Water Quality Board (WQB) Manure Management Report Public Webinar

Public and Media Audience (May 1, 2020) Webinar video recording at: *https://vimeo.com/415669859*

Summary of WQB panelist responses to webinar questions

On May 1, 2020 an open webinar was held to present report findings and answer participants' questions. Below is a list of questions posed by webinar audience members with the responses from the WQB panelists (beginning below on page 1). The list also includes responses to questions that were not able to be answered during the available webinar time (beginning on page 10).

WQB Member Panelists: *Gayle Wood (Ontario Conservation Authorities – Retired)*
Mark Wales (Ontario Federation of Agriculture)
Joe Tomandl III (Dairy Grazing Apprenticeship)
Sandy Bihn (Lake Erie Waterkeeper)

QUESTIONS ANSWERED DURING THE WEBINAR

Question:	**Can manure regulation be handled at the state level? Or will we need national standards for fairness and effect?**
Response:	**[Joe T.]** Thanks for the question. Currently most of these regulations, a lot of them, are handled at the state level, but that is where they become inconsistent. There are various ways to determine how much manure is produced by certain species of animals as well as the classification of them, as well as a number of other things. As brought up during the webinar that some states do require NMP for smaller sized units and agriculture units and animal size units. We need to look at Great Lakes as a watershed, as a whole unit itself. It will take a consistent effort to really make an impact. So this is something that will need a national oversight or a state unified oversight. In my opinion, if the recommendation is taken forward a lot of this will really be worked on in how we determine how implement the recommendation, and will come together in time. It would need to be more than an individual state taking a shot at it. As I said, this would be a Great Lakes states, unified watershed entity, unless it was overseen nationally. It could possible apply to more sensitive watersheds that are out there. The bottom line of the recommendations is to try to get a more standardized approach to mitigating the impacts of animal agriculture and manure into the Great Lakes system. **[Follow-up response by Sandy B.]** Thank you Joe. I would like to add that. The USEPA does have jurisdiction under the Clean Water Act for manure management and CAFO permitting. They have determined the number of animals for the size of facility – the large, the medium and the small. It seems that this would be a starting point for them to standardize, by taking a look at and updating their reports from 2013. Perhaps determining what could be done better to standardize the management and get the nutrient issue addressed as much as possible.

Question:	**How might harmonization of land application and soil testing regulations among states/provinces help advance nutrient reductions?**
Response:	**[Sandy B.]** Thank you for question. It is certainly at the heart of this issue. When we are offering funding for CAFOs one thing would be to measure, before and after, using soil

testing and testing in the streams to determine if there has actually been a reduction as a result of the practice that is being funded. That is one way to harmonize it. That is one way to get the testing and have accountability, which a lot of us are interested in. regulations are tough. The farmer, for commercial fertilizer, doesn't want to put down any more phosphorus than he needs to, because he pays for it. The flip-side of that is that manure is a product. It can be a product or a waste, depending on how it is used for the crops. If it applied excessively, it is more of a waste. That is the dilemma we are in, in the U.S. Because we have permitted such large facilities the volume of manure produced is huge. So there can be harmonization in land application and soil testing, but there also has to be a reckoning of just how much manure can be applied.

Question:	**How can this approach [Nutrient Management Act] be incorporated into precision ag operations where location and quantity factors are needed?**
Response:	**[Mark W.]** Actually precision agriculture will fit very well under the nutrient management act model, because it requires you to know exactly the quantity of manure; requires testing of manure; knowing how much has been applied; and where it has been applied. That would all fit very well into any precision agriculture operation – they are a natural fit.

Question:	**What is the manure contribution to the toxic algae issue in Lake Erie?**
Response:	**[Sandy B.]** The answer is - we are not sure. But generally, some reports have shown from around 20% up to 50%. Agricultural non-point source runoff has been measured up to 85% -90% of the problem, but in terms of breaking that down into commercial and manure, need to have good testing to know what is going on. But generally, it's around 20%-50%.

Question:	**What are the key legislation in Ontario that govern manure management?**
Response:	**[Mark W.]** Basically we have 2003 Nutrient Management Act which is a provincial piece of legislation under the Ministry of Agriculture, Food and Rural Affairs. This regulates the application of nutrient to land. Currently it is for farms that are new and expanding or 300 nutrient units or greater, as presented in the webinar. It has also recently been extended to the greenhouse sector, where they have to land apply their nutrient solutions after it has been recycled a number of times. Actually the green house sector asked to come under the act so they could have an orderly set of regulations to comply with. Someday I expect the act will be extended to other agriculture, of all size of livestock operations and crop farming as well. When the Act was brought in, in 2003, there was a lot of cost-share funding provided at both the federal and provincial levels to help farmers get to a point where they could meet the requirements, such as 275 days of storage, deemed to be sufficient then. People were also able to stack grants. There was a period of several years where those operations that fell under the Act immediately in 2003, were helped financially to meet the requirements. When that money ran out, which government funding sometimes does, the government decided the majority of the problem had been solved and they would only go further when money was available to help owners get there. We also have provincial environmental protection legislation which comes into effect when there is a spill of any type, not just

from a farm. We also have overarching national environmental legislation, but really around manure, it's all about the Nutrient Management Act in Ontario. I believe Quebec has some similar legislation, and while they do not border on the Great Lakes, they do border the St. Lawrence River, which is of course the outlet for all five of the Great Lakes.

Question: **How do manure management regulations differ by state and livestock type? Are regional manure management approaches similar to wastewater treatment plants?**

Response: **[Sandy B.]** I will answer the second question first. Certainly manure management approaches are not similar to human waste treatment in wastewater treatment plants. Human waste is treated and manure waste is land applied, so it's generally not treated at all. As far as manure regulations and how they differ from state to state, generally the amount of manure and nutrients going into the land is around 150 ppm, which is similar among the states. Where the differences occur, if you look at Indiana, the number of confined animal permits is higher than in the other Great Lakes states. The reason for this is they use the medium threshold of 300 cows instead of 700, as used by the other states. A new thing is that Michigan is now requiring recording of when the manure is applied and where – this is a new rule that recently passed. Michigan and Ohio have bans, to some extent, on frozen ground or winter application. Other states have some parts of that as well. They have approached that part of it, but the nutrient soil part is where the real challenge comes, to get the numbers down and reduce the algae.

Question: **How does the report deal with the issue of manure transfer? Should CAFOs be responsible for the appropriate application of their manure regardless of where it is applied?**

Response: **[Joe T.]** The report doesn't particularly deal with the issue of manure transfer and may be a bit out of the realm of the report. However regarding whether CAFOs, or anybody, be responsible for the appropriate application of their manure regardless of where it is applied – yes. That is one of the things we are looking at. Regardless of size you need to be responsible for where the manure goes and how much is applied.

