

Pabineau First Nation and Nepisiguit Salmon Association  
2021 Field Report







***Nepisiguit Salmon Assessment  
and Enhancement Project***  
***Projet d'évaluation et d'amélioration  
de l'Association du Saumon Népisiguit***

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Many Thanks to our Sponsors and Partners



The Nepisiguit Salmon Association and Pabineau First Nation are pleased to be part of Facebook social media; this has demonstrated to our community our activities, and the understanding of our conservation mission for the Atlantic salmon in our region.

## Executive Summary

The Nepisiguit Salmon Association [NSA] and Pabineau First Nation [PFN] signed a Protocol Agreement to partner on joint initiatives or programs that support the conservation, protection and enhancement of Atlantic salmon and other fish species.

This year field work was conducted in collaboration with PFN and NSA. Michel Poitras was the Project Manager and was assisted by Eric Guignard. Staff from PFN helped with electrofishing, the counting fence, brood stock collection and streamside fertilisation. Thanks to the crew for their hard work during 2021.

COVID-19 continued to impact the ability to do work on our project limiting the size of our crew and having to respect workplace COVID-19 Protocols. Extremely warm weather and warm river temperatures added more pressure to the crews resulting in less electrofishing and difficult working conditions.

Stream side incubation started on April 19th, earliest start up NSA has ever had. 74,000 fry were stocked in the Nepisiguit, Gordon Meadow Brook, Pabineau Brook and Little River.

Electrofishing took place on 18 sites in the Nepisiguit, Gordon Meadow Brook, Pabineau Brook and Little River. The Warm Water Protocol was put in place resulting in restricted angling for mornings only in June and July, and a period of no angling in August. Water temperatures reached 27 degrees which has a negative impact on salmon survival.

Obstructions to fish passage were not located, mapped or breached this year on Gordon Meadow and Pabineau Brooks; however beavers were trapped on Little River through a project administered through PFN. Water quality readings were taken monthly in several rivers and brooks in the Bathurst basin. pH readings of 4.5 and 4.9 were recorded in Gordon Meadow Brook; this needs to be explored further in 2022.

Broodstock were collected and a streamside fertilization project at PFN resulted in approximately 101,000 eggs being transferred to the CharloSEC hatchery. This is an innovative project resulting in less stress on the broodstock as they do not need to be transferred to and from the hatchery for fertilisation. Training sessions were held at PFN for staff in order to assist with this and other projects.

495 grilse and 280 salmon for a total of 775 fish passed through the PFN counting fence this year. Approximately 600 redds were counted on the upper part of the river in late October which is encouraging. Angling results were very good considering the restricted angling due to the warm water.



## **Table of Contents**

	Page
Executive Summary	4
Table of Contents	5
List of Appendices	6
Streamside Incubation Boxes	7
Electrofishing Results	17
Water Quality Measurements	30
Warm Water Protocol	40
Stream Side Fertilization Project	45
Training for First Nations Technicians	50
Salmon Counting Fence Report	51
Charlo Hatchery Inventory Report	57
Beaver Dam Assessment	58
Diatom Deposits	60
Garbage Cleanup	61
Fish Friends Program	61
Ron Gauthier Award	61
Observed Wildlife Habitat	62
Redd Counts	60
Angler Surveys	65
Other Projects GMRC	65

## **Appendices**

1. Incubation Box Procedure
2. Electrofishing Procedure
3. Electrofishing Factored Data
4. Electrofishing Data
5. Electrofishing Site Maps
6. Electrofishing GPS Locations
7. Warm Water Temperature Protocol
8. PFN Daily Count Sheet
9. Daily Salmon Enhancement Tank Log
10. Nepisiguit River Restoration Report

## 2021 Stream Side Incubation Results

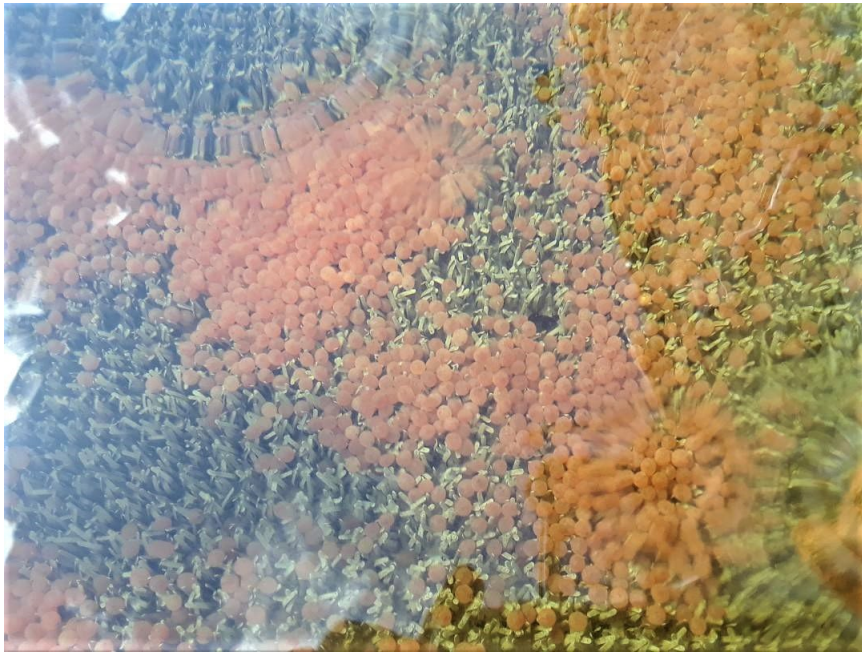
The incubation system was installed on April 19th at the Nepisiguit NB Power Dam facilities. Four [4] incubation boxes with a head tank and 2 circular tank and degassing tower were installed including a parabolic filter. All hoses and tanks were refurbished in 2020 with new fittings and valves to facilitate installation and better control of water management, disinfected and operational for the expected eyed eggs. All work was executed by several Nepisiguit Salmon Association (NSA) volunteers and the Project Manager (**Photo 1**). The crew from NB Power installed a dedicated water source which would allow for continuous water flow through the incubation period.



**Photo 1** – 2021 incubation box installation

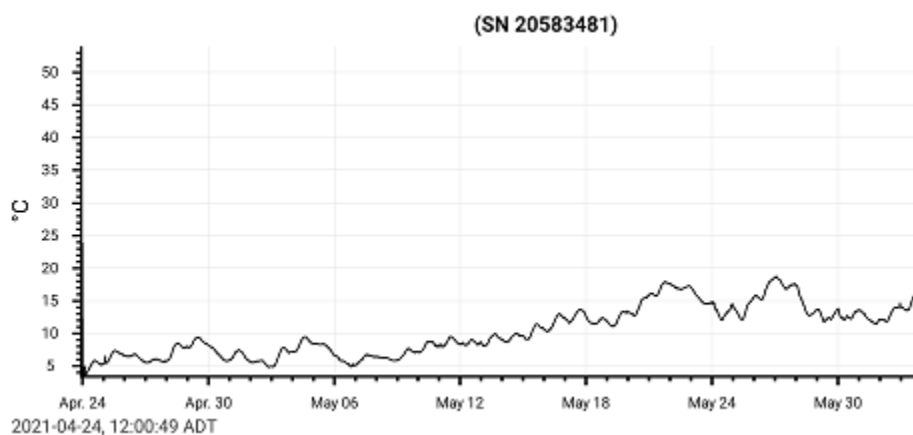
On April 26<sup>th</sup> (**Photo 2**) 75,904 eyed eggs were delivered by DNRED (Department of Natural Resources and Energy Development) crew. Eggs were previously fertilized from broodstock collected by Pabineau First Nation (PFN) in October of 2020 and over wintered at the Charlo Salmonid Enhancement Center (Charlo SEC).





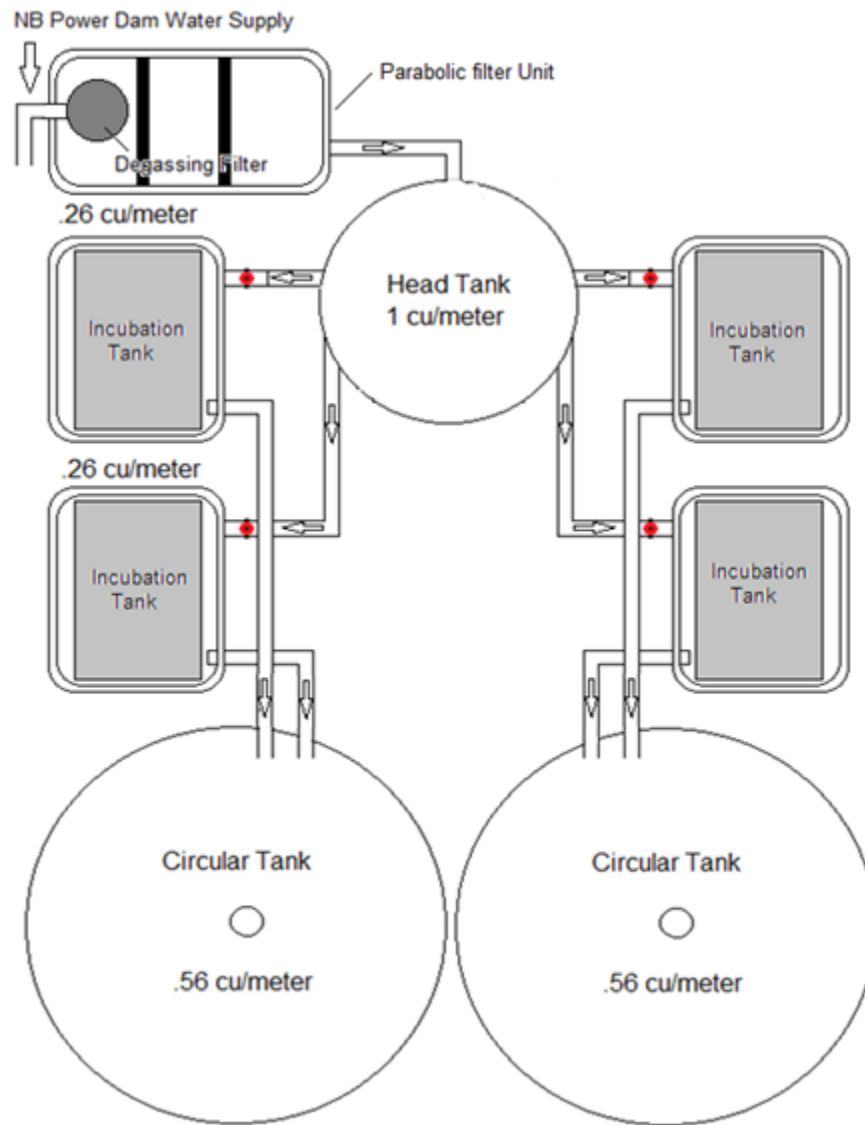
**Photo 2 – 75 904 fertilized eyed eggs**

The water temperature of 5°C was ideal on that day as the acclimation was equal to water utilised for egg transfer. See temperature graph (**Temperature Graph 1**)



**Temperature Graph for 2021**

**Illustration 1 –**

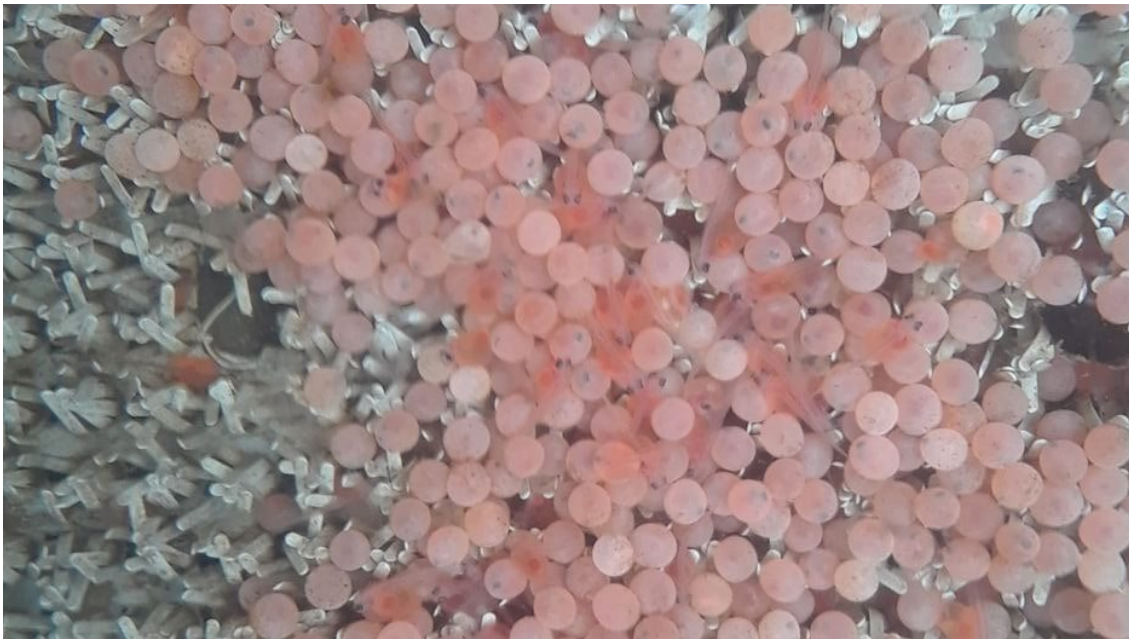


**2021 NSA Incubation tank set up**

The eggs were placed in incubation boxes with help of NSA volunteers, DNRED staff and the NSA Project Manager. 18,976 eggs were placed in incubation box #1, 2, 3 & 4 for a total of 75 904 eggs for the Nepisiguit River.

