BIG TRACADIE RIVER WATERSHED

ATLANTIC SALMON CONSERVATION STRATEGY

November 2024

Big Tracadie River Watershed

Atlantic Salmon Conservation Strategy

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Contents

Acknowledgements iii
Executive Summary vi
1.0 Introduction 7
2.0 River Attributes and Access 7
3.0 Conservation Strategy Objectives for Atlantic Salmon on the Big Tracadie River watershed 10
4.0 River Setting & Climate 12
5.0 Bedrock and Surficial Geology 16
6.0 Land Use History, Land Cover and Land Use 18
7.0 Land Tenure 18
8.0 Beaver Dams 19
9.0 Habitat Conditions 21
9.1 Electrofishing Results – Lord and Foy River 27
9.2 Electrofishing Results – Big Tracadie River at Hwy 160 28
10.0 Water Quality and Quantity 28
11.0 Conclusion 33
12.0 Summary of Recommendations 35
References 36
Appendix A: Fish Habitat Assessment Sheets – Lord and Foy and Big Tracadie Rivers 37
Appendix B: pH Results from the Big Tracadie River and Tributary Streams May 8th 2024 42
Appendix C: General Chemistry and E. coli Results from the Big Tracadie Watershed 43
Appendix D: Electrofishing Data – Lord and Foy River 51
Appendix E: Electrofishing Data – Big Tracadie River 53

List of Figures

Figure 1 Big Tracadie River Drainage Basin - Geographical Location 8
Figure 2 Big Tracadie River watershed and watercourses 9
Figure 3 Ecoregions 13
Figure 4 Big Tracadie River Watershed Land Cover/Land Use 14
Figure 5 Big Tracadie River Canoe Reconnaissance – pH sampling May 2024 15
Figure 6 Big Tracadie River Drainage Basin Bedrock Geology 17
Figure 7 Lord and Foy Electrofishing - Beaver Dam Upstream as a Natural Barrier 20
Figure 8 Habitat Surveys and Electrofishing Sites 22
Figure 9 Habitat Assessment - Big Tracadie Headwaters 23
Figure 10 Habitat Assessment - Lord and Foy River 23
Figure 11 Water Temperature Profiles - Tracadie River and Tributaries 25
Figure 12 Electrofishing on the Lord and Foy River 26
Figure 13 Atlantic Salmon Parr - Lord and Foy River 27
Figure 14 Water Quality Monitoring Sites - Big Tracadie River Watershed 29
Figure 15 Temperature Logger Locations - Big Tracadie River Watershed 31
Figure 16 Protected Land 32
Figure 17 Blueberry Fields Dominate Large Areas of the Watershed 33

Executive Summary

In 2024, the Miramichi River Environmental Assessment Committee (MREAC) was supported by the Foundation for Conservation of Atlantic Salmon (FCAS) to prepare an Atlantic salmon conservation strategy for the Big Tracadie River in northeastern New Brunswick. The watershed of the Big Tracadie River is large and supports a population of Atlantic salmon (*Salmo salar*). MREAC staff and volunteers completed significant environmental monitoring and habitat assessment during the open water season of 2024. Both current and historical data is incorporated into the conservation strategy. Interviews with local recreational fishers, members of Le Club Chasse & Pêche de la Grand Rivière Tracadie (the Big Tracadie fish and game club), were conducted and proved invaluable.

Based on compiled data, visual observations, river monitoring, and communication with river stakeholders, the Big Tracadie River has habitat characteristics required to sustain a significant Atlantic salmon production. The production of juvenile Atlantic salmon, relative to several other watersheds of comparable scale in eastern New Brunswick, is significantly higher. Limiting factors to greater production and survival of Atlantic salmon are discussed. Some natural limiting factors will remain unsurmountable. Concern about the rapid and large-scale landscape conversion into blueberry production is the largest perceived threat. Recommendations are made relative to known limiting factors that can be addressed.

Future efforts should focus on maintaining the existing ecological values that sustain the current stock of Atlantic salmon and other indigenous fish species. Additional and ongoing monitoring of this keystone species is recommended. Regular and long-term assessments of fry and parr production should be monitored in the face of risk posed by large scale industrial level forest harvesting and blueberry agriculture along with their respective pest spray programs.

This and other comparable sized tributaries in eastern New Brunswick should be assessed further to determine the actual size of the annual spawning population. Resource protection through jurisdictional enforcement and citizen engagement should be enhanced as opportunities allow.

1.0 Introduction

The Miramichi River Environmental Assessment Committee (MREAC) undertook the production of an Atlantic Salmon Conservation Strategy on the Big Tracadie River in 2024. The project was supported by the Foundation for Conservation of Atlantic Salmon (FCAS). Based on available watershed data, recent monitoring efforts, other research, and opportunistic interviews, MREAC herein presents this strategy.

The Big Tracadie River is located on the northeastern shore of New Brunswick on the Acadian Peninsula. The watershed consists of 549.7 square kilometres (Figure 1) and is comprised of three significant waterways with multiple smaller brooks, several of which are likely to host spawning Atlantic salmon. The larger branches are the Big Tracadie River (main branch), the Lord and Foy River and the Portage River. The project watershed boundary that includes all drainage into the mouth of the Big Tracadie river captures the Portage River drainage basin (Figure 2).

2.0 River Attributes and Access

Typical of eastern New Brunswick rivers the Big Tracadie has a large estuary and long inland tidal influence. The head of tide measured from the mouth of Big Brook to the Northumberland Strait is 22.6 kilometers. The meander length of the river's main branch from Big Brook up to the headwaters near Hwy 134 is approximately 62.6 kilometres, making a total meander length for the Big Tracadie River of approximately 85 kilometres.

The north-south Highway 134 briefly touches some of the extreme headwaters of the Big Tracadie drainage basin, while the east-west Highway 160 transects the upper watershed. As part of the Acadian Coast Drive, Highway 11 crosses the river's mouth near the Gulf of St. Lawrence.

MREAC survey teams travelled approximately 26 km on the waterway by completing a reconnaissance canoe run and two habitat assessments. The established (DNR/DFO) Stream Habitat Inventory protocol was applied on the two reaches that were habitat-assessed. Each assessment covered a minimum of one kilometer. Throughout the watershed, six temperature loggers were deployed at widely distributed locations. Three were located on the main branch, three others were deployed on the Lord and Foy, the South Branch Big Tracadie and on the Portage River. Only three of these loggers were successfully recovered. One of the missing loggers was harvested by beaver for a dam project just below the deployment site. The others went missing to upright mammals, best guess.

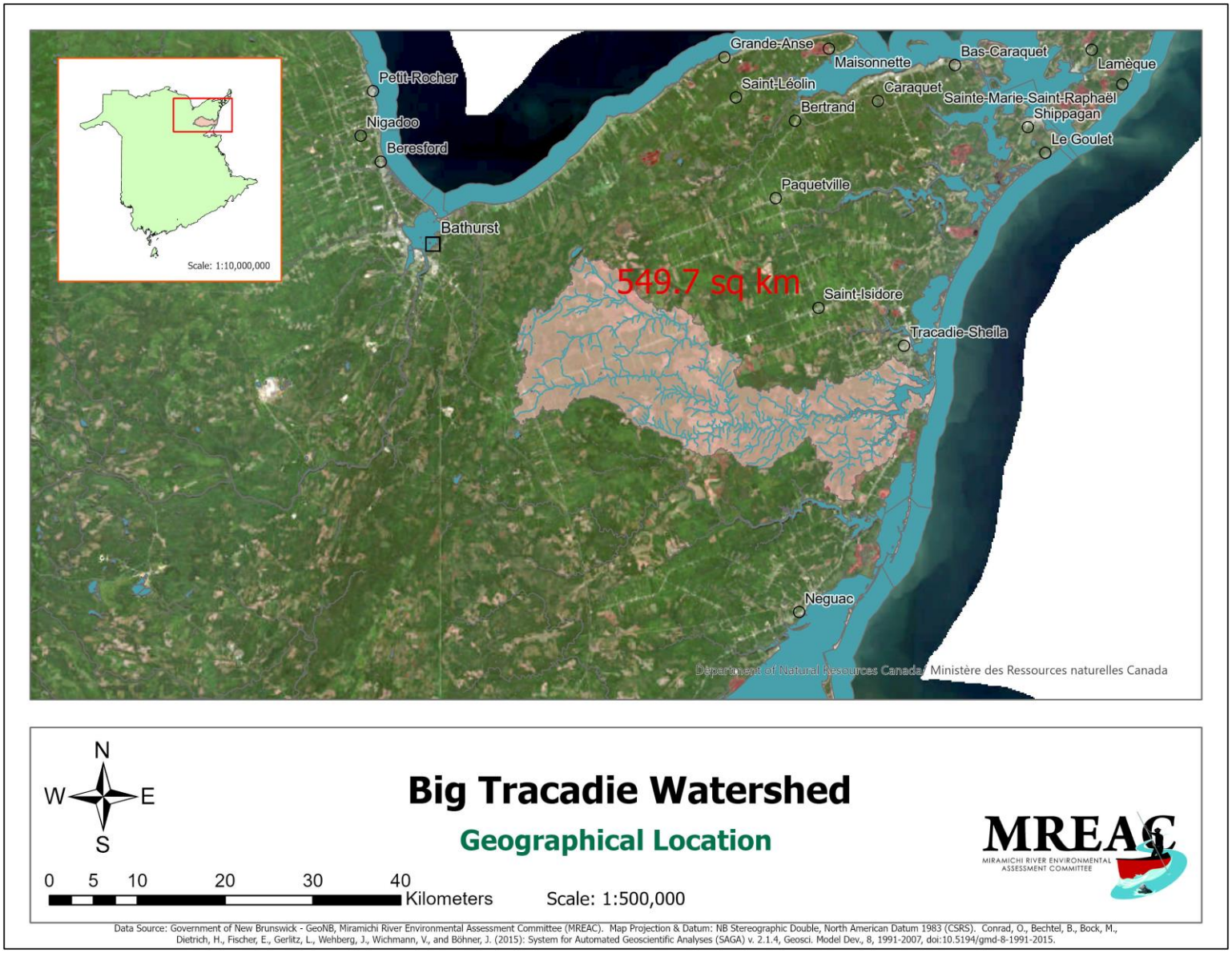

Figure 1 Big Tracadie River Drainage Basin - Geographical Location

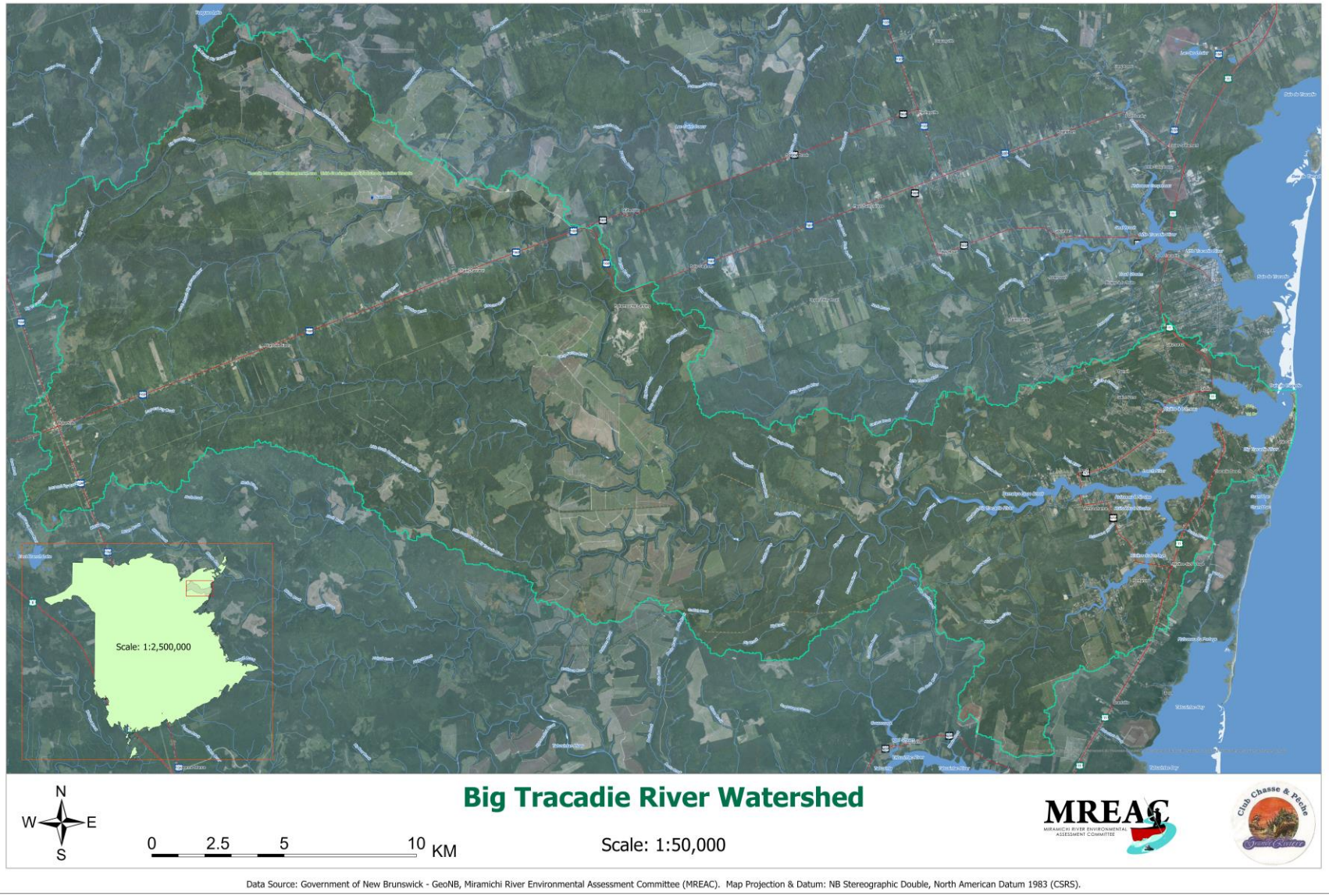

Figure 2 Big Tracadie River watershed and watercourses

The Big Tracadie River flows west to east and ultimately drains into the Northumberland Strait. The Big and Little Tracadie watershed is among a suite of waterways of the Acadian Peninsula cradled between the Tabusintac River (south) and the Nepisiguit River to the north. Each of these watersheds face challenges due to intensive resource harvesting, their relatively limited size, and other development pressures. On the Big Tracadie the urban and rural population is concentrated along the tidal waters. There is, however, a long ribbon community distributed along 22 kilometres of Hwy 160 that crosses the upper Big Tracadie watershed. Resource harvesting on the watershed has typically been industrial level forestry. More recently commercial blueberry operations are covering expansive landscape views. This sector, already large, is rapidly expanding and limiting opportunities for anglers, hunters, and outdoor enthusiasts.

