MANITOBA CLEAN ENVIRONMENT COMMISSION

LAKE WINNIPEG REGULATION REVIEW

UNDER THE WATER POWER ACT

VOLUME 1

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Transcript of Proceedings
Held at RBC Convention Centre
Winnipeg, Manitoba
TUESDAY, MARCH 10, 2015

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APPEARANCES

CLEAN ENVIRONMENT COMMISSION
Terry Sargeant - Chairman
Edwin Yee - Commissioner
Neil Harden - Commissioner
Beverly Suek - Commissioner
Bill Bowles - Counsel to Commission
Cathy Johnson - Commission Secretary
Joyce Mueller - Administrative Assistant
Amy Kagaoan - Administrative Assistant
Phil Shantz - Advisor
George McMahon - Advisor
Bob Armstrong - Report writer

MANITOBA CONSERVATION AND WATER STEWARDSHIP
Rob Matthews
Puru Singh

MANITOBA HYDRO
Doug Bedford - Counsel
Janet Mayor - Counsel

CONSUMERS ASSOCIATION OF CANADA (Manitoba chapter)
Byron Williams - Counsel
Aimee Craft - Counsel
Gloria Desorcy

MANITOBA METIS FEDERATION
Marci Riel
Jasmine Langman

MANITOBA WILDLANDS
Gaile Whelan Enns

PEGUIS FIRST NATION
Lloyd Stevenson

PIMICIKAMAK OKIMAWIN
Annette Luttermann
Darwin Paupanakis
Jeremiah Raining Bird
William Osborne

KEWATINOOK FISHERS
Meryl Ballard

NORWAY HOUSE FISHERMAN'S CO-OP
Keith Lenton

APPEARANCES

TATASKWEYAK CREE NATION
Sean Keating

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TUESDAY, MARCH 10, 2015

UPON COMMENCING AT 9:30 A.M.

THE CHAIRMAN: Good morning. We'll call these proceedings to order. Welcome, many familiar faces and some new faces, so welcome to these proceedings. For those of you who don't know me, and for the record, my name is Terry Sargeant and I'm the chair of the Manitoba Clean Environment Commission, as well as the chair of the panel conducting this particular proceeding.

At the outset, I would like to acknowledge that we are meeting in the traditional territory of the Anishinaabe people in Treaty One territory and in the homeland of the Metis nation.

I'd like to introduce the other panel members, members who will be serving on this panel for the review of Lake Winnipeg Regulation. To my left is Edwin Yee, to my right, Bev Suek and Neil Harden. In addition to the panel, I'd like to introduce staff and advisors who are assisting us in this review, starting with our Commission secretary, Cathy Johnson. She is the one that you want to pay particular attention to because all communications should be done through Cathy

Johnson. We also have administrative staff, Joyce Mueller and Amy Kagaoan. Our legal counsel for these proceedings is Bill Bowles. Our report writer, as for the last few, is Bob Armstrong. We also have with us today from our technical advisory team Phil Shantz and George McMahon.

We are here today because in 2011, the Minister of Conservation and Water Stewardship asked the Clean Environment Commission to provide a forum to hear evidence from the public about impacts of Manitoba Hydro's regulation of Lake Winnipeg. We were asked to hold meetings in communities around both the north and south basins of Lake Winnipeg, as well as in the City of Winnipeg.

To date we have had six weeks of community meetings in Northern Manitoba and around the lake. Today we begin what we expect to be five weeks of meetings here in the City of Winnipeg. At the end of those five weeks we will make one more trip to the north for a couple of days in Norway House. We expect to close the public meetings by the end of April.

Pursuant to the Manitoba Water Power Regulation, Hydro is entitled to a final licence

upon fulfillment and compliance with the terms and conditions of its interim licence. The decision as to whether or not to issue a final licence rests ultimately with the Minister of Conservation and Water Stewardship.

The Commission has not been asked to provide an opinion on whether or not the final licence should be issued, nor have we been asked to pass comment or judgment on whether or not Lake Winnipeg Regulation should have been implemented in the first place. And while we recognize that Lake Winnipeg Regulation is a key part of the overall hydro system, we have not been asked to review other parts of the system.

Specifically we have been asked to review the broader public policy reasons as to why the regulation of Lake Winnipeg came into being with the issuance of the interim licence in 1970. We have also been asked to hear evidence from Manitobans regarding effects and impacts of Lake Winnipeg Regulation since it first went into full operation in 1976. We have been asked to review the successes and failures of the implementation of those public policy goals. And finally, the Commission may comment or may make comment on

concerns raised about the issuance of the final licence, including but not limited to future monitoring and research beneficial to the project, to Lake Winnipeg, and to communities regulated or affected by the regulation.

I'd like to particularly emphasize that the Commission is not mandated to engage in the section 35 consultations required with indigenous peoples. That is done by another branch of the Provincial Government. So matters relating to Treaty and/or Aboriginal rights are beyond the scope of these hearings.

The Manitoba Clean Environment Commission is an arm's length provincial agency established under the Environment Act to encourage and facilitate public involvement in environmental matters. One way in which we do this is by conducting proceedings such as these. The purpose of these meetings is to provide an open and accessible process to allow for public input into the decision-making which will assist the Commission in providing recommendations or conclusions to the Minister, which in turn will assist the Minister, as the ultimate decision maker, by providing diverse, well-reasoned and

well-informed perspectives on the merits of the proposal.

To achieve this we will strive as much as reasonably possible to assure a thorough and comprehensive review.

The Commission operates under the authority of the Environment Act of Manitoba. The Commission is directed to conduct the hearings in general accordance with the process guidelines respecting public hearings, which ensure that hearings remain fair and open forums for the exchange of information and ideas and that they provide full opportunity for public involvement in the environmental assessment process in Manitoba.

We strive to be as informal as possible, however, recognizing that meetings such as these do require some structure. Thus our practice guidelines, our process guidelines include a number of practice directions and guidelines that all parties to this proceeding will be expected to follow.

We recognize that fairness must not only occur but that there must be a perception of fairness and impartiality during the hearing process. We also recognize that participants, and

in particular members of the public, do not have the same access to expert advice and resources available to Manitoba Hydro. And we recognize that critical questioning of all aspects and merits of this project contributes to a positive process and to a positive outcome. So flexibility and common sense will be given preference over rigid bureaucratic rules. The panel will be the final arbiter of procedural fairness in adapting to circumstances that may arise.

Let me just say a few words about what will ensue over the next few weeks. A schedule of the hearings, a general schedule of the hearings is available at the registration desk, but I'd like to review the schedule quickly. After opening procedures this morning, Manitoba Hydro will present a detailed description of the project. This will be followed by cross-examination and questioning. We expect this to take three or so days. Next week experts engaged by the Commission will make presentations. They will be subject to cross-examination. And following that participants will present their evidence, which in turn will also be subject to cross-examination and questioning.

We will provide opportunities for members of the public with their own concerns to be heard. Two evening schedules have been scheduled in the city, primarily to hear presentations from members of the public. Upon demand, we may hear public presentations during daytime sittings. Members of the public at certain times will be allowed to ask questions of Manitoba Hydro.

I should note that public presentations are not subject to cross-examination. Panel members only may make questions, or ask questions of clarification.

Once participant evidence is concluded, Manitoba Hydro will be given an opportunity for rebuttal. This will be followed by final argument by the parties. After the hearings end and the record is closed, the panel will begin its deliberations.

The Commission will make a report containing advice and recommendations to the Minister. Under an Environment Act proceeding, which I should note this is not, but under an Environment Act proceeding we are required by the statute to report to the Minister within 90 days.

We will follow that 90 day rule for these proceedings. And once the Minister has received the report, it is up to him to determine when the report will be released to the public. And as I have already noted, ultimately it is the Minister's decision as to whether a final licence is issued and on what conditions.

Just a few more words to do with housekeeping issues. Top of the list in this hearing room, cell phones. Turn your cell phones to vibrate. If you have to take a call, please step out of the room. Conversations in the room, please take your conversations out of the room, and take them away from the doorway. Although in this case the door is closed, but in other rooms we have been in, people go outside of the door and leave the door open and gab away, and it can be very distracting. As well, moving around the room, please keep this to an absolute minimum because that too is distracting to the other parties. And as those of you who have been through hearings that I have chaired before, please don't try to test my patience on any of these.

Also, you will know, those of you who

have been through previous hearings or who attended the pre hearing meeting earlier last year, I guess, I am a stickler for starting on time. In the morning, after breaks and after lunch, we start at the time that we have said that we will start. We also enforce time limits strictly. Where you are bound by a time limit, and this is particularly relevant to the public presentations which are limited to 15 minutes, where you are bound by a time limit, I will give five and one minute warnings. And at the end of that time, we'll shut you down.

In regard to registration, members of the public wishing to make a presentation must register at the desk at the back of the room to let us know. And if you wish to receive, if members of the public wish to receive a copy of the report, or if any of the participants wish to receive printed copies of the report, please let us know about that as well.

Finally, we will make best efforts to post verbatim transcripts of each day's proceedings by the following day. We will also post to our website all written submissions and presentations as quickly as we can. There may,

from time to time, be some limits in respect of overly large documents.

And in conclusion, as in all of our proceedings, the challenge for the panel is to have a complete and understandable body of evidence upon which to base our recommendations to the Minister. The challenge for Manitoba Hydro is to ensure that the panel and the public fully understand the rationale behind Lake Winnipeg Regulation and its impacts. And the challenge for the participants is to vigorously test the positions and arguments put forth by Manitoba Hydro, in this way assisting the overall process and in particular the panel in its understanding.

So with those brief opening comments, I'd like to now turn it over to Dave Cormie and the Manitoba Hydro panel. I'm being skwarked at here so we'll just wait a moment. In a minute or two, we will turn it over to Dave Cormie and the Manitoba Hydro panel, who will make a presentation.

MS. JOHNSON: Mr. Chairman, I have a number of documents we have to put on record.

THE CHAIRMAN: Can we put those documents on record at the end of each day?

MS. JOHNSON: Ours as well?
THE CHAIRMAN: I think so.
MS. JOHNSON: Okay, no problem.
THE CHAIRMAN: I think rather than having documents coming in at various times, we'll just have one time at the end of each day where documents will be registered.
Okay. Mr. Cormie?
MR. CORMIE: Mr. Chair, was it your intention that we were to be sworn?
THE CHAIRMAN: Yes, it is. I didn't note that in my opening remarks, I am not sure how it didn't get in there, but we do have a practice of swearing in, or asking all witnesses, anybody giving evidence to attest that they are going to give only the truth. So, madam secretary?
MS. JOHNSON: Could you each state your name for the record, please?
MR. CORMIE: My name is David Cormie.
MR. GAWNE: My name is Kevin Gawne.
MR. HUTCHISON: Dale Hutchison.
MR. SWEENY: My name is Mark Sweeny.
MR. SWANSON: Gary Swanson.
David Cormie, Kevin Gawne, Dale Hutchison, Mark Sweeny: Sworn

THE CHAIRMAN: Thank you. You may proceed, Mr. Cormie.

MR. CORMIE: Thank you, Mr. Chairman. Good morning, Commission members, chiefs, elders, participants, and ladies and gentlemen. My name is David Cormie and I am the division manager of power sales and operations at Manitoba Hydro.

The outline of our presentation today is shown here on the screen. I will present first, providing an introduction and history of the Lake Winnipeg Regulation project.

Mr. Gawne, who is sitting next to me, is the manager of energy operations planning, and he will follow after me and we'll discuss the project and its operations.

Mr. Swanson, who is our senior environmental specialist, will present on what we know about the environmental impacts of the project.

Following him, Mr. Sweeny will present, and he is our manager of community relations and he will discuss the socio-economic impacts.

Following him, Mr. Hutchison, our hydraulics coordinator, will present on concerns

we have heard from those around Lake Winnipeg.

And lastly, I will close Manitoba Hydro's presentations with a wrap-up review and some closing comments.

Our panel will be available for questions after my closing comments.

Although I am a professional engineer in a senior position at Manitoba Hydro, my relationship with Lake Winnipeg began, like many Manitobans, as a child, a family cottage, and I have many wonderful memories of summer at the lake. But beyond that, I also have a long work history of involvement with the Lake Winnipeg Regulation project. During the initial study period for the project between 1970 and 1972, I was employed by Manitoba Hydro as a survey crew member, mostly living and working at the north end of Kiskittogisu Lake. I participated in exploration and construction surveys of the project channels, dikes and various structures. In addition, I spent time living on a Lake Winnipeg whitefish boat as part of the fish and water quality surveys at the north end of Lake Winnipeg and on Playgreen and Kiskittogisu Lakes. It was after this work experience that I decided

to attend university, where I received my science degree in civil engineering.

After graduation, I was hired as an engineer at Manitoba Hydro and was directly involved for 17 years in reservoir and system operations, including those of Lake Winnipeg. I participated in the development of energy and water management models and forecasting models which were used in the operational decision-making.

From 1993 until now, I have held management positions of increasing responsibility for Lake Winnipeg Regulation, operation, licensing, and public and stakeholder consultations.

The final licensing process began in December 2010, when Manitoba Hydro requested a final Water Power Act licence for Lake Winnipeg Regulation for Manitoba Water Stewardship. They are responsible for administering the Water Power Act.

In July 2011, then Conservation Minister Blaikie announced that the Clean Environment Commission will hold public hearings on Manitoba Hydro's request. Quoting Minister

Blaikie:

"We want to provide an opportunity for the public to express their views on this important issue."

Manitoba Hydro welcomes the opportunity to participate in this process. To assist with that public involvement, Manitoba Hydro has published a plain language document, and we published that in July 2014, that describes the Lake Winnipeg project and how it works, explains the licensing process, describes the effects on water regimes and impacts the environment. It describes Manitoba Hydro's ongoing dialogue and engagement efforts with stakeholder groups, and considers some implications of changing some terms of the licence. Our presentation today is on material presented in that document.

The water level issue on Lake Winnipeg is not new. Awareness of Lake Winnipeg's flood potential predates recorded history. As is noted in the 1958 report on measures for the control of waters of Lake Winnipeg and Manitoba, Aboriginal knowledge about Lake Winnipeg flooding was shared with Icelandic settlers when they arrived in 1876.

The recorded history of water levels

began in 1912. From that hundred years of measurements, we can see that the level of the lake goes up and down in response to prevailing weather conditions. And we can see that the lake had a natural range of at least 9 feet. On an hourly basis, water levels can change due to local wind and storm conditions, but on a longer term basis, wind-eliminated levels slowly rise and fall based on the balance between how much water is flowing into the lake from its major tributaries and how much water flows out, down the Nelson River.

In years of very large flood such as on the Winnipeg, Red and Saskatchewan Rivers, waters pour into the lake at a rate two or three times greater than can flow out, and that causes the lake level to rise. And so if we use the elevation of 715 feet as a benchmark for high water levels, the record of water levels maintained by Water Survey of Canada first indicates levels exceeding 715 feet in 1916. This flood was one of those where high water flows on the Winnipeg and Red River coincided with record summer floods on the Saskatchewan River. Maximum water levels in that year reached 715.4 feet in

September and they stayed about 715 feet for 68 continuous days.

The historic record indicates that the next big flood occurred in 1927 when the maximum level reached was 716.9 feet. Again, this flood was from flood flows from Alberta and Saskatchewan, which combined with the major flood in the Winnipeg River, which rises in Northwest Ontario. Lake levels were above 715 feet for a continuous period of over 247 days, stretching well into 1928, when the Saskatchewan River flooded again. Unlike flood events today which benefit from Lake Winnipeg Regulation, multi-year flooding prior to the project was common due to the limited outflow capability of the lake.

The record flood occurred in 1974 on Lake Winnipeg when the maximum level of 718.2 feet was reached, and that was a result of major floods on the Winnipeg, Red and Saskatchewan Rivers. In this event, Lake Winnipeg was about 715 feet for 573 continuous days, the flood carrying over well into 1975. Through these many flood events, shore-land flooding was devastating to many communities around the lake. And although long ago, our understanding of the impacts and damage,

the angst and the cry for help in subsequent public debate is still easy to relate to today. The Province appears to be going through another wet cycle and there are many Manitobans experiencing similar flooding circumstances on Lake Winnipeg and in the Interlake.

Finally, after the 1950's flood, the Province established the Lake Winnipeg and Manitoba Study Board in 1956 to see if anything could be done. However, their 1958 report indicated that something could be done, but the costs of regulating Lake Winnipeg to provide flood relief was not affordable, so nothing was done at that time.

Another important part of the history of Lake Winnipeg relates to the growing demand for electricity in Manitoba. After World War II, the economy of the province grew rapidly. In addition, extending electricity service across the province became a priority. But by the mid '60s, the hydro potential of the Winnipeg River and Saskatchewan River had been developed, and the options for Manitoba Hydro were either expanded coal production or development of the hydro potential of the Nelson River. And there was

urgency as the demand for power was growing rapidly. Between 1968 and 1971, energy use grew at an average rate of 11 percent per year.

In 1966, Manitoba, Canada and Manitoba Hydro agreed that the best path forward was to develop Manitoba's northern hydro potential on the Nelson River. This project would require a major new dam at Kettle Rapids on the Nelson River, a high voltage direct current transmission line to Winnipeg, and regulation and development of storage on the Churchill River and Nelson River.

Between 1964 and 1970, eight major studies were undertaken to optimize the amount and location of storage on Lake Winnipeg and on Southern Indian Lake for power production purposes. Key to the development of a reliable supply of electricity was water control, and the establishment of significant amounts of reservoir storage. Storage is essential, especially in a region like Manitoba that is prone to extended drought. Storage provides a reserve of water that can be called upon in droughts to keep the lights on with an appropriate level of reliability.

The outcome of these studies was a Manitoba Hydro recommendation to government for

high level diversion of the Churchill River, which would involve the development of 24 feet of storage on Southern Indian Lake. That project would be followed at a later date with regulation of Lake Winnipeg. These plans were approved by the government at that time.