[Follow-up response by Sandy B.] The report does say that the distribution and utilizations used in Ohio when its offsite, should be treated just as the manure onsite. So to that extent that does address it.

[Follow-up response by Mark W.] I know the Ontario Nutrient Management Act does require that if you are the one producing the manure you are responsible for having somewhere to apply it - having sufficient land and sufficient land that has a low enough soil test to receive it. You simply can't give the manure to someone else and pass on the problem. I think that is a key point to remember in dealing with manure that has to leave the farmstead where it was produced.

Question:	**Do the majority of farmers apply manure in the spring or in the fall?**
Response:	**[Mark W.]** Last spring taught us that it doesn't matter what your plans are, mother nature gets the last word, which is perhaps why in these days of changing climate we may need to look at longer than 275 days of storage. Typically, in Ontario, manure is applied to hay fields in the springtime or onto land that is going to grow corn. The other application time is mid-summer after hay has been cut the first time - manure may get applied before a second or third cut. If wheat is harvested mid to late July that land may get an application of manure, which is incorporated, and then the land would be used for corn the following year. It would be uncommon to put manure on wheat if that land is going to be used for soybeans - that would probably be too much nitrogen. But manure is typically going to go on hay fields or land that is going to be used for corn. The greatest period of application would be in the springtime or mid-summer, not so much in the fall, but that would depend on the operation, size of operation and how much storage you have.

Question:	**Which localities' existing regulations are closest to Ontario?**
Response:	**[Mark W.]** As I mentioned earlier the province of Quebec, Ontario's neighbour, probably has the closest regulations to Ontario. I don't know what their legislation is, but their nutrient management is closely monitored. There is no winter spreading allowed and they fly-over farms to ensure people aren't out in a snowstorm trying to pretend that's incorporation. They regularly levy fines against people who are trying to get around the regulations. Quebec would be the closest. **[Follow-up response by Joe T.]** I can speak more particularly for Wisconsin. In many cases a lot of the counties throughout Wisconsin are still required to have nutrient management plans, which includes a lot of mid-size and smaller size farms. We do come in with that level of reporting and planning. That is what I am seeing here in the state.

Question:	**Is there any provision for punitive actions against a CAFO who just ignores all recommendations and permitting terms?**
Response:	**[Sandy B.]** There are laws and CAFO permits. If there is a permit violation, in Ohio, the Department of Agriculture has personnel that oversees the permits and they will send a letter with recommendations. If after sending the letter the farm doesn't come into compliance further action can be taken by the Ohio Attorney General's office. How often does this happen? Almost never. While the rules are there and the ability to do it is there, the enforcement and the number of people to do it is very small and very weak. I should add that in Michigan that is not so much the case. There is more enforcement in Michigan and there appears to be more ensuring the permits are being complied with. **[Follow-up response by Mark W.]** In Ontario the Nutrient Management Act legislation is under Ontario Ministry of Agriculture, Food and Rural Affairs, but the enforcement arm is done by the Ontario Ministry of Environment, Conservation and Parks. They have enforcement personnel for various regulations that fall under their ministry. They

are not known to be a friend to agriculture and so farmers are very careful about doing anything that might result in an enforcement office visiting their farm. When the Act was established this was intentional on the part of the government and it has worked very well. There are few if any enforcement requirements since 2003 under this legislation. It shows that people are using it and that it is working properly.

Question: **What is the appropriate application rate for manure?**

Response: **[Sandy B.]** Generally speaking its really what the soil and crop need that is the determining factor.
[Follow-up response by Mark W.] I will echo Sandy's comment. In Ontario we have everything from, lake sandy soils to heavy clay soils and poorly drained soils to very well drained soils. It really comes down to, how liquid or solid the manure is; how much phosphorus is in the manure; what the recent cropping history of the land is; and what crop are you intending to grow. For example, corn requires a lot of nitrogen and phosphorus, so a heavier application rate can be used - many tonnes per acre or gallons per acre of liquid or solid manure. Whereas hay need to be more careful and a lower application rate. If growing soy beans, care is needed as well. Typically straw pack manure can be used on vegetable crops and other crops like tobacco. Liquid manure would never be used on crops that are very nitrogen sensitive; otherwise you will have a crop with a lot of vegetation, but no fruit. It's really variable based on soil type, crop history and the type of crop being grown.

Question: **Are there programs, laws, or other governmental planning processes that community members can access to ensure that industrial sized farms are responsibly managing the excessive amounts of manure they produce so they do not pollute our Great Lakes and tributaries?**

Response: **[Sandy B.]** Great question. There are two aspects with the challenge with manure management– the community where the manure is being applied and then the waters that they are impacting, which are downstream. For example, in the western basin of Lake Erie the CAFOs are mostly in the Maumee watershed, which is about 75-100 miles upstream of the lake. It transports down the Maumee River through streams through the Auglaize. That's where most of them are at. There is no accessible database to see when manure is being applied, if it has been over-applied and if/how it is impacting the lake. I don't know of any testing being done, unless there is a researcher doing a specific edge of field study for manure runoff and whether there is *E. coli* in the streams before reaching the lakes or the amount of phosphorus runoff. Heidelberg has a database that can be accessed in terms of the amount of phosphorus, as does the University of Toledo and Ohio State. There are a lot of data points in those where you can see the amount of phosphorus. I think I saw another question that asked if you can determine if it is commercial fertilizer or manure. The answer is - it's not being tested in that manner. You can do it. There is DNA testing that can tell us if it is an organic source or commercial fertilizer and if it is human or animal. However, that kind of testing is not being done. It's been proposed, but it has not happened. It would be very helpful to know this, to help zero-in on the extent of the problem. I can't tell you of a good database that exists. There are different boards in different states that

people may want to access, but it is not an easy thing to determine. Mark, what is it like in Ontario?