3.0 Conservation Strategy Objectives for Atlantic Salmon on the Big Tracadie River watershed

1. To maintain the ecological integrity and existing recreational fishing values that the Big Tracadie River currently possesses.

2. To conserve and protect existing Atlantic salmon stocks and their habitat.

3. To contribute to existing environmental knowledge and tap into the existing traditional knowledge through monitoring and interviews of recreational fishers.

4. To promote the cooperation and support of residents, landowners, recreational users, industrial users, and other interested parties in effective management of recreational fisheries resources.

5. To promote additional Protected Natural Areas on the Big Tracadie watershed in face of significant industrial forestry levels and rapidly increasing agricultural development.

6. To promote equity and fairness for all users in the application of management measures for recreational fishing.

7. To present a long-term strategy to conserve and maintain recreational fish and their habitat.

8. To encourage consultation between recreational resource users and developers that change natural landscapes into industrial or agricultural uses.

9. To promote and support more community-based monitoring and stewardship.

In discussions with Atlantic salmon anglers, in review of available resource information, and as confirmed by current electrofishing results, the Big Tracadie has significant resident Atlantic salmon. However, little monitoring occurs on the level of salmon angling and the river's potential in producing Atlantic salmon. In 2024, temperature monitoring, field surveys, habitat assessment, electro-fishing, and interviews were completed to support this conservation strategy. The scope of this 2024 work on the Big Tracadie River watershed cannot determine the current level of Atlantic salmon production. Nor do we know the number of returning Atlantic salmon to spawn annually. The technology referred to as "ARIS Sonar Population Tracking" should be considered for future application on the Big Tracadie to assess the numbers of returning spawners.

Recommendation: *When feasible, the Big Tracadie Rive should be assessed using "ARIS Sonar Population Tracking" to determine the actual size of the annual spawning population*.

This report considers the river's limiting factors and considers approaches to sustain the existing level of salmon production and the prospect of enhancing that production.

Trout are the other target species of local fishers on the Big Tracadie. Salmon angling is concentrated in the spring and fall. Like most other rivers of this scale in eastern New Brunswick, summer heat and limited rainfall often limit salmon movement to a fall run. Low water levels and high-water temperatures are a deterrent to these cold-water fishes under mid summer conditions. Two habitat surveys completed in 2024 on the Lord and Foy and the Big Tracadie (main branch) showed that there are several naturally occurring pools and good conditions for resident juvenile salmon as well as adequate spawning conditions for returning salmon. (Appendix A)

4.0 River Setting & Climate

The Big Tracadie drainage basin is found in the Eastern Lowlands ecoregion (Figure 3). The lowland topography results in an even, low gradient river with an average drop of approximately 2.5 meters per kilometer from the headwaters to the head of tide .

As noted, the Big Tracadie River watershed covers 549.7 km² (Figure 1 Big Tracadie River Drainage Basin - Geographical Location). The basin consists of the main branch, several larger tributaries and numerous small brooks. Three of the larger tributaries were successfully monitored for their season-long temperature regime. The flow conditions in 2024 were low and temperatures warm due to the hot and dry summer weather. These conditions require the main salmon spawning run to occur later in the fall when water volumes are greater, and the water is cooler. Climate Normals from Bathurst New Brunswick (1991-2020) show a daily average July temperature of 19.1°C and a daily average January temperature of -10.6°C. The mean annual precipitation was 1117.7 mm. The past decade has shown that summer temperatures are on the rise, and this is in keeping with the expected climate change scenario.

Crown lands on the Big Tracadie River are largely managed by two industrial operations, namely industrial forestry and, more recently, blueberry agriculture.

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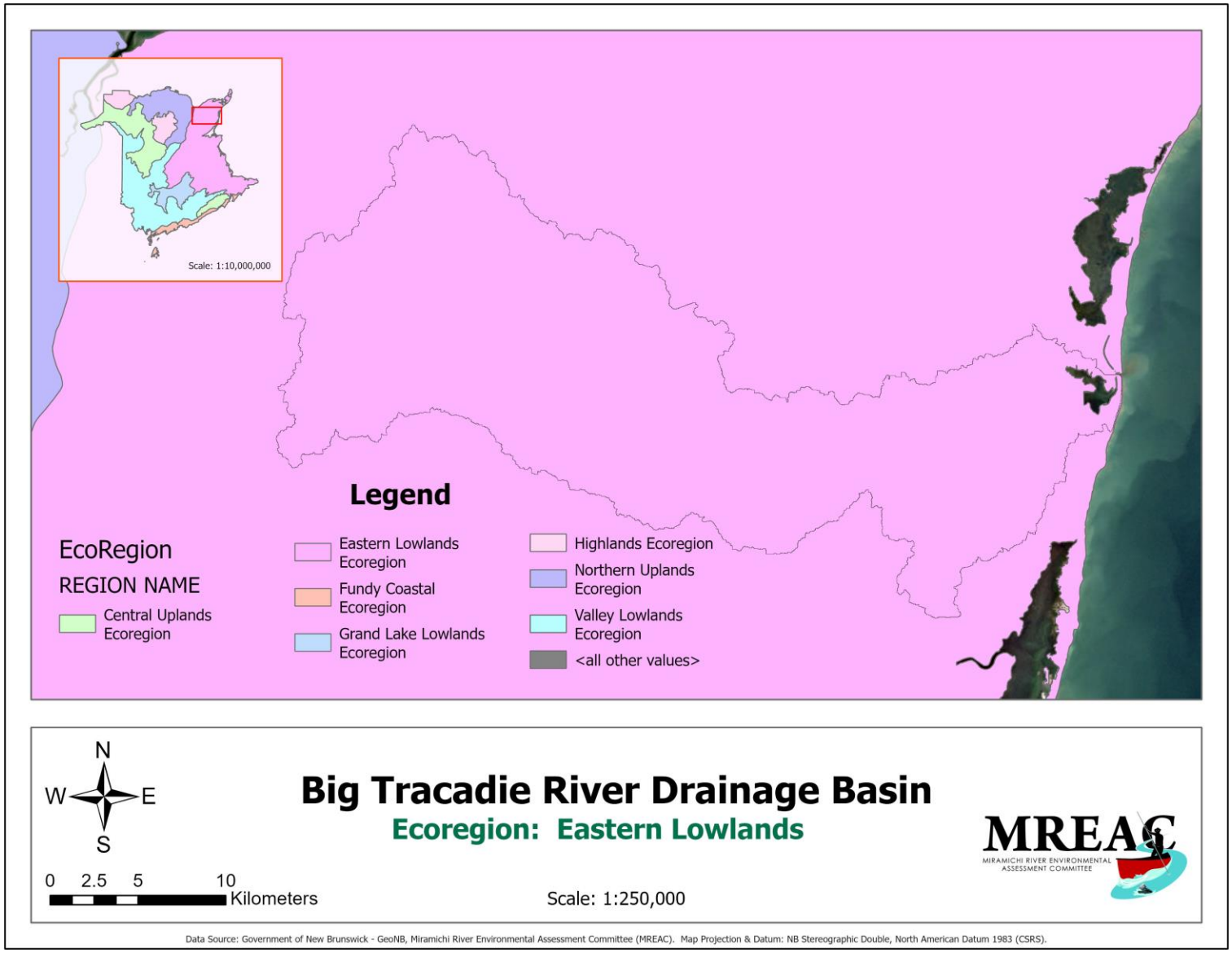

Figure 3 Ecoregions

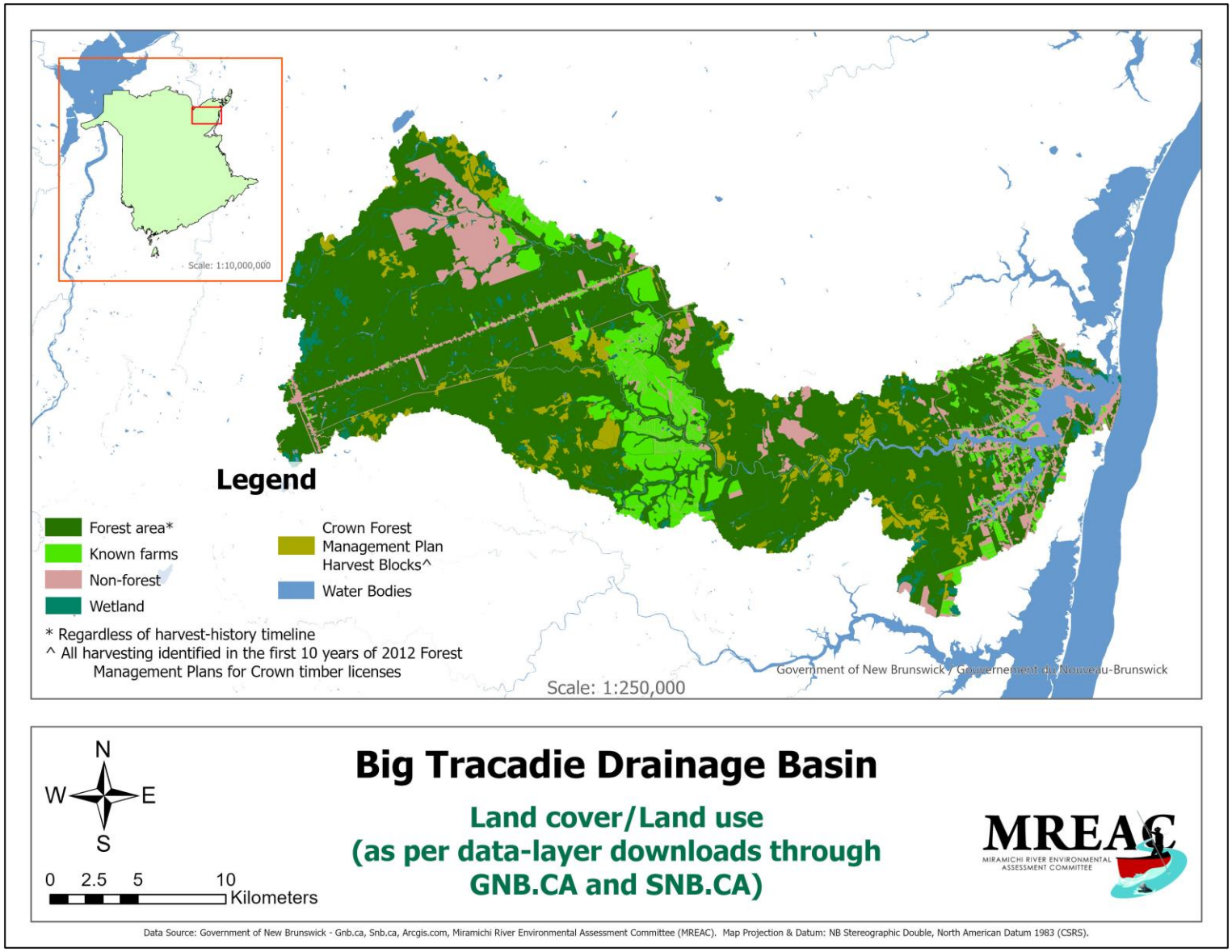

Figure 4 Big Tracadie River Watershed Land Cover/Land Use

Figure 5 Big Tracadie River Canoe Reconnaissance – pH sampling May 2024

5.0 Bedrock and Surficial Geology

The bedrock geology of the Big Tracadie drainage basin is typical to that of the eastern lowlands ecoregion which is generally composed of grey sandstone and red mudstone. The stratum dates to the Carboniferous (Pennsylvanian) geologic era. Exposed bedrock are a feature of some stretches of the river bottom with little other surficial material as a cover. More commonly the river has a cobble/gravel bottom and suitable habitat for the variety of resident aquatic species.

The surficial geology of the Big Tracadie River basin is primarily composed of silt, sand, gravel, rubble, loamy lodgement till, and minor ablation till. Once tidal influenced waters are reached the waterway becomes a depositional environment. Sandy bottoms and shoals become a common feature in these settings. Wetlands and bogs are more common in the headwaters but do not negatively impact water quality or clarity.

According to Natural Resources and Energy Development data, the watershed is divided between two main bedrock geologies, coded by the DNRED as "MNT-mc" and "RCH-mc". Both are largely sandstone.

MNT-mc: "Grey to greenish grey, fine- to coarse-grained sandstone, pebbly sandstone and quartz pebble rich conglomerate; minor dark grey and maroon mudstone and siltstone; sandstone is commonly brown-weathered, flaggy and plant-bearing."

RCH-mc: "Grey and brownish red, commonly micaceous, lithic and arkosic sandstone, pebbly sandstone, and intraformational mudstone-clast conglomerate; brownish red to brick-red and lesser grey, siltstone and mudstone."

RCH-mc is the bedrock geology of the coastal area of the Eastern Lowlands Ecoregion, generally, and MNT-mc of the inland area of the same, generally. The junction runs north-south across the watershed, dividing the watershed about 1 km downriver of the junction of the Big Tracadie with the Little South Branch Big Tracadie.

Extending into the upper watershed from the southwest and from the northeast directions are two narrow intrusions of dark grey tholeiitic diabase (coded as "CRQ-mi"), each approximately 0.25 km wide. Each of these intrusions terminates about 1 km from the Lord and Foy. The northern intrusion crosses the Route 363 near its intersection with Route 160, just outside of the watershed, and crosses the Big Tracadie shortly below its junction with Meadow Brook. The southern intrusion crosses the upper headwaters of the Little South Branch Big Tracadie.