The decision to pursue high level diversion of the Churchill River meant raising the level of Southern Indian Lake by 35 feet, widespread flooding and the relocation of communities. The high level diversion project became a major public issue. In 1970, following an election the newly elected Schreyer Government rejected high level diversion and instructed Manitoba Hydro to search for alternatives.

Following studies of Manitoba Hydro, the Government of Manitoba announced in 1970 that Lake Winnipeg Regulation and low level Churchill River Diversion would proceed in parallel. Outflows from Lake Winnipeg would be regulated for flood control and for power purposes. Lake Winnipeg Regulation would be accomplished by allocating four feet of storage within the nine foot natural range for power production. That storage would provide a supply of water for power

production.

With the combination of Lake Winnipeg Regulation and low level Churchill River Diversion, the full development of the Nelson River could be justified and flood damage reduction on Lake Winnipeg could be achieved. Provincial studies considering agriculture, recreation, power, navigation, wildlife and fisheries confirm that the four feet of storage was best achieved between the elevations of 711 and 715.

Following that announcement, the Province issued Manitoba Hydro an interim licence for Lake Winnipeg regulation in November of 1970. That licence authorized Manitoba Hydro to build and operate the project and occupy Crown lands for that purpose.

In 1972, as the conceptual design of the control works evolved, Manitoba Hydro requested and the Province issued a supplementary interim licence, which reflected the final project configuration and operating limits. An interim licence allowed Manitoba Hydro to build a project and to confirm, after a period of operation, that the licence terms were suitable.

In 2010, Manitoba Hydro was in the position that it could provide the Province with that confirmation and thus request its final licence.

Once the Province is satisfied that Manitoba Hydro has met the terms and conditions of the interim licence, a final licence can be issued.

The term of the licence, whether it's an interim or final licence, is 50 years from the date of completion of works. For Lake Winnipeg Regulation, that occurred in the summer of 1976. So regardless of whether Manitoba Hydro's licence is interim or final, that licence will expire in 2026. A Water Power Act licence is not a permanent licence. Therefore, prior to 2026, Manitoba Hydro will be requesting a renewal licence. The requirement for ongoing renewal of licences ensures ongoing review of projects and that they continue to be in the public interest.

Now I will explain what the Lake Winnipeg Regulation and Water Power Act Licence permits. It allows Hydro to regulate water flows and levels for the purposes of developing the water power potential of the Nelson River. It

authorizes construction and operation and maintenance of the project. It defines the project's operating parameters such as maximum water levels and water flow limits such as minimum flows and maximum rates of change for flows. The licence defines the location of the works and the lands of the Province required for the project and its transmission lines. It authorizes the occupation of Crown lands and the requirement to pay land and water rentals. And it defines the terms and conditions of a final licence.

It has now been 44 years since the interim licence was issued. Why has it taken so long for Hydro to request such a final licence? Well, unlike other water projects in Manitoba such as the Wuskwatim Generating Station, the effects and impacts of Lake Winnipeg Regulation extend over the entire length of the Nelson River, from the north end of Lake Winnipeg all the way downstream to Hudson Bay. Lake Winnipeg Regulation has impacted the water regime and many people along the Nelson River.

Although the Northern Flood Agreement was signed in 1977, it has taken 40 years for Manitoba Hydro to understand the full impacts of

the project, mitigate them if possible, such as with the Cross Lake weir, and negotiate comprehensive agreements and compensation. In addition, ongoing programming such as safe ice trails and debris management were needed to be put in place to deal with concerns of local stakeholders. And even today, they remain outstanding issues.

What is the Lake Winnipeg Regulation project? Well, it's at the north end of Lake Winnipeg where the Nelson River begins its flow north. Prior to the project, all water flowed past Warren Landing and into South Playgreen Lake, a small portion went north via the east channel, but the majority of water flowed north through Playgreen Narrows and into northern Playgreen Lake. From there it flowed through a series of channels into the west channel of the Nelson and then into Cross Lake, and then downstream. However, because Playgreen Lake is shallow, and even more so in the winter when there is significant thicknesses of ice blocking the flow, the water doesn't flow north easily. And this was especially apparent in high water years such as 1916, 1927, 1950 and 1974, when water backed up in

Lake Winnipeg causing shore-land flooding around the lake.

Lake Winnipeg Regulation was designed to increase the outflow through the construction of several channels -- and they are shown here with these bold red arrows -- dams, dikes and water control structures at the north end of Lake Winnipeg, so the same outflow could occur at lower lake levels or increased flows could occur at the same level. The channels built increase the outflow capacity by up to 50 percent from its natural capability. In summer this new capability is used to meet the flood objective of the project. Floods can now pass through Lake Winnipeg faster and at lower levels than previously. And in the winter this new capability is used to meet the power objective of the project. The dam at Jenpeg allows outflows to be controlled so that the availability and timing of water for downstream power production is enhanced. And during periods when drought threatens the security of the energy supply, the four feet of storage on Lake Winnipeg is available to increase the energy security of the Province.

In a few minutes, Mr. Gawne will

describe in much more detail the channels and operation rules of the project.

But negative effects from the project have taken place downstream of Lake Winnipeg, whereas on Lake Winnipeg proper conditions have remained relatively unchanged or have been improved. These negative effects from the project have been significant. They include physical and environmental changes from increased shoreline erosion, changes to water quality, changes to fish populations and wildlife, and changes to the natural water regime. And later today, Mr. Swanson will share our understanding of those impacts with you in more detail.

The socio-economic effects on people living downstream include impacts to the culture, way of life and heritage resources, the way the landscape looks, resource use, loss of reserve land, navigation, transportation and public safety, health concerns and issues. And there's been personal property loss and damage. Later today, Mr. Sweeny will review these effects, but will also speak about employment, training and business opportunities that have arisen because of the project.

The adverse impacts have occurred because much more water can now flow out of Lake Winnipeg when maximum discharge conditions are required, either because of high levels on Lake Winnipeg or to meet the winter power demand.

Because the Lake Winnipeg licence requires maximum outflow when Lake Winnipeg reaches 715, the frequency of high water and the rapidity of flooding downstream of the lake has increased. In the 38 years the project has been operated, flood control operations have been triggered nine times.

To deal with these effects Manitoba Hydro has negotiated settlement agreements, including the Northern Flood Agreement and comprehensive implementation agreements. Mitigation works have been constructed and programming has been undertaken with the communities. The programming will also be described later by Mr. Sweeny.

On the benefits side of the ledger, the project has achieved the benefits originally envisioned. The frequency and magnitude of shoreline flooding events around Lake Winnipeg has been reduced without a change to average or

seasonal patterns of levels. A good example of this was the 1997 flood of the century, which, although it was a crisis for Winnipeg, was passed quickly through Lake Winnipeg with only minor effects. Hydro development has produced an economic, dependable and renewable electricity supply for the Province. And continued control of river flows has been key for further northern Hydro development, such as is now occurring at Keeyask.

However, on Lake Winnipeg many still have ongoing concerns with high water levels, erosion, water quality, the fishery and the marshes and blame the Lake Winnipeg project for these problems. Manitoba Hydro believes these concerns would be there for the most part, regardless of whether the project had been built. The project has not eliminated all problems, but it was never intended to. But in response to those who have these concerns, Manitoba Hydro has been engaging with the public for several decades, listening to concerns, explaining Manitoba Hydro's role and the relationship that regulation has to these concerns. Manitoba Hydro is committed to these ongoing discussions and a strengthened

relationship with those around the lake, as we want with all stakeholders along Manitoba Hydro affected waterways.

The information we share with those who are concerned about Manitoba Hydro's role in regulation of the lake is our understanding about water levels, and that is that regulation has lowered the peak water levels, that there's not been an increase in the average water level, that with regulation water levels in the fall are lower during wet and average years and higher during dryer years. And that with regulation, water levels continue to follow a typical seasonal pattern and resident times are similar to those that occur naturally.

With regard to erosion, we believe shoreline erosion is driven by natural processes. And with regard to water quality, the impact of regulation is likely very small. With regard to the fishery, they are generally in a healthy state. And with regard to the Netley-Libau marshes, the health of these marshes have been declining over the past 80 years, well prior to the existence of the project. Later today, Mr. Hutchison will describe in more detail our

understanding of these issues.

Manitoba Hydro has requested no changes to the Water Power Act Licence in applying for the final licence. Any changes to the licence conditions would require much in-depth study. What additional benefits would be achieved, what would be the impacts if the water regime that has been in place for the past 40 years is altered again, to the fish, to wildlife, to shoreline erosion, to resource use and the culture of the affected peoples? What would be the economic costs and who would pay? Any changes would require extensive consultation with all stakeholders. Manitoba Hydro has no plans to investigate changing their licence at this time.

Thank you. At this time, I'll turn it over to Mr. Gawne.

MR. GAWNE: Thank you, Mr. Cormie.

Good morning commissioners, chiefs, elders, participants and general public. My name is Kevin Gawne and I'm the manager of energy operations planning at Manitoba Hydro. I am a professional engineer and I have worked at Manitoba Hydro for over 17 years, primarily in the areas of transmission and generation operations.

My training background is civil engineering and I have a Masters of Science and Civil Engineering where my studies were focused on water resources and hydraulics.

I have been involved in reservoir operations, and particularly Lake Winnipeg Regulation operations in various capacities, including spending weeks at Jenpeg, responsible for the LWR ice stabilization program, planning Lake Winnipeg releases through the drought of 2003/04, and overseeing reservoir operations during the floods of 2011.

One key role in energy operations planning is to plan the operation of the generating system, including the hydro generating stations' control structures and thermal stations, and that's a function of the department that I manage. So I'll spend roughly the next 60 minutes to present on the topic of Lake Winnipeg operations, LWR operations, as well as system operations in general.

Just to start an outline, I will provide an overview of the Manitoba Hydro system, followed by an explanation of the physical features of the LWR project and the licence

parameters in the Water Power Act Licence, explain the process of energy operations planning, and then speak specifically to Lake Winnipeg Regulation operations, following with an overview of downstream water regime before and after Lake Winnipeg Regulation, and then summarize at the end.

So first of all, the Manitoba Hydro system. Manitoba Hydro and its customers benefit from being at the downstream end of two very large drainage basins, the Churchill and Nelson River basins. The Lake Winnipeg watershed at the Lake Winnipeg basin is roughly 1 million square kilometres and makes up the large portion of the combined Nelson/Churchill system. The basin stretches from approximately 20 kilometres this side of the Great Lakes, out west to the Rockies and the Continental Divide. It drains water from four states and four provinces that ultimately makes its way into Lake Winnipeg, and as Mr. Cormie had indicated, eventually drains out of the north end of Lake Winnipeg to the Nelson River.

The major river basins flowing into Lake Winnipeg include the Winnipeg River, the Red

River, the Saskatchewan River and the Lake Winnipeg local basin.

Looking at Lake Winnipeg tributaries specifically, there are a number of tributaries flowing into Lake Winnipeg. And all of this water, as I mentioned, must make its way north out into the Nelson River. The graphic here illustrates the major tributaries into Lake Winnipeg, and the width of the arrows on the graphic are roughly proportional to the average flow from these rivers.

Now, the proportion of inflow to Lake Winnipeg from each of these rivers certainly varies from year to year, however, the graphic here indicates the average contributions. Clearly, the most significant inflow into Lake Winnipeg itself comes from the Winnipeg River, or roughly 50 percent of the inflows to Lake Winnipeg originate from that river.

Next we have the Saskatchewan River, approximately 25 percent, the Red River at 16 percent, the Fairford River at 4 percent, and then the balance from the other tributaries in Lake Winnipeg.

Now, I earlier showed a map of the

drainage basin supplying Lake Winnipeg, and despite the fact that it's huge in expanse and it provides geographic diversity and water supply, there is still tremendous variability in inflows to the Manitoba Hydro system. Where as you can see on this chart, and I'll explain it, what you're seeing here is a chart of annual system inflows to the Manitoba Hydro system as a percentage of average. So on the horizontal axis you have year, and vertical axis is percent of average inflows, and the dark bars are just marking the decade markers. There is a number of information that can be drawn from this chart here. First is, you can see there's tremendous variability from year to year. So you can see our drought year, our lowest flow on record was in 1940/41, where flows to the system were less than 50 percent of the long-term average flows into the Manitoba Hydro system. And that's in comparison to our high flow years, for example, 2005/06, where inflows to the system were 170 percent of average, so over three times the drought year. So there's tremendous variability, as you can see.

You'll also note that there are periods of, prolonged periods of dry conditions,

for example, in the low water periods of the late '80s, and also prolonged periods of above average conditions. And as Mr. Cormie had mentioned, right now we are still in a cycle of above average water supply conditions, and we've gone through over 10 years now where flows into the Manitoba Hydro system have been above average to record high.

The variability of inflows into the Manitoba Hydro system and into Lake Winnipeg is an important thing to keep in mind when we're talking about Lake Winnipeg Regulation operations. So we'll come back to that.

Next, I'd like to briefly review some of the major components of the Manitoba Hydro system, including the generating stations and the hydraulic features of the system, starting at the upstream end in Southern Manitoba, the Winnipeg River. The Winnipeg River itself consists of six generating stations that use water that originates in Ontario, where roughly 90 percent of the water that flows through those plants comes from the basin in Ontario regulated by the Lake of the Woods Control Board.

Next, we have Cedar Lake and Grand

Rapids. Grand Rapids is our fourth largest generating station and Cedar Lake is a significant reservoir controlled by that generation, by that station.

Of course, we have Lake Winnipeg Regulation, and I'll get into that in greater detail, but the primary function of that project, as we have heard, is flood control and also for the control of outflow for power purposes.

We have the Churchill River Diversion project. Mr. Cormie explained that portion of the system. As far as it relates to Lake Winnipeg Regulation, a key function of the Churchill River Diversion is to increase flows or transfer flows to the Nelson River, and supply our major generation on the Nelson River, particularly during the winter months when ice is restricting outflows out of Lake Winnipeg, the Churchill River Diversion flows can augment the flows on the Nelson and account for that restricted outflow from Lake Winnipeg.

Next we have the lower Nelson River. So this is a cascade of our three largest plants, Kettle, Long Spruce and Limestone. Together those plants make up roughly 70 to 75 percent of

Manitoba Hydro's generation. The main supplies of water to those stations come from Lake Winnipeg and the operation of Lake Winnipeg Regulation, and also the Churchill River Diversion.

There's other generation on this system. In Southern Manitoba we have thermal generation at Brandon and Selkirk, and we also purchase power from two wind farms located at St. Joseph and St. Leon. However, overall the system itself is 95 percent hydroelectric. And that's an important point to keep in mind for future slides.

Manitoba is interconnected to the neighboring electricity markets. If you recall from the previous slide, we have this massive drainage basin, and we are also 95 percent hydro. So Manitoba Hydro has designed its system so that we can provide our electrical, or supply our electrical demand even during droughts, even when flows are very low on the system. Under most conditions, we have better than drought conditions and we can supply surplus energy to neighboring markets. So there is a place to put that power if water conditions permit.

Manitoba Hydro's electrical demand is

highest in the winter, primarily because of heating loads. And that's relevant to the earlier explanation by Mr. Cormie where a key role of the LWR project is to allow more water to come out of Lake Winnipeg during the winter months, and that's to supply Manitoba load when it is highest.

Our exports, however, are higher in the summer months, so we can export energy to the neighboring markets, particularly to the U.S. market where their load is peaking in the summer time because of air conditioning load. So exports are typically higher in the summer months. And this is coincidentally when we receive our inflows into the system, during the spring and summer months, the majority of our inflows.

In addition to exports, the tie lines to the neighboring markets diversify our supply. So we are 95 percent hydroelectric, however, we are interconnected to neighboring systems that are not at risk of a regional drought, so we can import energy from those neighboring systems during a drought or if we have emergencies on our system, or when it's economic to do so.

So that's the Manitoba Hydro system. I would like to now explain some of the key

physical features of the LWR project, as well as the licence parameters of LWR.

This is a map to the right of the LWR outlet channels and some of the key features of the LWR project. And these features shown in this chart, in the photos to the left are -- the primary role of these features is to increase the outflow from Lake Winnipeg, to provide increased capacity from the outlet channels to allow more water to come out of lake Winnipeg.

So first we have the 2-mile channel located in the north basin of Lake Winnipeg. The purpose of this channel is to allow water to exit Lake Winnipeg into Playgreen Lake, and bypass some of the restrictions in the natural channels at the north end of Lake Winnipeg.

Next we have the 8-mile channel, and my guess is these channels were named by an engineer because this one's about 8 miles long. And the purpose of this channel is to direct flows from Playgreen Lake into Kiskittogisu Lake, bypassing the narrows north on Playgreen Lake and as well the narrows at Whiskey Jack, Whiskey Jack Narrows at the north end of Playgreen Lake.

Next we have the Kisipachewuk channel

improvements. There's no photo here because it's under water, but this involved excavation of a restriction to improve the flow of water or increase the ability of water or flow from Kiskittogisu Lake directly into the Nelson west channel.

The photo at the bottom is the Ominawin bypass. This is located at the north end of Kiskittogisu Lake and allows water to bypass the natural restrictions at Ominawin channel and allow more water to come out of the lake. It has a unique feature in the centre, as you can see, we call it this rock groyne down the centre, and the purpose of that groyne is to help improve ice conditions to allow more water to come out of Lake Winnipeg in the winter months.

So those features increase the outflow capability from Lake Winnipeg. Next we have features involved in flow control or containment of water as part of the features of Lake Winnipeg Regulation project. First, of course, we have Jenpeg about a hundred kilometres north of Lake Winnipeg. The primary role that Jenpeg provides is flow control through the west channel, which is the bulk of the outflow from Lake Winnipeg. There

is also generation there at Jenpeg, but again the primary role at Jenpeg is for control of flow on the Nelson River.

Next we have the Kiskitto inlet and control structure and as well the Kiskitto dam. And the purpose of these structures were, they were to contain the impoundment from Jenpeg Forebay, to isolate the effects of Kiskitto Lake, to isolate the effects from the Lake Winnipeg Regulation project on Kiskitto Lake. So together with the Black Duck Control Structure, these features are operated to maintain Kiskitto Lake within its natural operating range prior to Lake Winnipeg Regulation.

