete an assessment (hard copy or via Survey Monkey) and asked to provide their insights via one-on-one conversations with VNMLT members. Participants in one-on-one conversations were asked their opinion about how to make Virginia's nutrient management planning program a more useful tool for farmers that use it, and how to encourage more farmers to participate in the program. The following is a summary of discussion comments collected from one-on-one conversations with 16 farmers and agricultural industry professionals by Sustainable Chesapeake (Kristen Hughes Evans and Dale Gardner) with support from Dorothy Baker, from the Institute for Environmental Negotiation. Note that comments provided by assessment participants through the Survey Monkey and hard copy assessments are included in the Farmer (Appendix A) and Industry (Appendix B) assessment results.

Opportunities to Expand Participation:

Based on comments we note there are significant opportunities to improve program participation. For example, participants questioned whether some farmers who received certified nutrient management plans (NMPs) were following them, and participants indicated they were writing "plans" that did not meet Virginia's nutrient management standards and criteria:

Farmer: "The only reason I fool with it is that it's required for cost-share. It's something you write but you don't follow it. It goes in a drawer and you don't look at it for three years."

Conservation professional: "A lot of our farmers get certified nutrient management plans because they are required to participate in cost share programs, but I'm not sure how many of the farmers actually use them. Larger producers seem to have more interest in technical tools. But your small, average farmer appears to get the certified nutrient management plan because they are required too – and I'm not sure that they understand the plans or follow them. Maybe the planners just need to sit down and talk with the farmers and explain what they mean in technical terms."

Certified nutrient management planner: "The question is what do you mean by a nutrient management plan? If you mean a plan that complies with DCR regulatory criteria, I don't write any. If you mean a plan that supports crop production, I write a lot of those. I could make it easy for myself and give my farmers the printout from the NutMan program, but my clients wouldn't know what to do with that. I work with my farmers to come up with a fertilizer plan for the farm that is practical and cost-effective. And sometimes that isn't compatible with NutMan recommendations."

When asked why there was a difference between the plans he wrote and a plant that met VA's Standards and Criteria he summarized as follows:

- My customers don't want printouts of maps that show environmentally sensitive areas. They already know where those areas are. They just want information that tells them what they need to do.
- Sometimes complying with the NM program isn't practical. For example, say in one field, I have 3 or 4 subsamples that don't need any phosphorus, but other areas of the field that do need phosphorus. My clients don't have enough acreage to justify custom fertilizer blends for each field, and you can't just turn of the phosphorus in a blended fertilizer. So, we need to come up with a blended fertilizer that works for their whole farm. So, some fields that don't need phosphorus end up getting phosphorus.
- Poultry litter is another issue. It's hard to tell a customer they can't use their poultry litter. Sometimes I recommend a rate of 2 tons per acre because they can use the nitrogen, potash and micronutrients even if they don't need the phosphorus. It doesn't make economic sense to move it off the farm where they aren't getting paid for it, and then turn around and pay for commercial fertilizer.

Another planner said that his company had moved away from writing certified nutrient management plans in part because of concerns about liability of writing plans that include manure application of fields with high soil phosphorus. They are however working with clients to write crop production plans that they feel meet nutrient management principals.

Another said: "The nutrient management planning we do for farms where we don't have a certified NMP comes from our planning tools – proven tools we've been using all along – like Virginia Tech guidelines."

Another farmer we spoke with indicated his appreciation for the environmental aspects of nutrient management planning: "If I get out synch with the environment, then I'm losing nutrients or buying nutrients that have no value, then this is just a cost deficit that I need to get rid of. We are serious and hardnosed about what we do. We think we do a good job on the environmental side…. We have healthy soil. That is not my problem. So, I'm not so concerned about soil health but about the environmental aspects. Am I being judicious enough with how I am applying nutrients? As I look at my world, I want an increasing pool of nutrients for my microbes to eat so they can feed the plants, but at some point, it gets to the point that it is too much. Soil has an equilibrium."