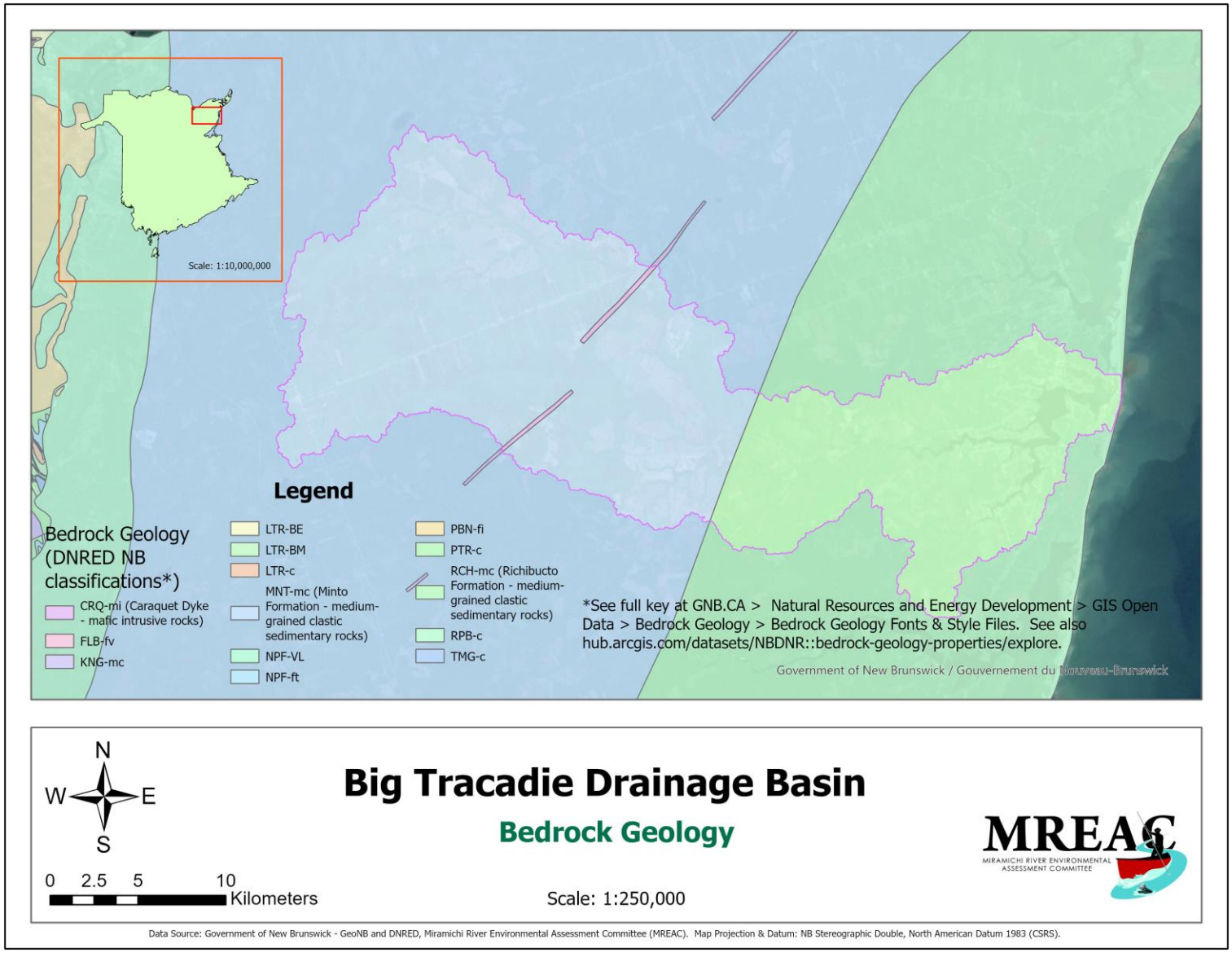

Figure 6 Big Tracadie River Drainage Basin Bedrock Geology

6.0 Land Use History, Land Cover and Land Use

The Big Tracadie River watershed has the unique and unenviable status of hosting a former "bombing range". The area was used for practice bombing runs and artillery training during World War II and well beyond. The area was greater than 18,000 hectares of land west of the town of Tracadie-Sheila. Both the Army and Air Force used the area as a training firing range from 1939 until 1994. When established, the area required the expropriation of properties and removal of residents to other locations. While this area has been returned to the province (1997) there remain areas identified where there is some risk of encountering unexploded ordinances (UXO).

The predominant land-cover on the Big Tracadie River is forest cover and forestry remains a main economic activity on the watershed. Most of the forest harvesting is industrial scale with leased crown land worked by Interfor Corp. Industrial scale blueberry agriculture is quickly expanding with an already large footprint in the watershed. These activities have the greatest anthropogenic impact on the watershed. Private woodlots and smaller privately owned blueberry operations are also common. Both industry sectors have associated spray programs for respective pests. Both sectors also require a buffer zone along waterways. The "agriculture" status of blueberry operations has a 5-meter buffer rather than the 30 meters required in forest harvesting. The Tracadie Fish and Game club, in light of the rapidly expanding blueberry operations, would like to see the blueberry sector adopt wider buffer zones for their operations. They would also like to see regular third-party water quality monitoring following spray operations to determine potential habitat impacts. This monitoring, they feel, should be sponsored by the blueberry sector.

There is no active tracking of the level of recreational fishing activity and even less resource data available on Atlantic salmon. Anglers on the Big Tracadie target Brook trout during the summer months with little expectation of catching Atlantic salmon until the fall run. Recreational fishing for Striped bass fishing has grown dramatically in popularity on the tidal waters over the past decade with the explosion of the Striped bass population in the Gulf of St Lawrence. Striped bass have been caught by anglers as far upstream as Big Brook. The level of predation by Striped bass on Atlantic salmon smolt as they migrate to salt water is a major concern among Atlantic salmon anglers, including those on the Big Tracadie River.

7.0 Land Tenure

Much of the crown land on the Big Tracadie watershed is leased out to either industrial scale forestry or blueberry operators. Within the last two decades the blueberry sector on both private and crown lands has expanded rapidly, especially on the Big Tracadie River watershed.

There is a significant corridor of private land ownership along Hwy 160 where it crosses the west end of the Big Tracadie watershed. Another area of private land ownership is along the Tracadie-

Sheila coastal zone and estuarine waters. The split between crown and non-crown land is approximately 55%/45% respectively.

Private woodlot holdings come with the regulations of applying appropriate stewardship principles. These can be provided through the New Brunswick Federation of Woodlot Owners. Forestry operations on crown land come with stewardship regulations, one being a 30m buffer along water ways. Blueberry production however comes under regulations related to agricultural practices. Regulations in this sector allow for a 5-meter buffer along watercourses.

It is noted that nationally, Canada has a target of protecting 30% of its lands by 2030. New Brunswick has a target of protecting 10% of its land area. Recent-year additions through the Nature Legacy Protected Areas initiative have apparently increased protected lands on the Big Tracadie to 12.2%. However, the Tracadie Fishing and Game club members noted that a significant area of protected land from the former Tracadie River Wildlife Management Area appears to be reclassified as agricultural land, with the major portion of the Wildlife Management Area sold off to a large blueberry grower, the sale date being back in 2014-Oct-10 according to SNB Property Assessment Online and SNB Real Property Online, with (possibly relevant) "changes of terms" in 2020-Jan-24 and 2023-Jun-01 in SNB document numbers 39809927 and 43896332, respectively. This property is dissected by the South Branch Big Tracadie and the main branch of the Big Tracadie River, known salmon-bearing streams.

It is the impression of the fish and game club that most industrial land deals are low profile and/or secretive to avoid public scrutiny. The Tracadie Fish and Game Club would like to have active engagement in a public forum when any landscape deals are proposed.

***Recommendation**: Strategies to promote the use of best management practices among private woodlot owners can be promoted through the New Brunswick Federation of Woodlot Owners.*

***Recommendation**: Strategies to promote shoreline protection and river stewardship should include recreational users, full-time residents, camp and cottage owners.*

Stricter trespass regulations on leased crown lands for agriculture (i.e. blueberries) have also impacted traditional access to waterways. Requiring "written permission" from the landowner and crown land leaseholder is the new requirement. The prospect of getting written permission from industrial scale operations on crown land seems daunting at best. This is another point of frustration for recreational anglers.

8.0 Beaver Dams

Beaver dams were typically present on the Big Tracadie River and her tributaries. Low water levels in 2024 allowed these rodents to construct a dam near the mouth of the Lord and Foy

River, one of the larger tributaries. Active beaver dams were left untouched by MREAC staff. The Tracadie fish and game club have expressed interest in seeking approval for a beaver dam notching program to be conducted during the fall spawning run. The Miramichi Salmon Association currently have a WAWA permit to undertake just such a program. No inactive dams were encountered that presented problems to fish passage in 2024. The fish and game club have notched or removed inactive dams in past years.

Figure 7 Lord and Foy Electrofishing - Beaver Dam Upstream as a Natural Barrier

Very high river flows in 2023 removed several older, inactive dams based on the strength of flow conditions (Pers. Com. Gilles Sonier - trapper).

***Recommendation**: Permits for the annual notching of problematic beaver dams in the late fall during spawning season should be granted to the Tracadie Fish and Game Club to enhance salmon access to headwater spawning sites.*

9.0 Habitat Conditions

Past habitat assessment and habitat improvement projects by the former Association des Bassins Versants de la Grande et Petite Riviere Tracadie and the Tracadie Fish and Game Club are acknowledged. Habitat assessments and electrofishing results in 2000 by members of the fish and game club, supported by staff from Fisheries and Oceans Canada, found juvenile Atlantic salmon on the Tracadie River (main branch), South Branch of the Big Tracadie and the Lord and Foy River. Other brooks, the Clearwater and Frank Hyde, did not result in the capture of juvenile salmon. Electrofishing in 2024 confirmed the presence of juvenile salmon on the Big Tracadie (main branch) and the Lord and Foy.

Two detailed habitat surveys were completed in 2024. First, on a one-kilometer reach extending from the mouth of the Lord and Foy one kilometer upstream (Figure 8). The second reach extends from the Hwy 160 bridge crossing over the Big Tracadie River upstream, again for one kilometer. The results of both habitat assessments (Appendix A) showed physical conditions conducive to rearing Atlantic salmon. The data recorded on the "DNR&E / DFO – New Brunswick Stream Habitat Inventory" field forms show that the overall physical characteristics make for favorable conditions in the number and depth of pools, available shade, potential cover with woody debris, bank stability, available shade, vegetated riverbanks and overall environmental conditions. The substrate would allow for nesting activity (i.e. the creation of a salmon redd).

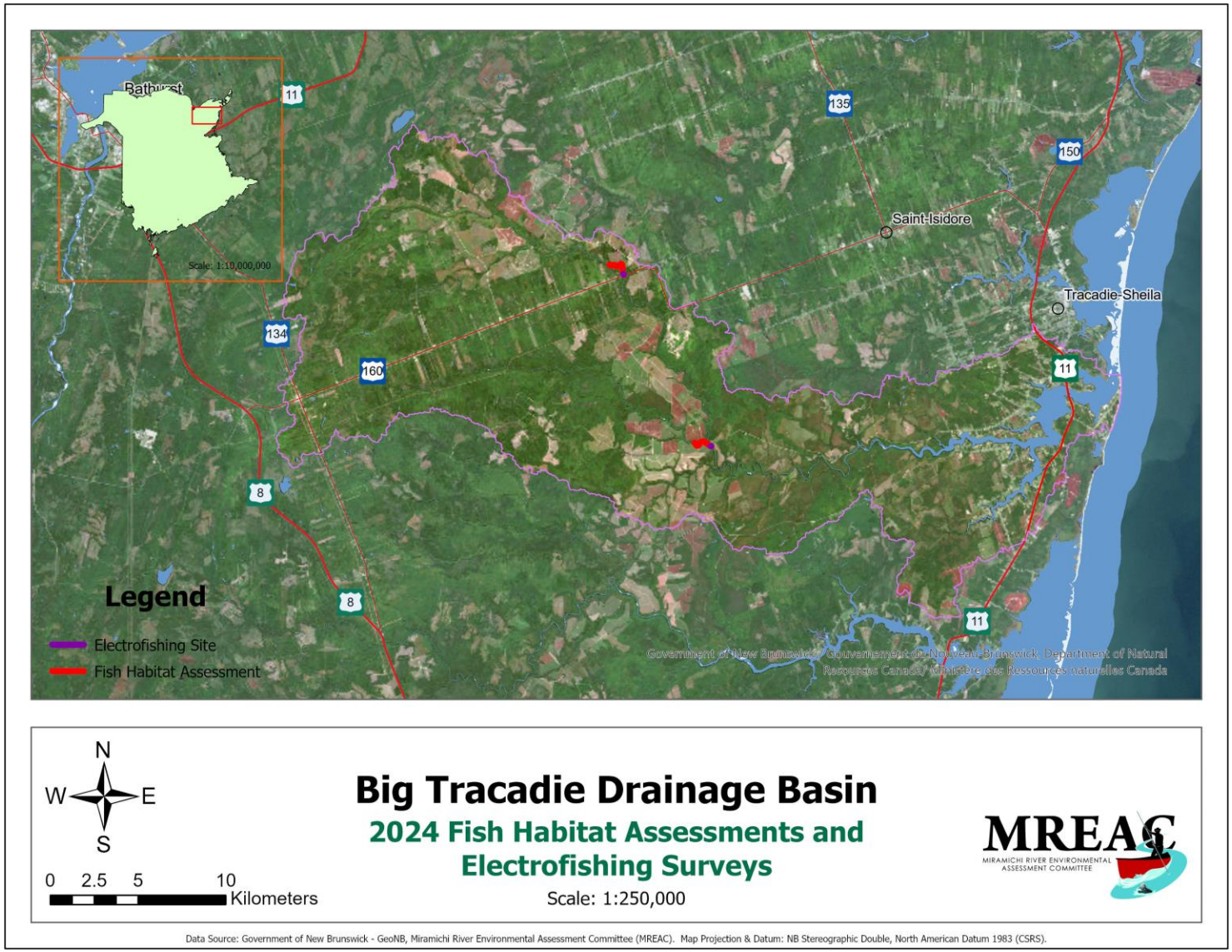

Figure 8 Habitat Surveys and Electrofishing Sites

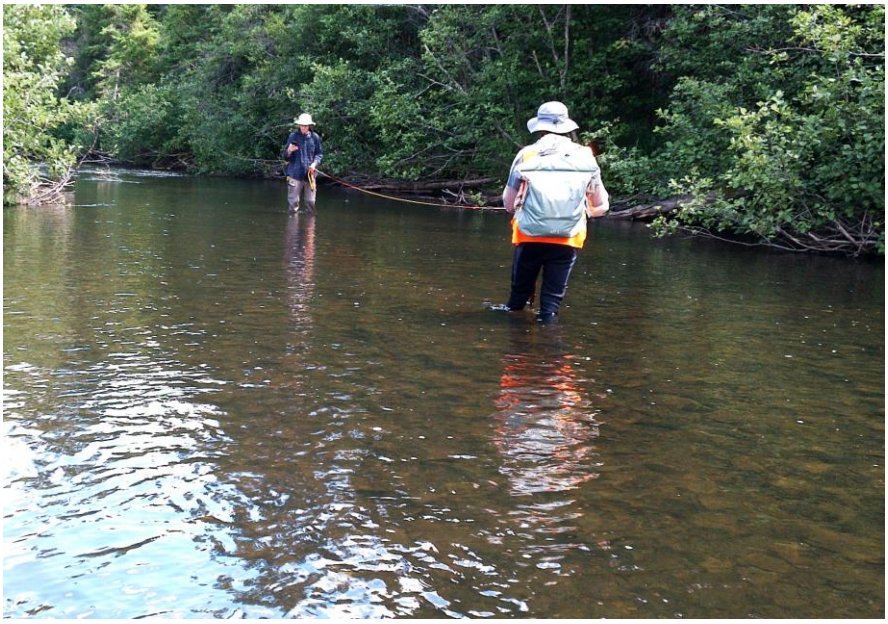

Figure 9 Habitat Assessment - Big Tracadie Headwaters

Figure 10 Habitat Assessment - Lord and Foy River

Water temperature loggers were deployed at six watershed sites, distributed on the main branch and two tributaries. Only three of these were successful recovered as noted earlier. The data (Figure 11) show that the Portage River is the more variable with greater highs and lows throughout the monitoring season. The smaller and more shaded South Branch of the Big Tracadie showed the consistently lower temperature readings. All three stations exceeded the recognized stress level for salmonids for a number of days in mid July and again in late July.