So all these projects put together provide two main functions. They increase the outflow capacity from Lake Winnipeg for flood control on Lake Winnipeg, and also for generation in the winter months on the Manitoba Hydro system. So there's flood control benefits on Lake Winnipeg and also power system benefits that all these projects put together, or all these features put together make up the Lake Winnipeg Regulation project.

Now to speak to some of the parameters

of the interim licence. First of all with Lake Winnipeg itself, there's level constraints, or level zones on Lake Winnipeg defined according to the wind-eliminated level on the lake, where when the level of the lake is above 715 operations are for flood protection, or flood reduction. When water levels are in this zone, Manitoba Hydro is required to operate at maximum discharge. Within the green zone shown on the chart to the right between 711 and 715, Manitoba Hydro is authorized to operate Lake Winnipeg Regulation for power production purposes. When the water level recedes below 711 feet, operation of Lake Winnipeg Regulation and the outflows from Lake Winnipeg are directed by the Minister of Conservation.

There's also flow constraints associated with Lake Winnipeg Regulation. The minimum outflow of Lake Winnipeg is 25,000 cubic feet per second. Also at Jenpeg, Jenpeg must be operated such that a change in flow within a 24-hour window is less than 15,000 cubic feet per second. There are also level constraints on Playgreen and Kiskittogisu Lake, so ranges have been identified in the licence for those lakes. And then as I mentioned earlier, Kiskitto Lake is

operated within its natural range prior to Lake Winnipeg Regulation.

Now looking at levels on Lake Winnipeg before and after, or before and with Lake Winnipeg Regulation. This chart here is quite involved and there's a lot of information in the chart. So give me a second to just explain briefly the chart. What you see here are monthly average water levels on Lake Winnipeg from the period of 1915 up until toward the end of 2014.

The blue shaded area depicts periods when water levels were above the average for that period. The red shaded areas illustrate when water levels were below the average. So you have an invisible line here through the pre Lake Winnipeg Regulation period that represents the average water level over that entire period. Similarly, there's the average level depicted on the right half of the chart that slices between the blue and the red, illustrating the average level after Lake Winnipeg Regulation began operations.

So there's a number of things we can observe from this chart. First of all, the lows -- and Mr. Cormie alluded to this earlier --

the lows that are experienced on Lake Winnipeg are not as low as what occurred prior to Lake Winnipeg Regulation. So these monthly average levels that were observed and experienced in the '30s and '40s have not been experienced since Lake Winnipeg Regulation. Now, that's recognizing, of course, that the water supply conditions have not been the same as they were prior to LWR. And we'll talk about that later.

Now the highs, similarly the highs experienced, the peaks of Lake Winnipeg are not as high as was experienced prior to Lake Winnipeg Regulation.

Mr. Cormie spoke of the duration of the floods that were experienced, and the duration of these extreme events is not as long with Lake Winnipeg Regulation as was experienced prior to Lake Winnipeg Regulation. So the duration of the events, both the dry events or low average events, as well as the above average events.

These arrows here depict the difference between the averages, the long-term averages prior to LWR and following Lake Winnipeg Regulation. It's also shown on the chart in the upper left. But essentially the long-term average

water level, or the post Lake Winnipeg average water level on Lake Winnipeg is nearly the same as what was experienced prior to Lake Winnipeg Regulation, so .2 feet higher. And this is despite the fact that water conditions have been wetter since the LWR project was put into place.

Also the ranges in highs and lows is not as wide. So as you can see, the range between the high water levels and low water levels experienced on Lake Winnipeg is narrower than what was experienced prior to Lake Winnipeg Regulation. And this is not because the hydrology has been more stable, rather it's through the operation of Lake Winnipeg Regulation, through the flood control and storage requirements for generation that the range has been less. And essentially some of the variability that was experienced prior to LWR has been moved downstream, to the rivers and lakes downstream of Lake Winnipeg Regulation. And I'll explain this further in a moment.

If you can consider two extremes in reservoir management, and this is a hypothetical situation but just to explain the point of how to manage variability with the reservoir. You can do this in two ways. Imagine one that the objective

is to hold the reservoir constant and set outflows to match inflows. So in other words as you have a reservoir and inflows are changing, if the objective is to hold the level of that reservoir constant, you have to exactly match the outflows with the inflows, so your inflows and outflows are matching at all times. To do this with Lake Winnipeg, outflows would have to be varied between 15,000 CFS on the low end, which is well below the minimum allowed by licence, and up to 340,000 CFS, which is well above the maximum possible with the Lake Winnipeg project, this is 85 percent higher than what we peaked at in terms of outflows in 2011. So obviously this cannot be done with a minimum and the physical flow constraints from Lake Winnipeg. So the lake level will rise and fall. For example, when inflows are high, the lake level will simply have to rise to allow the outflows to increase. In a flood, the lake level will continue to rise until it reaches an equilibrium when outflows are equal to inflows. So that's one extreme of reservoir operation.

Second, on the other end of the spectrum is, what if you wanted to allow the reservoir levels to vary and hold the outflows

from the reservoir constant? So if the objective is to have a completely stable outflow from a reservoir to match the average inflows over the long-term, what would have to happen is, as inflows increase, the lake levels would have to rise, and as inflows decrease, the lake level would have to fall. If that was the objective -- or modeling and looking at the inflows into Lake Winnipeg, if that was the scenario, the outflow would be held constant at the long-term average, and the lake level would rise and fall freely, but Lake Winnipeg levels would have to rise and fall over a range of about 35 to 45 feet, or 10 times the power production range between 711 and 715 feet. So, of course, this isn't the case, so Lake Winnipeg outflows must be varied and are highly dependent on inflows to the lake.

So managing inflow variability as it relates to Lake Winnipeg Regulation operations. Despite the fact that Lake Winnipeg is so large in area, given the wide variability of inflows to the Manitoba Hydro system, the power production range is relatively small and there's only a limited ability to manage this inflow variability. The February 2015 Sustainable Development Report

confirmed this and said that the storage capacity of Lake Winnipeg is very small compared to that of other large lakes. Between the two extremes that I had just explained in my earlier slide, I would characterize Lake Winnipeg as being closer to the first case, that is the features of the LWR licence are trying to keep the lake level stable, therefore, Manitoba Hydro and the project is required to pass the inflows downstream to the extent possible with the structures in place at LWR project. So this moves the variability and inflows downstream to the downstream users. And it defines our operation. Our operation is largely determined based on the inflows to Lake Winnipeg.

I'd now like to explain basically some basics of the process of energy operations planning. So now we're talking about reservoir operations, but also electrical operations.

The objective of energy operations planning is to plan for the reliable and economic operation of Manitoba Hydro's system of reservoirs and generating stations, while considering effects on stakeholders and the environment. So that's our high level objective. And what does that

mean? It can be explained using the analogy of a balance. Operating a power system involves developing a plan or a series of planned operating decisions to ensure that supply or electrical generation and demand, which is electrical load, are balanced over the entire operating horizon. Whether it's next hour, next day, two weeks out or next month, it's trying to ensure that you have a balance between supply and demand.

Major electrical energy supplies, in the Manitoba Hydro context, clearly is hydroelectricity, and the key inputs to that are, of course, inflows in the system and storage. I mentioned earlier, we're connected to neighboring markets and imports provide an electrical supply. Wind generation as well, as is thermal generation, and to a lesser extent emergency energy can assist in balancing supply with demand for short term emergencies.

On the demand side of the ledger or the balance is domestic load. So Manitoba Hydro is obligated to serve its electrical customers in Manitoba. As I mentioned, we also have export demands. So together between these supplies and demands, the objective of operations planning is

to keep these two in balance.

Now, of course, there's tremendous uncertainty on some of the parameters on this balance. For example, weather forecasts are highly uncertain, and climate variability can drive precipitation and inflows, so that can affect the supply side of the balance. And as well, electrical demand is, to some degree, a function of weather, so that demand itself can be uncertain due to weather. So we need to understand and develop forecasts and deal with the fact that many of these supply and demand parameters have uncertainty around them.

Now, if economics were the only priority, then an optimal plan or an optimal balance of supply and demand would simply involve minimizing costs or maximizing net revenues. However, the reality is there's other priorities at play. We need to consider energy security for reliability, social interests, environmental impacts, as well as safety, of course, in our operations. So there's multiple priorities and often these priorities are competing. And we have to consider that in our planning of the operations of the system.

Just briefly to touch on the cycle of energy operations planning, so planning the operation of a power system is not a static undertaking. It's not that Manitoba Hydro determines what reservoir releases to make and then walks away and comes back months later and finds out how it worked out. It's a continuous cycle of operation and planning and updating. So, if you will, the cycle starts at the beginning, at the top, with observations and updating of forecasts. So we need to collect information on the various operating parameters, the supply and demand parameters that I just spoke of, and we need to create forecasts out into the future of these parameters because, as I said, it's planning the operation over a period of time.

Next in the cycle is assessing and adjusting the plan at the 3:00 o'clock position. One needs to confirm the operating plan is the same series of decisions, does it still make sense. Update the operating decisions to assess what to do next, whether or not to generate or spill? And these decisions are generally optimized subject to constraints on the system. We must meet load regulatory requirements and

other constraints.

It's at this juncture when the operating plan is being updated that our Manitoba Hydro operations planning engineers are using decision support models to help in planning the operations of the system. It's also at this stage where input and feedback is gained from external stakeholders. And just to provide an example of that in considering stakeholder input, for example, this past winter when Manitoba Hydro was looking to delay flow increases on the Churchill Diversion until after freeze-up, our operations planning staff consulted with our Aboriginal relations department staff to determine when and how much of a flow increase would be reasonable after freeze-up had occurred on the Churchill Diversion.

So after that discussion we determined that it was best to limit slush ice on the lakes along the diversion and delay the flow increase, but only make smaller flow increases, and ensure that those flow increases are timed such that they happened outside of the window when there was on-ice activity expected in the area. So this is one form of receiving external feedback and input

into the operations planning process, or one example.

After assessing the conditions and deciding on a plan, of course, we need to communicate that operating plan. So we're now at the bottom of the cycle. We need to communicate our planned operations to meet our internal staff, for example, control centre folks in generating stations, but also to the stakeholders outside of Manitoba Hydro, so those that we impact or affect on the waterways that we affect in our operations. So that could involve issuing forecasts to the communities that are along the Nelson River.

And of course at the nine o'clock position, we need to carry out those operating decisions. So someone is out in the field making a flow change at a control structure, for example, and that operating decision has been implemented.

And next we go to the top of the cycle. So time has passed and now we have the benefit of time to observe what has happened, update our observations and update our forecasts and continue along with the cycle of planning the operations.

I mentioned in the previous slide

there that our operations planning engineers use models, decision support systems or tools to help in planning the operation of our system. There's a lot of information to keep track of and many decisions on water management for a power system become very complex very fast. So akin to many people here who likely have Microsoft Office at home with the suite of tools, PowerPoint, Excel, Word, our operations planning engineers have a suite of tools that they use to help them make decisions on water management. And those tools consist of flow forecasting tools, energy load forecasting, water simulation tools to help us understand the effects of our decisions on, for example, lakes downstream of Lake Winnipeg. So the decision support system is the suite of tools that our operations planners use to assist in making planning decisions of LWR and other aspects of the Manitoba Hydro system.

Now, this is a picture, there's a bunch of pictures here on this chart, and the point is not to understand what all those are, but the point is that it is a complex system of tools that Manitoba Hydro uses to plan the operations of its system. And it's fundamentally based on

operations research and essentially applied mathematics to help us plan the operation of the system, where we inform these decisions through well established tools. Similar to other big hydro utilities, Manitoba Hydro uses these techniques of applied operations research. To model the operation of the Manitoba Hydro system, we maintain awareness of the industry practices in these tools through involvement with industry groups specialized in the field, where membership of these groups include entities like B.C. Hydro, Hydro Quebec, Swedish companies, Bonneville Power Authority and many other major hydro utilities. So that's how we're engaged with people in the field of decision support systems for hydro operations.

Essentially, the exercise or the requirement is to model the physical characteristics of the system. So including the reservoir sizes, channels, tributary inflows, generating station capabilities, transmission limits and other physical parameters. At a very high level, the operations planning process in a hydro utility is to determine what a trade-off decision should be. Should we release water now

and generate electricity, or store water for later opportunities? And that's the highest level of the decision.

Water inflows are a key input to the whole decision process, so we need to assess multiple water supply conditions in our decision-making, because of course there is uncertainty in future water supplies.

As I mentioned, we are required to adhere to physical and regulatory constraints, and we model those constraints within our decision support systems and help us make our decisions.

Now, lastly, the point is operations are tempered. There is professional engineers that are using these tools. They are specialized expert systems that -- you know, a mathematical model will find the theoretical optimal solution and how to operate a system, but the reality is sometimes those flow changes, for instance, aren't practical to implement, or they may be overly aggressive in their operations. So this is when the operations planning engineer needs to exercise judgment and effectively temper those operations so that they can be implemented in the field, and as I mentioned earlier, consider the effects of

stakeholders and the environment in our operations decisions.

So how do we consider stakeholders and the concerns of the environment in operations planning? Well, there's a number of methods, or I guess a number of means that we achieve that, some being formal long-term efforts, others being issued specific means where we determine what the impacts are on the waterway communities, and what's happening in the water bodies that we are impacting. So formalized input is received through agreements, where over the course of multiple years, Manitoba Hydro has learned and understood and engaged with those that are impacted by our operations of what those impacts are and what those concerns are. And we'll hear more about those agreements later.

Issue specific input is received through contact with the corporation stakeholder engagement staff who are familiar with activities in the field along the waterways affected by our operations. And they can feed back to the operations planning engineers about activities that are going on at the time of when operations are planned.

In the shorter term, we engage with our internal staff from Aboriginal relations and hydraulic operations, again, those that are familiar with conditions on the waterway in terms of stakeholder activities. And this provides a two-way communication where we can understand what's going on in terms of activities on the waterway. For instance, if there is a community event on the waterway and we're looking at making a water flow change, there may be an opportunity to adjust the operating plan to avoid making those changes at the time when there's increased activity along the waterway. And similarly, it provides communication in the other direction, where when we're meeting with our stakeholder and engagement staff and we can advise that conditions have changed considerably, then that information can flow out to the stakeholders that are affected by our waterways, for instance, in the forms of special advisories if water conditions have changed considerably.

Next I'd like to speak to Lake Winnipeg Regulation operations specifically. And I'm going to show a very busy chart here, and what I would like to do is just explain what you're

looking at here, first of all, before we get into it. This is a chart of daily discharge from Jenpeg, so the bulk of the outflow from Lake Winnipeg, daily average discharge from Jenpeg starting in January, on the horizontal axis to the end of the calendar year. On the vertical axis is flow at Jenpeg in cubic feet per second. Now, the gray lines on this chart represent historic years of flow operations at Jenpeg from 1977 to 2012. The black kind of more tempered line through the year is the average of experience from 1977 to 2013, so post LWR. The bold blue line is the operations at Jenpeg from 2013, and then the bold red line is the operating history at Jenpeg for 2014.

So to explain LWR operations, one way to do it is to break it up into seasons. Starting with the winter, which is highlighted in these blocks, after freeze-up flows out of Jenpeg and out of Lake Winnipeg are usually increased to supply the Nelson River generation. For winter generation when Manitoba load is highest, flows are typically increased to maximum that's possible under the ice conditions. So we can see there's almost a ceiling of flows in these, in this

period. And the grouping of flows is tighter. So this variability in flows for Jenpeg is much tighter during the winter months than the open water seasons, for a few reasons. They are bound on the top by the ice restrictions out of Lake Winnipeg, you can only get so much water out of Lake Winnipeg when there's ice on the channels. And on the bottom there is a minimum amount of water that we need to get out of Lake Winnipeg to reliably operate the power system. So we need to supply that generation on the Nelson River during the winter months and, again, when our load is higher.

Now, water levels, a lot of these operations are maximum discharge out of Lake Winnipeg, but that number isn't necessarily the same every year. It's a function of the ice conditions at the channel outlet, at the outlet of Lake Winnipeg, and also the water levels on Lake Winnipeg itself.

Next, moving into spring, you can see discharge history at Jenpeg kind of diverges into a grouping of flows increasing and flows decreasing. Operation of Lake Winnipeg outflow in the spring is certainly driven by a number of

factors, including regulated inflows from upstream of Manitoba, levels on Lake Winnipeg and other lakes, snow pack, and spring rains. Generally flows are reduced out of Jenpeg so as to not overload the Nelson River with water at the time when run-off is happening in the north, and also when electrical loads are lower. So if inflows are below average, water is conserved for use later when demand is higher. If levels are high on Lake Winnipeg, or if inflows are high or projected to be high because of snow melt, then you see this grouping of flows increasing. And what's happening there is inflows are being transitioned towards maximum discharge, and that discharge amount is higher because the ice is relaxed and it's melted off the channels at the north end of Lake Winnipeg. So the discharge at Jenpeg can be higher.

Next we have the summer months. And again, Lake Winnipeg outflows are highly dependent on conditions. And as you can see, there's a lot of variability in outflows during the summer, and this is when the variability is highest. Outflows are a function primarily of inflows into Lake Winnipeg, as I explained earlier, but also levels

on Lake Winnipeg as well as other reservoirs. Outflows can change relatively rapidly in this time of the year, particularly when flow increases are done. And this is mainly in response to major successive rainy events in the Lake Winnipeg basin.

So there's a much wider range in outflows during the summer, from maximum discharge under open water conditions at the top of the chart to the minimum required when inflows to the lake are low.

Next we have the fall. With the typical decline in inflows through late summer and fall and higher evaporative losses, generally there is a decline in inflows to the lake. Early fall flows are generally lower than mid summer, because inflows are lower on average and because electrical demand is less. So electrical demand is peeling off in the fall season so flow reductions can be made from a power system perspective.

