

Independent Expert Advisory Committee (IEAC) on Impacts of Methylmercury

Update for NCC's 2017 Annual General Assembly

Happy Valley – Goose Bay

October 21, 2017

Agenda

1. Introductions
2. IEAC Overview
3. Monitoring
4. Mitigation
5. Results to Date
6. Conclusions
7. Questions

1. Introductions

- Brigid Rowan, energy economist with experience examining economic and environmental impacts of large destructive energy projects
- Advisor to NCC on IEAC since last December
- Extensive experience working with Indigenous communities throughout North America including:
 - Grand Council of the Crees regarding impacts of Hydro-Quebec dam projects
 - Rosebud Sioux Tribe examining worst-case spill scenarios of Keystone XL
 - Standing Rock Sioux examining economic impacts of Dakota Access Pipeline.
- Here to discuss Committee and what it's doing.

2. IEAC Overview

- Key part of October 26, 2016 agreement between 3 Indigenous Groups (NCC, NG, IN) & GNL
- Landmark agreement & unprecedented for a project of this magnitude
- IEAC has two committees: Oversight Committee (OC) and Science Committee or Independent Experts Committee (IEC), chaired by Dr. Ken Reimer, who is working very hard and doing a very impressive job.
- Oversight Committee has representatives from NCC (George Russell Jr and Tammy Lambourne as alternate), NG and IN, federal, provincial and municipal governments and Nalcor – but only Indigenous Groups and Affected Municipalities have a vote.

The (Western) Scientific Experts

- In August, each member of the Oversight Committee (except Nalcor) appointed a (Western) scientific expert to the Science Committee.
- Tremendous combined mercury expertise
- NCC appointed Dr. David Lean, a world-renowned mercury scientist, who has worked extensively on mercury contamination in aquatic systems and more specifically on how methylmercury affects Indigenous Communities (North and Central America). Worked on water contamination issues at Attawapiskat in ON.
- World-class mercury scientist but also understands and shares concerns of Indigenous communities, such as NCC.
- George and I campaigned to ensure David's expertise (as well as the best possible independent scientific expertise) were available to the Committee.

IK Experts

- Each IG has also appointed an IK expert for a total of 3.
- Stewart Michelin is representing NCC.
- IK experts been active participants, especially Stewart & have pushed the Western scientists to keep the research focussed on the practical
- Their involvement should increase as IEC moves into discussions about communications and human health.
- George from NCC brought up the suggestion that IK experts are useful in identifying specific regional information and which country foods are important. Jamie Snook your new Chair and George suggested that the IEC undertake an Indigenous Knowledge compilation of the area and review existing EA for knowledge gaps.
- 3 IGs to determine what IK should be collected by an IK consultant.