Higher temperatures and low water levels of the summer normally prohibit an early run of Atlantic salmon. This was true in 2024. Testimonial evidence informed that the very high flows in 2023 resulted in salmon entering the headwaters earlier than normal. However, as a “fall-run river”, adult salmon and grilse are not as at-risk due to the stresses of low water and high temperatures. Resident juvenile salmon will seek out cooler water conditions to wait out the warm-water season. With a warming climate is becoming increasingly important to protect cold water sources to continue to provide refuges for juvenile salmonids.

The three temperature loggers recovered provide profiles that extend four to five months. All were deployed in the spring and extracted in the fall.

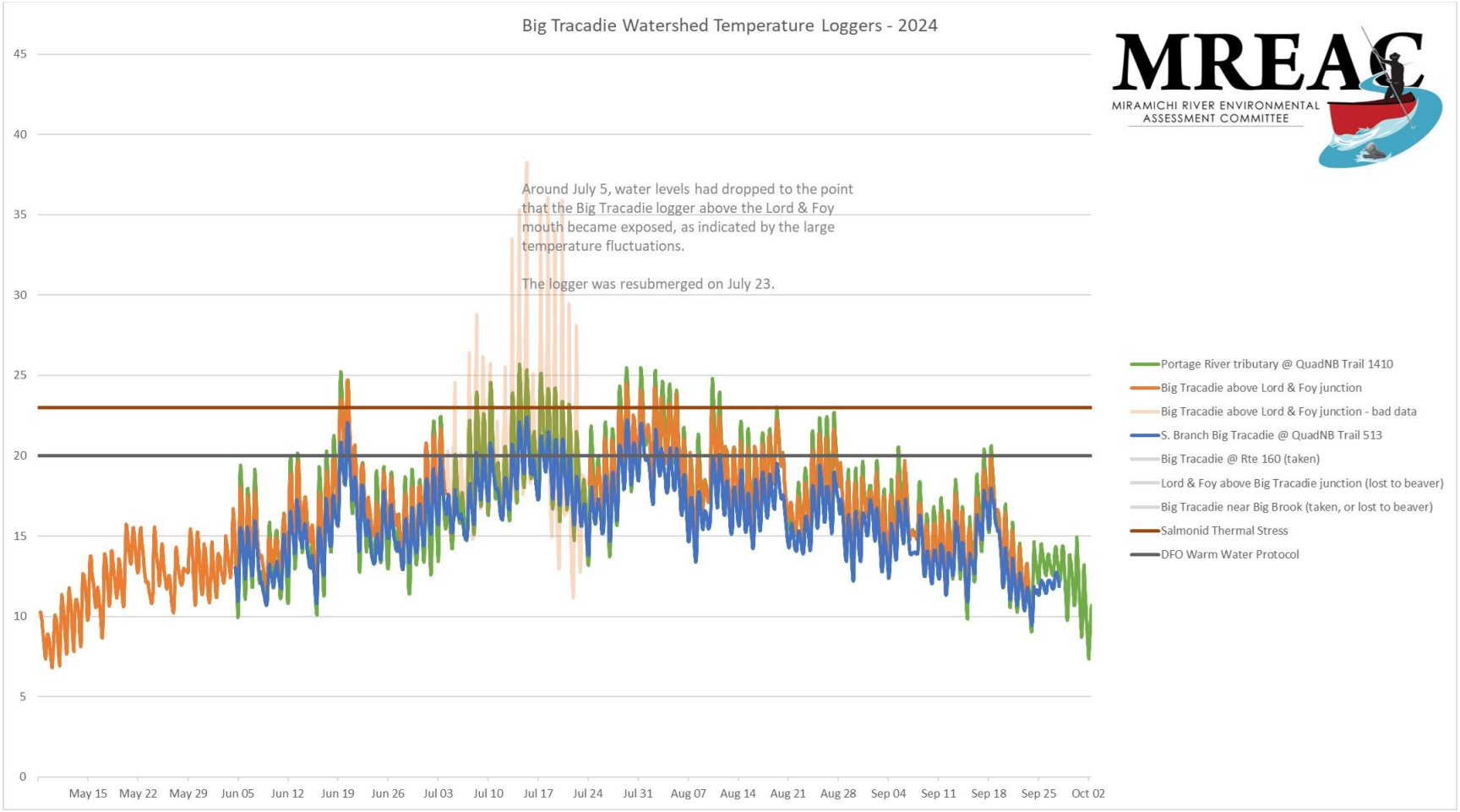

Figure 11 Water Temperature Profiles - Tracadie River and Tributaries

***Recommendation**: The Big Tracadie River watershed should be included in an annual comprehensive monitoring program of water temperature and other environmental parameters to monitor long-term trends with the intent of providing special protection of colder water streams and pools as fish refuges.*

Two electrofishing sites were fished by Mr. Rod Currie, fish biologist, on September 24th and 28th respectively. Mr. Currie was assisted by MREAC staff and volunteers The electrofishing team (Figure 12) found the electrofishing results much better than anticipated and were encouraged by both fry and parr abundance (Figure 13). Electrofishing data is presented later in this report and with added detail in Appendix D and E.

Figure 12 Electrofishing on the Lord and Foy River

Figure 13 Atlantic Salmon Parr - Lord and Foy River

9.1 Electrofishing Results – Lord and Foy River

	A	B	C	D	E	F	G	H	I	J
1	**Electrofishing results at Lord & Foy near junction with Big Tracadie, Sep. 24, 2024**									
2	**Species**	**MicroFish 3.0 Population Estimate**							**Total catch over 3 runs**	
3		Per: 171.5 sq m			**Per 100 sq m**			Data adjustment required?*	171.5 sq m	Adjusted to 100 sq m
4		Max-likelihood	95 % confidence interval		**Max-likelihood**	**95 % confidence interval**				
5			Low	High		**Low**	**High**			
6	Fry	78	54	102	**45.5**	**31.5**	**59.5**	No	61	35.6
7	Parr	38	33	43	**22.2**	**19.2**	**25.1**	No	36	21.0
8	Brook trout	11	8	14	**6.4**	**4.7**	**8.2**	No	11	6.4
9	Sculpin	19	6	32	**11.1**	**3.5**	**18.7**	No	15	8.7
10	Three-spined stickleback	2	> 0	7	**1.2**	**> 0**	**4.1**	No	2	1.2
11	Lake Chub								17	9.9
12	Lamprey								7	4.1
13	Sucker								23	13.4
14	American eel								2	1.2
15										
16		* Part of a catch may be attributed to an earlier run if there is a non-descending catch								
17		pattern								

The Lord and Foy electrofishing results were very encouraging, as the estimates above show. R.A. Currie (fisheries biologist) had not seen such productivity for a "long time".

The electrofishing data analysis was completed using MicroFish 3.0, by Van Deventer, J.S., and Platts, W.S. 1989. This is a software program for generating population statistics from electrofishing data. The same analysis was applied to the electrofishing site on the Big Tracadie River at Hwy 160.

9.2 Electrofishing Results – Big Tracadie River at Hwy 160

	A	B	C	D	E	F	G	H	I	J
1	**Electrofishing results at Big Tracadie above Rte. 160, Sep. 28, 2024**									
2	**Species**	**MicroFish 3.0 Population Estimate**							**Total catch over 4 runs**	
3		Per: 419.1 sq m			**Per 100 sq m**			Data adjustment required?*	419.1 sq m	Adjusted to 100 sq m
4		Max-likelihoo	95 % confidence interval		**Max-likelihood**	**95 % confidence interval**				
5			Low	High		**Low**	**High**			
6	Fry	367	269	465	**87.6**	**64.2**	**111.0**	Yes	238	56.8
7	Parr	9	8	10	**2.1**	**1.9**	**2.4**	No	9	2.1
8	Brook trout	15	3	27	**3.6**	**0.7**	**6.4**	Yes	12	2.9
9	Sculpin	174	144	204	**41.5**	**34.4**	**48.7**	No	140	33.4
10	Three-spined stickleback	8	5	11	**1.9**	**1.2**	**2.6**	No	8	1.9
11	Lamprey	3	>0	6	**0.7**	**>0**	**1.4**	Yes	3	0.7
12										
13										
14		* Part of a catch may be attributed to an earlier run if there is a non-descending catch								
15		pattern								

10.0 Water Quality and Quantity

Water quality monitoring on the Big Tracadie River watershed indicated that conditions are acceptable to support fish populations, including Atlantic salmon. Appendix C shows the results of two general chemistry suites of samples taken in 2024 from the Big Tracadie at Big Brook and at the mouth of the Lord and Foy River. These samples were analyzed at the RPC Laboratory (Fredericton). These results were compared to the Canadian Council of Ministers of the Environment's (CCME) Water Quality Guidelines for the Protection of Aquatic Life. No issues were noted. MREAC also sampled the Big Tracadie for cyanobacteria for both Algal Toxins Anatoxin-a and Microcystins. No cyanobacteria were detected.

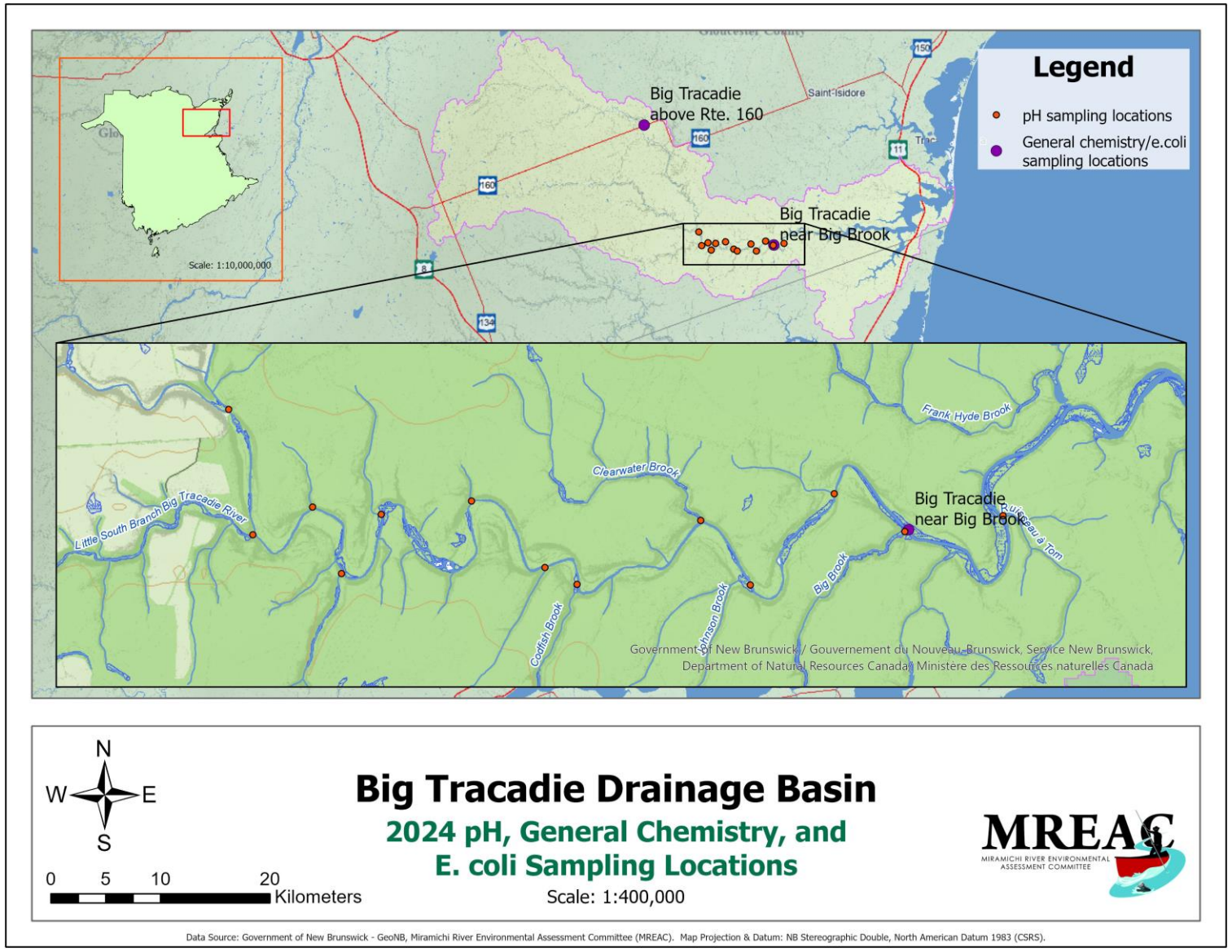

Figure 14 Water Quality Monitoring Sites - Big Tracadie River Watershed

Water temperature is an issue that has increasingly become a stress factor for Atlantic salmon in eastern New Brunswick rivers, including the Big Tracadie. Heat stress and low water conditions dictate a fall spawning run for both grilse and larger salmon. Water quantity is often another factor limiting fish movement. In 2024 low rainfall amounts resulted in very low-flow conditions. These are now typical conditions and spawning salmon respond in kind to enter freshwater to spawn only when conditions allow.

Other water parameters were taken throughout this project. Dissolved Oxygen (DO) levels have been acceptable in repeated monitoring over multiple visits. The river's pH values are also within an acceptable range. Regular monitoring of these parameters was commonplace when the watershed association was active. These are no longer monitored on a regular basis.

***Recommendation**: The Big Tracadie River should be included in a comprehensive monitoring program of water temperature in eastern New Brunswick rivers to monitor long-term trends with the intent of providing special protection of colder water streams and pools as fish refuges.*

***Recommendation:** Monitoring of the Big Tracadie for dissolved oxygen, pH levels and conductivity should continue annually throughout the open water season.*

Sedimentation issues appear to be minimal. Industrial level forest harvesters comply with the 30m buffer zone along waterways. Some river fording sites were noted in the spring river reconnaissance, but none seemed to contribute significant sediment to the watercourse. As an indicator of lower sedimentation levels, there is no extensive delta where the waterway becomes influenced by tides. Results in 2024 from sampling the general chemistry of Big Tracadie River and her tributaries did not flag any specific compounds that would limit habitat conditions for Atlantic salmon. (See Appendix C.)

