Oversight of Animal Feeding Operations for Manure Management in the Great Lakes Basin

Summary of Insights Learned Through Webinar Input

Prepared by the Great Lakes Water Quality Board
Submitted to the International Joint Commission

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List of Acronyms

BMP	best management practice
CAFO	concentrated animal feeding operation
ENGO	environmental nongovernmental organization
IJC	International Joint Commission
US EPA	US Environmental Protection Agency
WQB	Great Lakes Water Quality Board

Executive Summary

Runoff from manure on agricultural fields—both surface and via field tiles—contributes significantly to nutrient loadings to the Great Lakes and is making the problem of harmful algal blooms more serious. This situation is exacerbated by increased frequency of extreme precipitation events which leads to increased runoff of excess nutrients from agricultural land. The situation is of even greater concern because of the increasing trend toward more, and larger, concentrated animal feeding operations (CAFOs) of livestock. To address this issue, the Water Quality Board (WQB) urges governments, agriculture and citizens to work together aggressively to get a better understanding of the magnitude of the manure problem and take action to address it. The WQB, in its capacity as the principal advisor to the IJC, recommends strategies to prevent and resolve challenges facing the lakes and advice on the role of relevant jurisdictions in implementing these strategies.

In 2017, the WQB commenced a study to address this issue and developed a report entitled the Oversight of Animal Feeding Operations for Manure Management in the Great Lakes Basin.[1] The report, submitted to the International Joint Commission (IJC) in September 2019, presented four recommendations for priority actions to strengthen and coordinate the regulatory manure management frameworks on both sides of the border. The recommendations are intended to be applicable to permitted large and medium sized facilities as defined by the US Environmental Protection Agency (USEPA) and permitted facilities greater than 300 nutrient units in Ontario. In January 2020, the IJC approved the WQB's report and posted it to the WQB's website.

With the release of the report, the WQB organized and held three webinars, followed by surveys, to obtain feedback on the feasibility of implementing the board's recommendations. The first webinar on April 15, 2020 involved agricultural and environmental nongovernment organizations (ENGOs). The second webinar on May 1, 2020 engaged members of the interested public. The third webinar on June 26, 2020 centered conversations with regulators and Indigenous government agencies. In total, approximately 400 individuals, agencies and organizations participated in the webinars.

This report summarizes the collective feedback from these webinars and surveys. The WQB reflected on this feedback and the key takeaways from this engagement supports the proposed next steps outlined in the conclusion of this report. These next steps are for the IJC to consider in advancing the implementation of the WQB's 2019 recommendations by governments.

Overall, the majority of the agriculture, ENGO and public audiences agreed that the four recommendations provided in the original report, and outlined below, are important to implement. These audiences shared a similar concern about the economic and political challenges to implement the recommendations. This likely reflects perceptions that any change to agricultural policy will require a careful, transparent process. The government audience recommended a bottom-up approach that engages farmers encountering manure management challenges to allow better management decisions at the farm level.

[1] Available from: ijc.org/en/wqb/oversight-animal-feeding-operations-manure-management-great-lakes-basin.

Based on this feedback, the WQB recognizes that a crucial gap exists for implementing our report recommendations: there is no existing entity that provides the opportunity for key players, from farmers to federal agencies to convene and assess their existing manure management regulatory frameworks. Therefore, the WQB proposes to undertake a process that begins with a committee of the WQB determining an umbrella Great Lakes organization with their designated representatives to create a diverse steering committee with key stakeholders that establishes the framework for advancing Recommendation 1, an overall manure assessment, and ultimately Recommendations 2 through 4.

1.0 Feedback on Report Recommendations

This section synthesizes the WQB's key webinar and survey findings about four WQB recommendations for priority actions to strengthen and coordinate the regulatory manure management frameworks in the Great Lakes on both sides of the border. Three webinars were held: (1) by-invitation with agriculture and ENGOs (~50 participants) (2) interested public (~320 participants) and (3) by-invitation with governments and Indigenous agencies and organizations (~30 participants). As part of the agriculture/ENGO and public audience webinars, feedback was sought on the importance of implementing the recommendations, as well as the specificity, attainability, and feasibility of each recommendation. Respondents also provided open-ended responses, which were reviewed for common themes and ideas. The webinar with the government audience presented the findings of the previous webinars and sought open-ended feedback on what aspects of the recommendations would be feasible for governments to implement. Table 1 provides a summary of the survey responses of the agriculture/ENGO and public audiences. The summary of responses received via the follow-up surveys for each of the webinars is provided in **Appendix A** (agriculture and ENGO), **Appendix B** (public) and **Appendix C** (governments). Lists of participating organizations in each of the webinars are at the end of each appendix. A recording of the public webinar and question and answer documents for each of the webinars can be found on the WQB's webpage.

Table 1. Summary of survey responses from the Agriculture/ENGO and Public audiences to WQB recommendations

Audience	Agriculture/ENGO (# of respondents = 10)	Public (# of respondents = 70)
Recommendation 1 Assess and coordinate the regulatory framework; use Ontario as a model	67% agree important 89% agree relevant 30% agree specific 40% agree attainable 60% agree feasible	80% agree important 76% agree relevant 63% agree specific 59% agree attainable 55% agree feasible
Recommendation 2 Strengthen manure management rules and policies	50% agree important 50% agree relevant 50% agree specific 40% agree attainable 50% agree feasible	80% agree important 78% agree relevant 74% agree specific 71% agree attainable 71% agree feasible
Recommendation 3 Funding to support agriculture	70% agree important 70% agree relevant 60% agree specific 70% agree attainable 70% agree feasible	84% agree important 65% agree relevant 70% agree specific 70% agree attainable 68% agree feasible
Recommendation 4 Understanding the international and indigenous context	50% agree important 70% agree relevant 50% agree specific 50% agree attainable 50% agree feasible	67% agree important 57% agree relevant 47% agree specific 57% agree attainable 62% agree feasible

Recommendation 1

Each Great Lakes state and Ontario should conduct an in-depth assessment of permitting rules and requirements and the actual implementation of each state/province's respective manure management framework to identify successes and challenges in achieving reduced nutrient runoff goals. Federal governments and/or state/provincial governments should establish a set of guidelines and regulations for mid- and large- size animal feeding operations to be incorporated by all states/provinces to ensure an equivalent implementation framework, which includes the coordination and oversight of manure management among federal and provincial/state regulators. Such guidelines and regulations should include:

1.1 Developing a manure management plan permitting framework for mid- and large size animal feeding operations (USEPA definition). Currently most midsize operations have no permitting requirements. The framework should have consistent permitting requirements including comprehensive nutrient guidelines, consideration of management plans by a qualified professional that are consistent for all nutrient sources, and a framework that requires assessment and compliance with federal and provincial/state policies and recommendations. The Province of Ontario's manure management framework, which includes nutrient management plans, should be used as a model.

1.2 Requiring systematic testing of manure nutrient soil content and developing a template of best management practices (BMPs) and recommended standards for optimal nutrient application which minimize nutrient runoff. This policy should consider testing results and cost. The Ontario template of BMPs should provide a process for evaluating the effectiveness of the Nutrient Management Plan and include an adaptive management component. Ontario's ban on the use of high trajectory irrigation guns to apply manure (unless containing more than 99 percent water) should be considered.

1.3 Eliminating the practice in US Great Lakes states that allow animal feeding operations to subdivide adjoining operations, physically located in the same area, to bypass the requirement for a permit and thus bypass permit requirements.

1.4 Developing a binational, central Great Lakes information center that shares new and evolving technology for manure treatment/reuse (potentially through the US Great Lakes Observing System Data Portal).

From the agriculture/ENGO audience survey 67 percent agree Recommendation 1 is important to implement, with a majority agreeing it is relevant and feasible. However, a smaller percentage agreed it was specific (30 percent) or attainable (40 percent). Respondents noted that Ontario may have good ideas as a starting point, but that a one-size-fits-all model is not productive. Respondents expressed support for information sharing on new technologies and management practices and that assessing current manure rules for implementation would be a valuable learning process.

Eighty percent of the public audience agreed that Recommendation 1 was important to implement, with somewhat lower percentages agreeing it was relevant, specific, attainable and feasible to implement (**Table 1** above). The public audience comments reflected the sentiment that improving policy by creating a unified standard is important, but that a lack of political will or industry support would be a significant barrier to implementation.

Both in the webinar discussion and the follow-up survey, government participants noted that there are already many quasi-voluntary programs in place (i.e., best management practices), but as Recommendation 1 is written, these programs would be overlooked in an assessment of permitting rules and requirements since they are not considered as a "formal act or law." Farmers consider these programs as "rules" that are often followed, though they are not codified as such, so they are important to consider as part of understanding the current practices in place.

Recommendation 2

The US Great Lakes states and Ontario, if not already doing so, should create rules and policies for manure applications that include:

2.1 Developing a systematic approach that requires dedicated minimum acreage for the amount of land needed per animal unit for manure application. This should include factors such as livestock types, soil phosphorous levels and a requirement for manure storage needed per animal unit. Ontario's Nutrient Management Act provides an example of how this can be accomplished. The minimum acreage requirement should apply to onsite and offsite manure applications in the region the facility is located in. Reduction of land needed should be given when the manure is transported outside the facility region with reporting of destination required.

2.2 Developing a land base registry in each state and province that is reported to the national/federal government or equivalent tracking system and includes the number of animals, manure application agreements, parcel identification where manure is applied, the manure application dates and the manure amounts.

2.3 Developing an assessment of liquid and other manure applications and runoff (including field tile) and requirements for the permissible timing and amount of manure applications (e.g., not on frozen ground and not when there are forecasts for heavy rains) that is applicable to both onsite and offsite locations and to animal feeding operations that are both permitted and unpermitted. Bans on frozen ground can be date specific or on a definition of frozen ground. Determinations should also be made as to when manure is a waste and when it is a fertilizer.

2.4 Developing requirements that all property owners and residents within a certain radius of a facility seeking a permit for a new or expanding animal feeding operation be notified and have the opportunity to comment, using Alberta's approach as a model.

2.5 Developing a more established, standardized process by which Indigenous communities are notified, engaged and consulted on new or expanding animal feeding operations within a certain radius of their communities.

Of the agriculture/ENGO audience only half agreed that Recommendation 2 is important to implement with the same proportion agreeing it is relevant, specific and feasible to implement; 40 percent agreed it was attainable. Respondents noted that some states already have rules in place or are doing the things being recommended (i.e., limitations on manure application during precipitation events; notification of neighbors) and therefore do not feel these particular recommendations are needed or relevant.

In contrast, 80 percent of the public audience agreed Recommendation 2 is important to implement, with two thirds or more agreeing it is relevant, specific, attainable and feasible to implement (**Table 1** above). Responses reflected interest in strengthening the rules, but skepticism about whether it would be politically feasible to make policy change at the levels necessary or to secure the funding to ensure compliance and enforcement of stronger rules.

Government participants shared similar sentiments to the agriculture audience in that parts of the Board's suggested practices and policies for a framework are already in place in their respective states or provinces. Government participants' comments also reflected hope that recommendations would focus less on top-down rules and more on bottom-up engagement with farmers; helping those who have challenges with manure management, regardless of the size of the operation.

Recommendation 3

The federal Canadian and U.S. governments, along with Great Lakes states and the province of Ontario, should provide funding dedicated to assisting agriculture for manure management including reuse and treatment technologies. Funding should also assist existing animal feeding operations to make necessary changes to meet recommended standards and best management practices.

Of the agriculture/ENGO audience surveyed, 70 percent agreed that the recommendation is important to implement as well as a majority agreeing it is relevant, specific, attainable and feasible to implement (**Table 1** above). Responses, via the survey, reflected optimism and interest in adopting technologies to increase agriculture's environmental responsibility. However, people also voiced concern about securing and accessing funding to implement such technologies.

From the public audience 84 percent agreed the recommendation is important to implement as well as a majority agreeing it is relevant, specific, attainable and feasible to implement (**Table 1** above). This audience expressed that funding is a requisite for implementation of best practices and technology and that existing funding programs can be augmented by long-term funding commitments. Like the agriculture/ENGO audience, concerns were raised about implementing funding programs given other funding priorities as well as accountability mechanisms for meeting funding requirements.

While government participants recognized the importance and clear need for funding to implement technologies, they also noted that there could be more focus on improving manure technologies and science to make better management decisions at the farm level, rather than focusing more on a top-down regulatory approach.