Lake Winnipeg levels typically decline through the fall. However, when water supply conditions are low, outflows will be reduced to conserve water for use in supplying winter demand.

In late fall between mid November and early December, Lake Winnipeg outflow is usually reduced for the ice freeze-up program.

Lastly, I just highlighted a kind of a grouping of flows here to make a further point that this will maximum discharge operation under open water conditions -- so this is when the lake level has risen to or above the 715 level and Manitoba Hydro is obligated to operate at maximum discharge -- for flood control benefits on Lake Winnipeg. So this is the type of operation we see encircled in this shape here. And the point here is that this operation is for flood control benefits on Lake Winnipeg. And a bulk of the flows that are being released out of Lake Winnipeg under these conditions are actually spilled at the generating stations downstream. So this water is not necessarily being used for generation. It's the requirement of the licence to go to maximum discharge that requires flows to be so high on the Nelson River, and much of that water ends up going over the spillways on the generating stations along the Nelson River.

I'd like to talk to a specific point about concerns about levels on Lake Winnipeg in

the fall months. So we have heard concerns from residents around Lake Winnipeg and cottage owners about high levels, and particularly during the fall months when damaging windstorms are common. Now, what has happened however with Lake Winnipeg Regulation is that we have operated such that in wet years, fall levels are lower with Lake Winnipeg Regulation versus if LWR was removed or Lake Winnipeg Regulation project was not there. So under wet conditions and flood conditions, water levels are lower now, in a range between 1.6 to 3.6 feet lower in the fall with Lake Winnipeg Regulation than if Lake Winnipeg Regulation were not there. And I'd refer to appendix 4 for that study.

In dry years, however, when inflows to the system are low and storage is needed to reliably meet electrical demand in the winter months, fall levels will be higher with Lake Winnipeg Regulation. And the reason for that is storage is being conserved to make it through the winter and supply the generation on the Nelson River system. And again, appendix 4 provides the information on that evaluation of what Lake Winnipeg levels would have been had Lake Winnipeg

Regulation been removed.

Now, this is counter to what the expectations were of the Lake Winnipeg/Churchill River/Nelson River Study Board. And perhaps that's part of the concern of the view that levels are higher in the fall, and may stem from the predictions by those early studies. The study board predicted that average fall levels would be higher by 1.2 feet. However, experience has been that average levels have been about .2 feet higher than the actual water levels. And as I mentioned earlier, with the simulation with actual flows, and it's been wetter since Lake Winnipeg Regulation began, levels would have been much higher, in the order of 1.6 to 3.6 feet in the fall, if LWR was not in place.

So why haven't fall levels been higher than predicted by the study board? Well, one significant reason for that is the degree that Manitoba Hydro is interconnected to neighboring electricity markets. Inflows are highest in the summer and spring. And now with Manitoba Hydro being interconnected to neighboring markets, that water can be used to generate electricity during the summer months and export the electricity, as

opposed to holding onto that water and reservoir storage to use later on in the winter months when Manitoba load is higher. So Manitoba load is higher in the winter time, but we're tied to these markets and we can use our interconnections to export electricity during the summer months, as opposed to retaining that water for storing in the winter. And we can do this knowing that we have connection to these neighboring markets to provide electricity to supply Manitoba load, if conditions turn dry, we can use these connections to purchase power from neighboring markets and supply Manitoba demand during the winter months. So we can still ensure the security of supply or energy reliability without hanging on to extra reservoir storage heading into the fall months. And this was not anticipated at the time that the study boards were projecting that lake levels would be higher in the fall months, whereas in fact that has not happened.

Next I'd like to speak to the topic of the Netley-Libau marsh. It has been suggested that one way to help re-establish emergent plans in the Netley-Libau marsh would be to lower Lake Winnipeg levels to levels approaching 711 feet for

extended periods. And it has been suggested this type of operation occur for extended periods in the order of two years once every 10 to 20 years.

Now, is that possible? To answer that question, we have to remember that the most significant driver impacting wind-eliminated levels on Lake Winnipeg and the operation of Lake Winnipeg is the amount of inflow into the lake. And we also need to be reminded that Manitoba Hydro system is 95 percent hydraulic, and two key parameters in that supply and demand balance that I showed earlier is inflows and storage. So under above average or high inflows, Lake Winnipeg levels, as I had mentioned, will rise until such a point that outflows reach an equilibrium with inflows. So low levels are simply not possible when inflows to Lake Winnipeg are high. The lake levels need to rise until the outflows match inflows and then the lake level will stop rising.

Now, under low inflow conditions, Manitoba Hydro, as I have said earlier, conserve storage above that 711 foot level to reliably supply our energy demands, particularly during the winter months. And targeting very low levels on Lake Winnipeg under low inflow conditions would

put energy reliability at risk with potentially devastating consequences. For example, extended periods of energy deficits through a drought could require rotating electricity outages for Manitoba electrical customers. There would be other consequences too, including negative effects on navigation and lake access.

So if you remember back to the supply and demand balance slide that I had showed earlier at the beginning, if storage was to be drained out of Lake Winnipeg at a time when inflows are low, we would be challenged to balance supply and demand in the following time period, particularly during the winter months.

So regardless of the lower limit of the power production range, prolonged periods of low lake levels would only be possible under low inflow conditions, but targeting those levels under those conditions would risk prolonged outages to Manitoba customers.

I'd now like to speak to some --

THE CHAIRMAN: Mr. Gawne, I'm thinking that this might be an appropriate time to take a short break. So we'll break now and come back at 11:15.

(Proceedings recessed at 11:00 a.m.
and reconvened at 11:15 a.m.)

THE CHAIRMAN: Okay. We'll come back to order, please. Order, please. Mr. Gawne?

MR. GAWNE: Thank you.

Okay. I'll resume with a few slides on the downstream water regime. First of all, Cross Lake, what you're looking at here is a water level chart for Cross Lake illustrating the monthly average levels through the year starting at January to December, and this is for the period prior to Lake Winnipeg Regulation. So just briefly to explain the chart. What you see is water levels would be on average declining through the winter months and then rising through the spring and open water period when inflows to Cross Lake would increase as the ice restrictions from Lake Winnipeg melt off, and also as precipitation adds to the system, and then again the levels declining through the fall months toward the freeze-up period. So that was prior to LWR.

This next slide includes an additional red line illustrating the monthly average levels on Cross Lake following Lake Winnipeg Regulation but prior to the construction of the weir. In low

flow years, Lake Winnipeg Regulation is operated to reduce the outflow of Lake Winnipeg into Cross Lake, and in the summer, and then increasing flows out of Lake Winnipeg during the winter months, again, to supply electrical demand during the winter months. So what happened is essentially a seasonal reversal of water levels on Cross Lake. Levels in the summer were clearly lower than was experienced prior to LWR and winter levels were higher.

Below average flows, particularly in the period of 1976 through 1991, resulted in this seasonal reversal of levels, and a large part of the reason why the Cross Lake weir was constructed. And that weir was constructed in 1991. As you can see here, the Cross Lake weir is shown in plan drawing, so a map of the outlet area of Cross Lake where the weir was constructed, and the purpose of the construction, again, was to lessen the effects of Lake Winnipeg Regulation on water levels on Cross Lake.

The objective was to increase the low levels and stabilize levels at average water levels and then decrease or manage the flood levels when inflows to Cross Lake were high. So

what you see here is a cross-section, this red dashed line through the plan drawing is shown as if you would take a cut through the land, and this is a cross-section of two of the channels of the outlet, the centre channel and then the east channel.

So the project involved filling in a portion of the centre channel to essentially deal with the very low water levels on Cross Lake when inflows to Cross Lake are low, and also excavating material on the east channel to allow more water to come out of the lake at a given level on Cross Lake. And that's to deal with flood flows in Cross Lake.

So what happened with levels following the weir? Well, the objectives were to deal with low levels and the low levels certainly have been addressed through the fill portion of the centre channel on the weir, where levels in the open water period are not as low as was experienced prior to construction of the weir. So the lower levels have been raised.

The maximum levels, the objective was to not exceed a level of 687 feet on Cross Lake in a flood year. Now, these are monthly averages so

it's not obvious to know what the maximums have been experienced, but that flood level has been lowered with the excavation of the east channel at the outlet of Cross Lake.

So the lower levels have been raised and the higher levels have been managed, and also levels are more stable during the period of the year where water levels more closely represent or reflect what had occurred prior to Lake Winnipeg Regulation.

Moving further downstream to Split Lake, a similar chart, this blue line here reflects the monthly average levels at Split Lake and a similar pattern was observed. Water levels would be declining through the winter, again with Lake Winnipeg outflows getting restricted with ice formation, and the creeks and rivers freezing up in the winter. And then water levels rising as those ice restrictions were released and precipitation and run-off was occurring, and then again a decline through into the fall and winter months.

Now, since Lake Winnipeg Regulation and now we are adding in Churchill River Diversion, of course, because diversion water is

coming from the Churchill system into Split Lake, and operations of CRD and LWR have affected water levels on Split Lake and downstream on the Nelson River, all the way to Gull Rapids -- pardon me, all the way to the Hudson Bay, the CRD has increased average flows, and both CRD and LWR have affected the seasonal flow pattern. Winter flows and levels are generally higher because of CRD and LWR. And the average water level on Split Lake is about 1.2 feet higher now than it was experienced prior to the two projects.

And similar to the experience that was seen on Cross Lake, but perhaps not to the same extent, there has been a seasonal reversal effect on Split Lake where water levels are now on average higher in the winter months than during the open water period.

Now, talking about water regime downstream, it's natural to talk about the effects of that water regime downstream, and one of those effects is erosion along the waterways downstream of Lake Winnipeg Regulation. Shoreline erosion is a natural process that will occur and can occur on all waterways. However, Lake Winnipeg Regulation has accelerated erosion, and regeneration and

accumulation in several ways through erosion of the shore material at the two and eight-mile channels, flooding in the Jenpeg forebay areas, increased water levels on Cross Lake at certain times of the year, and increased flows in general on the Nelson River. And shoreline erosion can have a number of impacts, two being making access to the water difficult, or access to the shore if you're on the water more difficult, and it can result in the loss or addition of beach terrain.

There will be later presentations that will address the impacts of erosion on the water as well as the stakeholders along the waterways impacted by our operations.

So I'd like to now close off with a summary. I have shown a lot of slides here, and just have a few more summary slides.

First of all, Lake Winnipeg Regulation does provide flood relief on Lake Winnipeg. The upper range of the Lake Winnipeg Regulation licence and the requirement to go to maximum discharge, and the increased outflow capability that the project provides has allowed there to be benefits on Lake Winnipeg in terms of flood reduction benefits. I reviewed operations

planning in a high level. The process involves planning the operation of the reservoirs and generating system in a reliable and economic manner, while considering the effects on stakeholders and the environment. And that's our operations planning objective. Lake Winnipeg Regulation has been key and instrumental in meeting that objective, in providing for reliable operation of the Manitoba Hydro system and economic management of the reservoir releases and the lake releases from Lake Winnipeg, allowing us to balance that supply and demand that I spoke of earlier, balancing the energy supply with the electrical demands on the system.

I spent some time going through explaining that Lake Winnipeg, although it's huge, it's roughly 25,000 square kilometres in area, it's actually, in fact, not that large relative to the variability of inflows into the system and relative to the four foot operating range defined in the licence. Therefore, lake levels and Lake Winnipeg operation, or Lake Winnipeg Regulation operation are largely driven by inflows. So in floods, water levels will still rise on Lake Winnipeg and they will rise above the 715-foot

elevation. And in dry conditions, water levels will recede. But the operation of the Lake Winnipeg Regulation project is largely driven by the hydrology flowing into that lake.

I touched on the concern about high average fall levels that were anticipated by the study board and that are certainly a concern by residents around the basin, or the Lake Winnipeg, particularly when the fall storms can result in significant erosion damage. The expectation was levels would be higher in the fall, leading up into the winter, and what has happened is levels has not been increased in the fall months. In fact, during wet years, levels are lower in the fall than they would be without Lake Winnipeg Regulation.

I spoke of downstream water levels and flows, and the fact that conditions downstream have been impacted by Lake Winnipeg Regulation.

My last slide here addresses implications to changing the licence. Manitoba Hydro is not seeking to have the terms of the Lake Winnipeg Regulation Water Power Act interim licence changed, but it was important to look at what would implications be if there was a change

to that licence. In terms of operations and power system operations, which is my area of expertise, a reduction in storage or a reduction in the flexibility to operate flows out of Lake Winnipeg, when water levels are in the power production range would impact reliability or economics for Manitobans and the ratepayers of Manitoba Hydro. So if there was a change that was immediately imposed on the Lake Winnipeg Regulation licence, I spoke of the potential of the liability impacts, what would likely happen is Manitoba Hydro would like to re-establish that level of reliability, and that could result in capital work or some change to Manitoba Hydro's resource plan to re-establish the reliability that the Lake Winnipeg Regulation licence provides.

Any changes to the upstream or downstream water regimes would impact on either side of that change, essentially if there's a move to modify the Lake Winnipeg, terms of the Lake Winnipeg Regulation licence to change conditions upstream, well, there is an effect downstream. Similarly, downstream changes will translate upstream.

And lastly on topic of the

Netley-Libau marsh and the thought to help the marsh re-establish vegetation through extended periods of low levels on Lake Winnipeg by specifically targeting drawing Lake Winnipeg levels down. As I have indicated, it's not possible to achieve those low levels on Lake Winnipeg when inflows to the lake are high. It is possible to draw Lake Winnipeg levels lower through operation of Lake Winnipeg Regulation when inflows are low, however, during -- that type of operation would add risk to the reliability of electrical system, and it would challenge the balance of supply and demand in meeting the electrical demands if you did not have that storage available to you in a low inflow scenario.

So that closes with my summary, and I thank you. I think we have another presenter coming up next.

MR. CORMIE: Yes, Mr. Chairman. Mr. Swanson will now join the table and present, if that's your will.

THE CHAIRMAN: Yes.

MR. SWANSON: Good morning, my name is Gary Swanson and I'm here to present to you a summary of the environmental effects of the Lake

Winnipeg Regulation downstream of Lake Winnipeg.

As part of this presentation, I'm going to tell you that while Manitoba Hydro understands the environmental issues and concerns, the available information doesn't allow us to quantify the effects of Lake Winnipeg Regulation. This is because the studies were not set up to do that. But I'm also going to tell you about more recent monitoring activities that will help us better understand the effects of Hydro operations into the future. My presentation should take about 40 minutes. And before I proceed, I'm going to quickly note that a presentation on key issues for Lake Winnipeg will follow this presentation.

My background is that I'm a fisheries biologist. I manage the aquatic ecosystem and approval section in the environmental licensing and protection department at Manitoba Hydro. I have been in this role for the last eight years. Prior to that, I was employed by Manitoba Fisheries Branch for 20 years, working first on Hydro impact assessments, then managing the Province's fish hatchery program, and for the last 13 years there as the manager as the Province's sport and commercial fishing programs.

The summary of regulatory changes is taken from appendices 6 and 8 in the LWR document. It was included in those appendices to remind readers how much things have changed from the time of construction of Lake Winnipeg Regulation to today. These changes in the regulatory framework reflect the changing expectations and the increasing importance of the environmental assessment as part of project reviews. As time has gone by, there has been an expectation for greater detail to be presented in terms of parameters sampled, as well as a greater expectation for reporting on concepts like ecosystem function, biodiversity and cumulative effects.

This complicated slide was also included in the appendices in the LWR document, and I have included it here to show how a thorough impact assessment would be done today according to today's standards. The pathways of effects approach is used to map the possible connections by which a proposed project might affect the environment. Each possible cause and effect relationship would then be considered, and the pathways viewed as likely to impact the

environment would be investigated in detail, including the collection of baseline data for important parameters and the prediction of the amount of impact for each critical factor. Monitoring programs would then track key parameters after construction, and when compared to baseline data, the impacts of the project would be confirmed.

For Lake Winnipeg Regulation, this would have been a complicated assessment, as Lake Winnipeg Regulation had multiple component activities associated with it, each with their own project effects. However, the standards of 1970 were not the standards of today, and the Lake Winnipeg research plain language document is a summary of the available information and not a contemporary environmental impact statement.

In brief, during this presentation, I'm going to describe how the available information tells us that water quality parameters changed associated with LWR, but the reports varied in their conclusions and the authors stated that the changes that were documented were small and it should not affect the ecosystem or uses of the water.

Recent monitoring indicates that most water quality parameters and guidelines for the protection of aquatic life are being met, and nutrient levels indicate that the lakes in the LWR area are medium to highly productive. While the available fish data must be interpreted cautiously, the abundance of predatory species is relatively consistent both between years and between lakes. Lake Whitefish abundances and the catches have declined in more recent samples and it's understood that this is an issue as many residents prefer to eat Lake Whitefish.

For wildlife, the shoreline habitat was affected and it is assumed that this has likely had an effect, but the published reports did not provide much in the way of population abundance estimates, rather they focused more on harvest activities, and they also point to other regional factors that are known to affect some populations.

The published information was gathered and reviewed and is presented in appendix 6 of the Lake Winnipeg research document for three study reaches as follows, the outlet lakes area from Warren Landing to Jenpeg Generating Station, the

Upper Nelson River area downstream from Jenpeg Generating Station to Kelsey Generating Station, and the Kelsey Generating Station to Gull Rapids area that is also impacted by Kelsey flows and the CRD.

In terms of the information that was gathered, the pre Lake Winnipeg Regulation study that was done was the Lake Winnipeg/Churchill/Nelson River Study Board report. The study was very comprehensive for its time, was conducted by multiple provincial and federal departments, along with universities and several consulting firms. It's contained in nine volumes and is over 9,000 pages long.

The study was conducted to determine the effects the development of hydroelectric potential was likely to have on water and related resource uses, to make recommendations for enhancing the benefits with due consideration for the protection of the environment.

Following the study board report and following the construction of the project, there were also numerous studies and post project assessments conducted in the LWR area. These included key studies performed by Manitoba and

Canada as part of their commitment under the Northern Flood Agreement to long-term monitoring and research, as well as monitoring mercury in fish.