IEAC Mission

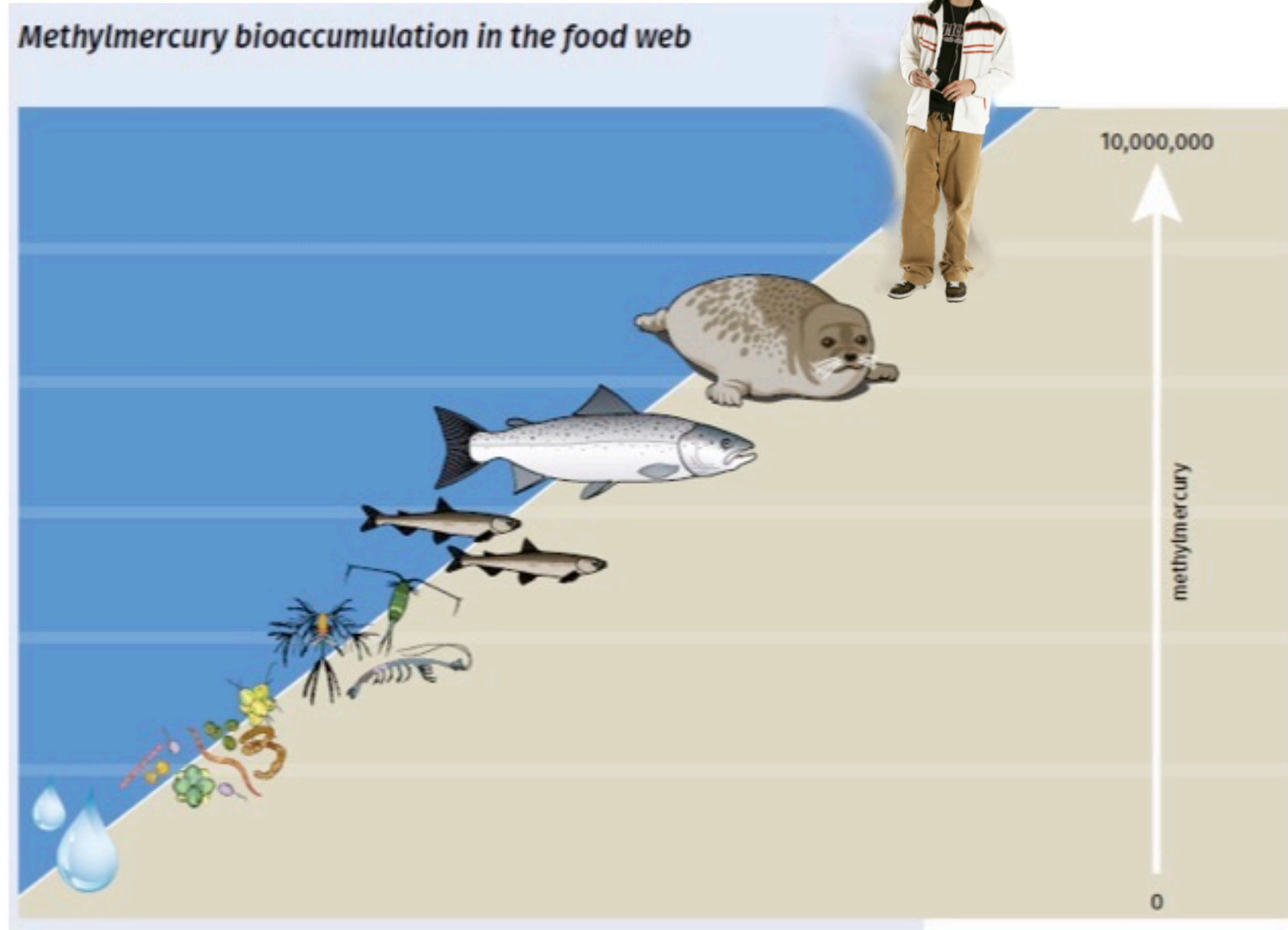
- Mission:

The mission of the IEAC is to independently **assess the adequacy of mitigation, monitoring and management of the Lower Churchill Project**, and to provide recommendations to the Responsible Ministers with respect to the protection of the health of the Indigenous and local population impacted by the Lower Churchill Project, **with particular on focus increases of methylmercury in country foods in the Churchill River near Muskrat Falls and downstream, all along the river and including Lake Melville.**

IEAC Goals

- Overall goal: protect the health of people with a focus on methylmercury in country foods downstream from Muskrat Falls, all along the river and in Lake Melville
- How?
- **Figure out if MF results in methylmercury contamination**
- **Figure out the best way to reduce it**

Why Focus on Methylmercury?



IEAC Milestones & Activities

- March 2017: finalized IEAC TOR
- May: selected members of the Oversight Committee
- August: Chair selected – Dr. Ken Reimer (experienced science administrator) – hasn't wasted any time:
- August: Finalized Science Committee (6 Western & 3 IK)
- September: Two-Day Science Committee in-person meeting and one-day in-person of OC in HVGB
- 3 key recommendations from Sept 20 meeting; all accepted by Minister.
- 6 research portfolios underway
- To date: six teleconference calls with scientists and monthly teleconferences with Oversight Committee
- Goal: as much preliminary work as possible completed by end of 2017; no more budget after March 2018

3. Monitoring

Figure out if MF results in methylmercury contamination

3. Monitoring

- The Science Committee needs to determine if there is (or will be) an MeHg contamination problem
- Undertook a detailed review of the current monitoring program, which samples the water at the reservoir in the river and LM.
- A monitoring program is needed to establish a baseline (what things are like before flooding) and to identify changes from reservoir creation
- Found there were some issues of concern related to the accuracy and frequency of the sampling (first raised in Feb by NCC expert David Lean).
- Resulted in changes in the way the sampling is done, which have now been implemented; samples are being sent to very reputable lab (Fleck in MB).

Monitoring Recommendation

The IEC recommends that Nalcor implement the changes described in the IEC report titled “Recommendations on changes to the scope and quality of the Muskrat Falls AEEMP, 15 September 2017”.

