Water Quality Monitoring, Education and Climate Change Adaptation in the Jemseg-Grand Lake Watershed

New Brunswick Environmental Trust Fund Project no. 250221

JEMSEG GRAND LAKE WATERSHED ASSOCIATION

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Jemseg Grand Lake Watershed Association

Water Quality Monitoring, Education and Climate Change Adaptation in the Jemseg Grand Lake Watershed

NBETF Project 250221 Final Report by Alyson Kenny

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Jemseg Grand Lake Watershed Association Report 26-01

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Report cover photo credit: Alyson Kenny at Fredericton Yacht Club, Douglas Harbour

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1. Project Background

The Jemseg-Grand Lake Watershed is a unique drainage system in New Brunswick. It contains multiple water bodies, including the largest freshwater lake in the Maritime Provinces, Grand Lake, and one of the largest freshwater wetland habitats in the Maritime Provinces, Grand Lake Meadows. As an area dominated by floodplains and heat-moderating lakes, it is ecologically diverse and fertile, populated by multiple rural communities, and frequently visited for recreational purposes. The slow drainage of this system, the rising effect of climate change, and increased recreational use have made this watershed more vulnerable to environmental threats like increased flooding events, cyanobacteria blooms and invasive species spread.

For the 2025-2026 fiscal year, the Jemseg Grand Lake Watershed Association (JGLWA) was awarded $40,000 by the New Brunswick Environmental Trust Fund (NBETF) to build on work conducted in our watershed since 2020. In 2025, our project was divided into two main components: 1 - Aquatic Ecosystem Health Monitoring, and 2 - Outreach and Education.

To monitor aquatic ecosystem health, our proposed activities included monitoring water quality at 8 sites around the watershed and the calculation of water quality index scores for those sites. We also proposed to survey for invasive Eurasian watermilfoil (EWM) in new and previously surveyed locations.

We achieved our specific goal of building on water quality data collected since 2020. We successfully met the requirements to calculate water quality index (WQI) scores, by sampling for four consecutive months. The WQI scores are shared in the results section of this report. To further support water quality monitoring, we partnered with the Hammond River Angling Association to deploy two CyanoTrackers. These trackers collected real-time data related to cyanobacteria growth, which was accessible through our website. Unfortunately, we did not have the funds to offer free water testing to landowners, though we would like to explore this again in future years. Additionally, we did not have the necessary funds to further investigate the fish species present in Grand Lake as originally intended. In place of this, we noted species that we saw on water quality field days and posted results from our previous environmental DNA (eDNA) study on social media. We reduced the number of EWM surveys to match the funding received, so repeating past EWM surveys was not possible. However, we did complete six surveys in new areas, totaling 28.5 km of shoreline in Grand Lake.

Our intended outreach and education activities for 2025 included attending in-person community events and engaging with locals to promote our projects, post about current environmental issues and watershed news on our social media channels, host webinars and workshops led by environmental professionals, partner with local indigenous groups, and to hang Clean, Drain, Dry signs that we acquired in previous years. Throughout the 2025 season representatives from the JGLWA attended multiple community events, where we engaged residents in the watershed on issues like water quality and invasive species. Furthermore, in 2025 we began sharing our data publicly on Swim Guide and Atlantic DataStream in addition to on our website.

2. Water Monitoring Program

2.1 Introduction

The JGLWA was formed in the fall of 2019 by a group of resident volunteers to initiate activities to build public interest and to work together for the benefit of the aquatic environment in the watershed area. Concerned about the state of the watershed and wanting to engage people in activities that help protect it, the JGLWA initiated its water quality monitoring program in 2020. The JGLWA water quality monitoring program has been in place for five years, building year over year based on what has been learned from previous years.

The JGLWA monitoring program was designed to examine the water quality of Grand Lake, its main inflows, and its outflow, Jemseg River. Since our program's inception, the list of monitoring sites and measured parameters has been tweaked to allow our group to better understand what is necessary for efficient monitoring in the area. Consistent parameters that have been measured each year include surface water temperature, dissolved oxygen (DO), pH, and nutrients such as nitrate and phosphorus. We also try to have one deep-water station each year to document a monthly vertical profile of Grand Lake. This has been difficult in recent years with limited access to boats, and/or has been dependent on the availability of boat operators.

Grand Lake is the largest lake in New Brunswick and is fed by three main inflows: Salmon River, Newcastle Creek, and the Maquapit Thoroughfare Exit (Maquapit Exit). Grand Lake drains into Jemseg River, eventually reaching the Wolastoq (Saint John RIver). In 2023, three river stations at Salmon River, Newcastle Creek, and Lakeville Corner were established to monitor the influence of these inflows. Sampling conducted in the 2024 field season was treated as primarily exploratory due to a late start up, and data from that year are reduced compared with previous years.

In the 2025 field season, 8 pre-established monitoring sites were selected based on their importance of gathering baseline data for the watershed. Each of the major Grand Lake tributaries were monitored, as well as one community wharf and the Jemseg River outflow (Figure 2.1). Additionally, the Jemseg River outflow was monitored (Figure 2.1). We also managed, through the help of some generous members of the watershed, to monitor one deep-water site in Grand Lake near Grand Point. Seven of the 8 sites were monitored monthly from May to September 2025 for various bio-physical parameters, surface water chemistry, trace metals, and *E. coli*, whereas the 8th site (the Waterborough Community Wharf), was monitored biweekly for only *E. coli*.

Aside from our ambient water monitoring program, in 2025, the JGLWA once again partnered with the Hammond River Angling Association to monitor for the presence of cyanobacteria. To do this, we had access to data from the two CyanoTracker devices deployed in our watershed, which continuously monitor parameters related to cyanobacteria growth. We launched two CyanoTracker devices this year: one was placed at the pre-established Cumberland Bay site, and a second in Douglas Harbour, which is known to have low flow (Figure 2.1). To support cyanobacteria monitoring further, our group also took grab samples when we noticed an accumulation of green particles in the water and sent them to the Research and Productivity Council Laboratories to be analyzed for chlorophyll A concentrations. In total, we took two samples for chlorophyll A analysis, once at the Waterborough Wharf and once in Wiggin's Cove.

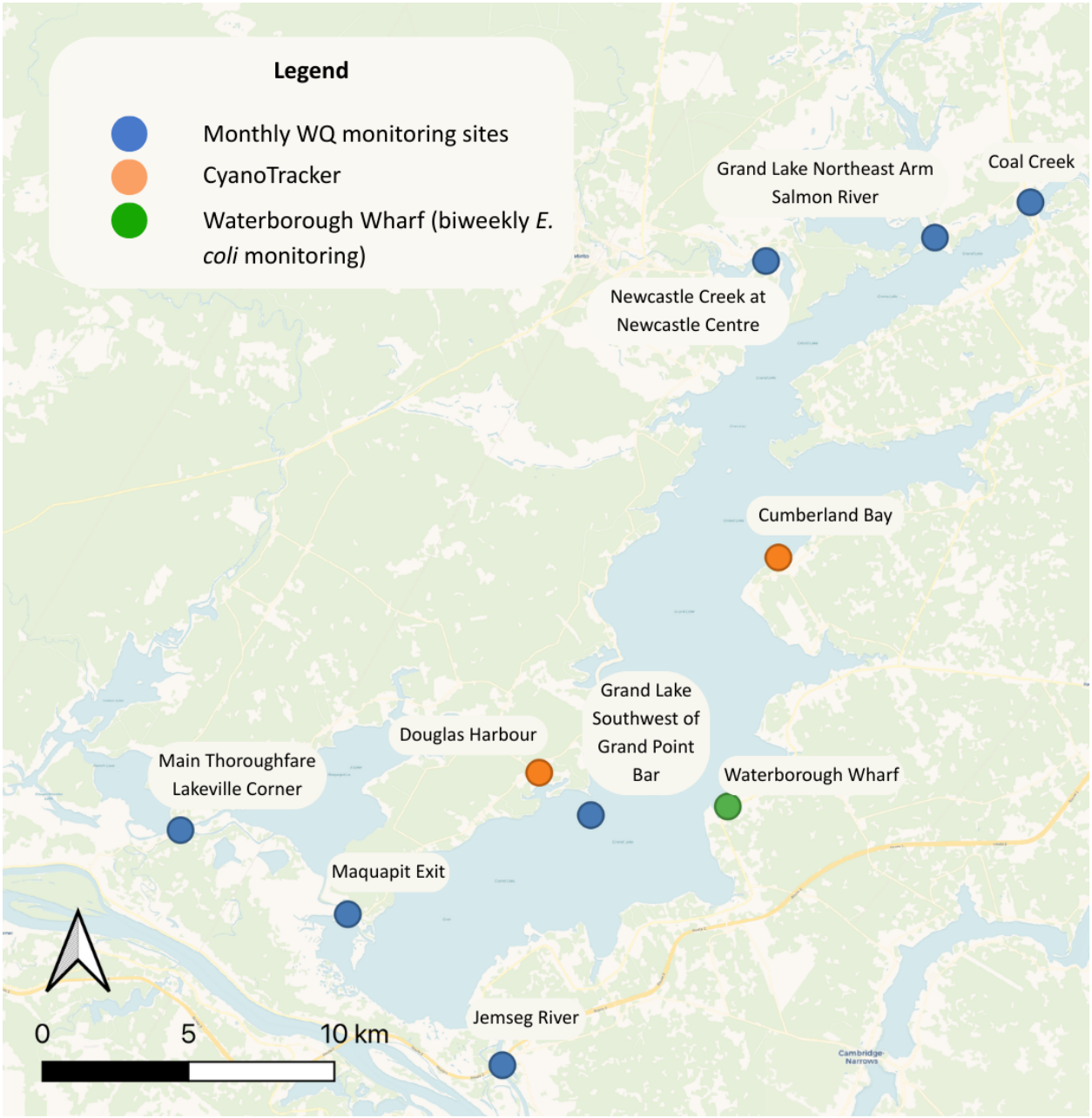

Figure 2.1 Map of monitored water quality sites in the Jemseg-Grand Lake watershed in 2025

2.2 Methods

Biophysical parameters including surface water temperature, DO, pH, and conductivity, were measured in the field, monthly, at each site by the using a YSI multiprobe device. These measurements were taken at a minimum of 6 inches below the surface of the water, suspended in the water column, where possible. To obtain vertical profiles at our deep-water site, Grand Point, readings were taken in 1 meter-intervals until the probe touched the lakebed. Also at the deep-water site, we used a secchi disk to observe water transparency. Our field meter was calibrated for pH, DO, and conductivity before each sampling day.

Monthly chemical and microbiological parameters were also monitored at each site. Grab samples were taken by contractors monthly, at the same time as field measurements. Samples were collected from a location positioned upstream and diagonal from field meters where possible. Samples were taken 6 inches below the surface of the water. In the case of the deep-water site, an additional sample was taken below the thermocline through the use of a Niskin water sampler and then decanted into bottles provided by the Research and Productivity Council (RPC). For chlorophyll A samples, 1-litre samples were taken at each of the two sites and covered in tin foil to limit UV exposure. All samples were kept in coolers with ice until being transported to the RPC laboratory in Fredericton, within 24 hours of being collected. A complete list of analyses performed by RPC, and results, can be found in Appendix A.

2.3 Data Analysis

To display the range of parameters sampled with the YSI probe (conductivity, oxygen, pH, and temperature), results were summarized as average, maximum and minimum values. Oxygen concentration is also plotted along with temperature against depth to display the temperature and oxygen distribution during stratification at the Grand Point deep-water site.

Water chemistry results were also used to generate a water quality index for each individual station, as well as an overall water quality index for the whole lake, using the Canadian Council of Ministers of the Environment (CCME) approach (CCME, 2001). The CCME water quality index (WQI) provides a method to summarize water quality data to facilitate communication about water quality to a general audience. The WQI incorporates three elements: scope - the number of variables not meeting water quality objectives; frequency - the number of times these objectives are not met; and amplitude - the amount by which the objectives are not met. The WQI produces a score between 0 (worst water quality) and 100 (best water quality). These scores are divided into five descriptive categories to simplify presentation (CCME, 2001). We made a change to which parameters and guidelines we used in the WQI compared to previous years to harmonize with those currently being used by the New Brunswick Department of Environment and Local Government. We added copper which has been analyzed also during previous years but not included in the WQI. We also changed the parameter used to look at dissolved reduced nitrogen from total ammonium-N (NH_4^+) to ammonia-N (un-ionized, NH_3) which is what NBDELG uses in their calculation of WQI. In addition to the new parameters and their new guideline values we also changed the guideline levels of concern for DO, nitrate, turbidity, and zinc. A full listing of parameters and guidelines can be found in Table 2.2. To make comparisons with earlier results we also recalculated the WQI from earlier years using the new set of parameters and guidelines.

In past years' reports we determined the trophic status of the lake by using the trophic state index (TSI) equation, developed by Carlson and Simpson (1996). The original equation includes the use of values obtained from the

analysis of phosphorus and chlorophyll A, in addition to secchi disk measurements. Previously we have altered the equation to not include secchi disk measurements on account of the natural brown colour of the water fed into the lake by its tributaries. In 2025, a broader selection of sites and sampling frequency were prioritized, and we did not have the necessary funding to complete chlorophyll A sampling at every site. For this reason, TSI scores are absent from this report.

Table 2.2 Parameters and guidelines concentrations used in the calculation of CCME water quality index scores.

Parameter Name	Lower Limit	Upper Limit	Unit	Reference/Comment
Ammonia, un-ionized[1]	0	0.015	mg/L as N	CCME 2001
Arsenic	0	0.005	mg/L	CCME 1997
Chloride	0	120	mg/L	CCME 2011
Copper	0	0.002	mg/L	CCME 1987
Dissolved oxygen (DO)	6.5	Infinite	mg/L	CCME 1999
Iron	0	0.3	mg/L	CCME 1987
Nitrate	0	3	mg/L	CCME 2012
pH, lab	6.5	9	-	CCME 1987
Total Phosphorus, mixed forms	0	0.02	mg/L	Guidance framework (CCME 2004)
Turbidity	0	10	NTU	Provincial guideline (DELG 2023)
Zinc	0	0.008	mg/L	CCME 1987

2.4 Results

2.4.1 Grand Lake Surface Water Biophysical Characteristics

Biophysical characteristics of Grand Lake surface water taken during our four sampling sessions are provided in Table 2.3 and summarized in the following bullet points.

[1] Calculation as follows, un-ionized ammonia = (total ammonia)/(1+$10^{(pKa - pH)}$)

Grand Point Southwest of Grand Point Bar

- Surface water temperature, on average, was higher than in previous years. The maximum temperature of the season occurred during August, and read 24.4 ° C. This is 2 **°** C higher than the maximum in 2024, which was 22.4 ° C.
- All pH readings, both from the field and results received from RPC, fell within the acceptable guideline (6.5 < pH < 9). pH values collected using the YSI averaged out to be 7 while those from the lab averaged slightly more alkaline at 7.38. Field obtained pH values are in between what was observed during the 2023 and 2024 field seasons.
- Visibility was increased this year, with secchi disk readings averaging out to 2.63 meters, compared to 1.5 meters in both 2023 and 2024.
- Conductivity readings were on par with those observed in 2023 and 2024
- DO stayed within the guidelines (6.5 mg/L < DO) for aquatic life all season, reaching a maximum of 11.3 mg/L in June.