Recommendation 4

With federal funding from Canada and the United States, a Canadian and US panel of experts should report on the international management policies, tools, technologies, reporting and recordkeeping practices of the Netherlands and Denmark, who have a long history with manure management that can inform on lessons learned and may have application in the Great Lakes basin. Additionally, there should be a comprehensive assessment of manure management impacts on the Indigenous community.

Of the agriculture/ENGO audience, half felt that Recommendation 4 is important to implement, with the same agreeing that it is specific, attainable and feasible; 70 percent agreed it was relevant. While respondents felt learning from other jurisdictions is important, this should be undertaken by existing entities (e.g., universities, agencies), with the limited funding that is available prioritized for helping farmers implement new technologies (as in Recommendation 3).

Two thirds of the public audience agreed that Recommendation 4 is important to implement with a smaller percentage agreeing that it is relevant, specific, attainable and feasible (**Table 1** above). Commenters noted that such a review would need to consider the political and economic context of international models and that the panel should have a diversity of stakeholder representation.

There were no government audience comments received relevant to this recommendation.

2.0 WQB Synthesis of Webinar Feedback

Despite skepticism expressed in implementing these recommendations due to economic and political acceptability, the overall feedback is that the recommendations are vital to transform and to reduce nutrient runoff from current manure management practices in the Great Lakes watershed. Based on these important stakeholder engagement sessions, the WQB is not recommending amendments to its 2019 recommendations on manure management.

The WQB recognizes that some states are implementing some aspects of the report recommendations, and that voluntary programs and best management practices are also implemented in addition to regulatory/permitting requirements to manage manure and minimize nutrient runoff. However, the WQB stands by its recommendations that advocate for consistency and common practices and policies across jurisdictions, where the lakes and watersheds often cross state boundaries. The adoption of a consistent set of manure practices and policies throughout the Great Lakes states will improve water quality impacts from manure, enable the measurement of progress over time, and evaluate efficacy of practices at a watershed scale. A Great Lakes-wide set of practices and policies allows continuity to assess if manure management practices are protecting Great Lakes water quality. A patchwork quilt or inconsistent set of rules makes it difficult to identify which practice(s) are working for each Great Lake in the relevant states/provinces and to pinpoint where improvements or changes are needed.

All webinar audiences agree that funding is critical to implement proven technologies that assist farmers with manure management technologies and operations to meet water quality goals and policies. But, as also noted through the feedback received, there is concern about securing and accessing such funds. Funding is needed when established manure management technologies are identified for those operating mid- and large-scale CAFOs, that typically cannot afford the latest and greatest manure reuse and treatment technologies. These technologies are very important to drive change in manure farming practices, but they are expensive. Cost-share funding is historically a successful model for technology adoption. There may be other innovative funding approaches to explore that incentivize or reward those who are implementing best practices.

In advancing strengthened practices, regulations, and a consistent framework, the WQB agrees with the feedback received that a bottom-up approach is also needed, such that farmers and the agricultural community are involved in the development of practices going forward. In Ontario, the process for creating of the Nutrient Management Act (the suggested framework to model), was initiated by the agricultural community to ensure they were part of its development rather than it being imposed upon them in a patchwork manner. Involving farmers in the process of formulating a strengthened, consistent manure management framework will also allow them to identify what forms of cost-share funding will work best to enable them to implement practices and ensure the adoptability and practicality of projects. This bottom-up approach will also need to include regulators and agencies that will have data about the costs and benefits of the management practices for securing funding.

3.0 Conclusion: Recommended Next Steps

Based on this multi-stakeholder feedback, the WQB concludes that its 2019 report recommendations are supported by the audiences it engaged with, and do not need to change. Of the report's four recommendations, Recommendation 1 for a coordinated framework, is a logical starting point for implementation, as it lays the groundwork for the implementation of the other three recommendations. This feedback helped the WQB recognize that implementation of Recommendation 1 will require coordination across jurisdictions and the opportunity for agricultural stakeholders to participate in the process of assessing existing practices and formulating a consistent framework across the basin.

However, this feedback also helped the WQB identify a crucial gap: currently, there is not an 'umbrella organization' or forum that exists to convene these key stakeholders. While the Great Lakes Water Quality Agreement Annex 4 Subcommittee and its task teams do bring together various sectors to focus on phosphorus objectives of the Agreement, the scope of its core mandate does not lend itself to focusing on manure management, nor is it a practical venue to enable a bottom-up process to involve the agricultural community in a process of assessing and coordinating manure management policies and practices. The 'table'—around which key stakeholders can convene to begin implementation of Recommendation 1—is missing.

Therefore, the WQB concludes that next steps to advance the implementation of its report recommendations includes the development of a WQB work plan to provide better provide advice, via steering committee recommendations, to the jurisdictions to achieve implementation (per Agreement Article 8.3(c)). The objective of this work plan would be to bring together a steering committee under a Great Lakes umbrella organization comprised of key stakeholders to establish a process, using a template for two key watersheds, that will lead to jurisdictional recommendations for implementation of Recommendation 1. The key elements of this work will include:

- WQB consults with key stakeholders to evaluate existing organizations and identify an appropriate entity that could fill the 'umbrella organization' gap for hosting a steering committee, and identify an appropriate chair for that committee who is respected by agriculture and agency stakeholders. WQB members would participate on this steering committee.
- The steering committee of the 'umbrella organization' would identify one Canadian and one US pilot watershed (e.g., Auglaize subwatershed of the Maumee River in Ohio and Medway subwatershed of the Thames River in Ontario).
- The steering committee of the 'umbrella organization' would then collaborate to establish the scope and membership of a working group (and any needed subgroups) that includes representatives from both sub-watershed regions, federal, state and provincial agencies, and agriculture.
- The working group would then agree upon defining a scope of work, including identifying costs and responsibilities of a contractor, to pilot the process of implementing Recommendation 1: assessment of manure management policies and practices in the subwatersheds and development of proposed harmonized management framework.
- The contractor would undertake key activities, including but not limited to:
    - Collect data on each subwatershed;
    - Collate data to validate animal counts for permitted and unpermitted facilities;
    - Map facility locations; use scientific standards to determine nutrient production by animal (i.e., attempt to construct a "nutrient management unit" for United States applications);
    - Determine land application rates;
    - Assess the existing permitting rules and voluntary practices in use;
    - Describe the impairment status of the waterway (under Canadian and US water laws), and;
    - Produce a report evaluating the efficacy of existing manure management framework in the pilot subwatersheds.

The WQB would not "own" or "facilitate" the steering committee and work group but would provide the leadership needed to bring the broad range of key stakeholders together. Piloting a process that brings together binational perspectives across agriculture and regulatory sectors is an important first step because it advances implementation of Recommendation 1. Furthermore, the pilot project will enable three key outcomes:

1. Provide the WQB and the IJC with further insight to advise the Canadian and US governments and their state and provincial counterparts on a process for implementing

Recommendation 1 that is politically feasible and can be scaled up at a watershed-wide and basinwide level, because it has been tested in a way that has buy-in from key stakeholders including the agricultural community in both countries and key watersheds.

2. Begin to build relationships and promote communication among a binational group of diverse stakeholders that do not currently interact.
3. Build the case for manure management funding needs that define costs and benefits from improved manure management.

In sum, the WQB proposes to develop a work plan for Recommendation 1, an overall manure assessment process, in the coming work cycle that builds on the insights gained from its feedback and advances the implementation of its recommendations. This will also lead to the framework to implement Recommendation 2 (policies), Recommendation 3 (funding) and Recommendation 4 (international and indigenous considerations).

4.0 Appendices

Appendix A: Agriculture and ENGO (environmental nongovernment organizations) audience – summary of key themes

Water Quality Board (WQB) Manure Management Report By-Invitation Webinar

Agriculture and Environmental Non-Government Organizations Audience (April 15, 2020)

SUMMARY OF KEY THEMES AND MESSAGES

Webinar: 49 participants (of 35 webinar poll respondents - 1 IL, 3 MI, 11 OH, 17 ON, 2 PA, 1 WI)
Survey: 14 respondents (3 MI, 7 OH, 4 ON)

Overall Report and Recommendations

- Survey respondents rated the importance of the recommendations as: Recommendation 3 most important and Recommendation 4 the least important, with Recommendations 1 and 2 in the middle with equal ratings. This is consistent with responses to later individual survey questions on each recommendation, where 70 percent (of 10 respondents) felt that Recommendation 3 was important to implement (see below).
- In terms of feasibility of implementation, from the webinar poll, Recommendation 2 was seen as most feasible to implement by respondents (33 percent). Recommendation 1 was seen as the least feasible to implement by respondents (31 percent).
- Concerns that the perspectives of participants from the 2018 workshop are not reflected in, or adequately considered, in developing the final report recommendations; recommendations that had little or mixed work shop participant support were not modified and still appear in the final report.
- Mixed survey responses on how informative the report is. Some found the comparison of rules and regulations among states and Ontario quite informative and useful, others found the report's information to be "old hat".
- Several follow-up survey comments that the report seems to be biased against livestock operations (particularly medium and large facilities) and that the report is trying to eliminate livestock operations and/or hamper their ability to remain in business.
- General misunderstanding that the Canada/Ontario quota system is being recommended for the US.
- Legacy phosphorus in soils was seen as a source that needs to be addressed, as issues in the lake will continue even if livestock management changes are made.

Recommendation 1

- Two thirds of 10 survey respondents agreed that Recommendation 1 was important to implement with fewer agreeing that the recommendation was feasible to implement (60 percent), attainable (40 percent) and sufficiently specific (30 percent).
    - Of the five components of Recommendation 1, requiring permits for both large and medium sized facilities and harmonizing soil phosphorus needs for commercial fertilizer and manure were rated highest for importance, followed closely by a binational information sharing hub.

Banning of liquid manure broadcasting and disallowing farm sub-dividing was rated as lowest importance.

- Ontario has good ideas as a starting point, but a one-size fits all is never productive; rules need to fit the regional needs.
- Assessing rules to evaluate what works is a valuable learning process; information sharing on new technologies and management practices would be helpful.

Recommendation 2

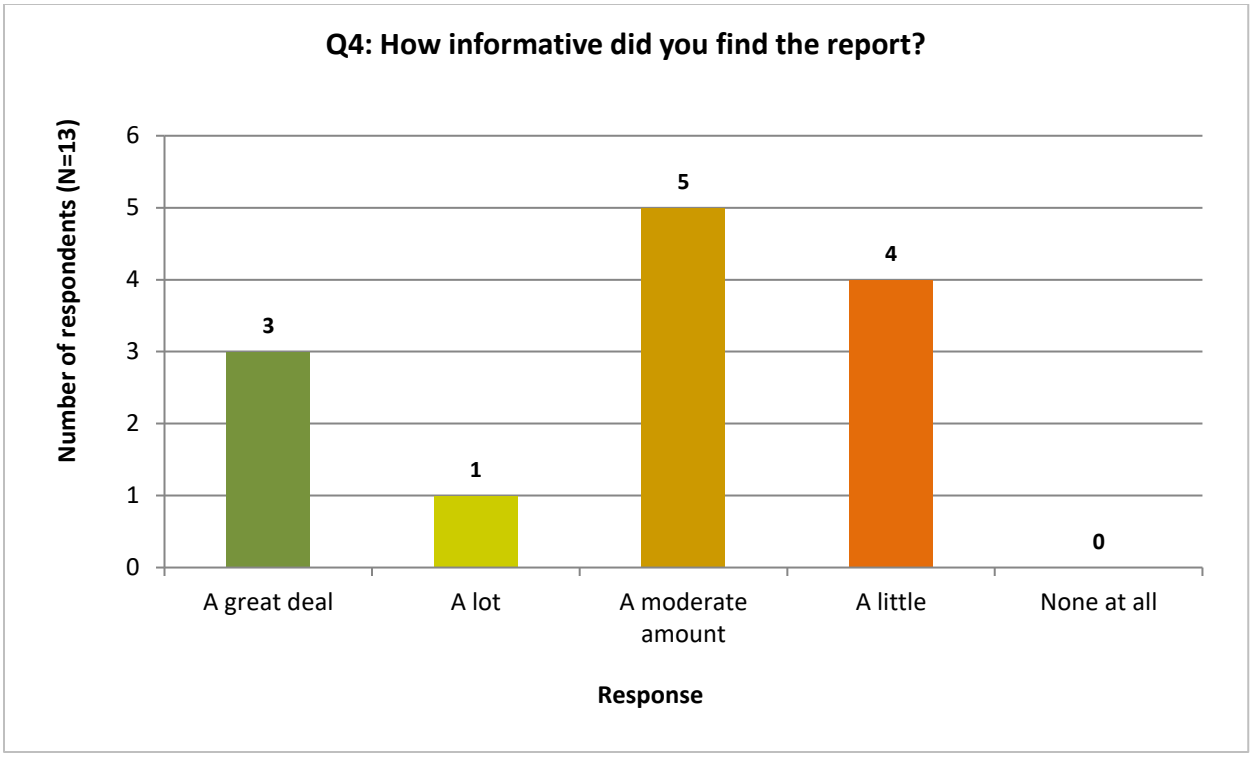
- Half of the 10 survey respondents agreed the Recommendation 2 was important to implement, feasible to implement and sufficiently specific. Fewer agreed that the recommendation is attainable (40 percent).
    - Of the five components of Recommendation 2, requiring minimum acreage of land per animal unit received the highest rating of importance, with establishing requirements for timing of manure a close second. A standardized process for notifying neighbors received the lowest rating of importance.
- Some states already have rules in place or doing the things being recommended (i.e., limitations on manure application during precipitation events; notification of neighbors) and so don't feel these particular recommendations are needed/relevant.