The eggs were monitored through the incubation period, recording of water and air temperature, pH, dissolved oxygen, including egg mortalities and water velocity which was adjusted according to water levels. Also, sedimentation maintenance was added this year for water quality.

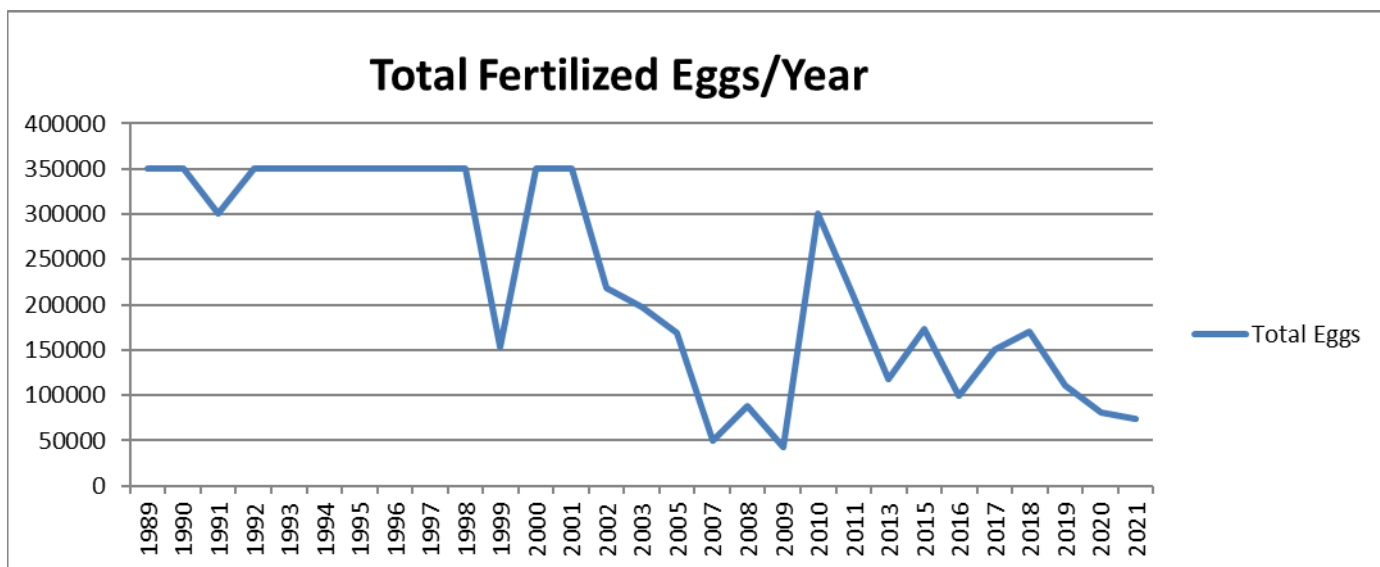
On April 30th, 5% of the eggs were hatched (**Photo 3**) and this increased to 100% on May 12th. On May 21st. the first swimming fry has emerged. Monitoring of parameters continued including the removal of any dead eggs to eliminate fungal growth in the incubation boxes and mats.



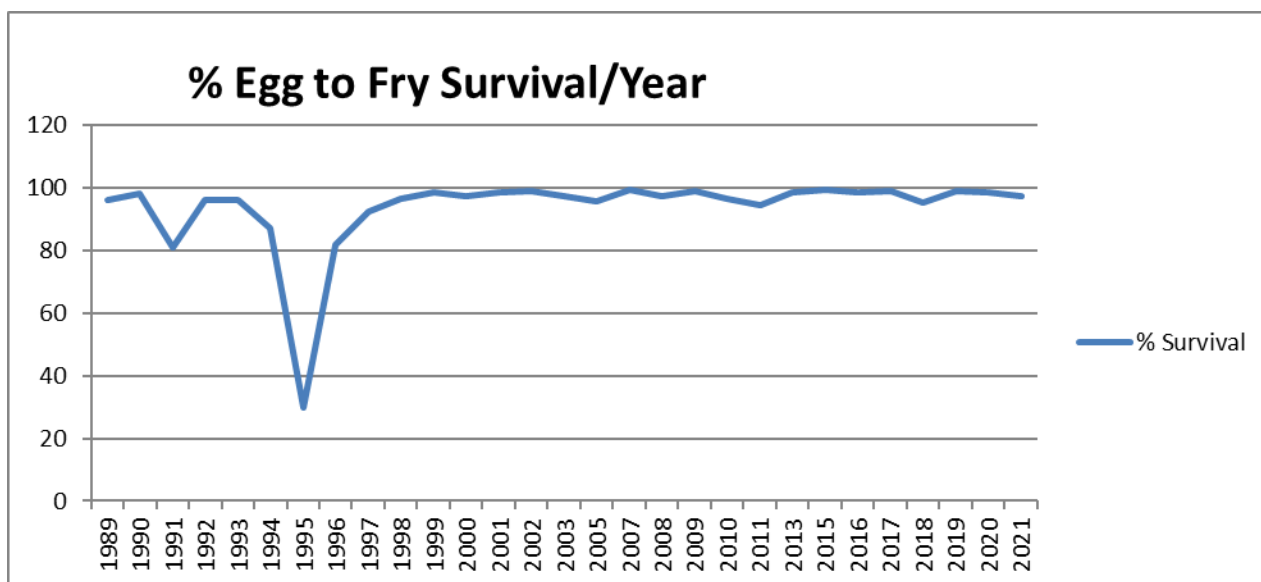
**Photo 3** - First fry hatching on incubation mats

A total of 74 000 swim up fry survived in incubation boxes 1,2,3,4 with a successful survival rate of 97.5 % for the Nepisiguit River enhancement program. (**Figure 2**)





**Figure 1 – History of total fertilized eggs**



**Figure 2 – History of egg to fry survival**

Summary of the Streamside incubation box program for the Nepisiguit River

Year	1985	1986	1987	1988	1989	1990	1991	1992
Site	Pab Brook	Pab Brook	G.F	G.F	G.F	G.F	G.F	G.F
Eggs	26176	50000	150000	300000	350000	350000	300000	350000
Fry	25669	48312	144450	293465	335533	342981	243016	335801
Survival %	98.1	96.6	96.3	97.8	95.9	98	81	95.9

Year	1993	1994	1995	1996	1997	1998	1999	2000
Site	G.F	G.F	G.F	G.F	G.F	G.F	G.F	G.F
Eggs	350000	350000	350000	350000	350000	350000	153408	350000
Fry	336277	304079	105000	285939	323537	337354	151228	340236
Survival %	96.1	86.9	30	81.7	92.4	96.4	98.6	97.2

Year	2001	2002	2003	2005	2007	2008	2009	2010
Site	G.F	G.F	G.F	G.F	G.F	G.F	G.F	G.F
Eggs	350000	219000	197275	168270	50000	88400	43250	300900
Fry	345272	216532	192412	160960	49000	86270	42104	290452
Survival %	98.7	98.9	97.5	95.6	99.4	97.5	98.9	96.5

Year	2011	2013	2015	2016	2017	2018	2019	2020
Site	G.F	G.F	G.F	G.F	G.F	G.F	G.F	G.F
Eggs	208000	118000	173000	100000	150000	170000	110373	81372
Fry	196376	116400	171838	98483	148162	161803	104847	80169
Survival %	94.4	98.7	99.3	98.5	98.8	95.4	91.4	98.5

For **2021** – at the G.F site a total of **75904** eggs delivered and **74000** total fry

With a survival rate of 97.5%

Total of **7,077,802** eggs and **6,487,957** Fry and an average of 91.6% survival rate

(There was no incubation program in 2004, 2006, 2012, and 2014)

The following is a distribution history of salmon fry release for the Nepisiguit River (**Table 1**)

### Distribution history of fry release from 1985 -2021

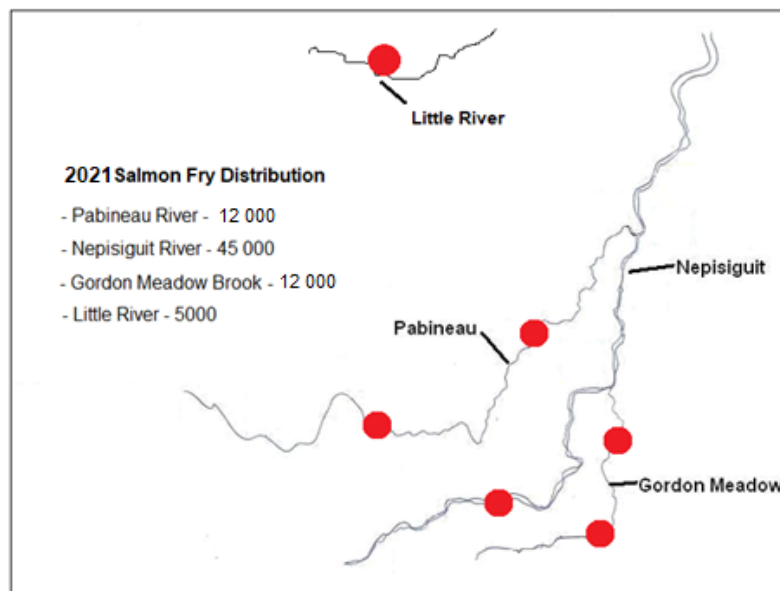
Year	Temp.C°	Distribution dates	# Eggs	% Succ.	Total Fry
1985	n/a	n/a	26176	98.1	25669
1986	n/a	n/a	50000	96.6	48312
1987	n/a	n/a	150000	96.3	144450
1988	10°	June 3-4	300000	97.8	293465
1989	7°	June 4-7	350000	95.9	335533
1990	15°	June 8-12	350000	98	342981
1991	15°	June 10th	300000	81	243016
1992	18°	June 8-12	350000	95.9	335801
1993	15-18°	June 14-17	350000	96.1	336277
1994	14°	June 16-18-20	350000	86.9	304079
1995	n/a	n/a	350000	30	105000
1996	19	June 11th	350000	81.7	285939
1997	16	June 16-18	350000	92.4	323537
1998	11	June 4th	350000	96.4	337354
1999	17	June 9th	153408	98.6	151228
2000	15.4	June 14th	350000	97.2	340236
2001	15.5	June 11th	350000	98.7	345272
2002	14	June 11th	219000	98.9	216532
2003	15.6	June 18th	197275	97.5	192412
2004	No incubation program				
2005	15	June 15-16	168270	95.6	160960
2006					
2007	14	June 13th	50000	99.4	49000
2008	17	June 17th	88400	97.5	86270
2009	16	June 12th	43250	98.9	42104
2010	11	June 3rd	300900	96.5	290452
2011	13	June 17th	208000	94.4	196376
2012	No incubation program				
2013	14	June 19th	118000	98.7	116400
2014	No incubation program				
2015	17	June 15th	173000	99.3	171838
2016	15	June 13rd	100000	98.5	98483
2017	n/a	June 9th	150000	98.8	148162
2018	16	June 20th	170000	95	161803
2019	16.5	June 20th	110373	91.4	104847
2020	17	June 15th	81372	98.5	80169
2021	15	May 31st.	75409	97.5	74000



On May 31st, all swim up fry were disbursed in the Nepisiguit River (approx. 45,000), Pabineau River (approx. 12,000), and Gordon Meadow Brook (approx. 12,000). Stocking was achieved with the help of DNRED and project staff; Michel Poitras, NSA project Manager and Eric Guignard of NSA. Also 5000 salmon fry were distributed for Little River on June 6<sup>th</sup>.