Modelling

- Since flooding has not yet occurred, the only way to predict the changes in methylmercury production and effect on food is by means of mathematical modelling
 - All models are subject to uncertainties as it is only possible to make assumptions about certain parameters
- In 2016, Harvard researchers produced a model that predicts that methylmercury production could increase substantially within 18 mos to a few years after full flooding.
- Nalcor is working on an updated model that will include Lake Melville to be finalized in February 2017
- The Committee is encouraging the sharing of information between Nalcor and Harvard to create the best possible predictions.

Modelling Recommendation

The IEC recommends that Nalcor expedite the finalization of their modelling efforts and complete the work no later than February 15, 2018.

4. Mitigation

Figure out the best way to reduce methylmercury contamination

4. Mitigation

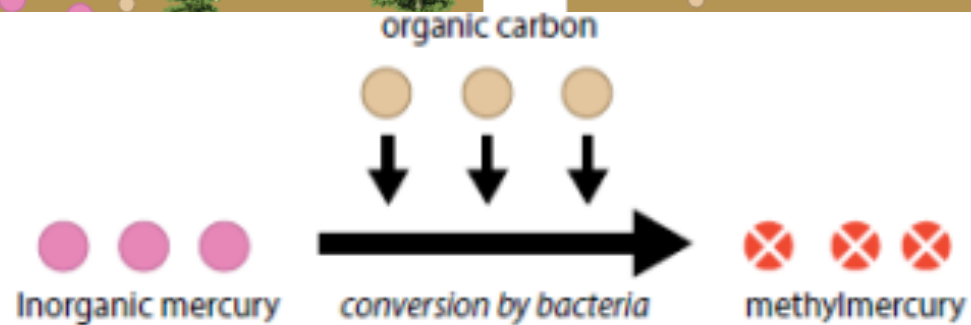
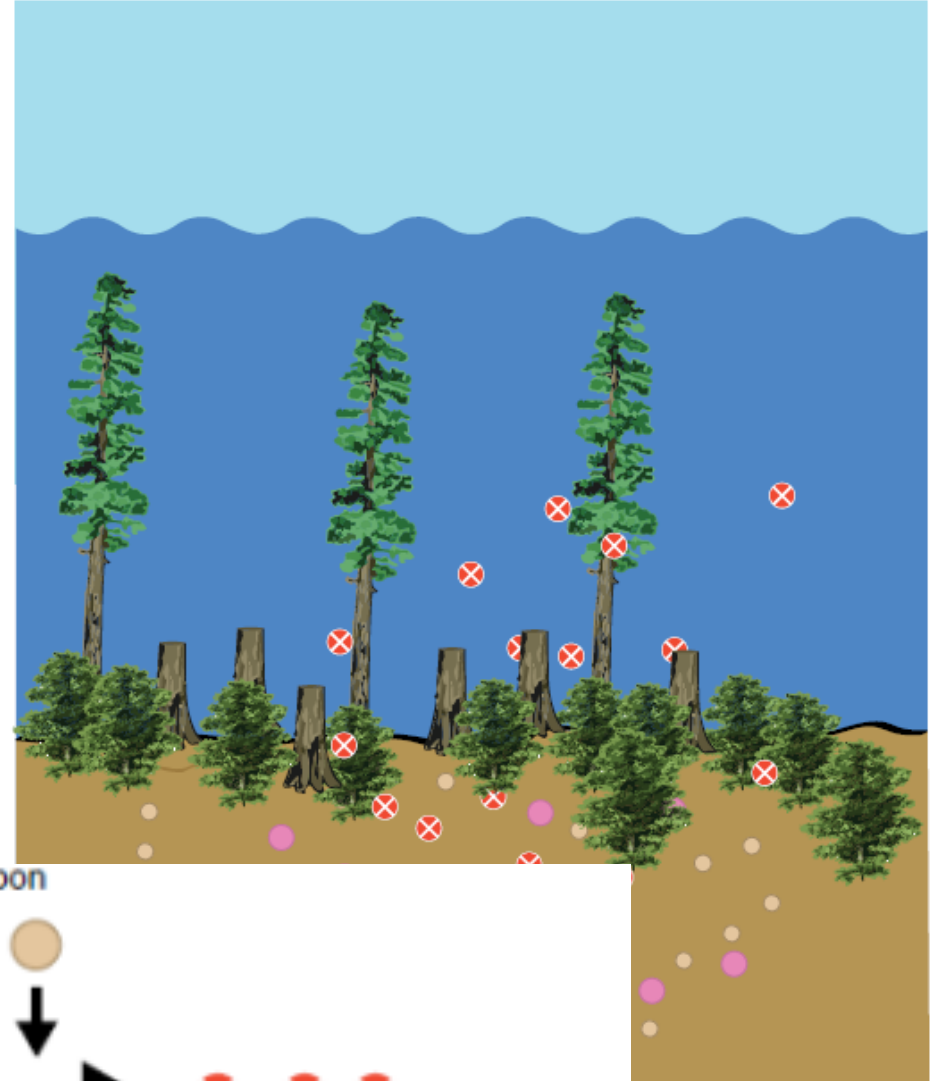
- Assuming there is evidence of MeHg contamination: aim of mitigation: to reduce the production of MeHg, after the reservoir is flooded
- Mitigation options depend on how the MeHg is produced
- Evidence that MeHg is produced by bacteria in sediments: bacteria activity converts Hg (less toxic) to MeHg (more toxic)
- If true, then we want to decrease activity of the bacteria so Hg stays in less toxic form
- Evidence that source of energy for bacteria is organic carbon
- Investigating mitigation options that involve getting rid of the energy source (or “food”) for bacteria, i.e. getting rid of organic matter (which contains organic carbon).