Near shore sites

- Overall, average water temperatures were higher than in previous years. The warmest temperature readings were observed during August (24-28.1 °C). The sites with the warmest average temperatures were Maquapit Exits and Salmon River.
- Average DO was lowest at Coal Creek (5.95 mg/L), where measurements fell beneath the guideline for cold water biota (6.5 mg/L) in both August (4.45 mg/L) and September (5.1 mg/L). DO at Lakeville corner also fell beneath the guideline twice during June and August (5.98 mg/L and 5.72 mg/L, respectively). Other sites that failed to meet the guideline were Newcastle Creek (September, 6.25 mg/L), Maquapit Exit (August, 5.04 mg/L), and Jemseg River (August, 6.38 mg/L). Every site exceeded the lower limit of 6.5 mg/L in July. Highest average DO was seen at Salmon River (8.14 mg/L).
- Conductivity was highest at Newcastle Creek (Averaging 186.65 μS/cm), which aligns with what was observed in previous years. All readings observed are considered normal.
- pH was lowest at Lakeville corner, with an average field reading of 6.38, which falls below the CCME guideline (6.5 < pH < 9) for aquatic biota. In June, readings from Salmon River, Maquapit Exit, and Newcastle Creek also fell beneath the guideline and ranged from 6.05 to 6.47. All readings taken in August and September fell within acceptable levels. All pH measurements taken by RPC fell within acceptable limits.

Table 2.3 Summary statistics of Grand Lake Surface Water biophysical characteristics in 2025.

Station ID	Station Name	Oxygen (mg/L)			Water Temp (℃)			Conductivity µS/cm			pH			Secchi Depth (m)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
JGLN01	Coal Creek	4.45	7.58	5.95	19.4	27.7	22.98	84.1	177.5	144.22	6.54	7.14	6.81	-	-	-
JGLP01	Grand Lake Northeast Arm Salmon River	6.68	9.77	8.14	20.4	27.3	24.05	83.6	125.9	104.33	6.09	7.38	6.96	-	-	-
JGLP04	Grand Lake Southwest of Grand Point Bar	8.49	11.3	9.3	16	24.4	20.5	53.3	69.7	63.35	6.87	7.2	7	2	3.75	2.63
JGLN02	Jemseg River	6.38	9.57	8.06	14.2	26.8	21.3	50.2	112	88.38	7.26	7.32	7.29	-	-	-
JGLR03	Main Thoroughfare Lakeville Corner	5.72	7.84	6.6	20.8	26.9	23.23	30.8	41.2	36.88	6.05	6.67	6.38	-	-	-
JGLP06	Maquapit Exit	5.04	7.42	6.71	21	28.4	25.1	33.1	63.7	46.63	6.21	7.27	6.74	-	-	-
JGLR02	Newcastle Creek at Newcastle Centre	4.46	7.92	6.56	17.4	27.1	22.23	79	257.4	186.65	6.47	6.92	6.68	-	-	-

2.4.2 Vertical Profile

Our June 2025 sampling revealed that thermal stratification had begun at our deep-water station. During July we observed quite a long, gradual, metalimnion, which stretched from 6 meters to 17 meters in depth. In August, the decline was marginally sharper. Due to high winds and waves in September, we had to sample at a shallower location in September. By the time of this September sampling (September 8th) thermal stratification had broken and the lake water was overturning completely (Figure 2.2).

In July oxygen concentrations were still high under the thermocline, hovering around 7.5 mg/L. During August we observed low concentrations under the thermocline, which aligns with data from previous years.

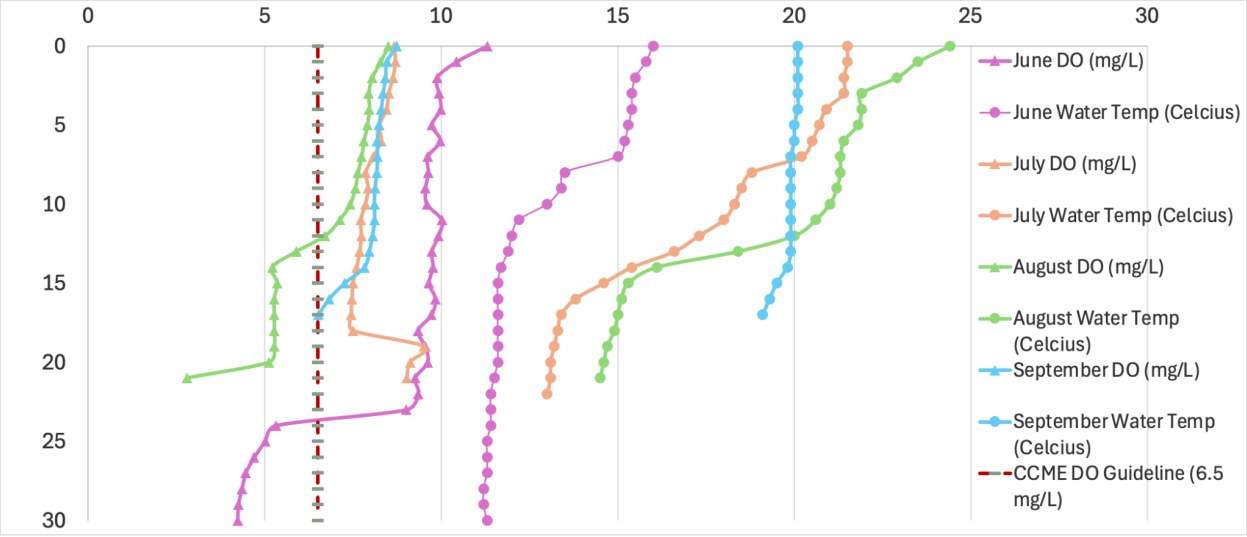

Figure 2.2 Vertical profiles of temperature and oxygen concentrations versus depth at Grand Point Bar for June, July, August, and September 2025.

2.4.3 Water Quality Index

Using the CCME Water quality index (WQI) manual (CCME, 2001), the WQI of the 7 sites in Grand Lake were calculated using the following parameters: arsenic, ammonia (un-ionized), chloride, copper, DO (surface measurement), iron, nitrate, pH, total phosphorus, turbidity, and zinc. The average water quality index for all 7 Grand Lake stations was 84 putting the lake in the "Excellent" category (Figure 2.3). Despite having the average of all scores reaching "Excellent", Newcastle Creek, and Jemseg River sites had slightly lower scores in 2025 compared to previous years. Results for the parameters used to calculate WQI are publicly available on Atlantic DataStream (https://bit.ly/3ZNgxMf).

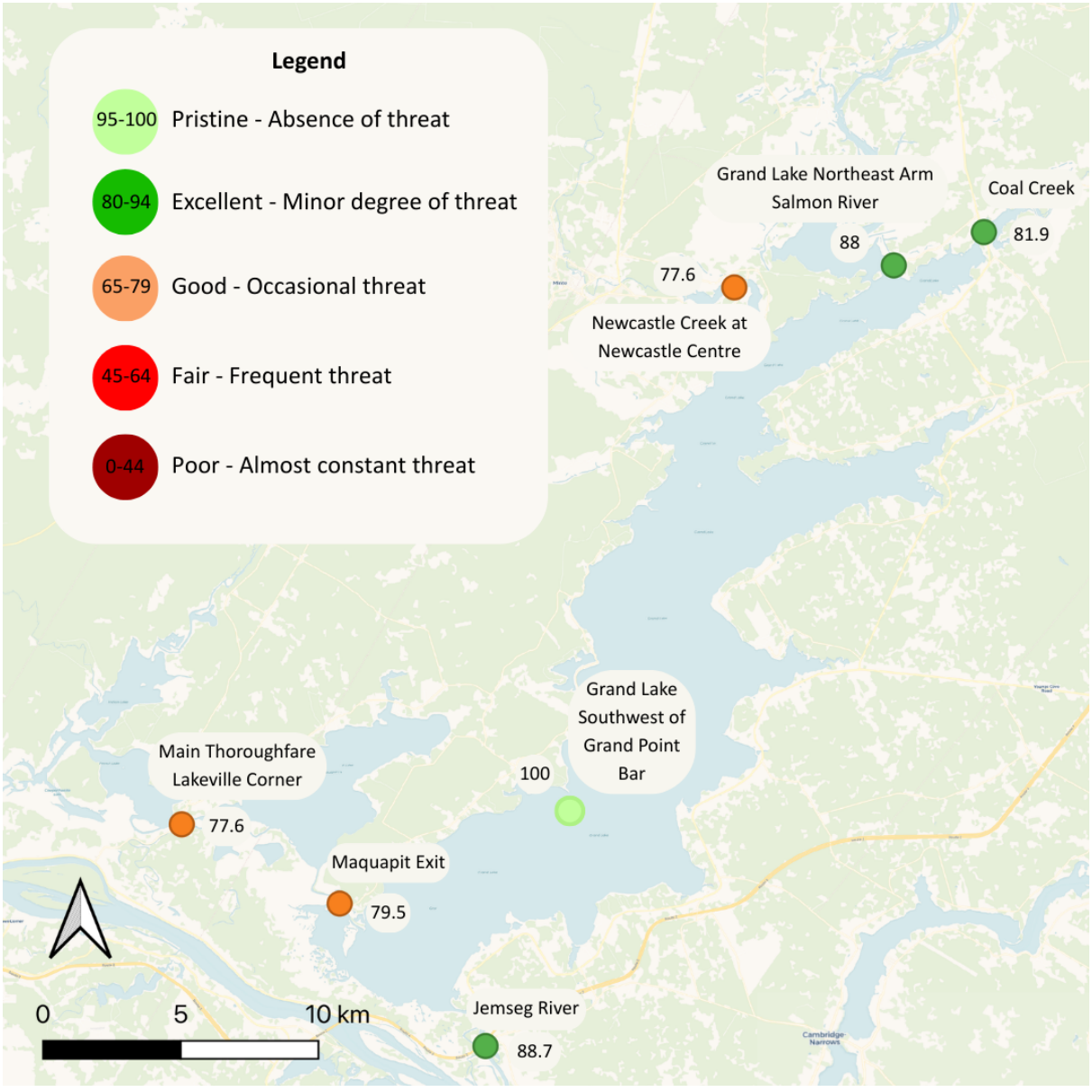

Figure 2.3 Water quality index (WQI) scores for stations sampled in 2025.

2.4.4 Escherichia coli

E. coli concentrations in all samples met the CCME guideline for Canadian recreational water quality of less than 400 per 100 ml of sample. Of all the sites, Newcastle Creek had the highest concentration of *E. coli* for a season maximum of 218.7 MPN/100 mL in September. All other sites yielded concentrations below 100 MPN/100 mL.

It should be noted that *E. coli* concentrations vary substantially and rapidly over time, and it is easy to miss an increase in *E. coli* concentrations without an intensive monitoring program. For this reason, we also conducted biweekly sampling at Waterborough Wharf, which is a popular recreation area. None of the samples taken from this site had *E. coli* concentrations exceeding 10 MPN/100 mL. The samples taken by the association only provide a spot check, which does not necessarily give a representative picture of the situation in Grand Lake. Results from the biweekly sampling are also shared publicly on Swim Guide (https://bit.ly/4sa0ioG).

2.4.5 CyanoTrackers

Results from the CyanoTracker will be compared by the Hammond River Angling Association with 19 other CyanoTrackers deployed elsewhere in the Wolastoq (Saint John River) drainage basin. The present report includes a summary of results for the CyanoTrackers in Cumberland Bay and Douglas Harbour (Figures 2.4a-c). There is a data gap for the Cumberland Bay CyanoTracker from October 6 to October 10, where the antenna had come loose.

The CyanoTrackers directly measure solar light, temperature, chlorophyll A (pigment emitted by green algae), and phycocyanin (pigment emitted by cyanobacteria), and turbidity (concentration of suspended particles in the water). We observe five main peaks for phycocyanin in Cumberland Bay: late July, two peaks in August, one in September, and one in October. This pattern is mirrored for turbidity. Phycocyanin at Douglas Harbour stayed relatively consistent.

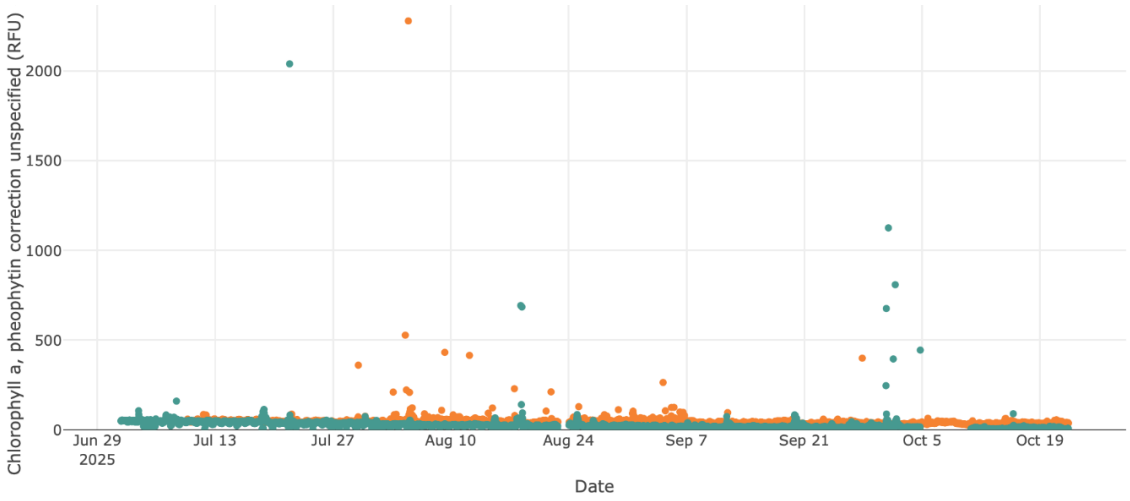

Figure 2.4a Chlorophyll A measured in relative fluorescence units (RFU) by CyanoTrackers at Douglas Harbour (orange) and Cumberland Bay (teal).

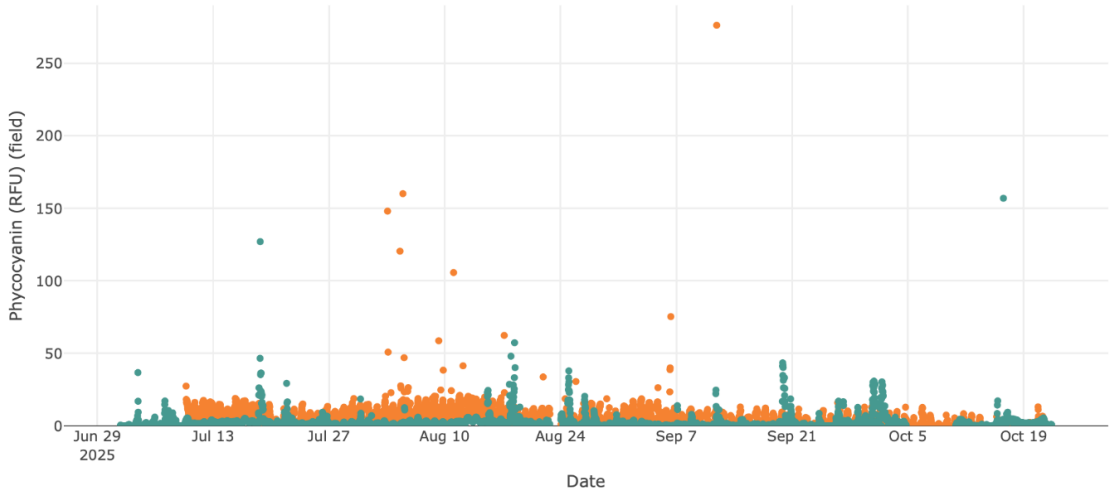

Figure 2.4b Phycocyanin measured in relative fluorescence units (RFU) by CyanoTrackers at Douglas Harbour (orange) and Cumberland Bay (teal).