**Photo 4** – Fish transfer for Little River June 6<sup>th</sup>, 2021



**Figure 3** – 2021 Salmon Fry Distribution

2021 incubation period was a success, and the earliest in the history of the incubation program of released fry to date. The holding period of the swimming salmon fry was at its comfortable threshold. The total biomass was 12.95 kg; the available disposable volume of water was 2 cubic meters. An acceptable biomass density for salmon fry should have been 10 kg. /cubic meter. The average fish weight was 0.175g; giving a total number of 74 000 fish.

Nepisiguit River – 45 000 Salmon fry with a total biomass of 7.875 Kg.

Gordon Meadow – 12 000 Salmon fry with a total biomass of 2.1 Kg.

Pabineau Brook – 12 000 Salmon Fry with a total biomass of 2.1 Kg.

Little River – 5000 Salmon fry with a total biomass of 875 gr.

The following chart (**Table 2**) shows the progression of salmon eyed egg development, it would be pertinent to have the documentation of the history of the delivered eggs. Having the total of degree days of incubation or a percentage of development from the date of fertilisation, we can continue the development and predict the hatching period; NSA will follow up with Charlo SEC.

**Table 2 – Development of Fertilised Salmon Eggs**

**Percentage of development of fertilized salmon eggs according to water temperature chart**

Temp. °C	% Dev.	Temp. °C	% Dev.	Temp. °C	% Dev.
2.0	0.60	5.0	1.01	8.0	1.60
2.1	0.61	5.1	1.03	8.1	1.62
2.2	0.62	5.2	1.04	8.2	1.64
2.3	0.63	5.3	1.06	8.3	1.67
2.4	0.64	5.4	1.08	8.4	1.69
2.5	0.66	5.5	1.10	8.5	1.71
2.6	0.67	5.6	1.11	8.6	1.74
2.7	0.68	5.7	1.13	8.7	1.76
2.8	0.69	5.8	1.15	8.8	1.78
2.9	0.71	5.9	1.17	8.9	1.81
3.0	0.72	6.0	1.19	9.0	1.83
3.1	0.73	6.1	1.21	9.1	1.86
3.2	0.74	6.2	1.22	9.2	1.88
3.3	0.76	6.3	1.24	9.3	1.91
3.4	0.77	6.4	1.26	9.4	1.93
3.5	0.78	6.5	1.28	9.5	1.96
3.6	0.80	6.6	1.30	9.6	1.98
3.7	0.81	6.7	1.32	9.7	2.01
3.8	0.83	6.8	1.34	9.8	2.03
3.9	0.84	6.9	1.36	9.9	2.06
4.0	0.86	7.0	1.38	10.0	2.08
4.1	0.87	7.1	1.40	10.1	2.11
4.2	0.89	7.2	1.42	10.2	2.14
4.3	0.90	7.3	1.44	10.3	2.16
4.4	0.92	7.4	1.47	10.4	2.19
4.5	0.93	7.5	1.49	10.5	2.22
4.6	0.95	7.6	1.51	10.6	2.24
4.7	0.96	7.7	1.53	10.7	2.27
4.8	0.98	7.8	1.55	10.8	2.30
4.9	0.99	7.9	1.57	10.9	2.33



## 2021 Salmon Electrofishing Results

This year's electrofishing activities were delayed due to late permit remittance from Department of Fisheries and Oceans; this has delayed electrofishing activities of 4 weeks.

Glencore provided us with electro fisher LR-20-B, which was used during our operational season. A secondary unit was available from Pabineau First Nation in case of technical issues as a backup.

The electrofishing study was carried out on the Nepisiguit River (10 sites), Gordon Meadow Brook (2 sites), Little River (3 sites), Pabineau Brook (3 sites). A total of 18 different sites were completed throughout the season (see **Appendix 3** for electrofishing procedure). Location maps and GPS coordinates for each site are included in **Appendix 5**.

Water temperature was very high during the summer and with air temperature of over 30°C there was an impact on the work for crew and fish health concerns due to high heat. Also, the high-water temperatures resulted in 18 Atlantic Salmon dying and floating into the counting fence at Pabineau First Nation. In July and August, the water was very warm; this implemented the Warm Water Protocol established by DFO, NSA, DNRED, and Pabineau First Nation. (See **Appendix 8** for Warm Water Protocol). Also, there were days when electrofishing activities were suspended due to low oxygen levels.

This year 4 temperature data loggers were placed in strategic areas in the Nepisiguit River, this was used to create a history to be used for the future of environmental trends, a multi parameter meter was used to ensure safe environmental conditions for fish. (see section on Water temperature, pH, TDS, conductivity and dissolved oxygen and Warm Water Protocol (page 41))

For the electrofishing sites near busy roads and highways, yellow flashing lights on the vehicle and safety cones used for safety.

Electrofishing results were tabulated and are shown in Figures **6 to 14** shown as total factored density per 100m<sup>2</sup> (see **Appendix 4, Tables 1 to 11 for supporting data**). All field data sheets are in **Appendix 4**.

**Table 3** shows the estimated fry and parr density for all sites which are found on each individual electrofishing sheet.

**Table 13** shows the overall factored result for every electrofishing site for every year the studies were completed (see **Appendix 4**). The overall densities found in **Table 4** were also tabulated in a graph format to facilitate comprehension of the results (**Figures 6 to 14**).

The survival from fry to parr was calculated for the Nepisiguit utilizing Table 2 as a reference and presented in **Figure 15**.

The water depth in each electrofishing site was measured, recorded and averaged directly on the field sheets. The results of this data were then tabulated and presented in **Figure 16 a**.

Salmon age is categorized by its length (fry being 3.1cm to 5.5cm), (parr 1+ being 5.6cm to 10.5cm) and (parr 2+ being bigger than 10.5cm). The parr densities for the 1+ and 2+ were added together, as a whole due to the insignificant number of 2+ found as shown in **Figure 17**.

The electrofishing study enumerated the Atlantic salmon but also other species within each site. These other species include black nose dace, lamprey eels, American eels, shiners, trout, sticklebacks and suckers. The percentage of captured Atlantic salmon vs other species were tabulated for each site and then combined for an overall result as shown in **Figure 18**. Summaries for other species caught at each site are included in **Table 5**.

Revised worksheets were completed and spread sheet calculations are on Excel for efficient tabulation of data. (See **Appendix 4**).

In addition to electrofishing sites, we have explored other areas to see if habitat was favorable and possible new sites for the future to record.

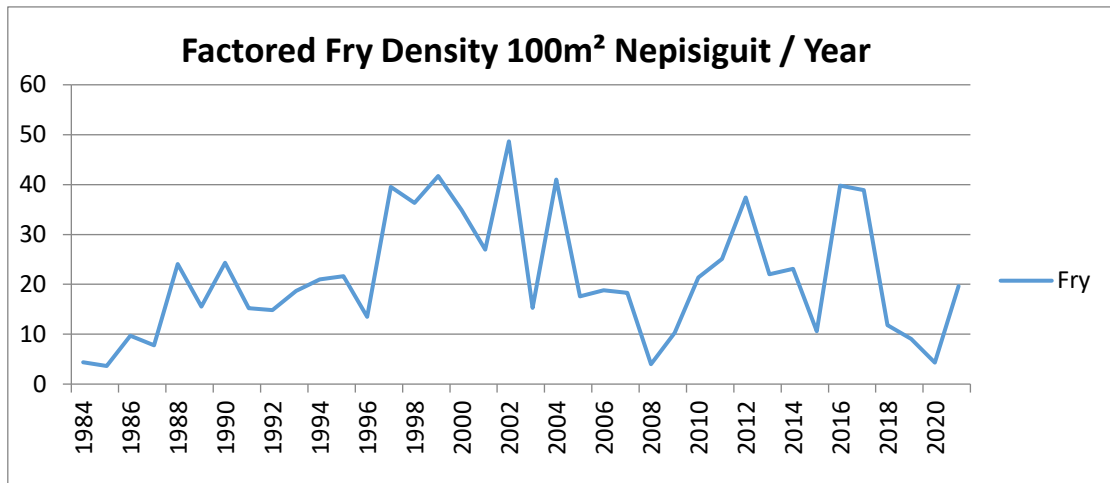
**Table 3:**

Estimated Density of Fry and Parr per 100 m<sup>2</sup> (using estimated total population/total m<sup>2</sup> x 100) these results are calculated directly onto the field sheets

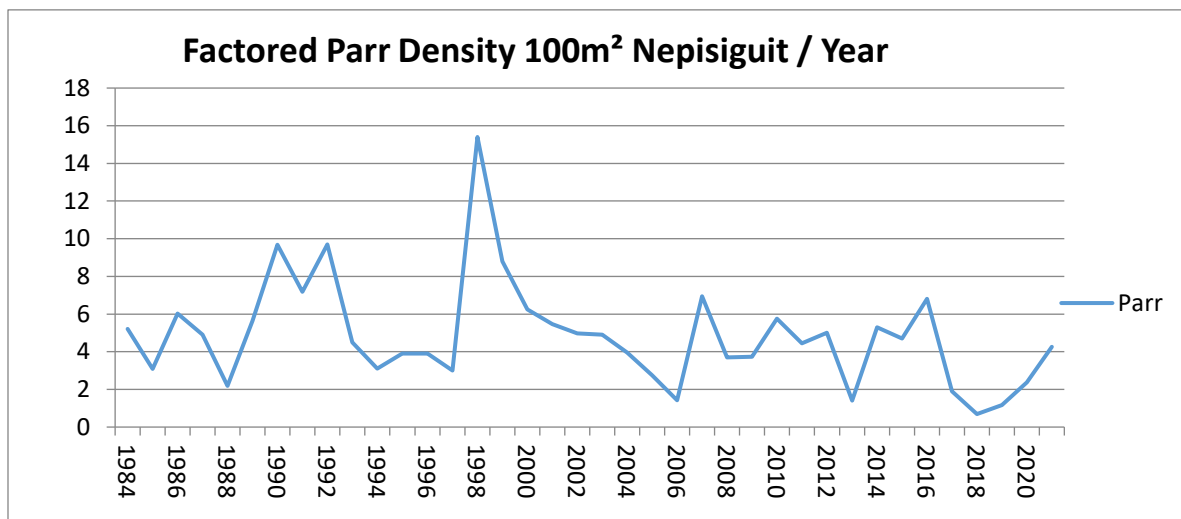
		MONTH	Total m <sup>2</sup>	FRY 100m <sup>2</sup>	PARR 100m <sup>2</sup>
STREAM	SITE				
Nepisiguit River	V Pool moved to right side	Aug.	533.80	5.62	0.62
	Below Chain of Rocks	n/a			
	A-Fence Left side	n/a			
	B- Fence Right side	July	293.94	30.62	0.00
	C-Mouth Pabineau Brook	July	667.30	47.45	0.99
	E – New site opposite to A site	July	299.21	45.67	0.00
	1B-A Frame (Burnt)	n/a			
	5-Below cable pool	July	363.57	13.75	2.75
	3 -Above Black Meadow pool	July	298.68	29.02	7.81
	3A-Below Knights Brook	Aug.	354.20	0.94	16.94
	3B-Above.Knights Brook	Aug.	493.99	9.45	9.45
	2-Mouth Gordon Meadow	July	594.98	10.64	2.80
	4 - Long Pool	Aug.	326.03	1.02	4.09
Pabineau Brook	1 -Above Mouth	n/a			

