Memo

To:	Jackie Wells
From:	Matthew Gosse
cc:	James McCarthy
Date:	02 March 2021
Re.	Muskrat Falls Reservoir Methylmercury Monitoring – January 2021 Update

Dear Ms. Wells,

In order to provide additional monitoring coverage of possible changes in methylmercury concentrations in water during headpond and reservoir formation, the provincial government requested an additional sampling program be implemented by Nalcor. Nalcor provided a program description to government and engaged Wood Environment & Infrastructure Solutions (Wood) to implement the sampling program. This memo provides a summary of total and dissolved methylmercury data collected in January 2021. While not considered analysis, the results will be continually added to the annual trend.

Methylmercury

Methylmercury is the organic form of mercury, which is bioavailable and biomagnifies within the food chain (Mergler et al. 2007, Chen et al. 2014). The Muskrat Falls Methylmercury Monitoring Program is specifically designed to monitor methylmercury (total and dissolved) as well as total mercury and various parameters which could affect methylation (i.e. total phosphorus, DOC, and temperature) and transport (i.e., TSS).

Headpond Formation and Reservoir Creation

Headpond formation was completed in early February 2017, with the first set of impoundment samples being collected February 6, 2017. The inundation to full supply water level (38.5-39 m elevation) began on August 7, 2019 and was completed on September 5, 2019. The first complete year of water quality data with full reservoir formation was collected between September 9, 2019 through August 25, 2020. Year two of full reservoir formation began in September 2020.

Sampling Program Overview

Water sampling began in October 2016, with initial samples being collected before any headpond/reservoir formation began in order to capture natural methylmercury concentrations. Headpond formation in February 2017 initiated weekly water sample collection from 11 of the 13 sample locations (Figure 1). Throughout headpond formation, inundation had not affected sample locations N2 and N3, therefore they were omitted from the weekly sampling regime until full reservoir inundation, as per WRMD request.

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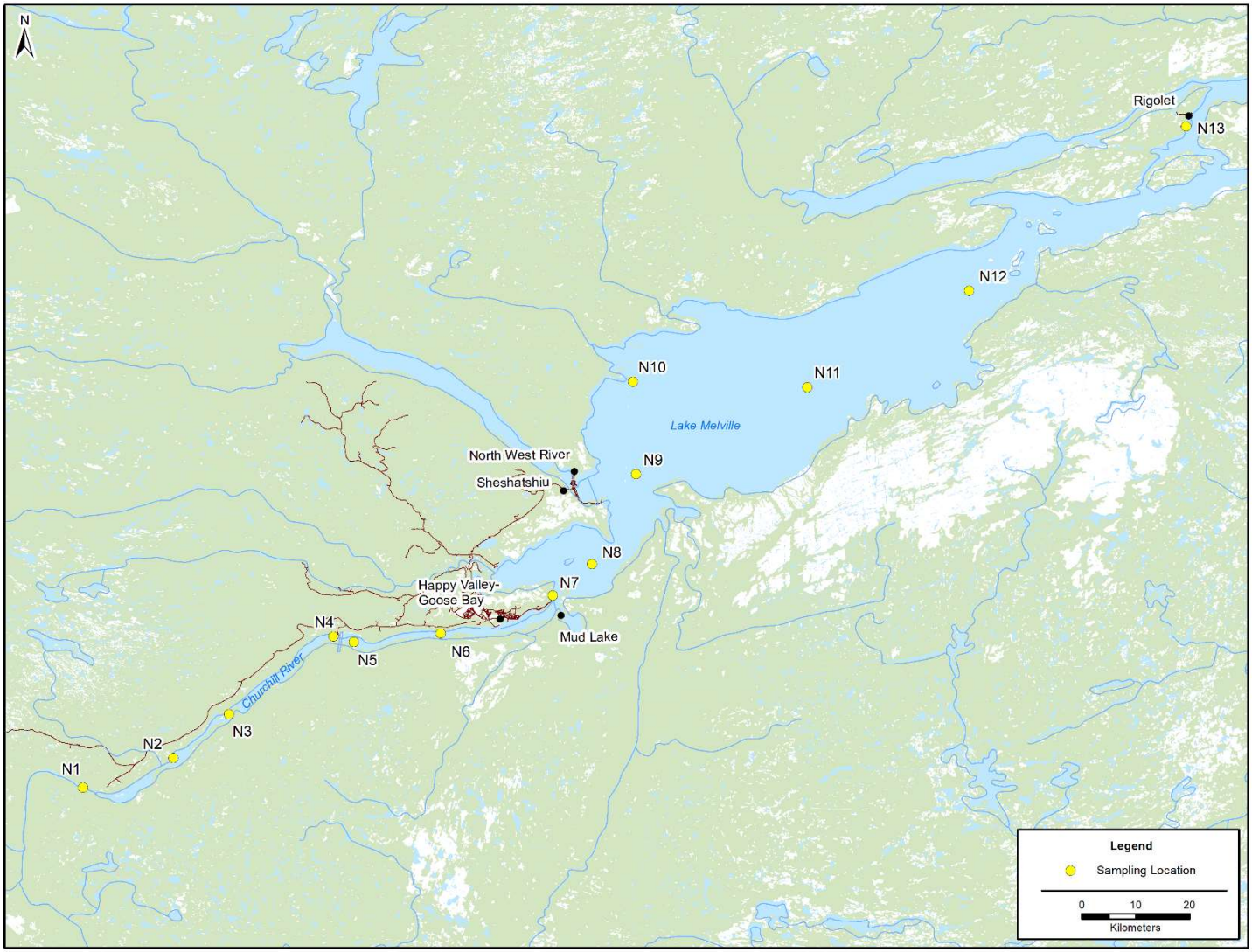