[Follow-up response by Mark W.] I will focus on the part of the question regarding whether there are programs, laws, or other governmental planning processes that community members can access. The direct answer is no, but there are a number of indirect ways the community can be involved. Ontario has pieces of legislation, such as the Environmental Protection Act and Nutrient Management Act that operate on a complaint basis. So if someone sees something being done wrong the Ontario Ministry of Environment, Conservation and Parks will go out to investigate to make sure things are being done properly. That is typically how our legislation functions. We have a piece of legislation called the Clean Water Act 2006. This organized 19 regions in Ontario called Conservation Authorities, where committees were formed that included people from the general public. As Gayle mentioned in the introduction, I sit on the Lake Erie region onec. This is a four watershed area, in central part of Lake Erie watershed. There are representatives from agriculture, municipal governments, Indigenous communities, business and the general public. For the last 14 years we have been creating watershed plans to ensure municipal sources of drinking water are protected from any harmful activity, not just agriculture. The requirement is that any activity, whether salt storage or manure application, that occurs within a certain distance from a municipal water intake or a well, has to have a plan on how to mitigate the activity or it must be stopped. That process has been in place for 14 years. It has worked very well and has the participation of the general public through monthly or bi-monthly meetings. That's a fairly extensive process. The public can also be involved in Conservation Authority activities. Conservation Authorities are primarily responsible for flooding and water management of the tributaries that eventually make their way to the lakes. There is a lot of public involvement there. However, directly overseeing farms is a responsibility of government. They take that responsibility very seriously as does the farm community. This is why farmers worked closely with government 17 years ago to get the Nutrient Management Act in place. So there was one consistent set of rules that everyone had to obey and everyone could understand.

Question: **Rather than compare bordering states and provinces to one another, why not include international best practices from jurisdictions such as the Netherlands?**

Response: **[Joe T.]** That is one of the things we looked at. Recommendation #4 does suggest looking at other jurisdictions, such as the Netherlands. In particular, their manure management practices and how they provide oversight of it. It is something to take into consideration. Also consider the landscape and soils they are dealing with as well as their animal operation size. Definitely something to be taking a look at, which the report recommends assessing.

[Follow-up response by Sandy B.] Also recommend further study of the Netherlands of their practices to look at the potential of applying those practices here. This study had limited funds and time to be able to go into detail of the Netherlands or other countries that have good nutrient management practices.

[Follow-up response by Mark W.] I would add that the report looked at Denmark, in addition to the Netherlands. These two jurisdictions have a long history of large-scale livestock operations and issues around them. As Sandy pointed out we had limited funds and we could only do so much study. We clearly identified there was more to learn from these jurisdictions, in Denmark and the Netherlands, related to manure management that could be applied here.

Question: **Mark, is there consistency between states/provinces in the use of P-soil index testing to set NMP requirements based on P soil levels?**

Response: **[Mark W.]** Quick answer is no. That is one of the things I pointed out in the beginning. Here in Ontario, for the soil test recommendations, it doesn't matter what crop is being grown. It is based on crop removal; what the crop needs. This is not the case on the US side of the lakes and is something that needs to be brought better into line. I'm not sure what Quebec uses in terms of soil test requirements, but suspect it is similar to Ontario.

Question: **The Nutrient Management Act only limits spreading of manure on frozen snow or covered ground for farms with greater than 300 livestock. What controls are in place for 299 livestock and less?**

Response: **[Mark W.]** Just to clarify it's not 300 animals, it's 300 nutrient units (NU). This would typically be 300 dairy cows, so it can be a lot more hogs, a lot more chickens. The Act itself covers not only those operations with 300 NU or more, but also limits the spreading for new operations, regardless of size; expanding operations; and those operations prior to 2003 that were irrigating liquid manure on land. Those same controls someday will legally apply for those under 300 NU, but don't today. Spreading on frozen or snow covered ground is deemed to be a bad practice. We do have a system in place with different livestock commodities where producers are encouraged to not engage in this practice if they fall outside of the Act. I have caught farmers, when it's snowing, who were applying manure to the land. I said to them – I know you are supposed to be able to incorporate this in 24 hours, but spreading in a snow storm does not equate to incorporation within 24 hours. The livestock commodities do work for their producers. If there is a complaint they will go talk to the farmer in question and encourage them to stop the practice. Obviously if there is any runoff into a stream or tributary with a fish kill, this brings in the Ministry of Environment, Conservation and Parks and the farmer will get charged. I would expect someday the Nutrient Management Act will be extended to all livestock producers. But, as Joe pointed out the economics of livestock production are such that the smaller producers will have a great deal of difficulty and will need some cost share funding in order to get their manure storage up to 275 days, if not more.

Question:	**Was the economics of animal farming in the US and Canada explored in the background of the Water Quality Board's report, that is, from farm suppliers all the way through to the ultimate meat consumer?**
Response:	**[Joe T.]** Those intricacies were not totally explored throughout the report. What was looked at was the thresholds and involvement is regarding state and federal funding; what is out there; what is required; and the type of cost-share that is needed to put some of these manure management structures in place. As far as a comprehensive supply chain study, that wasn't something that was explored as part of this report.

Question:	**What is likely to reverse the CAFO trend? Or is better manure control the best approach for now?**
Response:	**[Sandy B.]** I don't see reversing the trend as possible; they are a reality of today. We need to address the manure issue that comes with them. I think we are looking at establishing standards for manure production, as discussed in one of the recommendations, as they do in Ontario. In Ohio, the amount of manure produced per animal varies from permit to permit even though it appears to be the same type of animal with similar conditions. It's not uniform and that needs to be standardized. That's one approach. When you have a watershed that has excessive phosphorus, as in the Maumee and other watersheds that are having algae issues, and you continue to add more animals and manure and phosphorus to that watershed, that is a problem. There are some environmental groups calling for moratoriums on new confined animal feeding operations or requiring new operations to treat animal waste in a manner that is similar to how human waste is treated. In other words, don't keep adding to a problem in a watershed – use a watershed approach, which is important. Those are two approaches that I could see happen. **[Follow-up response by Mark W.]** I pointed out earlier some reasons why, historically, farms in Ontario tend to be smaller than those in the states. Ontario does have larger farms, but they are typically not the problem because they are regulated under the Nutrient Management Act. They are big enough that they will have sufficient storage, many over 300 days of storage, some with perhaps 365 days. This allows them to apply manure when the field conditions are better and proper. The reality is that as long as there is a strong demand for animal protein in the world, someone is going to produce it. As Sandy pointed out, if you are doing too much of one thing in one place and it is causing a problem, the best thing that can be done is to slow down the problem. Manure management is probably the best approach, given the realities and economics of agriculture. **[Follow-up response by Joe T.]** I echo what Mark and Sandy are saying. CAFOs are very much supported by industry, everything from information management systems to the management technologies involved. But there is a place also. We need to be careful where they are placed and how they are managed to. Manure management and control is probably our best approach right now. That is the nature of the industry and the economics.