Hydroelectric Dams

Before flooding



After flooding



Tree Clearing

Will reduce some of the carbon needed to produce MeHg

There has been a considerable removal of trees within the reservoir area (about 55% by surface)

This will help reduce the amount of MeHg produced



Beyond Trees: Soil and Vegetation Clearing

Will reduce some of the carbon needed to produce MeHg

A lot of the carbon is still present in soils and in vegetation.

Time-consuming, expensive and very challenging to remove all the top soil;
never been done on a large scale before



Effect of Soil Types & Burning

Different soil types may have different potentials to produce MeHg; IEC can help identify priority areas (carbon/Hg pools).

Also Mixed literature evidence the burnt areas could reduce MeHg (but concerns about burning sacred sites)

IEC proposes soil experiments to investigate these areas

Research Portfolio #1
(Harvard) – Dec results



Mitigation Recommendation

The IEAC recommends that a feasibility study be undertaken by December 20, 2017, for the removal of soil and vegetation from the future reservoir area.

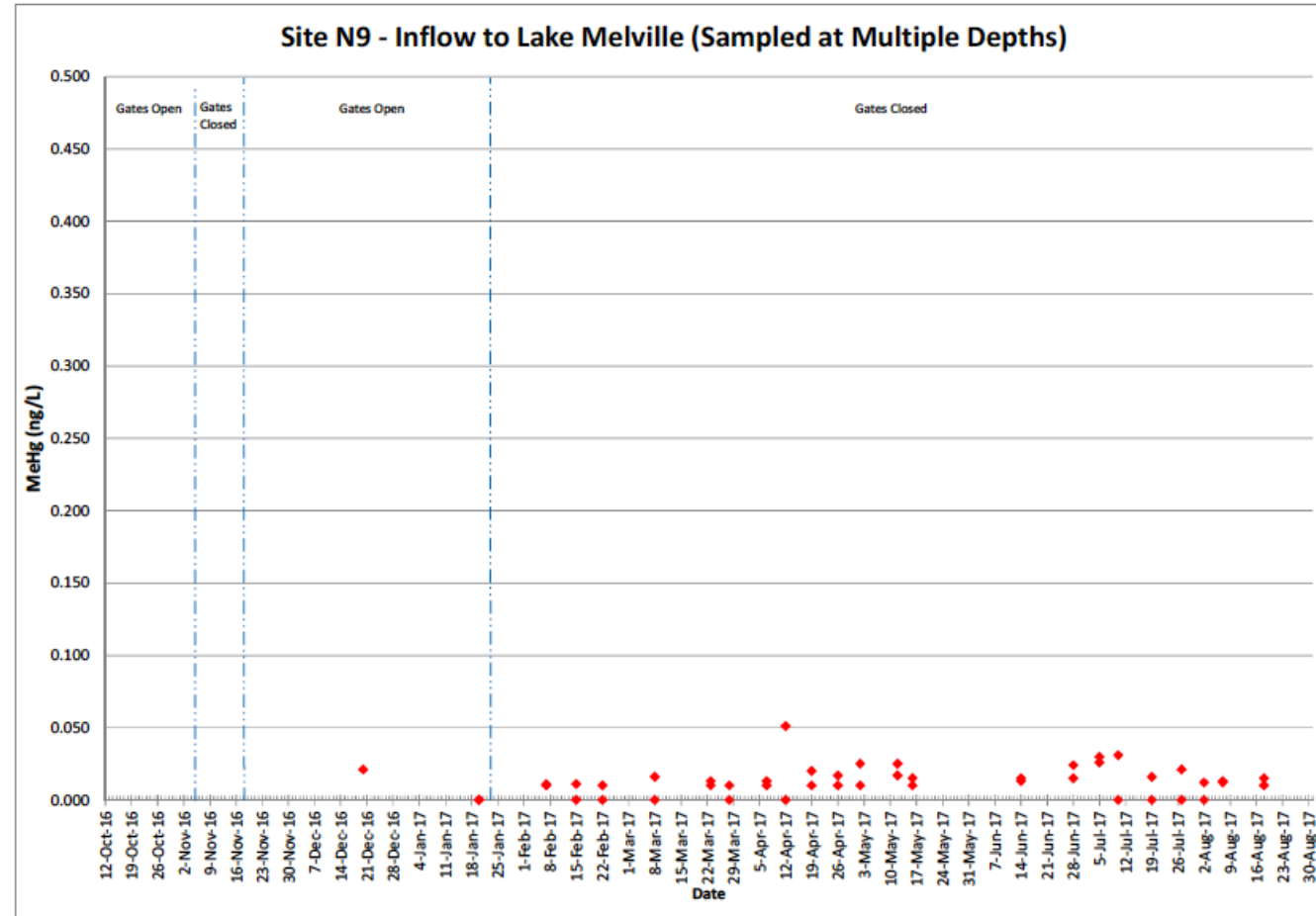
Note: Feasibility study will explore feasibility from an economic, engineering, public safety perspective. Need to ensure soil removal does not backfire and result in increased MeHg contamination and is cost effective.