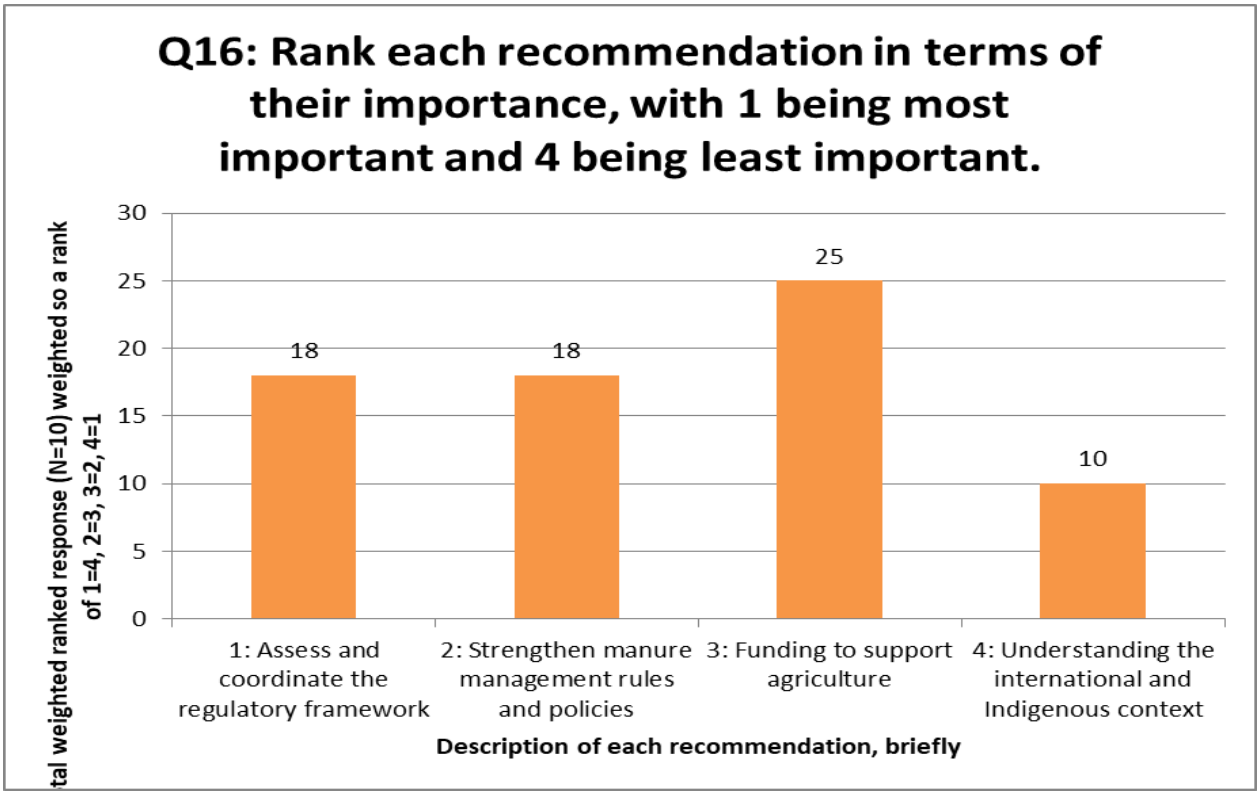
Recommendation 3

- The majority of the 10 survey respondents agreed that Recommendation 3 is important to implement (70 percent) and that it is attainable (70 percent), feasible to implement (70 percent) and sufficiently specific (60 percent).
- Funding for technologies that improve application are all opportunities to increase environmental responsibility; however, many see challenges in implementing funding programs, maintaining funding and/or ease in farmer accessing such funding.

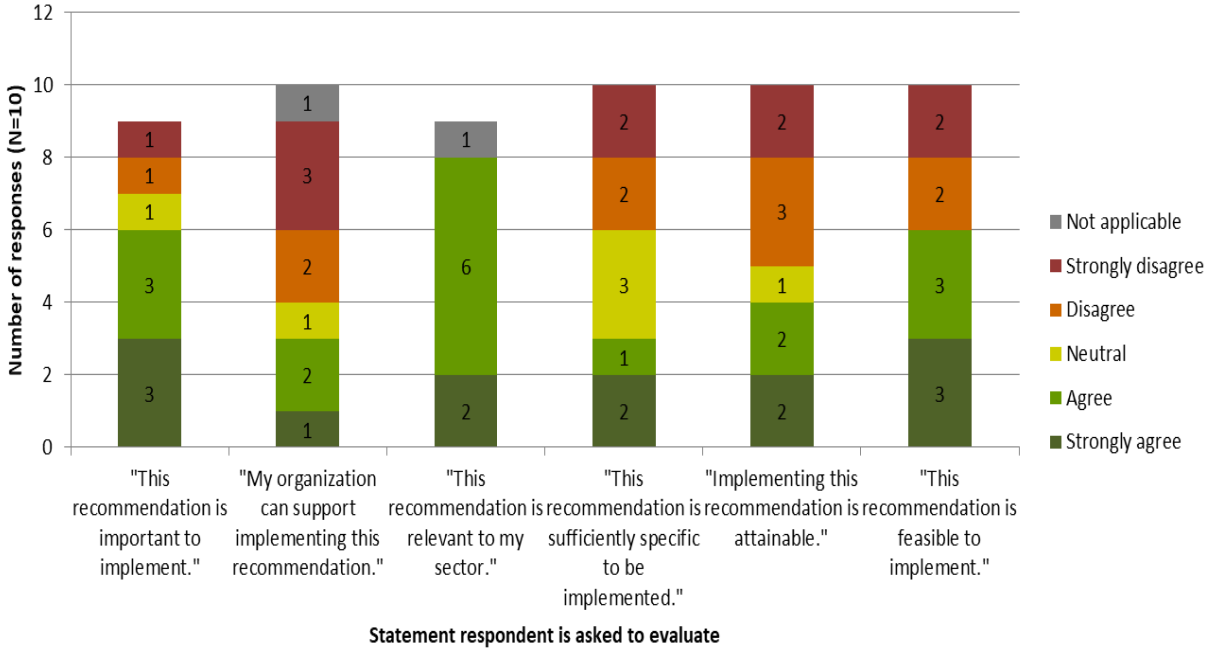
Recommendation 4 (10 survey respondents)

- Half of the 10 survey respondents agreed that Recommendation 4 is important to implement, attainable, feasible and sufficiently specific.
- While information sharing is important, it should be undertaken by existing entities (i.e., universities, agencies), with limited funding prioritized for helping farmers implement new technologies.

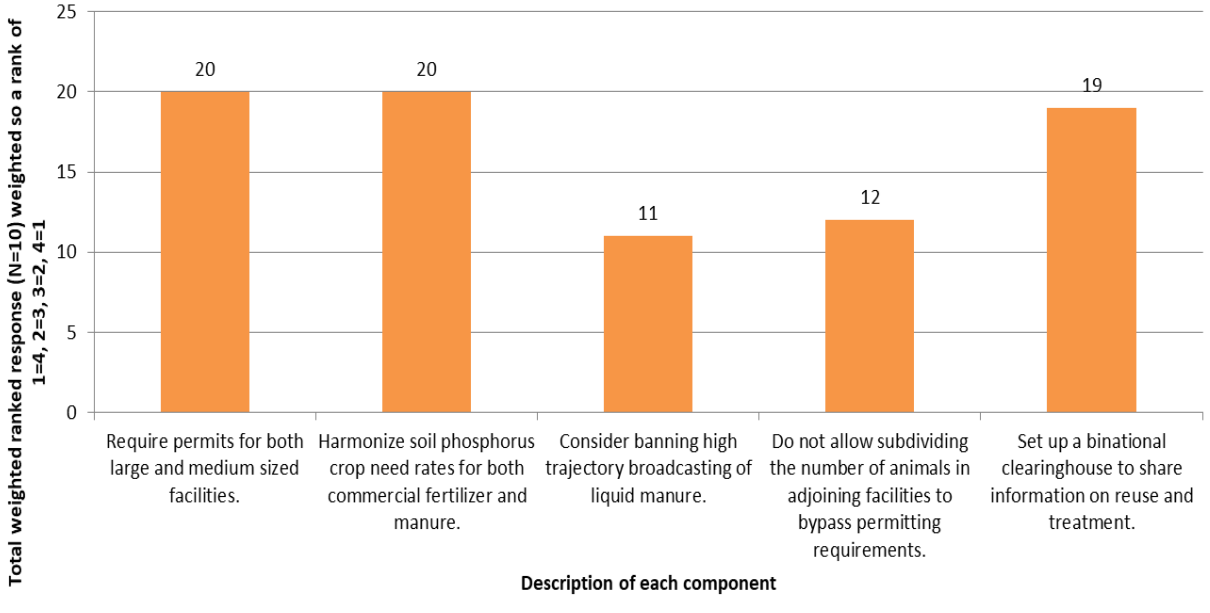

Q4: How informative did you find the report?
Number of respondents (N=13)
6
5
4
3
2
1
0
3
1
5
4
0
A great deal
A lot
A moderate amount
A little
None at all
Response


Q16: Rank each recommendation in terms of their importance, with 1 being most important and 4 being least important.
tal weighted ranked response (N=10) weighted so a rank of 1=4, 2=3, 3=2, 4=1
30
25
20
15
10
5
0
18
18
25
10
1: Assess and coordinate the regulatory framework
2: Strengthen manure management rules and policies
3: Funding to support agriculture
4: Understanding the international and Indigenous context
Description of each recommendation, briefly

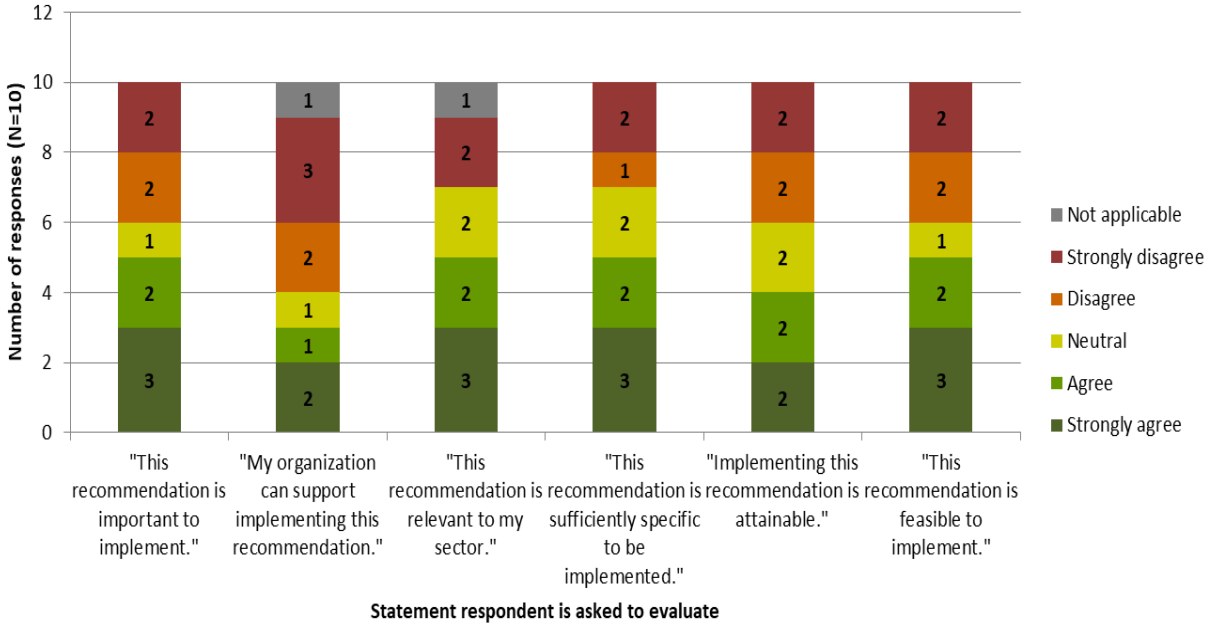
Q6: Please evaluate each statement about Recommendation #1 overall.