Question:	**Is there any recommendation for joint nutrient management plans for adjacent livestock projects, as one problem is the cumulative effects of several farms in the same region?**
Response:	**[Mark W.]** The reality is, under the Ontario Nutrient Management Act and the plans required, you should only be putting enough manure, either solid or liquid (in most cases it is liquid), on land that the crop will use during that growing season. If you are doing that appropriately on one farm in the area or a dozen farms in the area, as long as it is being used by the crop, it is not going to leave the farm property. One of the problems, which studies show, is that the greatest amount of nutrients leaving the landscape occurs between November and April, when there is no crop on the ground. This is the issue with fall or winter spreading of manure. In Ontario, the Thames River Phosphorus Collaborative, who work with the Great Lakes mayors group and the Ontario Federation of Agriculture and a number of other commodity organizations; have several edge-of-field capture projects. Tile drainage is captured from farms and channeled to one structure, where the phosphorus is removed from the water and the clean water is fed to a ditch system, which eventually makes its way to Lake Erie. So, we are actually proving that tile drainage water, coming off farmland, can be treated. It has been working very well. Some of these projects have been underway for several years – we are proving you can deal with that problem. If you are applying nutrients at the proper level on the farms, there really isn't a cumulative effect. **[Follow-up response by Joe T.]** I think you just summed it up right there Mark – if we can apply the proper level at the proper time, there should not be that cumulative effect. I think where we are seeing a cumulative effect, is possibly due to improper levels or improper sub-soil structures and we may be seeing this in some of the more environmentally sensitive areas.

Question:	**I am curious about recommendation to notify neighbours about new/expanding livestock operations. How does proposed neighbour notification improve water quality if the farm meets all regulatory and best management practice requirements in their documentation?**
Response:	**[Sandy B.]** Very sensitive to the neighbours of new CAFOs and existing CAFOs. Hydrogen sulfide is a big problem in terms of emissions. It can adversely affect neighbours' health and quality of life. In the Great Lakes states even though the neighbours can be informed, because they are generally in rural areas, there is little local input or local jurisdiction to help to effect the permit. I think if people begin to raise the issues more and perhaps organize better, maybe we can get better local input. Mark, please correct me if I'm wrong, but you had said the Ontario program started because local communities restricted the number of animals on each site to five animals. And therein became the conflict that resulted in the current manure management system in Ontario. We don't have any similar restrictions on the number of animals or restrictions on the closeness or location, in general, here in the states. Even though we can notify neighbours, we would need to strengthen the local jurisdictional law and opportunities for property owners to protect their property and

quality of life. Even though it is a good recommendation it probably doesn't go far enough to make something happen.

[Mark W.] In Ontario we have legislation for minimum distance separation (MDS), which is enforced by the local township or municipality. If a livestock operation wants to build there has to be a MDS between it and any existing houses. If there is an existing livestock operation and someone wants to build a house nearby, the MDS rules kick-in and the house must be a least X-distance away from that livestock operation. All of this discussion and notification will happen through the township council process. I served 8 years on municipal council and we have dealt with a number of variances or issues around MDS regulations. That is the opportunity for neighbours to be notified. A question certainly asked of the councils, is if it is 990 feet instead of 1000 feet, will there be an impact on water quality. There is an opportunity there to deal with water quality issues. Even though the farm may intend to do everything right, still need to ensure there is the appropriate distance, geography, and terrain. As Sandy mentioned, as part of our history in Ontario in the late 1990s, we had municipal councils in rural areas that really no longer had farmers on them. People were moving to the country/rural area that didn't understand agriculture, not just livestock, but dust noise and everything else. They wanted farms to be quaint and small, and hence people got as silly as saying they don't want farms with more than 5 animals in their township. That was how out of touch with reality it got. We got our legislation and along with the MDS requirements. There is an opportunity for the public as part of the township meeting process to have their input and make sure things are dealt with properly. There is a chance there to improve water quality through the MDS notification rules.

[Follow-up comment by Sandy B.] Perhaps we can get a hold of the local rules in Ontario and have them to reference, in case people are interested in trying to get rules here in the states. How far that might go I don't know, because there is a lot of pre-emption in the states in law.

[Follow-up by Mark W.] Certainly our systems of local government operate under different pieces of legislation, but again there are things that could be looked at that could help. Anything that all of us can do to make the practices better will improve the water quality in the Great Lakes. There's lots of ways to win-win on this.

QUESTIONS ANSWERED AFTER THE WEBINAR

Question:	**Two-part question: Part 1 - What is the method for implementation of the IJC recommendations?** **Part 2 - Is there an idea as to the timeframe to convert the recommendations to regulations in ON?**
Response:	**Part 1 -** The Water Quality Board (WQB) report has been provided to the IJC Commissioners. The recommendations outlined in the report have been reviewed through an Experts Workshop and three webinars to gather further feedback. A final

	Summary Report, with recommendations and feedback from the webinars, will be produced and provided to the IJC Commissioners. If the IJC forwards the recommendations to governments it is up to the "Parties" (US and Canadian governments) to determine whether to implement the recommendations and the timeframe within which to do it. **Part 2 -** Ontario currently has regulations under the Nutrient Management Act. The WQB report recommends that the US consider adopting regulations similar to Ontario.
Question:	**Two-part question: Part 1 - How was the make up of the board determined? Did either of the members from the agriculture community represent the interests, experience, and knowledge of the CAFOs? If not, how was that segment of Ag incorporated into your research, investigation, analysis, and recommendations?** **Part 2 - What kind of producer involvement or collaboration is there with this project?**
Response:	**Part 1 -** The agricultural representatives on this Project Team are members of the Water Quality Board that represent the agricultural sector. It is acknowledged that the agricultural community has broad interests, experience and knowledge. The Project Team tried to ensure that the invitation to the webinar with the agricultural community represented a broad outreach to a variety of those involved in this important sector. **Part 2** Based on the work group members' knowledge of interested key organizations, the work group sent out invitations to farmers from different livestock commodities to attend the focus groups and reviewed the contractor report as well.
Question:	**Who [was] attending these meetings in the fall of 2019?**
Response:	There was a workshop in November 2018 with meat and dairy, environmental and government representation to give feedback on the recommendations.
Question:	**Could we get a status update on the use of DNA in tracking ag manure?** **Actually, DNA testing will be useless to tell the source of the P. It can help with microbial contamination, but the P in the river is simply an element that is not attached to any particular sources.**
Response:	The DNA referred to is testing in waters to determine the source of the phosphorus. There are tests to determine whether the DNA is inorganic commercial fertilizer or organic. There are also DNA tests that can determine if the organic source is human or animal, and when it is animal DNA, the type of animal (cow, chicken, hog).
Question:	**What can we do in the USA to get standards more like those of Canada?**
Response:	The IJC can bring both countries and the states/province together to discuss. Initially, the effort will be to get some foundation agreements for information to help to

develop policies. Ultimately, it will be a combination of public demand and political will.