The Manitoba Ecological Monitoring Program, or MEMP, ran from 1985 to 1989, and a complementary Federal ecological monitoring program, FEMP, started in 1986. It was more focused on CRD but did provide information that complemented MEMP and contributes to our understanding of LWR.

In addition to those government lead studies, Manitoba Hydro, along with community partners, conducted post project effect studies as well as Cross Lake monitoring to understand the effects of the weir.

Numerous other studies associated with claims under the Northern Flood Agreement were also undertaken to describe site and issue specific items like the effect of debris on fishing, fish movements, fish population genetics and impacts to waterfowl habitat.

So while numerous studies were performed, there were some issues. The changing standards, the variety of locations studied, and

the different reasons for the studies makes comparing or using the data to quantify the effects of LWR inappropriate. Notwithstanding those limitations, the number of studies that were implemented, the length of time since construction, and Manitoba Hydro's experience with LWR, along with information provided from the communities does provide an understanding of the types and general levels of effects associated with Lake Winnipeg Regulation.

The next three slides will show just the broad geographic area that was studied in terms of studies in the outlet lakes area, studies in the Upper Nelson River area from Jenpeg to Kelsey, and studies downstream from Kelsey to Gull Rapids. More recently, a coordinated and system-wide approach to monitoring has been developed by Manitoba Hydro and Manitoba Conservation and Water Stewardship. The coordinated aquatic monitoring program, or CAMP, monitors key aquatic ecosystem parameters in Manitoba Hydro's system with a consistent sampling protocol. The need for broader system-wide monitoring was identified by Manitoba Hydro as comprehensive implementation agreements were being

completed, the need for numerous issue and site specific studies were declining. Communities likewise expressed the need for an approach like this at Wuskwatim public hearings and associated section 35 consultations. Following that feedback, an MOU between Manitoba and Manitoba Hydro was developed to detail existing monitoring programs, determine if there were any gaps, and then address those gaps. CAMP spans Manitoba Hydro system with over 40 water bodies sampled both on and off Manitoba Hydro system. CAMP is based on atrophic efficiency model of ecological health. And I'll explain this in a little bit of detail in the following slide.

This slide is not from the LWR document, but I included this and the next slide to explain a few terms and some basic ecology for any non biologists in the room. The word trophic comes from the Greek word for feeding. This picture shows the general idea behind trophic levels in an aquatic food chain. CAMP was designed to monitor different trophic levels in selected water bodies on and off Manitoba Hydro system.

I mentioned earlier that nutrient

levels indicated the lakes in the LWR area are medium to highly productive. Nutrients are the fuel that is converted into edible plant material for the food chain, and the amount of nutrients in the water is used to classify lakes as highly productive or eutrophic, mesotrophic meaning intermediate levels of nutrients and productivity, or nutrient poor with low productivity or oligotrophic. Associated with that concept, most of you have probably heard the line that a land that supports healthy wolves is a healthy land. That's because the lower trophic levels of that ecosystem must be healthy and there must be enough food to support predators at the top of the food chain.

For that reason, I included this picture in order to talk about that concept, why I'm going to make reference to walleye and northern pike abundances for the different water bodies. Walleye and pike would be at the top of this diagram for a Manitoba aquatic ecosystem, and the inference here is that for walleye and pike to be abundant in index netting, the aquatic ecosystem has to be functioning and relatively healthy.

So back to CAMP. In this fashion, by sampling different trophic levels over time, CAMP will build our understanding of the health of these aquatic ecosystems. Initially, CAMP sample sites were chosen based on where existing programs or data existed. And parameters were selected using expert advice from regulators, scientists academics and consultants. As the program evolved, additional sites were identified by Manitoba and communities as part of their ongoing dialogue.

In the Lake Winnipeg Regulation area, the annually sampled water bodies are Cross Lake and Setting Lake and rotational sampling sites include Playgreen Lake, Little Playgreen Lake, Walker Lake and Sipiwesk Lake.

A CAMP pilot summary report for 2008 to 2010 has been completed and is on the CAMP website, CAMPMB.com. And the three year synthesis report that will include 2011 to 2013 data as well is currently being worked on.

So the previous slide summarized the information that we used, the sources. Now I'll talk about what that information said for water quality and fish by study reach.

Two major studies on water quality in the outlet lakes area were found. Those studies reported changes in some parameters but that the changes that were observed were not reported consistently and were not seen as large by the reports' authors. This aligns with the Lake Winnipeg, Churchill Nelson River study board report prediction that indicated that the chemical, bacteriological and physical composition of the water was not anticipated to change due to LWR given that the source of the water would continue to be Lake Winnipeg. Water quality for Kiskitto and Kiskittogisu Lakes weren't found.

CAMP water quality monitoring indicated that for most water quality parameters sampled in Playgreen and Little Playgreen Lake, the levels were within the protection of aquatic life guidelines and objectives. The few parameters that exceeded PAL guidelines, aluminum and iron are often exceeded in off-season water bodies as well. The table on this slide identifies nutrient levels and Chlorophyll A averages as sampled in CAMP. As noted previously, nutrient levels are used to classify the level of productivity in a lake and Playgreen and Little

Playgreen Lake would be considered medium to highly productive or well-fed. Chlorophyll A is an indicator of primary productivity or plant growth. As noted in the table, both water bodies would be considered as medium productivity based on the average chlorophyll A levels.

This graph shows average phosphorus levels for all the Lake Winnipeg Regulation area lakes as described in the CAMP pilot summary report. I have included it to show that there were generally high phosphorus levels in the blue or on-system water bodies in the Lake Winnipeg Regulation area. That's reflected of the source of the water being Lake Winnipeg which, as we all know, has high phosphorus levels that had been associated with inflows and inputs from the Red River.

Historical fish sampling information for Playgreen Lake indicated that major changes in fish abundance hadn't occurred. Kiskitto, Kiskittogisu and Jenpeg Forebay fishing results were either very limited or absent before LWR, and we couldn't find any after LWR.

So this graph shows catch per unit effort, or CUE, for years where gill netting data

was available for Playgreen Lake. So Catch per unit effort is a measure of fish abundance calculated as the number of fish caught per 100 metres of gill net set for a night.

This slide is a good example of how cautious we have to be in interpreting between different netting studies. Specifically you will see that there are two 1971 bars on the left side of the graph. The first bar is roughly one-third of the catch per unit effort of the second bar. This may be because the first study was performed in August when water is warmer and fish move less; whereas, the second study started in July but extended into October when the fish move more.

In addition, if a netting study was targeted at determining the population dynamics of a specific fish species as is often the case for commercial fishery management purposes, netting is targeted at the habitat of that species to get a large statistically significant sample. Conversely, if assessment of habitat change is the focus, then all the habitats are sampled representatively. This difference, along with timing and gear changes, can drastically affect catch per unit effort data.

As regards, Playgreen Lake fish population, the data appears to indicate that overall abundance or catch per unit effort and CUE of pike and walleye does not appear to have declined, although fewer whitefish were sampled in studies done since Lake Winnipeg Regulation.

This slide shows average catch per unit effort for CAMP data for all the lakes in the LWR area. As you can see, the overall CUE for Playgreen and Little Playgreen Lakes on the left are quite high. Catch per unit effort for walleye and northern pike at the top of the food chain and represented in the green and blue are similar for Playgreen, Little Playgreen and Cross Lake and similar I guess other than a slight decrease in the northern pike on Split Lake.

In summary, changes in water quality were reported but those changes were seen by the report authors as temporary and small in magnitude. Most parameters in CAMP were sampled within the guidelines for the protection of aquatic life. Based on nutrient levels, the lakes would be considered medium to high in productivity.

For fish, while fishers experienced

difficulties, the studies indicated that there were no measurable effects on fish abundance as measured by CUE on Playgreen Lake or Little Playgreen Lake. Overall, CUE is high compared to other on-system camp water bodies. And walleye and northern pike abundances are similar to other on-system water bodies in the Lake Winnipeg Regulation area.

Information is lacking on the fish communities of Kiskittogisu and Kiskitto Lakes but they both support commercial fisheries.

In the Upper Nelson River area Between Jenpeg Generating Station and Kelsey Generating Station, the low water levels prior to the weir exposed mud flats and contributed to increased suspended solids and turbidity on Cross Lake. However, similar to the outlet lakes, the findings of the two water quality studies were not consistent in assessing what had changed. And a quote from the more recent of the reports indicated that the longer term changes in water quality were of small magnitude and should not have significantly affected water uses.

The same study documented a few changes in Sipiwesk Lake after LWR, but those

changes reviewed by the authors as probably having little effect on vegetation and aquatic organisms. As there are no pre LWR water quality data for Walker and Pipestone Lakes, effects of LWR on those water bodies were not described in the reports.

In the Upper Nelson River area as per the outlet lakes area, most CAMP water quality parameters were within the protection of aquatic life guidelines and objectives. Those parameters that exceeded the PAL protection of aquatic life guidelines were the same elements that commonly exceed the guidelines in off-system lakes as previously noted. Nutrient levels indicate that Cross Lake is medium to highly productive.

In terms of the effects of LWR on fish populations, Cross Lake, before the construction of the weir, is viewed as having been negatively affected by Lake Winnipeg Regulation. Prior to the weir, the change in flow pattern combined with dry weather to reduce the quantity and quality of fish habitat. The construction of the outlet weir in the early 1990s mitigated the low water issues and addressed quantity of habitat affected by reduced lake level, especially in the summer. The

citing of Jenpeg Generating Station likely also had an effect as the rapids habitat there would have been fish spawning and feeding habitat. The station is also a barrier to any upstream movement of fish.

Pipestone Lake physical changes were similar to Cross Lake and fishery effects were seen to be similar. Water levels on Walker Lake were not as seriously impacted.

So similar to Playgreen Lake, different netting studies over different time periods contributed to this graph of fish catch per unit effort for West Cross Lake. The 1980 to '89 data were collected by Manitoba Fisheries Branch and methods are assumed to be fairly consistent. This is followed by weir monitoring data that used similar gear but varied in determining how sampling sites were selected. And since 2008, data has been collected on west basin of Cross Lake using the CAMP sampling protocol.

Results indicate that walleye and northern pike had been sampled at similar levels over the years in West Cross Lake, and Whitefish catch per unit effort declined. The other species CUE has varied and is composed of white suckers

and yellow perch based on the CAMP data after 2008.

So quickly again, here's the average catch per unit effort for Lake Winnipeg Regulation area CAMP water bodies. It can be seen that while the overall Cross Lake CUE is lower than Playgreen and Little Playgreen Lakes, for key species at the top of the food chain, i.e. the walleye and northern pike, the catch per unit effort from CAMP index netting data is similar.

On Sipiwesk Lake, pre LWR data was limited. And Sipiwesk Lake is affected by both LWR and back water effects of Kelsey Generating Station. The most obvious difference in comparing historical catch per unit effort information for Sipiwesk Lake is the presence of Whitefish at low levels in 1966 shortly after the construction of Kelsey Generating Station but not in subsequent years sampled. From 1985 to 1989, sampling was done consistently under the MEM program, Manitoba Ecological Monitoring. And results indicate that while northern pike abundance was fairly consistent, each year walleye numbers fluctuated between years.

Available CAMP data is restricted to

one year, 2011, and overall catch per unit effort is similar with walleye sampled at a lower abundance that year. Overall, the catch per unit effort of fish in Sipiwesk Lake appears to have been fairly stable.

To summarize the Upper Nelson River area, on Cross Lake there were water quality changes including increased turbidity but reports indicate that changes were of small magnitude and should not have affected water uses. Walker and Pipestone Lakes, pre LWR water quality data is lacking and assessment of LWR effects were not made. For Sipiwesk Lake, the reports concluded that water quality changes probably had little effect on vegetation and aquatic organisms.

CAMP sampling indicates that most parameters were found to be within the protection of aquatic life guidelines and objectives except for common elements that are high in both on and off system water bodies. Based on nutrients and chlorophyll A, Cross Lake is categorized in the medium to high productivity category.

As regards to fish, Cross Lake was negatively affected by Lake Winnipeg Regulation and there were declines in the fish stocks,

particularly Lake Whitefish and Cisco. Since the construction of the weir, the overall fish community has stabilized although Lake Whitefish and Cisco populations have not returned to historic levels.

The lack of Whitefish recovery may be best explained by the combination of historic effects of LWR along with current circumstances that include the invasion and establishment of rainbow smelt in the lake. The fish community of Pipestone Lake was affected by LWR similarly while Walker Lake did not appear to be affected by Lake Winnipeg Regulation.

On Sipiwesk Lake, LWR effects on fish are difficult to separate from changes caused by the Kelsey Generating Station in 1960. Studies indicate that catches appear to be similar to pre LWR levels and the Upper Nelson River lakes continue to support fisheries as they did previous.

Downstream of Kelsey Generating Station, in Split Lake the water quality reports vary again as to the conclusions that they drew. In addition to that, the reports do not separate the smaller effects of Lake Winnipeg Regulation

from the larger effects of CRD. While it's clear that water quality changed, the effects are stated as being much more closely related to the effects of Churchill River diversion.

Similar to upstream water bodies, water quality parameters were mostly within the guidelines for PAL and the exceptions to that are for those parameters that often exceed the guidelines in off-season water bodies as well. Nutrient concentrations indicate that Split Lake is in the medium to high productivity category.

The catch per unit effort data for fish in Split Lake appears to indicate a shift from Whitefish in the yellow bars to walleye in the green bars in the eight years between the MEMP sampling and the TEMA data, TEMA standing for Tataskweyak Environmental Monitoring Agency. However, we understand that TEMA, Keeyask and CAMP sampling sites were all chosen based on the habitat change objective or determining habitat change while MEMP data was collected for valuable fisheries species. If this was the case, then the difference between the Whitefish and the walleye after MEMP may only be because areas with higher Whitefish abundance that were focussed on in MEMP

in the 1980s were not as strongly represented in sample sites after 1997.

As was the case for water quality, the effects of LWR on fish populations downstream of the Kelsey Generating Station are difficult to separate from the effects of other developments in the area. CAMP data indicates that the present day fish assemblage in the region is dominated by walleye, northern pike and white sucker.

For reference and consistency, here is the CAMP overall CUE comparison graph again. As can be seen, Split Lake is similar in CUE and abundance of walleye and northern pike to the other on-system Lake Winnipeg Regulation mix.

So in summary, from Kelsey to Gull Rapids, while water quality changes occurred, the most significant changes were likely from the addition of CRD water and determining impacts from LWR are not possible.

CAMP monitoring indicates that as with the other water bodies sampled, most water quality parameters are within the objectives and guidelines for protection of aquatic life and Split Lake is medium to high in productivity. For fish, previously stated differences in sampling

along with the confounding effects of multiple developments makes quantifying the effects of LWR downstream of Kelsey Generating Station difficult. Current conditions indicates that catch per unit effort for walleye and northern pike is similar to other lakes in the Lake Winnipeg Regulation area and Split Lake continues to support a commercial fishery.

So now I'm going to look at each of the remaining issues. The mercury, sturgeon and wildlife across the entire Lake Winnipeg Regulation area, primarily because the issues or the species are either regional in context or distribution or the factors affecting them are. The first of these is mercury. Mercury in fish is an important subject and is of concern to the communities in the Lake Winnipeg Regulation area. Hydro related mercury increases in fish result from the flooding of land and processes that decompose flooded organic material. Because there was little flooding associated with Lake Winnipeg Regulation, mercury increases in fish were not detected. Currently, mercury concentrations in fish sampled from Playgreen and Little Playgreen Lakes are among the lowest observed in water

bodies monitored as part of the CAMP program.

Cross Lake was not flooded and mercury in fish did not increase associated with LWR. CAMP data indicated that mercury levels in fish were actually higher in Setting Lake, a lake not affected by hydroelectric development.

The increases that were noted in fish in Sipiwesk Lake predate Lake Winnipeg Regulation. And studies indicated that LWR did not increase mercury concentrations in fish in Split Lake. Currently, mercury concentrations in fish sampled as part of the CAMP program are low.

The effects of Lake Winnipeg Regulation on lake sturgeon abundance was small because the sturgeon populations in Lake Winnipeg and downstream on the Nelson River were severely impacted by commercial fishing before Lake Winnipeg Regulation. It's recognized however that Lake Winnipeg Regulation did change available Sturgeon habitat. Fisheries Branch has reported that regulation caused habitat changes in the outlet lakes area and Upper Nelson River by changing spawning and feeding habitat and that likely affects habitat suitability or availability for sturgeon.

Information on wildlife populations is limited as many of the studies looked at the impacts on harvest and not on the actual animal populations. It's also harder to associate results for wildlife with Lake Winnipeg Regulation because wildlife populations are often wide ranging and are impacted by regional and terrestrial activities as well. For example, habitat, climate variability and harvest across the continent can affect survival and fly away changes for ducks and geese. So while Lake Winnipeg Regulation changed the habitat in the area, trying to determine the contribution of that to a reduction in abundance is difficult.

Nevertheless, studies indicated that Lake Winnipeg Regulation affected nesting and staging habitat particularly for diving ducks in the outlet lakes area. Studies also indicate that changes from Lake Winnipeg Regulation may have initially affected populations of diving ducks Canadian Geese, Canada Geese in the Cross Lake area. It's assumed, however, that construction of the weir in 1991 likely improved conditions by reducing the range of water levels and increasing minimum water levels. Downstream of Kelsey

Generating Station, the effects are not possible to separate from the effects of other developments in the area.

For aquatic fur bearers, studies typically related to increasing difficulties with the harvest of fur, and the estimates of population abundances were typically not done. While trapping records provide an indication of the species present, they don't reflect abundance as changes in fur prices affects trapping effort which biases records to more valuable species. Similar to waterfowl though, changes in the shorelines would likely have affected aquatic fur bearers.