	2 -Route 360	Aug	526.50	5.12	11.05
	3A-Wedge Road	Sept.	204.96	8.13	29.27
	3B-South Branch	n/a			
	3C-Sports Lodge	Sept.	376.48	3.54	6.20
	4 -Therault Road	n/a			
<b>Gordon Meadow Brk.</b>	1B-Taylor Brook Road	July	307.71	90.99	10.83
	2A-Accross pine plantation	Aug.	106.26	12.33	14.51
	2B-Below Taylor Brook Road	n/a			
<b>Middle River</b>	1 -Guy Hachey's	n/a			
	2-Curtis Meadow	n/a			
	4 -Rio Road	n/a			
	5 -Arsenault Road	n/a			
	6 - Below whites bridge	n/a			
<b>Tetagouche River</b>	1 -Vallee Lourde	n/a			
	1B-RR Bridge	n/a			
	2 -Hick's	n/a			
	2A-Atlantic Host Bridge	n/a			
<b>Bass River</b>	1 -Route 11	n/a			
	2 -Route 134	n/a			
	3 -Route 08	n/a			
<b>Nigadoo River</b>	1 -Route 315	n/a			
	2 -Below Rte 11	n/a			
	3 -Ste. Rosette	n/a			
	4 -Free Grant	n/a			
<b>Elm Tree River</b>	1 - Bassin road	n/a			
	2 - Madran above highway 11	n/a			
<b>Millstream</b>	1 -Above Route 11	n/a			
	2 - Above hydro line	n/a			
	3 - Evolution street	n/a			
<b>Little River</b>	1110/NB13	Aug	177.45	56.27	16.37
	1110/above NB13	n/a	170.31	1.96	1.96

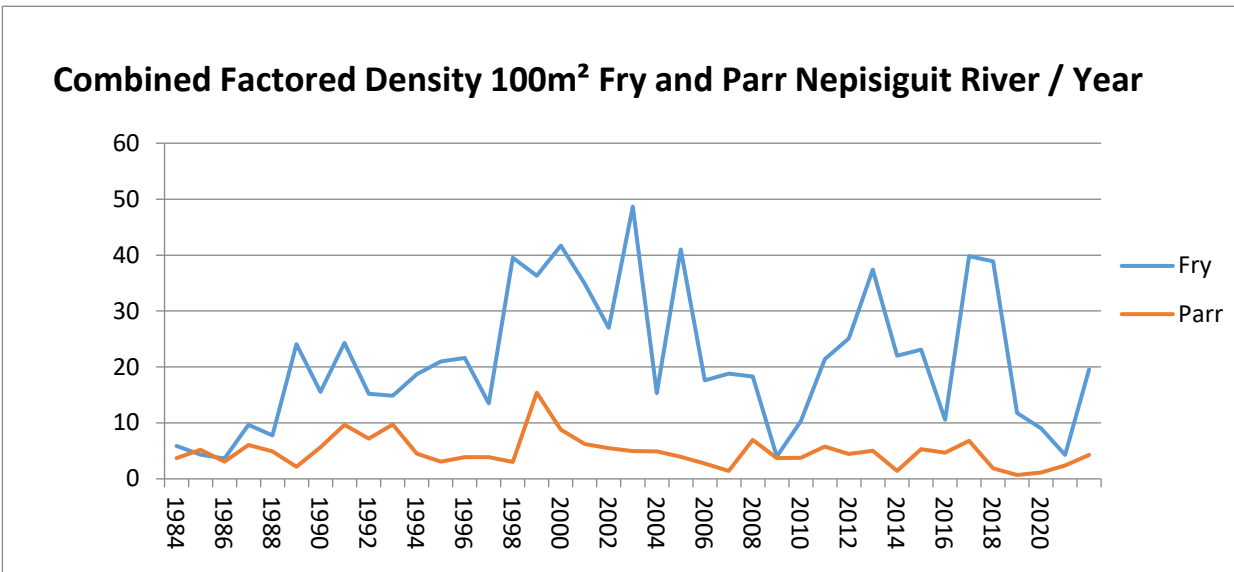
	1111/SB1	n/a	181.60	0.00	3.67
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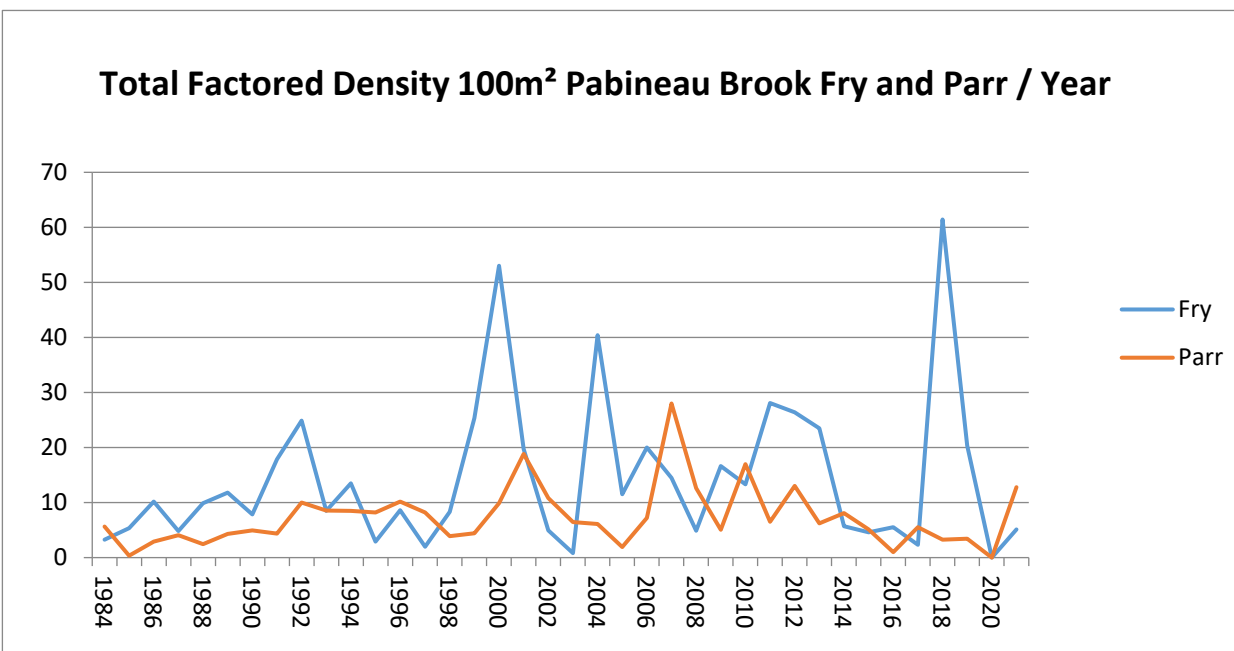
**Figure 4** - Factored Fry density for 1981-2021 electrofishing studies on the Nepisiguit River.