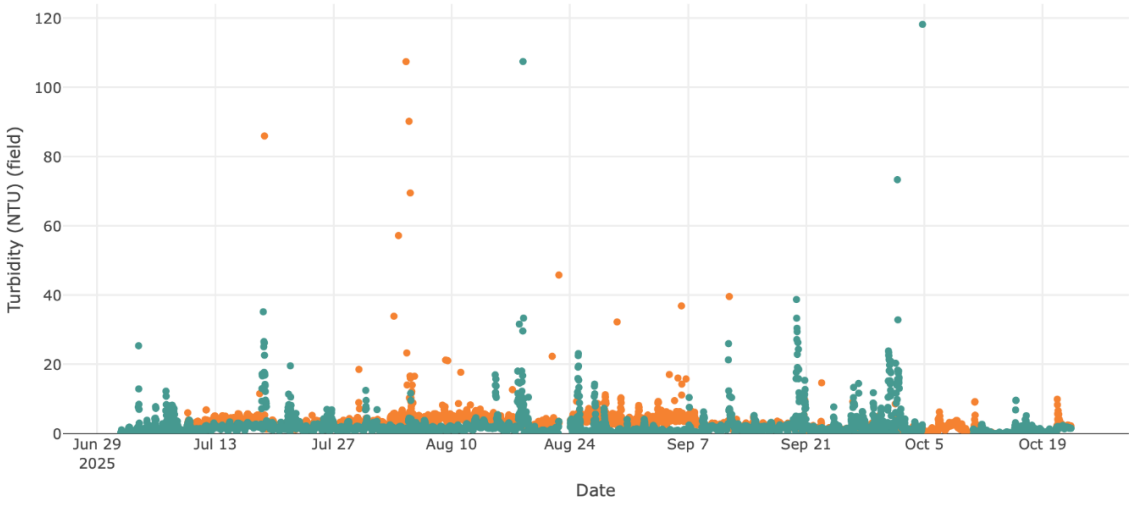

Figure 2.4c Turbidity measured in nephelometric turbidity units (NTU) by CyanoTrackers at Douglas Harbour (orange) and Cumberland Bay (teal).

2.5 Recommendations

For 2026 to 2027 funding year, we recommend the following:
Water quality monitoring

- continue to monitor the same set of parameters at the 7 sites that were monitored in 2025
- add monitoring stations in the southwestern tributaries to examine the potential source(s) of nutrient inputs to Grand Lake

E. coli

- Add more popular recreation sites to our monitoring list, such as Youngs Cove Wharf and Princess Park
- Promote our data shared with Swim Guide through social media and local newsletters

Cyanobacteria

- Continue monitoring Cumberland Bay and Douglas Harbour sites with CyanoTrackers in an ongoing partnership with the Hammond River Angling Association, to learn more about tracking and predicting cyanobacteria blooms
- Share data and safety information consistently on social media

2.6 Acknowledgements

The authors would like to thank the New Brunswick Environmental Trust Fund, the Hammond River Angling Association, and New Brunswick Alliance of Lake Associations for supporting this program. Special thanks to Greg Gillis, Jason Glen, Larry Bailey, Sam Allen, Dieter Kromm, Aaron Fraser, Mary Murdoch, and Juan Sanchez for being part of the sampling program.

2.7 References

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3. Monitoring of Eurasian Watermilfoil

3.1 Introduction

Eurasian watermilfoil (Latin name: *Myriophyllum spicatum*) is an invasive aquatic plant recently identified in the Jemseg-Grand Lake Watershed. While various native milfoil species inhabit the watershed, the rapid growth, vegetative reproduction, environmental tolerance, lack of natural predators, and competitive mat-forming strategy of Eurasian watermilfoil (EWM) allow it to outcompete native plants. This poses a significant threat to the local aquatic ecosystems. In high densities, EWM mats block sunlight, reduce biodiversity, smother the substrate, and deplete oxygen during decomposition, harming fish and other organisms (Madsen and Smith 1997; Craigs and Barko 1990). Moreover, its proliferation disrupts recreational activities like swimming and boating and may decrease property values near affected water bodies due to the decline in recreational opportunities (Olden and Tamayo 2014). Therefore, effective management strategies are crucial to mitigate the potential impacts of EWM on the Jemseg-Grand Lake aquatic ecosystems and recreational activities.

EWM was confirmed to be present in the Wolastoq/Saint John River in 2016 (Bruce, Linnansaari, and Curry 2019), and has since spread to its tributaries, including Grand Lake and Jemseg River. In 2022, the first EWM infestation in Grand Lake was recorded at Dykeman Cove after an association member, John Welsman, noticed an increase in plants near his family's property. In response to the concerning rapid spread of EWM, the JGLWA applied for funding from the New Brunswick Environmental Trust Fund to study EWM distribution and management in the watershed. With ETF funding in 2023, the association initiated a monitoring program with two components: removal pilots to assess the effectiveness of different management techniques, and lake patrols to monitor EWM spread and identify critical areas.

In 2024, the organization continued the project to expand the areas surveyed for EWM presence and assess the success of the 2023 removal pilot. Surveys were conducted in both previously and newly surveyed locations, with the additional testing of underwater recording as a complementary tool to visual surveys. The pilot program at Dykeman Cove was reevaluated to determine the extent of EWM spread. The 2025 EWM program was limited by budget constraints. Therefore, we focused on previously un-surveyed locations to gain a better understanding of EWM in the watershed. This ongoing effort is critical for understanding and controlling the EWM invasion, aiming to preserve the ecological integrity of the Jemseg-Grand Lake Watershed.

3.2 Methods

EWM surveys

As the largest lake in New Brunswick, with an area of 171 km², it is not practical to survey the entire shoreline of Grand Lake and its tributaries for the presence of EWM each year. EWM typically prefers shallow waters, with optimal growth occurring at depths of 1 to 3 meters, although it can be found up to 10 meters deep, particularly in clearer waters. It thrives in a variety of substrates, including sand, silt, and organic-rich sediments. Potentially, all open shores of the lake with suitable depths and substrate could serve as EWM habitat. Therefore, the survey area focussed on easily accessible areas that provided suitable habitat for EWM and had elevated potential for introduction and spread due to higher levels of boat activity. A total of 4 areas were selected for survey (Figure 3.1), all of which were in the northern area of the lake.

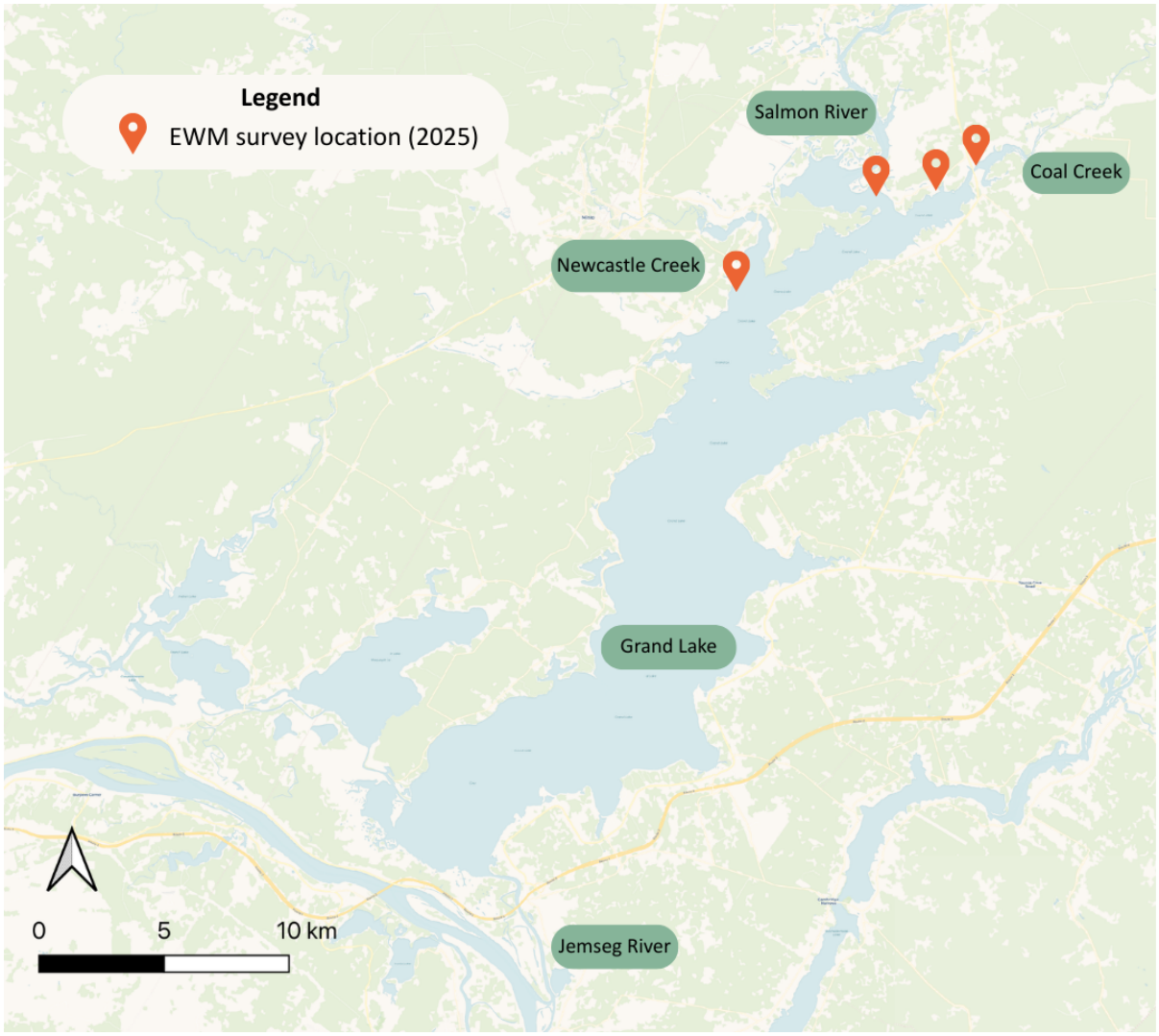

Figure 3.1 Sites selected for Eurasian watermilfoil surveys in 2025.

Surveys were conducted along the lakeshore by visual observations from kayaks or paddleboards. Areas with depths between 1 to 3 meters were covered following a zigzag pattern parallel to the shore and then returning in a straight line. During visual surveys, when a plant resembling EWM was detected, a field ID was made using three traits: 1) branching pattern, 2) leaf rigidity out of water, and 3) leaflet number (Figure 3.2). Compared to native species, EWM primarily branches from the top, its leaves fall back to the stem when pulled out of the water, and its mature leaves possess between 14 to 25 leaflets. When multiple potential EWM individuals were spotted, leaflet count was performed on up to three individuals only, while the rest were assumed to be EWM based on the branching pattern and leaf rigidity. The location coordinates of EWM were obtained from a handheld GPS, and photos were taken using a cellphone camera. A location was marked with the GPS for each EWM individual observed, and the number of marks and their proximity were used as a qualitative measurement of EWM relative abundance in the area. This method was used rather than taking extensive field observations to manage the surveying time and expand the explored area.

The area searched during the surveys was estimated by drawing a 1.5 m buffer from the recorded GPS pins and tracks using QGIS.

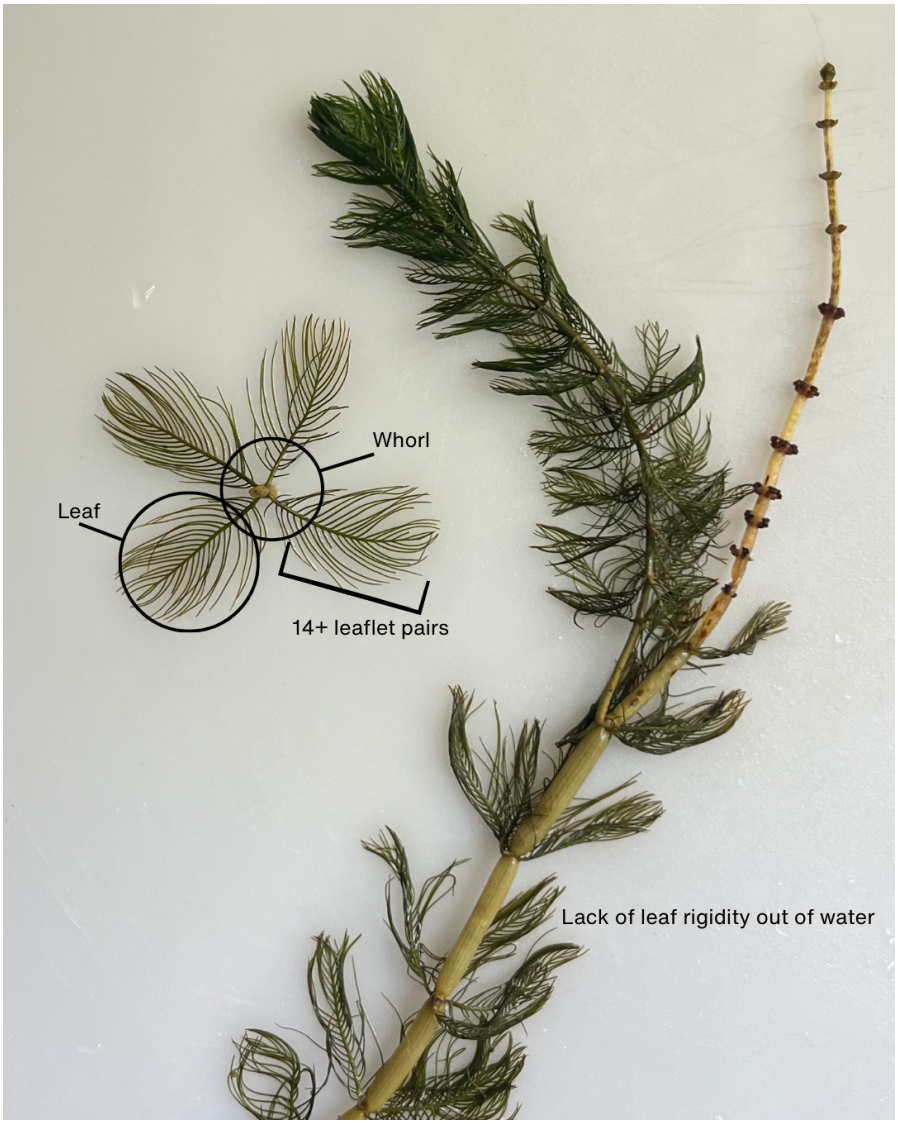

Figure 3.2 Characteristics used for field identification of Eurasian watermilfoil.