It's possible that changes in seasonal water levels had negative effects on local populations of muskrat and beaver except on Kiskitto Lake where water levels were not affected. They were maintained at historic levels due to the presence of the control structures. Construction of the weir in 1991 on Cross Lake likely improved conditions by reducing the range of water levels. And again, downstream of Kelsey, it's very difficult to determine what effects LWR had separate from CRD.

While shoreline changes would have affected the use of that habitat by moose, the contribution of Lake Winnipeg Regulation to any observed decreases in moose or caribou populations aren't possible. They are also seen as likely small compared to other factors. It's been stated that increased road access, fire suppression near communities large fires away from communities have probably had a greater effect. Those effects would have varied depending on the proximity to the community.

In summary then, shoreline habitat changes affected wildlife habitat. Communities have stated Lake Winnipeg Regulation and other developments have affected hunting and trapping, but studies related to those concerns have contained limited data regarding the effects of projects on wildlife populations. Factors like natural variability and regional waterfowl populations, effects of exploitation and fire suppression to moose populations further confound drawing conclusions on the effects of Lake Winnipeg Regulation.

In terms of an overall summary, while there has been a lot of study done on Lake

Winnipeg Regulation, and in general we understand the environment effects of the project, the number of other factors that affect the ecosystem along with differences in study, design and sampling gear means that precise statements about the amount of effect cannot be made for Lake Winnipeg Regulation with the information that was found. What we do know is that water bodies are medium to highly productive due in part to the nutrient-rich waters from Lake Winnipeg. Water quality changes were recorded but they tended to be local or temporary or they were inconsistently reported in the studies. For Cross Lake, some significant issues were mitigated by the construction of the weir.

Without trying to minimize the difficulties experienced harvesting fish, fish population effects were reported as most noticeable in Cross Lake prior to the weir and abundances of valuable commercial fish species are currently similar between water bodies in the study area according to the CAMP data. Those water bodies also continue to support a mix of commercial and domestic fisheries.

There has been a decline in Whitefish

in Cross Lake but declines in Whitefish abundance may have also occurred in other water bodies. It's not known to what extent the establishment of rainbow smelt contributes to that state.

Mercury levels in fish did not increase and that's consistent with the lack of flooding associated with Lake Winnipeg Regulation.

For wildlife, shoreline habitat changed but there's limited population abundance information for the affected area. Additional external factors also affect wildlife populations.

And lastly, with respect to the implications of changing the management of Lake Winnipeg to a threshold of 714 feet before going to maximum discharge, increasing the frequency of maximum discharge occurrences downstream will logically affect the physical habitat. A thorough understanding of the amount of physical change would be required to undertake a pathways of effects assessment of environmental effects. And it would take a considerable amount of study and assessment to meet the standards of today.

Thank you.

MR. CORMIE: Mr. Chairman, we're prepared to continue if that's your desire?

THE CHAIRMAN: That would be fine. We'd likely have to break somewhere in the middle of Mr. Sweeny's presentation for lunch.

MR. CORMIE: I'm wondering if we could break early and so that he would be allowed to continue, provide his presentation on a continuous basis?

THE CHAIRMAN: Just hang on one second. Okay, why don't we break now and come back at 1:15. So back here at 1:15.

(Proceedings recessed at 12:09 p.m. and reconvened at 1:15 p.m.)

THE CHAIRMAN: We will come back to order now. Continuing with Manitoba Hydro's presentation, Mr. Cormie.

MR. CORMIE: Thank you, Mr. Chairman. Mr. Mark Sweeny will now speak on the socio-economic effects of the project on the downstream communities.

MR. SWEENY: Good afternoon, commission, participants, elders. My name is Mark Sweeny, I'm the community relations manager responsible for all aspects of field activities and operations related to the implementation of various agreements, programs and policies, such as

our waterways management program. I'm also the manager responsible for the liaisoning with the various Aboriginal communities that we work in.

A brief background of my professional history has been, I started with the corporation in 1997, into a career with the power line trades, as a power lineman mainly working on distribution lines, building distribution lines by climbing poles. I later moved into the customer service section of Manitoba Hydro responsible for the distribution and service to residents in Northern Manitoba. From there I moved into the operations coordinator of the Northman area supporting management and, again, the customer service section responsible for the operations of our distribution service to northern residents.

In 2005 I had an interest with moving over into the Aboriginal relations section and working with some of my people. Therefore, in 2007 I obtained a position within the Aboriginal relations division as a supervisor responsible for the implementation of various programs that relate not only to the NFA, but also to various other communities.

I later held various positions within

the Aboriginal relations division, including a senior liaison officer responsible for working with impacted communities, and also negotiating, addressing the various impacts that communities have experienced downstream. And most recently I became the manager of the community relations department within the Aboriginal relations section. Although the community relations department is responsible for building relations within Manitoba as it pertains to Aboriginal communities, most of my experience has been in the downstream area.

I also want to give you a brief background of my personal life. I was raised in Cross Lake, also known as Pimicikamak, I was born to the LWR impacts. I spent most of my life in Cross Lake. Basically, I was raised practising the many traditional pursuits that we tend to experience, both in trapping and commercial harvesting and recreational use. I continue to practice that today, I still continue to be active in the commercial trapping area. Although, obviously, sometimes you can't always do that where I would like to.

But one thing I wanted to note as well

is my grandmother, who is known as Ethyl McLeod, she played a significant role in my life. And the reason I bring this up is because my grandmother, not only my grandmother but also was a trapper. She spent over 81 winters, summers, on the trapline. She raised a family of eight children on the trapline. And what made my grandmother unique is not that she was only my grandmother, but that my grandmother in her time, when most men would pack it in, and women would pack it in at ages 60, 70 at trapping, my grandmother trapped well into her 80s, at the age of 81. And the only time she would come off the trapline is when she suffered a stroke and she was taken off by helicopter. My grandmother lived to the age of 91 and passed away in 2001. Another thing that made my grandmother unique was because she was a woman, and in those days trapping was mainly done by men in our culture. So that's what made her very unique.

So it gives me great pride to share that with you, because, again, she played a significant role in raising myself and my siblings.

So with that, I just wanted to

illustrate that because I have a personal knowledge of the areas that I will be speaking about, and I also have a personal sensitivity to the various topics that I will be speaking to.

Land and water continue to be an integral part of the culture, the customs, the traditions of Aboriginal people. And in the same way, in a similar use, Manitoba Hydro uses land and water to produce reliable low cost energy. Hydro development has caused impacts on the traditional way of life. And the various socio-economic effects have been on culture. I will be speaking to the impacts on the landscape and the way it looks. I will speak to some of the effects on resource use and resource harvest. I will speak on some of the effects on loss of reserve land. I will also speak on some effects that relate to navigation, transportation and public safety, and some of the measures that have been taken over the years to address the various topics. I will be speaking to health issues and concerns, personal property and damage loss, and some of the initiatives taken by the corporation as far as employment, training and business opportunities.

I also want you to know, when it comes to people all of these things intertwine, they are all connected. So although I will be speaking to them individually, they are all connected when we talk about impacts on people.

Witatosketowin is a Cree word that translates into working together. And I wanted to bring this forward, because working together has been a way that Manitoba Hydro has and continues to use a key element in addressing impacts of Lake Winnipeg Regulation. It is also a key element in moving forward and working with the various groups that we impact, and finding solutions to address those impacts.

This map illustrates the downstream communities and their various locations as it pertains to Lake Winnipeg Regulation. I also want to note the physical location of these various communities, and point out that some of these physical communities also have a much larger land base that they identify with. Resource management areas, registered trapline districts have been a big part of it. And it is difficult to communicate, but most people from these communities relate to their home, not just the

physical location of that particular community, but the overall land base. And it is also important to note that these communities are there for particular reasons, they tie to the lakes, to the rivers, to the streams that the people in these communities utilize to practice their traditional pursuits, their culture, their lifestyles.

It is also an area that Manitoba Hydro uses to produce energy as well.

Now to the history of settlement agreements, I will speak to the various settlement processes that have taken place to resolve grievances. I will go through the Northern Flood Agreement. I will speak to the comprehensive implementation agreements. I will talk to some of the other settlement agreements that have been reached with various other communities.

Communication has been key, communication with First Nations and communities and community groups have been key to working through grievances. They have been key for Manitoba Hydro to understand the various impacts. And although these agreements, the history has been over a long period of time, we will show that

working with the various communities, and impacted communities and stakeholders, that communication has been key and a big part of that.

Although planning for Lake Winnipeg Regulation and the Churchill River Diversion began in the early 1960s, 1970s, prior to the 1970s development was guided by the political, the social, and the legal atmosphere at the time. And although Manitoba Hydro had already built projects such as Grand Rapids, there was no real meaningful environmental consultation, environmental regulation as Mr. Swanson spoke about. There was also little dispute, despite the amount of flooding that was done on previous projects. There was limited pre-project consultation. And there was a lack of resources for most Aboriginal groups in those areas.

Moving into the 1970s, there was increased public concern. There was -- another significant factor that played a role in that was the formation of the Northern Flood Committee in 1974, and later formalized in 1975. This committee represented five First Nations, Cross Lake First Nation, Norway House Cree Nation, Nelson House First Nation, York Factory and Split

Lake, and negotiated from 1975 to 1977. And what came about from those joint discussions and negotiations was the Northern Flood Agreement in 1977. The agreement was a four party agreement between Manitoba, Canada, Manitoba Hydro and the Northern Flood Committee.

I have here the Northern Flood Agreement, and this Northern Flood Agreement was there to address impacts of the effects of hydro development on land pursuits and activities of the five First Nations that were affected. This document is no more than 100 pages of articles and schedules, and it has some key provisions. Some of the key provisions included land exchange. For every -- for every land, reserve land flooded, there was four acres of land that should have been provided. There was notice for consultation -- consultation in regards to future development, navigation provisions, policy issues, and fishing and trapping programs.

One of the key things about the Northern Flood Agreement was the reverse onus clause. And what the reverse onus clause is, if there was to be a claim by a party, it put the onus on Hydro to prove that claim or adverse

effect did not happen on account of the project. It also had arbitration provisions, an arbitrator who resolved claim disputes as well.

Not all effects were known at the time the NFA was negotiated and signed. Implementation proved challenging and difficult in regards to the NFA. One of the reasons was that it left much room for interpretation. Words like "should" or "may", those presented challenges. And you incorporate that along with the reverse onus clause, there was costly implementation processes for lawyers and consultants.

By 1980 many claims are filed, and one of the reasons many claims were filed from the impacted communities was due to the four-year limitation period that's incorporated into the NFA. So many claims went to arbitration. But if you think about this for a second, the NFA was informally formed in 1974. In 1975, it was formalized. The NFA was signed in 1977, later ratified by the bands in 1978. Jenpeg was built in 1979. And the first arbitrator appointed to the NFA was appointed in 1980. That's over a four to five, six year stretch. By this time the people that had been impacted were frustrated.

By 1986, the Northern Flood Committee proposed global negotiations to address all outstanding claims related to the NFA. Although that didn't take place, many of the communities decided to go into the comprehensive approach alone, first starting with Tataskweyak, later with York Factory, then with Nisichawayasihk Cree Nation, and later with Norway House. And it was also a time the corporation had a foundation to enhance Aboriginal relations within Manitoba.

This is a copy of a comprehensive agreement. The comprehensive agreement has clear and defined processes and policies and time lines, and that was one of the benefits of the comprehensive agreement. And also another great thing about the comprehensive agreement, it put the decision making back into the hands of the First Nations that were impacted, so that they could in turn implement their various programs that they felt would resolve the various issues.

So contracts were put in place, rather than resolve claims on a claim by claim basis, but resolve all of the outstanding grievances in one period. It included provisions for compensation, trust indentures where the First Nations can

utilize the interest from the trust to enhance some of the various programs to address LWR effects; a land exchange, a land exchange at a ratio of 16 to 1 versus the 4 to 1. It also had established resource management areas and processes that would have the various First Nations involved with the decision making in those areas. It had provisions and policies for environmental monitoring. And it also had provisions and policies for consultation in regards to future developments. It also had in some of the -- although the comprehensive were different to each First Nation, but they were similar in a lot of ways as well. And they also had pre-determined compensation provisions to address the various water levels and flows within a certain range, and provided pre-determined compensation when those went over.

It also provided a sense of healing in addressing the various issues to those particular communities, a sense of moving on. And in my personal view, I think it was essential in regards to moving on to Wuskwatim and Keeyask.

NFA implementation, 1994 to 1997 negotiations to reach a CIA were actually

negotiated between Cross Lake First Nation and the Province and Canada and Manitoba Hydro. However, in 1997 Cross Lake decided they didn't want to proceed with the comprehensive approach and remained with the specific terms of the Northern Flood Agreement. I remember this time specifically because it was, number one, when I first got hired with Manitoba Hydro, and number two, there was a change in local leadership at the time, so the direction changed. That later moved into action plans developed jointly between Manitoba Hydro, Cross Lake First Nation and Manitoba, which lead to a 15-month action plan that had specific programs that would relate to specific obligations with the various parties.

Throughout the years the action plan has been implemented, other initiatives have been implemented, other initiatives in various ways. Most recently a process agreement was signed on December 15, 2014, with the Pimicikamak Cross Lake First Nations, which was an agreement, an engagement, a process engagement agreement, which has the NFA implementation identified as one of the discussion items.

Have there been challenges?

Definitely. Have there been differences of opinion? Of course. Like in any relationship, you are going to have those. But we are in an effort to move forward with NFA implementation.

So the NFA continues to be implemented in various ways, through action plans, development of working groups, implementation committees. And the picture to your bottom right is an illustration of one of the programs that's implemented in regards to the NFA, it is a dock program. And each summer the docks are installed within various areas of communities, and later removed in the fall months. The docks are also there to track some of the fluctuating water levels, but also there to provide the community members access to the shorelines as well.

Another item to mention here is a pre-determined compensation agreement was also reached with the Cross Lake First Nation in 2012, and that agreement was to address high water impacts dating back from 1977 to 2016, and that's also been implemented.

There has been various other programs that have been implemented, shoreline maintenance, elders' fuel wood programs, safe travel programs,

which I will speak about a little bit later, alternative food programs, hot lunch programs, the arena, the Cross Lake weir. And I will speak also a little further into my presentation about some of the debris management programs in place.

Manitoba Hydro has also worked with various other communities to address impacts of LWR. Some of those agreements have pre-determined compensation, some of them have provisions for annual consultation on an ongoing basis. Some agreements include -- are not only with the communities but also include the various resource harvester groups, associations that relate to trapping and fishing.

LWR has resulted in positive and negative changes or effects on people, communities and individuals. Many Cree elders believe that the downstream communities have been born to the cost of hydroelectric development, whereas the south have been born to the benefits of hydroelectric development. The altered landscapes and people's use and relationship with that land has been impacted, the very connection.

Although there is no doubt that Lake Winnipeg Regulation has affected customs,

practices and traditions of downstream communities, non-hydro development has also caused impacts on those very communities. Non-hydro development, government policy such as mining, forestry, roads, residential schools, the welfare system. So it has been difficult to separate in some cases.

LWR has had impacts on culture, the way of life, and heritage. The loss of traditional sites and burial grounds are of significance in any culture. Exposure to the burial grounds in my culture, again, it is seen as disrespectful and hurtful. Although many of these burial grounds, the locations of many of these burial grounds weren't known at the time, they have been -- they have caused some impacts, although Hydro remains committed and has protected or made efforts to protect the various shorelines that are known, and continues to provide that protection. Also in some of the various settlement agreements there is specific provisions on how to address the various impacts to burial grounds and other culturally significant sites.

Hydro provides support to the Historical Resource Branch to implement various

archaeology programs throughout the system. This one here is from the artifacts that were found within the Sipiwesk Lake area. These are replicas of the rich history as it relates to Aboriginal culture and the Pimicikamak Cree. This picture illustrates pottery items and other tools that were utilized before. There is also a number of other archeological programs that are administered, the Hunting River burial site, a system wide archaeology program as well.

Lake Winnipeg Regulation has resulted in physical and visual changes to the landscape, water and waterways. This has impacted the health and wellness of many people impacted in those areas, the connection to the land. It has also provided various navigational challenges as it pertains to those landscapes. Navigation for resource use is not only utilized through the water system but also the connection to the land base. And that's how people are brought up, they are taught to move out throughout the system. But Hydro has also provided shoreline protection to some of these areas of cultural significance.

There has been negative effects caused by Lake Winnipeg Regulation as well, as it pertain

to domestic and commercial harvesting, resource harvesting. Connection to the land and the ability to practice these customs and traditions have caused some difficulties.

The Aboriginal culture is in part made up of verbal communication, but also visual. So for an example of that, my grandmother would take me out to various locations and stop at various locations, and part of that would not only be just to stop and rest but also to teach me something. So when there is a loss of land that are of cultural significance to some of the individuals that have been impacted, that connection is lost. And some of those sites were utilized to teach patience for an example, to teach confidence for an example. So those have been lost. So that ability to transmit traditional knowledge and teachings have been lost to generations as well.

So addressing commercial and domestic fishing, settlements have been reached, settlements are in place to address the commercial fishing and domestic fishing issues in many of the communities. A lot of the settlement agreements have processes for not only compensation, but programs to enhance their fisheries. And

compensation agreements with impacts to the CIAs are also there to resolve the outstanding commercial fishing adverse effects. There is also programming in Cross Lake that pertains to the domestic fishing program that operates in the summer and winter, that was developed jointly with Cross Lake First Nation, Manitoba, and Manitoba Hydro, and this program continues. It employs local residents from the community. They in turn domestic fish on the bay lakes and other remote lakes and provide local fish to the community and the residents of Cross Lake.

Lake sturgeon is also another key area. Lake sturgeon is important to the Aboriginal culture, the food is considered a delicacy of the fish, and that continues. So Manitoba Hydro supports a lake sturgeon stewardship enhancement program. One of those programs that Manitoba Hydro provides support to is the Nelson River Sturgeon Board, which originated as part of a claim, however, Manitoba continues to support that board, and that board is made up of downstream communities that have been impacted by LWR.