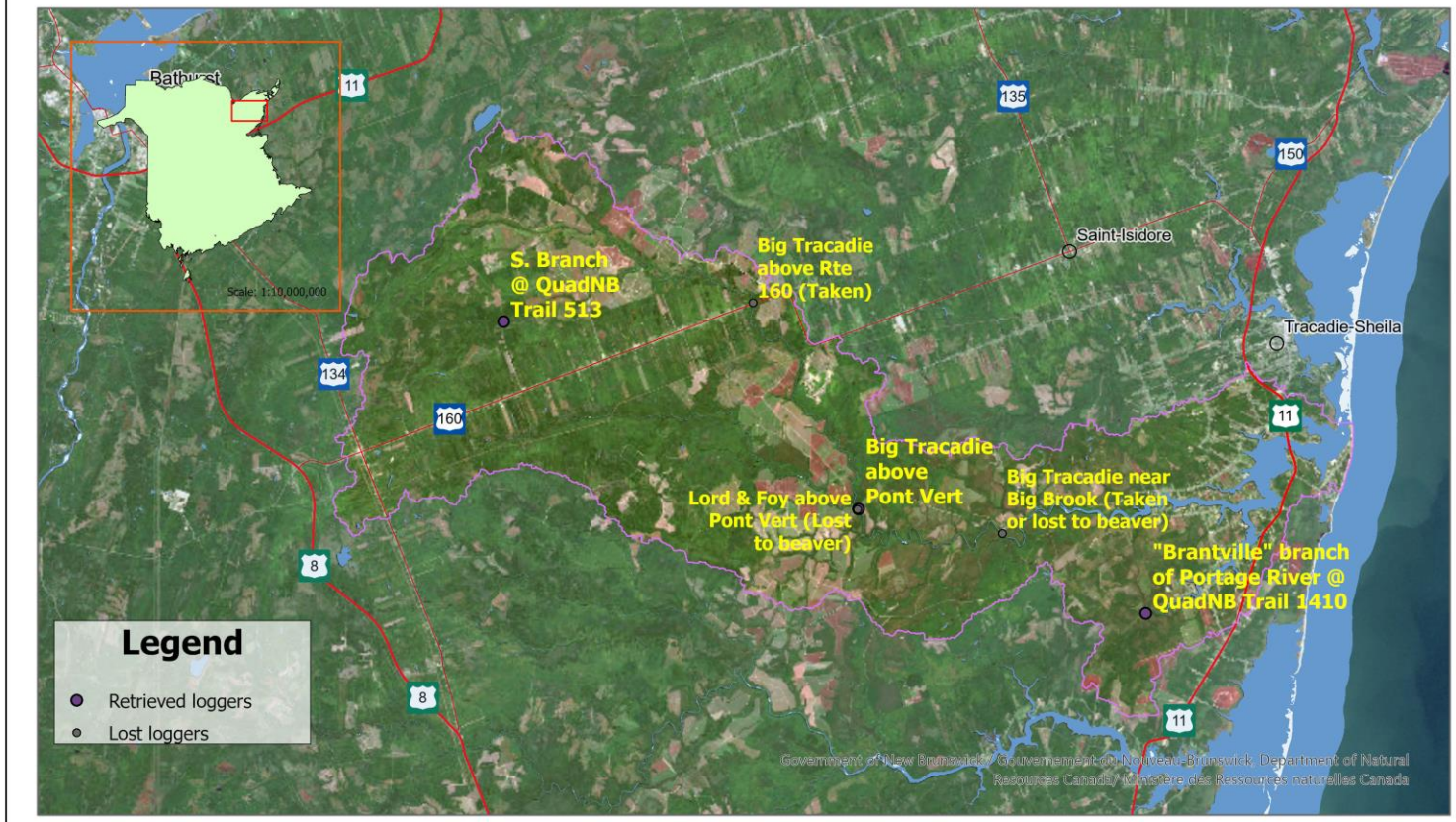

Figure 15 Temperature Logger Locations - Big Tracadie River Watershed

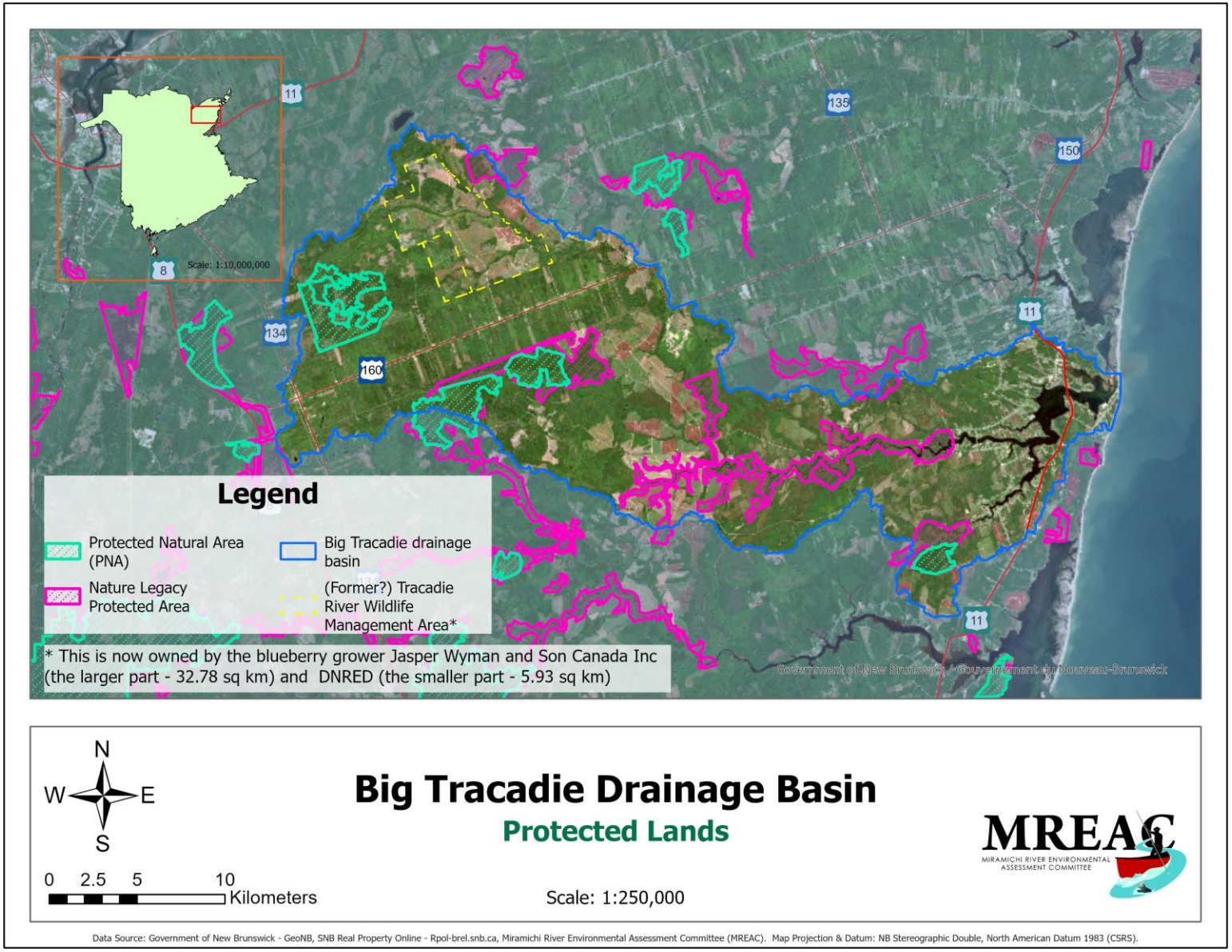

Figure 16 Protected Land

Figure 17 Blueberry Fields Dominate Large Areas of the Watershed

11.0 Conclusion

The Big Tracadie River watershed remains an intact waterway with an extant and stable Atlantic salmon population. The watercourse is not currently a significant destination for recreational salmon anglers due to its scale and relatively low profile. Local anglers are fine with the idea of having a 'hidden jewel' of a waterway without much external competition for angling waters.

Juvenile salmon productivity appears strong from results of monitoring in 2024. The threat of poaching of existing stocks is flagged as an issue via testimonial reports but its impact is unknown. The 'catch and release' regulation that now applies throughout New Brunswick has reduced salmon angling on the Big Tracadie as it has elsewhere in the province. The limited fishing pressure on this waterway suggests the available Atlantic salmon stock is not in peril from legitimate recreational angling.

MREAC monitoring and research on the Big Tracadie River was important to the development of this strategy as limited recent or historic information was available. These data are included in this strategy and display an intact and relatively healthy watershed,

Climate change impacts, as they increase, will be problematic on this waterway. Salmonids already suffer high temperatures during the peak heat of most summers. Larger Atlantic salmon and grilse are at sea for most of the warm water conditions. Habitat conditions for juvenile salmon will likely get more stressful in the face of warming conditions. Apart from high temperatures and often low water quantity during hot dry summers, other water quality parameters seem acceptable for Atlantic salmon survival.

Industrial scale forestry using clear-cutting methods is a major industrial use of the headwaters of the Big Tracadie watershed. Along with other rivers in New Brunswick, it continues to be "flashy", with quickly rising and quickly falling water levels associated with larger rainfall events. The riparian zone along the Big Tracadie is in generally good shape and with a narrow channel that offers good shading and some pools. The accepted 5-meter buffer zone for agricultural operations, including blueberry operations, is problematic.

Based on the data, visual observations recorded, and personal communications, the Big Tracadie watershed appears to have a significant production of Atlantic salmon. While poorly known, the limited pressure from recreational fishers suggest that the existing salmon stock is currently secure. The prospect of seeding this waterway with salmon eggs from brood stock collected on the river should be explored. In the interim, implementing the recommendations from this conservation strategy will assist in stabilizing the Atlantic salmon stock over the shorter-term.

***Recommendation**: Seeding the Big Tracadie watershed with salmon eggs from brood stock collected from the river should be explored and implemented, if feasible.*

All this considered, the future of Atlantic salmon in eastern New Brunswick waterways, including the Big Tracadie River, seems more likely to be determined by far reaching and challenging global factors rather than local limiting conditions.

12.0 Summary of Recommendations

Recommendation: Permits for the annual notching of problematic beaver dams in the late fall during spawning season should be granted to the Tracadie Fish and Game Club to enhance salmon access to headwater spawning sites.

Recommendation: The Big Tracadie River watershed should be included in an annual comprehensive monitoring program of water temperature and other environmental parameters to monitor long-term trends with the intent of providing special protection of colder water streams and pools as fish refuges.

Recommendation: Monitoring of water quality should continue annually in late-winter, spring and throughout the field season as part of a watershed monitoring program.

Recommendation: Strategies to promote shoreline protection and river stewardship should include recreational users, full-time residents, camp and cottage owners.

Recommendation: When feasible, the Big Tracadie River should be assessed using "ARIS Sonar Population Tracking" to determine the size of the annual spawning population.

Recommendation: A real-time monitoring station should be installed in the Tracadie River watershed to track water temperatures and serve as the trigger to institute a "warm water protocol" as needed to reduce stress to salmonids.

Recommendation: Monitoring of the Big Tracadie for dissolved oxygen, pH levels and conductivity should continue annually throughout the open water season. .

Recommendation: Strategies to promote the use of best management practices among private woodlot owners can be promoted through the New Brunswick Federation of Woodlot Owners**.**

Recommendation: Seeding the Big Tracadie watershed (main branch) with salmon fry taken from brood stock collected from the river should be explored and implement if feasible.

References

DFO. 2022. Update of indicators of Atlantic Salmon (Salmo salar) in DFO Gulf Region Salmon Fishing Areas 15 - 18 for 2020 and 2021. DFO Can. Sci. Advis. Sec. Sci. Resp. 2022/021.

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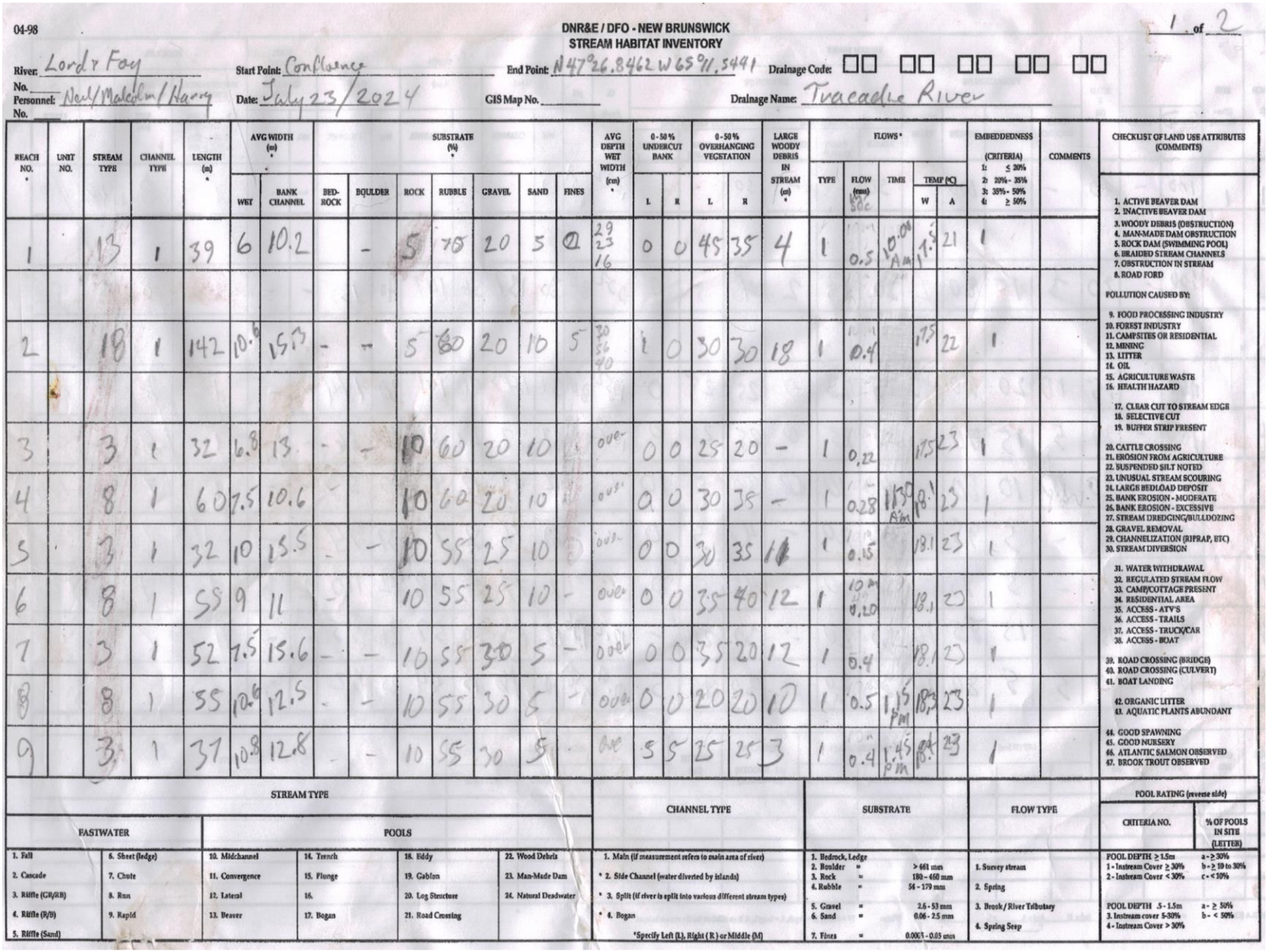
Van Devente, J.S., and Platts, W.S. 1988 Microcomputer software system for generating population statistics from electrofishing data: users guide for MicroFish 3.0. General Technical Report INT-254. United States Department of Agriculture, Forest Service, Ogden, Utah.

