Tabusintac River

Atlantic Salmon Conservation Strategy

2023

The Foundation for Conservation of Atlantic Salmon
La Fondation pour la conservation du saumon atlantique

TABUSINTAC WATERSHED
T.W.A.
ASSOCIATION

Tabusintac River

Atlantic Salmon Conservation Strategy

2023

Billie-Joe Fowler, Executive Director

Neil Collins, GIS Project Manager

Tabusintac Watershed Association

1-4689 Route 11
Tabusintac, NB
E9H 1J6

Phone: (506) 779-1185
Fax: (506) 778-0378

Email: tabusintacwatershed@hotmail.com
Website: www.tabusintacwatershed.com

November 2023

Acknowledgements

The Tabusintac Watershed Association (TWA) would like to thank The Foundation for Conservation of Atlantic Salmon (FCAS) for their funding support and this opportunity to work on Atlantic salmon conservation within the Tabusintac watershed. TWA volunteers Tim Humes, Reid Wishart, Dean Strang, Donnie Robertson, and Abby Fowler-Harding are recognized for their contribution to field work and expertise. TWA also appreciates the Miramichi River Environmental Assessment Committee for taking a lead on the project and for the loan of hand-held field scientific equipment and canoes.

MREAC
MIRAMICHI RIVER ENVIRONMENTAL ASSESSMENT COMMITTEE

Fisheries and Oceans Canada
Pêches et Océans Canada

New Nouveau Brunswick
Your Environmental Trust Fund at Work

EDDY OUT DEPOT

Please note TWA's office and Tabusintac watershed is located on the traditional territories of the Wabanaki peoples. They are the original caretakers of this land, in which we are all responsible for upholding the Peace and Friendship treaties.

Executive Summary

In 2023, the Tabusintac Watershed Association (TWA) was supported by The Foundation for Conservation of Atlantic Salmon (FCAS) to prepare an Atlantic Salmon Conservation Strategy for the Tabusintac River. TWA staff and volunteers completed significant environmental monitoring and habitat assessments during the open water season of 2023. The project allowed for meetings to be conducted among community members, First Nations, stakeholders, and government agencies to capture feedback and recommendations for the conservation of Atlantic salmon. Land use within the Tabusintac watershed has changed dramatically within the past decades with an increase of blueberry operations, peat harvesting, aquaculture, residents, and cottages along the Tabusintac River with an increase of recreational boating from the head-of-the tide to the Tabusintac Bay.

Limiting factors to Atlantic salmon production are herein identified and, where possible, addressed with a remediation strategy. Some natural limiting factors will be insurmountable. Future efforts should concentrate on maintaining the existing ecological values that sustain the existing stock of Atlantic salmon and other indigenous fish species. 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 should be enhanced as human resources allow.

Contents

List of Figures

1.0 Introduction

The Tabusintac Watershed Association (TWA) was supported by the Foundation for Conservation of Atlantic Salmon (FCAS) to complete the *Tabusintac River Atlantic Salmon Conservation Strategy* in 2023. Based on available watershed data, recent monitoring efforts, other research, opportunistic interviews, and community meetings, TWA herein presents this strategy.

The Tabusintac River watershed is located within northeastern New Brunswick and has five significant tributaries, Tabusintac River, Little Eskedelloc River, Big Eskedelloc River, Trout Brook, and Big Hole Brook, along with other tributaries that feeds into the main stem. The headwaters of the Tabusintac River are maintained by groundwater, wetlands, and springs that starts west off Highway 8 and flows east into the Southern Gulf of St. Lawrence.

The Tabusintac River meander length from the headwaters to the head-of-the tide is approximately 43 kms. The Tabusintac River watershed covers an area of 780.83 km² (Figure 1). It is known to have an Atlantic salmon population, but little is known about the current size or sustainability of this population. The last population survey was conducted in 2000 with Department of Fisheries and Oceans.

The TWA with partners surveyed 14 kilometers of the Tabusintac River by canoe from Curve Pool, located in leased waters, to the head-of-tide located above Trout Brook on April 28, 2023. In 2022, the survey team was able to complete a reconnaissance in the headwaters from Hwy 8 to Curve Pool, covering an additional 16 kilometers. This work was to support a different project. Most of the open water season does not allow for canoe passage due to low water levels within the headwaters of the Tabusintac River. It was noted that there is very limited access to the river, even by woods roads due to gates on crownland leases for blueberry operations within this area.

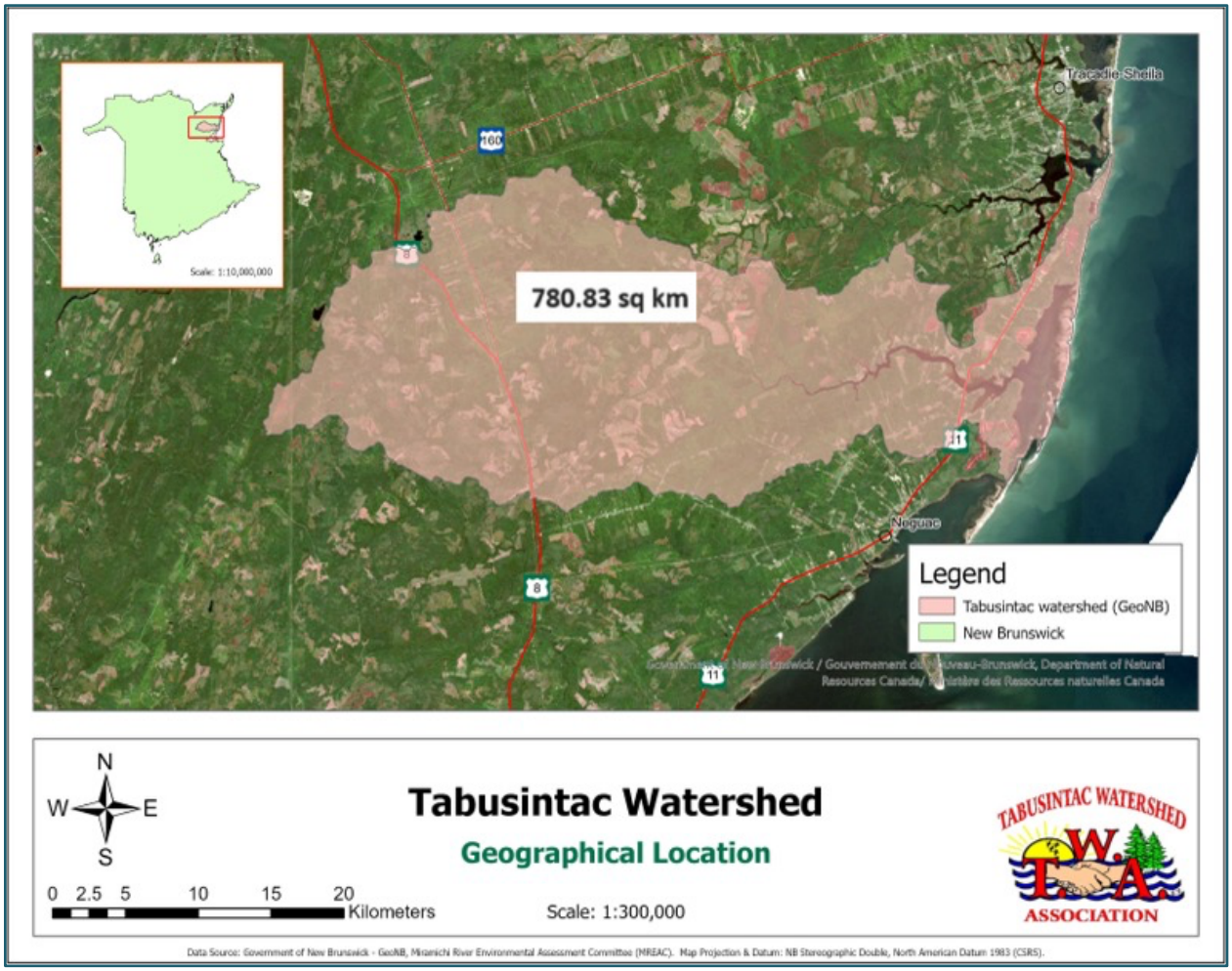


Figure 1 Tabusintac River Drainage Basin Geographical Location

TWA staff and partners were able to complete several field work assignments in 2023 including seasonal temperature monitoring at two locations, one river reach was assessed using a fish habitat assessment protocol from Department of Fisheries and Oceans and Department of Natural Resources and Energy Development, one suite of water samples were taken for general chemistry analysis, bacteria, and metals. Hand-held monitoring equipment captured data on dissolved oxygen, pH, conductivity, and temperature. The canoe run in the spring from Curve Pool to the head-of-the tide on the Tabusintac river provided a river reconnaissance (Figure 2). The field work contributed to habitat assessment and collected data that contributed to the overall conservation strategy.

