Public Hearing Transcript
Proposed Nutrient Concentration Objectives and Loading Targets for the Red River
Transcript of Public Comment Period during the Red River Public Hearing in Winnipeg, MB on February 12, 2020

Marci Riel:

Being first.

Marci Riel:

So I'm Marci Riel, I'm the senior director of energy and infrastructure at the Manitoba Metis Federation. Thank you very much for the opportunity to bring comments.

Marci Riel:

So to start, I'd like to thank you for your acknowledgement and welcome you to the homeland of the Metis Nation. We will be submitting a written submission to the IJC, and so for the purpose of this evening, given the amount of time allotted and the number of others who are here today, I'd like to make just a couple of comments and provide some context.

Marci Riel:

So laying it out there, obviously the MMF is the government of the Manitoba Metis community. Certainly our focus is on health in the current state of Lake Winnipeg as influenced by increasing nutrients causing eutrophication. The MMF has a series of recommendations regarding the proposed nitrogen and phosphorus nutrient objectives that are being proposed in this process.

Marci Riel:

And from that I have three specific recommendations and just a couple of comments. So recommendation number one is that the MMF supports the IJC's proposal to add nitrogen and phosphorus to the list of objectives that are being monitored. Nutrient loading in the Red River undoubtedly influences other lakes and rivers within the basin and specifically of concern to the MMF and its citizens is the downstream effects towards Lake Winnipeg.

Marci Riel:

Mitigating nutrients to help protect Lake Winnipeg is a priority for the MMF on behalf of its citizens. Our citizens and harvesters are primarily focused on concerns around water quality, ecosystem health, those types of issues, and we're particularly concerned with the current state of Lake Winnipeg in general, the algal blooms, all those types of significant issues.

Marci Riel:

Rob mentioned earlier consumable fishable is always a big concern to the MMF and its citizens. President Chartrand always says having the right to harvest is not a useful right to have if there's nothing left to harvest. And so certainly the focus is on health and safety of the basin itself.

Marci Riel:

With regard to moving forward in a process, one of the things that we would be looking for the IJC to consider as a recommendation is partnerships with the local indigenous communities. Certainly the

MMF would be willing to partner with the IJC on monitoring programs specific to nitrogen and phosphorus concentrations in the Red River basin. It would be among our focuses to ensure that the objectives are being met.

Marci Riel:

I know we're all aware that exceedances happen, but they tend to happen quite a lot within this basin, and then they tend to happen quite significantly, so one of the concerns that has been raised, or is being raised by the MMF through this process, is that we understand that that will happen, but it seems to consistently happen, and so that leads into my second recommendation, which is from our review of the IJC nutrient reports, the MMF is concerned with the suggested nitrogen and phosphorus targets in the fact that they're higher than the nutrient criteria proposed for the Canadian prairies.

Marci Riel:

Specifically, we're noting that if Lake Winnipeg is to return to nutrient levels that are pre-influence, the proposed nutrient objectives must be stricter. It would be our perspective that based on some of the documents that you've put forward through this process, the MMF is proposing nutrient concentrations that are aligned with the objectives for Lake Winnipeg in terms of total phosphorus concentrations that are significantly different than what is being proposed.

Marci Riel:

We would like to see stronger, stricter regulations around that process. And to the extent that it's possible, we would be encouraging the IJC through its recommendations to both Canada and the U.S., to identify where and when penalties for exceedances would be an option. I think the MMF's perspective would be that one of the challenges of this process is that we understand that you can't always meet the target, but if it's not possible to meet the target, then there's two options. Either the target is wrong, or there's not a sufficient level of concern about what happens when the target is not met.

Marci Riel:

And so, certainly, the MMF's perspective would be that there's an opportunity there to find some middle ground between the target itself and the penalties for failing to do so.

Marci Riel:

It's our perspective that minimizing nutrients in the Red River is a priority for the MMF. It's crucial to helping to protect downstream Lake Winnipeg. We would focus on the desired nutrient objectives in terms of the monitoring process. The MMF is fortunate it has a community-based climate monitoring program and we'd be interested to work with the IJC and its counterparts in the basin to discuss opportunities for processes that would assist with bringing that indigenous knowledge into the process.

Marci Riel:

The final comment that I would make is that we hear a lot about, it was in Rob's presentation earlier, the socioeconomic impacts. To the best of our knowledge, that's the only place that the IJC is considering the impacts of these processes on indigenous rights.