GNB.CA > Natural Resources and Energy Development > GIS Open Data > Bedrock Geology (https://www2.gnb.ca/content/gnb/en/departments/erd/open-data/bedrock-geology.html)

https://www.canada.ca/en/department-national-defence/services/uxo/uxo-locations/practicing-uxo-safety-tracadie-range.html

Appendix A: Fish Habitat Assessment Sheets – Lord and Foy and Big Tracadie Rivers



04-98

DNR&E / DFO - NEW BRUNSWICK
STREAM HABITAT INVENTORY

1 of 2

River: Lord & Foy Start Point: Confluence End Point: N47°26.8462 W65°11.3491 Drainage Code: □□ □□ □□ □□ □□

No. ____ Personnel: Neil/Malcolm/Harry Date: July 23/2024 GIS Map No. ____ Drainage Name: Tracadie River

No. ____

REACH NO.	UNIT NO.	STREAM TYPE	CHANNEL TYPE	LENGTH (m)	AVG WIDTH (m) WET	AVG WIDTH (m) BANK CHANNEL	SUBSTRATE (%) BED-ROCK	BOULDER	ROCK	RUBBLE	GRAVEL	SAND	FINES	AVG DEPTH WET WIDTH (cm)	0-50% UNDERCUT BANK L	0-50% UNDERCUT BANK R	0-50% OVERHANGING VEGETATION L	0-50% OVERHANGING VEGETATION R	LARGE WOODY DEBRIS IN STREAM (m)	FLOWS* TYPE	FLOWS* FLOW (cms)	FLOWS* TIME	TEMP (°C) W	TEMP (°C) A	EMBEDDEDNESS (CRITERIA) 1: ≤ 20% 2: 20% - 35% 3: 35% - 50% 4: ≥ 50%	COMMENTS
1		13	1	39	6	10.2		-	5	70	20	5	10	29 23 16	0	0	45	35	4	1	0.5	10:00 AM	17.5	21	1	
2		18	1	142	10.6	15.7	-	-	5	80	20	10	5	30 50 40	1	0	30	30	18	1	0.4		17.5	22	1	
3		3	1	32	6.8	13	-	-	10	60	20	10		over	0	0	25	20	-	1	0.22		17.5	23	1	
4		8	1	60	7.5	10.6			10	60	20	10		over	0	0	30	35	-	1	0.28	1:55 PM	18.1	23	1	
5		3	1	32	10	15.5	-	-	10	55	25	10		over	0	0	30	35	14	1	0.15		18.1	23	1	
6		8	1	55	9	11	-		10	55	25	10	-	over	0	0	35	40	12	1	10 cm 0.20		18.1	23	1	
7		3	1	52	7.5	15.6	-	-	10	55	30	5	-	over	0	0	35	20	12	1	0.4		18.1	23	1	
8		8	1	55	10.6	12.5	-	-	10	55	30	5	-	over	0	0	20	20	10	1	0.5	1:15 PM	18.3	23	1	
9		3	1	37	10.8	12.8	-	-	10	55	30	5	-	over	5	5	25	25	3	1	0.4	1:45 PM	18.4	23	1	

CHECKLIST OF LAND USE ATTRIBUTES (COMMENTS)

1. ACTIVE BEAVER DAM
2. INACTIVE BEAVER DAM
3. WOODY DEBRIS (OBSTRUCTION)
4. MAN-MADE DAM OBSTRUCTION
5. ROCK DAM (SWIMMING POOL)
6. BRAIDED STREAM CHANNELS
7. OBSTRUCTION IN STREAM
8. ROAD FORD

POLLUTION CAUSED BY:

9. FOOD PROCESSING INDUSTRY
10. FOREST INDUSTRY
11. CAMPSITES OR RESIDENTIAL
12. MINING
13. LITTER
14. OIL
15. AGRICULTURE WASTE
16. HEALTH HAZARD
17. CLEAR CUT TO STREAM EDGE
18. SELECTIVE CUT
19. BUFFER STRIP PRESENT
20. CATTLE CROSSING
21. EROSION FROM AGRICULTURE
22. SUSPENDED SILT NOTED
23. UNUSUAL STREAM SCOURING
24. LARGE BEDLOAD DEPOSIT
25. BANK EROSION - MODERATE
26. BANK EROSION - EXCESSIVE
27. STREAM DREDGING/BULLDOZING
28. GRAVEL REMOVAL
29. CHANNELIZATION (RIPRAP, ETC)
30. STREAM DIVERSION
31. WATER WITHDRAWAL
32. REGULATED STREAM FLOW
33. CAMP/COTTAGE PRESENT
34. RESIDENTIAL AREA
35. ACCESS - ATV'S
36. ACCESS - TRAILS
37. ACCESS - TRUCK/CAR
38. ACCESS - BOAT
39. ROAD CROSSING (BRIDGE)
40. ROAD CROSSING (CULVERT)
41. BOAT LANDING
42. ORGANIC LITTER
43. AQUATIC PLANTS ABUNDANT
44. GOOD SPAWNING
45. GOOD NURSERY
46. ATLANTIC SALMON OBSERVED
47. BROOK TROUT OBSERVED

STREAM TYPE

FASTWATER: 1. Fall; 2. Cascade; 3. Riffle (GR/RB); 4. Riffle (R/B); 5. Riffle (Sand); 6. Sheet (ledge); 7. Chute; 8. Run; 9. Rapid

POOLS: 10. Midchannel; 11. Convergence; 12. Lateral; 13. Beaver; 14. Trench; 15. Plunge; 16.; 17. Bogan; 18. Eddy; 19. Gabion; 20. Log Structure; 21. Road Crossing; 22. Wood Debris; 23. Man-Made Dam; 24. Natural Deadwater

CHANNEL TYPE

1. Main (if measurement refers to main area of river)
* 2. Side Channel (water diverted by islands)
* 3. Split (if river is split into various different stream types)
* 4. Bogan

*Specify Left (L), Right (R) or Middle (M)

SUBSTRATE

1. Bedrock, Ledge
2. Boulder = > 661 mm
3. Rock = 180 - 660 mm
4. Rubble = 54 - 179 mm
5. Gravel = 2.6 - 53 mm
6. Sand = 0.06 - 2.5 mm
7. Fines = 0.003 - 0.05 mm

FLOW TYPE

1. Survey stream
2. Spring
3. Brook / River Tributary
4. Spring Seep

POOL RATING (reverse side)

CRITERIA NO.	% OF POOLS IN SITE (LETTER)
POOL DEPTH ≥ 1.5m	a - ≥ 30%
1 - Instream Cover ≥ 30%	b - ≥ 10 to 30%
2 - Instream Cover < 30%	c - < 10%
POOL DEPTH .5 - 1.5m	a - ≥ 50%
3. Instream cover 5-30%	b - < 50%
4 - Instream Cover > 30%	

REACH NO.	SITE (50m interval)	% SITE		SHADE (%)	STREAM BANKS											O₂ (mg/l)	pH	DEPTH						POOL RATING (CRITERIA ON OTHER SIDE)		POOL TAIL			% TURBULENCE
					VEGETATION (%)				EROSION (%)									¼ (m)		½ (m)		¾ (m)				EMBEDDEDNESS (CRITERIA)	MEAN SUBSTRATE SIZE (cm)	% FINE	
		RIFFLE/ RUN	POOLS		BARE GROUND	GRASSES	SHRUBS	TREES	LEFT BANK (0 - 50%)			RIGHT BANK (0 - 50%)						Wet	CHANNEL	Wet	CHANNEL	Wet	CHANNEL	NO.	LETTER	1: ≤ 20% 2: 20% - 35% 3: 35% - 50% 4: ≥ 50%			
									STABLE	BARE STABLE	ERODING	STABLE	BARE STABLE	ERODING															
1	1	100	-	40	-	-	100	-	50	-	-	50	-	-		10.52	8.04	29		23		16		-	-			10	100
2		100	-	20	3	15	80	2	30	15	2	45	5	0		10.52	8.04	30	137	56	147	40	155	-	-			5	5
3		100	-	15	10	20	60	10	25	25	0	25	25	0		10.52	8.04	31	143	41	161	30	144	-	-			5	100
4		100	-	20	5	15	80	-	25	25	0	25	25	0		10.33	8.0	37	97	23	84	16	66	-	-			5	0
5		100		20	0	10	80	-	40	10	0	30	5	10		"	"	12	41	12	43	20	53	-	-			5	100
6		100		15	-	5	95	-	30	20	-	45	5	0		"	"	29	76	36	93	37	94	-	-			5	0
7		90	10	15	-	5	95	-	30	20	-	45	5	0		"	"	7	79	25	68	62	110	2	b	1	7	5	0
8		100	-	15	-	15	85	10	30	20	-	30	20	-		10.2	7.96	16	63	20	59	21	55	-	-	1	7		
9		100	-	10	5	5	80	10	30	20	-	30	15	5		10.01	7.88	10	46	15	44	25	62	-	-				

REACH NO.	UNIT NO.	STREAM TYPE	WET WIDTH (m)	DEPTH (cm)			AVERAGE DEPTH SUM/4		COEFFICIENT (0.9 - SMOOTH) (0.8 - ROUGH)	LENGTH (3m)	FLOAT TIME (sec)				COMMENTS (LOCATION)
				⅛ WAY	½ WAY	⅞ WAY	CENTIMETERS (cm)	METERS (m)			⅛ WAY	½ WAY	⅞ WAY	AVERAGE	

FORMULA (CMS) = W_____ (m) x D_____ (m) x A_____ x L_____ (m) / T_____ (sec) Where: W = width, D = depth, L = length, A is coefficient for the stream bottom

04-98

DNR&E / DFO - NEW BRUNSWICK
STREAM HABITAT INVENTORY

River: Lord's Fork Start Point: Green Bridge End Point: N47°26.8462 W65°11.5441 Drainage Code: ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

No.

Personnel: Neil/Harry/Malcolm Date: July 23/24 GIS Map No.

No.

Drainage Name: Tracadie River NB

REACH NO.	UNIT NO.	STREAM TYPE	CHANNEL TYPE	LENGTH (m)	AVG WIDTH (m)		SUBSTRATE (%)							AVG DEPTH WET WIDTH (cm)	0-50% UNDERCUT BANK		0-50% OVERHANGING VEGETATION		LARGE WOODY DEBRIS IN STREAM (#)	FLOWS					EMBEDDEDNESS (CRITERIA) 1: ≤ 20% 2: 20% - 35% 3: 35% - 50% 4: ≥ 50%	COMMENTS
					WET	BANK CHANNEL	BED-ROCK	BOULDER	ROCK	RUBBLE	GRAVEL	SAND	FINES		L	R	L	R		TYPE	FLOW (cms)	TIME	TEMP (°C) W	TEMP (°C) A		
10		8	1	200	8.7	10.8	-	5	~~15~~ 5	70	15	5	-	28	0	0	25	30	8	1	10	20	18.4	23	1	
11		3	1	297	9.3	12.3		5	10	60	10	5	-	24	0	0	25	30	33	1	10 in	20	18.4	24	1	
12																										
13																										

CHECKLIST OF LAND USE ATTRIBUTES (COMMENTS)

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2. INACTIVE BEAVER DAM
3. WOODY DEBRIS (OBSTRUCTION)
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9. FOOD PROCESSING INDUSTRY
10. FOREST INDUSTRY
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12. MINING
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17. CLEAR CUT TO STREAM EDGE
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43. AQUATIC PLANTS ABUNDANT

44. GOOD SPAWNING
45. GOOD NURSERY
46. ATLANTIC SALMON OBSERVED
47. BROOK TROUT OBSERVED

STREAM TYPE

FASTWATER

1. Fall
2. Cascade
3. Riffle (GR/RB)
4. Riffle (R/B)
5. Riffle (Sand)
6. Sheet (ledge)
7. Chute
8. Run
9. Rapid

POOLS

10. Midchannel
11. Convergence
12. Lateral
13. Beaver
14. Trench
15. Plunge
16.
17. Bogan
18. Eddy
19. Gabion
20. Log Structure
21. Road Crossing
22. Wood Debris
23. Man-Made Dam
24. Natural Deadwater

CHANNEL TYPE

1. Main (if measurement refers to main area of river)
* 2. Side Channel (water diverted by islands)
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*Specify Left (L), Right (R) or Middle (M)

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3. Rock = 180 - 460 mm
4. Rubble = 54 - 179 mm
5. Gravel = 2.5 - 53 mm
6. Sand = 0.06 - 2.5 mm
7. Fines = 0.0005 - 0.05 mm

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1. Survey stream
2. Spring
3. Brook / River Tributary
4. Spring Seep

POOL RATING (reverse side)

CRITERIA NO.	% OF POOLS IN SITE (LETTER)
POOL DEPTH ≥ 1.5m	a - ≥ 30%
1 - Instream Cover ≥ 30%	b - ≥ 10 to 30%
2 - Instream Cover < 30%	c - < 10%
POOL DEPTH .5 - 1.5m	a - ≥ 50%
3. Instream cover 5-30%	b - < 50%
4 - Instream Cover > 30%	

REACH NO.	SITE (50m - interval)	% SITE		SHADE (%)	STREAM BANKS											O₂ (mg/l)	pH	DEPTH						POOL RATING (CRITERIA ON OTHER SIDE)		POOL TAIL			% TURBULENCE
					VEGETATION (%)				EROSION (%)									¼ (m)		½ (m)		¾ (m)						
		RIFFLE/ RUN	POOLS		BARE GROUND	GRASSES	SHRUBS	TREES	LEFT BANK (0 - 50%)			RIGHT BANK (0 - 50%)						Wet	CHANNEL	Wet	CHANNEL	Wet	CHANNEL	NO.	LETTER	EMBEDDEDNESS (CRITERIA) 1: ≤ 20% 2: 20% - 35% 3: 35% - 50% 4: ≥ 50%	MEAN SUBSTRATE SIZE (cm)	% FINE	
									STABLE	BARE STABLE	ERODING	STABLE	BARE STABLE	ERODING														
10		100	-	15	-	5	45	0	40	10	-	40	10	-	10.07	7.89	26	62	30	64	27	64	-	-				
11		100	-	20	5	5	60	20	35	10	5	35	10	5	10.07	7.89	29	73	21	66	22	66	-	-				

REACH NO.	UNIT NO.	STREAM TYPE	WET WIDTH (m)	DEPTH (cm)			AVERAGE DEPTH SUM/4		COEFFICIENT (0.9 - SMOOTH) (0.8 - ROUGH)	LENGTH (3m)	FLOAT TIME (sec)				COMMENTS (LOCATION)
				⅛ WAY	½ WAY	⅞ WAY	CENTIMETERS (cm)	METERS (m)			⅛ WAY	½ WAY	⅞ WAY	AVERAGE	

FORMULA (CMS) = W_____ (m) x D_____ (m) x A_____ x L_____ (m) / T_____ (sec) Where: W = width, D = depth, L = length, A is coefficient for the stream bottom

04-98

31-80
40-84
42-87

1 of 1

DNR&E / DFO - NEW BRUNSWICK
STREAM HABITAT INVENTORY

River: Big Tracadie River Start Point: N 47° 32.1510 W 065° 14.7694 End Point: N 47° 32.4174 W 065 15.1124 Drainage Code: ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

No.

