

## Memo

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**To:** Jackie Wells  
**From:** Matthew Gosse  
**cc:** James McCarthy  
**Date:** 12 July 2021  
**Re.** Muskrat Falls Reservoir Methylmercury Monitoring – May 2021 Update

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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 May 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.



**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 2,200 samples have been collected and analysed.

### Measured Methylmercury – May 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 May 2021, the highest mean concentrations of total and dissolved methylmercury were measured within the Muskrat Fall Reservoir (N4) and immediately downstream of the Reservoir (N5; Table 1) respectively. All samples were collected during each sampling event in May 2021.

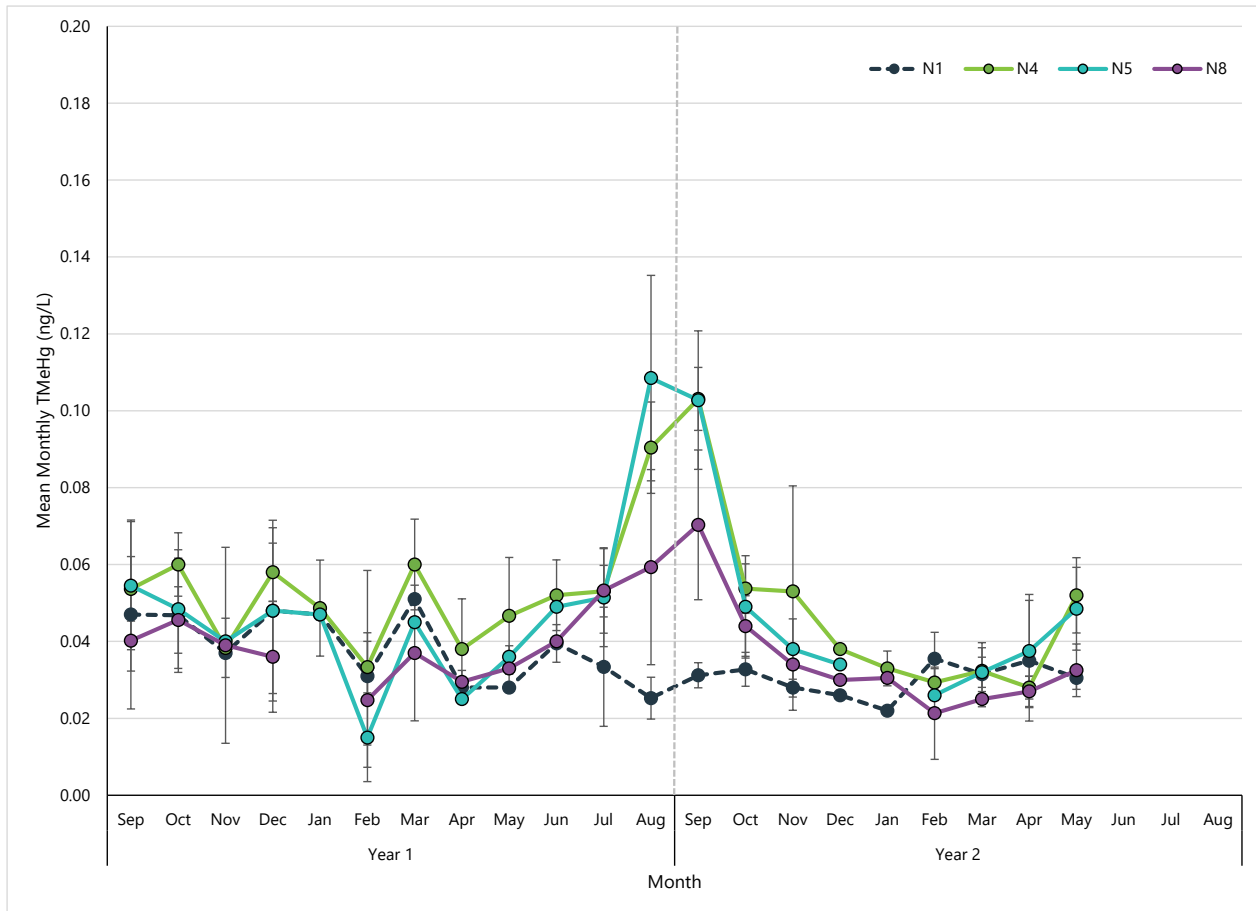
**Table 1: Summary of methylmercury concentrations, May 2021**

Sample Site	Total Methylmercury			Dissolved Methylmercury		
	Sample Size <sup>1</sup>	Mean (ng/L)	Max (ng/L)	Sample Size <sup>1</sup>	Mean (ng/L)	Max (ng/L)
N1	2	0.031	0.032	2	0.017	0.024
N2	2	0.041	0.042	2	0.034	0.036
N3	2	0.046	0.047	2	0.033	0.036
N4	2	0.052	0.057	2	0.037	0.039
N5	2	0.049	0.054	2	0.038	0.040
N6	2	0.034	0.035	2	0.029	0.030
N7	2	0.040	0.041	2	0.025	0.028
N8	2	0.033	0.036	2	0.020	0.020
N9	2	0.051	0.063	2	0.026	0.031
N10	2	0.033	0.036	2	0.019	0.021
N11	2	0.022	0.026	2	0.013	0.015
N12	2	0.033	0.034	2	0.020	0.021
N13	2	0.014	0.017	2	0.011	0.012

Note All values below detection limits have been included in calculations at the detection limit (0.010 ng/L)

<sup>1</sup> All sample depths, where applicable, have been included in summary values

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.



**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.**

All water quality data related to this program is available from Nalcor’s website ([muskratfalls.nalcorenergy.com](http://muskratfalls.nalcorenergy.com)).

## Closure

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

Prepared by

Reviewed by

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Biologist

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## References

Azimuth Consulting Group Partnership. 2017. Relationship between Muskrat Falls Reservoir elevation and mercury concentrations, Lower Churchill River October 2016 - September 2017. Nalcor Energy, St John's, NL.

Chen, C. Y., M. E. Borsuk, D. M. Bugge, T. Hollweg, P. H. Balcom, D. M. Ward, J. Williams, and R. P. Mason. 2014. Benthic and Pelagic Pathways of Methylmercury Bioaccumulation in Estuarine Food Webs of the Northeast United States. PLoS ONE 9:e89305.

Mergler, D., H. A. Anderson, L. H. M. Chan, K. R. Mahaffey, M. Murray, M. Sakamoto, and A. H. Stern. 2007. Methylmercury Exposure and Health Effects in Humans: A Worldwide Concern. *AMBIO: A Journal of the Human Environment* 36:3–11.

Reed Harris Environmental Ltd. 2018. Updated analysis of predicted increases in methylmercury concentrations and downstream export from Muskrat Falls Reservoir. Nalcor Energy, St. John's, NL.

W.F. Baird & Associates Coastal Engineers Ltd. 2018. Lake Melville Model Setup and Results. Nalcor Energy, St John's, NL.