**Figure 5** – Factored Parr density for 1981-2021 electrofishing studies on the Nepisiguit River.

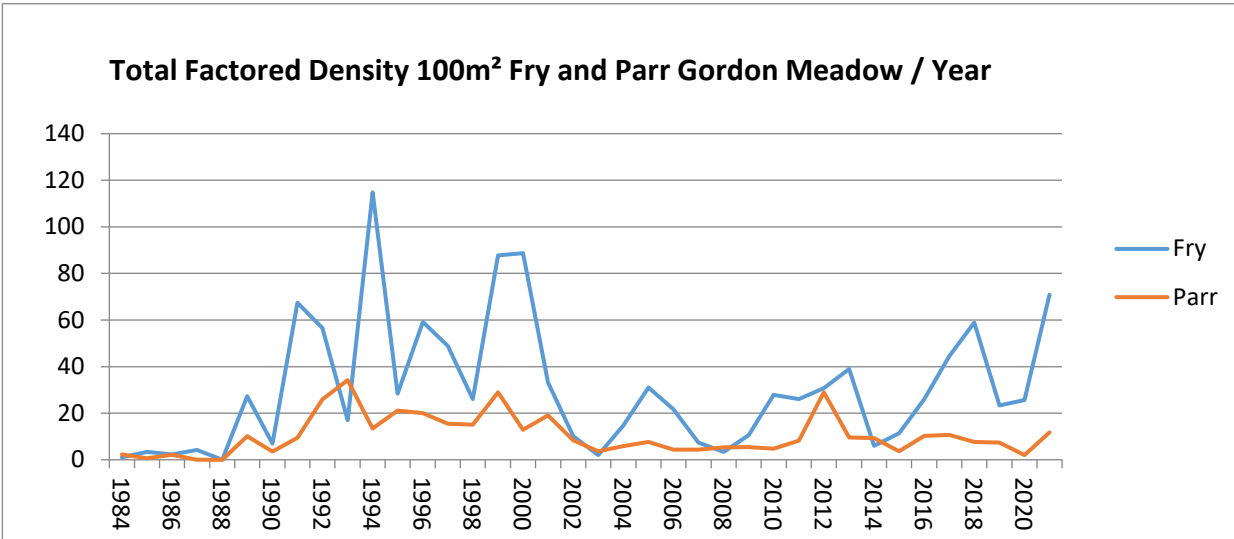


**Figure 6** – Combined factored fry and parr density on the Nepisiguit River 1982-2021

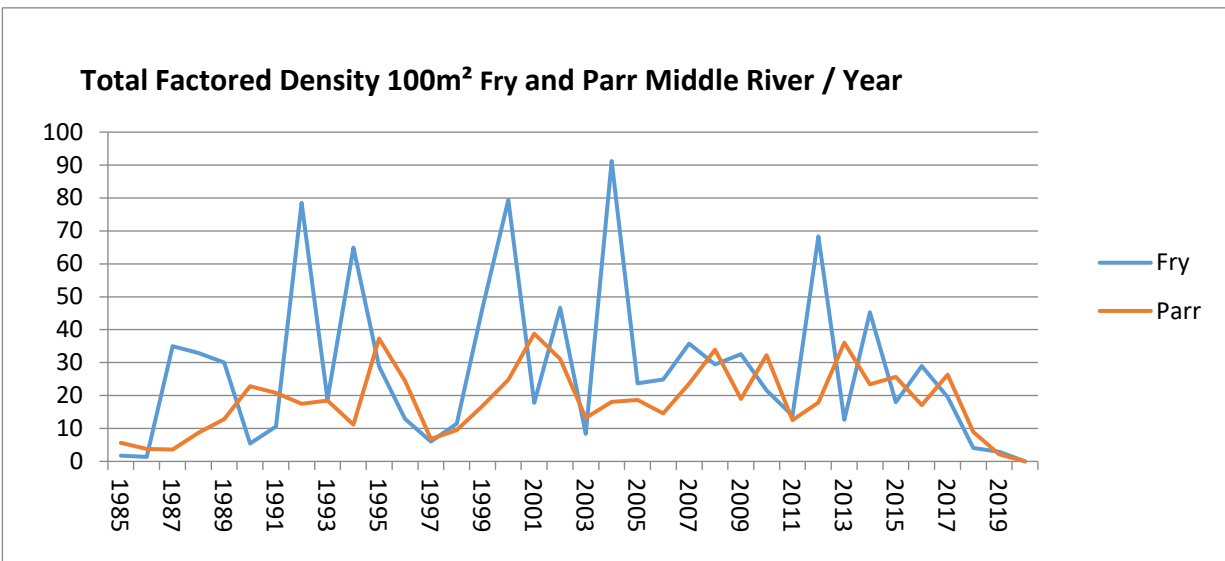


**Figure 7** – Combined factored fry and parr density on the Pabineau Brook for 1982-2021



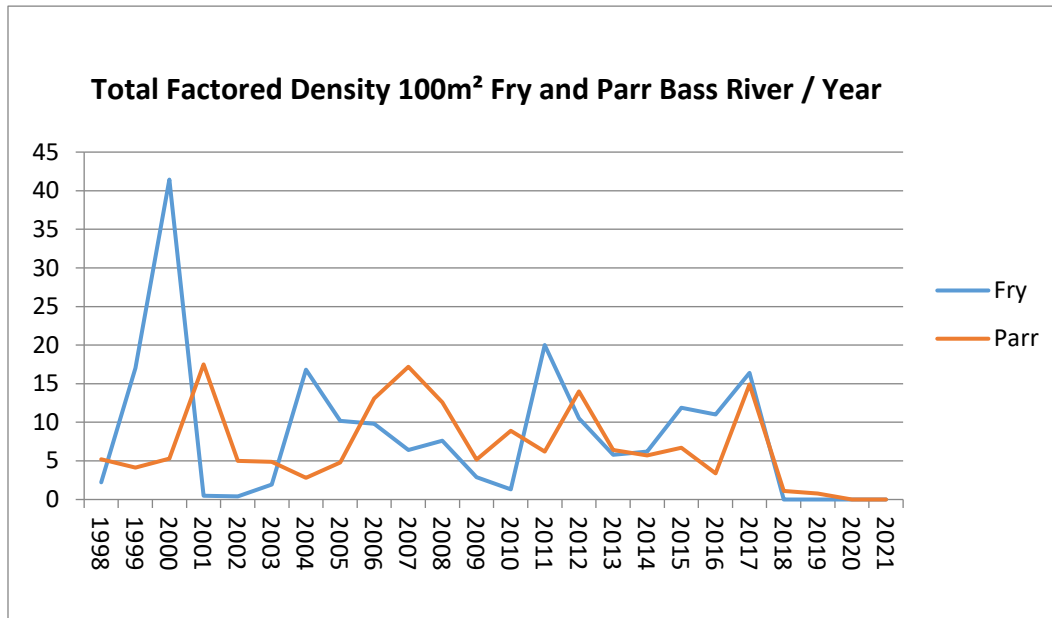


**Figure 8** – Combined factored fry and parr density on the Gordon Meadow Brook for 1982-2021



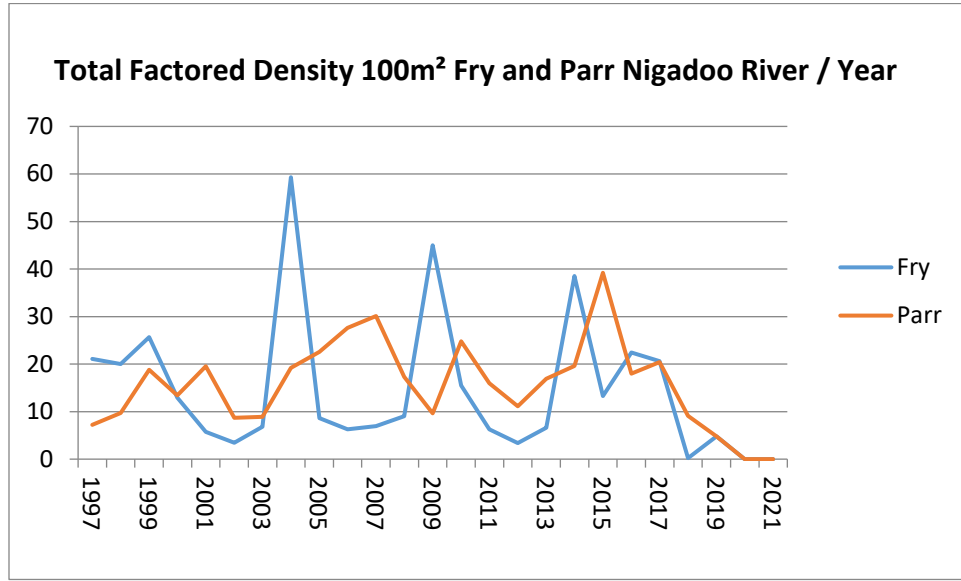
**Figure 9** - Combined factored fry and parr density on the Middle River for 1984-2020

(Note this site was not done in 2020 and 2021)

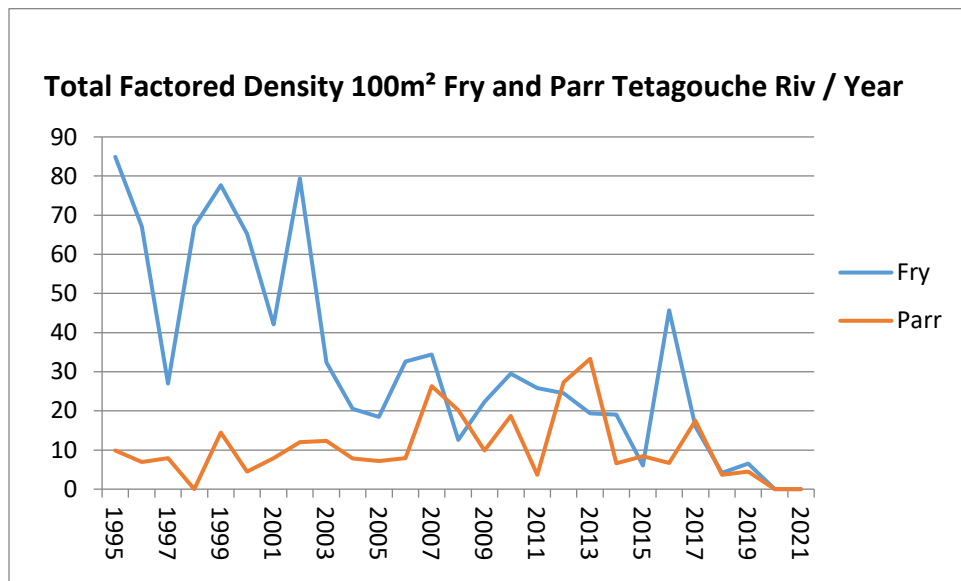


**Figure 10 - Combined factored fry and parr density on the Bass River for 1995-2020**

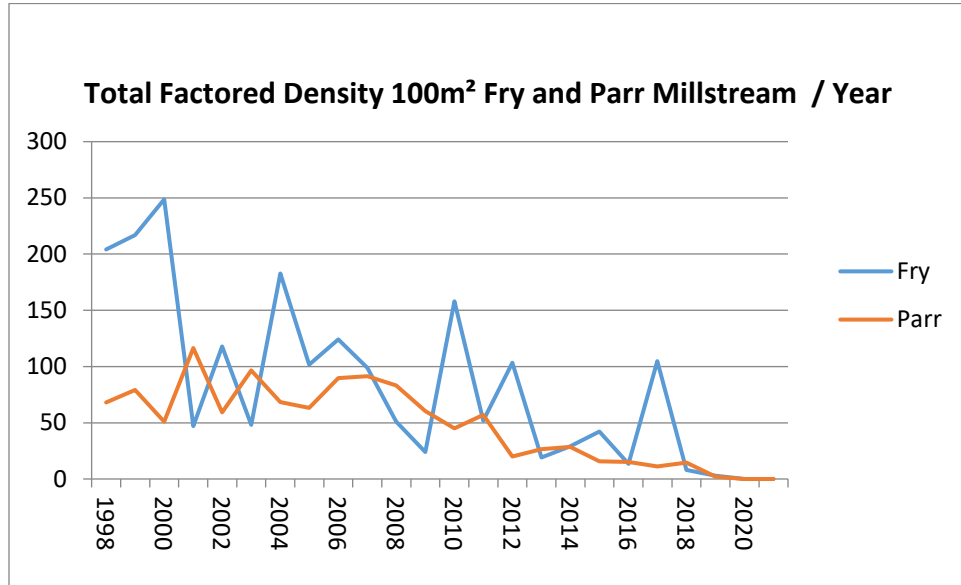
(Note this site was not done in 2020 and 2021)



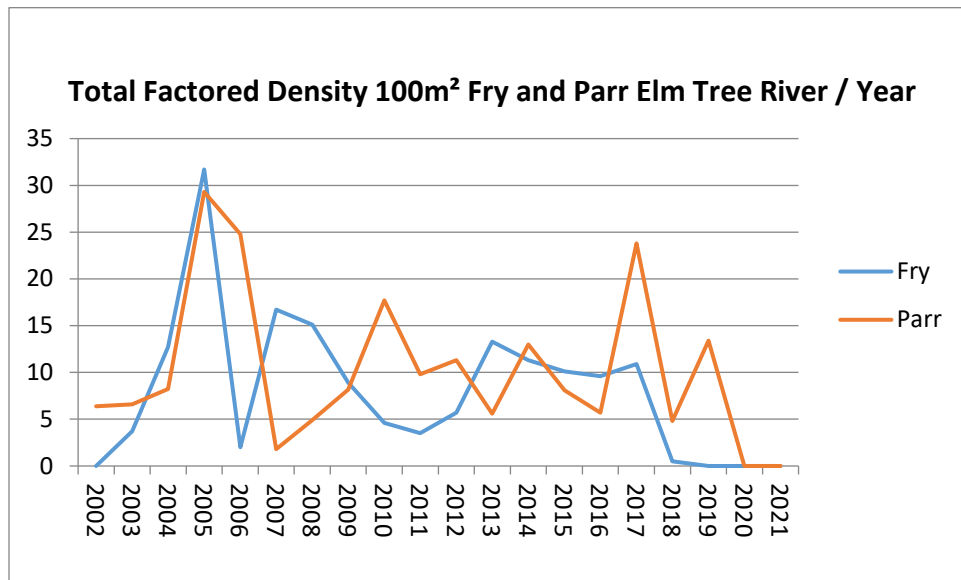
**Figure 11** - Combined factored fry and parr density on the Nigadoo River for 1994 to 2020  
(Note this site was not done in 2020 and 2021)



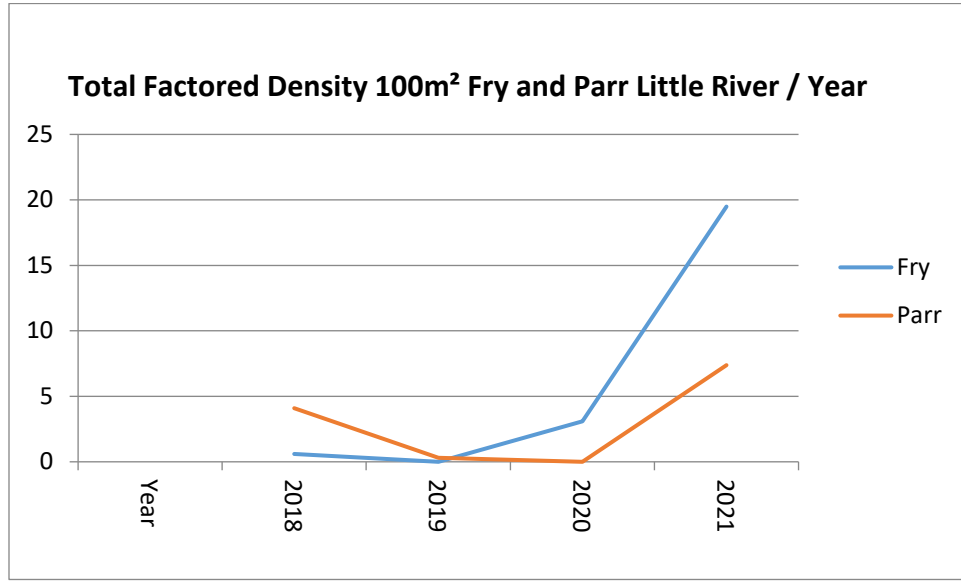
**Figure 12** - Combined factored fry and parr density on the Tetagouche River for 1991-2020  
(Note this site was not done in 2020 and 2021)