Marci Riel:

Being shoved in the socioeconomic box is really not appropriate. There are processes for stakeholders and then there are processes for rights holders, and the IJC has, at a higher level, begun working towards those opportunities. I'm not sure that the Red River board is quite there yet. I'm hopeful that that will rollout in the near future. But in the meantime, one of the things that I think we are looking for is that there are impacts of decisions made by the Crown, decisions made by industry, decisions made by arms-length organizations like the IJC that do have an impact, regardless of issues related to duty to consult and accommodate and the triggering of those processes.

Marci Riel:

But that I would encourage you to remember that in the development of these processes, it's far better and more efficient to be having those conversations with us now than it is to try to deal with what's missing later when those recommendations are being made to Canada and the U.S.

Marci Riel:

Thank you. Do you have a question?

Commissioner Merrell-Ann Phare:

I just have two questions. One is, you mentioned that, in your second point, that your recommendation, the MMF's recommendation, was that the limits should be more in line with the objectives that exist for Lake Winnipeg. And could you give us which objectives are those for Lake Winnipeg?

Marci Riel:

I probably could. I just to flip through.

Commissioner Merrell-Ann Phare:

Or will you be providing that information in your written submission?

Marci Riel:

I will be providing it in my written submission, yes.

Commissioner Merrell-Ann Phare:

Or focus and track that?

Marci Riel:

Yeah, so we think the note I have here is that it should be more in line with the criteria proposed for the Canadian prairies, and so there's a, pardon?

Commissioner Merrell-Ann Phare:

I guess my question is more proposed by whom? I'm just trying to get specifics of where, as long as we can track the ones that you're recommending, that's the point that I'm ... so if in your written submission you could specify which ones you're-

Marci Riel:

Yes, they're in the written submission. It's all specified.

Commissioner Merrell-Ann Phare:

Okay, excellent.

Marci Riel:

Yeah, no, I do apologize for that.

Commissioner Merrell-Ann Phare:

Yeah, thanks.

Marci Riel:

Second question. Yeah, thanks. You just have the one?

Commissioner Merrell-Ann Phare:

I do.

Marci Riel:

Excellent. Thank you very kindly.

Commissioner Merrell-Ann Phare:

I'll stand up again. The next person, if we could have Alexis Kanu from the Lake Winnipeg foundation, please.

Alexis Kanu:

Thank you, commissioners. My name is Alexis Kanu. I'm the executive director of the Lake Winnipeg Foundation.

Alexis Kanu:

To address water quality in the Red River watershed and in downstream Lake Winnipeg, we need to focus on phosphorus. The Lake Winnipeg Foundation supports the phosphorus objective proposed for the Red River at Emerson. However, based on the best available science and on the IJC's own recommendations in other jurisdictions, the Lake Winnipeg Foundation does not support the proposed nitrogen objective.

Alexis Kanu:

A science-based approach to water quality management in the Red River watershed, must first acknowledge that phosphorus is the cause of algae blooms in freshwater ecosystems, including Lake Winnipeg. The role of phosphorus in promoting algal growth has been demonstrated over five decades of research in freshwater lakes in Northwestern Ontario at the Experimental Lakes Area.

Alexis Kanu:

Most recently, a paper by Higgins et al demonstrated that total reduction of anthropogenic nitrogen loading had no impact in reducing algal biomass in eutrophic lakes. These ELA studies demonstrate the critical importance of focusing on phosphorus to address algal blooms and make effective use of limited

resources. The solutions that we apply to address phosphorous will necessarily be site specific, but the physiology of the algae that we are fighting is not.

Alexis Kanu:

Cyanobacteria, or blue green algae, is present in lakes around North America. It relies on dissolved reactive phosphorous in the water to grow and it pulls its own nitrogen directly out of the atmosphere. It makes nitrogen out of thin air. This is one of its incredible evolutionary advantages and it's the reason why reducing nitrogen doesn't reduce blue green algae. In fact, it plays to the algae's own unique adaptation. For valuable lessons on reducing algal blooms, we here in the Red River basin can look to Lake Erie.

