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| ADDENDUM TO THE LCP AQUATIC PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN |          |      |
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| LCP-PT-MD-9112-EV-PL-0001-01   | A1       | 1    |

Nalcor Energy – Lower Churchill Project



**Addendum to the  
LCP Aquatic Environmental Effects Monitoring Plan**

LCP-PT-MD-9112-EV-PL-0001-01

## **1 BACKGROUND**

In January 2016, the Canadian Science Advisory Secretariat of federal Dept. of Fisheries and Oceans undertook a 'Review of the Mercury Bioaccumulation in the Biota of Lake Melville'. This review was in response to research which postulated a mechanism for methylmercury transport and bioaccumulation in Lake Melville. The review of this and other relevant documents included the objective of providing advice with respect to the following context:

- To provide advice on whether information in the Schartup et al. 2015 paper significantly changes the overall predictions about the potential for bioaccumulation of mercury in fish and seals in Lake Melville as presented by DFO and recognized by the Joint Review Panel during the environmental assessment of the Lower Churchill Hydroelectric Generation Project; and
- To advise whether methylmercury monitoring measures prescribed by DFO downstream of the Muskrat Falls hydroelectric dam should be changed in response to information in the Schartup et al. (2015) paper.<sup>1</sup>

This Science Response Report results from the Science Response Process of February 17, 2016 on the Review of Mercury Bioaccumulation in the Biota of Lake Melville made recommendations to improve the monitoring program as per the adaptive management process.

The Lower Churchill Project accepted the noted recommendations and has made revisions to the Aquatic Environmental Effects Monitoring EEM program as per the details herein.

## **2 AQUATIC EEM PROGRAM ADAPTIVE MANAGEMENT**

### **Sampling Protocol Modifications**

#### **Additional Sampling Location**

An additional sample location at the eastern end of Lake Melville is added as of the 2016 sampling program. It is located approximately 30 kms west of Rigolet. See the attached image for overview of sample locations within Lake Melville (See Figure 1).

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<sup>1</sup> Review of Mercury Bioaccumulation in the Biota of Lake Melville, Canadian Science Advisory Secretariat, Dept. of Fisheries and Oceans, 2016.