Question:	**The environmental working group report was based on remote sensing, was this data checked against the recent USDA Ag Census report? (US side)**
Response:	Although, not available before the IJC manure report was written, there was the EWG report and others study on the Maumee watershed in the Western basin of Lake Erie completed in April 2019 (see: https://www.ewg.org/release/investigation-manure-unregulated-factory-farms-fuels-lake-erie-s-toxic-algae-blooms). There was a follow up study by Jeffrey Kast and others, Manure Management at Ohio Confined Animal Feeding Facilities in the Maumee watershed, completed in December 2019 (see: https://www.sciencedirect.com/science/article/abs/pii/S0380133019301765 but note this is behind the paywall of a peer-reviewed journal). The Kast et al. study widely confirmed the remote sensing EWG data by using the USDA census data, except for poultry. However, the disputed site of 4 million chickens does in fact exist, and the 4 million chicken location was reportedly incorrectly reported to USDA in the ag census. EWG called USDA and found that there was an entry error, the chickens were mistakenly entered somewhere else. 4 million chickens do exist in the Maumee watershed. Therefore, the numbers in the EWG report were substantially confirmed.

Question:	**At one point, the idea of creating a manure dataset with location information. Will this dataset be GIS compatible? Further, will it be open source so academics can easily work with it to model nutrient runoff using a GIS?**
Response:	The goal is to be able to have an animal count reported by county/watershed and to have a standard amount of manure generated per animal that then would determine the acreage needed at the agronomic rate for the manure. It is premature to know if this information will be able to be placed in a GIS database, though a GIS database would be good to have.

Question:	**Ms. Bihn states that the algal bloom escalation coincided with an escalation of CAFOs in the Western Lake Erie Basin. Would you please elaborate further on this observation and include any census or other numbers of new livestock operations and science based support for the coincidence.**
Response:	USEPA did a manure report in 2013 that stated that there was an 80% reduction in the number of farms raising livestock along with a 50% increase in the number of animals being raised (see: https://nepis.epa.gov/Exe/ZyPDF.cgi/P100H2NI.PDF?Dockey=P100H2NI.pdf). The switch to confinement and nearness to markets began in the 1980s and began to take hold in the 1990s in the western Lake Erie basin. A lot of dairy relocated from the Netherlands to the Maumee watershed in the 1990s. This is documented in articles (see: Henry, Fran. "Big Farms, Big Problems?" Cleveland Plain Dealer. Aug. 1, 2004). The other 'change' that occurred with the confinement is that hog and cow manure had to be liquefied to be spread within a couple of miles of the barns. The EWG report (see: https://www.ewg.org/release/investigation-manure-unregulated-factory-farms-fuels-lake-erie-s-toxic-algae-blooms) showed a 40% increase in the number of animals and

the amount of manure generated in the Maumee watershed with an estimated 62% increase in manure generated phosphorus between 2005 and 2018. The numbers were largely confirmed by a December 2019 study by researchers at OSU (see: https://www.sciencedirect.com/science/article/abs/pii/S0380133019301765 but note this is behind the paywall of a peer-reviewed journal). The percentages would be even greater if the period between 1995 and 2005 were included, but there is no satellite imagery for the earlier years. There was also an increase of 28,000 hogs in permitted facilities in the Maumee in 2019 and 12.600 more hogs in the permitting process in 2020.

Question: **You mentioned that you are suggesting prohibiting irrigation of manure. Is there any consideration for setting a threshold of nutrient content? Currently, low-concentration products like egg wash water and post-treatment effluent are being irrigated. These liquids do not contain enough nutrients to be trucked or drag-lined, but cannot be discharged to surface water like wastewater plants.**

Response: There is no recommendation or suggestion on prohibiting the irrigation of manure. The report recommends "Ontario's ban on the use of high trajectory irrigation guns to apply manure (unless containing more than 99 percent water) should be considered."

Question: **Didn't the IJC last year fund LimnoTech to do a manure balance report that showed the P manure contribution was somewhere around 18% for Lake Erie I think. I could look it up but it certainly was under 20%? Is there a source cited for the 50% figure that Sandy stated?**

Ms. Bihn states that 20-50% of the total P loading can be sourced to livestock. Can a source be cited for this assessment and what is the technology that is used to ID the P source whether commercial or manure?

How much of the pollution and algae bloom in Lake Erie is caused by non-agricultural operations and activities?

Response: In February 2018 the IJC published a report by its Great Lakes Science Advisory Board, "Fertilizer Application Patterns and Trends and Their Implications for the Water Quality in the Western Lake Erie Basin and provided a supplemental analysis with more data in 2019 (for the report and supplemental, see: https://www.ijc.org/en/fertilizer-application-patterns-and-trends-and-their-implications-water-quality-western-lake-erie). It considers primarily commercial (or synthetic) fertilizer and manure, and secondarily other nutrient-containing materials applied to agricultural lands. This IJC report also noted the challenge of getting accurate data on non-permitted livestock feeding operations in order to accurately estimate manure generation.

This WQB report does not exclusively focus on the western Lake Erie basin, but looked at livestock feeding operations throughout the Great Lakes basin. The available data to analyze is a moving target as increases in the number of animals and facilities is always changing. The manure mass balance in this WQB report was initially based on the 2002 USDA census, and was updated later and was based on permitted facilities. It is estimated that are nearly double the number of confined operations (EWG) in what is

commonly referred to as 'one unders.' The December 2019 Maumee manure report be researchers from OSU and the Graham Institute in a report, state that 85-88% of the nutrient runoff in the Maumee is from nonpoint sources. This report also estimates the manure Maumee nutrient contribution at 19-23%. The estimate of up to 50% is based on permitted and unpermitted facilities, the change to liquid manure, soil phosphorus 150 ppm limit, and the increase in field tiles in the Maumee basin, and the decrease of phosphorus commercial fertilizer use by 40%(Ohio Farm Bureau) in the last several decades while the phosphorus in the Maumee has remained constant or increased. A basin wide TMDL would determine the source and amount phosphorus/nutrient contribution from the Maumee to Lake Erie.

The IJC Great Lakes boards (Science Advisory Board and Water Quality Board) will be collaborating on more research into nutrients in the Great Lakes in the future.