Figure 2 Curve Pool looking downstream on the Tabusintac River

The Tabusintac River watershed with the many tributaries remains an important refuge for Atlantic salmon in New Brunswick, Canada. The Tabusintac River has little recent data on Atlantic salmon populations.

The Tabusintac River watershed has been recognized internationally for hundreds of years for its abundance of Atlantic salmon through records from local outfitters who have leased land and waters within the headwaters. Indigenous knowledge passed down through generations indicates Atlantic salmon populations were sustainable. The Tabusintac River has a reputation as an Atlantic salmon angling destination but has data gaps with the current production of Atlantic salmon and has received very little attention in salmon management in the past decades.

TWA undertook this Atlantic salmon conservation strategy on the Tabusintac River with hopes of protecting and improving salmon productivity. Field work involving temperature monitoring, river reconnaissance, habitat assessment, electro-fishing, and water quality monitoring were

completed to contribute to this strategy. Consultations with outfitters, community members, and First Nations were conducted so that their contributions could be added to this strategy. The report does consider the rivers limiting factors, approaches to sustain the existing level of salmon production, and the prospect of enhancing that production.

The Tabusintac River does have a significant population of Atlantic salmon as shown by catch and release efforts from the outfitters' club, community members, and from First Nations food harvests and ceremonial usages.

As with other waterways in eastern New Brunswick the Tabusintac River has a smolt run in spring and spawning run in the fall. It is apparent that there is some pressure on this stock from land use changes, climate changes, recreational watercrafts, and illegal fishing.

2.0 Conservation Strategy Objectives for Atlantic Salmon on the Tabusintac River

1. To maintain the ecological and existing recreational fishing values that the Tabusintac currently possesses.
2. To conserve and protect existing Atlantic salmon stocks and their habitat.
3 To maintain and ensure access to existing recreational fishing opportunities and experiences.
4. To promote the cooperation and support of recreational users, community members, First Nations, and other interested parties to promote effective management of the recreational fisheries resources.
5. To promote equity and fairness for all users in the application of management measures for the recreational fisheries.
6. To present a long-term strategy to conserve and maintain recreational fishes and their habitat on the Tabusintac River.

3.0 River Setting & Access

The Tabusintac River drainage basin lies in Northeastern New Brunswick and covers approximately 780 km² (Figure 1). The basin contains the main stem of the Tabusintac River that flows east into the Gulf of St. Lawrence. The Big Eskedelloc River and Little Eskedelloc River runs parallel to the Tabusintac River than to the northeast until it enters the main branch near the middle section of the headwaters in the watershed. Highway 8 crosses the three rivers. Big Hole Brook is located north of the main branch and has three tributaries; these being, North Brook, Middle Brook, and Pisiguit Brook that enter in from the northwest. Big Hole Brook

Figure 3 Tabusintac River and major tributaries

flows north to south into the Tabusintac River that enters the lower section of the headwaters. Trout Brook is located south of the main branch and flows from the west to northeast to enter the Tabusintac River near head-of-the tide (Figure 3). There are four ford crossings that are still in use that crosses the Tabusintac River.

4.0 Physical Setting & Climate

The Tabusintac River drainage basin it entirely within the Eastern Lowlands Ecoregion (Figure 4). Elevations ranges from 150 m to sea level at the mouth of Tabusintac River. Parts of the headwaters have steep banks that can have an elevation difference of 60 m from the river to the stop of the riverbank. The Tabusintac watershed is underlain by Pennsylvanian sedimentary rocks that consist of red, buff, grey, and olive-green sandstone, interbedded with mudstone and conglomerate. A geological feature, Jurassic diabase dyke, intersects the Tabusintac watershed which surfaces irregularly across much of the New Brunswick (Figure 5).