Alexis Kanu:

Responding to the whole ecosystem science produced at ELA, jurisdictions around Lake Erie reduced municipal phosphorous loading in the 1980s and the lake's water quality improved, touted at the time as a global success story. Unfortunately, severe algal blooms are now recurring in Lake Erie, but this is not because of nitrogen. It's because the surrounding jurisdictions didn't address all sources of phosphorous the first time around. They ignored diffused non-point sources in the 1980s. Learning from Lake Erie, we must ensure that here in the Red River watershed, we have the capacity and the resources necessary to deal with both municipal and agricultural sources of phosphorous in tandem.

Alexis Kanu:

Undeniably, this will be a significant undertaking. The nitrogen limits proposed here for the Red River also contradict the IJC's own focused and science-based approach to improve water quality in Lake Erie.

Alexis Kanu:

Its 2014 report, A Balanced Diet for Lake Erie, The IJC states that the single most important solution for the restoration of Lake Erie water quality is the reduction of phosphorus inputs. The report also acknowledges that the recent accelerating decline of this lake, manifested as impaired water quality, massive summer long algal blooms, hypoxia and fish kills, has focused by binational attention on the need for urgent actions to reduce external inputs of phosphorous. And the report acknowledges that all sources of phosphorous must be addressed to successfully improve water quality. While the primary focus in the 1980s was phosphorus for municipal sewage, today, phosphorus loads come largely from diffuse non-point sources, such as fertilized farm fields and livestock operations.

Alexis Kanu:

These sources too must be addressed. Learning from the IJC's own work over the last 50 years in Lake Erie, we need to maintain a strict and science-based focus on phosphorous in the Red River watershed. This will ensure that we can commit the attention and resources required to tackle both municipal and agricultural sources effectively.

Alexis Kanu:

ELA's whole ecosystem multi-decade research tells us that setting nitrogen targets for the Red River will, at best, have no beneficial impact on downstream water quality. Our own experience on Lake Winnipeg tells us that setting unnecessary nitrogen targets will, at worst, distract us from focusing on phosphorous and delay action. We can no longer afford this. It's time to get on with the huge and necessary task of reducing phosphorous from all sources to make real improvements in water quality.

Alexis Kanu:

Thank you.

Commissioner Merrell-Ann Phare:

So just to be clear, so you support the nitrogen numbers-

Alexis Kanu:

Support the phosphorous-

Commissioner Merrell-Ann Phare:

Sorry, you support the phosphorus, but the nitrogen, is it the main reason is that it distracts us from the phosphorus number?

Alexis Kanu:

It's not necessary to improve downstream water quality.

Commissioner Merrell-Ann Phare:

Okay. Thank you. Okay, so now we would like to ask up Daniel Kanu from the Lake Winnipeg Indigenous Collective, and after him will be Wayne Warren.

Daniel Kanu:

All right. Thank you. I'm Daniel Kanu. I'm from Animakee Wa Zhing and director of Lake Winnipeg Indigenous Collective.

Daniel Kanu:

So First Nation people, Cree, Ojibwe, Dakota, they have lived along the Red River watershed and Lake Winnipeg since time immemorial, long before borders, long before even the river and the lake were formed.

Daniel Kanu:

Our ancestors lived and survived along these shores and riverbanks, passing teachings generation to generation. And these teachings showed us how to survive and how to thrive. These teachings showed us that our survival depended on the land and the waters that give us life.

Daniel Kanu:

These teachings survive to this day, and the lake and the water continue to give us life to all human and nonhuman inhabitants. And yet, we find that the rivers are getting increasingly polluted and increasingly disrespected. And when I speak with First Nation members from around the lake, the thing I hear most is that the frustration, that continuing disrespect for the water, disrespect for muskrat and the fish, for our teachings, and disrespect, really, for future generations. And for too long we've seen in the cities and towns and farmers, industries alike have treated the river and the lake as a toilet, really, to flush away their waste, forcing everyone downstream to deal with the contaminated water and algal blooms.

Daniel Kanu:

So Lake Winnipeg Indigenous Collective, we seize this process to set targets for Red River as a positive step to reduce that harm and ensure that waters can be enjoyed by all inhabitants. After careful review of various reports informing the process, we do not think the proposed limits are appropriate. I'll explain that. But they will not accomplish the objective set up by the IJC and will have little benefit for Lake Winnipeg.