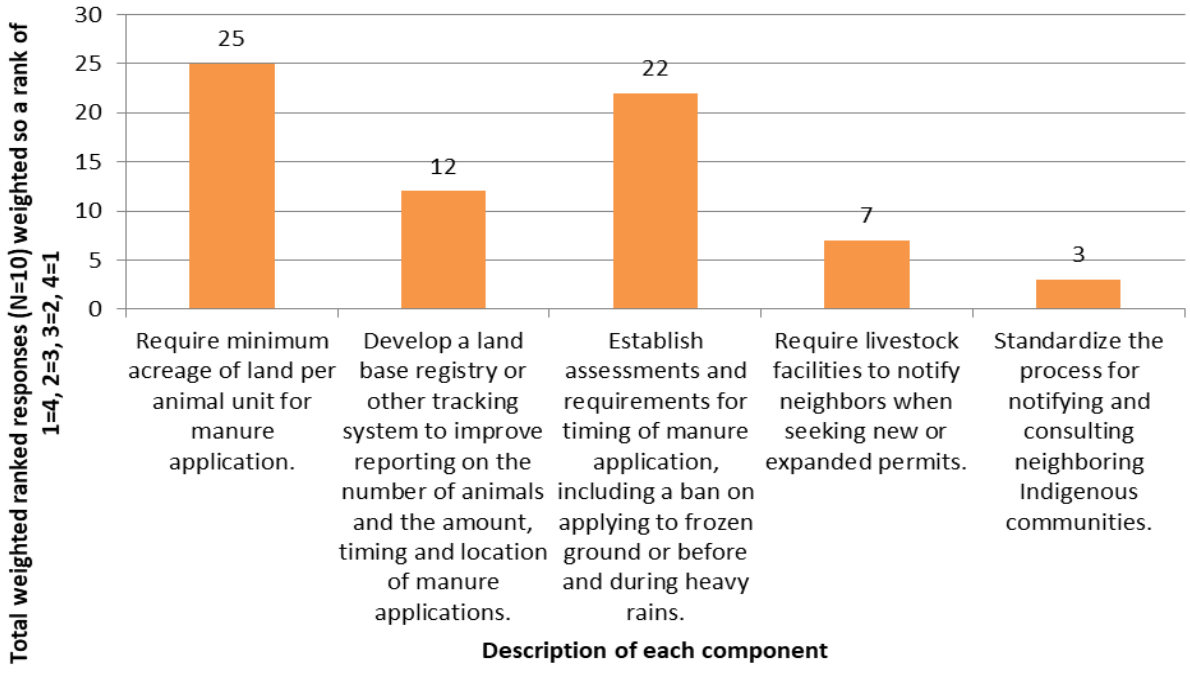
Q7: Regarding the proposed *coordination of a single regulatory framework,* rank each component by their importance



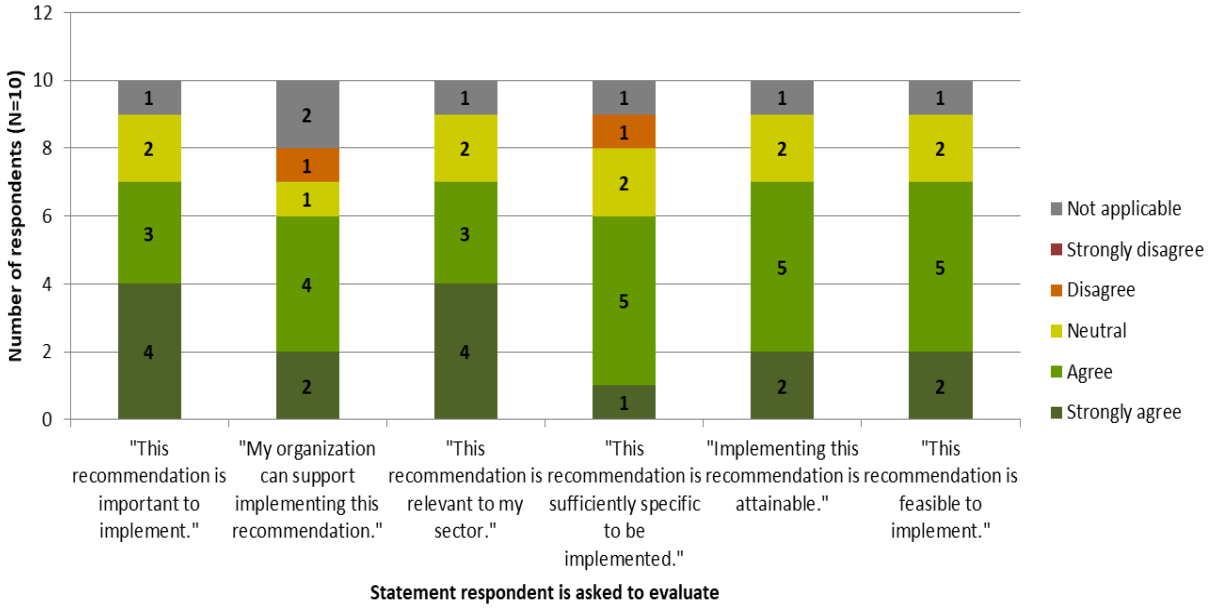
Q9: Please evaluate each statement about Recommendation #2 overall.



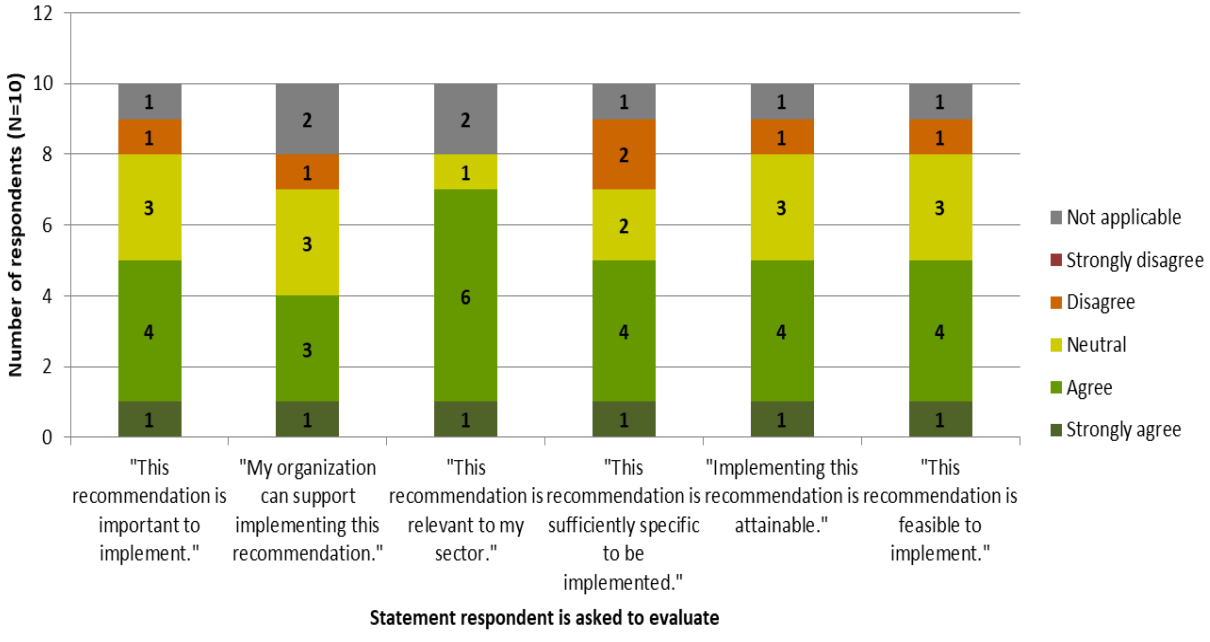
Q10: Rank each component [of Recommendation 2] by their importance.

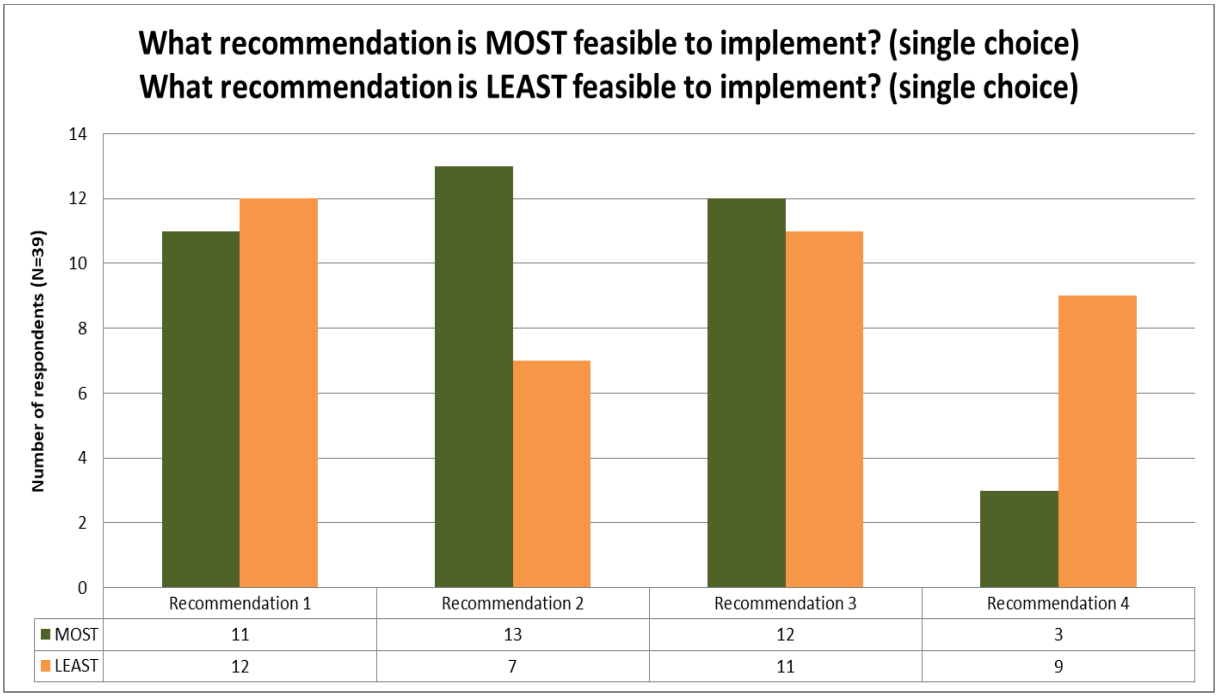


Q12: Please evaluate each statement about Recommendation #3 overall.



Q14: Please evaluate each statement about Recommendation #4 overall.





LIST OF ORGANIZATIONS THAT WERE PRESENT ON THE WEBINAR

A total of 49 participants from a variety of agricultural organizations and environmental nongovernment organizations attended the webinar.