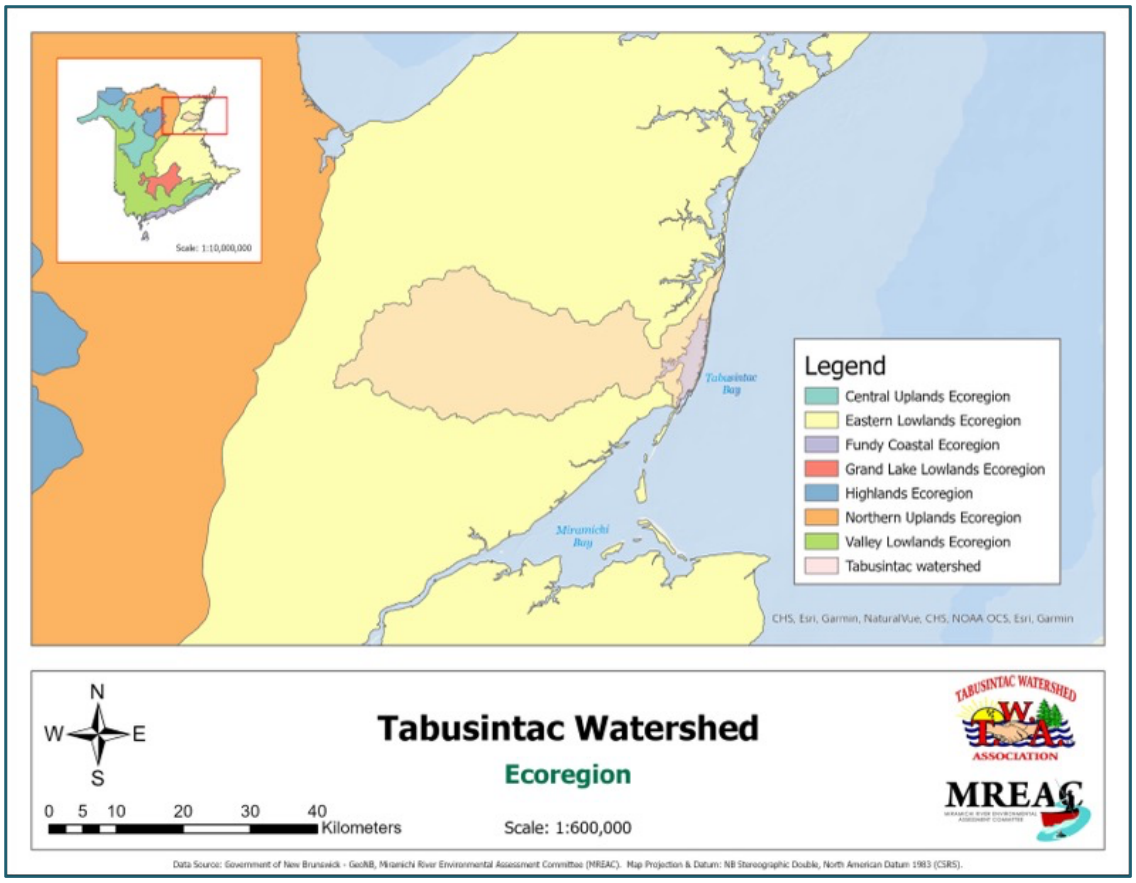


Figure 4 Ecoregion of the Tabusintac Watershed

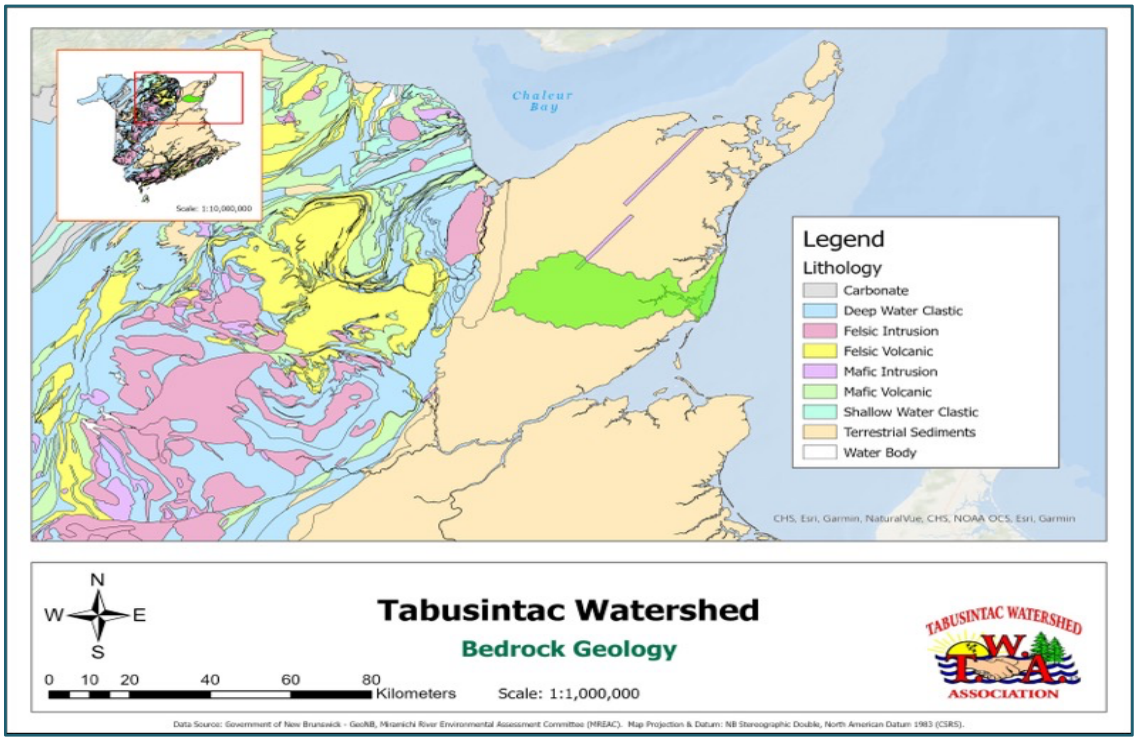


Figure 5 Bedrock geology within Tabusintac watershed

Climate within the Tabusintac watershed has been changing with erratic precipitation events and extreme fluctuations in air temperatures. In the 2023 field season mean air temperatures along with extreme low and high air temperatures, accumulation of precipitation for the month and the most accumulation of precipitation per day are presented in Figure 6.

		Air Temperature (℃)			Precipitation (mm)	
	Month	Mean	Extreme Low	Extreme High	Total accumulation per month	Most accumulation received in a day for that month
2023	May	10.1	-0.6	33.4	70.3	18.8
	June	15.0	4.0	35.5	202.8	57.3
	July	22.7	10.2	32.5	96.5	24.0
	August	17.5	8.1	25.7	247.9	63.9
	September	16.5	3.5	29.1	119.0	46.1
	October	10.6	-4.8	25.9	100.0	22.5

*Data retrieved from Environment Climate Change website for Miramichi Weather Station 2023

Figure 6 Air Temperatures for 2023 Field Season for the Tabusintac Watershed

The field season had an early freshet compared to past years with records of above normal temperatures in May. Highest air temperatures were captured in June and July of 2023 with heat warnings issued from Environment Canada and Climate Change in June and July. This season was the first time in decades that commercial fisherman in Tabusintac had to keep their boats tied up for four consecutive days due to high wind gusts.

The past two decades has shown that summer temperatures are on the rise with extreme fluctuations, and this is in keeping with the expected climate change scenario. The rainfall amounts have been more erratic, but the soils tend to be dryer.

5.0 Land Cover & Land Use

The Tabusintac watershed land covers many different ecosystems from mixed boggy environments with coniferous forests, fens, mixed forest types, and coastal wetlands. Because of the diversity of species and the species that do thrive within the Tabusintac watershed there are five Natural Protected Areas (NPA) that are situated within the watershed (Figure 7).

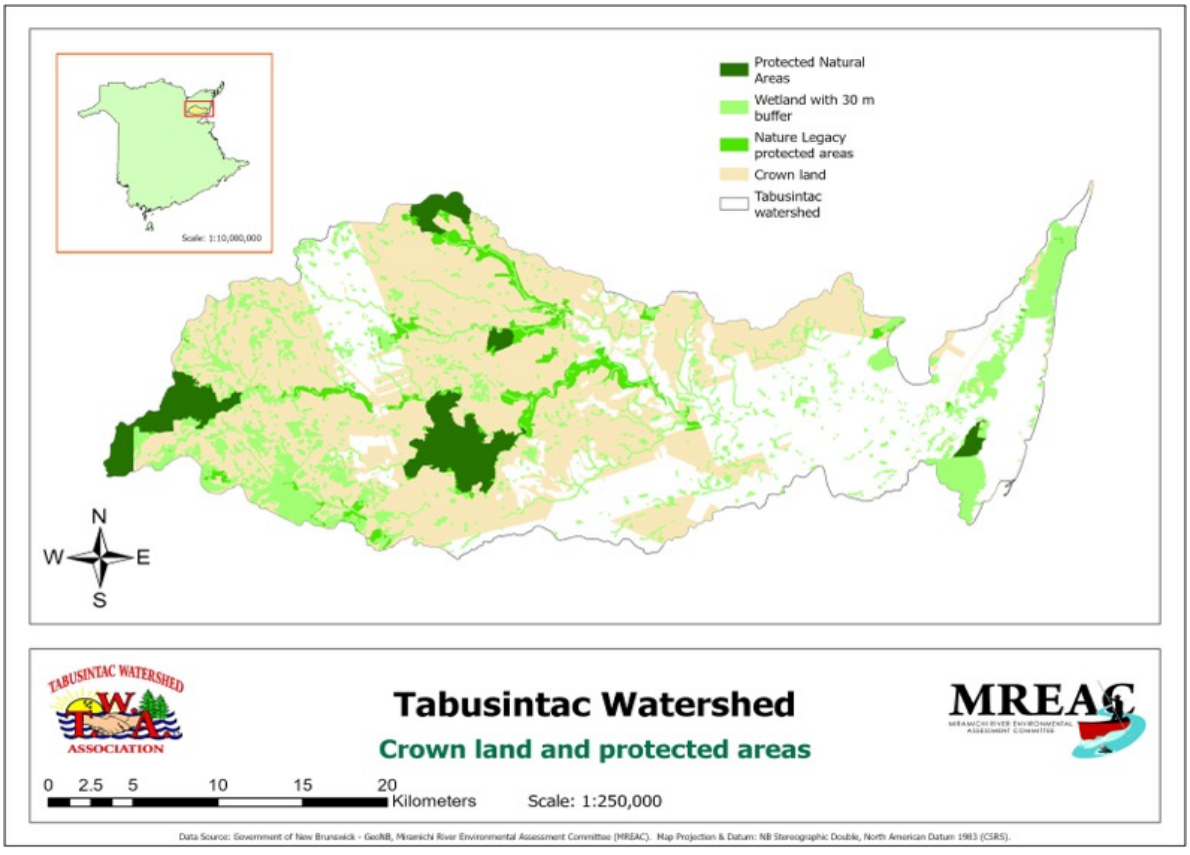


Figure 7 Crown Land and Provincial Natural Protected Areas within Tabusintac Watershed

East Branch Portage River NPA is situated within the headwaters of the Tabusintac watershed with an area 11.2 km^2 , Tabusintac River NPA spans a section of the Tabusintac River, Big Eskedelloc, and Little Eskedelloc with an area of 20.5 km^2 , Pisiguit Brook NPA has an area of 1.7 km^2 , Lord and Foy NPA is located within the headwaters of North Brook that runs into Big Hole Brook and has an area of 5.2 km^2, Tabusintac NPA near the mouth of Tabusintac River has an area of 1.9 km^2 . This amounts to 5.2% of the watershed currently under some level of protection. This is far removed from current protected area targets of 30%. If achieved, it would significantly improve habitat conditions for land-based and riverine wildlife.

The land use within the headwaters of the Tabusintac River are managed by the Crown Land Branch. Historically, the area was harvested for lumber, fish, and wildlife. Currently some timber harvesting is occurring within management blocks leased by Intefor. Most of the blocks that are harvested will be transferred over to Department of Agriculture, Aquaculture and Fisheries for long-term blueberry operations. Bragg Lumber Ltd. works with blueberry operators as Acadian Farms, Peninsula Foods, and Oxford to clear sites on crown land and has obtained crown land as private. (Appendix A). The landscape within the headwaters is drastically changing with blueberry operations (Figure 8 and 9). An outfitter club has been leasing two parcels of land with private fishing rights to select waters for over a century (Figure 10).