Daniel Kanu:

We find that given the evidence, the phosphorus is the limiting nutrient for algal growth, that the nitrogen limit is too strict and does not need to be included. So longterm research conducted at Experimental Lakes Area has consistently demonstrated over the last 50 years that controlling phosphorus is the only way to reduce algal blooms.

Daniel Kanu:

We find it odd that this work has not been cited or described in the report, suggesting that this robust, longterm evidence was not part of the consideration in developing limits or targets. We recognize that there are reasons for controlling both nutrients at the same time. In other watersheds, they tend to be closer in proximity to oceans, or in some cases, they're looking to avoid a hyper eutrophication when there are already high levels of phosphorus.

Daniel Kanu:

Simply put, in freshwater, nitrogen is only important to control if we fail to control phosphorus. In Red River, reducing elevated levels of phosphorus should be the primary goal. Given the importance of phosphorous, and if you look at the literature, that the 0.15 milligrams per liter phosphorus limit is also too relaxed.

Daniel Kanu:

We would have expected the limit to be no more than 0.1, but it could have been as low as 0.02 based on biological indicators. And this was noted in the IJC water quality, our report to the IJC water quality committee, but I think it will be worth reviewing in the future.

Daniel Kanu:

While it's tempting to control all manner of chemical or nutrient flowing into any waterway, we note that jurisdictions with strict rules may have more trouble achieving unreasonable targets, leaving those waterways vulnerable. We see those effects right here in Winnipeg, where the city has been unable to produce either phosphorus or nitrogen in treated water coming from the North End Treatment Plant for the past 15 years. And with a plan now set aside to do the so in the next 15 years, which is quite a long time, 30-year time span.

Daniel Kanu:

The city and province, to their credit, they have committed to accelerate that process and put extra resources and effort to address that shortcoming. But at the heart of this are those strict nutrient limits set by the province of Manitoba that require massive investment by the city that they simply can't afford.

Daniel Kanu:

In the meantime, Lake Winnipeg continues to suffer because of elevated levels of concentrations of phosphorus coming down the river, and nitrogen continues to be a minor issue. We urge the IJC to recommend that only the phosphorous loading target and concentration objectives be set at this time.

Commissioner Merrell-Ann Phare:

So if we could call up Wayne Warren, please.

Wayne Warren:

Good evening, commissioners. Welcome to chilly Manitoba. First of all, I must say that 111 years later, we're starting to identify the real source of the problem, particularly as it affects Lake Winnipeg.

Wayne Warren:

My small company with minuscule budgets has decided to tackle the entire ecosystem, from the headwaters of the Red to the north end of Lake Winnipeg and way beyond.

Commissioner Merrell-Ann Phare:

Can I ask you just to state your name and your-

Wayne Warren:

Yes, my name is Wayne Warren, and I'm the managing director for SRM Limited.

Commissioner Merrell-Ann Phare:

Sorry to interrupt you. Thank you.

Wayne Warren:

Okay. So before I go on to some other comments, I want to draw your attention to a population of indigenous people that is not present here and has not been factored into this big, broad issue. And I'm speaking specifically about the population from the north outlet of Lake Winnebago all the way up to Hudson Bay, and in specifically Norway House, Cross Lake.

Wayne Warren:

Those two communities have had significant impacts because of sediment loading, chemical loading, impacts on fish, algae bloom, plus a whole bunch of other issues related to the Northern Flood Agreement.

Wayne Warren:

I've spent a fair bit of time in Pimicikamak, the Cree name for Cross Lake, and I can tell you that as severe as the issues are here, they're equally severe there, but without the resources to do much about it.

Wayne Warren:

So, to back up, my company has taken a comprehensive approach to looking for micro solutions and macro solutions, such that applying a series of localized, small scale interventions built into a large network of large scale interventions will actually drop the phosphorous loads.

Wayne Warren:

And I couldn't agree more, by the way, the two previous speakers drew your attention to the fact, nitrogen is not the issue. Phosphorous is the issue. We have developed, and we will share it with whomever later, we have developed a technology that can cut phosphorus levels with a single intervention in half, and combining a number of related technologies, virtually reduce phosphorus in the watershed.

Wayne Warren:

So I want to offer a note of optimism. This is not an impossible challenge, but it is a big challenge. And at this point, given that there are very limited budgets to tackle the macro issues, I'm recommending, we are recommending, a series of micro interventions, starting from farmers at the headwaters of the Red River all the way up to the northern exit from Lake Winnipeg. That's my point.