3.3 Results

The total area and length searched were 7.15 ha and 28.5 km, respectively, with the larger sampled area at the mouth of Coal Creek (3.2 ha, 10.8 km), followed by the mouth of Salmon River (1.69 ha, 8.1 km). EWM presence was confirmed at 3 of the 4 survey locations. All collected EWM samples were identified with high certainty as all had more than 15 leaflets on one side of the leaf. Some variation was observed among individuals, like differences

in the number of nodes. Native species were also recorded in the watershed, including *M. verticillatum* and *M. heterophyllum.*

Other aquatic species recorded during the surveys included Eelgrasses, Pondweeds, Water-nymphs, Water-Thymes, Bladderworts, and Coontails.

Of the 7.15 ha searched, a total of 87 EWM plants were observed (Figure 3.3). The sparsity of plants in these newly surveyed areas indicate that these are recent invasions. 14 plants were observed at the mouth of Coal Creek, in very sheltered coves, while no EWM was observed further upstream. 16 plants were observed at the mouth of Salmon River, and 56 plants were found in Newcastle Creek.

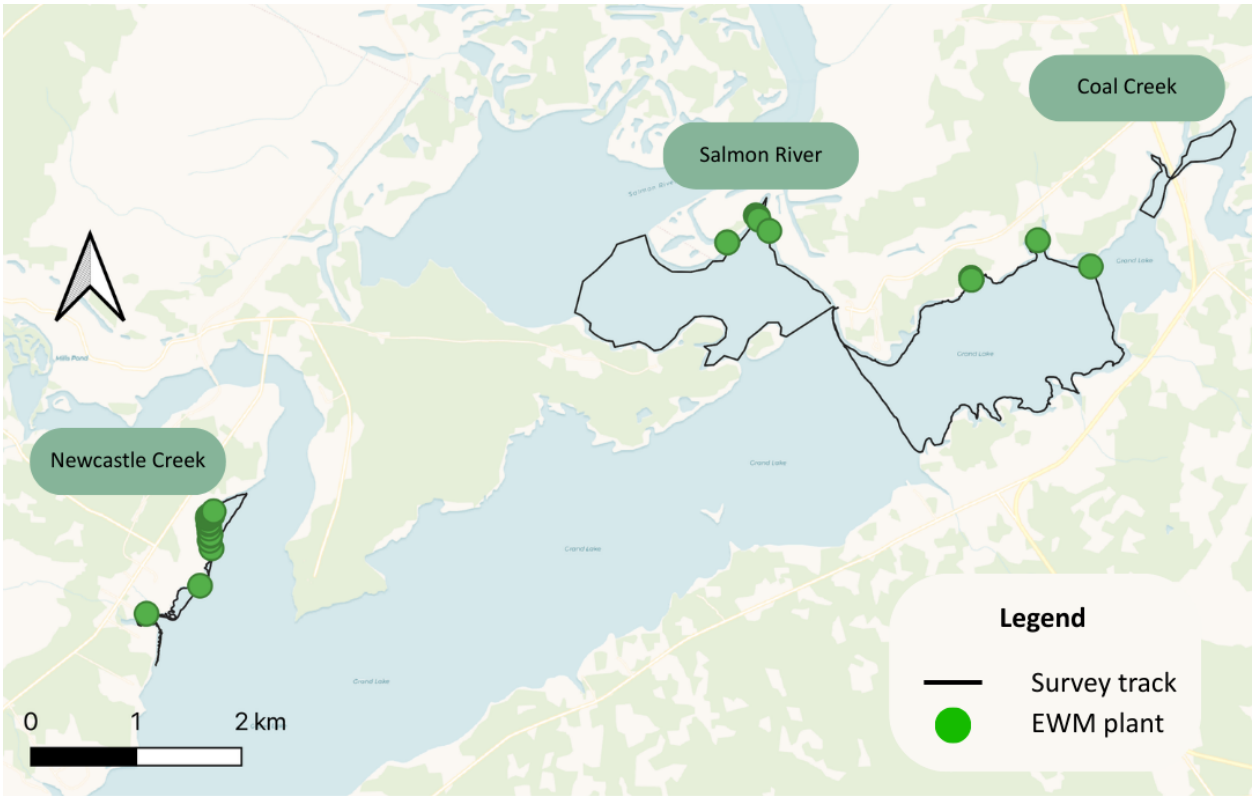

Figure 3.3 Map of GPS tracks (with 1.5 m buffers) and observed Eurasian watermilfoil plants from surveys completed in Newcastle Creek, Salmon River, and Coal Creek in 2025.

Areas with no EWM plants were observed to have native plants, the most prolific of those being *M. heterophyllum,* and other pondweeds. Figure 3.4 displays the current knowledge of EWM presence in the Jemseg-Grand Lake watershed.

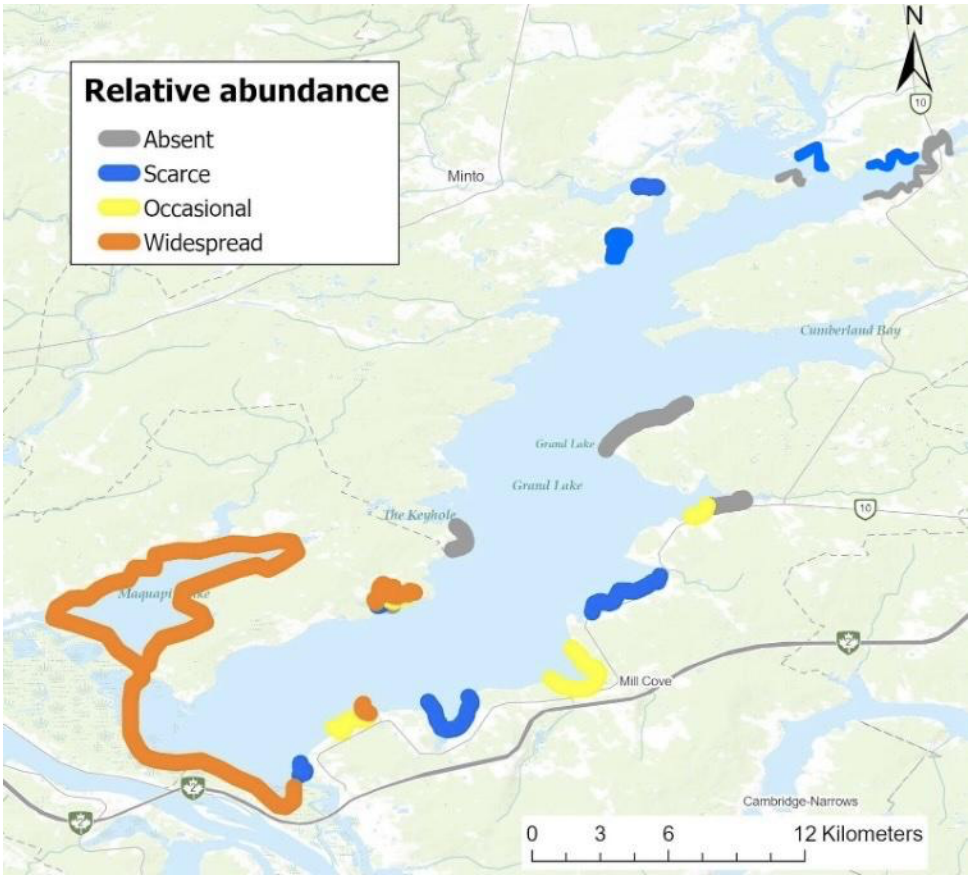

Figure 3.4 Current knowledge of EWM spread in the Jemseg-Grand Lake watershed. Relative abundance is categorized by an absence of EWM observations during surveys, scarce (few patches of EWM spaced out), occasional (many spaced patches of EWM), and widespread (mat forming patches).

3.4 Recommendations and Plans for 2026

We have submitted an application to ETF and Wildlife Habitat Canada (WHC) to continue this project in 2026. Since our submission, we have received confirmation that WHC has awarded our organization $ 10, 000 for the upcoming year. While this is great news for our organization, funding from WHC is conditional on a 1:1 match from other sources. We will depend on funds from the ETF to continue this work in the new fiscal year.

1. Gain a better understanding of the aquatic vegetative communities in Grand Lake by conducting vegetation surveys along new shoreline areas of both native and invasive aquatic plants,
2. Remove invasive Eurasian watermilfoil EWM from recently invaded areas and/or targeted areas that have high potential to enable spread of the species (like near boat launches) using careful root removal methods piloted by JGLWA in 2023,
3. Identify potential links between waterfowl species abundance and habitat quality through surveys for waterfowl and their food sources (benthic macroinvertebrates, and native vegetation)

4. Demonstrate proper EWM removal techniques to the public to limit spread.
5. Share data with the New Brunswick Invasive Species Council, DNRED, and Ducks Unlimited Canada.

3.5 References

Bruce, Meghann, Tommi Linnansaari, and R. Allen Curry. 2019. "First Record of Eurasian Watermilfoil, Myriophyllum Spicatum, for the Saint John River, New Brunswick." Canadian Field-Naturalist 132 (3): 231–37.

Craigs, Smith, and J. W. Barko. 1990. "Ecology of Eurasian Watermilfoil." Journal of Aquatic Plant Management 28:55–64.

Madsen, John D., and Dian H. Smith. 1997. "Vegetative Spread of Eurasian Watermilfoil Colonies." J. Aquat. Plant Manage.

Olden, Julian D., and Mariana Tamayo. 2014. "Incentivizing the Public to Support Invasive Species Management: Eurasian Milfoil Reduces Lakefront Property Values." PloS One 9 (10): e110458

4. Education and Outreach

Education and outreach are really important for our association. We reach out to residents and visitors to hear what they value about the watershed, share what we are learning, and invite participation in our activities. Education and outreach are accomplished by in-person events, hosting webinars, posting information on our webpage and on social media.

In 2025, we continued holding membership drives at public events, attending 8 different community events. Events included the Grand Lake Outdoors Show (May 31) Minto Fun Day (June 28), Gagetown Farmers Markets (July 13, 20 and August 10), Douglas Harbour Community Breakfasts (July 19 and August 16), Life at the Lakes (August 9). Depending on the attendance of these events, this gets us in front of between 200 and 500 people. We have a "soccer tent" set up with brochures and banners, which draws attention. We also held an EWM ID training workshop in Dykeman Cove on July 26, with 7 people attending and actively participating in the planned activities. In October, a presentation was given to the Atlantic Tree Nursery Association in Juniper about our 2021 red tip willow planting project. There were around 30 people that attended.

Our website https://jemseggrandlakewatershed.ca/ continues to serve as a useful and up to date portal to information about the Jemseg Grand Lake Watershed Association's and its ongoing activities. In 2025 we began the process of rebranding our organization, which included a new logo and colour scheme to be added to our website. Through the regular maintenance of our website and email we were able to hear stories from community members like Frank Camm, who has an ongoing restoration project focusing on planting Bur Oaks. To date, Frank and the group of volunteers with have planted approximately 500 Bur Oaks. We hope to promote stories like his in the coming year.

We have hosted one webinar this year, where 25 people (including panelists and hosts) attended:

- 'Shoreline stewardship along lakes and flowing waters in New Brunswick - what you need to know about protecting your shoreline'' on March 3, 2026, at 7 pm Atlantic Time, hosted by Mary Murdoch, with presentation by Catherine Lambert and Matthew Stocek of NBDELG.

Additional webinars on eDNA and archaeological history will also be presented in Q1/Q2 2026 to engage residents of the watershed.

The webinars are promoted on social media and through our member email list. Webinars are recorded and posted on our youtube channel where they can be viewed at any time by members of the public who land on our webpage.

This year our organization also contributed to two different public data sharing platforms: Swim Guide and Atlantic DataStream. These contributions will be highlighted at in person events in 2026, so that community members are aware of what data is available to them.

We are always looking for more ways to engage the people who enjoy this watershed, to hear what they value, stimulate their interest, and let them know what we are learning. In 2026 we plan to host more workshops, attend more community events, and develop a consistent presence on social media.

Unfortunately, our plans of installing Clean, Drain, Dry signs did not come to fruition this year, once more, since questions about land ownership came up. We have sorted this out and will install signs when the ground thaws in the spring. We have plans to replace the sign, previously hung by our organization, at Waterborough Wharf since it was vandalized over the summer.

Report ID: 557345-IAS
Report Date: 25-Jun-25
Date Received: 16-Jun-25

CERTIFICATE OF ANALYSIS

for
Jemseg Grand Lake Watershed Association
27 Pine Grove Lane
Jemseg, NB E4C 4L7

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Alyson Kenny
Project #: Not Available
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			557345-1	557345-2
Client Sample ID:			Grand Point Surface 17/25/19007	Grand Point Niskin 17/25/19007
Date Sampled:			16-Jun-25	16-Jun-25
Analytes	**Units**	**RL**		
Sodium	mg/L	0.05	3.88	3.88
Potassium	mg/L	0.02	0.47	0.40
Calcium	mg/L	0.05	6.77	6.86
Magnesium	mg/L	0.01	1.08	1.10
Alkalinity (as $CaCO_3$)	mg/L	2	12	13
Chloride	mg/L	0.5	4.2	4.1
Fluoride	mg/L	0.05	0.22	0.23
Sulfate	mg/L	1	12	12
Bromine	mg/L	0.01	< 0.01	< 0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	0.07	0.07
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	0.07	0.07
Nitrogen - Total	mg/L	0.2	0.7	0.5
Phosphorus - Total	mg/L	0.002	0.013	0.014
Carbon - Total Organic	mg/L	0.5	7.6	7.5
Colour	TCU	5	46	46
Conductivity	µS/cm	1	65	66
pH	units	-	7.5	7.4
Turbidity	NTU	0.1	1.2	0.7
Calculated Parameters				
Bicarbonate (as $CaCO_3$)	mg/L	-	11.9	13.0
Carbonate (as $CaCO_3$)	mg/L	-	0.035	0.031
Hardness (as $CaCO_3$)	mg/L	0.2	21.4	21.7
TDS (calc)	mg/L	-	44	44
Saturation pH (20°C)	units	-	9.4	9.4
Langelier Index (20°C)	-	-	-1.90	-1.96

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Troy Smith
Supervisor
Inorganic Analytical Services

Krista Skinner
Senior Chemical Technician
Inorganic Analytical Services

Report ID: 557345-IAS
Report Date: 25-Jun-25
Date Received: 16-Jun-25

CERTIFICATE OF ANALYSIS

for
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Attention: Alyson Kenny
Project #: Not Available
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			557345-1	557345-2
Client Sample ID:			Grand Point Surface 17/25/19007	Grand Point Niskin 17/25/19007
Date Sampled:			16-Jun-25	16-Jun-25
Analytes	**Units**	**RL**		
Aluminum	mg/L	0.001	0.078	0.078
Antimony	mg/L	0.0001	< 0.0001	< 0.0001
Arsenic	mg/L	0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.018	0.017
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.003	0.003
Cadmium	mg/L	0.00001	< 0.00001	< 0.00001
Calcium	mg/L	0.05	6.77	6.86
Chromium	mg/L	0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	< 0.0001	< 0.0001
Copper	mg/L	0.001	< 0.001	< 0.001
Iron	mg/L	0.02	0.12	0.12
Lead	mg/L	0.0001	< 0.0001	< 0.0001
Lithium	mg/L	0.0001	0.0007	0.0007
Magnesium	mg/L	0.01	1.08	1.10
Manganese	mg/L	0.001	0.023	0.029
Molybdenum	mg/L	0.0001	< 0.0001	< 0.0001
Nickel	mg/L	0.001	< 0.001	< 0.001
Potassium	mg/L	0.02	0.47	0.40
Rubidium	mg/L	0.0001	0.0007	0.0006
Selenium	mg/L	0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	3.88	3.88
Strontium	mg/L	0.001	0.079	0.080
Tellurium	mg/L	0.0001	< 0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001	< 0.0001
Uranium	mg/L	0.0001	< 0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.003	0.008