Figure 8 Clearing of forested crown land for blueberry operation


Figure 9 Blueberry fields within the headwaters of Tabusintac River

Figure 10 Lodges of outfitters that lease crown land and waters at the mouth of Big Hole Brook along Tabusintac River with blueberry agriculture fields in background

Near the head-of-the tide, there are camps that are leased on crown land and is only accessible in the open-water season by watercrafts. This section of the Tabusintac watershed is heavily used for blueberry operations. Tabusintac Reserve Number 9, under management of Esgenoôpetitj Chief and Band Council, is located below the head-of-the tide with an area of approximately 23 km^2. In this section of the river, above Beck's Brook, is the first Atlantic salmon pool coming up the Tabusintac River. The Tabusintac River continues to flow by cottages and residents above the Cains Point Bridge towards the bay where recreational fishing, swimming, and boating are very popular in the open water season. The lower section of the Tabusintac watershed has residents, commercial fisheries, blueberry operations, oyster aquaculture, soft-shell harvesting, and peatmoss operations.

6.0 Habitat Assessments

A fish habitat assessment protocol was applied to a one-kilometer reach on July 11, 2023, on the main branch of the Tabusintac River above the old wooden abutments above the bridge on Highway 8 (Figure 11). The reach was chosen based on its accessibility, water velocity, and offers a representative section of the waterway. The results of the habitat assessment showed habitat conditions were well suited to rearing Atlantic salmon. Using the "DNR&E / DFO, New Brunswick Stream Habitat Inventory", the overall physical characteristics show favorable conditions in the available pools, shade, potential cover with woody debris, bank stability, and vegetation along banks. During the spring canoe runs in 2022 and 2023 it was noted that there were reaches on the main branch of the Tabusintac River that offered good spawning conditions. (Appendix B: New Brunswick Stream Habitat Inventory field sheet).

Figure 11 Harry Collins and Neil Collins with Miramichi River Environment Assessment Committee working with TWA completing a habitat assessment on the Tabusintac River

One electrofishing site was surveyed on September 26, 2023, on the Tabusintac River just upstream of Highway 8. The team was led by fish biologist Mr. Rod Currie with support from Miramichi River Environment Assessment Committee and community members (Figure 12, 13, and 14).

The electrofishing results were a success in capturing Atlantic salmon. See Figure 15 for estimated salmon population densities per age class along with a list of other species captured. (Brook Trout, Slimy sculpin, and Blacknose dace). A total distance of 27.2 m of reach was electro-fished with an average bank width of 11.2 m for a total area of 304.6 m^2.

Figure 12 Preparing site for electrofishing

Figure 13 Electrofishing results from Tabusintac River above Highway 8 in 2023

Figure 14 Brook Trout that was seined at Tabusintac electrofishing site

Electrofishing results: Tabusintac @ Hwy 8

Estimates of population density were generated using the Microfish 3.0 formula (Van Deventer and Platts, 1989).

Species	Age Class	Number of Fish/100m2
Atlantic salmon	0+	0.66
	1+	6.57
	Total Salmon	7.23
Brook trout		0.33
Blacknose dace		21.01
Slimy sculpin		18.38
Total Fish		46.95

Figure 15 Population density from electrofishing results from FCAS project in 2023

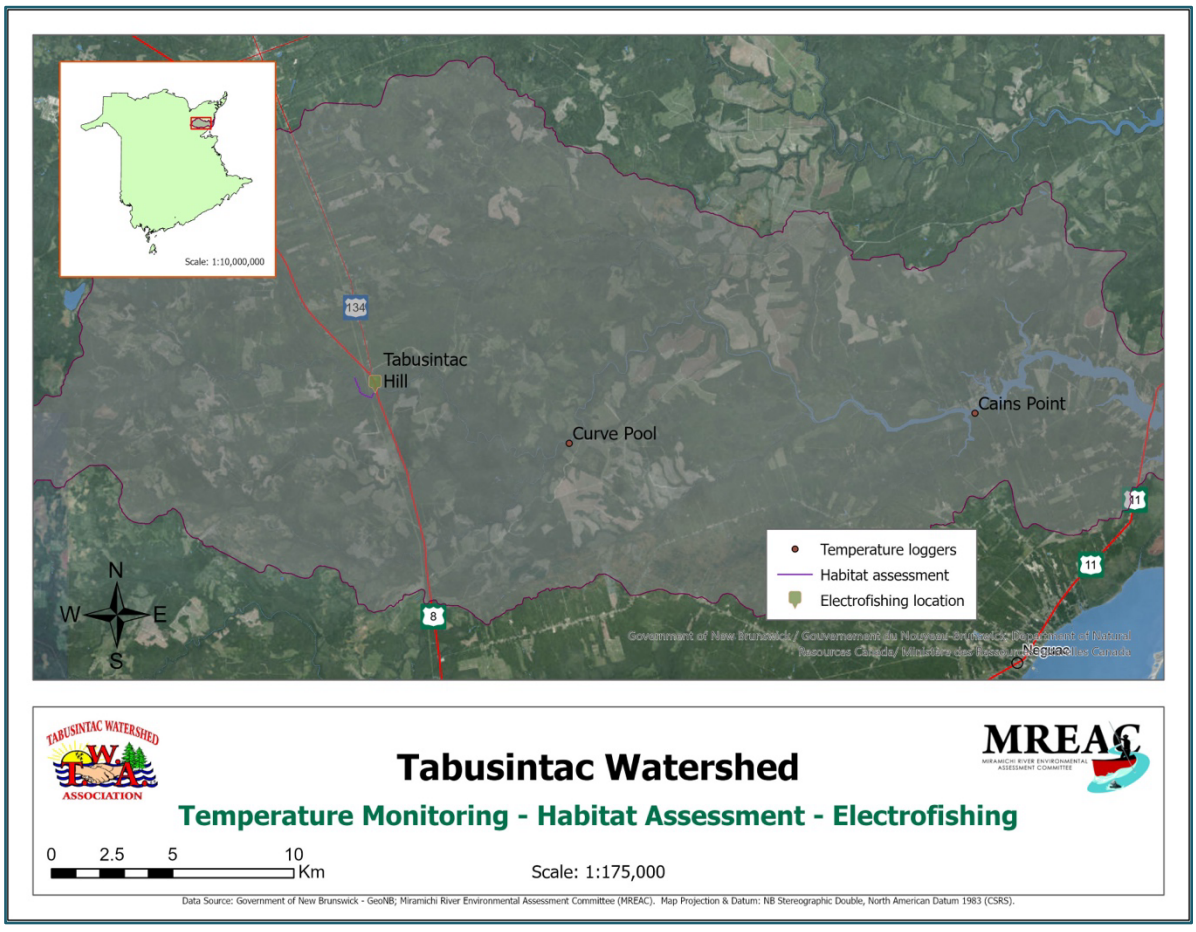


Figure 16 Temperature loggers, habitat assessment, and electro-fishing site on the Tabusintac River in 2023

7.0 Water Quality

Three temperature loggers were deployed on the Tabusintac River at widely distributed locations (Figure 16). The first water temperature sensor was installed at the electrofishing site off Highway 8 but went missing when it was time to retrieve sensors. Flashy flows from erratic precipitation events could have dislodged the sensor or it was removed by recreational users. The second sensor installed was below Curve Pool along the side of a bank that was shaded. The sensor located at Curve pool registered above the Department of Fisheries and Oceans Warm Water Protocol threshold of 20^{O}C in late May returning to cooler temperatures until the of end of June. Most of July stayed above the 20 ^{O}C with August and September water temperatures falling below the protocol threshold. Thermal stress to Atlantic salmon occurs at 23 ^{O}C. Curve Pool waters reached these limits or above in the first and last week of July. The third sensor was installed at Cains Point within brackish waters and had higher water temperatures trends than at Curve Pool. This was expected since Curve Pool is strictly feed by spring and groundwaters where Cains Point has tidal influence; therefore, depth of water fluctuated greatly, and bank full width was greater. Figure 16 shows the correlation of water temperatures between Curve Pool and Cains Point. Cains Point registered above thermal stress staring at the end of June and remaining above 23 ^{O}C until the beginning of August. Temperatures started to get warmer in the beginning of September but started to cool back down in the second week of September with temperatures at or below 15 ^{O}C.

Water quality monitoring on the Tabusintac River watershed in 2023 indicated that parameters show conditions that are acceptable to support fish populations, including Atlantic Salmon during the spring and fall migration. Appendix 3 shows the general chemistry results taken in 2023. The chemistry sample was processed by the RPC Laboratory (Fredericton). Water temperatures and pH taken on April 28, 2023 (Figure 18), were all with recommended ranges for water quality (Figure 19). 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.