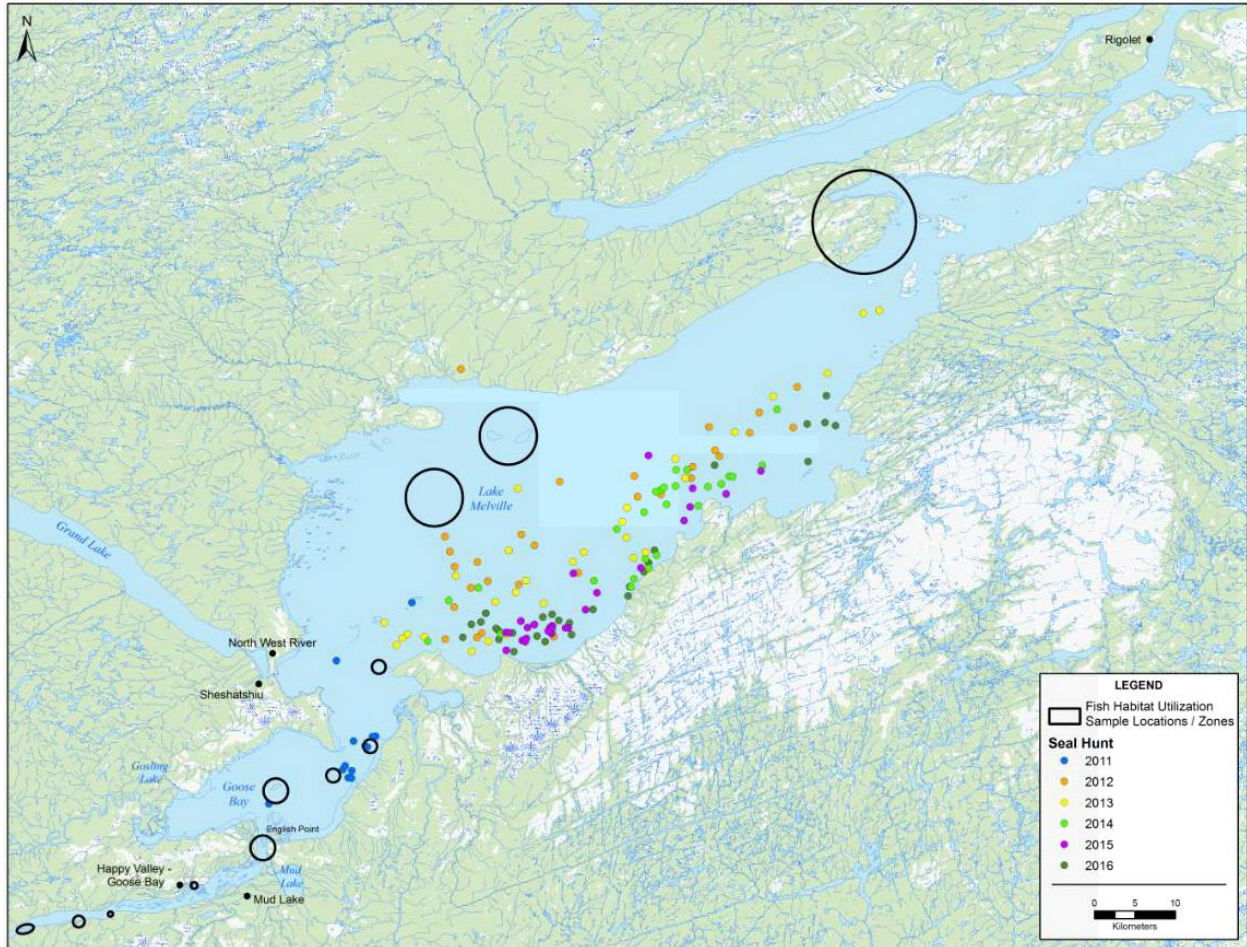


Figure 1: LCP Aquatic EEM Sampling stations and previously obtained seal samples in Lake Melville.

### **Ringed Seal Sample Sizes**

Preliminary power analysis has been completed on the sampled pups (less than one year old) illustrated in Figure 1. Given that the pups are generally very similar in size and age, current annual sample sizes with a p-value of 0.1 and power of 0.7-0.8, are capable of detecting a 50-75% increase in total mercury concentrations. All sample years combined for pups indicate a detectable total mercury increase of 30% at similar p-value and power.

### **Fish Sampling Protocol**

Fish from each site are to be sampled by a length stratified protocol and by age/size, when possible, and this is reflected in the 2015 Annual report and going forward. Details as to the actual protocol undertaken for each sample site will be detailed in the methods.

Sampling of seals is directly related to the active harvest and consumption of seal in the community therefore the samples are biased toward younger, smaller animals but represent those being utilized. Analysis will be separated for pups and “non-pups” which will reduce bias based on oversampling of younger animals.

### **Stable Isotope Analysis – Seal Sampling**

Stable isotope analysis is added to the program to determine if the variability in methylmercury levels in ringed seal samples is related to diet, or some other factor (e.g. age, size, site fidelity). Sulphur isotopes are used to allow for the determination of estuarine food utilization.

### **Methylmercury and Carbon Sampling – Lake Melville**

Water column and sediment samples collected and analyzed for particulate and dissolved methylmercury and total mercury and dissolved organic carbon is to be collected at the locations indicated in Figure 1. Added to the program are samples from the nepheloid and near bottom layers.

Some samples have been collected previously and data is available since 2013. This data for 2015 is published in the Annual Report.

### **Report Modifications**

Modifications to the reporting protocols include:

- Inclusion of mercury levels in each fish species and seals on a site by site basis (included as per 2015 Annual Report);
- Inclusion of mercury levels for each fish species on a standard length basis (as per 2016); and
- Inclusion of plots of length versus methylmercury levels (as per 2016).

### **Baseline EEM Schedule**

| <b>Monitoring</b> | <b>Years</b> |
|-------------------|--------------|
| Baseline          | Through 2018 |
| Post-construction | 2019-2038    |