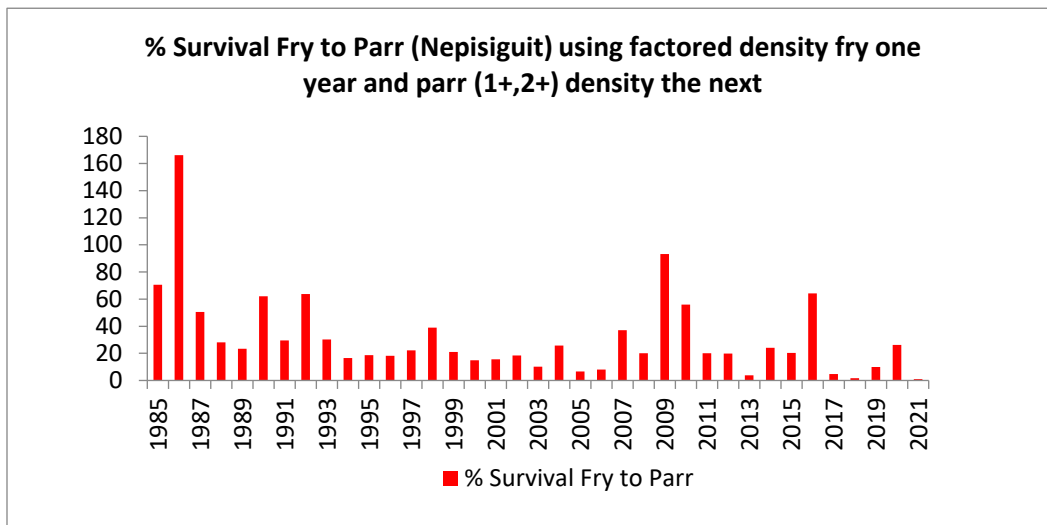
**Figure 13** - Combined factored fry and parr density on the Millstream for 1995-2020  
(Note this site was not done in 2020 and 2021)



**Figure 14** - Combined factored fry and parr density on the Elm Tree River for 1991 to 2020  
(Note this site was not done in 2020 and 2021)



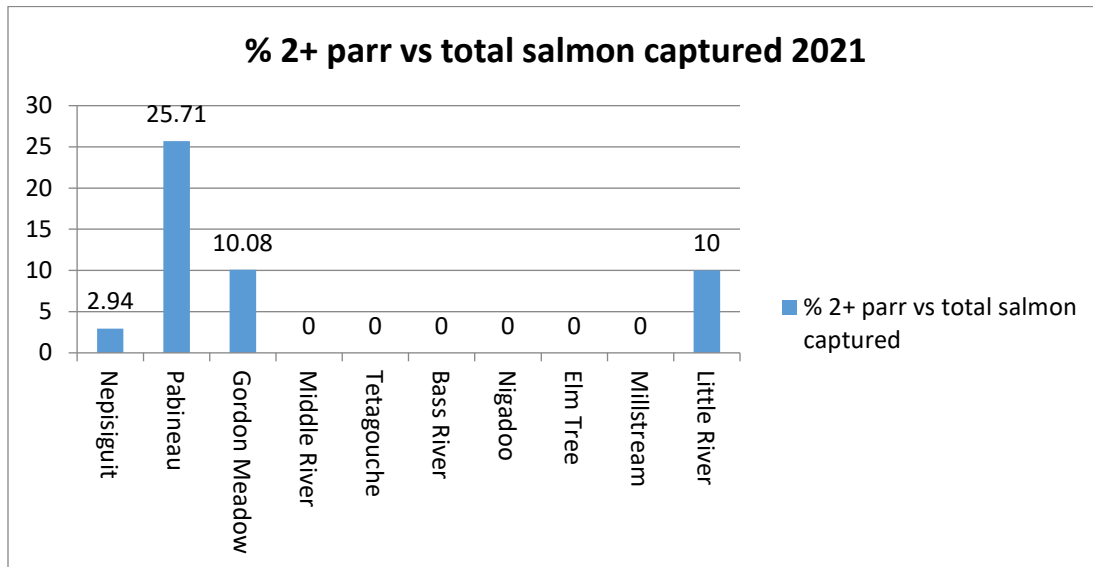
**Figure 15** - Combined factored fry and parr density on the Little River for 2018 to 2021



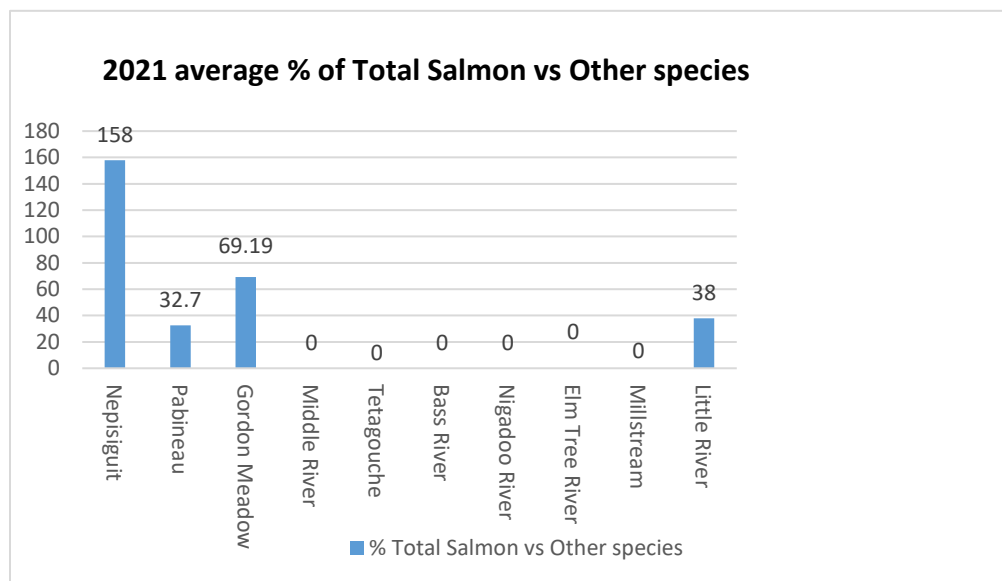
**Figure 16** - Survival rate between factored fry per 100m² and factored parr at age 1+ and 2+ per 100m².

(Parr density one-year divide by fry density the previous year x 1





**Figure 17** - Percent of total captured 2+ parr VS all other captured total salmon age per site 2021. Totals were combined for all of the sites per system. (Note that Middle River, Tetagouche, Bass River, Nigadoo, Elm Tree and Millstream were not done this season)



**Figure 18** - The average percentage of salmon captured at electrofishing sites was calculated versus the percentage of all other species captured. (Note that Middle River, Tetagouche, Bass River, Nigadoo, Elm Tree and Millstream were not done this season)

**Table 5** – Detailed species captured in 2021

STREAM	SITE	Dace ( <i>Leuciscus leuciscus</i> )	Shiner ( <i>Notropis maculatus</i> )	Lamprey Eel ( <i>Petromyzon marinus</i> )	American Eel ( <i>Angilla rostrata</i> )	Creek Chub ( <i>Semotilus atromaculatus</i> )	Trout ( <i>Salvinus fontinalis</i> )	Sucker ( <i>Catostomus catostomus</i> )	Stickel Back	
Nepisiguit River	V Pool	5			2					
	Below Chain of Rocks									

	A-Fence Left side									
	B- Fence Right side	26	4	4	2					
	C-Mouth Pabineau Brook	17		1						
	1B-A Frame (Burnt)									
	5-Below cable pool	12			4					
	3 -Above Meadow pool	17		8	3					
	3A-Below Knights Brook	4		5	10					
	3B-Above.Knights Brook	6		3	10					
	2-Mouth Gordon Meadow	11			1					
	4 - Jamieson's camp	3		11	8					
	E- New site	2			11					
	<b>Total</b>	103	4	32	51	0	0	0	0	0
<b>Pabineau Brook</b>	1 -Above Mouth	38	64	30	3	3	1			
	2 -Route 360	81	36	10		7	1			
	3A-Wedge Road	34	11	1	1					
	3B-South Branch									
	3C-Sports Lodge									
	4 -Therault Road									
	<b>Total</b>	153	111	41	3	10	2	0	0	0
<b>Gordon Meadow</b>	1B-Taylor Brook Road	27	4		4				1	
	2A-Accross pine plantation	91	36			9				
	2B-Below Taylor Brook Road									
	<b>Total</b>	118	40	0	4	9	0	0	1	0
<b>Middle River</b>	1 -Guy Hachey's									
	2-Curtis Meadow									
	4 -Rio Road									
	5 -Arsenault Road									

	6 - Below Whites bridge									
	<b>Total</b>	0	0	0	0	0	0	0	0	0
<b>Tetagouche River</b>	1 -Vallee Lourde									
	1B-RR Bridge									
	2 -Hick's Camp									
	2A-Atlantic Host Bridge									
	4-Above the falls									
	<b>Total</b>	0	0	0	0	0	0	0	0	0
<b>Bass River</b>	1 -Route 11									
	2 -Route 134									
	3 -Route 08									
	<b>Total</b>	0	0	0	0	0	0	0	0	0
<b>Nigadoo River</b>	1 -Route 315									
	2 -Below Rte 11									
	3 -Ste. Rosette									
	4 -Free Grant									
	<b>Total</b>	0	0	0	0	0	0	0	0	0
<b>Elm Tree River</b>	1 - Bassin road									
	2 - Madran above highway 11									
	<b>Total</b>	0	0	0	0	0	0	0	0	0
<b>Millstream</b>	1 -Above Route 11									
	2 - Above hydro line									
	3 - Evolution street									
	<b>Total</b>	0	0	0	0	0	0	0	0	0
<b>Little River</b>	1110/NB13	186	62		4	2				
	1110/ above NB13	8	6		3	1	6	1	2	
	1111/SB1	5	2	1	1					
	<b>Total</b>	199	70	1	8	3	6	1	2	0

Total Species Captured	573	225	74	66	22	8	1	3	0
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#### 2021 Water Quality Measurements

Water quality readings were taken revisiting the same sites once every month. The sites measured were the Nepisiguit River, Bass River, Little River, Middle River, Gordon Meadow Brook, Pabineau Brook, Tetagouche River, Millstream, Nigadoo River and the Elm Tree River. **(Table 6)**

Additional water location sites have been taken once every month in the Little River **(Table 7)**; this is part of the Little River Project in its continuation of an important stream. The rejuvenation of this stream data resumes as of 2016 by Pabineau First Nation, including additional electrofishing sites in the future to conclude and demonstrate fish habitat in the areas.

New equipment had been requested for 2021; extra data loggers for other streams, flow meter for accurate water flow, conductivity meter, oxygen meter, and water testing kit of variance chemical properties, due to back orders from supplier's flow meter and water variance test kit did not arrive.

Water data loggers were installed in 4 strategies location on the Nepisiguit River, Pabineau Counting Fence Area, Cable Pool, Middle Landing and Night Brook Location. 3 other units



were placed in the Little River, NB13 (**Figure 19** reference # 20583481), SB1 (**Figure 20** reference # 21011195), and LR17 (**Figure 21** reference # 21011131).

It is interesting to note that pH readings on Gordon Meadow had readings of 4.5 and 4.9 in June and August; this will be explored further next year.

Water quality readings were recorded with a "Horiba U-50" multi parameter provided from Pabineau First Nation. This unit measured the following parameters, Temperature, pH, dissolved oxygen, salinity, conductivity, ORP, turbidity, and TDS.

The following parameter definitions are as follows;

- **Temperature**; indicated water temperature in degree Celsius.
- **pH**; a figure expressing the acidity or alkalinity of a solution on a logarithmic scale on which 7 is neutral, lower values are more acid and higher values more alkaline.
- **D.O.-mg./l**; Dissolved oxygen or "DO" means the concentration of oxygen dissolved in effluent, expressed in mg /l or as percent saturation, where saturation is the maximum amount of oxygen that can theoretically be dissolved in water at a given altitude and temperature.
- **Salinity**; is the saltiness or amount of salt dissolved in a body of water, called saline water. It is usually measured in g/L or g/kg (grams of salt per liter/kilogram of water; the indicated measurements are in ppt. equal to ‰).
- **Conductivity mS/cm**; the conductivity of water is a measure of the capability of water to pass electrical flow. This ability is directly dependent on the concentration of conductive ions present in the water. These conductive ions are originated due to inorganic materials such as chlorides, alkalis, carbonate and sulfides compounds and dissolved salts. Higher the number mS/cm the higher the conductivity of the water capacity.
- **ORP mV**; stands for oxidation-reduction potential, which is a measure, in millivolts, of the tendency of a chemical substance to oxidize or reduce another chemical substance.
- **Turbidity NTU**; Turbidity is commonly measured using a nephelometer which uses a light beam (source beam) and a light detector (usually at a 90° angle) set to one side of the source beam. The units from a calibrated nephelometer are called Nephelometric Turbidity Units (NTU).
- **TDS**; Total dissolved solids (TDS) are the amount of organic and inorganic materials, such as metals, minerals, salts, and ions, dissolved in a particular volume of water; TDS are essentially a measure of anything dissolved in water that is not an H<sub>2</sub>O molecule. Example g/l = grams of solids per litre.