Fertilizer Canada	Ohio Pork Council
Healing Our Waters Coalition	Ontario Federation of Agriculture
Illinois Farm Bureau	Ontario Greenhouse Vegetable Growers
Lambton Federation of Agriculture	Ontario Pork
Michigan Farm Bureau	Ontario Soil and Crop Improvement Assoc.
Mid-west Cover Crops Council	Pennsylvania Farm Bureau
Michigan State University Extension	Socially Responsible Agricultural Project
National Farmers Union - Ontario	Southern Environmental Law Center
National Wildlife Federation	Soy Ohio
Ohio Agri-Business Association	Stateler Family Farms
Ohio Corn and Wheat	Thames River Phosphorus Reduction Collaborative
Ohio Ecological Food and Farm Association	The Fertilizer Institute
Ohio State University Extension	University of Windsor
Ohio Farm Bureau Federation	University of Wisconsin Madison – Soil Science Extension

Appendix B: Public audience – summary of key themes

Water Quality Board (WQB) Manure Management Report Webinar

Public Audience (May 1, 2020)

Summary of Key Themes and Messages

Webinar: 317 participants (of 140 webinar poll respondents - 2 IL, 24 MI, 1 MN, 10 NY, 24 OH, 50 ON, 3 PA, 15 WI, 11 Other)
Survey: 102 respondents (15 MI, 2 MN, 7 NY, 31 OH, 34 ON, 5 WI, 6 Other)

Overall Report and Recommendations

- Survey respondents rated the importance of the recommendations as: Recommendation 2 most important, with Recommendation 1 followed closely by Recommendation 3 and Recommendation 4 the least important. This is consistent with the webinar poll results that overwhelming identified Recommendation 2 as the most important.
- In terms of feasibility of implementation, from the webinar poll, Recommendation 2 was seen as most feasible to implement by respondents, while Recommendation 1 was seen as the least feasible to implement by respondents.
- Sixty three (63) percent of respondents said the report was informative "a great deal" or "a lot".
- Overall, sentiments about the recommendations were mixed because there was support for the recommendations on their face but much skepticism about the ability to implement in the face of lack of political will, industry buy-in, financing for compliance and enforcement, and the challenge of many layers of jurisdiction (i.e., Indigenous relations is under federal government jurisdiction, whereas land use planning is under local or regional jurisdiction).
- Many familiar with the Ontario model generally agreed it could be used as a frame of reference basinwide, but noted that it also contains weaknesses in enforcement and applicability.
- Comments reflected a concern that cumulative effects of manure are missed by focusing only on large operations, while others were confused about how large and medium facilities were defined.

Recommendation 1

- More than two thirds (80 percent) of 79 survey respondents agreed that Recommendation 1 was important to implement and relevant (76 percent), with fewer, but still a majority, agreeing that the recommendation was sufficiently specific (63 percent), attainable (59 percent) and feasible (55 percent).
    - Of the five components of Recommendation 1, requiring permits for both large and medium sized facilities was rated highest for importance, followed closely by disallowing farm sub-dividing and harmonizing soil phosphorus needs for commercial fertilizer and manure. Banning of liquid manure broadcasting and a binational information sharing hub were ranked among the least important.
- Comments were dominantly supportive of the recommendation for a binational standard, but concerned about barriers to implementation, including lack of political will and industry support, and concern about lack of funding, enforcement and compliance. Other comments reflected a concern that one size cannot fit all but reflected a desire for a unified performance target.

- Some confusion or concern about relevance of recommendations to operations of different sizes.

Recommendation 2

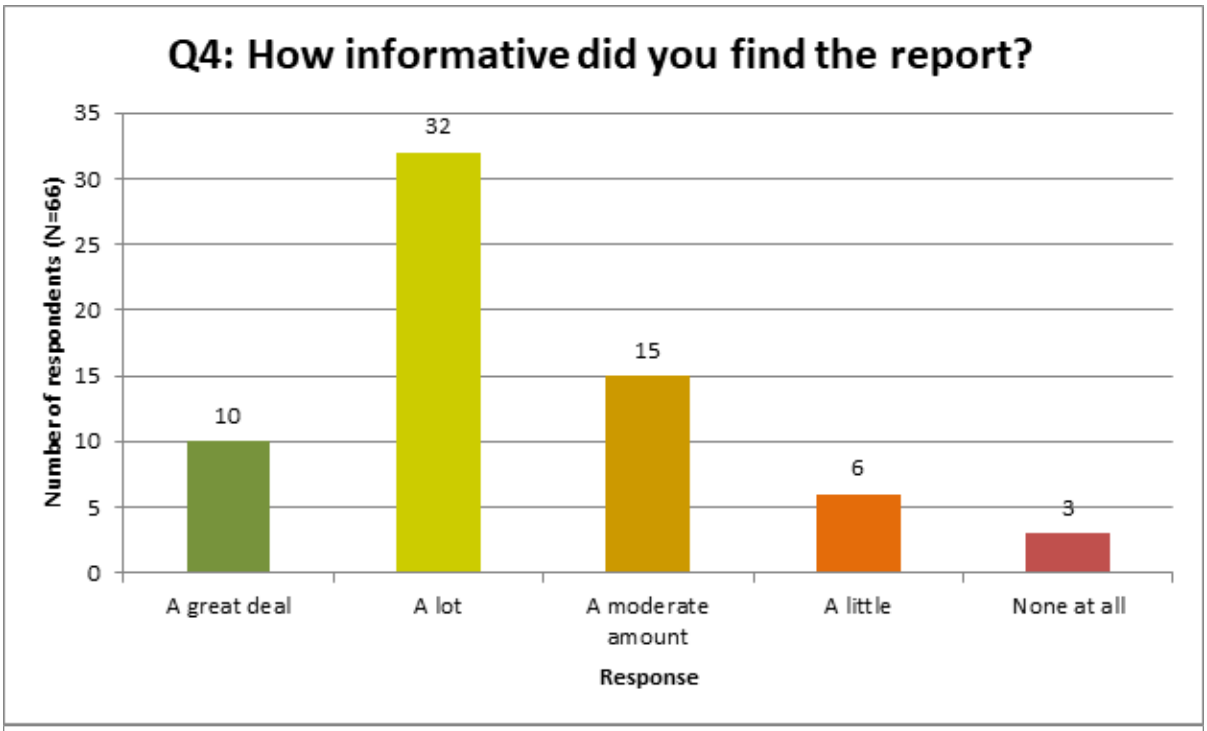
- More than two- thirds (78 percent) of 70 survey respondents agreed the Recommendation 2 was important to implement, and relevant (77 percent), sufficiently specific (72 percent) and feasible (70 percent) while more than a majority of respondents agreed it is attainable (64 percent).
    - Of the five components of Recommendation 2, requiring minimum acreage of land per animal unit and establishing requirements for timing of manure were virtually tied as the highest rated with respect to importance. A standardized process for notifying neighbors received the lowest rating of importance.
- Many comments identified that the recommendation is good and needed but were weary of the ability to change policy and get industry buy-in needed to adopt and implement. Questions arose about who does the implementation, and who pays for implementation and enforcement.
- Some saw the registry as an asset to enable enforcement and accountability but others were concerned the data would not be accurate if self-reported, and identified challenges to determining right minimum acreage or right timing that is applicable to a wide range of farm needs.

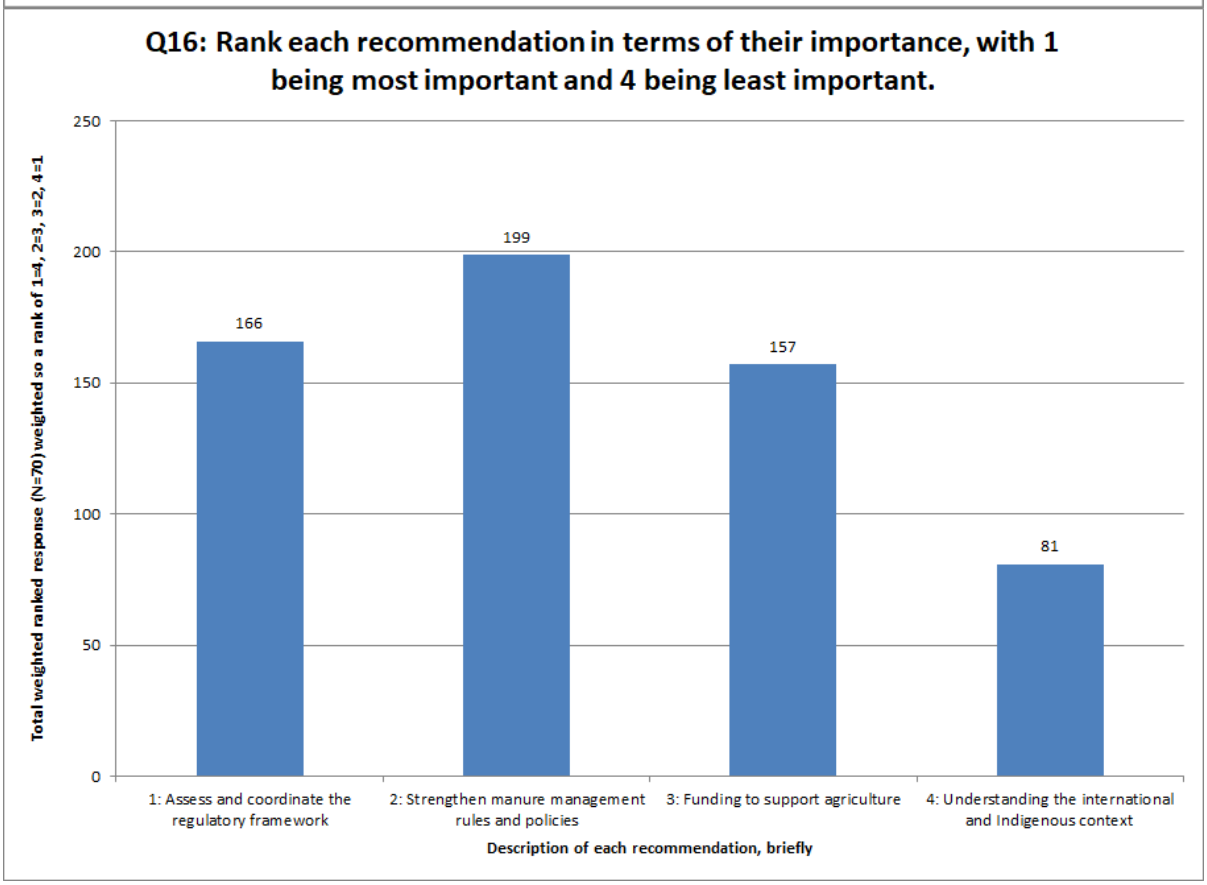
Recommendation 3

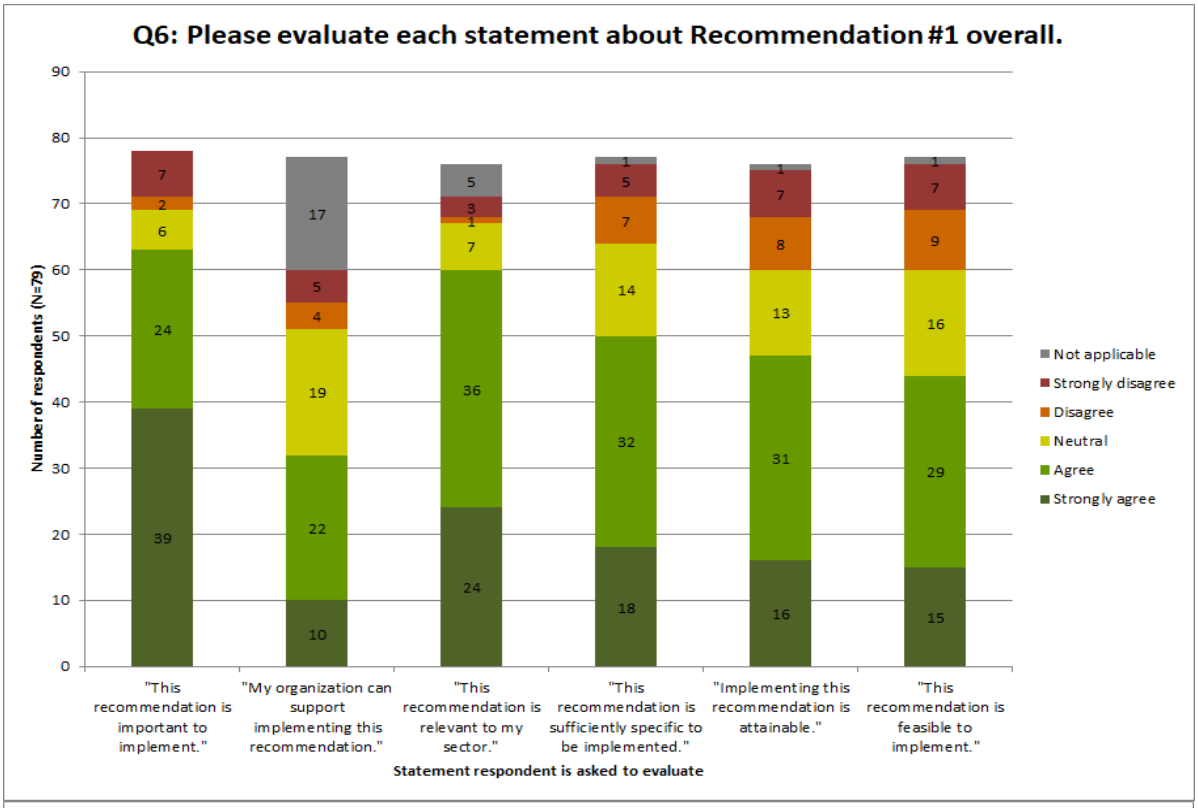
- The majority of the 70 survey respondents agreed that Recommendation 3 is important to implement (84 percent) and that it is relevant (65 percent), sufficiently specific (70 percent), attainable (70 percent), and feasible to implement (68 percent). Of 56 respondents for whom the question is applicable, 60 percent of respondents said their organization can support implementing this recommendation.
- Positive comments reflect that existing funding programs can be improved, augmented by expanded, long-term funding commitments, and that funding is a requisite for implementation of best practices and technology adoption.
- Mixed and negative comments observed challenges in implementing funding programs, particularly given other funding priorities for agriculture, concerns about accountability mechanisms for meeting funding requirements, and negative views about additional subsidies to the heavily-subsidized agricultural sector.