Question:	**Just wondering if the report includes any recommendation related to improvement of manure management at small and medium farms?**
Response:	The report recommends that all confined operations report the number of animals and that Nutrient Management Plans be required for all medium and large size operations(as defined by USEPA), along with using the agronomic soil phosphorus amount.

Question:	**Manure P may be as available as what [is] in chemical fertilizer. How [are] the long-term manure P effects are considered?**
Response:	This is beyond the scope of this study.

Question:	**Were other provinces' manure and nutrient management practices and regulations besides Alberta and Saskatchewan reviewed during the work done for the report?**
Response:	Yes, Ontario was reviewed.

Question:	**Do you think that this report adequately captured the efficacy of institutions? You draw a tenuous causal inference between more stringent regulatory standard levels and environmental performance.**
Response:	No, this report did not address the efficacy of institutions in one sense, but did review and compare policies of multiple institutions. Establishing standards for performance and a data base for the numbers if each classification of livestock animals are needed for the institutions to assess impacts and to attain environmental sustainability.

Question:	**Many of our Great lakes tribs [sic] have headwater sources supplied by glacial moraine aquifers often unconfined and vulnerable to surface land uses which in Western NY are changing from forest to CAFOs (land clearing for manure spreading). Is this addressed by Rec. 1?**
Response:	This report did not address geology and feasibility of soil/aquifer types. Though the aquifers and soils are a required part of the nutrient management planned required for permitted facilities.

Question:	**Has there been any thought of encouraging a more distributed food system as it applies to livestock, something that would necessarily require the establishment of more small abbatoirs?**
Response:	Not a part of this WQB report, but something we're working on in the Dairy Grazing Apprenticeship with the New Dairy Concept.

Question:	**Since 2002, Wisconsin has required a Nutrient Management Plan for any farmer applying commercial fertilizer or manure, or any farmer raising livestock. Nutrient management plans in WI are required far more frequently than just for CAFOs.**
Response:	This is true. The report is recommending consistency for these plans across the basin.

Question:	**Under Report Recommendations 3.2 - What about No-Till practices in combination with cover crops? I didn't hear any mention of no-till.**
Response:	No till is a recognized practice to reduce soil erosion, it was just neglected to be mentioned in the responses during the webinar.

Question:	**Given that there is a recommendation for government financial assistance to help ag operations shift toward better manure management, is there a total cost estimate and/or any discussion about a surcharge on feedlot products to off-set these costs?**
Response:	The financial assistance/cost-share aspect is related to report recommendation 3, but the report did not look at estimated costs or approaches to off-setting costs. History shows that cost-share programs are a much better way of getting acceptance from the farming community. In Ontario, cost-sharing is a well-established process that many farm operations have experience with. Since 1992, 75% of all Ontario farmers have done an Environmental Farm Plan where they identify practices that need improvement and this makes them eligible for 30% and sometimes 50% cost share funding to solve the problem.

Question:	**What do federal and state regulators take into account when determining what the maximum load is per farm?**
Response:	Part of the reason that the WQB recommends following the Ontario model is that the Ontario model is prescriptive for many variables with a standard formula for determining nutrient management units, while in the US there is not a single framework to account for setting maximum loads. Overall, soil is tested to determine the current nutrient levels. The manure is tested to determine its nutrient content. Identify the nutrient needs of the crop. Calculate the manure application rate. Crops may underperform with a limited or an excessive amount of nutrients. Further complicating the problem, manure testing is not all that accurate. Ultimately it depends on many variables.

Question:	**Comment in the summary: "The situation is of even greater concern because of the increasing trend toward concentrated feeding of livestock and other farm animals rather than pasturing or free range." This is confusing to me and implies that**

	pasturing/free range would be much less of a concern than CAFOs. I believe that New Zealand has a nutrient loading problem mainly due to pasture cattle production. Shouldn't be the problem be more of the increase in cattle production intensity and its consequences? Whether it is in pasture or CAFO, the amount of manure produced would still be the same. Thanks.
Response:	Agreed it's the concentration of animals that is the main issue. Much of the problems in New Zealand is the over application of commercial Nitrogen to boost grass growth vs the amount of manure that the cows are producing. The number of animals in a grazing based operation is determined by the amount of feed that can be grown within a distance that the cow can walk. Typically this equates to smaller herd sizes.

Question:	**How does a technology provider from the US obtain funding for enhanced manure management/treatment in Ontario?**
Response:	In the US, typically, the farmer applies for, and receives the funding for, manure management structures or practices to be implemented in their farm. It is up to the farmer to hire the contractor or technology provider to do the work. To the knowledge of the work group members, it would be up to the US farmer to contact the contractor or technology provider if they were located in Ontario, or vice versa. The work group is not aware of ways a US technology provider could currently receive funding to provide their enhanced manure management/treatment services in Ontario, assuming that is what this question might be asking. The idea behind the report Recommendation 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)" is to begin to bridge this binational gap in sharing access to technology.

Question:	**Has the report (or any other sources) determined the amount of P loss per ha when following the Ontario model NMP?**
Response:	There are no reports or studies that our WQB work group members are aware of. However, there are numerous studies that show the variation of P loading from all sources during each month. The peak loadings occur from November to April when crops are not growing, and cover crops and buffer strips have limited benefit.

Question:	**Following the recommendation to use Ontario's framework as a model, I'd like to know if the WQB considered the gaps in our nutrient management model. Namely: the lack of enforcement, and loopholes in our framework particularly around winter spreading. This year from Jan 12-16 storm events led to a years worth of phosphorus entering Lake Erie from Canadian tributaries -this shows we have a lot of work to do in ON**
Response:	The work group members agree that there is still more work to be done in Ontario. Ontario's act requires complaint driven enforcement, which is typical for much of our legislation. Winter spreading by those not covered by the act is definitely a concern and it is the opinion of the work group members that winter spreading will need to be regulated in Ontario in the future.

Question:	**Does Ontario have less pressure from Ag groups to resist regulations? Isn't lobbying to the state legislature a factor in Ohio, for instance? I congratulate Ontario!**
Response:	As work group member Mark Wales mentioned in the webinar, the Ontario Ag organizations asked for the Nutrient Management Act and worked with the government of the day to get a practical workable piece of legislation. We appreciate your congratulations.
Question:	**In Ontario there seems to be little pre-emptive enforcement of good practice in some areas. Is there a chance of better enforcement?**
Response:	It has been found that education and cost shared funding programs work much better than prescriptive enforcement. Since 1992, 75% of all Ontario farmers have done an Environmental Farm Plan where they identify practices that need improvement and this makes them eligible for 30% and sometimes 50% cost share funding to solve the problem. Many farms have used this route to improve their manure storage and application practices. Also, buffer strips near watercourses and adoption of cover crops have been done thru this and other programs as well.