Month	June										
Water Parameter	Date	T°C	pH	DO-mg/l	Salinity- ppt	Conductivity mS/cm	ORP mV	Turbidity NTU	TDS /l TDS	Depth m	Time
Location											
Nepisiguit River	06 17 21	17.33	8.40	13.79	0.00	0.0450	264	0.000	0.029	0.25	n/a
Pabineau Brook	06 22 21	20.40	8.50	12.42	0.00	0.0500	152	0.000	0.033	0.35	n/a
Tetagouche River	6 22 21	22.46	8.13	11.84	0.10	0.1360	231	0.000	0.089	0.30	n/a
Middle River	6 22 21	22.18	7.01	11.84	0.00	0.0780	250	0.000	0.051	0.25	n/a
Little River	6 22 21	22.23	6.59	11.98	0.70	0.4400	276	0.000	0.294	0.25	n/a
Bass River	6 22 21	22.96	7.14	10.2	0.00	0.1030	282	0.000	0.067	0.25	n/a
Gordon Meadow	6 22 21	20.02	6.80	10.36	0.00	0.0350	132	0.000	0.023	0.25	n/a
Mill Stream	6 22 21	21.29	8.26	13.05	0.10	0.1700	230	0.000	0.100	0.25	n/a
Nigadoo River	6 22 21	20.50	7.45	11.34	0.10	0.1450	277	0.000	0.094	0.50	n/a
Elm Tree River	6 22 21	22.36	7.34	10.65	0.10	0.1190	267	0.000	0.077	0.75	n/a

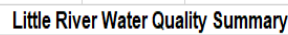
Month	July										
Water Parameter	Date	T°C	pH	DO-mg/l	Salinity- ppt	Conductivity mS/cm	ORP mV	Turbidity NTU	TDS /l TDS	Depth m	Time
Location											
Pabineau Brook	07 13 21	16.38	7.63	13.07	0.00	0.0500	203	0.000	0.032	0.25	n/a
Gordon Meadow	07 13 21	17.64	4.50	10.11	0.00	0.0250	294	0.000	0.016	0.35	n/a
Little River	07 19 21	17.99	6.38	13.02	0.40	0.8170	236	0.000	0.523	0.30	n/a
Middle River	07 13 21	18.40	6.77	11.88	0.00	0.0540	230	0.000	0.035	0.25	n/a
Nepisiguit River	07 13 21	19.96	6.24	12.99	0.00	0.0340	224	0.000	0.022	0.25	n/a
Tetagouche River	07 19 21	23.21	8.16	12.45	0.10	0.1590	214	0.000	0.103	0.25	n/a
Bass River	07 13 21	25.74	6.90	11.72	0.00	0.0820	256	0.000	0.053	0.25	n/a
Mill Stream	07 19 21	23.76	7.95	13.23	0.10	0.1660	226	0.000	0.108	0.25	n/a
Nigadoo River	07 19 21	23.43	7.69	12.41	0.10	0.1470	245	0.000	0.096	0.50	n/a
Elm Tree River	07 19 21	22.42	6.80	11.94	0.00	0.0970	270	0.000	0.063	0.75	n/a

Month	August										
Water Parameter	Date	T°C	pH	DO-mg/l	Salinity- ppt	Conductivity mS/cm	ORP mV	Turbidity NTU	TDS /l TDS	Depth m	Time
Location											
Pabineau Brook	Aug.31	14.92	7.58	9.8	0.00	0.0620	246	3.800	0.04		
Gordon Meadow	n/a										
Little River	Aug.31	19.44	7.12	10.37	0.20	0.4960	160	22.200	0.336		
Middle River	Aug.31	20.96	7.56	9.56	0.00	0.0780	215	14.700	0.053		
Nepisiguit River	Aug.31	19.01	7.52	10.87	0.00	0.0510	181	38.000	0.033		
Tetagouche River	Aug.31	19.75	8.33	10.05	0.10	0.1510	168	18.700	0.103		
Bass River	n/a										
Mill Stream	Aug.31	19.10	8.03	11.51	0.10	0.2090	209	19.200	0.143		
Nigadoo River	Aug.31	19.46	8.5	10.3	0.10	0.1490	197	9.400	0.101		
Elm Tree River	Aug.31	19.27	7.72	9.48	0.10	0.1150	216	7.800	0.078		

Month	September										
Water Parameter	Date	T°C	pH	DO-mg/l	Salinity- ppt	Conductivity mS/cm	ORP mV	Turbidity NTU	TDS /l TDS	Depth m	Time
Location											
Pabineau Brook	Sept. 27	16.10	7.43	11.27	0.00	0.0390	249	0.000	0.025		
Gordon Meadow	Sept. 27	16.40	4.90	9.45	0.00	0.0250	272	0.000	0.016		
Little River	Sept. 27	16.80	6.50	11.33	0.70	1.4500	208	7.200	0.965		
Middle River	Sept. 27	17.10	6.81	11.44	0.00	0.0550	195	4.800	0.037		
Nepisiguit River	Sept. 27	16.60	6.50	11.25	0.00	0.0410	264	0.000	0.026		
Tetagouche River	Sept. 27	16.50	7.59	12.54	0.10	0.1250	245	0.000	0.081		
Bass River	Sept. 27	16.50	6.08	11.63	0.00	0.0400	231	10.100	0.99		
Mill Stream	Sept. 27	16.50	7.42	12.45	0.10	0.1250	250	0.000	0.081		
Nigadoo River	Sept. 27	16.10	7.61	12.24	0.00	0.0800	245	0.000	0.051		
Elm Tree River	Sept. 27	16.3	7.46	12.13	0.05	0.0470	254	0.000	0.031		

Month	October										
Water Parameter	Date	T°C	pH	DO-mg/l	Salinity- ppt	Conductivity mS/cm	ORP mV	Turbidity NTU	TDS /l TDS	Depth m	Time
Location											
Nepisiguit River	25-Oct	7.78	6.11	12.24	0.00	0.0350	276	0.000	0.023		
Pabineau Brook	20-Oct	9.55	6.53	11.88	0.00	0.0320	212	0.000	0.021		
Tetagouche River	20-Oct	10.20	7.85	12.11	0.10	0.0720	186	0.000	0.076		
Middle River	20-Oct	9.99	6.6	12.11	0.00	0.0370	183	0.000	0.024		
Little River	20-Oct	10.32	6.55	11.80	0.20	0.3350	184	0.000	0.226		
Bass River	20-Oct	9.53	6.57	12.4	0.00	0.0330	291	0.000	0.022		
Gordon Meadow	20-Oct	9.71	5.05	9.2	0.00	0.0250	309	0.000	0.058		
Mill Stream	20-Oct	8.92	7.38	11.42	0.00	0.0550	251	0.000	0.045		
Nigadoo River	20-Oct	8.83	7.35	13.12	0.00	0.0900	230	0.000	0.058		
Elm Tree River	20-Oct	9.29	6.75	12.86	0.00	0.0380	246	0.000	0.025		

**Table 6** – Water quality readings in the Nepisiguit River, Pabineau River, Tetagouche River, Middle River, Little River, Bass River, Gordon Meadow, Millstream, Nigadoo River, and Elmtree River for 2021



July

AugustSeptember35

Month	October										
Water Parameter	Date	T°C	pH	DO%-mg/l	Salinity- ppt	Conductivity mS/cm	ORP mV	Turbidity NTU	TDS /l TDS	Depth m	Data
Location											Logger
LR-1	10 20 21	10.32	6.55	11.8	0.2	0.335	184	0.0	0.226	n/a	
LR-9	10 20 21	9.74	6.52	11.93	0.9	1.760	201	0.0	0.318	n/a	X
LR-17	10 20 21	9.02	6.92	11.48	0.0	0.038	187	0.0	0.025	n/a	X
PK-NB-13	10 20 21	8.51	6.78	9.41	0.0	0.039	190	0.0	0.026	n/a	
SB-6	10 20 21	12.01	8.05	11.30	1.9	3.710	211	0.0	2.380	n/a	
SB-1	10 20 21	10.02	6.24	11.49	0.9	1.76	201	0.0	1.150	n/a	X
LR-16	n/a										
Month	November										
Water Parameter	Date	T°C	pH	DO%-mg/l	Salinity- ppt	Conductivity mS/cm	ORP mV	Turbidity NTU	TDS /l TDS	Depth m	Data
Location											Logger
LR-1	11 08 21	3.82	7.56	14.43	0.4	0.806	166	0.0	0.226	n/a	
LR-9	11 08 21	3.95	7.81	14.82	0.5	0.978	171	0.0	0.626	n/a	X
LR-17	11 08 21	2.43	7.72	11.57	0.0	0.047	169	0.0	0.031	n/a	X
PK-NB-13	11 08 21	2.34	6.31	12.51	0.0	0.124	223	0.0	0.124	n/a	
SB-6	11 08 21	5.92	7.46	13.86	1.9	3.720	189	0.0	2.380	n/a	
SB-1	11 08 21	3.42	7.23	13.57	0.1	0.355	197	0.0	0.454	n/a	X
LR-16	n/a										

**Table 7 – Water quality readings in the Little River for 2021**



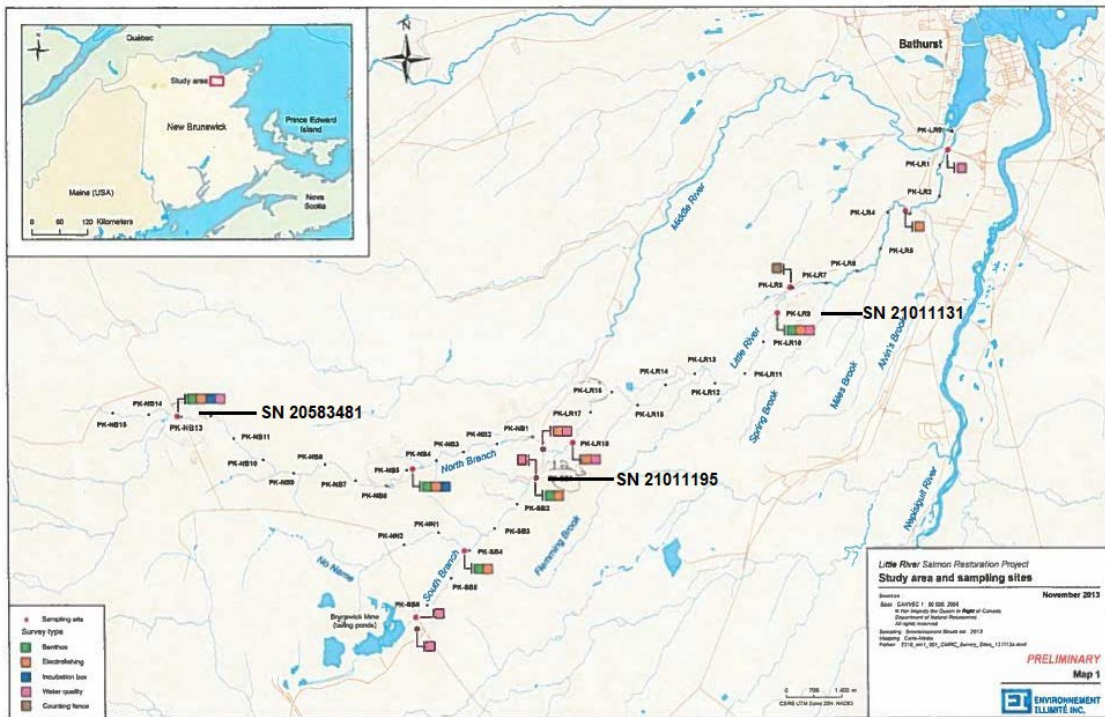
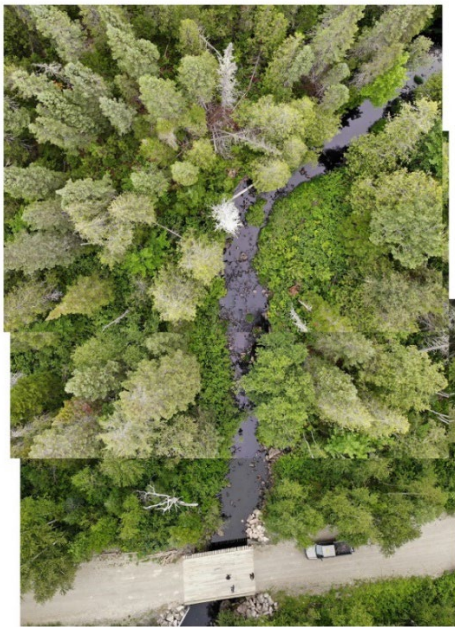