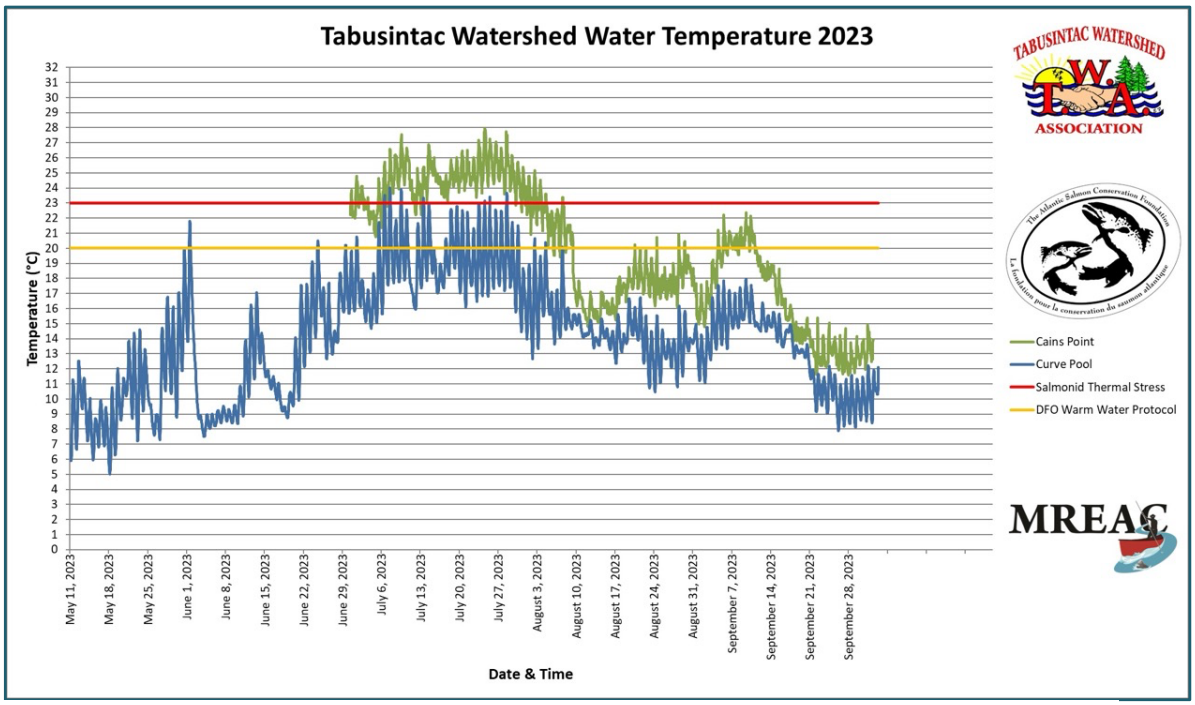


Figure 17 Water temperatures for 2023 at Curve Pool and Cains Point in the Tabusintac Rive

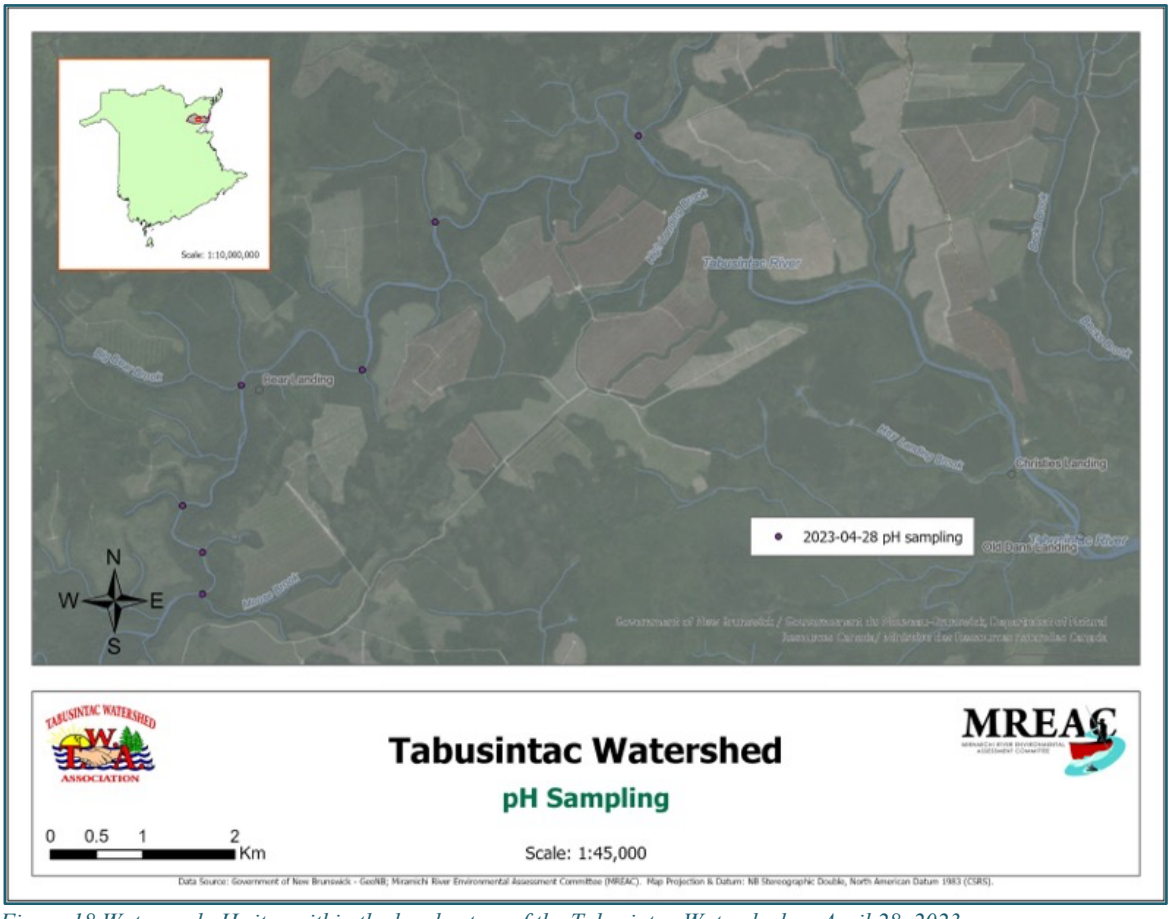


Figure 18 Water and pH sites within the headwaters of the Tabusintac Watershed on April 28, 2023

Site	River Water pH	Water Temp (Celcuis)
Tabusintac River @ Moose Brook	8.92	6.6
Tabusintac main branch	8.36	5.9
Tabusintac River @ unnamed brook-River Left (RL)	8.66	6.4
Tabusintac River @ Big Bear Brook	8.27	7.1
Tabusintac River @ unnamed brook-River Right (RR)	8.8	7.1
Tabusintac River @ unnamed brook-RL	8.48	8.5
Tabusintac River @ Big Hole Brook	8.42	8.7

Figure 19 Water pH and temperatures on April 28, 2023, at sites within the headwaters of the Tabusintac Watershed

8.0 Community Outreach

On September 8, 2023, TWA meet with community members and stakeholders in Tabusintac. TWA and their project partner Miramichi River Environmental Assessment Committee (MREAC) tabled this project to create an Atlantic Salmon Conservation Strategy in a report. Traditionally, on the Tabusintac, wild Atlantic salmon management and conservation was implemented through verbal agreements with the community members, First Nations, stakeholders, and government agencies. These agreements were referred to *"Gentlemen's Agreements"*. For example, a type of warm water protocol and "poling only" near the first salmon pool and towards the headwaters were in effect up to mid-1980s.

Feedback from meeting:

Agreement on degradation of the overall watershed has occurred since the 2000s.

- Landscape has drastically changed in the last 20 years with blueberry agriculture in the headwaters, peat mining within the estuary and along the coast, and increase in residential cottages and homes along the Tabusintac River, wetlands, streams, brooks, and springs.
- Increase in technologies for watercrafts, commercial fisheries, aquaculture, agriculture, wood harvesting, and peat harvesting.
- Increase in recreational watercrafts and usage in the Tabusintac River that are located near areas of critical habitat for Atlantic salmon.

Climate change affects such as extreme fluctuations in air temperatures, increase in water temperatures, and more intense precipitation events that causes sedimentation and wash outs are occurring. This negatively effects water quality and aquatic habitats.

Striped bass have been caught above the "head of the tide" which in the past, did not occur. Some possibilities mentioned that could be the result of climate change and the lack of seagrasses that once was presented.

Beaver dams have been impairing some stretches of the river and with heavy precipitation events that has created blow outs impairing river stretches within the Tabusintac River creating fragmentation for fish passage and impacting the substrate and water flows for pools and riffles.