Wayne Warren:

Thank you.

Commissioner Merrell-Ann Phare:

Thank you very much. And our last registered speaker, unless there's any others, is Michael Stainton. Michael, are you here?

Michael Stainton:

Hello, my name is Mike Stainton. I'm a retired research chemist from the Department of Fisheries and Oceans Experimental Lakes Area, so you can guess where I'm going. And I've also spent since 1969 participating in research and monitoring on Lake Winnipeg.

Michael Stainton:

I'm speaking as a private citizen who has concerns for the lake but is also concerns about the use of scarce resources to address a number of issues that are confronting the Red River basin.

Michael Stainton:

I'd like to start by referring to you to a paper by Binding et al in April of 2018 issue of the Journal of Lakes Research. This paper uses remote sensing imagery collected over a decade to develop metrics for algal bloom severity, a way of ranking the algal blooms observed on the lake into different orders of severity. It then looked at this ranking mechanism in relationship to a variety of parameters in the watershed that impact the lake, nutrient loads, sunlight, temperature, et cetera, et cetera.

Michael Stainton:

Their analysis of all of this data concluded there are two predictors of algal bloom intensity extent and severity on the lake. These are water temperature and phosphorus loading. The publication was silent on nitrogen as a controlling component of algal blooms. Both of the two, water temperature and phosphorous loading, are arguably climate related, water temperature related to air temperature, phosphorous loading related to precipitation and runoff.

Michael Stainton:

Both of these have increased in the last two decades, so arguably, much of the change we're seeing on the lake is being driven by climate change.

Michael Stainton:

With these findings in mind of Binding et al, I have nothing but encouragement for any actions that will lower the phosphorus concentration on the Red and its phosphorous loading to Lake Winnipeg.

Michael Stainton:

I do, however, have a problem with the proposed nitrogen targets, largely because nitrogen management in the Red is being conflated with and promoted in the name of improvements to the health of Lake Winnipeg.

Michael Stainton:

In general, I have a problem with the nitrogen targets as being benefit to the lake as there's no scientific evidence that nitrogen managed effectively controls nuisance algal growth. There will be written submissions that will support this fact and demonstrate the primacy of phosphorus management in the control of algal growth in lakes.

Michael Stainton:

I have a specific concern about the treatment of nitrogen targets in the respect report and the subsequent correspondence from the international Red River board.

Michael Stainton:

In spite of the respect reports specifically qualifying their work is not concerned with seasonal variation of algal growth in nutrient loading in specific aspects of the downstream Lake Winnipeg, both a respect report and the IRRB correspondence continually link the proposed end targets for the Red River as improving Lake Winnipeg health.

Michael Stainton:

The findings for end targets level than loading in respect report, based on their limitations of their experimentation and analysis, are only valid, if anywhere, in the Red River, and must have their merit judged based on anticipated improvements to the condition of the Red River.

Michael Stainton:

The findings of end level and loading suggestive had the Red River should not accrue any merit from inferred benefits to Lake Winnipeg.

Michael Stainton:

If nitrogen management in the Red becomes to rely on Lake Winnipeg for its justification, then I'm concerned there's a risk of economic harm from unnecessary expenditure of scarce public dollars in both Canada and the United States. The same climate change drivers that are arguably cause in cyanobacteria blooms in Lake Winnipeg and arguably producing more important changes in the landscape than the nitrogen levels in the lake are. It would be unconscionable to use scarce public resources to invoke a nutrient management strategy that is unsupported by evidence.

Michael Stainton:

I have a few simple requests through the IJC, and one is, manage point source phosphorus as aggressively as possible. It's easy, it's inexpensive and will have a positive impact on the lake. I would suggest that you don't spend a dime on managing nitrogen levels and load. It's expensive and ineffective.

Michael Stainton:

And if you do recommend communities to manage nitrogen level end load, don't use Lake Winnipeg as a justification. It's just false advertising. I would hope that instead of spending public resources on nitrogen management, the funds could be better used to manage all of the other extremes of precipitation and runoff in the watershed, where there are multiple benefits to be had to both agriculture and in receiving waters.

Michael Stainton:

Thank you for this opportunity. And I must compliment you on the transparency of the whole process and the resources you provided on your website that make it possible to comment on the proposals.