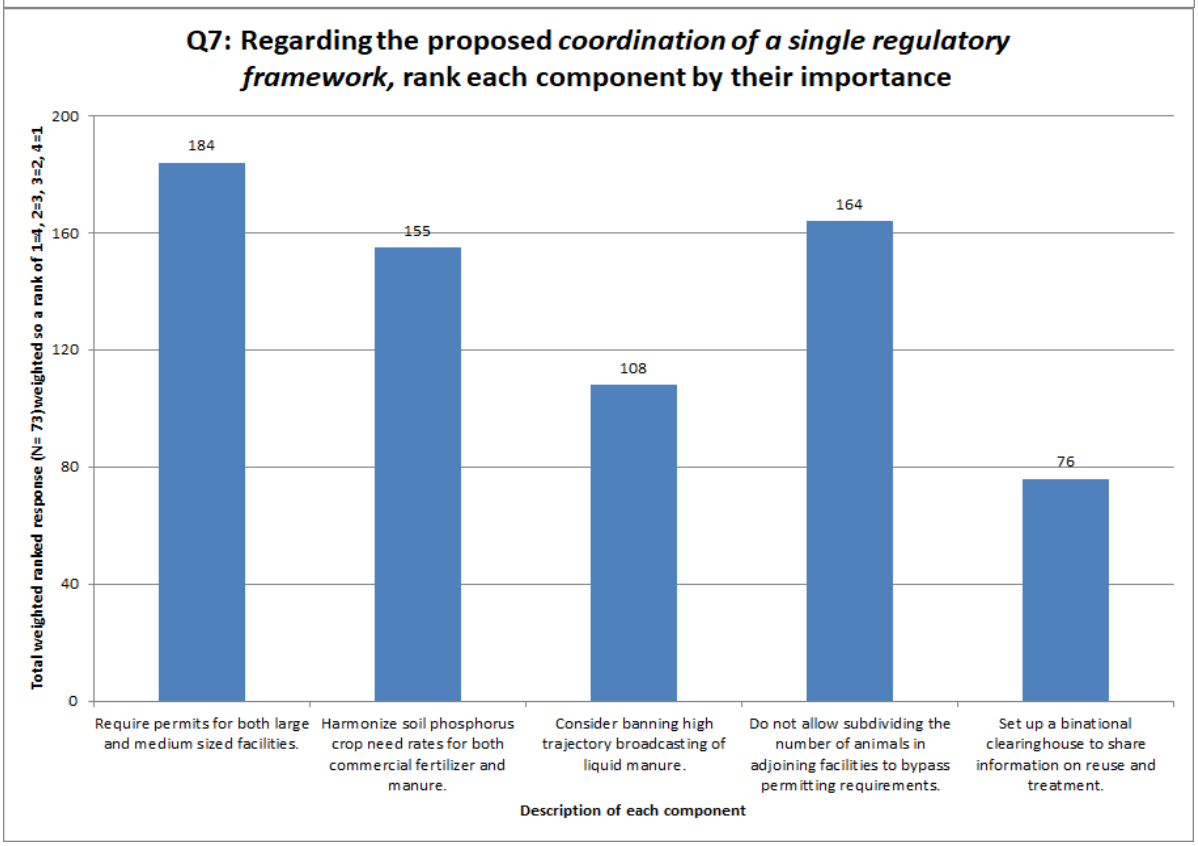
Recommendation 4

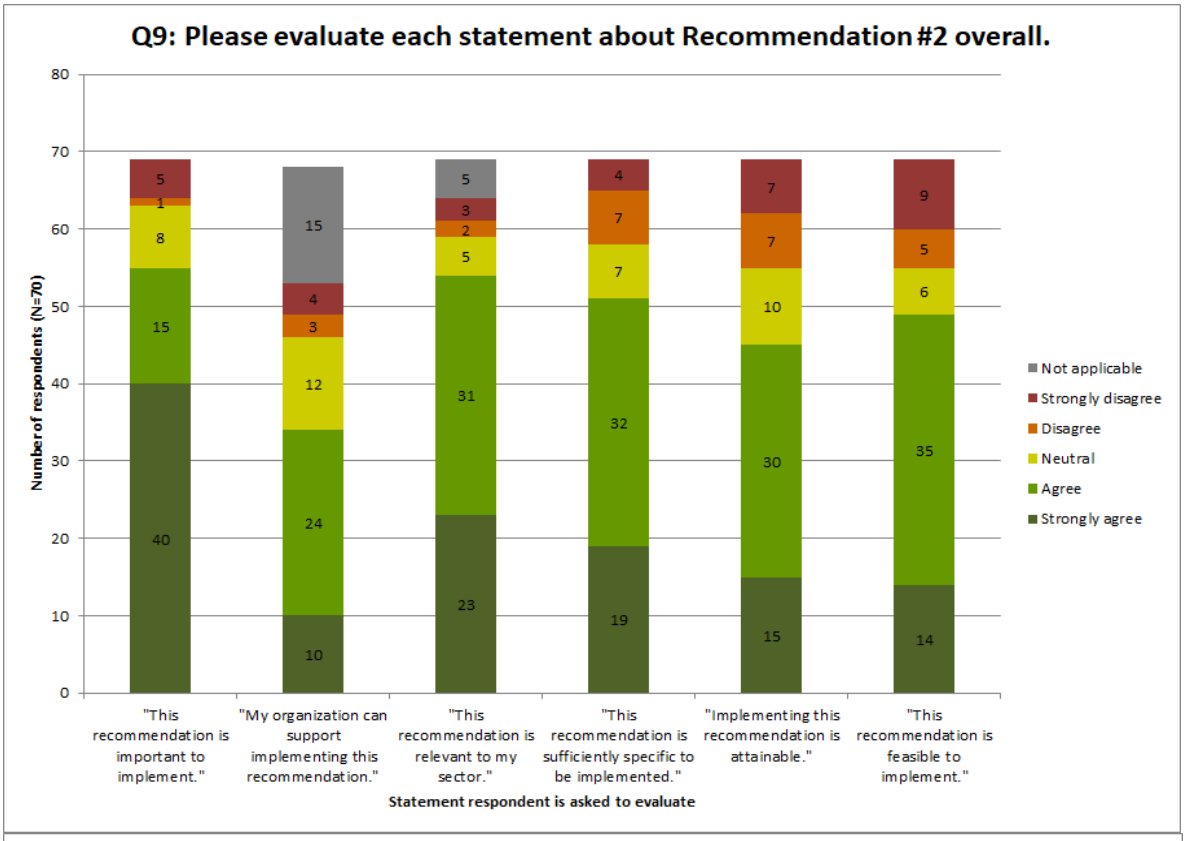
- Of the 70 survey respondents, the majority agreed that Recommendation 4 is important to implement (67 percent), relevant (57 percent), attainable (57 percent) and feasible (62 percent).
- Open-ended responses commented on the challenge of implementation, with some noting that the political and economic context of international models need to be accounted for.
- Multiple respondents noted that either there are no federally-recognized Indigenous nations with land in their community, that federal jurisdiction over Indigenous matters would complicate this recommendation, or that consideration for Indigenous neighbors is not unique from other neighbors.
- Some noted the expert panel would be redundant while other urged greater diversity in stakeholder representation on such a panel.

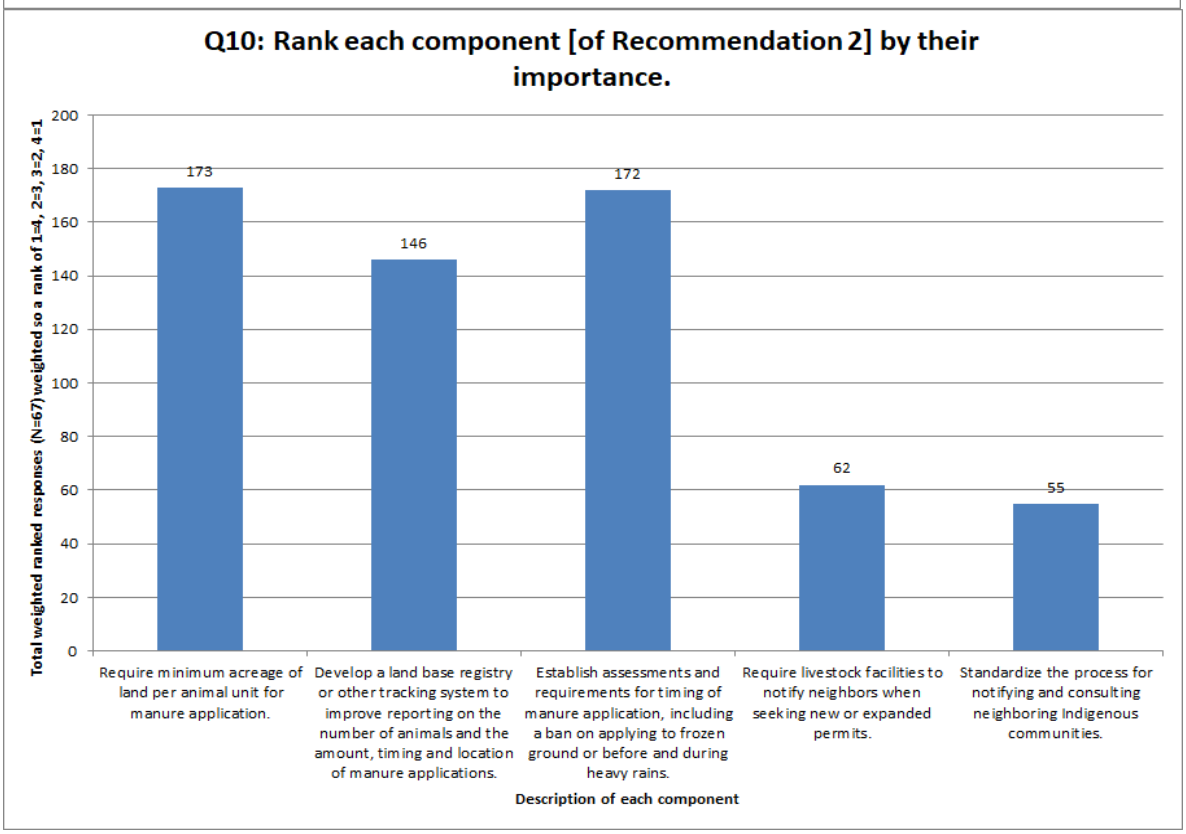

Q4: How informative did you find the report?
Number of respondents (N=66)
35
30
25
20
15
10
5
0
32
15
10
6
3
A great deal
A lot
A moderate amount
A little
None at all
Response