Lack of awareness on the importance of the habitats within the Tabusintac River and the functions and benefits they provide for economic, social, environmental, and ceremonial usages.

Lack of outreach to teach the importance of salmonids habitat that are within the Tabusintac River.

Action plans/solutions to mitigate impacts to wild Atlantic salmon in the Tabusintac watershed:

Perform site assessments on previous sites that were assessed from the 2000s report from DFO and DNRED to be compared to up-to-date data to determine if any changes have occurred.

Electrofishing to determine diversity, richness, and numbers of fish at previous sites there were electro-fished in the 2000 report.

More "people on the ground" on the river for outreach, provide education on mitigation from the impacts of recreational, agriculture, and industry usage.

Any size bass should be allowed to be retained in scheduled fly-fishing waters and above the "head-of-the tide" during recreational and sportfishing.

Postpone bait fishing by at least 2 weeks so that the "black salmon" are not as stressed to reach the bay and ocean. Bait fishing from May 16 to 31 each year from Beck's Brook upstream in the Tabusintac River should be cancelled because there are too many salmon and big spawning trout being hooked.

Implement *"gentlemen's agreements"* that were used in the mid-1980s and prior.

- Warm water protocol for the entire stretch of the Tabusintac River from Cain's Point up.
- Poling only in river below Beck's Brook- before the first salmon pool in the Tabusintac River; except with those with licenses above Beck's Brook.
- Patrolling of the river day and night to provide enforcement.

Implement the same buffers zones for agricultural land and crownland as private land of at least 30 metres compared to the current 5 metre of required buffer zone along all tributaries. Ensure buffer zones are measured on a horizontal rather than on a vertical plane.

Implement same techniques and technologies used in the 1980s at sites that incorporate *"Grandfather Clauses"*. For instance, using block and cut method to harvest peatmoss while using similar tools and machinery that were used in 1980s.

Implement speed restrictions with Transport Canada near critical habitat for Atlantic salmon. *"Low wake"* zones need to be enforced.

Restocking of rivers and brooks with Atlantic Salmon using brood stock of the Tabusintac River and streams.

TWA meant with different branches of government to ask for feedback for the Atlantic Salmon Conservation Strategy for the Tabusintac River. Concerns and feedback that were not captured at the community meeting but were presented included concerns of the recent approval to double

the amount of oyster cages on the Tabusintac estuary. Concerns includes a lack of research and monitoring on the temperature impacts on the water due to the black colour of the cages along with considerations for impacts of climate change. Atlantic salmon must migrate through this section to reach the headwaters of the Tabusintac River. Concerns of all-terrain vehicles restricting Atlantic salmon migration when crossing the fords within the headwaters of the Tabusintac River. Different groups of recreational users, four-wheelers, dirt bikes, side-by-sides, and four-by-four trucks can be counted into the hundreds at a time that access some of the fords.

9.0 Conclusion

The headwaters in the Tabusintac River watershed have been providing pristine habitat for wild Atlantic salmon for centuries. There has been little industry within the past in the Tabusintac watershed and therefore Atlantic salmon waters and habitat had little impact. Timber harvesting, peat mining, and harvesting of wildlife and fish, were the main economic drivers within the region before the 1980s. Land use has changed dramatically in the last few decades with blueberry operations on leased crown land, parcels of crown land transferred over to Acadia Farms, reduction in outfitters, and no fisheries to obtain Atlantic salmon, apart from First Nations food and ceremonial fishing.

TWA monitoring within the headwaters of the Tabusintac River and community meetings in 2023 was fundamental to the development of this strategy. Habitat assessment and electrofishing results showed Atlantic salmon were present on the main branch of the Tabusintac River and the area has suitable habitat. Water chemistry and metals analyzed from Curve Pool met the recommended guidelines for protection of aquatic life. Water temperatures recorded at Curve Pool were above the Department of Fisheries and Oceans Warm Water Protocol threshold for the beginning of June, late June, and for the most of July. July temperatures showed temperatures above the recognized threshold for salmonid thermal stress. The steep gradient and rough substrate within the headwaters of the Tabusintac River results in riffles and rapids contributing to well oxygenated waters.

Climate change impacts, as they increase, will be problematic on this and other eastern New Brunswick waterways. Apart from temperature, good water quality and good habitat conditions

suggest the Tabusintac watershed could continue to support populations of Atlantic Salmon. Historically, industrial forestry was the major land use on the Tabusintac watershed. Land use practices has changed to include large blueberry operations. The riparian zones of 30 m for timber harvesting does not have to be necessarily implemented on blueberry operations because it is deemed "agriculture". The riparian zones within the headwaters are impacted from strong winds that creates blowdowns. Water retention from the forested soils do not absorb as well as they did in the past. After a heavy precipitation event, the water runs through the ground into the headwaters very quickly resulting in flashy flows.

From the data acquired and feedback received throughout the project, the headwaters of the Tabusintac watershed does have an Atlantic salmon population. The multiple anthropogenic pressures are negatively impacting land use and water. Implementing recommendations from this conservation strategy will support the Atlantic salmon stock. More monitoring and effective long-term management is recommended.

10.0 Summary of Recommendations

Recommendation: Monitoring of the Tabusintac River for pH levels should continue annually in late-winter, spring and throughout the field season as part of a watershed monitoring program.

Recommendation: An annual program of notching beaver dams in the late fall during spawning season should be implemented as needed to extend spawning further into the Tabusintac headwaters.

Recommendation: Implement strategies in the use of beneficial management practices among recreational fishers, recreational boaters, all-terrain vehicles, peat harvesting, and for blueberry operations**.**

Recommendation: When feasible, the Tabusintac River's headwaters should be assessed using technologies as "ARIS Population Tracking" to determine the actual size of the annual spawning population.

Recommendation: A real-time monitoring station should be installed in the Tabusintac 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: The Tabusintac 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: Strategies to promote shoreline protection and river stewardship should include any full-time residents along with camp and cottage owners.

Recommendation: Any size bass should be allowed to be retained in scheduled fly-fishing waters and above the "head-of- the tide" during recreational and sportfishing.

Recommendation: Postpone bait fishing by at least two weeks so that the "black salmon" are not as stressed to reach the bay and ocean. Bait fishing from May 16 to 31 each year from Beck's Brook upstream in the Tabusintac River should be cancelled because there are too many salmon and big spawning trout are being hooked.

Recommendation: Poling only in river above Beck's Brook- before the first salmon pool in the Tabusintac River; except with those with licenses above Beck's Brook.

Recommendation: Implement speed restrictions with Transport Canada near critical habitat for Atlantic salmon. "Low wake" zones need to be enforced.

Recommendation: Restocking of rivers and brooks with Atlantic Salmon using brood stock of the Tabusintac River and streams.

Recommendation: Provide more education on the importance of Atlantic Salmon habitat and current regulations.

Recommendation: Monitoring of the Tabusintac River and her three main branches should occur annually for pH levels, general chemistry, and metals in the spring and fall.

Recommendation: The Canadian Aquatic Biomonitoring protocol should be included in a regular monitoring by Environmental Canada and Climate Change to track the ecological condition of the benthic macroinvertebrate population on this waterway.

Recommendation: Additional electrofishing efforts should be applied to the Tabusintac River at historical electrofishing sites to gain a better picture of spawning levels and to determine trends from historical data.

Recommendation: Implement larger buffer zones for all land usages and ensure they are measured on a horizonal plane and monitor their integrity.