Figure 1: Map of sampling locations for the Muskrat Falls Methylmercury Monitoring Program

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With the completion of reservoir formation in September 2019, samples are currently being collected from all 13 sampling locations, including N2 and N3. As per Independent Expert Advisory Committee (IEAC) recommendation, each location is now sampled weekly when water temperatures exceed 6°C. When water temperatures are below 6°C, sampling occurs on a bi-weekly basis unless there is a change in water elevation of the reservoir by Nalcor which would re-trigger weekly sampling.

Since this program began in October 2016, over 2,000 samples have been collected and analysed.

Measured Methylmercury – January 2021

The most recent results received from the lab were collected on January 5, 2021. All ongoing laboratory analysis is currently being completed by AGAT Laboratories, with a subset of methylmercury also being analysed by Flett Research as a means of QA/QC. The results of this annual QA/QC analysis will be presented at a future date.

During January 2021, the highest mean concentrations of total methylmercury were measured within the Muskrat Falls Reservoir (N2; Table 1), while the highest concentration of dissolved methylmercury was measured at Rigolet (N13; Table 1). Sampling at N13 occurred during low tide, and low water levels were noted at time of collection. The sample was noted as having a yellow cast, and was relatively high in total and dissolved methylmercury, total mercury and organic carbon, both total and dissolved.

Sample collection in January 2021 was limited due to helicopter availability, which resulted in a single sampling round being completed. During this event, samples were collected from all locations where ice conditions allowed.

Table 1: Summary of methylmercury concentrations, January 2021

Sample Site	Total Methylmercury			Dissolved Methylmercury		
	Sample Size[1]	Mean (ng/L)	Max (ng/L)	Sample Size[1]	Mean (ng/L)	Max (ng/L)
N1	1	0.037	-	1	0.022	-
N2	1	0.039	-	1	0.023	-
N3	1	0.034	-	1	0.022	-
N4	3	0.033	0.037	3	0.024	0.026
N5	0	-	-	0	-	-
N6	1	0.033	-	1	0.022	-
N7	1	0.030	-	1	0.026	-
N8	2	0.031	0.031	2	0.017	0.020
N9	0	-	-	0	-	-
N10	1	0.017	-	1	0.014	-
N11	0	-	-	0	-	-
N12	1	0.023	-	1	0.014	-
N13	1	0.038	-	1	0.033	-

Note All values below detection limits have been included in calculations at the detection limit (0.010 ng/L)
[1] All sample depths, where applicable, have been included in summary values
[2] All values were below detection limits

Figure 2 provides the annual trend in mean monthly Total Methylmercury concentrations through Year One and Year Two since full reservoir creation. The graph will be extended through Year Two as additional mean monthly data continues to become available.