Lake Melville is Special

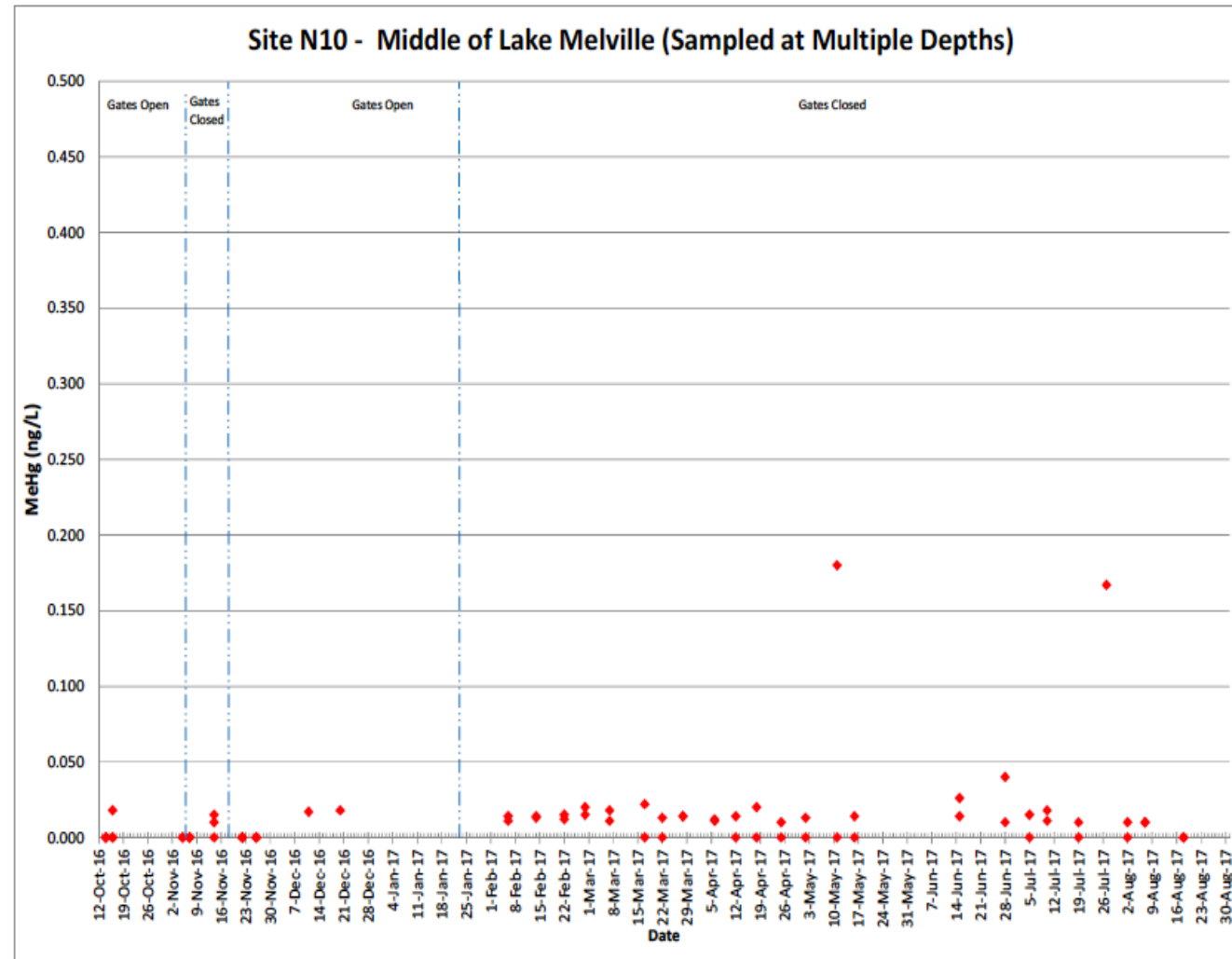
- LM is unusual in that it has a layer of freshwater and a layer of saltwater
- Much of the MeHg research relates to freshwater systems.
- NCC-appointed scientist has raised concerns that MeHg could behave differently in LM.
- Increases the uncertainty re MeHg production (could be higher or lower)
- Increases uncertainty of effectiveness of soil & vegetation removal mitigation measures: (a) never been done on such a large scale even in freshwater; (b) LM is an estuarine lake.
- Scientists are also considering to what extent conventional wisdom and proposed mitigation measures will apply to an estuary system like LM?