Figure 20 Looking downstream at Tabusintac River above Highway 8

References

Department of Fisheries and Oceans, 2000. Status of Atlantic Salmon (Salmo salar) in the Tabusintac River in 1999. DFO Can. Sci. Advis. Sec. Sci. Resp. 2000/003

Environment Canada. (2023). Monthly Data Reports for Miramichi Station Retrieved November 22, 2023 from https://climate.weather.gc.ca/climate_data/daily_data_e.html?hlyRange=1994-02-01%7C2023-12-02&dlyRange=2005-09-01%7C2023-12-02&mlyRange=2005-09-01%7C2007-07-

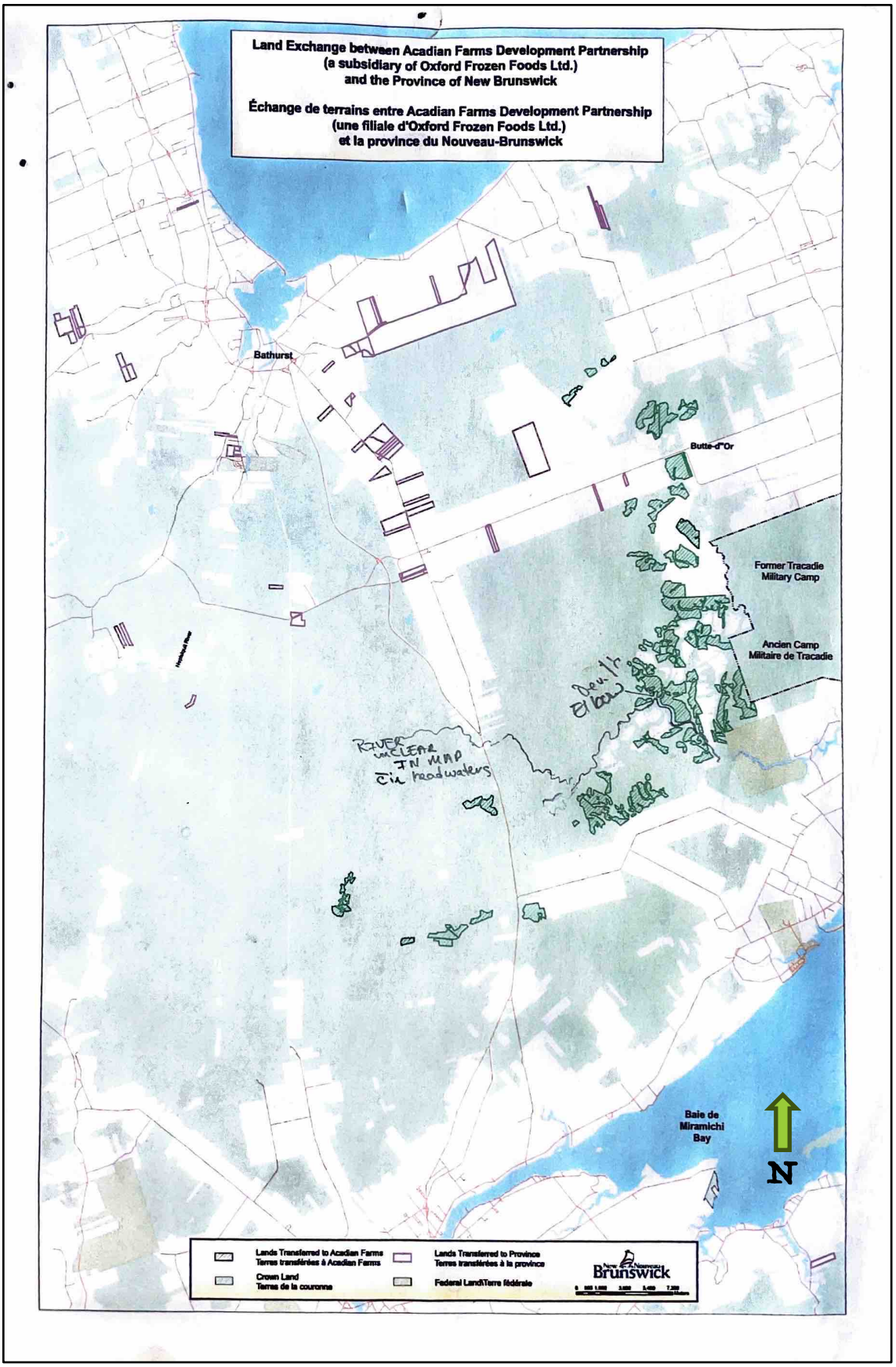
GeoNB Map Viewer GeoNB Map Viewer (arcgis.com)

Government of New Brunswick, Fish 2023 - a part of our heritage. 2023

NBDNR. (2000). *Bedrock Geology of New Brunswick*. New Brunswick Department of Natural Resources and Energy. Minerals and Energy Division. Map NR-1(2000 Edition) (scale 1: 500 000).

Rampton, V.N. (1984). *Generalized Surficial Geology Map of New Brunswick*. Department of Natural Resources and Energy, Minerals. Policy and Planning Division. NR-8 (scale 1: 500 000).

Appendix A: Provincial Crown Land within the Tabusintac Headwaters That Were Transferred to Acadian Farms


Land Exchange between Acadian Farms Development Partnership
(a subsidiary of Oxford Frozen Foods Ltd.)
and the Province of New Brunswick
Échange de terrains entre Acadian Farms Development Partnership
(une filiale d'Oxford Frozen Foods Ltd.)
et la province du Nouveau-Brunswick
Bathurst
Butte-d'Or
Former Tracadie
Military Camp
Ancien Camp
Militaire de Tracadie
Baie de
Miramichi
Bay
N
Lands Transferred to Acadian Farms
Terres transférées à Acadian Farms
Crown Land
Terres de la couronne
Lands Transferred to Province
Terres transférées à la province
Federal Land/Terre fédérale
Brunswick

Appendix B: DNR&E / DFO, New Brunswick Stream Habitat Inventory

04-98

DNR&E / DFO - NEW BRUNSWICK
STREAM HABITAT INVENTORY

River: Tabusintac | Start Point: HWY 8 @ old crossing | End Point: N47°21.062 W65°56.481 | Drainage Code: ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

No. ____ | Personnel: Billie Joe, Abby, Keenan, Noah, Nancy | Date: July 11/23 | GIS Map No. ____ | Drainage Name: Tabusintac River (Main) @ HWY 8

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 (#)	FLOWS * TYPE	FLOW (cms)	TIME	TEMP (°C) W	TEMP (°C) A	EMBEDDEDNESS (CRITERIA) 1: ≤ 20% 2: 20% - 35% 3: 20% - 50% 4: ≥ 50%	COMMENTS
	1	4	1	55	10			-	75	20	15	-	-	220	5	0	10	10	2	1		42/10 M	18	16	1	
	2	3	1	245	10	11	2	2	50	25	10	5		60	-	-	5	5	18	1		14/10 M			1	
	3	4	1	130	13	14		5	20	45	20	5	-	20	-	-	5	5	1.5	1		25/10			1	
	4	3	1	125	10	13		5	20	45	20	5	-	35	-	-	5	5	20	1		25/10			1	
	5	4	1	185	9	10.3	2	-	20	50	20	8	-	34	-	2	3	3	44	1		26/10			1	
	6	3	1	80	10	11		5	20	45	20	5		82	-	-	5	5	-	1		20/10			1	
	7	14	1	47	9.5	10.1	2	10	45	20	20	5		79	-	-	3	3	30	1		42/10			1	
	8	3	1	53	12.3	14	2	5	20	45	20	3		83	-	-	2	2	5	1		26/10			1	
	9	4	1	95	11	12	-	-	45	30	20	5		85	-	-	2	3	-	1		49/10			1	
				935																						

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 (CB/RB)
4. Riffle (B/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. Dogan
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. Dogan