Question:	**Are there any initiatives or research efforts looking at improving manure transport/trading between smaller farms not covered under the Ontario Nutrient Management Act as an effort to curb winter spreading on these smaller farms?**
Response:	Manure is seen to have value as a nutrient supplement and given that livestock farms tend not to be concentrated there is generally not a lot of need for trading. Having sufficient storage for liquid manure even for smaller operations is the real problem and the best solution has been cost-shared programs to improve on farm storage until field conditions are best.

Question:	**Spill reports are voluntary - and then the NMA [Ontario Nutrient Management Act] points to the EPA [Ontario Environmental Protection Act], which allows an exemption for a "normal farm practice" So is winter spreading considered a normal farm practice?**
Response:	Under the NMA, spills, fish kills, etc. are an offense and are subject to a visit by the Ministry of Environment enforcement branch. Winter spreading is not considered a “normal farm practice.” There is a separate piece of legislation entitled the Normal Farm Practices Protection Act which was created to deal with normal practices like spreading manure (under the appropriate conditions), making dust when tilling land and the noise, etc. from activities such as planting, spraying harvesting, etc., and of course sometimes working around the clock to stay ahead of weather etc.

Question:	**Who oversees Ontario's system to ensure facilities comply and how often are they inspected?**
Response:	In general, the Ministry of Environment enforcement branch is responsible when a spill, etc. has occurred. The local Municipality’s building inspector is typically responsible to ensure that the design and construction and location are all meeting the building code and various legislation such as MDS (minimum distance separation) are adhered to. There is no mandated inspection of manure storage that work group members are aware of, however there may be. Most liquid manure is stored in concrete tanks many having concrete lids or are located under

the livestock barns. Failure of the storage will result in a charge under the NMA so farmers are pretty good about maintaining them. There are not many earthen manure lagoons in Ontario.

Question: **Is there very specific nitrogen management plan in Ontario? Such as 200 kg/ha use for everyone? Or just maximum amount for recommendation?**

Response: There are no specific recommendations for Nitrogen on crops. Soil tests for Nitrogen are not always accurate, and nitrogen needs are very specific to the crop being grown. Vegetable crops especially are very Nitrogen sensitive. Too much at the wrong time will ruin the crop.

Question: **Is the soil testing for animal farms mandatory in ON?**

Response: No, soil testing is not mandatory for all animal farms. It is a required part of your Nutrient Management Plan if your farm falls under the Act (greater than 300 Nutrient Units). Soil testing is recommended for all farms.

Question: **For crop fertilizer, is there Ontario provincial plan for forcing farmers to apply certain amount of nitrogen or phosphorus fertilizer by law? Or just have recommendations different by regions?**

Response: There are recommendations based on your soil test and cropping history for fertilizer application. Every farm is different and even within a 100 acre farm you may have several different soil types and grow different crops thus everyone's needs will be different potentially on every field every year. Nitrogen and Phosphorus are very expensive and farmers by nature are very frugal. Wasting money on excess fertilizer is not good business.

Question: **Is there a timetable for extending the NM Act to operations less than 300 Nutrient Units (NU) in Ontario?**

Response: When the Act was created in 2003, the priority, both real and political, was to resolve the issues for farms with more than 300 NU, and new and expanding. There was a great deal of cost share funding made available so that those farms could improve their practices. When the money ran out so did the political will to extend the Act further. The Act was designed to cover all livestock and crop farms.

Question: **How much manure production in Ontario is covered by phased in Nutrient Management Plans?**

Response: Certainly the majority of livestock numbers are covered by the Act. Not the majority of farms but the majority of production. Our work group members do not know the exact percentage.

Question: **A comment on neighbouring farms: The Ontario Nutrient Management Act was set up to avoid barriers for moving manure from livestock farms to neighbouring cash crop farms, so the nutrients can be used more efficiently.**

Response: Generally, farmers who have more manure than owned land are able to rent sufficient land to use to spread and crop. This is the normal situation. Some manure is sold but this is generally dry straw pack and is used by specialty vegetable growers.

Question:	**Why not mandate precision ag practices on both sides?**
Response:	Currently "4R" which is a part of Precision Ag is being promoted in most parts of the basin. This is really about using the right product, right amount, right place and right time. Liquid manure does not necessarily lend itself well to this model. Fertilizer of course does.

Question:	**Which types of manure-generating operations are growing most rapidly? Hogs?**
Response:	In Ontario, there tends to be consolidation in dairy operations but no real growth. Hogs tend to be cyclical and grow or shrink as a result of trade deals. Recent diseases outbreaks and economics have tended to limit growth. On the US side, to the knowledge of the work group members, it is dairy that is growing most rapidly in the Great Lakes states.

Question:	**Are there any counties in the Great Lakes Basin that have banned or restricted manure application due to P content? If not, is this a predicted trend in local regulations to reduce the load discharged into the Lake?**
Response:	Work group members are not aware of any county restrictions in Ontario. Since overall P loading from Ontario is only 6% of the total there is not the need to restrict one activity. In addition, we have legislation (the NMA), plus good adoption of Best Practices and 4R. Also, the total loading is not only from Agriculture but Municipal sewage treatment and inconsistent storm water treatment and poor septic systems.

Question:	**Two-part question – Part 1: Is there any limitations on heavy metals that restricts sludge application on farmland? Part 2: Is there regulation on not concentrating cows under the area that is way too crowded. Such as limiting the number of livestock allowed?**
Response:	**Part 1:** In Ontario, there are permit requirements for farmland application of Municipal sewage sludge. These fall under the Ministry of the Environment and require testing and include limiting the amounts. There is ongoing controversy about the practice much of it related to heavy metals and medical waste that ends up going down the drain. Paints and other chemicals that people pour down drains create challenges as most Municipal treatment systems cannot separate them out from basic biological waste. **Part 2**: In Ontario, the cost of quota acts as a limit on the number of animals in Dairy, Chicken, and Turkey operations. Hog farms tend to be at the mercy of the marketplace with very little government support when times are bad which limits growth as well. In addition Municipal rules relating to MDS (minimum distance separation) restrict where livestock barns can be located in relation to existing houses.