5. Results to Date

Sample Water Monitoring Results at Inflow to LM on GNL site



Sample Water Monitoring Results Middle of LM on GNL site



Increases in Methylmercury Levels

- The IEC reviewed all of the water sampling results for MeHg that were available as of mid-Sep (at that time the data were up to mid-July).
- **They concluded that there was “inconclusive evidence linking increases in water levels to increased methylmercury production.”**
- This may have been because the amount of freshly flooded soil was small and/or the fact that MeHg production naturally occurs at warmer temperatures and an increase, if there was to be one, had not occurred yet.
- Note: sampling at other reservoirs has shown that it takes some time (usually several years) for MeHg concentrations to peak after full inundation. Changes in water concentrations happen first and living creatures later - with different species taking different amounts of time to show increases in MeHg.
- No one should leave thinking that there will be no MeHg contamination problem from MF; but it appears likely that it may not have materialized yet.

Early Days Yet So Continued Monitoring and Analysis Are Crucial

- At a glance, there does not seem to be a change in MeHg but to draw a valid conclusion IEC needs to conduct a statistical analysis.
- Just contracted someone to do this work
- Will start the first week in November at which point we will have a year of data to examine. Preliminary results will be available by year end.
- **The IEC continues to receive, monitor and analyze sampling results: this is crucial for early detection of increases in MeHg.**

Can You Eat the Fish?

- IEC contracted a health expert to review all of the biomonitoring data - Harvard work, HHRA, hair results etc.
- Expert been also asked, to make a comment on the current levels of MeHg in foods. Results could be available as early as December. Report will be on Committee website this winter.
- Until we have that independent analysis, public health specialist on the IEC has urged Committee not to make any public statement like “the food is safe to eat.”
- **Chair of IEAC, Dr. Reimer was recently interviewed and made the following statement: “I would eat anything out of Lake Melville and I would feel comfortable giving the same food to my grandchildren.”**

6. Conclusions

- IEAC exists because of your efforts and the leadership of NCC and other IGs; commended for willingness to sit down with GNL and Nalcor
- Landmark committee.
- Dedicated scientists and IK experts working very hard for little compensation
- Continued monitoring is absolutely crucial to the public health of NCC and the affected communities
- Continued research may result in effective implementation measures to reduce MeHg levels after full flooding.
- Otherwise measures can be put in place to reduce risk to the community if mitigation is not effective.
- Imperfect, difficult and challenging but in my view Committee still the NCC's best insurance that public health concerns are monitored, mitigated if possible, and taken seriously by governments.