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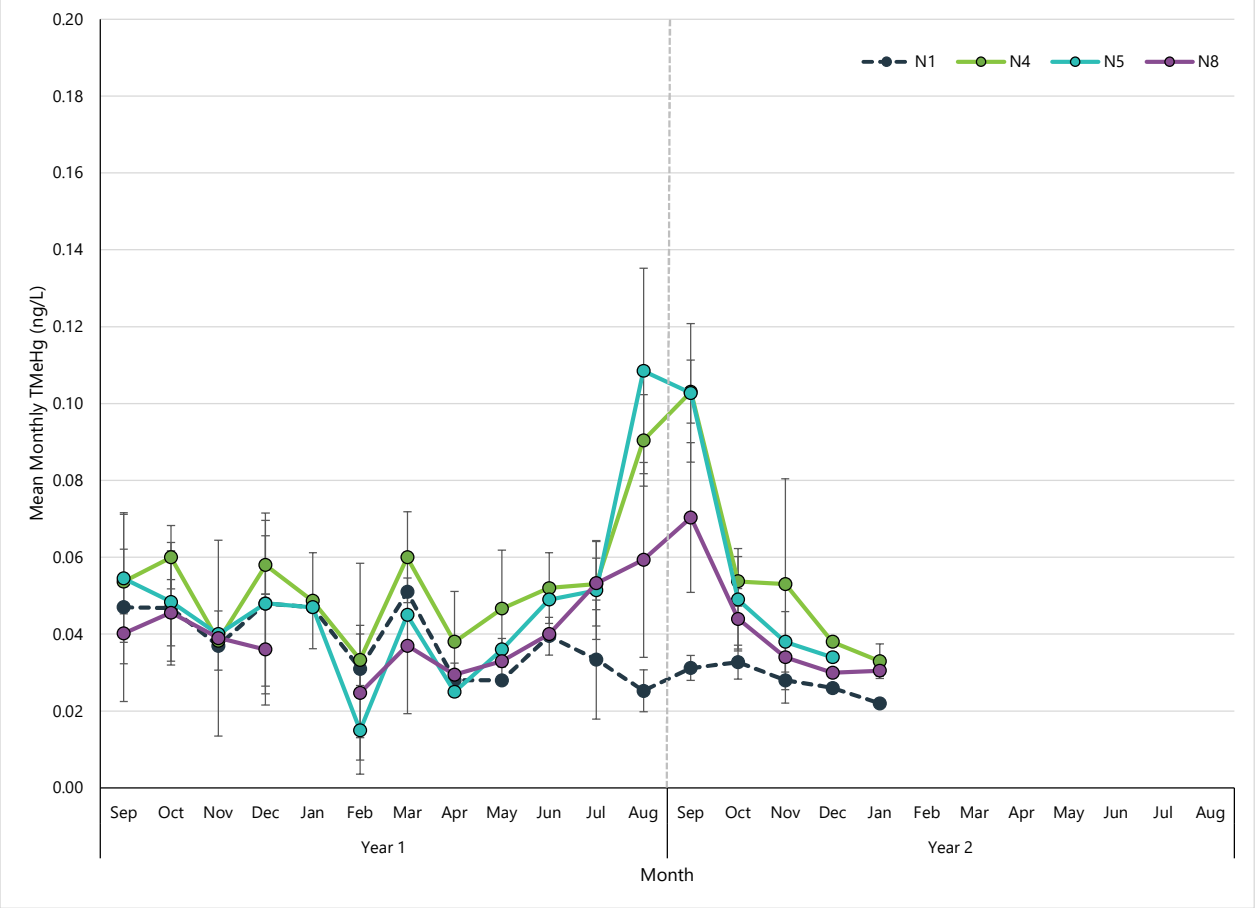

Figure 2: Summary of mean monthly Total methylmercury concentrations since the completion of Reservoir inundation (September 2019). Error bars represent the 95% Confidence interval of the mean monthly concentration.

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All water quality data related to this program is available from Nalcor's website (muskratfalls.nalcorenergy.com).

Closure

Should you have any questions, comments of concerns regarding the information presented within this summary, please do not hesitate to contact us at your convenience.

Prepared by

X

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Reviewed by

X

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Senior Biologist/Ecosystems Group Lead

References

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