Chair Jane Corwin:

Thank you, Michael. Just a quick question. The study you had quoted in the beginning. Who was the author of that one? Just so we can go back and reference.

Michael Stainton:

Caren Binding.

Chair Jane Corwin:

Binding? Okay, great. Thank you very much.

Michael Stainton:

No problem.

Chair Jane Corwin:

Terrific. Thank you so much.

Commissioner Merrell-Ann Phare:

So those are all of the registered speakers so far. Would you like to ...

Fred Welding:

Yeah, I put on the question board. I didn't want to speak because I wanted to hear more.

Commissioner Merrell-Ann Phare:

Give your name and your affiliation, if you have one, or whether you're speaking on personally.

Fred Welding:

Yeah, I'm Fred Welding. I'm from Silver Harbor. I represent the Silver Harbor Environment Committee, but I also represent the Coalition to Save Lake Winnipeg.

Fred Welding:

To give a bit of a history, last September, we got together with interest groups from the east side and the west side of Lake Winnipeg to form a coalition, but we all have as a common objective restoring the health of Lake Winnipeg. So the coalition formed, we have a steering committee and we organized a major meeting in November, November 30th. At the meeting, we had about 150 people attend, and these people represented roughly 50,000 people.

Fred Welding:

And the reason I wanted this mentioned is that politicians are very sensitive to numbers. And we really want the politicians to know that we, as a grassroots organization, are extremely concerned about Lake Winnipeg.

Fred Welding:

We wholeheartedly support the science that has been provided by the Lake Winnipeg Foundation, especially the phosphorus problem. In fact, we have worked quite hard with petitions and to the government to reduce, asking to reduce the phosphorous loading of Lake Winnipeg.

Fred Welding:

So the only thing I really want to say is that please take the concerns of the citizens seriously and do everything in your power to reduce the phosphorous that comes into Red River, Red River, whatever strategy, whatever method works, please do that work. Thank you very much.

Commissioner Merrell-Ann Phare:

Thank you.

Fred Welding:

Any questions?

Commissioner Merrell-Ann Phare:

Nope, that's good. You're very clear. Thank you.

Commissioner Merrell-Ann Phare:

So is there anybody else who would like to share their views or their thoughts this evening?

Commissioner Merrell-Ann Phare:

Okay, well, oh, Glen?

Glen Koroluk:

Yes. Thank you. My name is Glen Koroluk. I'm here as a citizen today. I am the executive director with the Manitoba Eco Network and we're going to be writing a formal submission by the end of the month, I guess.

Glen Koroluk:

I just wanted to make a quick question, comment. We didn't find out about this hearing until about two weeks ago. And we're really pleased that the IJC is doing this, because there's been a lot of work done in the past, and sometimes there's not a lot of information out there for the public to get engaged in these types of processes.

Glen Koroluk:

So for future investigations, it would be more appropriate to get a larger timeframe for notification. We're a nonprofit organization, we have a committee, they're all volunteers, and we want to put together a decent presentation and two weeks just isn't enough.

Glen Koroluk:

So that's something to consider. And the question I ask is the February 28th submission deadline, is that sort of like a final date or is that the closure of your investigation period?

Commissioner Merrell-Ann Phare:

It is, sorry, did you want to-

Glen Koroluk:

Formally, yeah.

Commissioner Merrell-Ann Phare:

Formally, but we can extend that deadline if you let us know that you need a bit more time.

Glen Koroluk:

Okay, great.

Glen Koroluk:

And another comment I'd like to make is I did have a chance to review some of the supporting documentation that was referenced in here, and some of the information I thought was a bit outdated.

Glen Koroluk:

I know some of the data that the Manitoba government was providing was from 2001, 2002, like the trends analysis. And we're in 2020 already. And I'm wondering if the IJC has a better dataset, and if that's available for the public to view?

Glen Koroluk:

And also, there has been work done by the government of Canada and the province of Manitoba on the state of Lake Winnipeg. And the last time we got a report from them, it was data that was going back to 2007. So again, that's a bit outdated. So I think to make informed decisions and even for the public to be engaged, we would like to see more of that information available in terms of the dataset. Is there anything else there that is available?

Chair Jane Corwin:

Well, you know, if it's all right. We'll go back and take a closer look at that. I'd have to go back and look at the datasets and see the timing of that.