Challenges to Participation

Participants in one-one-one interviews offered comments on challenges to program participation. The comments are presented in the same order used earlier in the main document:

a) NutMan Software
b) Flexibility
c) Potential for Future Government Regulations
d) Yields
e) Practicalities of Implementation
f) Communication and Programmatic Responsiveness

a) NutMan Software

Complexity
Comments from certified planners:

"My thinking when I started working with the planners is that this program is nowhere near as user friendly as the DHIA [Dairy Herd Improvement Association] programs for dairy herds. The one dairies use for milking herds is just easy to follow… I always thought that if the software we used for nutrient management was as user friendly as the dairy herd management software, it would be a lot easier to sell this program….and…

"It needs to be a different format. Sometimes I take a word document or Excel and just do a table – and just break it down that way. We don't have time to do a whole lot of that. I don't include a lot of data either – so I don't really include all that's on the balance sheet – but I make it a lot more plain…It helps to hit the high spots. But time is important – farmers are business people and they are not prone to waste time. If you waste their time, you are going to have a hard time building back that relationship. But if you try to walk through this overly complicated document, it's hard not to waste time."

"The units are not well done – sometimes they are not there or sometimes they are confusing. Why did we start using metrics units? We use the abbreviation "k" for thousands of gallons and that is misleading. Things like that are easily changed. But the layout we need to really think about."

Need to update
Certified nutrient management planner comments:

"The software is probably over 20 years old. It has maybe had one upgrade."

"Nutman is an antiquated program. The idea and concept is great. But the format is beyond belief. It is like something from the early 1980's. I like the concept of the planning process, but the way the program is laid out, it is a bear to work with. Every page is so specified so that you can't see what's going on, you can't cut and paste. If it was in Excel, you could see everything and keep it set in your head instead of clicking okay and going back and forth all the time…. It's fine for a part-time farmer but for a large farm operation where you specify field by field, no. The only reason I fool with it is that it's required for cost-share. I only do it for farms required for cost-share."

b) Flexibility:

Keeping the plan updated

Certified nutrient management planner: "About 50% of my customers are participating in government programs. I'm going to be there 3-4 times per year during the growing season. I'll be there to review the plans and make adjustments and help with record keeping. If there is a significant enough change in what they are doing, we update the plan. I describe it as helping them to stay eligible for the program. If there is just a minor adjustment – l like changing from corn to soybeans – we make a minor adjustment, but no big deal. So, the free planner doesn't have enough time, and the fertilizer dealer doesn't have enough incentive to make these kinds of time investments."

Several mentioned an opportunity that had been explored to keep the plan updated through an Excel-type program that had apparently not been approved by DCR. An Excel-type of platform is also discussed in the software section.

Programmatic flexibility

Certified nutrient management planners:

"Our current planning program essentially gives the farmer the document and it's like "read it and weep." This is a clear goal of nutrient management – help the farmer achieve their goals. We need to get back to this. We need to be able to say "here's where you are, some of this you might not like, but let's see where we can go." So long as we can achieve continuous improvement, we are moving in the right direction."

There should be a suite of efficiency practices. If that farmer is following those – sitting here now, we can't tell what the corn yields are going to be 9 months from now. If he has a conservation plan that is reducing erosion. He should at least be put into some group where he is not micromanaged. I don't know quite how you structure it, but we need to put it less on the plan and more on the action."

"It's harder for me to get the plan approved than it is for me to get the plan implemented."

"Fall nitrogen limit – don't get me started on that. [Cover crops can assimilate a lot of nitrogen]. But because the agronomic recommendation is to down no more than 30 lbs. of plant available nitrogen… no plans are approved for more manure application than 30 lbs. of plant available nitrogen in the fall. [A lot of farmers in the Valley are] spreading manure today [February 8th, because of manure storage issues]. Thank God the ground is not frozen."

Ag Industry Specialist:

"In my opinion it doesn't need to be over-regulated. Farmers weren't over-applying fertilizer even when prices were good. Now that [commodity] prices are down, they definitely aren't over-applying fertilizer. Farmers who weren't being efficient business operators went out of business a long time ago."

c) Potential for Future Government Regulation

"Some farmers see getting a nutrient management plan as a move towards regulation. They fear that if they get a nutrient management plan, even if they are not required to do so, they will be forced to follow the plan exactly. In some communities, this is a major barrier."

d) Yields

Several industry professionals noted that there have been advances in yields over the past years. For example, "Advances in genetics and biologicals (like treatments applied to seeds) are increasing yields."