Personnel: Neil/Middle/Harry Date: Aug 7/2024 GIS Map No. Drainage Name: Big Tracadie River

No.

REACH NO.	UNIT NO.	STREAM TYPE	CHANNEL TYPE	LENGTH (m)	AVG WIDTH (m) WET	AVG WIDTH (m) BANK-CHANNEL	SUBSTRATE (%) BED-ROCK	BOULDER	ROCK	RUBBLE	GRAVEL	SAND	FINES	AVG DEPTH WET WIDTH (m)	0-50% UNDERCUT BANK L	0-50% UNDERCUT BANK R	0-50% OVERHANGING VEGETATION L	0-50% OVERHANGING VEGETATION R	LARGE WOODY DEBRIS IN STREAM (#)	FLOWS* TYPE	FLOW (m³/s)	TIME	TEMP (°C) W	TEMP (°C) A	IMPEDIMENTS (CRITERIA)	COMMENTS
1		8	1	250	10.5	13.2	-	-	-	20	75	5	-	37.6	-	-	5	5	55	1	.25	12:00	17.5	24	1	
2		3	1	50	17.5	22.5	-	-	-	20	75	5	-	11.8	-	-	5	5	2	1	.2	12:30	17	24	1	
3		8	1	600	14	21.5	-	-	50	45	5	-	-	42.3	-	-	5	5	46	1	.3	13:17	17	25	1	
4		3	1	28	7.3	9.6	-	10	60	25	5	-	-	19.6	-	-	5	5	1	1	.9	13:50	18	25	1	
5		8	1	72	12.8	14.5	5	5	40	30	15	5	-	60.6	-	-	5	5	1	1	.44	14:00	17	25	1	

STREAM TYPE

FASTWATER		POOLS			
1. Fall	6. Sheet (ledge)	10. Mid-channel	14. Trench	18. Eddy	22. Wood Debris
2. Cascade	7. Chute	11. Convergence	15. Plunge	19. Gabion	23. Man-Made Dam
3. Rifle (Gravel)	8. Run	12. Lateral	16.	20. Log Structure	24. Natural Deadwater
4. Rifle (Rock)	9. Rapid	13. Beaver	17. Dugout	21. Road Crossing	
5. Rifle (Sand)					

CHANNEL TYPE

1. Main (If measurement refers to main arm of river)
* 2. Side Channel (water diverted by islands)
* 3. Split (If river is split into various different stream types)
* 4. Dugout

*Specify Left (L), Right (R) or Middle (M)

SUBSTRATE

1. Bedrock, Ledge		
2. Boulder	=	> 501 mm
3. Rock	=	180 - 400 mm
4. Rubble	=	84 - 179 mm
5. Gravel	=	2.6 - 83 mm
6. Sand	=	0.06 - 2.5 mm
7. Fines	=	0.0005 - 0.05 mm

FLOW TYPE

1. Heavy stream
2. Spring
3. Brook/River Tailwater
4. Spring Seep

CHECKLIST OF LAND USE ATTRIBUTES (COMMENTS)

1. ACTIVE BEAVER DAM
2. INACTIVE BEAVER DAM
3. WOODY DEBRIS (OBSTRUCTION)
4. MAN-MADE DAM OBSTRUCTION
5. ROCK DAM (SPAWNING POOL)
6. SHADED STREAM CHANNELS
7. OBSTRUCTION IN STREAM
8. ROADSIDE

POLLUTION CAUSED BY:

9. FOOD PROCESSING INDUSTRY
10. FORESTRY INDUSTRY
11. COMMERCIAL OR RESIDENTIAL
12. MINING
13. LITTER
14. OIL
15. AGRICULTURE WASTE
16. HEALTH HAZARD

17. CLEAR-CUT TO STREAM EDGE
18. SELECTIVE CUT
19. BUFFER STRIP PRESENT

20. CATTLE CROSSING
21. EROSION FROM AGRICULTURE
22. SUSPENDED SILT NOTED
23. UNUSUAL STREAM SCOURING
24. LARGE SEDIMENT DEPOSIT
25. BANK EROSION - MODERATE
26. BANK EROSION - EXCESSIVE
27. STREAM CHANNELIZING/BULLDOZING
28. GRAVEL REMOVAL
29. CHANNELIZATION (RIPRAP, ETC)
30. STREAM DIVERSION

31. WATER WITHDRAWAL
32. REGULATED STREAMFLOW
33. CAMP/COTTAGE PRESENT
34. RESIDENTIAL AREA
35. ACCESS - ATV'S
36. ACCESS - TRAILS
37. ACCESS - TRUCK/CAR
38. ACCESS - BOAT

39. ROAD CROSSING (BRIDGE)
40. ROAD CROSSING (CULVERT)
41. BOAT LANDING

42. ORGANIC LITTER
43. AQUATIC PLANTS ABUNDANT

44. GOOD SPAWNING
45. GOOD NURSERY
46. ATLANTIC SALMON OBSERVED
47. BROOK TROUT OBSERVED

POOL RATING (reverse side)

CRITERIA NO.	% OF POOLS IN SITE (LETTER)
POOL DEPTH ≥ 1.5m 1 - Instream Cover ≥ 20% 2 - Instream Cover < 20%	a - ≥ 30% b - ≥ 10 to 30% c - < 10%
POOL DEPTH .5 - 1.5m 3. Instream cover 5-20% 4 - Instream Cover > 20%	a - ≥ 30% b - < 30%

Appendix B: pH Results from the Big Tracadie River and Tributary Streams May 8th 2024

	GPS Coordinates		Brook/river sampled	River Right/Left	pH	Temp - C	DO mg/L	SPC us/cm
1	N47° 26.84'	W65° 10.91'	Main branch Big Tracadie at Lord & Foy junction	n/a	8.24	7.8	10.96	74.9
2	N47° 26.161'	W65° 10.728'	Little South Branch	R.R.	7.4	7.6	11.85	60
3	N47° 26.305'	W65° 10.248'	Brook @ N47° 26.305' W65° 10.248'	R.L.	8.27	5.4		
4	N47° 25.942'	W65° 10.026'	Gionne Brook (local name?) - N47° 25.942' W65° 10.026'	R.R.	7.91	7.7	7.7	51.4
5	N47° 26.259'	W65° 09.702'	Ruisseau de la Mollasse	R.L.	8.14	6.8		
6	N47° 26.323'	W65° 08.977'	Brook @ N47° 26.323' W65° 08.977'	R.L.	8.03	7.3		
7	N47° 25.957'	W65° 08.400'	Brook @ N47° 25.957' W65° 08.400'	R.R.	8.09	6.4		
8	N47° 25.863'	W65° 08.146'	Codfish Brook	R.R.	7.86	9.5		
9	N47° 26.196'	W65° 07.151'	Clearwater Brook	R.L.	7.8	8.7		
10	N47° 25.843'	W65° 06.765'	Johnson Brook	R.R.	7.3	10	3.59	33.9
11	N47° 26.329'	W65° 06.080'	Albert Richardson Brook (local name?) - N47° 26.329' W65° 06.080'	R.L.	7.75	8.2		
12	N47° 26.116'	W65° 05.523'	Big Brook	R.R.	7.68	10.8	3	34.4
13	N47° 26.194'	W65° 04.737'	Ruisseau à Tom	R.R.	7.78	11.6		

Appendix C: General Chemistry and E. coli Results from the Big Tracadie Watershed

Apr. 17, 2024 sampling - Across from GeoNB's *Big Brook* (here labelled as Isaie Pont):

Report/Rapport: 519077-ML-W1
Date: 19-Apr-24
Date Received/Reçu: 18-Apr-24

CERTIFICATE OF ANALYSIS / CERTIFICAT D'ANALYSE
for/pour
Miramichi River Environmental
Assessment Committee
21 Cove Road
Miramichi, NB E1V 0A6

Attention: Harry Collins

rpc
921 ch College Hill Rd
Fredericton NB
Canada E3B 6Z9
☎ 506.452.1212
506.452.1395
www.rpc.ca

Client Location: Tracadie
Microbiological Examination of Water/Qualité microbiologique de l'eau potable

RPC Sample ID/No. d'échantillon de RPC:				519077-1
Client Sample ID/ID d'échantillon du client:				Big Tracadie - Isaie Pont
Date collected/Date du prélèvement				17-Apr-24
Time sampled/Heure du prélèvement				12:30:00 PM
Analytes/Paramètre(s)	**Method/Méthode**	**Date Analyzed Date Analysé**	**Units Unités**	
E. coli	MICRO10	18-Apr-24	MPN/100mL	48.8

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 ID: 519077-IAS
Report Date: 24-Apr-24
Date Received: 18-Apr-24

CERTIFICATE OF ANALYSIS

for
Miramichi River Environmental
Assessment Committee
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Miramichi, NB E1V 0A6

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

Attention: Harry Collins
Project #: Not Available
Location: Tracadie

Analysis of Surface Water

RPC Sample ID:			519077-1
Client Sample ID:			Big Tracadie - Isaie Pont
Date Sampled:			17-Apr-24
Analytes	**Units**	**RL**	
Sodium	mg/L	0.05	2.09
Potassium	mg/L	0.02	0.36
Calcium	mg/L	0.05	5.35
Magnesium	mg/L	0.01	0.98
Alkalinity (as $CaCO_3$)	mg/L	2	17
Chloride	mg/L	0.5	3.1
Fluoride	mg/L	0.05	0.14
Sulfate	mg/L	1	< 1
Bromine	mg/L	0.01	< 0.01
Ammonia (as N)	mg/L	0.05	< 0.05
Un-ionized @ 20°C	mg/L	-	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05
Nitrite (as N)	mg/L	0.05	< 0.05
Nitrate (as N)	mg/L	0.05	< 0.05
Nitrogen - Total	mg/L	0.2	< 0.2
Phosphorus - Total	mg/L	0.002	0.018
Carbon - Total Organic	mg/L	0.5	4.0
Colour	TCU	5	28
Conductivity	µS/cm	1	48
pH	units	-	7.4
Turbidity	NTU	0.1	1.0
Calculated Parameters			
Bicarbonate (as $CaCO_3$)	mg/L	-	16.9
Carbonate (as $CaCO_3$)	mg/L	-	0.040
Hardness (as $CaCO_3$)	mg/L	0.2	17.4
TDS (calc)	mg/L	-	27
Saturation pH (20°C)	units	-	9.3
Langelier Index (20°C)	-	-	-1.93

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
Chemical Technician
Inorganic Analytical Chemistry

Report ID: 519077-IAS
Report Date: 24-Apr-24
Date Received: 18-Apr-24

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

Attention: Harry Collins
Project #: Not Available
Location: Tracadie

Analysis of Surface Water

RPC Sample ID:			519077-1
Client Sample ID:			Big Tracadie - Isaie Pont
Date Sampled:			17-Apr-24
Analytes	**Units**	**RL**	
Aluminum	mg/L	0.001	0.104
Antimony	mg/L	0.0001	< 0.0001
Arsenic	mg/L	0.001	< 0.001
Barium	mg/L	0.001	0.041
Beryllium	mg/L	0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001
Boron	mg/L	0.001	0.003
Cadmium	mg/L	0.00001	0.00001
Calcium	mg/L	0.05	5.35
Chromium	mg/L	0.001	< 0.001
Cobalt	mg/L	0.0001	< 0.0001
Copper	mg/L	0.001	< 0.001
Iron	mg/L	0.02	0.12
Lead	mg/L	0.0001	0.0002
Lithium	mg/L	0.0001	0.0004
Magnesium	mg/L	0.01	0.98
Manganese	mg/L	0.001	0.030
Molybdenum	mg/L	0.0001	< 0.0001
Nickel	mg/L	0.001	< 0.001
Potassium	mg/L	0.02	0.36
Rubidium	mg/L	0.0001	0.0004
Selenium	mg/L	0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001
Sodium	mg/L	0.05	2.09
Strontium	mg/L	0.001	0.033
Tellurium	mg/L	0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001
Uranium	mg/L	0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001
Zinc	mg/L	0.001	0.002

Report ID: 519077-IAS
Report Date: 24-Apr-24
Date Received: 18-Apr-24

CERTIFICATE OF ANALYSIS
for
Miramichi River Environmental
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Miramichi, NB E1V 0A6

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Fax: 506.452.0594
www.rpc.ca

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

Aug. 19, 2024 sampling – Big Tracadie at Hwy 160 and Big Brook; Portage River headwaters

Report/Rapport: 533086-ML-W1
Date: 21-Aug-24
Date Received/Reçu: 20-Aug-24

CERTIFICATE OF ANALYSIS / CERTIFICAT D'ANALYSE
for/pour
Miramichi River Environmental
Assessment Committee
21 Cove Road
Miramichi, NB E1V 0A6

rpc
921 ch College Hill Rd
Fredericton NB
Canada E3B 6Z9
☎ 506.452.1212
506.452.1395
www.rpc.ca

Attention: Harry Collins

Client Location: Big Tracadie Watershed
Microbiological Examination of Water/Qualité microbiologique de l'eau potable

RPC Sample ID/No. d'échantillon de RPC:				533086-1	533086-2	533086-3
Client Sample ID/ID d'échantillon du client:				Big Tracadie @ Hwy 160	Portage River (trib)	Big Tracadie @ Big Break
Date collected/Date du prélèvement				19-Aug-24	19-Aug-24	19-Aug-24
Time sampled/Heure du prélèvement				10:30:00 AM	11:45:00 AM	12:45:00 PM
Analytes/Paramètre(s)	**Method/Méthode**	**Date Analyzed Date Analysé**	**Units Unités**			
E. coli	MICRO10	20-Aug-24	MPN/100mL	63	135	31

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.