Chair Jane Corwin:

And can you leave your, I mean we can get back in touch with everybody who left an email. But we can get back to you specifically about that and maybe put something on our website regarding that comment.

Glen Koroluk:

Okay. Thanks.

Chair Jane Corwin:

So appreciate it though, you know, raising that issue. We'll take a closer look.

Glen Koroluk:

Okay. Thank you. And again, I really appreciate the IJC doing this process. It's great.

Commissioner Merrell-Ann Phare:

Thanks for your comments. We look forward to your submission. Yep.

Commissioner Merrell-Ann Phare:

Okay. Okay. Yes, sir. Okay. Please come up to the microphone.

Greg McCullough:

Okay. I hadn't prepared anything. I intend to-I'm Greg McCullough.

Commissioner Merrell-Ann Phare:

Thank you.

Greg McCullough:

I'm with the University of Manitoba. I'm speaking as a private citizen and a scientist. I'm up here partly because I'm a coauthor of the paper that Michael mentioned and I can comment on that.

Greg McCullough:

I'm also the author of another paper that I think is relevant and that's in view of the earlier presentation, actually. I hadn't entirely realized the import, perhaps. So, first of all, the paper that Michael described does indeed show, demonstrate, the variability from year to year, and the severity of blooms in Lake Winnipeg is highly correlated with the previous spring's loading and with the summer temperature. And in fact, when you tweak those two factors together, you get a remarkable predictability. So it's a pretty strong demonstration that those two factors are the major driving factors.

Greg McCullough:

The other paper that I'm an author on, or I'm the lead author of, is an earlier paper that models the phosphorus loading for Lake Winnipeg. And it, I think, I can say that it has had some effect on, in the

basin, on people's perception of how to deal with phosphorus. And I think it's relevant here in that that paper shows, demonstrates, that probably two thirds of the loading in the Red River is driven by climate in that sense that it's forced by a high discharges and flooding. So in particular, flooding spreads water over the land and increases the concentrations of phosphorus. And of course this happens in years when the flow was much higher than average flow.

Greg McCullough:

Now and I'll write this out. I will comment in writing, I realize. But you specifically said you're responding, one, first issue, nutrients are increasing, and that is certainly true in many watersheds. But I want to look for just a second at data that I hadn't actually seen before. I read the IRRB presentation, the IRRB report.

Greg McCullough:

Phosphorus is of course increasing, and nitrogen in the Red River is in general increasing as well, phosphorus somewhat more than nitrogen. But when you look at the figure six in the report, prepared it in a way that I hadn't seen prepared recently, at any rate, the phosphorus and nitrogen are shown adjusted for flow, which means that because phosphorus and nitrogen both rise with increasing flow and fall with decreasing flow, there is a way to remove that. There's a process use here that's a perfectly reasonable one, and it shows how the phosphorus concentration would have trended in the Red River had there been no change in discharge.

Greg McCullough:

And in fact, there was of course a change in discharge between the mid 1990s up until two or three years ago. The average decadal flow in the Red River was two times what it had been at any time measured in the 20th century. So for a hundred years. There had been very great changes in flow. And the argument of the paper I was talking about argues that phosphorus, at least, concentrations are largely driven phosphorous loading is largely driven by that.

Greg McCullough:

But in this figure that you present, the IRRB presents, you are showing increasing phosphorus regardless of flow in figure six, and you are showing a decrease in nitrogen, or at least that nitrogen concentrations were higher in the 1980s than they are now by a considerable amount. They seem to have dropped through the 1990s. I'm having a trouble reading the years on this. And then there've been fairly stable ever since.

Greg McCullough:

Now these numbers, these concentrations, are concentrations of nitrogen if there had been no change in discharge, or you can say they are not driven by the increase in discharge, they are just as they would have been. So they must therefore be associated with the loading that's driving the changes in concentrations.

Greg McCullough:

In other words, the loading either from sewage, from fertilizer, manure, or various other sources there might be, doesn't appear to have been changing over the last 20 years for nitrogen, where it has continued to increase for phosphorous.

Greg McCullough:

I'll describe that or go through that and hopefully a little more clearly because I've just worked it out over the last few days looking at this report. If you look at those numbers, then, and you look at that change, something else that's fairly dramatic happens. In the 1980s, the ratio of nitrogen to phosphorus, the molar ratio, would have been up the order of 25 to 30 just looking at these numbers.