Question:	**Do regulations cover the timing of manure application relative to the timing of precipitation events, i.e. do not apply right before rainfall? Research has shown linkages between elevated nutrients in surface runoff immediately following manure land application, especially after broadcast.**
Response:	In general, spreading is to be restricted prior to heavy rainfall unless it can be incorporated. Work group member Mark Wales notes:, "as a farmer, my challenge is that Mother Nature always gets the last word. When you want rain you will not get it, and when you plan on it not

raining then it definitely will. The weather is the will card in trying to deal with application timing."

Question:	**Is dry pack manure a major issue as well or just liquid manure?**
Response:	Dry manure does not flow well and has not been a problem.

Question:	**Unless things have changed... the owner of the animals do not own the waste. Should this change to put to ownership of the manure management on the corporate owner?**
Response:	Overall, the rule is, if it's your animal, it's your waste to deal with. Work group member Mark Wales notes: "As a farmer that is the reality I have to deal with in Ontario."

Question:	**Environmental monitoring is expensive. To what degree do the polluters pay for survey, monitoring, and remediation/restoration?**
Response:	Environmental monitoring, although important, was outside the scope of this project. It is important to note that the Water Quality Board co-chairs, in addition to other Advisory Board co-chairs of the IJC have identified monitoring as a key are to be discussed with the Commissioners.
Question:	**How is the proliferation of greenhouses affecting the P loading of Lake Eerie [sic]?**
Response:	Greenhouses weren't part of the project scope of this report. More information about greenhouses as they come under the Ontario NMA is found above on page 2 of this response document.

Question:	**Any comments related to possible changes in manure management related to the occurrence of perflourniated compounds in manure?**
Response:	While it is recognized that other contaminants exist in manure, the focus of the WQB's work was on nutrients in manure and the regulation and policy around manure to manage nutrients. The goal of the WQB's work was to identify areas for strengthening the manure management framework in the context of reducing and minimizing nutrient runoff from agricultural lands.

Question:	**In light of the Supreme Court Ruling on the sewage waste, would CAFO waste by extension be view in a similar manner?** **Is consideration given that if Municipal Waste Water Treatment Facilities no longer accept manure nutrients, does this impact the need to address the recommendations timeline?**
Response:	Manure management approaches are not similar to WWTPs, as WWTPs treat human waste and manure is land applied, and so generally manure is not treated while human waste is treated.

Question:	**Are there plans for (more facilities) to burn manure for energy or other methods for using excess manure?**
Response:	While the WQB's report recommends the need for funding to support the adoption of manure treatment technologies, it does not explore, assess or recommend specific treatments.

Question:	**Why has the Manure Management report not investigated these fish farms and included recommendations regarding nutrient loading from their open net pens?**
Response:	The WQB recognizes that there are several sources of nutrients to the Great Lakes. As noted in the report, the runoff of nutrients from manure applied to agricultural fields is a significant loading source to the lakes. As a result the report focuses on the regulation and policy around manure to manage nutrients and areas where this regulatory framework can be strengthened.

Question:	**What are your thoughts on the current milk over-supply and applying a manure+milk mixture as fertilizer (i.e., land application of milk)?**
Response:	This question is outside of the scope of the report and the Water Quality Board members do not have comments on this question.

Question:	**What about recommending building new and restoring wetlands to clean the runoff?**
Response:	There are a number of implementation programs, including wetlands, that can be reviewed and implemented to assist with reducing nutrient runoff. A complete report on implementation was outside the scope of this project.

Question:	**Have you considered climate change adaptations in your recommendations?** **What is your organization doing to address the CAUSES of global warming?**
Response:	The WQB's report notes that runoff of excess nutrients originating from agricultural land can be intensified during extreme storm events.

Question:	**Was any consideration given to developing a market to take the excess nutrients from the Great Lakes basin to more nutrient starved areas across the US?**
Response:	This question is outside of the scope of the report and the Water Quality Board members do not have comments on this question.

Question:	**Given that the Olympic Drug Squad is in a holding pattern for a year and the signs and symptoms of consuming chemically-compromised drinking water (e.g. Flint, MI) and polluted air mimic those of COVID-19, is it not then a matter of public safety to order the analytical labs contracted by the municipality in affected Watershed Treaty Territories to release the raw data + quality control quality assurance certificate to the public in order to make an accurate differential diagnosis and support the appropriate treatment protocol?**
Response:	This question is outside of the scope of the report and the Water Quality Board members do not have comments on this question.

Question:	**Starting with Ontario, how could these protocols be rapidly integrated into implementation of Recommendations 2.2, 2.4, 4.1 and 4.2 https://www.aaas.org/resources/location-based-data-crisis-situations?**
Response:	This question is outside of the scope of the report and the Water Quality Board members do not have comments on this question.

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

Lake Erie Foundation	Ontario Headwaters Institute
Lambton Federation of Agriculture	Pennsylvania Department of Environmental Protection
Land & Water Conservation Dept.	Pennsylvania State University
Laurentian University	Phosphorus Alliance
League of Women Voters	Queen's University
Lenawee Conservation District	Representative Gallagher's Office
LimnoTech	Saugeen Valley Conservation Authority
Little Traverse Bay Bands of Odawa Indians	Senator Gary Peters' Office
Maitland Valley Conservation Authority	Senator Rob Portman's Office
Manitoba ARD	Severn Sound Environmental Association
McMaster University	sharedgeo
Michigan Dept. of Agriculture and Rural Development	Sierra Club
Michigan Dept. Environment Great Lakes and Energy	Southeast Wisconsin Regional Planning Commission
Miami Conservancy District	St. Clair Region Conservation Authority
Michigan Environmental Council	The Council of State Governments
Michigan State University	The Nature Conservancy
Michigan State University Extension	Tip of the Mitt Watershed Council
Monroe Conservation District	Toledo Division of Environmental Services
National Farmers Union - Ontario	Toledo Metropolitan Area Council of Governments
National Wildlife Federation	Toledo Water Reclamation
Natural Resources Research Institute	Town of Essex
New York Department of Environmental Conservation	University of Guelph
New York Department of Agriculture and Markets	University of Iowa
New York Soil and Water Conservation Committee	University of Michigan
NEW Water	University of Waterloo
Northland College	University of Windsor GLIER
NTH Consultants, Ltd.	Upper Thames River Conservation Authority
Ohio Department of Agriculture	US Department of State
Ohio Department of Natural Resources	US EPA Region 2
Ohio Environmental Protection Agency	US EPA Region 5
Ohio Environmental Council	US EPA Great Lakes National Program Office
US Department of Agriculture	
US Department of Agriculture – Natural Resources Conservation Service	
US Geological Survey	
Vorys	
Water School for Decision-Makers (W1SD0M)	
Wisconsin Department of Natural Resources	
Wisconsin's Green Fire	