Report ID: 557345-IAS
Report Date: 25-Jun-25
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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Ammonia	IAS-M47	APHA 4500-NH_3 G	Phenate Colourimetry
pH	IAS-M03	APHA 4500-H^+ B	pH Electrode - Electrometric
Alkalinity (as $CaCO_3$)	IAS-M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	IAS-M44	APHA 4500-CL E	Ferricyanide Colourimetry
Fluoride	IAS-M30	APHA 4500-F- D	SPADNS Colourimetry
Sulfate	IAS-M45	APHA 4500-SO_4 E	Turbidimetry
Nitrate + Nitrite (as N)	IAS-M48	APHA 4500-NO_3 H	Hydrazine Red., Derivitization, Colourimetry
Nitrite (as N)	IAS-M49	APHA 4500-NO2- B	NED/sulfanilamide Colourimetry
Nitrogen - Total	IAS-M57	ASTM D8083-16	Combustion/Chemiluminescence
Phosphorus - Total	IAS-M17	APHA 4500-P E	Digestion, Manual Colourimetry
Carbon - Total Organic	IAS-M57	APHA 5310 B	Combustion/NDIR
Turbidity	IAS-M06	APHA 2130 B	Nephelometry
Colour	IAS-M55	APHA 2120 Color (A,C)	Single Wavelength Spectrophotometry
Conductivity	IAS-M04	APHA 2510 B	Conductivity Meter - Electrode
Trace Metals	IAS-M01/IAS-M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

Report ID: 559862-IAS
Report Date: 25-Jul-25
Date Received: 16-Jul-25

CERTIFICATE OF ANALYSIS

for
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Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			559862-01	559862-02	559862-03
Client Sample ID:			Grand Point Surface 17/25/19010	Grand Point Niskin 17/25/19011	Maquapit Lake 17/25/19012
Date Sampled:			15-Jul-25	15-Jul-25	15-Jul-25
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	3.71	3.75	3.11
Potassium	mg/L	0.02	0.40	0.41	0.42
Calcium	mg/L	0.05	6.93	6.64	6.41
Magnesium	mg/L	0.01	1.07	1.04	0.96
Alkalinity (as $CaCO_3$)	mg/L	2	16	14	16
Chloride	mg/L	0.5	4.3	4.3	4.1
Fluoride	mg/L	0.05	0.34	0.30	0.29
Sulfate	mg/L	1	11	12	7
Bromine	mg/L	0.01	< 0.01	0.01	< 0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	0.06	0.13	< 0.05
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	0.06	0.13	< 0.05
Nitrogen - Total	mg/L	0.2	< 0.2	0.2	0.3
Phosphorus - Total	mg/L	0.002	0.012	0.008	0.027
Carbon - Total Organic	mg/L	0.5	7.1	6.9	8.6
Colour	TCU	5	45	46	57
Conductivity	µS/cm	1	69	67	60
pH	units	-	7.4	7.3	7.4
Turbidity	NTU	0.1	0.6	0.5	1.8
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	15.9	14.0	15.9
Carbonate (as $CaCO_3$)	mg/L	-	0.038	0.026	0.038
Hardness (as $CaCO_3$)	mg/L	0.2	21.7	20.9	20.0
TDS (calc)	mg/L	-	45	45	41
Saturation pH (20°C)	units	-	9.3	9.3	9.3
Langelier Index (20°C)	-	-	-1.86	-2.04	-1.89

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Troy Smith
Supervisor
Inorganic Analytical Services

Krista Skinner
Senior Chemical Technician
Inorganic Analytical Services

Report ID: 559862-IAS
Report Date: 25-Jul-25
Date Received: 16-Jul-25

CERTIFICATE OF ANALYSIS

for
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Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			559862-04	559862-05	559862-07
Client Sample ID:			Lakeville Corner 17/25/19013	Jemseg River 17/25/19014	Coal Creek 17/25/19016
Date Sampled:			15-Jul-25	15-Jul-25	15-Jul-25
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	2.14	3.96	6.75
Potassium	mg/L	0.02	0.36	0.57	0.49
Calcium	mg/L	0.05	3.54	15.6	14.3
Magnesium	mg/L	0.01	0.56	1.93	2.65
Alkalinity (as $CaCO_3$)	mg/L	2	8	46	21
Chloride	mg/L	0.5	3.0	5.1	3.7
Fluoride	mg/L	0.05	0.33	0.32	0.53
Sulfate	mg/L	1	5	4	39
Bromine	mg/L	0.01	< 0.01	< 0.01	0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05	0.19	< 0.05
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	< 0.05	0.19	< 0.05
Nitrogen - Total	mg/L	0.2	0.3	0.4	< 0.2
Phosphorus - Total	mg/L	0.002	0.030	0.023	0.007
Carbon - Total Organic	mg/L	0.5	9.9	7.0	9.0
Colour	TCU	5	90	33	62
Conductivity	µS/cm	1	37	113	138
pH	units	-	7.0	7.9	7.5
Turbidity	NTU	0.1	1.6	1.1	2.4
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	8.0	45.6	20.9
Carbonate (as $CaCO_3$)	mg/L	-	0.008	0.340	0.062
Hardness (as $CaCO_3$)	mg/L	0.2	11.1	46.9	46.6
TDS (calc)	mg/L	-	30	68	90
Saturation pH (20°C)	units	-	9.8	8.5	8.9
Langelier Index (20°C)	-	-	-2.83	-0.58	-1.37

Report ID: 559862-IAS
Report Date: 25-Jul-25
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CERTIFICATE OF ANALYSIS

for
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Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			559862-08	559862-09
Client Sample ID:			Salmon River 17/25/19017	Newcastle Creek 17/25/19018
Date Sampled:			15-Jul-25	15-Jul-25
Analytes	**Units**	**RL**		
Sodium	mg/L	0.05	6.80	6.18
Potassium	mg/L	0.02	0.77	0.57
Calcium	mg/L	0.05	10.1	18.6
Magnesium	mg/L	0.01	1.61	3.12
Alkalinity (as $CaCO_3$)	mg/L	2	18	24
Chloride	mg/L	0.5	3.9	7.6
Fluoride	mg/L	0.05	0.60	0.56
Sulfate	mg/L	1	28	44
Bromine	mg/L	0.01	0.01	0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	< 0.05	< 0.05
Nitrogen - Total	mg/L	0.2	0.3	< 0.2
Phosphorus - Total	mg/L	0.002	0.008	0.022
Carbon - Total Organic	mg/L	0.5	8.5	7.5
Colour	TCU	5	70	73
Conductivity	µS/cm	1	104	169
pH	units	-	7.5	7.5
Turbidity	NTU	0.1	1.4	4.6
Calculated Parameters				
Bicarbonate (as $CaCO_3$)	mg/L	-	17.9	23.9
Carbonate (as $CaCO_3$)	mg/L	-	0.053	0.071
Hardness (as $CaCO_3$)	mg/L	0.2	31.8	59.3
TDS (calc)	mg/L	-	72	104
Saturation pH (20°C)	units	-	9.1	8.7
Langelier Index (20°C)	-	-	-1.57	-1.20

Report ID: 559862-IAS
Report Date: 25-Jul-25
Date Received: 16-Jul-25

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Tel: 506.452.1212
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Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			559862-01	559862-02	559862-03
Client Sample ID:			Grand Point Surface 17/25/19010	Grand Point Niskin 17/25/19011	Maquapit Lake 17/25/19012
Date Sampled:			15-Jul-25	15-Jul-25	15-Jul-25
Analytes	**Units**	**RL**			
Aluminum	mg/L	0.001	0.050	0.062	0.093
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	0.0004
Arsenic	mg/L	0.001	< 0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.016	0.017	0.011
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.003	0.003	0.003
Cadmium	mg/L	0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium	mg/L	0.05	6.93	6.64	6.41
Chromium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Copper	mg/L	0.001	< 0.001	< 0.001	0.001
Iron	mg/L	0.02	0.09	0.10	0.37
Lead	mg/L	0.0001	< 0.0001	< 0.0001	0.0002
Lithium	mg/L	0.0001	0.0006	0.0006	0.0005
Magnesium	mg/L	0.01	1.07	1.04	0.96
Manganese	mg/L	0.001	0.009	0.022	0.032
Molybdenum	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel	mg/L	0.001	< 0.001	< 0.001	< 0.001
Potassium	mg/L	0.02	0.40	0.41	0.42
Rubidium	mg/L	0.0001	0.0006	0.0007	0.0008
Selenium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	3.71	3.75	3.11
Strontium	mg/L	0.001	0.080	0.080	0.064
Tellurium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Uranium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.001	0.026	0.002

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Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			559862-04	559862-05	559862-07
Client Sample ID:			Lakeville Corner 17/25/19013	Jemseg River 17/25/19014	Coal Creek 17/25/19016
Date Sampled:			15-Jul-25	15-Jul-25	15-Jul-25
Analytes	**Units**	**RL**			
Aluminum	mg/L	0.001	0.106	0.037	0.075
Antimony	mg/L	0.0001	0.0002	0.0002	< 0.0001
Arsenic	mg/L	0.001	< 0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.013	0.011	0.030
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.003	0.005	0.005
Cadmium	mg/L	0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium	mg/L	0.05	3.54	15.6	14.3
Chromium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	< 0.0001	< 0.0001	0.0002
Copper	mg/L	0.001	0.003	0.001	< 0.001
Iron	mg/L	0.02	0.54	0.11	0.46
Lead	mg/L	0.0001	0.0004	< 0.0001	0.0002
Lithium	mg/L	0.0001	0.0006	0.0004	0.0013
Magnesium	mg/L	0.01	0.56	1.93	2.65
Manganese	mg/L	0.001	0.057	0.020	0.095
Molybdenum	mg/L	0.0001	< 0.0001	0.0001	0.0001
Nickel	mg/L	0.001	< 0.001	< 0.001	< 0.001
Potassium	mg/L	0.02	0.36	0.57	0.49
Rubidium	mg/L	0.0001	0.0009	0.0006	0.0011
Selenium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	2.14	3.96	6.75
Strontium	mg/L	0.001	0.038	0.105	0.228
Tellurium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	0.0017	0.0006	0.0001
Uranium	mg/L	0.0001	< 0.0001	< 0.0001	0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.004	0.002	0.002

Report ID: 559862-IAS
Report Date: 25-Jul-25
Date Received: 16-Jul-25

CERTIFICATE OF ANALYSIS

for

Jemseg Grand Lake Watershed Association
27 Pine Grove Lane
Jemseg, NB E4C 4L7

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			559862-08	559862-09
Client Sample ID:			Salmon River 17/25/19017	Newcastle Creek 17/25/19018
Date Sampled:			15-Jul-25	15-Jul-25
Analytes	**Units**	**RL**		
Aluminum	mg/L	0.001	0.072	0.067
Antimony	mg/L	0.0001	0.0001	< 0.0001
Arsenic	mg/L	0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.023	0.022
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.004	0.007
Cadmium	mg/L	0.00001	< 0.00001	< 0.00001
Calcium	mg/L	0.05	10.1	18.6
Chromium	mg/L	0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	< 0.0001	0.0003
Copper	mg/L	0.001	< 0.001	< 0.001
Iron	mg/L	0.02	0.31	0.83
Lead	mg/L	0.0001	0.0002	0.0002
Lithium	mg/L	0.0001	0.0010	0.0030
Magnesium	mg/L	0.01	1.61	3.12
Manganese	mg/L	0.001	0.031	0.227
Molybdenum	mg/L	0.0001	0.0001	0.0002
Nickel	mg/L	0.001	< 0.001	< 0.001
Potassium	mg/L	0.02	0.77	0.57
Rubidium	mg/L	0.0001	0.0012	0.0011
Selenium	mg/L	0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	6.80	6.18
Strontium	mg/L	0.001	0.155	0.396
Tellurium	mg/L	0.0001	< 0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	0.0001	< 0.0001
Uranium	mg/L	0.0001	0.0002	< 0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.004	0.002

Report ID: 559862-IAS
Report Date: 25-Jul-25
Date Received: 16-Jul-25

CERTIFICATE OF ANALYSIS
for
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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Ammonia	IAS-M47	APHA 4500-NH_3 G	Phenate Colourimetry
pH	IAS-M03	APHA 4500-H^+ B	pH Electrode - Electrometric
Alkalinity (as $CaCO_3$)	IAS-M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	IAS-M44	APHA 4500-CL E	Ferricyanide Colourimetry
Fluoride	IAS-M30	APHA 4500-F- D	SPADNS Colourimetry
Sulfate	IAS-M45	APHA 4500-SO_4 E	Turbidimetry
Nitrate + Nitrite (as N)	IAS-M48	APHA 4500-NO_3 H	Hydrazine Red., Derivitization, Colourimetry
Nitrite (as N)	IAS-M49	APHA 4500-NO2- B	NED/sulfanilamide Colourimetry
Nitrogen - Total	IAS-M57	ASTM D8083-16	Combustion/Chemiluminescence
Phosphorus - Total	IAS-M17	APHA 4500-P E	Digestion, Manual Colourimetry
Carbon - Total Organic	IAS-M57	APHA 5310 B	Combustion/NDIR
Turbidity	IAS-M06	APHA 2130 B	Nephelometry
Colour	IAS-M55	APHA 2120 Color (A,C)	Single Wavelength Spectrophotometry
Conductivity	IAS-M04	APHA 2510 B	Conductivity Meter - Electrode
Trace Metals	IAS-M01/IAS-M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

Report ID: 562246-IAS
Report Date: 26-Aug-25
Date Received: 14-Aug-25

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for
Jemseg Grand Lake Watershed Association
27 Pine Grove Lane
Jemseg, NB E4C 4L7

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Tel: 506.452.1212
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Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			562246-1	562246-2	562246-4
Client Sample ID:			Grand Point Surface 17/25/19022	Grand Point Niskin 17/25/19023	Coal Creek 17/25/19025
Date Sampled:			13-Aug-25	13-Aug-25	13-Aug-25
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	3.81	3.77	8.18
Potassium	mg/L	0.02	0.38	0.38	0.39
Calcium	mg/L	0.05	6.93	6.59	16.2
Magnesium	mg/L	0.01	1.11	1.04	3.12
Alkalinity (as $CaCO_3$)	mg/L	2	14	13	26
Chloride	mg/L	0.5	4.1	4.2	4.5
Fluoride	mg/L	0.05	0.30	0.33	0.66
Sulfate	mg/L	1	12	12	45
Bromine	mg/L	0.01	< 0.01	< 0.01	0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05	0.14	< 0.05
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	< 0.05	0.14	< 0.05
Nitrogen - Total	mg/L	0.2	0.3	0.3	0.3
Phosphorus - Total	mg/L	0.002	0.009	0.010	0.017
Carbon - Total Organic	mg/L	0.5	7.6	7.1	7.9
Colour	TCU	5	39	42	32
Conductivity	µS/cm	1	68	68	163
pH	units	-	7.4	7.3	7.5
Turbidity	NTU	0.1	0.6	1.1	1.9
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	14.0	13.0	25.9
Carbonate (as $CaCO_3$)	mg/L	-	0.033	0.024	0.077
Hardness (as $CaCO_3$)	mg/L	0.2	21.9	20.7	53.3
TDS (calc)	mg/L	-	45	44	102
Saturation pH (20°C)	units	-	9.3	9.4	8.7
Langelier Index (20°C)	-	-	-1.92	-2.07	-1.23