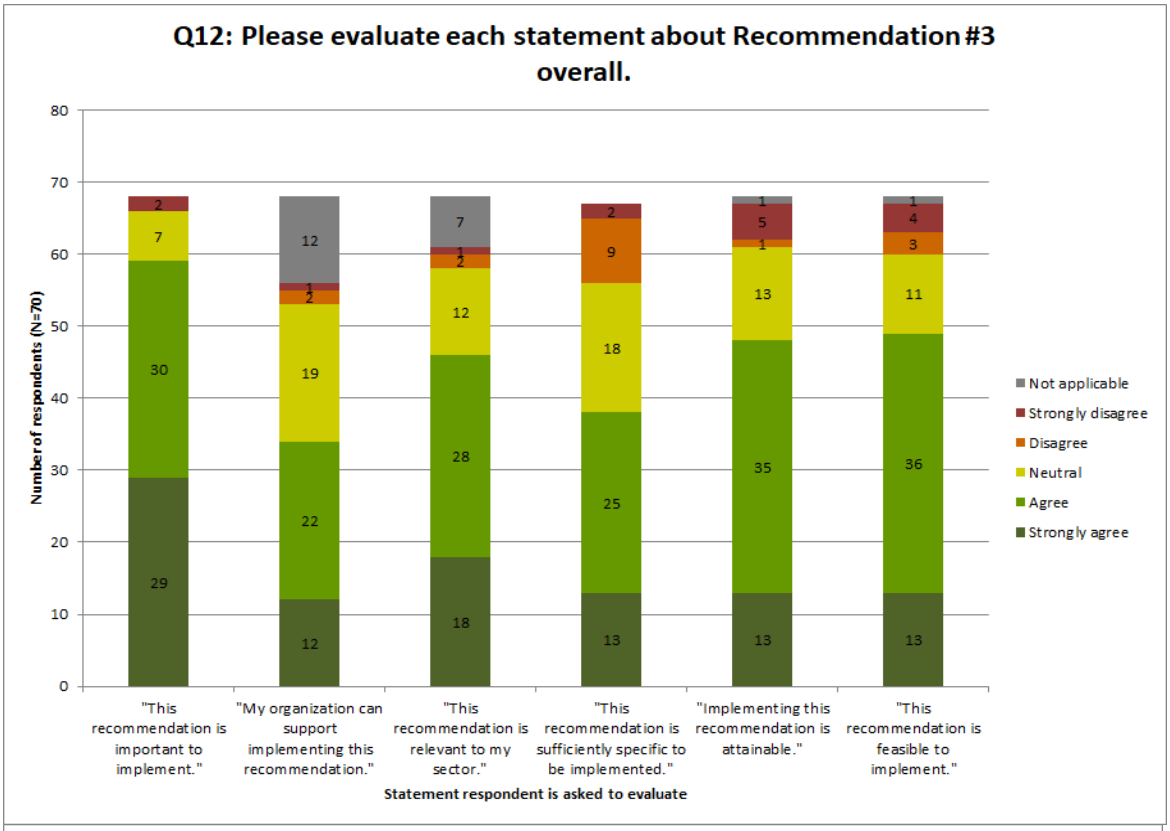

Q16: Rank each recommendation in terms of their importance, with 1 being most important and 4 being least important.
Total weighted ranked response (N=70) weighted so a rank of 1=4, 2=3, 3=2, 4=1
250
200
150
100
50
0
166
199
157
81
1: Assess and coordinate the regulatory framework
2: Strengthen manure management rules and policies
3: Funding to support agriculture
4: Understanding the international and Indigenous context
Description of each recommendation, briefly

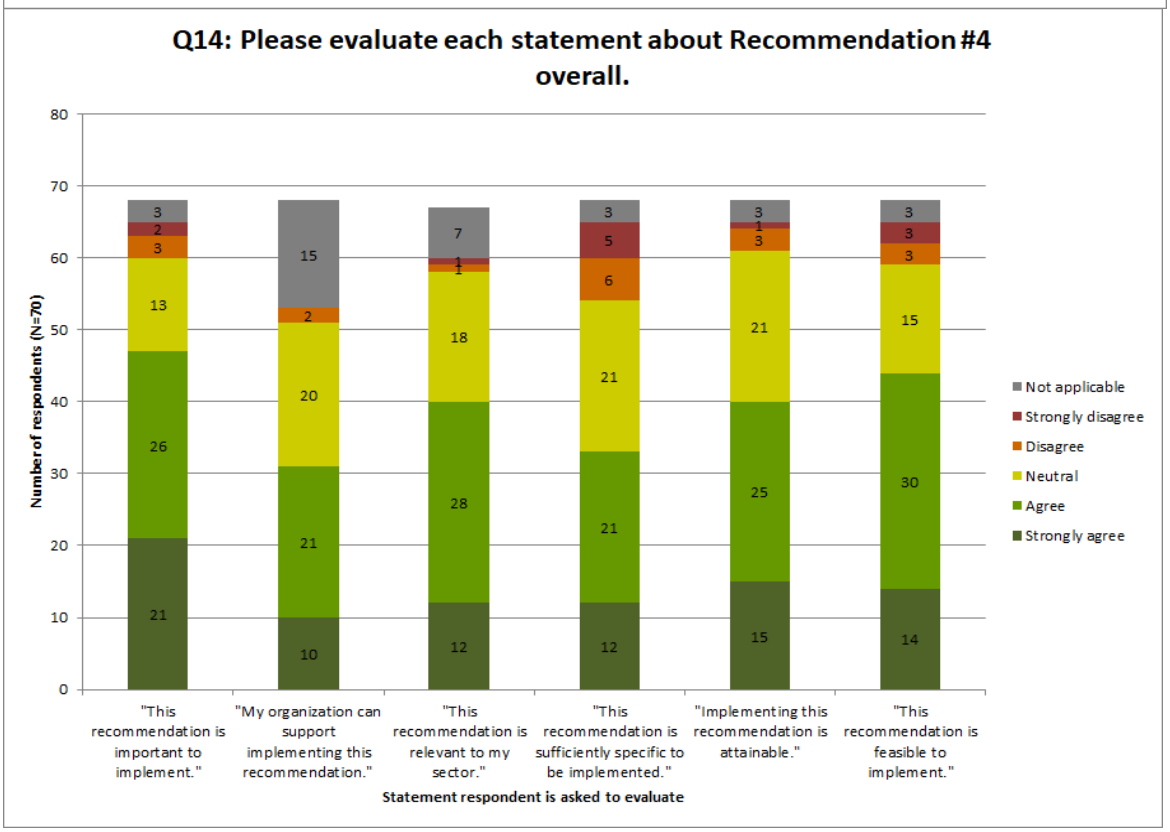

Q6: Please evaluate each statement about Recommendation #1 overall.
Number of respondents (N=79)
90
80
70
60
50
40
30
20
10
0
7
2
6
24
39
17
5
4
19
22
10
5
3
1
7
36
24
1
5
7
14
32
18
1
7
8
13
31
16
1
7
9
16
29
15
"This recommendation is important to implement."
"My organization can support implementing this recommendation."
"This recommendation is relevant to my sector."
"This recommendation is sufficiently specific to be implemented."
"Implementing this recommendation is attainable."
"This recommendation is feasible to implement."
Statement respondent is asked to evaluate
Not applicable
Strongly disagree
Disagree
Neutral
Agree
Strongly agree

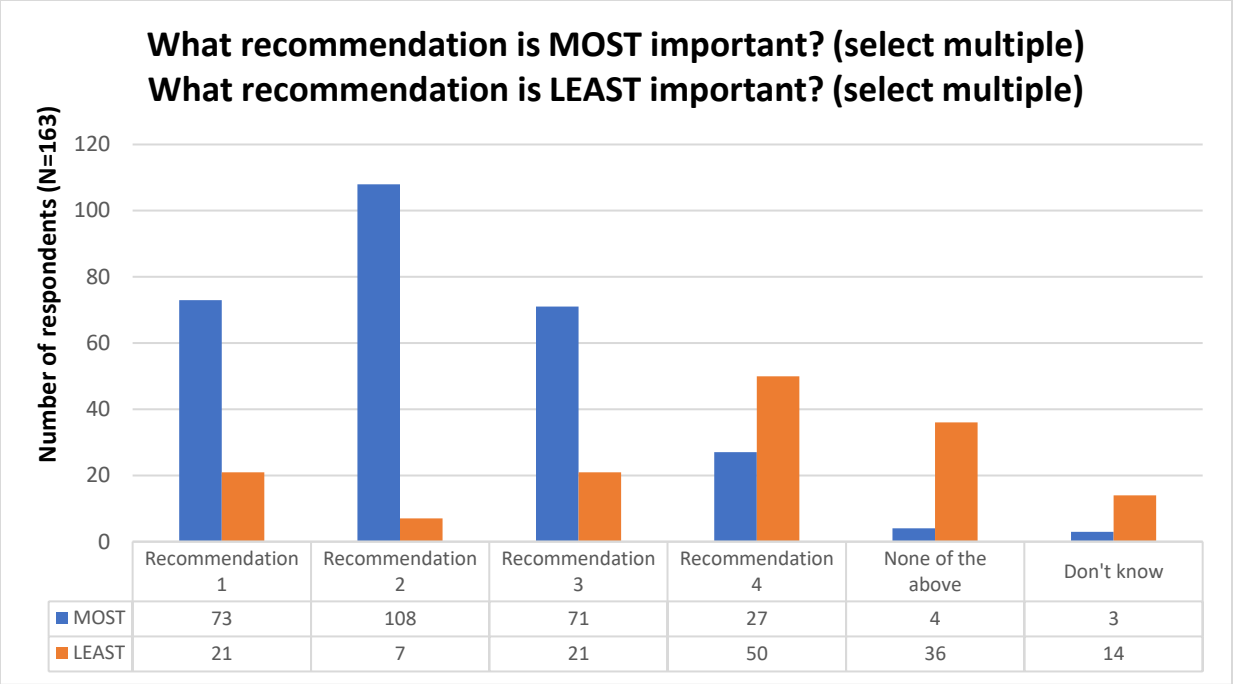

Q7: Regarding the proposed *coordination of a single regulatory framework,* rank each component by their importance
Total weighted ranked response (N= 73)weighted so a rank of 1=4, 2=3, 3=2, 4=1
200
160
120
80
40
0
184
155
108
164
76
Require permits for both large and medium sized facilities.
Harmonize soil phosphorus crop need rates for both commercial fertilizer and manure.
Consider banning high trajectory broadcasting of liquid manure.
Do not allow subdividing the number of animals in adjoining facilities to bypass permitting requirements.
Set up a binational clearinghouse to share information on reuse and treatment.
Description of each component

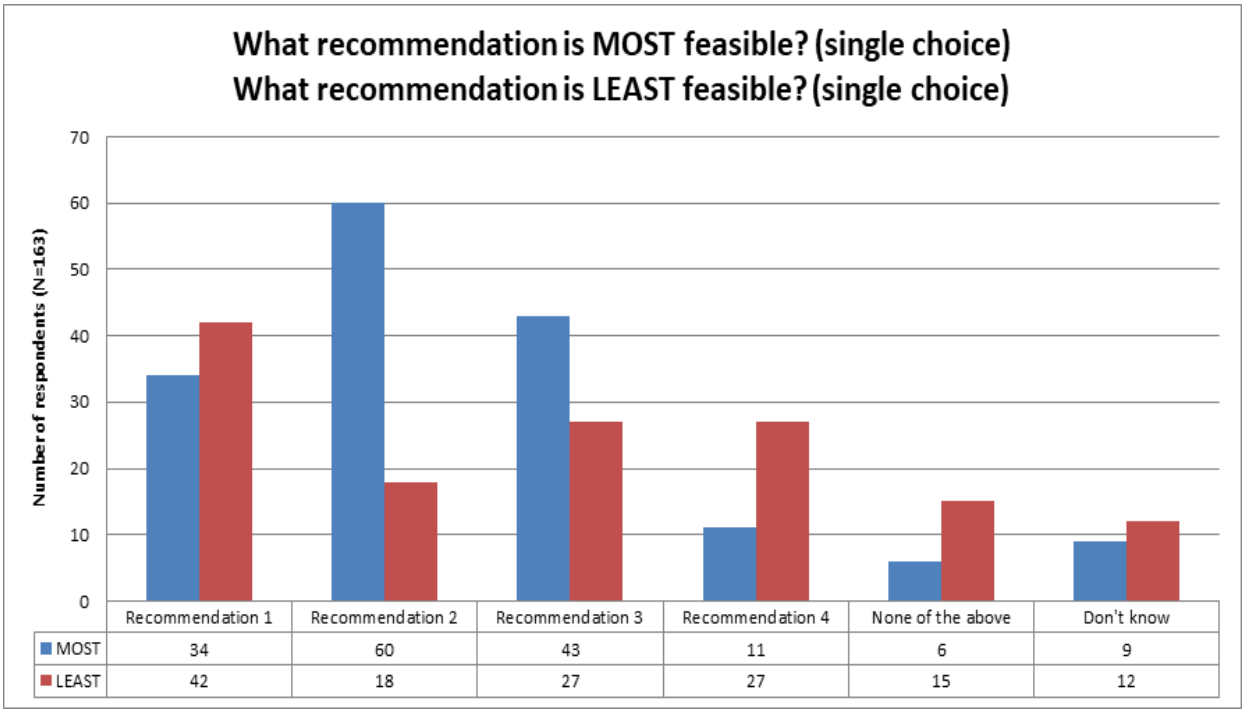

Q9: Please evaluate each statement about Recommendation #2 overall.
Number of respondents (N=70)
0
10
20
30
40
50
60
70
80
5
1
8
15
40
15
4
3
12
24
10
5
3
2
5
31
23
4
7
7
32
19
7
7
10
30
15
9
5
6
35
14
"This recommendation is important to implement."
"My organization can support implementing this recommendation."
"This recommendation is relevant to my sector."
"This recommendation is sufficiently specific to be implemented."
"Implementing this recommendation is attainable."
"This recommendation is feasible to implement."
Statement respondent is asked to evaluate
Not applicable
Strongly disagree
Disagree
Neutral
Agree
Strongly agree