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

SUBSTRATE

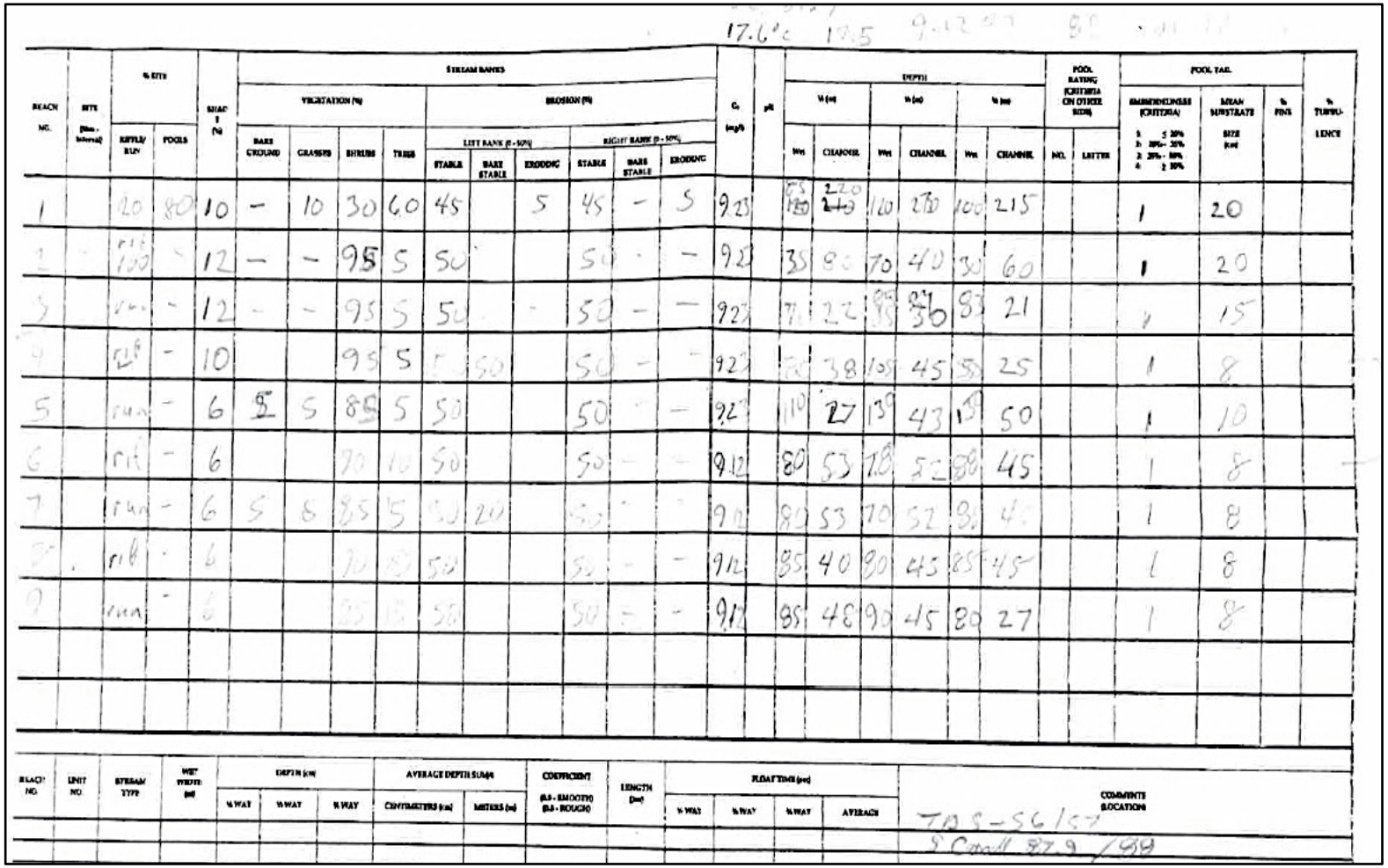
1. Bedrock, Ledge		
2. Boulder	=	> 682 mm
3. Rock	=	180 - 680 mm
4. Rubble	=	54 - 179 mm
5. Gravel	=	2.6 - 53 mm
6. Sand	=	0.06 - 2.5 mm
7. Fines	=	0.0005 - 0.05 mm

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 - ≥ 30%
3 - Instream cover 5-30%	b - < 30%
4 - Instream Cover > 30%	



17.6°C 17.5 9.12 80

REACH NO.	SITE (Dist. - Interval)	% SITE RIFFLE/ RUN	% SITE POOLS	SHAD I (%)	STREAM BANKS: VEGETATION (%) BARE GROUND	GRASSES	SHRUBS	TREES	STREAM BANKS: EROSION (%) LEFT BANK (L - S/P): STABLE	LEFT BANK: BARE STABLE	LEFT BANK: ERODING	RIGHT BANK (R - S/P): STABLE	RIGHT BANK: BARE STABLE	RIGHT BANK: ERODING	O2 (mg/l)	pH	DEPTH: % (cm) Wet	DEPTH: % (cm) CHANNEL	DEPTH: % (cm) Wet	DEPTH: % (cm) CHANNEL	DEPTH: % (cm) Wet	DEPTH: % (cm) CHANNEL	POOL RATING (CRITERIA ON OTHER SIDE) NO.	POOL RATING (CRITERIA ON OTHER SIDE) LETTER	POOL TAIL: EMBEDDEDNESS (CRITERIA) 1 ≤ 30% 2 30%+ - 35% 3 35% - 80% 4 ≥ 80%	POOL TAIL: MEAN SUBSTRATE SIZE (cm)	% FINES	% TURBULENCE
1		20	80	10	–	10	30	60	45		5	45	–	5	9.2		85 ~~150~~	220 ~~240~~	120	280	100	215			1	20		
2		rif 100	–	12	–	–	95	5	50			50	–	–	9.2		35	90	70	40	30	60			1	20		
3		run	–	12	–	–	95	5	50		–	50	–	–	9.2		7[illegible]	22	85	30	85	21			1	15		
4		rif	–	10			95	5	[illegible]	50		50	–	–	9.2		[illegible]	38	105	45	55	25			1	8		
5		run	–	6	5	5	85	5	50			50	–	–	9.2		110	27	139	43	130	50			1	10		
6		rif	–	6			90	10	50			50	–	–	9.12		80	53	110	52	80	45			1	8		
7		run	–	6	5	8	85	5	[illegible]	20		[illegible]	–	–	9.0		80	53	70	52	85	45			1	8		
8		rif	–	6			90	10	50			50	–	–	9.12		85	40	80	45	85	45			1	8		
9		run	–	6			85	15	50			50	–	–	9.12		95	48	95	45	80	27			1	8		

REACH NO.	UNIT NO.	STREAM TYPE	WET WIDTH (m)	DEPTH (cm) % WAY	% WAY	% WAY	AVERAGE DEPTH SUM: CENTIMETERS (cm)	METERS (m)	COEFFICIENT (0.0 - SMOOTH) (0.0 - ROUGH)	LENGTH (m)	FLOAT TIME (sec) % WAY	% WAY	% WAY	AVERAGE	COMMENTS LOCATION
															TR S-56 157
															S Canal 827.9 / 484

Appendix C: Water Chemistry Results 2023 at Curve Pool

Report ID: 486357-IAS
Report Date: 20-Jun-23
Date Received: 14-Jun-23

CERTIFICATE OF ANALYSIS

for
Tabusintac Watershed Association
1-4689 Route 11
Tabusintac, NB E9H 1J6

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

Attention: Billie Jo Fowler
Project #: ASCF 2023
Location: Tabusintac Watershed

Analysis of Surface Water

RPC Sample ID:			486357-1
Client Sample ID:			ASCF- Curve Pool in Tabusintac River
Date Sampled:			13-Jun-23
Analytes	**Units**	**RL**	
Sodium	mg/L	0.05	2.51
Potassium	mg/L	0.02	0.31
Calcium	mg/L	0.05	5.14
Magnesium	mg/L	0.01	1.18
Alkalinity (as $CaCO_3$)	mg/L	2	19
Chloride	mg/L	0.5	3.2
Fluoride	mg/L	0.05	0.17
Sulfate	mg/L	1	< 1
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	0.4
Phosphorus - Total	mg/L	0.002	0.017
Carbon - Total Organic	mg/L	0.5	6.1
Colour	TCU	5	60
Conductivity	µS/cm	1	53
pH	units	-	7.4
Turbidity	NTU	0.1	0.9
Calculated Parameters			
Bicarbonate (as $CaCO_3$)	mg/L	-	18.9
Carbonate (as $CaCO_3$)	mg/L	-	0.045
Hardness (as $CaCO_3$)	mg/L	0.2	17.7
TDS (calc)	mg/L	-	30
Saturation pH (20°C)	units	-	9.3
Langelier Index (20°C)	-	-	-1.90

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

RL = Reporting Limit

Matthew Norman
Interim Director
Inorganic Analytical Chemistry

SURFACE WATER CHEM
Page 1 of 3

Peter Crowhurst, B.Sc., C.Chem.
Chemist
Inorganic Analytical Chemistry

Report ID: 486357-IAS
Report Date: 20-Jun-23
Date Received: 14-Jun-23

CERTIFICATE OF ANALYSIS
for
Tabusintac Watershed
Association
1-4689 Route 11
Tabusintac, NB E9H 1J6

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

Attention: Billie Jo Fowler
Project #: ASCF 2023
Location: Tabusintac Watershed

Analysis of Surface Water

RPC Sample ID:			486357-1
Client Sample ID:			ASCF- Curve Pool in Tabusintac River
Date Sampled:			13-Jun-23
Analytes	**Units**	**RL**	
Aluminum	mg/L	0.001	0.070
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	5.14
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	0.15
Lead	mg/L	0.0001	0.0002
Lithium	mg/L	0.0001	0.0005
Magnesium	mg/L	0.01	1.18
Manganese	mg/L	0.001	0.032
Molybdenum	mg/L	0.0001	< 0.0001
Nickel	mg/L	0.001	< 0.001
Potassium	mg/L	0.02	0.31
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	2.51
Strontium	mg/L	0.001	0.132
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: 486357-IAS
Report Date: 20-Jun-23
Date Received: 14-Jun-23

CERTIFICATE OF ANALYSIS
for
Tabusintac Watershed
Association
1-4689 Route 11
Tabusintac, NB E9H 1J6

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
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	Ferrous Ammonium Sulfate 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