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Troy Smith
Supervisor
Inorganic Analytical Services

Krista Skinner
Senior Chemical Technician
Inorganic Analytical Services

Report ID: 562246-IAS
Report Date: 26-Aug-25
Date Received: 14-Aug-25

CERTIFICATE OF ANALYSIS

for
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Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			562246-5	562246-6	562246-7
Client Sample ID:			Salmon River 17/25/19026	Newcastle Creek 17/25/19027	Maquapit Exit 17/25/19028
Date Sampled:			13-Aug-25	13-Aug-25	13-Aug-25
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	7.95	8.88	2.37
Potassium	mg/L	0.02	0.48	0.94	0.29
Calcium	mg/L	0.05	10.9	28.4	4.20
Magnesium	mg/L	0.01	1.79	4.47	0.67
Alkalinity (as $CaCO_3$)	mg/L	2	21	38	10
Chloride	mg/L	0.5	4.2	11.3	2.9
Fluoride	mg/L	0.05	0.42	0.72	0.27
Sulfate	mg/L	1	30	61	4
Bromine	mg/L	0.01	0.01	0.01	< 0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	0.07
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrogen - Total	mg/L	0.2	0.3	0.2	0.4
Phosphorus - Total	mg/L	0.002	0.019	0.032	0.030
Carbon - Total Organic	mg/L	0.5	7.7	5.2	10.2
Colour	TCU	5	36	30	68
Conductivity	µS/cm	1	118	242	42
pH	units	-	7.6	7.8	7.1
Turbidity	NTU	0.1	1.2	2.1	2.0
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	20.9	37.7	10.0
Carbonate (as $CaCO_3$)	mg/L	-	0.078	0.224	0.012
Hardness (as $CaCO_3$)	mg/L	0.2	34.6	89.3	13.2
TDS (calc)	mg/L	-	77	145	31
Saturation pH (20°C)	units	-	9.0	8.3	9.7
Langelier Index (20°C)	-	-	-1.37	-0.54	-2.56

Report ID: 562246-IAS
Report Date: 26-Aug-25
Date Received: 14-Aug-25

CERTIFICATE OF ANALYSIS

for

Jemseg Grand Lake Watershed Association
27 Pine Grove Lane
Jemseg, NB E4C 4L7

rpc
921 College Hill Rd
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Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			562246-8	562246-9
Client Sample ID:			Lakeville Corner 17/25/19029	Jemseg River 17/25/19030
Date Sampled:			13-Aug-25	13-Aug-25
Analytes	**Units**	**RL**		
Sodium	mg/L	0.05	2.28	3.27
Potassium	mg/L	0.02	0.29	0.54
Calcium	mg/L	0.05	3.54	13.2
Magnesium	mg/L	0.01	0.60	1.63
Alkalinity (as $CaCO_3$)	mg/L	2	7	38
Chloride	mg/L	0.5	3.0	4.4
Fluoride	mg/L	0.05	0.33	0.41
Sulfate	mg/L	1	5	< 1
Bromine	mg/L	0.01	< 0.01	< 0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05	0.09
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	< 0.05	0.09
Nitrogen - Total	mg/L	0.2	0.3	0.4
Phosphorus - Total	mg/L	0.002	0.053	0.034
Carbon - Total Organic	mg/L	0.5	9.7	10.7
Colour	TCU	5	64	56
Conductivity	µS/cm	1	39	93
pH	units	-	7.0	7.7
Turbidity	NTU	0.1	3.8	1.6
Calculated Parameters				
Bicarbonate (as $CaCO_3$)	mg/L	-	7.0	37.8
Carbonate (as $CaCO_3$)	mg/L	-	0.007	0.178
Hardness (as $CaCO_3$)	mg/L	0.2	11.3	39.7
TDS (calc)	mg/L	-	30	58
Saturation pH (20°C)	units	-	9.9	8.6
Langelier Index (20°C)	-	-	-2.89	-0.92

Report ID: 562246-IAS
Report Date: 26-Aug-25
Date Received: 14-Aug-25

CERTIFICATE OF ANALYSIS

for
Jemseg Grand Lake Watershed Association
27 Pine Grove Lane
Jemseg, NB E4C 4L7

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Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			562246-1	562246-2	562246-4
Client Sample ID:			Grand Point Surface 17/25/19022	Grand Point Niskin 17/25/19023	Coal Creek 17/25/19025
Date Sampled:			13-Aug-25	13-Aug-25	13-Aug-25
Analytes	**Units**	**RL**			
Aluminum	mg/L	0.001	0.040	0.050	0.048
Antimony	mg/L	0.0001	0.0017	0.0003	0.0001
Arsenic	mg/L	0.001	< 0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.016	0.017	0.030
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.004	0.003	0.007
Cadmium	mg/L	0.00001	0.00006	0.00003	< 0.00001
Calcium	mg/L	0.05	6.93	6.59	16.2
Chromium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	< 0.0001	< 0.0001	0.0001
Copper	mg/L	0.001	< 0.001	< 0.001	< 0.001
Iron	mg/L	0.02	0.08	0.08	0.27
Lead	mg/L	0.0001	0.0004	0.0001	0.0001
Lithium	mg/L	0.0001	0.0007	0.0006	0.0012
Magnesium	mg/L	0.01	1.11	1.04	3.12
Manganese	mg/L	0.001	0.017	0.032	0.106
Molybdenum	mg/L	0.0001	0.0004	0.0002	0.0003
Nickel	mg/L	0.001	< 0.001	< 0.001	< 0.001
Potassium	mg/L	0.02	0.38	0.38	0.39
Rubidium	mg/L	0.0001	0.0007	0.0006	0.0010
Selenium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	3.81	3.77	8.18
Strontium	mg/L	0.001	0.079	0.078	0.256
Tellurium	mg/L	0.0001	0.0003	0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Uranium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.001	0.013	< 0.001

Report ID: 562246-IAS
Report Date: 26-Aug-25
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CERTIFICATE OF ANALYSIS

for
Jemseg Grand Lake Watershed Association
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Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			562246-5	562246-6	562246-7
Client Sample ID:			Salmon River 17/25/19026	Newcastle Creek 17/25/19027	Maquapit Exit 17/25/19028
Date Sampled:			13-Aug-25	13-Aug-25	13-Aug-25
Analytes	**Units**	**RL**			
Aluminum	mg/L	0.001	0.071	0.031	0.056
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Arsenic	mg/L	0.001	< 0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.026	0.027	0.010
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.005	0.011	0.003
Cadmium	mg/L	0.00001	0.00001	< 0.00001	< 0.00001
Calcium	mg/L	0.05	10.9	28.4	4.20
Chromium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	0.0001	0.0003	< 0.0001
Copper	mg/L	0.001	< 0.001	< 0.001	< 0.001
Iron	mg/L	0.02	0.28	0.65	0.34
Lead	mg/L	0.0001	0.0003	< 0.0001	0.0002
Lithium	mg/L	0.0001	0.0010	0.0042	0.0005
Magnesium	mg/L	0.01	1.79	4.47	0.67
Manganese	mg/L	0.001	0.083	0.405	0.059
Molybdenum	mg/L	0.0001	0.0003	0.0003	< 0.0001
Nickel	mg/L	0.001	< 0.001	< 0.001	< 0.001
Potassium	mg/L	0.02	0.48	0.94	0.29
Rubidium	mg/L	0.0001	0.0011	0.0016	0.0007
Selenium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	7.95	8.88	2.37
Strontium	mg/L	0.001	0.178	0.628	0.046
Tellurium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Uranium	mg/L	0.0001	0.0001	< 0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.001	< 0.001	0.002

Report ID: 562246-IAS
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CERTIFICATE OF ANALYSIS

for

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27 Pine Grove Lane
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Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			562246-8	562246-9
Client Sample ID:			Lakeville Corner 17/25/19029	Jemseg River 17/25/19030
Date Sampled:			13-Aug-25	13-Aug-25
Analytes	**Units**	**RL**		
Aluminum	mg/L	0.001	0.090	0.070
Antimony	mg/L	0.0001	< 0.0001	0.0005
Arsenic	mg/L	0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.011	0.011
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.003	0.005
Cadmium	mg/L	0.00001	< 0.00001	0.00004
Calcium	mg/L	0.05	3.54	13.2
Chromium	mg/L	0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	0.0001	< 0.0001
Copper	mg/L	0.001	0.002	0.001
Iron	mg/L	0.02	0.47	0.18
Lead	mg/L	0.0001	0.0005	0.0004
Lithium	mg/L	0.0001	0.0006	0.0005
Magnesium	mg/L	0.01	0.60	1.63
Manganese	mg/L	0.001	0.092	0.024
Molybdenum	mg/L	0.0001	< 0.0001	0.0002
Nickel	mg/L	0.001	< 0.001	< 0.001
Potassium	mg/L	0.02	0.29	0.54
Rubidium	mg/L	0.0001	0.0010	0.0007
Selenium	mg/L	0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	2.28	3.27
Strontium	mg/L	0.001	0.040	0.089
Tellurium	mg/L	0.0001	< 0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001	< 0.0001
Uranium	mg/L	0.0001	< 0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.001	0.002

Report ID: 562246-IAS
Report Date: 26-Aug-25
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for
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27 Pine Grove Lane
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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Ammonia	IAS-M47	APHA 4500-NH_3 G	Phenate Colourimetry
pH	IAS-M03	APHA 4500-H^+ B	pH Electrode - Electrometric
Alkalinity (as $CaCO_3$)	IAS-M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	IAS-M44	APHA 4500-CL E	Ferricyanide Colourimetry
Fluoride	IAS-M30	APHA 4500-F- D	SPADNS Colourimetry
Sulfate	IAS-M45	APHA 4500-SO_4 E	Turbidimetry
Nitrate + Nitrite (as N)	IAS-M48	APHA 4500-NO_3 H	Hydrazine Red., Derivitization, Colourimetry
Nitrite (as N)	IAS-M49	APHA 4500-NO2- B	NED/sulfanilamide Colourimetry
Nitrogen - Total	IAS-M57	ASTM D8083-16	Combustion/Chemiluminescence
Phosphorus - Total	IAS-M17	APHA 4500-P E	Digestion, Manual Colourimetry
Carbon - Total Organic	IAS-M57	APHA 5310 B	Combustion/NDIR
Turbidity	IAS-M06	APHA 2130 B	Nephelometry
Colour	IAS-M55	APHA 2120 Color (A,C)	Single Wavelength Spectrophotometry
Conductivity	IAS-M04	APHA 2510 B	Conductivity Meter - Electrode
Trace Metals	IAS-M01/IAS-M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

Report ID: 564084-IAS
Report Date: 18-Sep-25
Date Received: 09-Sep-25

CERTIFICATE OF ANALYSIS

for
Jemseg Grand Lake Watershed Association
27 Pine Grove Lane
Jemseg, NB E4C 4L7

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Tel: 506.452.1212
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Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			564084-1	564084-3	564084-4
Client Sample ID:			Jemseg River 17/25/19032	Coal Creek 17/25/19034	Salmon River 17/25/19035
Date Sampled:			8-Sep-25	8-Sep-25	8-Sep-25
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	3.07	8.32	6.91
Potassium	mg/L	0.02	0.53	0.51	0.48
Calcium	mg/L	0.05	12.7	19.1	9.93
Magnesium	mg/L	0.01	1.68	3.85	1.63
Alkalinity (as $CaCO_3$)	mg/L	2	38	27	19
Chloride	mg/L	0.5	4.3	5.1	4.4
Fluoride	mg/L	0.05	0.42	0.56	0.42
Sulfate	mg/L	1	< 1	52	24
Bromine	mg/L	0.01	< 0.01	0.02	0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	0.15	< 0.05	< 0.05
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	0.15	< 0.05	< 0.05
Nitrogen - Total	mg/L	0.2	< 0.2	0.3	< 0.2
Phosphorus - Total	mg/L	0.002	0.020	0.023	0.038
Carbon - Total Organic	mg/L	0.5	9.7	6.9	6.1
Colour	TCU	5	51	19	27
Conductivity	µS/cm	1	96	190	102
pH	units	-	7.5	7.3	7.3
Turbidity	NTU	0.1	0.6	2.7	2.9
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	37.9	26.9	19.0
Carbonate (as $CaCO_3$)	mg/L	-	0.113	0.050	0.036
Hardness (as $CaCO_3$)	mg/L	0.2	38.6	63.5	31.5
TDS (calc)	mg/L	-	56	113	66
Saturation pH (20°C)	units	-	8.6	8.6	9.0
Langelier Index (20°C)	-	-	-1.14	-1.34	-1.75

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Troy Smith
Supervisor
Inorganic Analytical Services

Krista Skinner
Senior Chemical Technician
Inorganic Analytical Services

Report ID: 564084-IAS
Report Date: 18-Sep-25
Date Received: 09-Sep-25

CERTIFICATE OF ANALYSIS

for
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www.rpc.ca

Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			564084-5	564084-6	564084-7
Client Sample ID:			Newcastle Creek 17/25/19036	Maquapit Lake 17/25/19037	Grand Point 17/25/19038
Date Sampled:			8-Sep-25	8-Sep-25	8-Sep-25
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	8.64	2.90	3.68
Potassium	mg/L	0.02	0.96	0.40	0.47
Calcium	mg/L	0.05	31.0	4.92	7.21
Magnesium	mg/L	0.01	5.14	0.88	1.19
Alkalinity (as $CaCO_3$)	mg/L	2	38	12	15
Chloride	mg/L	0.5	11.9	3.5	4.1
Fluoride	mg/L	0.05	0.62	0.27	0.33
Sulfate	mg/L	1	71	6	12
Bromine	mg/L	0.01	0.01	0.01	< 0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05	0.06
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	< 0.05	< 0.05	0.06
Nitrogen - Total	mg/L	0.2	< 0.2	0.3	0.2
Phosphorus - Total	mg/L	0.002	0.030	0.028	0.007
Carbon - Total Organic	mg/L	0.5	3.2	7.5	6.4
Colour	TCU	5	19	39	32
Conductivity	µS/cm	1	264	50	71
pH	units	-	7.3	7.1	7.2
Turbidity	NTU	0.1	3.7	2.9	0.6
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	37.9	12.0	15.0
Carbonate (as $CaCO_3$)	mg/L	-	0.071	0.014	0.022
Hardness (as $CaCO_3$)	mg/L	0.2	98.6	15.9	22.9
TDS (calc)	mg/L	-	157	34	45
Saturation pH (20°C)	units	-	8.3	9.5	9.3
Langelier Index (20°C)	-	-	-1.01	-2.43	-2.07