Corrie Maston
Acting Micro Supervisor
Applied and Experimental Bioscience

Page 1 of/de 1

Morgan Armour
Microbiology Technician
Applied and Experimental Bioscience

Report ID: 533086-IAS
Report Date: 30-Aug-24
Date Received: 20-Aug-24

CERTIFICATE OF ANALYSIS

for
Miramichi River Environmental
Assessment Committee
21 Cove Road
Miramichi, NB E1V 0A6

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

Attention: Harry Collins
Project #: Not Available
Location: Big Tracadie Watershed

Analysis of Surface Water

RPC Sample ID:			533086-1
Client Sample ID:			Big Tracadie @ Hwy 160
Date Sampled:			19-Aug-24
Analytes	**Units**	**RL**	
Sodium	mg/L	0.05	2.78
Potassium	mg/L	0.02	0.54
Calcium	mg/L	0.05	13.8
Magnesium	mg/L	0.01	1.89
Alkalinity (as $CaCO_3$)	mg/L	2	39
Chloride	mg/L	0.5	2.1
Fluoride	mg/L	0.05	0.19
Sulfate	mg/L	1	4
Bromine	mg/L	0.01	0.01
Ammonia (as N)	mg/L	0.05	< 0.05
Un-ionized @ 20ºC	mg/L	-	< 0.001
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05
Nitrite (as N)	mg/L	0.05	< 0.05
Nitrate (as N)	mg/L	0.05	< 0.05
Nitrogen - Total	mg/L	0.2	< 0.2
Phosphorus - Total	mg/L	0.002	0.014
Carbon - Total Organic	mg/L	0.5	1.8
Colour	TCU	5	7
Conductivity	µS/cm	1	102
pH	units	-	7.8
Turbidity	NTU	0.1	1.0
Calculated Parameters			
Bicarbonate (as $CaCO_3$)	mg/L	-	38.7
Carbonate (as $CaCO_3$)	mg/L	-	0.230
Hardness (as $CaCO_3$)	mg/L	0.2	42.2
TDS (calc)	mg/L	-	51
Saturation pH (20°C)	units	-	8.6
Langelier Index (20°C)	-	-	-0.79

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

RL = Reporting Limit

Matthew Norman
Senior Chemist
Inorganic Analytical Chemistry

Krista Skinner
Chemical Technician
Inorganic Analytical Chemistry

Report ID: 533086-IAS
Report Date: 30-Aug-24
Date Received: 20-Aug-24

CERTIFICATE OF ANALYSIS

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Tel: 506.452.1212
Fax: 506.452.0594
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Attention: Harry Collins
Project #: Not Available
Location: Big Tracadie Watershed

Analysis of Surface Water

RPC Sample ID:			533086-1
Client Sample ID:			Big Tracadie @ Hwy 160
Date Sampled:			19-Aug-24
Analytes	**Units**	**RL**	
Aluminum	mg/L	0.001	0.027
Antimony	mg/L	0.0001	< 0.0001
Arsenic	mg/L	0.001	< 0.001
Barium	mg/L	0.001	0.072
Beryllium	mg/L	0.0001	< 0.0001
Bismuth	mg/L	0.001	< 0.001
Boron	mg/L	0.001	0.005
Cadmium	mg/L	0.00001	< 0.00001
Calcium	mg/L	0.05	13.8
Chromium	mg/L	0.001	< 0.001
Cobalt	mg/L	0.0001	< 0.0001
Copper	mg/L	0.001	< 0.001
Iron	mg/L	0.02	0.12
Lead	mg/L	0.0001	< 0.0001
Lithium	mg/L	0.0001	0.0006
Magnesium	mg/L	0.01	1.89
Manganese	mg/L	0.001	0.070
Molybdenum	mg/L	0.0001	0.0001
Nickel	mg/L	0.001	< 0.001
Potassium	mg/L	0.02	0.54
Rubidium	mg/L	0.0001	0.0007
Selenium	mg/L	0.001	< 0.001
Silver	mg/L	0.0001	< 0.0001
Sodium	mg/L	0.05	2.78
Strontium	mg/L	0.001	0.123
Tellurium	mg/L	0.0001	< 0.0001
Thallium	mg/L	0.0001	< 0.0001
Tin	mg/L	0.0001	< 0.0001
Uranium	mg/L	0.0001	< 0.0001
Vanadium	mg/L	0.001	< 0.001
Zinc	mg/L	0.001	< 0.001

Report ID: 533086-IAS
Report Date: 30-Aug-24
Date Received: 20-Aug-24

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

Appendix D: Electrofishing Data – Lord and Foy River

Lord & Foy, Big Tracadie watershed, New Brunswick, Sep 24, 2024

Rod Currie, Greg Currie, Harry Collins, Neil Collins

Conditions:	Temp (C)	pH	DO (mg/L)	nductivity (µs/c	Salinity (ppt)
	11.1	7.83	11.52	85.4	0.05

Area:	length (m):	30	width (m):	6.4	6	5	4.8	5.7	6.4		
	total area =		171.5	*m2*	Conversion factor:		x	**0.583090379**	=	100	*m2*
			171.5					0.583090379			

	Run:	**1**	**2**	**3**	**4**
	Run time (seconds):	**1134**	**1165**	**978**	**741**
	Fry	28	23	10	15
	Parr	21	11	4	5
	Brook trout	5	5	1	4
	Blacknose dace				
	Redbelly dace				
	Common shiner				
	Lake Chub	5	9	3	4
	Sculpins	7	4	4	0
	Three-spined stickleback	1	1		
	Lamprey	1	3	3	3
	Suckers	6	14	3	6
	American eel		2		

Modifications of data for MicroFish 3.0 processing
(Run 4 omitted due to upstream disturbance. Data for non-descending patterns ommitted, also.)

Run:	**1**	**2**	**3**
Fry	28	23	10
Parr	21	11	4
Brook trout	5	5	1
Blacknose dace			
Redbelly dace			
Common shiner			
Lake Chub			
Sculpins	7	4	4
Three-spined stick	1	1	
Lamprey			
Suckers			
American eel			

MicroFish 3.0 formatted input:

Lord & Foy, Big Tracadie watershed, New Brunswick, Sep 24, 2024

1	1	Fry	.	.	28	.
1	1	Parr	.	.	21	.
1	1	Brook_trout	.	.	5	.
1	1	Sculpin	.	.	7	.
1	1	Three-spined_s	.	.	1	.
1	2	Fry	.	.	23	.
1	2	Parr	.	.	11	.
1	2	Brook_trout	.	.	5	.
1	2	Sculpin	.	.	4	.
1	2	Three-spined_s	.	.	1	.
1	3	Fry	.	.	10	.
1	3	Parr	.	.	4	.
1	3	Brook_trout	.	.	1	.
1	3	Sculpin	.	.	4	.
1	3	Three-spined_s	.	.	0	.

Electrofishing results at Lord & Foy near junction with Big Tracadie, Sep. 24, 2024

Species	**MicroFish 3.0 Population Estimate**							**Total catch over 3 runs**	
	Per: 171.5 sq m			**Per 100 sq m**			Data adjustment required?*	171.5 sq m	Adjusted to 100 sq m
	Max-likelihood	95 % confidence interval		**Max-likelihood**	**95 % confidence interval**				
		Low	High		**Low**	**High**			
Fry	78	54	102	**45.5**	**31.5**	**59.5**	No	61	35.6
Parr	38	33	43	**22.2**	**19.2**	**25.1**	No	36	21.0
Brook trout	11	8	14	**6.4**	**4.7**	**8.2**	No	11	6.4
Sculpin	19	6	32	**11.1**	**3.5**	**18.7**	No	15	8.7
Three-spined stickleback	2	>0	7	**1.2**	**>0**	**4.1**	No	2	1.2
Lake Chub								17	9.9
Lamprey								7	4.1
Sucker								23	13.4
American eel								2	1.2

* Part of a catch may be attributed to an earlier run if there is a non-descending catch pattern

	Atlantic salmon sizes					Atlantic salmon sizes - sorted descending					Brook trout sizes			
Run	**1**	**2**	**3**	**4**		**1**	**2**	**3**	**4**		**1**	**2**	**3**	**4**
	113	114	90	113		**133**	**124**	**90**	**113**		140	147	140	236
	96	124	57	86		**113**	**122**	**90**	**104**		111	136		153
	55	122	60	104		**107**	**116**	**88**	**100**		74	133		62
	59	65	90	100		**106**	**114**	**84**	**86**		61	124		72
	64	61	59	58		**104**	**101**	66	**81**		65	54		
	82	77	84	81		**103**	**89**	61	75					
	62	54	57	58		**102**	**89**	60	60					
	60	55	56	59		**96**	**87**	59	59					
	78	89	61	54		**93**	**87**	59	59					
	93	78	59	75		**93**	**85**	58	58					
	86	58	88	51		**92**	**81**	57	58					
	103	81	66	58		**88**	78	57	58					
	85	87	58	59		**87**	78	56	58					
	107	68	50	60		**86**	77	50	56					
	106	53		54		**86**	74		54					
	63	89		54		**85**	68		54					
	62	59		58		**85**	65		54					
	60	85		53		**85**	65		53					
	57	87		51		**82**	61		51					
	86	101		56		**81**	61		51					
	55	56				**80**	59							
	62	74				78	59							
	104	58				64	59							
	57	59				63	58							
	85	54				63	58							
	80	61				62	57							
	92	57				62	56							
	133	53				62	55							
	54	51				61	54							
	102	65				61	54							
	54	59				60	53							
	55	53				60	53							
	85	116				60	53							
	87	78				60	51							
	93					60								
	60					59								
	57					57								
	56					57								
	52					57								
	55					57								
	63					56								
	60					56								
	56					55								
	61					55								
	60					55								
	61					55								
	88					54								
	81					54								
	57					52								

Appendix E: Electrofishing Data – Big Tracadie River

Big Tracadie above Rte 160, Big Tracadie watershed, New Brunswick, Sep 28, 2024

Rod Currie, Harry Collins, et al — 345 volts

Conditions:		Temp (C)	pH	DO (mg/L)	nductivity (µs/c	Salinity (ppt)
		13.2	7.63	10.75	41.2	0.02

Area:	length (m):	27.5	width (m):	15	16	14.7	15.2	15.3
	total area =		419.1	*m2*	**Conversion factor:**		**x**	**0.2386065378**
			419.1					0.2386065378

							Data adjustment for MicroFish 3.0 processing				
	Run:	**1**	**2**	**3**	**4**		**Run:**	**1**	**2**	**3**	**4**
	Run time (seconds):	**1534**	**981**	**1148**	**697**						
	Fry	96	48	69	25		Fry	96	48	47	47
	Parr	6	2	1	0		Parr	6	2	1	0
	Brook trout	4	2	6	0		Brook trout	4	3	3	2
	Blacknose dace						Blacknose dace				
	Redbelly dace						Redbelly dace				
	Common shiner						Common shiner				
	Lake Chub						Lake Chub				
	Sculpin	63	31	25	21		Sculpins	63	31	25	21
	Three-spined stickleback	3	2	2	1		Three-spined stick	3	2	2	1
	Lamprey	0	1	1	1		Lamprey	1	1	1	0
	Sucker	2					Suckers	2			
	American eel						American eel				

MicroFish 3.0 formatted input:				Big Tracadie above Rte 160, Big Tracadie watershed, New Brunswick, Sep 28, 2024										continuation...			
				1	1	Fry	.	.	96	.	1	3		Sucker	.	.	0
				1	1	Parr	.	.	6	.	1	4		Fry	.	.	47
				1	1	Brook_trout	.	.	4	.	1	4		Parr	.	.	0
				1	1	Sculpin	.	.	63	.	1	4		Brook_trout	.	.	2
				1	1	Three-spined_	.	.	3	.	1	4		Sculpin	.	.	21
				1	1	Lamprey	.	.	1	.	1	4		Three-spine	.	.	1
				1	1	Sucker	.	.	2	.	1	4		Lamprey	.	.	0
				1	2	Fry	.	.	48	.	1	4		Sucker	.	.	0
				1	2	Parr	.	.	2	.							
				1	2	Brook_trout	.	.	3	.							
				1	2	Sculpin	.	.	31	.							
				1	2	Three-spined_	.	.	2	.							
				1	2	Lamprey	.	.	1	.							
				1	2	Sucker	.	.	0	.							
				1	3	Fry	.	.	47	.							
				1	3	Parr	.	.	1	.							
				1	3	Brook_trout	.	.	3	.							
				1	3	Sculpin	.	.	25	.							
				1	3	Three-spined_	.	.	2	.							
				1	3	Lamprey	.	.	1	.							

SIZES:														
	Atlantic salmon sizes					Atlantic salmon sizes - sorted descending					Brook trout sizes			
Run	1	2	3	4		1	2	3	4		1	2	3	4
	64	55	132	no parr		**173**	**106**	**132**	**no parr**		54	62		
	60	62				**120**	**93**				64	69		
	58	55	lengths for fry omitted	lengths for fry omitted		**111**	71	lengths for fry omitted	lengths for fry omitted		66		no lengths taken for this run	no lengths taken for this run
	66	57				**111**	67				71			
	58	59				**109**	66							
	58	106				**106**	65							
	173	71				72	65							
	120	93				72	65							
	65	65				68	64							
	64	60				67	64							
	68	62				66	63							
	65	57				66	62							
	65	56				66	62							
	55	58				65	62							
	60	56				65	61							
	61	52				65	61							
	59	65				65	60							
	65	64				65	60							
	65	59				65	60							
	64	56				65	59							
	57	61				65	59							
	56	58				65	59							
	55	58				64	59							
	63	60				64	59							
	72	60				64	58							
	60	59				64	58							
	61	59				64	58							
	65	63				64	58							
	58	50				64	58							
	58	59				64	58							
	62	66				64	57							
	57	54				63	57							
	51	64				63	57							
	57	50				63	56							
	62	57				63	56							
	63	65				63	56							
	64	62				62	56							
	50	56				62	56							
	54	58				62	56							
	65	61				62	55							
	64	54				62	55							
	51	67				62	54							
	63	49				62	54							
	61	53				62	54							
	63	58				61	53							
	61	58				61	52							
	63	54				61	51							

	57	56				61	50					
	60	51				61	50					
	56	56				61	49					
	53					60						
	59					60						
	57					60						
	62					60						
	64					60						
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	62					60						
	55					60						
	106					60						
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