Certified nutrient management planner: When asked what the number one barrier to farmers seeing Virginia's Nutrient Management Program as a good agronomic tool, his response was, "The first issue is the yield goal." He expressed concerns that NutMan defaults down to the productivity class that is one notch below that soil type. "For example, you could have a Frederick at a 2b, which has a N recommendation at 150-170 lbs. so you would normally take the midpoint of 160, and NutMan will spit out 140. Well, if you have a good farm manager, I find that I constantly have to do yield adjustments that are already existent within acceptable ranges. But this is 20 bushels of corn yield that is in jeopardy over time. As an agronomist, I can't recommend 20 lbs. less of N without jeopardizing both the short and long term yield…. Because this is in within accepted ranges, I should be able to make this recommendation. However, because this is a change to NutMan, it triggers a requirement for yield records. It has to be three out of the highest of five years of yields to justify those yield goals. It's hard to get the farmers to provide the yield data. They look at me and say if I can only fertilizer for 140 bushels and you've had to manipulate the NutMan program. And I want to emphasize that this adjustment is allowed in the standards and criteria…. Farmers say "one, I don't believe those yields and two, how am I going to grow high yields if I don't fertilize for those yields." They look at that paperwork and say "That doesn't reflect my operation." As soon as they see a few plans like that – they start trying to avoid nutrient management planning as much as possible."

"But what I am finding is that if the crop starts turning brown, they hold off on nitrogen, so the lower yield goal is achieved. But we are getting to the point where they don't believe the nutrient management plan recommendations. DCR will say that we've had too many dry years. But the reality is that with new genetic and planting density, we are seeing higher yields. But I'm noticing that as you start to go to those higher numbers, DCR starts reviewing the plans with a fine-tooth comb."

Certified nutrient management planner: "Some farmers perceive plans as something that will limit their production. They have heard false news stories or bad information, which travels just as fast as good information."

Farmer: "If I went by the yields they suggest, I'd go broke."

e) Practicalities of Implementation

Practicality of recommended rates or timing of fertilizer
Comments related to this are included in soil phosphorus and blended fertilizer areas (e.g. recommendations for rates of manure or poultry litter that are so low they "don't help" and/or feasibility of using multiple fertilizer blends for small portions of a farm's acreage).

Concerns about high soil phosphorus and limitations on use of manure/poultry litter
Farmer: "You often get high soil P on organic farms. If you are using a lot of chicken litter this can be a problem. On the other hand, on the organic side, we are building a pool of nutrients in the soil – it's not just in-time water soluble nutrients to feed the plant – it's a different world."

Previously stated comment from certified nutrient management planner: Poultry litter is another issue. It's hard to tell a customer they can't use their poultry litter. Sometimes I recommend a rate of 2 tons per acre because they can use the nitrogen, potash and micronutrients even if they don't need the phosphorus. It doesn't make economic sense to move it off the farm where they aren't getting paid for it, and then turn around and pay for commercial fertilizer.

Summary of comments from a certified nutrient management planner (comments summary): One planner in the Shenandoah Valley noted that one of the reasons his company stopped writing plans was the "fear of liability." They noted that "when the P index was revised downward by half almost overnight" the fear was that to write a plan on a high P or "0" P farm or field and allow for manure to be used on that farm would potentially lead to a libelous situation for their company."

Farmer: "I suggest we go back to a nitrogen-based plan. [Environmental organizations] are mainly concerned about phosphorus runoff into the Bay, but the farmers are not the only ones contributing to this. The metropolitan areas are also contributing. I didn't know if we could get it changed back or not." When asked if this was a barrier to participating in Virginia's program, he said "Well, it doesn't help. When your soil phosphorus levels get high, they want to limit your manure application to a level that is so low that it doesn't really help, and you are forced to buy commercial nitrogen. And the levels are high because of the poultry litter, but it's been a wonderful fertilizer for us in the Valley."

Practicality of plan implementation for farmers using blended fertilizer
The "practicality" associated with implementing a certified NMP when using blended fertilizer was mentioned by several participants. One farmer explained it this way: "We aren't field specific; we are farm specific. Even though one field is high in phosphate, it's going to get some phosphate because it's hard to get site specific when you are farming at that magnitude. I drive 60 miles and do 200 acres. I'm not driving an extra 60 miles to get an extra load of fertilizer for a 10-acre field."