Report ID: 564084-IAS
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for

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Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			564084-8	564084-9
Client Sample ID:			Grand Point Niskin 17/25/19039	Lakeville Corner 17/25/19040
Date Sampled:			8-Sep-25	8-Sep-25
Analytes	**Units**	**RL**		
Sodium	mg/L	0.05	4.16	2.47
Potassium	mg/L	0.02	0.40	0.32
Calcium	mg/L	0.05	7.63	4.00
Magnesium	mg/L	0.01	1.22	0.72
Alkalinity (as $CaCO_3$)	mg/L	2	16	8
Chloride	mg/L	0.5	4.1	3.1
Fluoride	mg/L	0.05	0.33	0.29
Sulfate	mg/L	1	13	6
Bromine	mg/L	0.01	< 0.01	0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	0.09	< 0.05
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	0.09	< 0.05
Nitrogen - Total	mg/L	0.2	0.2	0.3
Phosphorus - Total	mg/L	0.002	0.009	0.041
Carbon - Total Organic	mg/L	0.5	6.1	7.8
Colour	TCU	5	33	53
Conductivity	µS/cm	1	71	42
pH	units	-	7.2	7.1
Turbidity	NTU	0.1	0.5	3.8
Calculated Parameters				
Bicarbonate (as $CaCO_3$)	mg/L	-	16.0	8.0
Carbonate (as $CaCO_3$)	mg/L	-	0.024	0.009
Hardness (as $CaCO_3$)	mg/L	0.2	24.1	13.0
TDS (calc)	mg/L	-	47	30
Saturation pH (20°C)	units	-	9.2	9.8
Langelier Index (20°C)	-	-	-2.03	-2.69

Report ID: 564084-IAS
Report Date: 18-Sep-25
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27 Pine Grove Lane
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Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			564084-1	564084-3	564084-4
Client Sample ID:			Jemseg River 17/25/19032	Coal Creek 17/25/19034	Salmon River 17/25/19035
Date Sampled:			8-Sep-25	8-Sep-25	8-Sep-25
Analytes	**Units**	**RL**			
Aluminum	mg/L	0.001	0.026	0.048	0.062
Antimony	mg/L	0.0001	0.0003	< 0.0001	< 0.0001
Arsenic	mg/L	0.001	< 0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.007	0.034	0.025
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.005	0.008	0.005
Cadmium	mg/L	0.00001	0.00002	< 0.00001	< 0.00001
Calcium	mg/L	0.05	12.7	19.1	9.93
Chromium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	< 0.0001	0.0001	< 0.0001
Copper	mg/L	0.001	0.001	< 0.001	< 0.001
Iron	mg/L	0.02	0.09	0.24	0.23
Lead	mg/L	0.0001	< 0.0001	0.0001	0.0002
Lithium	mg/L	0.0001	0.0004	0.0010	0.0008
Magnesium	mg/L	0.01	1.68	3.85	1.63
Manganese	mg/L	0.001	0.012	0.070	0.058
Molybdenum	mg/L	0.0001	0.0001	0.0002	0.0002
Nickel	mg/L	0.001	< 0.001	< 0.001	< 0.001
Potassium	mg/L	0.02	0.53	0.51	0.48
Rubidium	mg/L	0.0001	0.0006	0.0010	0.0009
Selenium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	3.07	8.32	6.91
Strontium	mg/L	0.001	0.086	0.305	0.149
Tellurium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Uranium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.002	< 0.001	0.001

Report ID: 564084-IAS
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for
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Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			564084-5	564084-6	564084-7
Client Sample ID:			Newcastle Creek 17/25/19036	Maquapit Lake 17/25/19037	Grand Point 17/25/19038
Date Sampled:			8-Sep-25	8-Sep-25	8-Sep-25
Analytes	**Units**	**RL**			
Aluminum	mg/L	0.001	0.050	0.056	0.034
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Arsenic	mg/L	0.001	< 0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.025	0.010	0.016
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.012	0.004	0.004
Cadmium	mg/L	0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium	mg/L	0.05	31.0	4.92	7.21
Chromium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	0.0004	< 0.0001	< 0.0001
Copper	mg/L	0.001	< 0.001	< 0.001	0.001
Iron	mg/L	0.02	0.84	0.39	0.07
Lead	mg/L	0.0001	0.0001	0.0002	< 0.0001
Lithium	mg/L	0.0001	0.0044	0.0004	0.0007
Magnesium	mg/L	0.01	5.14	0.88	1.19
Manganese	mg/L	0.001	0.402	0.035	0.010
Molybdenum	mg/L	0.0001	0.0002	< 0.0001	0.0001
Nickel	mg/L	0.001	< 0.001	< 0.001	< 0.001
Potassium	mg/L	0.02	0.96	0.40	0.47
Rubidium	mg/L	0.0001	0.0015	0.0008	0.0007
Selenium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	8.64	2.90	3.68
Strontium	mg/L	0.001	0.674	0.055	0.088
Tellurium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Uranium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.001	< 0.001	0.002

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for
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Attention: Alyson Kenny
Project #: 250221
Location: Grand Lake

Analysis of Surface Water

RPC Sample ID:			564084-8	564084-9
Client Sample ID:			Grand Point Niskin 17/25/19039	Lakeville Corner 17/25/19040
Date Sampled:			8-Sep-25	8-Sep-25
Analytes	**Units**	**RL**		
Aluminum	mg/L	0.001	0.035	0.093
Antimony	mg/L	0.0001	< 0.0001	< 0.0001
Arsenic	mg/L	0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.016	0.012
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.003	0.003
Cadmium	mg/L	0.00001	< 0.00001	< 0.00001
Calcium	mg/L	0.05	7.63	4.00
Chromium	mg/L	0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	< 0.0001	< 0.0001
Copper	mg/L	0.001	< 0.001	< 0.001
Iron	mg/L	0.02	0.07	0.58
Lead	mg/L	0.0001	< 0.0001	0.0004
Lithium	mg/L	0.0001	0.0007	0.0005
Magnesium	mg/L	0.01	1.22	0.72
Manganese	mg/L	0.001	0.012	0.065
Molybdenum	mg/L	0.0001	< 0.0001	< 0.0001
Nickel	mg/L	0.001	< 0.001	< 0.001
Potassium	mg/L	0.02	0.40	0.32
Rubidium	mg/L	0.0001	0.0007	0.0009
Selenium	mg/L	0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	4.16	2.47
Strontium	mg/L	0.001	0.091	0.048
Tellurium	mg/L	0.0001	< 0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001	< 0.0001
Uranium	mg/L	0.0001	< 0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.005	0.001

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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Ammonia	IAS-M47	APHA 4500-NH_3 G	Phenate Colourimetry
pH	IAS-M03	APHA 4500-H^+ B	pH Electrode - Electrometric
Alkalinity (as $CaCO_3$)	IAS-M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	IAS-M44	APHA 4500-CL E	Ferricyanide Colourimetry
Fluoride	IAS-M30	APHA 4500-F- D	SPADNS Colourimetry
Sulfate	IAS-M45	APHA 4500-SO_4 E	Turbidimetry
Nitrate + Nitrite (as N)	IAS-M48	APHA 4500-NO_3 H	Hydrazine Red., Derivitization, Colourimetry
Nitrite (as N)	IAS-M49	APHA 4500-NO2- B	NED/sulfanilamide Colourimetry
Nitrogen - Total	IAS-M57	ASTM D8083-16	Combustion/Chemiluminescence
Phosphorus - Total	IAS-M17	APHA 4500-P E	Digestion, Manual Colourimetry
Carbon - Total Organic	IAS-M57	APHA 5310 B	Combustion/NDIR
Turbidity	IAS-M06	APHA 2130 B	Nephelometry
Colour	IAS-M55	APHA 2120 Color (A,C)	Single Wavelength Spectrophotometry
Conductivity	IAS-M04	APHA 2510 B	Conductivity Meter - Electrode
Trace Metals	IAS-M01/IAS-M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

Report ID: 557295-IAS
Report Date: 25-Jun-25
Date Received: 16-Jun-25

CERTIFICATE OF ANALYSIS

for
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Attention: Alyson Kenny
Project #: 250
Location: Jemseg Grand Lake

Analysis of Surface Water

RPC Sample ID:			557295-1	557295-3	557295-4
Client Sample ID:			Jemseg River 17/25/19000	Coal Creek 17/25/19002	Newcastle Creek 17/25/19003
Date Sampled:			15-Jun-25	15-Jun-25	15-Jun-25
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	3.33	2.77	3.96
Potassium	mg/L	0.02	0.36	0.31	0.34
Calcium	mg/L	0.05	5.98	10.4	9.56
Magnesium	mg/L	0.01	0.95	2.01	1.57
Alkalinity (as $CaCO_3$)	mg/L	2	12	13	11
Chloride	mg/L	0.5	4.1	2.4	6.0
Fluoride	mg/L	0.05	0.20	0.38	0.37
Sulfate	mg/L	1	11	29	25
Bromine	mg/L	0.01	< 0.01	0.01	0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	0.06	< 0.05	< 0.05
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	0.06	< 0.05	< 0.05
Nitrogen - Total	mg/L	0.2	0.7	0.5	0.5
Phosphorus - Total	mg/L	0.002	0.013	0.032	0.025
Carbon - Total Organic	mg/L	0.5	8.3	13.9	12.9
Colour	TCU	5	49	113	134
Conductivity	µS/cm	1	64	93	92
pH	units	-	7.5	7.1	7.1
Turbidity	NTU	0.1	1.0	3.4	1.9
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	11.9	13.0	11.0
Carbonate (as $CaCO_3$)	mg/L	-	0.035	0.015	0.013
Hardness (as $CaCO_3$)	mg/L	0.2	18.8	34.2	30.3
TDS (calc)	mg/L	-	42	70	67
Saturation pH (20°C)	units	-	9.4	9.2	9.3
Langelier Index (20°C)	-	-	-1.95	-2.09	-2.20

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Troy Smith
Supervisor
Inorganic Analytical Services

Krista Skinner
Senior Chemical Technician
Inorganic Analytical Services

Report ID: 557295-IAS
Report Date: 25-Jun-25
Date Received: 16-Jun-25

CERTIFICATE OF ANALYSIS

for

Jemseg Grand Lake Watershed Association
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Attention: Alyson Kenny
Project #: 250
Location: Jemseg Grand Lake

Analysis of Surface Water

RPC Sample ID:			557295-5	557295-6	557295-7
Client Sample ID:			Salmon River 17/25/19004	Maquapit Lake 17/25/19005	French Lake 17/25/19006
Date Sampled:			15-Jun-25	15-Jun-25	15-Jun-25
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	6.45	2.18	1.93
Potassium	mg/L	0.02	0.35	0.43	0.29
Calcium	mg/L	0.05	8.79	3.34	3.22
Magnesium	mg/L	0.01	1.37	0.51	0.49
Alkalinity (as $CaCO_3$)	mg/L	2	15	7	6
Chloride	mg/L	0.5	3.2	3.2	2.7
Fluoride	mg/L	0.05	0.34	0.21	0.22
Sulfate	mg/L	1	21	4	5
Bromine	mg/L	0.01	0.01	< 0.01	< 0.01
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001	< 0.001	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrite (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
Nitrogen - Total	mg/L	0.2	0.4	0.5	0.8
Phosphorus - Total	mg/L	0.002	0.032	0.062	0.058
Carbon - Total Organic	mg/L	0.5	12.6	10.9	13.8
Colour	TCU	5	116	94	126
Conductivity	µS/cm	1	89	35	34
pH	units	-	7.2	6.9	6.7
Turbidity	NTU	0.1	3.5	4.8	3.2
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	15.0	7.0	6.0
Carbonate (as $CaCO_3$)	mg/L	-	0.022	0.005	0.003
Hardness (as $CaCO_3$)	mg/L	0.2	27.6	10.4	10.1
TDS (calc)	mg/L	-	64	30	32
Saturation pH (20°C)	units	-	9.2	9.9	10.0
Langelier Index (20°C)	-	-	-2.00	-3.02	-3.29

Report ID: 557295-IAS
Report Date: 25-Jun-25
Date Received: 16-Jun-25

CERTIFICATE OF ANALYSIS

for
Jemseg Grand Lake Watershed Association
27 Pine Grove Lane
Jemseg, NB E4C 4L7

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Alyson Kenny
Project #: 250
Location: Jemseg Grand Lake

Analysis of Surface Water

RPC Sample ID:			557295-1	557295-3	557295-4
Client Sample ID:			Jemseg River 17/25/19000	Coal Creek 17/25/19002	Newcastle Creek 17/25/19003
Date Sampled:			15-Jun-25	15-Jun-25	15-Jun-25
Analytes	**Units**	**RL**			
Aluminum	mg/L	0.001	0.071	0.192	0.149
Antimony	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Arsenic	mg/L	0.001	< 0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.016	0.029	0.018
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.003	0.004	0.004
Cadmium	mg/L	0.00001	< 0.00001	0.00002	0.00001
Calcium	mg/L	0.05	5.98	10.4	9.56
Chromium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	< 0.0001	0.0003	0.0004
Copper	mg/L	0.001	< 0.001	< 0.001	< 0.001
Iron	mg/L	0.02	0.15	0.73	0.60
Lead	mg/L	0.0001	< 0.0001	0.0002	0.0002
Lithium	mg/L	0.0001	0.0007	0.0013	0.0022
Magnesium	mg/L	0.01	0.95	2.01	1.57
Manganese	mg/L	0.001	0.026	0.180	0.179
Molybdenum	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel	mg/L	0.001	< 0.001	0.001	0.001
Potassium	mg/L	0.02	0.36	0.31	0.34
Rubidium	mg/L	0.0001	0.0006	0.0007	0.0007
Selenium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	3.33	2.77	3.96
Strontium	mg/L	0.001	0.070	0.146	0.195
Tellurium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Uranium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	< 0.001	0.002	0.003

Report ID: 557295-IAS
Report Date: 25-Jun-25
Date Received: 16-Jun-25

CERTIFICATE OF ANALYSIS

for
Jemseg Grand Lake Watershed Association
27 Pine Grove Lane
Jemseg, NB E4C 4L7

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Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Alyson Kenny
Project #: 250
Location: Jemseg Grand Lake

Analysis of Surface Water

RPC Sample ID:			557295-5	557295-6	557295-7
Client Sample ID:			Salmon River 17/25/19004	Maquapit Lake 17/25/19005	French Lake 17/25/19006
Date Sampled:			15-Jun-25	15-Jun-25	15-Jun-25
Analytes	**Units**	**RL**			
Aluminum	mg/L	0.001	0.136	0.158	0.190
Antimony	mg/L	0.0001	0.0002	0.0001	< 0.0001
Arsenic	mg/L	0.001	< 0.001	< 0.001	< 0.001
Barium	mg/L	0.001	0.027	0.014	0.017
Beryllium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001	< 0.001	< 0.001
Boron	mg/L	0.001	0.004	0.003	0.003
Cadmium	mg/L	0.00001	0.00001	0.00001	0.00002
Calcium	mg/L	0.05	8.79	3.34	3.22
Chromium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Cobalt	mg/L	0.0001	0.0001	0.0001	0.0002
Copper	mg/L	0.001	< 0.001	0.001	< 0.001
Iron	mg/L	0.02	0.39	0.47	0.64
Lead	mg/L	0.0001	0.0002	0.0005	0.0006
Lithium	mg/L	0.0001	0.0010	0.0007	0.0009
Magnesium	mg/L	0.01	1.37	0.51	0.49
Manganese	mg/L	0.001	0.074	0.059	0.095
Molybdenum	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel	mg/L	0.001	< 0.001	0.001	< 0.001
Potassium	mg/L	0.02	0.35	0.43	0.29
Rubidium	mg/L	0.0001	0.0007	0.0010	0.0009
Selenium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.05	6.45	2.18	1.93
Strontium	mg/L	0.001	0.132	0.034	0.036
Tellurium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001
Uranium	mg/L	0.0001	0.0002	< 0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.002	0.007	0.002