Q10: Rank each component [of Recommendation 2] by their importance.
Total weighted ranked responses (N=67) weighted so a rank of 1=4, 2=3, 3=2, 4=1
0
20
40
60
80
100
120
140
160
180
200
173
146
172
62
55
Require minimum acreage of land per animal unit for manure application.
Develop a land base registry or other tracking system to improve reporting on the number of animals and the amount, timing and location of manure applications.
Establish assessments and requirements for timing of manure application, including a ban on applying to frozen ground or before and during heavy rains.
Require livestock facilities to notify neighbors when seeking new or expanded permits.
Standardize the process for notifying and consulting neighboring Indigenous communities.
Description of each component


Q12: Please evaluate each statement about Recommendation #3 overall.
Number of respondents (N=70)
80
70
60
50
40
30
20
10
0
2
7
30
29
12
1
2
19
22
12
7
1
2
12
28
18
2
9
18
25
13
1
5
1
13
35
13
1
4
3
11
36
13
"This recommendation is important to implement."
"My organization can support implementing this recommendation."
"This recommendation is relevant to my sector."
"This recommendation is sufficiently specific to be implemented."
"Implementing this recommendation is attainable."
"This recommendation is feasible to implement."
Statement respondent is asked to evaluate
Not applicable
Strongly disagree
Disagree
Neutral
Agree
Strongly agree


Q14: Please evaluate each statement about Recommendation #4 overall.
Number of respondents (N=70)
80
70
60
50
40
30
20
10
0
3
2
3
13
26
21
15
2
20
21
10
7
1
1
18
28
12
3
5
6
21
21
12
3
1
3
21
25
15
3
3
3
15
30
14
"This recommendation is important to implement."
"My organization can support implementing this recommendation."
"This recommendation is relevant to my sector."
"This recommendation is sufficiently specific to be implemented."
"Implementing this recommendation is attainable."
"This recommendation is feasible to implement."
Statement respondent is asked to evaluate
Not applicable
Strongly disagree
Disagree
Neutral
Agree
Strongly agree


What recommendation is MOST important? (select multiple)
What recommendation is LEAST important? (select multiple)
Number of respondents (N=163)
120
100
80
60
40
20
0
Recommendation 1
Recommendation 2
Recommendation 3
Recommendation 4
None of the above
Don't know
MOST 73 108 71 27 4 3
LEAST 21 7 21 50 36 14


What recommendation is MOST feasible? (single choice)
What recommendation is LEAST feasible? (single choice)
Number of respondents (N=163)
70
60
50
40
30
20
10
0
Recommendation 1
Recommendation 2
Recommendation 3
Recommendation 4
None of the above
Don't know
MOST 34 60 43 11 6 9
LEAST 42 18 27 27 15 12

LIST OF ORGANIZATIONS THAT WERE PRESENT ON THE WEBINAR

A total of 317 participants from a variety of sectors attended the webinar.

Advocates for a Clean Lake Erie	Clarkson University	Genesee RiverWatch
Agriculture and Agri-Food Canada	Clean Water Action	Georgian Bay Association
Alliance for the Great Lakes	Confederation College	Global Affairs Canada
Bad River Band of Lake Superior Chippewa	Cornell University	Government of Manitoba
Bay Mills Indian Community	Defiance College	Grain Farmers of Ontario
Bay of Quinte Remedial Action Plan	DeKalb County Soil and Water Conservation District	Grand Valley State University
BC Ministry of Environment & Climate Change Strategy	Detroit Public Television Great Lakes Now	Great Lakes Commission
Beef Farmers of Ontario	Door County	Great Lakes Trust
Bowling Green State University	Earlham College	Green Goderich (NGO)
Bruce Power	Eaton Conservation District	Halton Region Public Works
Buffalo Outer Harbor Coalition	Environment Climate Change Canada	Harrison SWCD, Carroll SWCD
Canadian Environmental Law Association	Environmental Defence	Heidelberg University
Canadian Freshwater Alliance	EPA GLNPO	Henderson NY zoning board
Central Lake Ontario Conservation Authority	EPA Region 5	House of Representatives Ohio
Chaoticwaters Inc	Erb Family Foundation	Hull Inc.
Chiefs of Ontario	Erie County	Huron Conservation District
Chippewa Ottawa Resource Authority	Farm & Food Care	Huron County
City of Ashland	Fertilizer Canada	Izaak Walton League of America
City of Lima Ohio	FLOW (For Love of Water)	Jacobs
City of Luna Pier	Fond du Lac Reservation - Office of Water Protection	Keweenaw Bay Indian Community
City of Toledo	Freshwater Future	Lake Erie Foundation
City of Vermilion Water Department	Friends of Portage Lake Association	Lambton Federation of Agriculture
City of Westerville	Friends of the Detroit River	Land & Water Conservation Dept.
CKNX Radio	Genesee Conservation District	Laurentian University

League of Women Voters	NEW Water	Phosphorus Alliance
Lenawee Conservation District	Northland College	Queen's University
LimnoTech	NTH Consultants, Ltd.	Representative Gallagher's Office
Little Traverse Bay Bands of Odawa Indians	Ohio Department of Agriculture	Pennsylvania Department of Environmental Protection
Maitland Valley Conservation Authority	Ohio Department of Natural Resources	Pennsylvania State University
Manitoba ARD	Ohio Environmental Protection Agency	Phosphorus Alliance
McMaster University	Ohio Environmental Council	Queen's University
Michigan Dept. of Agriculture and Rural Development	Ohio Lake Erie Commission	Representative Gallagher's Office
Michigan Dept. Environment Great Lakes and Energy	Ohio Pork Producers Council	Saugeen Valley Conservation Authority
Miami Conservancy District	Ohio State University	Senator Gary Peters' Office
Michigan Environmental Council	Ohio State University (Ohio Sea Grant/Stone Lab)	Senator Rob Portman's Office
Michigan State University	Ohio State University Extension	Severn Sound Environmental Association
Michigan State University Extension	Ontario Ministry of Agriculture, Food and Rural Affairs	sharedgeo
Monroe Conservation District	Ontario Ministry of Environment, Conservation and Parks	Sierra Club
National Farmers Union - Ontario	Ontario Ministry of Natural Resources and Forestry	Southeast Wisconsin Regional Planning Commission
National Wildlife Federation	Ontario Clean Water Agency	St. Clair Region Conservation Authority
Natural Resources Research Institute	Ontario Federation of Agriculture	The Council of State Governments
New York Department of Environmental Conservation	Ontario Headwaters Institute	The Nature Conservancy
New York Department of Agriculture and Markets	Pennsylvania Department of Environmental Protection	Tip of the Mitt Watershed Council
New York Soil and Water Conservation Committee	Pennsylvania State University	Toledo Division of Environmental Services

Toledo Metropolitan Area Council of Governments	University of Windsor GLIER	US Department of Agriculture – Natural Resources Conservation Service
Toledo Water Reclamation	Upper Thames River Conservation Authority	US Geological Survey
Town of Essex	US Department of State	Vorys
University of Guelph	US EPA Region 2	Water School for Decision-Makers (W1SD0M)
University of Iowa	US EPA Region 5	Wisconsin Department of Natural Resources
University of Michigan	US EPA Great Lakes National Program Office	Wisconsin's Green Fire
University of Waterloo	US Department of Agriculture	

Appendix C: Governments and Indigenous agencies and organizations – summary of key themes

Water Quality Board (WQB) Manure Management Report By-Invitation Webinar

Governments and Indigenous Agencies Audience (June 26, 2020)

SUMMARY OF KEY THEMES AND MESSAGES

Webinar: 32 participants (1 IL, 3 IN, 3 MI, 4 NY, 2 OH, 4 PA, 1 WI, 4 ON, 1 First Nation, 1 US tribal, 4 US federal, 4 Canadian federal)
Survey: 6 respondents (5 state: 1 NY, 1 PA, 1 OH, 1 WI, 1 IN; 1 Canadian federal)

Overall Report and Recommendations

- Both in the discussion and comments on the follow-up survey, regulators noted that bits and pieces of the various recommendations are "already in place" so the impression was that it's redundant to ask governments to recommend actions already taken.
- Comments noted that they hoped IJC recommendation would focus less on top-down rules and more on bottom-up engagement with farmers, helping those who are "management challenged," regardless of size of the operation.
- Similarly, comments noted that farmers need to be partners to be better managers, which includes ensuring economics enable them to afford implementing better management, including financing to ensure manure is moved around and applied to soils where it is needed.

Recommendation 1

- With respect to the in-depth assessment of permitting rules and requirements of the implementation of each state/province's respective manure management framework, participants noted that there are many quasi-voluntary criteria in place but that wouldn't be counted as a "formal act or law," yet farmers consider these programs as "rules" that are often followed.
- Comments questioned whether or what data shows that more regulation, or smaller farm size, results in improved water quality.
- Not sure changes to policy (i.e. prohibit parcel "splitting") would really change behavior/create desired positive water quality improvements.
- High-trajectory irrigation should not be outright prohibited as that would make problem worse by lessening opportunity to distribute responsibly; restriction should be specific about what type of equipment used with which nutrients.

Recommendation 2

- General sentiment that harmonizing rates across states will be a challenge.
- With respect to the process for harmonizing a nutrient unit calculation across state borders, participants noted that states use US Department of Agriculture and Natural Resources Conservation Service calculations and a lot of the same tools are used across states. However, calculations are site-specific to know how much can be applied. Natural Resources Conservation Service has tried to do computer modelling on a broad-based watershed scale, but without all the data needed it makes modelling difficult. Mostly only works done on-site but "there is a lot to it."

- Agreement that better data is needed for management and could pursue requirements to provide data, but concern that it might motivate processors to leave the basin which would not have political support.
- Concern that report encourages putting greater scrutiny on manure than on commercial fertilizer.

Recommendation 3

- "Of course" more money is needed to help implement practices.
- Recommendations and report could focus more about improving technologies and science to make better management decisions at the farm level, rather than focusing more on a top-down regulatory approach.
- No substantive discussion of this recommendation in the webinar.

Recommendation 4

- No substantive comments on this recommendation specifically about this recommendation occurred in the webinar or via the survey.

LIST OF ORGANIZATIONS THAT WERE PRESENT ON THE WEBINAR

A total of 32 participants from Indigenous, federal, state, and provincial governments attended the webinar.

Agriculture and Agri-Food Canada	Ontario Ministry of Natural Resources and Forestry
Chiefs of Ontario	Pennsylvania Department of Environmental Protection
Environment and Climate Change Canada	Pennsylvania State Conservation Commission
Great Lakes Commission	Saginaw Chippewa Indian Tribe
Indiana Department of Environmental Management	United States Department of Agriculture Natural Resources Conservation Service
Michigan Department of Agriculture and Rural Development	US Environmental Protection Agency (USEPA) Great Lakes National Program Office
Michigan Department of Environment, Great Lakes and Energy	USEPA Region 2
New York State Department of Environmental Conservation	USEPA Region 5
Ohio Department of Agriculture	United States Geological Service
Ontario Ministry of Agriculture, Food and Rural Affairs	Wisconsin Department of Natural Resources