There has been settlement agreements

reached as it pertains to commercial trapping, and these agreements have specific provisions to enhance the trapping programs in their areas and provide compensation. There is a registered trapline program, and also the commercial -- the establishment of a resource management board has helped enhance the commercial trapping area. There have been agreements reached with Thicket Portage, Wabowden, Pikwitonei as well in relation to commercial trapping.

The loss of reserve land within the NFA, Manitoba Hydro supports the Province and Canada and the First Nation in moving forward with the NFA obligation. Manitoba Hydro's role is focused largely on determining the severance lines on selected lands, and it is obtaining a water storage easement.

Manitoba Hydro monitors shoreline erosion and installs shoreline protection along the affected reserve lands. And the picture to your right illustrates some of that shoreline protection. Not only is it shoreline protection to reserve land, but also burial grounds and cemeteries that have been impacted by Hydro development.

Manitoba Hydro also has other remedial measures, including the replacement of recreational opportunities for the impacted communities, protection to causeways, and also beach restoration in some of the communities.

Mother nature has presented its own challenges when it comes to resource harvesting or going out on the land. With Lake Winnipeg Regulation, woody debris has caused access issues and safety issues. It has presented challenges to the various resource users in those communities. Also with the fluctuating water levels, that has created some various safety hazards. However, Manitoba Hydro has a policy, the Waterways Management Program, that gets implemented, the debris program. And the debris program works with the various communities to implement annual debris programs to remove the debris that's collected along the shorelines. The program indirectly creates employment opportunities for local communities, but also makes the environment safer for resource users.

So my point here is, agreements are milestones. Agreements are negotiated with the various impacted communities, First Nations,

stakeholder groups. Their negotiations go over a number of years, and at the end of the day the groups agree that they are milestones.

Along with the agreements, Manitoba implements various policies such as the one I just described. Another program that's part of the waterways management policy is a safe ice travel program, because ice conditions have been impacted, they have been impacted by the quality of the ice cover which has affected winter travel for resource use, recreational use. Although there is many factors as it relates to slush conditions, such as weather, those have caused some impacts. So the safe ice program that Manitoba Hydro implements every year usually starts in the early months of January, depending on the weather, and goes into the mid, early April. The program employs contract employees to implement these trails that are from these local communities. The resource users that know the area best, that install the safe ice trail markers, in the end remove the markers as well. The safe ice trails are monitored on a regular basis, and that provides a safe route for travel on some of the lakes and rivers that are impacted.

Another program that gets implemented annually is our boat patrol program. Where Manitoba Hydro employs seasonal employees from May to October to patrol the waterways that are impacted. The seasonal employees are from the various communities and are usually very well experienced in the waterways and working with the waterways. The program removes floating debris to prevent any hazards and to enhance the safety of the waterways.

So communication continues with the various stakeholders through monthly water level forecasts which are mailed out, and meeting notices are provided both in both Cree and English. Ongoing communications through the NFA and other settlement agreements continue. There is also communication during extreme events. There is also regular dialogue with northern staff in communities, including through our waterways management program.

The community relations department has a central location as well in the north made up of many staff, both full-time staff and seasonal staff. Many of these staff are from the various impacted communities that we live and work, that

have been impacted by LWR. They are usually very well knowledgeable of the impacts and work closely with those communities, to liaison with those various communities to address any impacts on a going forward basis. So there is regular dialogue with the very people that are utilizing the waterways in various ways.

You see mercury. Some in the Cree language call it piscipoyan, which in Cree that could mean poison. So that has caused some anxiety and stress on a lot of people. And the perception, the food -- it has impacted also the food consumption of traditional foods. However, potable water concerns, the NFA communities have issued those as well, but potable water remains an obligation of the Federal Government.

The NFA has provisions for individuals to make claims for loss associated with the project. Therefore, we have a personal property damage claim process. In Cross Lake they have a local office where community residents can come in to make claims associated with damage to equipment that are caused by the project, and this takes place as well, damages as it relates to snowmobiles, boats, nets. And in relation to the

CIAs, they have implemented their various own claims process. So there is a provision in the CIAs to address the claims that are associated with adverse effects of LWR.

So LWR has created short and long-term employment and business opportunities for local residents. Manitoba Hydro has a range of programs and policies designed to encourage and enhance Aboriginal representation in projects in the operational work force and to promote the participation of the northern Aboriginal businesses. Some of those, one program that that supports is the pre-placement program. And what that pre-placement program is, it provides training opportunities for Aboriginal people that are interested in a career with Manitoba Hydro.

And one thing I need to note as well, like I went to high school in Cross Lake as well. It is important to recognize that some of the high schools don't have the various courses required for entry level positions with Manitoba Hydro, and that was one of the reasons this program was created. It provided not only on-the-job training, but the education requirements to get to that entry level position.

There is also bursary programs, various bursary programs and employment preferences. It also allowed for direct negotiated contracts with the various Aboriginal businesses. And there is also a northern purchasing policy that allows for the corporation to work with the various local business groups to provide them an opportunity as well to participate, or to maximize the participation for the various groups and communities.

So in closing I would just like to say that the change and the frequency of flood peaks, there may be new impacts on the water regime and the environment if the licence conditions are changed. There could be additional social impacts which would be our unknown. There could be a potential for renegotiating existing agreements that are all in place. And there could also be a potential requirement for new agreements.

Egosi. I just want to thank the Commission for allowing me to do the presentation. It is a long history and it's sometimes very difficult to, you know, to speak to some of the adverse effects that are on people, and I just want to thank you as well for listening.

THE CHAIRMAN: Thank you, Mr. Sweeny. Mr. Cormie?

MR. CORMIE: Yes, Mr. Chairman, at this time we will have Mr. Hutchison present on the issues that are perceived on Lake Winnipeg and address the Lake Winnipeg concerns as we understand them.

MR. HUTCHISON: Thank you, David. Can everyone hear well? Good afternoon everyone. I've worked at Manitoba Hydro for 15 years understanding our impacts on the waterways and on the people we share them with. My academic background is environmental science and natural resource management. And my career has involved positions in this field with the Federal government, with the First Nation, and for the past 15 years with Manitoba Hydro. Ten years were spent in the corporation's Aboriginal relations area developing agreements and programming to address adverse effects of hydroelectric development with First Nations communities and resource users groups.

Over the past five years I've worked in the hydraulic operations department as the hydraulic operations coordinator. My role is to

increase communication and understanding between Manitoba Hydro and waterway stakeholders on how the Manitoba Hydro hydraulic system works, its influence on the waterways, and on the people living along these waterways.

This new role has brought me into contact with people with an interest in Lake Winnipeg, in addition to many of the same people that I have worked with previously downstream of the Nelson River.

Recently I had the opportunity to participate in the Clean Environment Commission's community hearings process, the communities and First Nations around Lake Winnipeg and downstream, where I provided the opening presentation on the hydro system and Lake Winnipeg Regulation. This experience provided me with additional insights into people's deep concerns for Lake Winnipeg, their anger and frustrations over the visibly deteriorating lake, and their concern with Lake Winnipeg Regulation.

Outside of work I spend a lot of time on Lake Winnipeg with my family out at our cottage, so either through work or play I have spent a lot of time meeting with, hearing from and

presenting to people on Lake Winnipeg.

I will speak on Lake Winnipeg concerns for about a half hour or so.

Here are many of the ways that we have engaged with people on the subject of Lake Winnipeg, and how we learned about their concerns. Some of this engagement goes back decades, while others are part of a more recent focus due to heightened interest in Lake Winnipeg during this current wet cycle and due to the increased focus related to our final licence request.

The photos show at an open house held in Matheson Island in 2013, our display at the Red River Basin Commission Conference, a tour of Jenpeg that we provided to the south basin mayors and reeves, and an article in our Hydrogram newsletter based on that tour. Our activities include the recent Lake Winnipeg stakeholder engagement program to pro-actively engage with all communities and First Nations around Lake Winnipeg. Our support of a Lake Winnipeg First Nations alliance through the Centre for Indigenous Environmental Resources are involved with the Lake Winnipeg Foundations Netley Marsh Rehabilitation project, and our participation in the Lake

Friendly Stewards Alliance.

It has often been challenging, as the message that I present on the history behind the project and how it works is so at odds with what people quite often passionately believe. We all agree that Lake Winnipeg has experienced many high water years, and there are problems with erosion, algae and the Netley-Libau marsh. What we don't agree on is the cause. I will go through each of these issues through my presentation.

The number one concern that we have heard over the years is the water levels. We have all seen the articles in the papers and the comments that follow them that claim that Manitoba Hydro is artificially holding water levels high on the lake, all so we can make more money. The high water claims often get more specific saying that we hold them high in the fall when storms are at their worst. An alternate claim that's often heard is that water levels are held constant at elevation 715 feet above sea level, or that because we use a wind eliminated water level our data is misleading.

So let's see if the additional information that we have will help better

understand the concern over water levels. On the issue of water levels it is a good idea to reiterate what Mr. Gawne said about the huge watershed draining into Lake Winnipeg. The map is a simplification to demonstrate the relative sizes of the many rivers flowing into the lake, and the low natural outflow of the Nelson River. The thickness of the arrows representing the rivers are based on their average annual water flow to the lake. Ditto for the Nelson River and 2-mile Regulation Channel outflows. Of course during wet periods the amount of inflow can vary tremendously. The Red River, for example, can flow to close to the full outflow of the Nelson and LWR channel combined.

Some of you may have seen this before, but it is the faucet, tub, drain analogy, and it is a way to demonstrate why LWR can only influence water levels on Lake Winnipeg, but cannot outright control the water level of the lake. If the water drop under the faucet represents all of the river inflows during a flood, the drop under the drain represents the Nelson River outflow. You can see that the droplet is much smaller than the one under the faucet. During floods this shows how

more water can enter the lake than can leave it which causes the lake level to rise and flood.

In the lower diagram, a second drain representing the LWR channel is shown. It is half the size of the water drop under the natural outflow. During flood years, even with the two outflows available, the two water drops together are still smaller than the faucet drop. So during floods more water still enters the lake than leaves it. However, the difference is not as great, so the lake level will not rise as high, and the lake will not be in flood as long. Therefore, because of this difference between more inflows than outflows, the LWR can influence the water level of the lake, but it cannot control the level.

I want to explain how water levels are determined on Lake Winnipeg, including the use of the wind eliminated water level. The red dots on the map show each of the eight Water Survey of Canada water level gauging stations. There are four stations in the north basin, two at the narrows, and two in the south basin at Gimli and Victoria Beach. The picture on the right shows what one of these stations look like. It is

rather like an outhouse. If you are interested in data from any of these stations, you can access it at the Water Survey of Canada website.

So the lake is huge and wind can change the level at any time in the lake by several feet in hours. The volume of the water in the lake doesn't change very quickly, a foot over the course of a month is about as fast as it gets. Therefore, unlike the wind, LWR cannot cause water flow fluctuations on Lake Winnipeg. In order to account for the constant motion of the water in the lake, a wind eliminated water level is used based on a formula that averages out the water level using the eight gauges on the lake. The methodology to derive the wind eliminated water level was jointly created by Canada, Manitoba, and Manitoba Hydro as the best way to get the water level of Lake Winnipeg.

People have questioned the use of this method, suggesting it is misleading or that there should be more monitoring stations. However, it was developed by three separate tentacle groups and independent experts like Baird Engineering in 2000 have verified it is the appropriate way to measure the water level of the lake.

I'm afraid there are a few charts in my presentation.

As seen in Mr. Gawne's presentation, a standard method used to examine water level is to look at water levels before and after regulation. The facts are that the average water level has only increased a couple of inches from 713.4 feet to 713.6 feet before and after regulation. And since Lake Winnipeg Regulation, the peak water levels have been decreased, the lowest water levels have increased, and the lake is not held at a constant level.

You can see that the lake level goes all over the place. There is a five and a half foot range in water levels that has been experienced so far. This is what we have been telling people since Lake Winnipeg Regulation began, the flood protection is working. But recently we began wondering if this was the whole story. By comparing water levels before regulation and after regulation, are we comparing apples to oranges? Are there other factors affecting water levels that we have experienced since regulation? In addition to LWR, a number of other factors do influence water levels on Lake

Winnipeg.

So simply comparing pre-LWR to post LWR data is not an apples to apples comparison.

Perhaps the most notable among these other factors is a dramatically wetter period since LWR was constructed in 1976. We have calculated post LWR inflows to the lake are 6 per cent greater than the preceding period. And over the past decade inflows to the lake have been a whopping 37 per cent greater than the pre LWR average, with three major floods occurring in this time. Recent scientific literature suggests climate induced changes to the stream flow have increased the average flows to Lake Winnipeg over the past couple of decades, especially in the Red River. Yet other studies, like Ducks Unlimited Broughton Creek project, indicate changes in land drainage also have the effect of increasing the flow to the lake. If you go to their website you can press play on the red button to access the viewer that shows the dramatic land use changes between 1968 and 2005 in this watershed.

Manitoba Hydro's own climate change analysis suggests that the Lake Winnipeg drainage basin will get wetter.

With these influencing factors, we need a new way to determine what the impact of regulation has been on water levels. To do this we developed a water balanced model to remove influences from these other factors and simulate Lake Winnipeg water levels without LWR so they can be compared to be observed with LWR water levels. This second method removes the influences from these other factors, and is described in detail in appendix 4 of our Clean Environment Commission submission.

So the left axis of the graph has the feet above sea level, while the bottom axis has the years from 1977, the first full year that LWR was in operation, to the present time. The blue line represents the observed with LWR water levels. And the simulated without LWR water levels are shown by the red band on the graph. For greater confidence the model used two techniques to estimate the level, which is why it was a band rather than a line. So the results show that water levels behave similarly, both with and without LWR conditions. This means that when the water level would tend to go up with LWR, it also went up without LWR, and vice versa when the

water went down.

The major effect of regulation is a reduction in flooding during wet years. Historically after several consecutive wet years the lake would sustain flood levels. The red without LWR shows the lake level would rarely have dropped below elevation 715 over the past ten years. Flood peaks of 1997, 2005, 2011 and 2014 have been reduced by two feet or more.

At lower water level elevations LWR has not had as dramatic an effect. There is only during a couple of points in the 1980s does the simulated range clearly fall below the observed range.

Another graph. This graph is based on the same water balance model data that was set on the previous slide, only now the 1977 to 2015 data are displayed over the course of a single year. So the bottom axis now has the 12 months from January to December. The blue line represents the observed with LWR average, and the blue shaded area represents the range of the highest and lowest recorded water levels for any given day of the year.

So for instance, if you are going to

look at January 1, the lowest the water level has been is 711 and a half feet. The highest it has been is just under 715 feet. And the average, the blue line, January 1, is about 713 feet.

This builds on the previous slide by adding the simulated without LWR average band, the one which is the faded red, representing the envelope of maximum and minimum water levels for any given day of the year if LWR did not exist. And the red band, right in the middle is the average of the faded red area.

Under both with and without LWR conditions, the lake follows a typical seasonal pattern. Since LWR began operating, the annual average water level of Lake Winnipeg, the blue line, remains lower than what it would have been without LWR, you can see the blue line is under the red band, including in the fall.

Presenting the data in this format clearly shows how LWR has reduced water levels significantly at the high range. As you can see the orange without LWR band is a good two feet higher throughout the whole course of the year. You would also see that LWR has less of an effect on the lower range.

So the best way to compare Lake Winnipeg Regulation's influencing Lake Winnipeg water levels is using the with and without LWR comparison that I just showed, because it factors in hydroclimatic land use and upstream regulation differences over time.

People have also pointed to forecasts made in the 1975 study board report when comparing water levels. The study board used the incorrect assumption that we would need to store water in Lake Winnipeg for winter use, which would increase the fall water level by 1.2 feet. Whereas explained by Mr. Gawne, transmission line interconnectedness with electricity markets outside of the province gives us the capacity to import electricity if necessary, so there is no need to store as much water as was assumed and its forecasted increase did not occur.

However, notwithstanding our preference to use the with and without LWR comparison, whether you accept this or want to rely on the pre-water level data or post water level data, they essentially show the same results. The lake is still behaving as a lake with water levels following a typical seasonal

pattern.

Regulation has lowered peak water levels. Both the average water level and the residence time of water in the lake remains similar to what it would have been without LWR. There are slight differences in residence time. In wet years, residence time is increased due to greater conveyance of water through the LWR outlet channel, while in the dryest years, residence time is increased in response to reduced outflows to maintain a reliable supply of water for hydroelectric generation.

There is a large range in water levels, some five and a half feet. They are not held constant at elevation 715 as some suggest. And the wind eliminated water level is not an attempt to skew data, it is in fact the best way to reference the water level of the lake, and this has been verified by independent experts.

In tandem with the speculation that LWR raises water levels comes the allegation that LWR has caused shoreline erosion to increase. But shoreline erosion is nothing new. Similar to historical information provided by Mr. Cormie in his opening remarks, shoreline erosion around Lake

Winnipeg is a major, long standing issue. Newspaper archives show reports of significant flooding and erosion of Lake Winnipeg shorelines during high water events before regulation. These are news headlines from 1950 and 1954.

Erosion is a natural, ongoing process around Lake Winnipeg. Wind events or storms creating waves and exerting their energy on the shoreline soil is the main cause of erosion. The October 2010 weather bomb provides a dramatic example of the effect of wind on the lake as shown in the graph. The vertical axis is the elevation above sea level, and the horizontal axis has the days leading up to and after the October 27, 2010 storm. Each colour on the chart represents one of the eight gauging stations I showed earlier on Lake Winnipeg. The Montreal Point station from the far north end of the lake is in pink at the bottom of the chart, while the Victoria Beach and Gimli stations are the top in brown and dark green respectively. The wind eliminated water level is the thick black line running through the centre. So essentially the north basin water subsided three feet while the south basin level increased by five feet for a total of an eight foot

difference in the south end of the lake.

Also to highlight the accuracy of the wind eliminated water level, other than the three inches of rain that fell directly on the lake, the wind eliminated level, the dark black line, is not affected during the course of the storm.