Greg McCullough:

The famous Redfield ratio which says that living algae has about 16 molecules of nitrogen to one of phosphorous. And if you feed algae water, if you put them in water that has a lower ratio, they'll pretty definitely be limited by phosphorus. If you raise it above that, they might be limited by nitrogen, but the thing about it is, they have, under those circumstances, let's say 25 to 30 to one nitrogen and phosphorous and they only need 16 to one. They don't need to go looking for nitrogen, and under the circumstances then in the 1980s, you wouldn't expect sign of bacterial blooms, which are there because the algal community is short of nitrogen, it doesn't have enough.

Greg McCullough:

Now we move to the present day and if you look at those same figures again, you would be able to calculate a molar ratio of about between 10 and 15 to one.

Greg McCullough:

In other words, it's dropped below the ratio that you see on average in living algae. These are very average numbers, but they're used widely in the world. And under those circumstances, you would expect a community of algae to then begin to move to those kinds of species that can find nitrogen somewhere else.

Greg McCullough:

And that's exactly what we see in Lake Winnipeg. This alone, this graph alone tells you a lot about what's happening, what has happened over the last 40 years, in addition to or separate from the increase in nutrients.

Greg McCullough:

Now, the IRRB has been very careful in, and I'm sure that in that recommendation they were fully aware of this, in producing a ratio of a nitrogen objective to a phosphorous subjective that is approximately the Redfield ratio.

Greg McCullough:

That's not an accident. That's because they recognize that if you're going to move phosphorus down, you better keep nitrogen at the same level.

Greg McCullough:

The point is, though, you're way over that right now. You have a long ways to go before you begin to deal with that. And if nothing changes in the nitrogen, in the nitrogen concentrations, which have been stable now for 20 years, then you really have to ask yourself what real scientific evidence you have for controlling that.

Greg McCullough:

So, in the long run, I've come around to what, four or five out of your six or seven of your presenters have said tonight, that if you want to lay the responsibility for these objectives or the goal of these objectives on Lake Winnipeg, you'll get a lot of argument. It's really important to reduce phosphorous, and you can change Lake Winnipeg by reducing phosphorous.

Greg McCullough:

What happens with nitrogen is pretty much secondary. It won't change Lake Winnipeg, whatever else it will do. And I'll leave you to think about the socioeconomic and other things, the costs, the relative costs of those two things.

Greg McCullough:

That was kind of all drawn from what I heard tonight and it's a little bit fuzzy, but...

Commissioner Merrell-Ann Phare:

He's also submitted in writing.

Chair Jane Corwin:

Yeah, I was going to say, it is possible to have you put that down in writing, so as we go back-

Greg McCullough:

Yes, I'll do that.

Chair Jane Corwin:

... that would be really helpful. Thank you.

Greg McCullough:

You've moved me tonight. I don't want to repeat. I do think you presented a tremendous set of background data to work with and it's perfect for me. Thank you.

Commissioner Merrell-Ann Phare:

You're welcome. Does anybody else feel moved? No? Okay, well, I'll hand it over to the Chair Corwin for closing remarks then.

Chair Jane Corwin:

Thank you, Merrell-Ann, and thank you everyone, once again, for attending the public hearing. I know for many people it's time away from home, your families, it's cold out. It's easy to stay home and stay warm and put on your favorite show, but this information that you're providing, your perspective and your input is very, very important for what we do. Our information coming out is only as good as what's coming in, and so we really do very much appreciate your perspectives and what you're seeing on the ground in your communities. So thank you again.

Chair Jane Corwin:

And as was said a couple times tonight, you can still submit written comment either by online, by mail, or by email, by February 28th. If you can't, for some reason, make it by February 28th, please send a note saying that you'll be sending something soon after, just so we don't close it out and go to print or go to making decisions and then have you be a day or two late. It's really important we get everyone's comments in and, I think it's written up there, that's our contact information up there, so please feel free. Be generous with your comments. So with that, I'd say, thank you, Merrell-Ann, for running the meeting. Thank you to our staff for putting it all together and for the people from the hotel who supported it, and have a wonderful evening, and do be sure to check up on our website, and you can see all the comments and the transcripts and everything right there for yourselves. All right? Thank you again. Have a great night.