Report ID: 557295-IAS
Report Date: 25-Jun-25
Date Received: 16-Jun-25

CERTIFICATE OF ANALYSIS
for
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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Ammonia	IAS-M47	APHA 4500-NH_3 G	Phenate Colourimetry
pH	IAS-M03	APHA 4500-H^+ B	pH Electrode - Electrometric
Alkalinity (as $CaCO_3$)	IAS-M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	IAS-M44	APHA 4500-CL E	Ferricyanide Colourimetry
Fluoride	IAS-M30	APHA 4500-F- D	SPADNS Colourimetry
Sulfate	IAS-M45	APHA 4500-SO_4 E	Turbidimetry
Nitrate + Nitrite (as N)	IAS-M48	APHA 4500-NO_3 H	Hydrazine Red., Derivitization, Colourimetry
Nitrite (as N)	IAS-M49	APHA 4500-NO2- B	NED/sulfanilamide Colourimetry
Nitrogen - Total	IAS-M57	ASTM D8083-16	Combustion/Chemiluminescence
Phosphorus - Total	IAS-M17	APHA 4500-P E	Digestion, Manual Colourimetry
Carbon - Total Organic	IAS-M57	APHA 5310 B	Combustion/NDIR
Turbidity	IAS-M06	APHA 2130 B	Nephelometry
Colour	IAS-M55	APHA 2120 Color (A,C)	Single Wavelength Spectrophotometry
Conductivity	IAS-M04	APHA 2510 B	Conductivity Meter - Electrode
Trace Metals	IAS-M01/IAS-M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

Report ID: 557295-ML-W1
Report Date: 17-Jun-25
Date Received: 16-Jun-25

CERTIFICATE OF ANALYSIS

for

Jemseg Grand Lake Watershed Association
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Attention: Alyson Kenny / NBDELG-ENVI NBDELG-ENVI / Jemseg Grandlake / Erin Douthwright / Kelli-Nicole Croucher

Project/Job #: 250

Client Location: Jemseg Grand Lake

Microbiological Examination of Water

Analytes:				E. coli
Units:				MPN/100mL
Method ID:				MICRO10
Date Analyzed:				16-Jun-25
RPC Sample ID	**Client Sample ID**	**Date Sampled**	**Time Sampled**	
557295-1	Jemseg River 17/25/19000	15-Jun-25	10:07:00 AM	5.2
557295-2	Youngs Cove Wharf 17/25/19001	15-Jun-25	10:30:00 AM	1
557295-3	Coal Creek 17/25/19002	15-Jun-25	11:14:00 AM	27.8
557295-4	Newcastle Creek 17/25/19003	15-Jun-25	1:00:00 PM	40.4
557295-5	Salmon River 17/25/19004	15-Jun-25	11:45:00 AM	24.6
557295-6	Maquapit Lake 17/25/19005	15-Jun-25	2:01:00 PM	7.2
557295-7	French Lake 17/25/19006	15-Jun-25	2:37:00 PM	3.1

This report relates only to the sample(s) and information provided to the laboratory.

Cathy Hay
Microbiology Supervisor
Applied and Experimental Bioscience

Adrienne Fortin
Microbiology Technician
Applied and Experimental Bioscience

Report/Rapport: 557345-MB
Date: 17-Jun-25
Date Received/Reçu: 16-Jun-25

CERTIFICATE OF ANALYSIS / CERTIFICAT D'ANALYSE

for/pour
Jemseg Grand Lake Watershed
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27 Pine Grove Lane
Jemseg, NB E4C 4L7

rpc
115A Harrisville Blvd
Moncton NB
Canada E1H 3T3
Tel: 506.855.6472
rpc.ca

Attention: Alyson Kenny

Location: Grand Lake

Examination of Water/Examen de l'eau

RPC Sample ID/No. d'échantillon de RPC:				557345-1	557345-2
Client Sample ID/ID d'échantillon du client:				Grand Point Surface 17/25/19007	Grand Point Niskin 17/25/19007
Date collected/Date du prélèvement:				16-Jun-25	16-Jun-25
Time sampled/Heure du prélèvement:				9:45:00 AM	10:18:00 AM
Analytes/Paramètre(s)	**Method Méthode**	**Date Analyzed Date Analysé**	**Units Unités**		
E. coli	MICRO10	16-Jun-25	MPN/100mL	< 10	< 10

This report relates only to the sample(s) and information provided to the laboratory.

Le présent rapport ne s'applique qu'aux échantillons et à l'information transmis au laboratoire.

LEGEND:

RL/SD = Reporting Limit/Seuil de déclaration cfu/ufc = Colony Forming Units/Unités formant des colonies

MPN/NPP = Most Probable Number/Nombre Plus Probable

Michael Lawlor
Lab Supervisor
Moncton Laboratory/Laboratoire de Moncton

Nadine Godin
Microbiology Technician
Moncton Laboratory/Laboratoire de Moncton

Report ID: 559862-ML-W1
Report Date: 17-Jul-25
Date Received: 16-Jul-25

CERTIFICATE OF ANALYSIS

for

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Attention: Alyson Kenny / NBDELG-ENVI NBDELG-ENVI / Jemseg Grandlake / Erin Douthwright / Kelli-Nicole Croucher

Project/Job #: 250221

Client Location: Grand Lake

Microbiological Examination of Water

Analytes:				E. coli
Units:				MPN/100mL
Method ID:				MICRO10
Date Analyzed:				16-Jul-25
RPC Sample ID	**Client Sample ID**	**Date Sampled**	**Time Sampled**	
559862-01	Grand Point Surface 17/25/19010	15-Jul-25	10:22:00 AM	<1
559862-02	Grand Point Niskin 17/25/19011	15-Jul-25	10:15:00 AM	<1
559862-03	Maquapit Lake 17/25/19012	15-Jul-25	4:31:00 PM	36.4
559862-04	Lakeville Corner 17/25/19013	15-Jul-25	12:12:00 PM	42.8
559862-05	Jemseg River 17/25/19014	15-Jul-25	1:10:00 PM	6.2
559862-06	Youngs Cove Wharf 17/25/19015	15-Jul-25	1:37:00 PM	1
559862-07	Coal Creek 17/25/19016	15-Jul-25	2:12:00 PM	8.5
559862-08	Salmon River 17/25/19017	15-Jul-25	2:40:00 PM	1
559862-09	Newcastle Creek 17/25/19018	15-Jul-25	3:38:00 PM	56.3
559862-10	Inner Douglas Harbour 17/25/19019	15-Jul-25	11:05:00 AM	2

This report relates only to the sample(s) and information provided to the laboratory.

Cathy Hay
Microbiology Supervisor
Applied and Experimental Bioscience

Morgan Armour
Microbiology Technician
Applied and Experimental Bioscience

Report ID: 562246-ML-W1
Report Date: 15-Aug-25
Date Received: 14-Aug-25

CERTIFICATE OF ANALYSIS

for

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27 Pine Grove Lane
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Attention: Alyson Kenny / NBDELG-ENVI NBDELG-ENVI / Jemseg Grandlake / Erin Douthwright / Kelli-Nicole Croucher

Project/Job #: 250221

Client Location: Grand Lake

Microbiological Examination of Water

Analytes:				E. coli
Units:				MPN/100mL
Method ID:				MICRO10
Date Analyzed:				14-Aug-25
RPC Sample ID	**Client Sample ID**	**Date Sampled**	**Time Sampled**	
562246-1	Grand Point Surface 17/25/19022	13-Aug-25	9:36:00 AM	<1
562246-2	Grand Point Niskin 17/25/19023	13-Aug-25	9:46:00 AM	<1
562246-3	Youngs Cove Wharf 17/25/19024	13-Aug-25	5:46:00 PM	4.1
562246-4	Coal Creek 17/25/19025	13-Aug-25	12:27:00 PM	9.7
562246-5	Salmon River 17/25/19026	13-Aug-25	1:01:00 PM	96
562246-6	Newcastle Creek 17/25/19027	13-Aug-25	2:02:00 PM	193.5
562246-7	Maquapit Exit 17/25/19028	13-Aug-25	3:52:00 PM	12.1
562246-8	Lakeville Corner 17/25/19029	13-Aug-25	4:21:00 PM	8.4
562246-9	Jemseg River 17/25/19030	13-Aug-25	6:15:00 PM	6.3

This report relates only to the sample(s) and information provided to the laboratory.

Corrie Maston
Acting Micro Supervisor
Applied and Experimental Bioscience

Morgan Armour
Microbiology Technician
Applied and Experimental Bioscience

Report ID: 564084-ML-W1
Report Date: 10-Sep-25
Date Received: 09-Sep-25

CERTIFICATE OF ANALYSIS

for

Jemseg Grand Lake Watershed Association
27 Pine Grove Lane
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Attention: Alyson Kenny / Peter Davidson /
Jemseg Grandlake / NBDELG-ENVI NBDELG-ENVI

Project/Job #: 250221
Client Location: Grand Lake

Microbiological Examination of Water

Analytes:				E. coli
Units:				MPN/100mL
Method ID:				MICRO10
Date Analyzed:				9-Sep-25
RPC Sample ID	**Client Sample ID**	**Date Sampled**	**Time Sampled**	
564084-1	Jemseg River 17/25/19032	8-Sep-25	6:26:00 PM	3.1
564084-2	Youngs Cove Wharf 17/25/19033	8-Sep-25	5:53:00 PM	29.2
564084-3	Coal Creek 17/25/19034	8-Sep-25	10:19:00 AM	8.5
564084-4	Salmon River 17/25/19035	8-Sep-25	10:43:00 AM	3.1
564084-5	Newcastle Creek 17/25/19036	8-Sep-25	11:52:00 AM	218.7
564084-6	Maquapit Lake 17/25/19037	8-Sep-25	1:27:00 PM	5.2
564084-7	Grand Point 17/25/19038	8-Sep-25	3:11:00 PM	<1
564084-8	Grand Point Niskin 17/25/19039	8-Sep-25	3:30:00 PM	<1
564084-9	Lakeville Corner 17/25/19040	8-Sep-25	12:49:00 PM	11

This report relates only to the sample(s) and information provided to the laboratory.

Cathy Hay
Microbiology Supervisor
Applied and Experimental Bioscience

Josie Michaud
Microbiology Technician
Applied and Experimental Bioscience

Report/Rapport: 558838-ML-W1
Date: 04-Jul-25
Date Received/Reçu: 03-Jul-25

CERTIFICATE OF ANALYSIS / CERTIFICAT D'ANALYSE

for/pour
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27 Pine Grove Lane
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Attention: Alyson Kenny / NBDELG-ENVI NBDELG-ENVI /
Jemseg Grandlake / Erin Douthwright / Kelli-Nicole Croucher

Project/Job #: 250221

Client Location: Youngs Cove Wharf

Microbiological Examination of Water/Qualité microbiologique de l'eau potable

RPC Sample ID/No. d'échantillon de RPC:				558838-1
Client Sample ID/ID d'échantillon du client:				Youngs Cove Wharf 17/25/19009
Date collected/Date du prélèvement				3-Jul-25
Time sampled/Heure du prélèvement				10:22:00 AM
Analytes/Paramètre(s)	**Method/Méthode**	**Date Analyzed Date Analysé**	**Units Unités**	
E. coli	MICRO10	3-Jul-25	MPN/100mL	<1

This report relates only to the sample(s) and information provided to the laboratory.

Le présent rapport ne s'applique qu'aux échantillons et à l'information transmis au laboratoire.

Cathy Hay
Microbiology Supervisor
Applied and Experimental Bioscience

Josie Michaud
Microbiology Technician
Applied and Experimental Bioscience

Report/Rapport: 561221-ML-W1
Date: 01-Aug-25
Date Received/Reçu: 31-Jul-25

CERTIFICATE OF ANALYSIS / CERTIFICAT D'ANALYSE

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Attention: Alyson Kenny / NBDELG-ENVI NBDELG-ENVI /
Jemseg Grandlake / Erin Douthwright / Kelli-Nicole Croucher

Project/Job #: 250221

Client Location: Youngs Cove

Microbiological Examination of Water/Qualité microbiologique de l'eau potable

RPC Sample ID/No. d'échantillon de RPC:				561221-1
Client Sample ID/ID d'échantillon du client:				Youngs Cove 17/25/19020
Date collected/Date du prélèvement				31-Jul-25
Time sampled/Heure du prélèvement				12:19:00 PM
Analytes/Paramètre(s)	**Method/Méthode**	**Date Analyzed Date Analysé**	**Units Unités**	
E. coli	MICRO10	31-Jul-25	MPN/100mL	1

This report relates only to the sample(s) and information provided to the laboratory.

Le présent rapport ne s'applique qu'aux échantillons et à l'information transmis au laboratoire.

Cathy Hay
Microbiology Supervisor
Applied and Experimental Bioscience

Morgan Armour
Microbiology Technician
Applied and Experimental Bioscience

Report/Rapport: 563054-ML-W1
Date: 27-Aug-25
Date Received/Reçu: 26-Aug-25

CERTIFICATE OF ANALYSIS / CERTIFICAT D'ANALYSE

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Attention: Alyson Kenny / Peter Davidson /
Jemseg Grandlake / NBDELG-ENVI NBDELG-ENVI

Project/Job #: 250221

Client Location: Grand Lake

Microbiological Examination of Water/Qualité microbiologique de l'eau potable

RPC Sample ID/No. d'échantillon de RPC:				563054-1
Client Sample ID/ID d'échantillon du client:				Youngs Cove Wharf 17/25/19031
Date collected/Date du prélèvement				26-Aug-25
Time sampled/Heure du prélèvement				10:50:00 AM
Analytes/Paramètre(s)	**Method/Méthode**	**Date Analyzed Date Analysé**	**Units Unités**	
E. coli	MICRO10	26-Aug-25	MPN/100mL	<1

This report relates only to the sample(s) and information provided to the laboratory.

Le présent rapport ne s'applique qu'aux échantillons et à l'information transmis au laboratoire.

Cathy Hay
Microbiology Supervisor
Applied and Experimental Bioscience

Gillian Travis
Microbiology Technician
Applied and Experimental Bioscience

Report ID: 560687-IAS
Report Date: 01-Aug-25
Date Received: 25-Jul-25

CERTIFICATE OF ANALYSIS

for

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Tel: 506.452.1212
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Attention: Alyson Kenny
Project #: 250221
Location: Wiggin's Cove

Analysis of Water

RPC Sample ID:			560687-1
Client Sample ID:			Wiggin's Cove
Date Sampled:			25-Jul-25
Analytes	**Units**	**RL**	
Chlorophyll-a	µg/L	0.5	6.2

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Krista Skinner
Senior Chemical Technician
Inorganic Analytical Services

Report ID: 561221-IAS
Report Date: 11-Aug-25
Date Received: 31-Jul-25

CERTIFICATE OF ANALYSIS

for

Jemseg Grand Lake Watershed Association
27 Pine Grove Lane
Jemseg, NB E4C 4L7

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Alyson Kenny
Project #: 250221
Location: Youngs Cove

Analysis of Water

RPC Sample ID:			561221-2
Client Sample ID:			Youngs Cove 17/25/19021
Date Sampled:			31-Jul-25
Analytes	**Units**	**RL**	
Chlorophyll-a	µg/L	0.5	9.7

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Brannen Burhoe
Supervisor
Inorganic Analytical Services

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