Another planner said [previously stated]: For example, say in one field, I have 3 or 4 subsamples that don't need any phosphorus, but other areas of the field that do need phosphorus. My clients don't have enough acreage to justify custom fertilizer blends for each field, and you can't just turn of the phosphorus in a blended fertilizer. So, we need to come up with a blended fertilizer that works for their whole farm. So some fields that don't need phosphorus end up getting phosphorus.

Compatibility of nutrient management program with precision agriculture;
Certified nutrient management planner: When asked about compatibility of NutMan and precision agriculture, he responded "NutMan doesn't have this capacity. The only way I know how to do this is in the narrative. What we have now is a bad way to track implementation…. What I have seen is the intention to apply multiple split applications per year. Doing three sidedress applications even to when corn is up to their head. I can't put that in the plan. The guys doing this are not Johnny-come-lately – they knew we wouldn't be able to accommodate this approach. It makes us look bad – like we are driving a model T and they are in a Lamborghini. It also creates an attitude of okay, let's get this over with because you aren't really helping me."

Farmer: "We are using some of the precision nutrient management now – grid soil sampling – two compartment spreader – pre-program everything – apply P and K according to that program. Nothing in that NutMan program allows for precision nutrient management. Actually, you farm in zones. So, the fertilizer spreader will change from one zone to another. The NutMan program focuses on field averages. So, they are behind the times. To me it's frustrating. They preach all this stuff about we have to do this and we have to do that, but its already been done."

Farmer: "DCR writes all of our plans and I look at them but we don't use them. We use precision agriculture and apply less fertilizer than the NMP recommends. We are going way beyond the NM plan so we have them, but they aren't useful for us."

f) Communication and programmatic response

Comments from certified nutrient management planners:

"This issue has been raised with DCR by people much smarter than me numerous times and it has continuously been ignored…. I encourage you to go back and look at the standards and criteria in 2005. And you read through the public comment and DCR's answers and you'll find a lot of these issues raised and promptly explained away. Even the ones from Virginia Tech that DCR holds up as their scientific experts."

"Speaking out hasn't served me well in the past."

"I'm hoping that the main thing is that some of us planners are really frustrated with the lack of keeping up with developments [like linking nutrient management plans with soil health and incorporating CO_2 burst tests into NM planning to estimate N mineralization] and the lack of flexibility in the software and the plan writing process. DCR is in the process of updating the NutMan software. But it will be a while until that will be available. We are hoping to influence its development and any help we can get will be appreciated."

"Nutrient management planners have given recommendations and feedback but they don't make any difference."

"Have we had this conversation with [a Northern Neck planner]? …He built a spreadsheet – a synopsis. He'd send a spreadsheet that was a synopsis of this balance sheet to his clients. He'd make the

adjustments based on communications with his farmers (cell phones and spreadsheets). [This approach] got shot down in a heartbeat. The farmers loved this because they could do this when they wanted to rather than a face-to-face meeting. This also kept the plan current because it was year-by-year. But the department would not bend on calling this a NMP. The hierarchy wouldn't go there. Note this area is all crops – no livestock – which simplifies things to a great extent…." and

"Utilizing yield data straight from the combine got shot down faster than [the Northern Neck planner's] spreadsheet approach. DCR didn't believe it was valid. Some of the big dairy farmers and the VSDA had a sit down with DCR about this to complain about the lack of acceptance of new technology and generation of all this data which could be used to provide more information. DCR resisted to using new technology."

Additional Recommendations:

Certified Planner: "Help people understand the advantages of nutrient management planning…Getting Extension, NRCS, and DCR shoulder to shoulder on this would really help. Extension is in a good position to influence opinion leaders in the farming community and help educated farmers about the benefits of nutrient management. DCR can complement NRCS and Extension outreach programs by discussing cost share funding available to implement practices."

Industry professionals:

"Focus on improving farm economic viability. If the practice does this, then get out the way." That economic link – if you want large scale implementation – that is really essential…." and

"Very commonly, some of the least productive lands are some of the most environmentally fragile. Converting them to some other use that has an economic value is something some farmers are open to. Not every farmer is going to do that, but increasingly some farmers are willing to do that. There are analytical tools that are helping farmers to look at this from a profit management tools, not just an environmental management perspective."

"The program should go back to a three-year program with a separate pot of funding that doesn't compete with the conservation programs…. Funding to pay for NMPs competes with other conservation programs and is likely to decrease with budget decreases in the coming years."