A 1974 study, the Lake Winnipeg Churchill Nelson River Study Board determined the south basin erosion rates of one to two feet typically per year, and up to 25 feet a year in extreme cases. This slide describes erosion before LWR caused a section of highway to disappear north of Gimli. 700 feet eroded in 95 years between 1876 and 1971, while another 108 feet eroded in the 23 years afterwards.

So the concern that LWR has caused shoreline erosion, this is not a new issue. In 1998 Manitoba commissioned the Lake Winnipeg Shoreline Erosion Advisory Group which in 2000 prepared a report, an independent review of shoreline erosion along the shorelines of the south basin of Lake Winnipeg and related issues. And this quote here is from their independent erosion expert.

This is our understanding of erosion.

It has been occurring since the formation of the lake and will continue almost forever. Erosion is driven by the wind. Regulation has not caused the erosion and has not made the erosion worse. We understand that erosion is greatest with the combination of high wind and high water levels. We have shown that LWR has reduced the average level of Lake Winnipeg and the flood peaks.

Water quality. There is a concern that Jenpeg holds back water in Lake Winnipeg causing more phosphorous to stay in the lake. This phosphorous fuels algal blooms, and more blue green algae. And when the algae dies off and decomposes, it uses oxygen so there is none for the fish and they die. Also the blue green algae can release neurotoxins. All together this has obvious effects on recreation and ecosystem values.

Science confirms that the main water quality issue is an increase in fertilizer and phosphorous loading to the lake, primarily from the Red River, due to agricultural fertilizers and precipitation increase. Perspectives expressed at the National Institute for Sustainable Development Red Zone Conference, and by scientists like

Hesslein and McCullough who have studied this issue, are not suggesting that LWR is a major factor. Our understanding is if LWR is having an effect on water quality, it is small in relation to land and agricultural practices and increased inflows to the lake. The residence time analysis I referred to earlier indicates it has been largely unaffected by LWR. Therefore LWR is not considered a major factor contributing to nutrient enrichment of Lake Winnipeg.

There is a fishery concern. We have heard a concern that LWR has changed currents of the lake, increasing debris and altering whitefish distribution, thereby decreasing commercial fishing success. The 1975 study board did not forecast any fishery impacts. In the early 1990s, former Provincial Director of Fisheries, and Director General of the Department of Fisheries and Oceans, Freshwater Institute, Lawler and Doan, conducted a study on this issue and concluded that rather than LWR, fishery management and economics affected the success of the whitefish fleet fishery. Walleye production and whitefish quotas have increased in recent years. Our understanding of the fishery is similar to what Lawler and Doan

reported in 1992, that fishery management and economics are keys to the success of the fishery. And it is important to point out that the Lake Winnipeg commercial fishery is successful.

Netley Marsh: There is a concern that LWR has contributed to a decrease in emergent vegetation and erosion and loss of uplands resulting in long term change to the marsh, from marsh to open water habitat.

Studies indicate that the marsh has been in decline for a long time, well before LWR was built. A 2004 study by Grosshans, Wrubleski and Goldsborough demonstrate a shift in plant species away from emergent vegetation such as bullrush and cattail between 1979 and 2001. The study also noted maps of the marsh from the 1920s to present, showed a pattern of increasing open water areas. Available research contributes decline of the health of the marsh to many factors. There was the Netley cut which was dredged in 1913 to the width of 80 feet and is now over 1500 feet wide. It allows a major portion of the Red River to flow into the marsh.

Isostatic rebound: Since the glaciers left the north -- and the province later, it is

causing the north end of the lake to rise faster than the south and having the effect of tipping the lake southwards into the marsh. High Red River flows have experienced more frequent flooding in the recent years. Between 1884 and 1999 the Federal government dredged the mouth of the Red River. Since 1999 the mouth has become blocked with sediment causing more water to flow through the cut and into the marsh. High turbidity, which means there is a lot more sediment suspended in the water, which reduces light penetration into the water, and without light plants can't grow, so there is less aquatic vegetation. Carp, an invasive species, introduced to the marsh in the 1940s, which uproots marsh vegetation as it dregs for food, making the water more turbid. And Lake Winnipeg Regulation which has reduced the range of water levels.

Our understanding is there are a large number of impacts and interactions between impacts, and research does not suggest that Lake Winnipeg Regulation is a primary factor in the decline of the Netley-Libau marsh. The Netley cut appears to be a significant contributing factor.

So this ends the review of the

concerns that people have raised about Lake Winnipeg and our understanding of these issues.

To provide information on Lake Winnipeg Regulation, on our website we list past, current and forecasted water levels in the hydrological window with facilitated access to close to real time Water Survey of Canada gauging stations. There is information on the project and our request for a final licence. And the ability for people to ask questions and information on other parts of the Manitoba Hydro system.

These are several of the research and education initiatives that we support to increase knowledge of the lake, which can be used to improve management practices and education. We share in the cost to operate the Lake Winnipeg Research Consortium's research vessel. There is the coordinated aquatic monitoring program, which Mr. Swanson mentioned earlier. There is the International Institute for Sustainable Development Water Innovation centre. You undoubtedly heard about their bio-economy project, as the basis of some of the meetings. The Manitoba museum developed a new permanent exhibit in collaboration with IISD, comprising of an

interactive simulation of life in the Lake Winnipeg basin. There is a number of technical research and scientific groups that we are involved with. We fund research on different eco-system aspects of the lake through our research and development program.

In speaking with people around the lake we have also heard the suggestion to simply lower the lake by one foot and have the top end of our operating range reduced to 714 feet. We looked into this after the Clean Environment Commission asked us to. And reducing the power production range on Lake Winnipeg by one foot results in a five inch decrease in the average water level, and even less when it comes to decreasing peak water levels during a flood, like last year or 2011. So changing the power range by one foot, does not translate into a one foot lower lake. Also it will not appreciably reduce erosion. Yet to achieve this there are new impacts downstream and costs. You can peruse the full study on our website and appendix 10.

On to the summary. There are a number of concerns on Lake Winnipeg; high water, erosion, water quality, the fishery and Netley-Libau marsh.

However, with the information presented, Lake Winnipeg Regulation is not the cause of these. LWR has successfully reduced flooding on Lake Winnipeg. It has reduced the peak water level and reduced the average level in the post regulation wet period. Shoreline erosion is a natural process, and there is no reason to suggest an increase in erosion rates after LWR. Water quality issues are primarily due to upstream nutrient inputs. LWR is likely at most a minor contributor to lake nutrient enrichment. Also we support significant independent research to confirm this. Any effects of LWR on the fishery are indiscernible from fish management and economic effects, and the fishery is successful. The decline of the Netley-Libau marsh over the past 80 years, is due to a number of interrelated factors, chief amongst these is the Netley cut from 1913.

Lake Winnipeg is a key part of the Manitoba Hydro system. Also it has significant cultural, spiritual, commercial and recreational importance to Manitobans. Therefore, Manitoba Hydro will continue our participation and support of research, development of best management

practices, stewardship and education for the lake. Thank you.

THE CHAIRMAN: Thank you, Mr. Hutchison. Mr. Cormie.

MR. CORMIE: Thank you, Mr. Chairman. That completes our detailed presentations. I would like now to summarize the material that we have presented today and provide some closing comments on behalf of Manitoba Hydro.

We have heard today from history that the decision to regulate Lake Winnipeg was a government decision that involved input from Manitoba Hydro. And that Government decision was multi-objective; to provide flood relief to those around Lake Winnipeg, and to enable the development of hydro power to meet the growing needs of the province. That decision balanced those major competing interests, but it has been done at a cost to those downstream.

That cost involved more frequent flooding, a change in seasonal flow patterns, and significant physical, environmental, and socio-economic effects. We heard that although Lake Winnipeg Regulation was a Provincial initiative, it has been implemented, and Manitoba

Hydro has been responsible for the project since day one. That the use of Lake Winnipeg as a power reservoir was the alternative chosen by government as the alternative to high level Churchill River diversion. We have heard that following Lake Winnipeg Regulation and Churchill River Diversion, subsequent developments at Long Spruce, Limestone and now Keeyask have benefited from Lake Winnipeg Regulation, and are now predicated on Lake Winnipeg Regulation as currently licensed.

We also heard that Lake Winnipeg average levels are essentially the same pre and post Lake Winnipeg Regulation, not higher as has been predicted. Those studies had not anticipated the degree to which Manitoba Hydro would be interconnected to neighboring markets, and there was a different use of storage than was anticipated.

Mr. Gawne reviewed with us the complex and extensive engineered system of channels and structures that make up the project. These works allow up to 50 per cent more water to flow out of the lake than would otherwise flow out naturally, both for the benefit of electricity production and for flood control.

Mr. Swanson reviewed the large amount of environmental studies that have been done in the past, and our ongoing work such as with CAMP. He also made us aware that compared to projects that we would build today, we have very limited baseline data, which hinders our full understanding of the project's impacts. You also heard about Manitoba Hydro's ongoing commitment to support research and monitoring of the lake.

Mr. Sweeny reviewed the many physical, environmental and social impacts on the downstream as a result of the project. These effects include changes to water regime and shoreline erosion. They include impacts to water quality, fish, mercury and wildlife. They include impacts on people, such as culture and way of life, the loss of heritage resources, the way the landscape looks, how resources are used, loss of reserve land, navigation, transportation, and there are issues of public safety, and there are health issues and concerns, including personal property loss and damage.

But the projects also include and has resulted in the creation of new opportunities in the areas of employment, training and business.

In the response to the impacts of the project we heard of the many agreements, programs and mitigation projects that Manitoba Hydro has put in place with those affected to help cope with and compensate for these impacts.

The benefits side of the project has achieved the benefits originally envisioned. The frequency and magnitude of shoreline flooding events around Lake Winnipeg has been reduced, hydro development has proceeded, and as envisioned, the province has a dependable affordable and renewable power supply. And with control of river flows, the foundation for further Hydro development, such as now occurring at Keeyask, is possible.

A few moments ago Mr. Hutchison reviewed with us several concerns that many people from around the lake have about Lake Winnipeg Regulation. But he also shared with us our understanding of whether these effects and concerns are related to Lake Winnipeg Regulation. Our understanding with regard to water levels is that regulation has lowered peak levels, the average is about the same, water levels in the fall are lower during wet years and higher during

dry years, water levels continue to follow the typical seasonal pattern and residence times are similar to natural conditions. We heard from him that erosion is driven by natural processes. And on water quality, eutrophication in the lake is primarily not driven by Lake Winnipeg Regulation, although some more research is needed.

On fisheries, Lake Winnipeg fisheries are generally in a healthy state, but many factors influence the fishery, including water quality, market factors, climate change and invasive species. However, the evidence suggests that LWR is not impacting the sustainability of the commercial fishery.

On the Netley-Libau marsh, he explained there are many factors which affect the marsh. And it is clear that the health of the marsh was declining prior to the project, and that many factors affect its health beyond just water levels.

In applying for a final licence Manitoba Hydro has requested no operating changes to the Water Power Act licence. In simple terms, all that will change now if the licence becomes final is the name of the licence. Changing the

license at this time would have many physical, environmental, social and economic impacts and consequences, the full extent of which are not known today. Much more study and consultations would be needed before this step is taken.

However, at the Commission's request we did study changing one licence condition, and that was varying the maximum discharge elevation. Assuming for the 37 years of actual operation since 1976 we were regulating to 714, as an alternative, or 716 as an alternative. And we did this to help understand the impact of that threshold elevation on the water regime. Our analysis of that is included in appendix 10 of the plain language document, and it shows that changing this level will change the frequency of maximum discharge occurrences, changes the water regime creating different environmental and social impacts, and would add significant costs to the operation of the Manitoba Hydro system. If the upper limit were reduced to 714 from 715, average peak levels on Lake Winnipeg would have been reduced by only a few inches. Frequency of flooding downstream would have increased, maximum discharge events would have occurred two and a

half times more frequently. Instead of nine maximum discharge events, there would be 24. This increase would have increased impacts to the downstream by increasing water level variations and the frequency of flood peaks. Lake Winnipeg levels would be typically lower going into the winter, leading to reduced winter discharge and reduced hydro energy production.

Conversely if the upper limit were increased to 716 from 715 feet, there would be benefits for hydroelectric generation, however, flood protection on Lake Winnipeg would be reduced modestly, with reduced average in peak flood levels increasing by a few inches. And the number of maximum discharge events would reduce by half, from nine events to four events over that 37 year history.

In summary, the licence as written is a balance for Manitobans. It provides for flood relief to those around Lake Winnipeg and allows for the regulation of the Nelson River so that the province has an economical independent supply of power.

However, there have been negative impacts to the downstream as a result of the

project, which Manitoba Hydro has worked to address over many, many years with the affected communities and stakeholders. This includes mitigating impacts where possible, providing alternative programming when mitigation isn't possible, and working out appropriate compensation.

Some on Lake Winnipeg asked that the project be operated to provide more flood protection on Lake Winnipeg. It is our view that such a change at this time would upset the balance, as it would add significant negative impacts and costs to those who are downstream, with very modest lake level benefits.

Manitoba Hydro is committed to sustainable development practices. That commitment was set in company policy in 1993. That commitment recognizes the interconnected nature of the environment, society and the economy. And today all of our new projects take into account the sustainability principles.

Projects such as Lake Winnipeg Regulation were conceived and built without the benefit of concept of sustainability, which makes it difficult to measure the project against those

principles. Regardless, sustainability principles inform and guide many of our activities as we work in partnership with affected communities to resolve the outstanding issues associated with our legacy projects, such as Lake Winnipeg Regulation. One aspect of that is in the area of global responsibility, where LWR was ahead of its time. Hydroelectric generation is renewable, which makes us the envy of many as we face the challenge of climate change. But in many other aspects we have to recognize that the project can't be unbuilt and the environmental impacts undone. But that doesn't mean that we won't commit to doing what we can do in the areas of remedy, conservation, access to information, public participation, understanding and respect.

In closing, Manitoba Hydro is committed to ongoing dialogue with all stakeholders to further build understanding about the project. Together with the Province of Manitoba we are committed to collect information to improve our understanding of system impacts through such activities as the coordinated aquatic monitoring program, and the regional cumulative effects assessment.

Given the importance of the lake to Manitoba Hydro and to all Manitobans, Manitoba Hydro will continue to support the research of others to improve the overall understanding of Lake Winnipeg, where there is a potential linkage to our activities. Manitoba Hydro does not see this hearing process and our final request for a final licence as the end of our work, rather we see these activities as the next step on a path that leads to a renewal licence in 2026 that will strike a modern balance between those upstream and those downstream which is in the best interests and benefit of all Manitobans.

Thank you.

THE CHAIRMAN: Thank you, Mr. Cormie. That concludes Hydro's opening presentation?

MR. CORMIE: It does.

THE CHAIRMAN: Thanks to the five of you. Next on the agenda then will be cross-examination of Manitoba Hydro. But don't get too excited, we won't do that until tomorrow, so we will give you overnight and tomorrow morning to prepare your cross-examinations. Tomorrow is one of the days where we have set aside an evening session. So we will start at 1:30 tomorrow

afternoon.

Okay. I guess we all stand corrected on this side of the fence. Apparently we have advertised and posted on our website that tomorrow afternoon is from 1:00 until 5:00, and then the evening is from 7:00 until 9:00. So we will abide by what is posted on the internet and what was advertised. So the agendas that were printed are incorrect, so ignore them. We will meet at 1:00 o'clock here tomorrow afternoon and ultimately adjourn tomorrow at 9:00 p.m. If there are no -- I think there are some documents to be registered before we shut down, but if there are no other very pressing matters, I will turn it over to the Commission secretary.

MS. JOHNSON: Okay. We have a number of documents. The first one is CEC number 1, which is a letter dated July 5, from Honourable Bill Blaikie advising the Commission to partake in this hearing. CEC number 2 is another letter from Mr. Blaikie as of September 1, 2011 that contain the terms of reference. Number 3 is the letter from Mr. Sargeant to Mr. Penner requesting the plain language document that's under investigation. Number 4 through number 9, are a

number of information requests of both Manitoba Hydro, Manitoba Conservation and Water Stewardship and MIT, as well as their responses. And number 10 is the water level of regulation in Lake Winnipeg basin and its effects on nutrient status of the lake as prepared by Mr. Hesslein. Manitoba Hydro documents, MH number 1 is the plain language document, and number 2 is the response to one of the letters from Mr. Sargeant. And number 3 is the responses to the IRs. And 4 through 6 are additional information pieces that were requested. Number 7 is -- are the CVs submitted on February 24, and number 8 is the presentation that we saw today.

(EXHIBIT 1: Letter dated July 5, from Honourable Bill Blaikie

(EXHIBIT 2: Letter from Honourable Bill Blaikie, September 1, 2011 containing the terms of reference)

(EXHIBIT 3: Letter from Mr. Sargeant to Mr. Penner requesting the plain language document)

(EXHIBITS 4 to 9: Number of information requests and responses)

(EXHIBIT 10: Water level of regulation in Lake Winnipeg basin and its effects on nutrient status of the lake prepared by Mr. Hesslein)

(EXHIBIT MH 1: Plain language document)

(EXHIBIT MH 2: Response to one of the letters from Mr. Sargeant)

(EXHIBIT MH 3: Response to IRs)

(EXHIBIT 4 to 6: Additional information pieces that were requested)

(EXHIBIT MH 7: CVs supplied February 24)

(EXHIBIT MH 8: Hydro presentation)

THE CHAIRMAN: Thank you. So that will conclude today's proceedings. See you all tomorrow afternoon, 1:00 o'clock.

(Adjourned at 3:00 p.m.)

OFFICIAL EXAMINER'S CERTIFICATE

Cecelia Reid and Debra Kot, duly appointed Official Examiners in the Province of Manitoba, do hereby certify the foregoing pages are a true and correct transcript of my Stenotype notes as taken by us at the time and place hereinbefore stated to the best of our skill and ability.

Cecelia Reid

Official Examiner, Q.B.

Debra Kot

Official Examiner Q.B.