Illustration – 5 Little River Map

The following areal images courtesy of Droneast Drone services are from locations NB13, LR-17, LR-9 and SB-1;



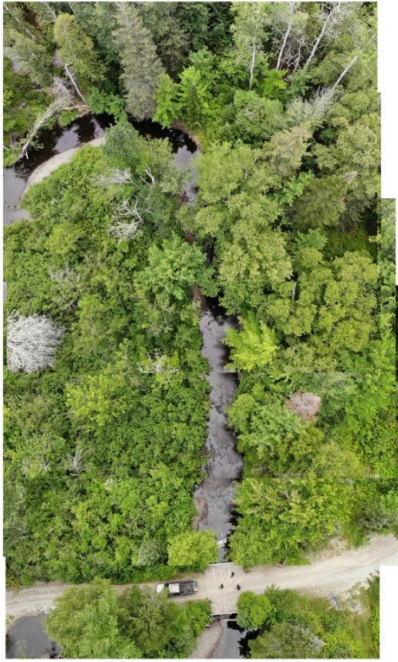
**NB-13 Downstream**



**NB-13**

**NB-13 Upstream**





**LR-17**

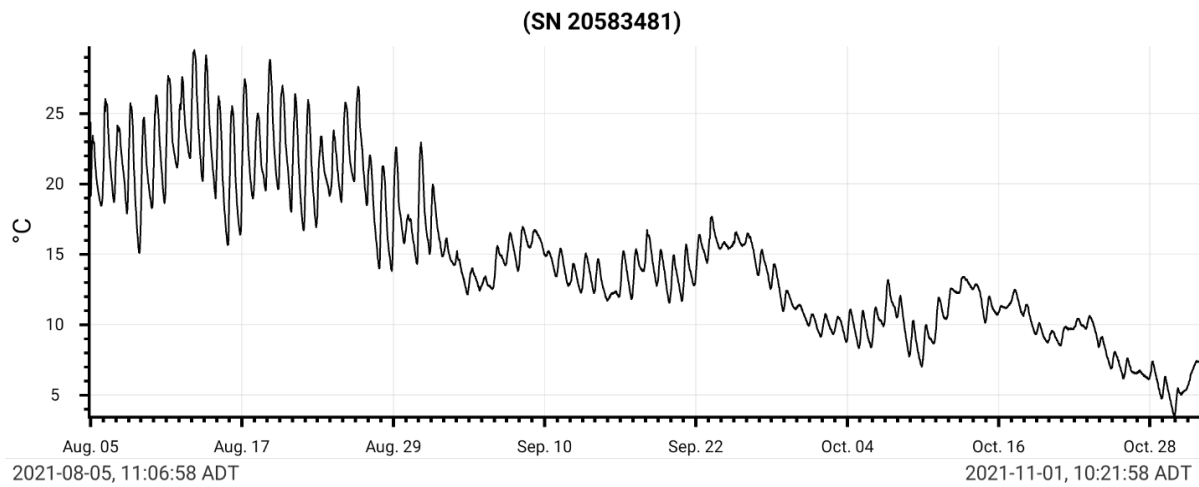


**SB-1**

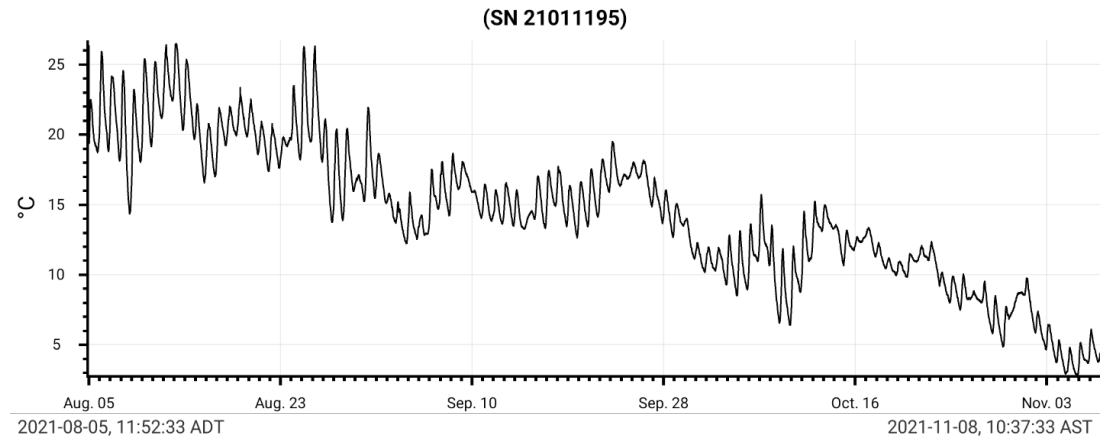


**LR-9**

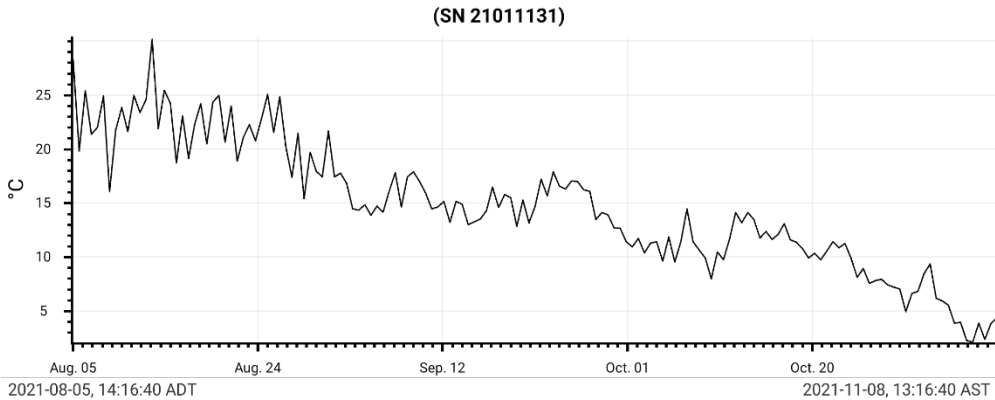
**Figure 19 (NB 13 Location)**



**Figure 20 (SB-1 Location)**



**Figure 21 (LB-17 Location)**



### Warm Water Protocol

In addition to water temperature data for the Nepisiguit River, 4 data loggers were put in place to respond to the Warm Water Protocol [WWP] (**Appendix 7**).

This protocol is a strategy for managing angling in periods of warm water in the Nepisiguit River, in collaboration with Department of Fisheries and Ocean Canada [DFO], Nepisiguit Salmon Association [NSA], Pabineau First Nations and the Department of Natural Resources and Energy Development [DNRED].

The NSA placed 4 data loggers in 4 strategic places in the Nepisiguit River (**Figure 22 a & b** Knights Brook area, **Figure 23 a & b** Middle Landing, **Figure 24 a & b** Cable Pool, and **Figure 25 a & b** Pabineau Counting Fence area). These units were easily assessable, and downloaded data in real time and then sent by e-mail to all parties regulating and administering the Warm Water Protocol at any time.

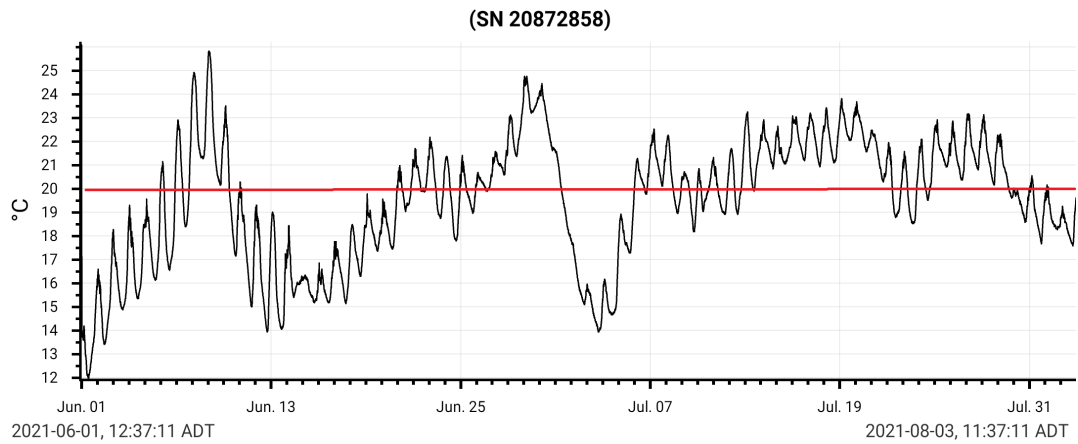
These data loggers are reusable and a memory for over 96 000 measurements, can be set to read data every second to 18 hours, additional specification on data logger can be found on **Appendix 7**.

For 2021, and until more detailed information is known on the temperature regime of the Nepisiguit River, the entire portion of the river used by salmon will be subject to potential restrictions. In Gulf Variation Orders it is described as 'Nepisiguit River from the dam at Grand Falls downstream to the mouth'.

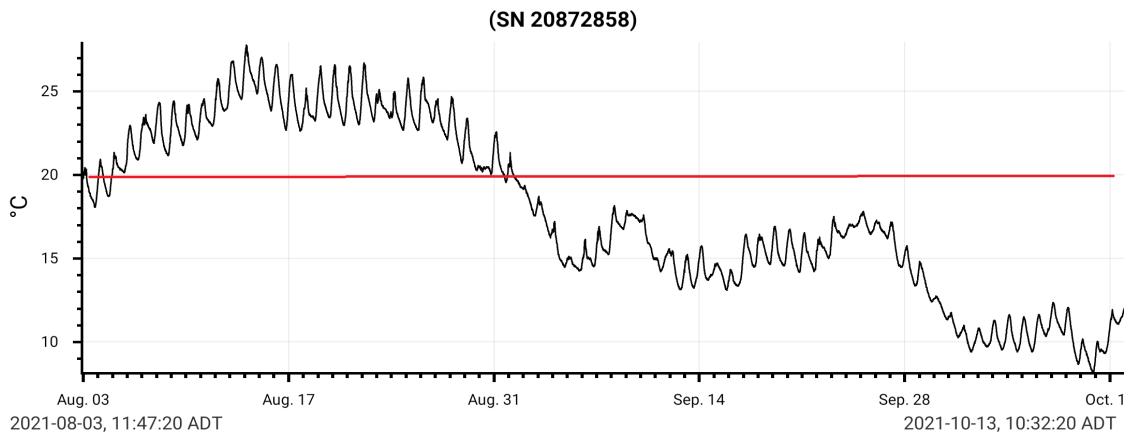
Threshold proposals are based on observed changes in behaviour of Atlantic salmon both in the wild and in experiments with measured physiological responses of adult salmon exposed to exercise at high water temperatures. A daily minimum water temperature rather than a maximum temperature (within the thermal tolerance limits of salmon) is proposed to be the appropriate indicator of physiological recovery and survival. Tmin value of 20°C is proposed as the threshold temperature for assessing physiological stress in Atlantic salmon. Here Tmin represents the minimum river temperature during the 24-hour daily cycle.

There were three occasions when the WWP was used and Variance Orders were issued; June 10-12 morning fishing only, July 14-24 morning fishing only and August 13-31 full closure of river to angling.

**Figure 22 a** (Knights Brook area)



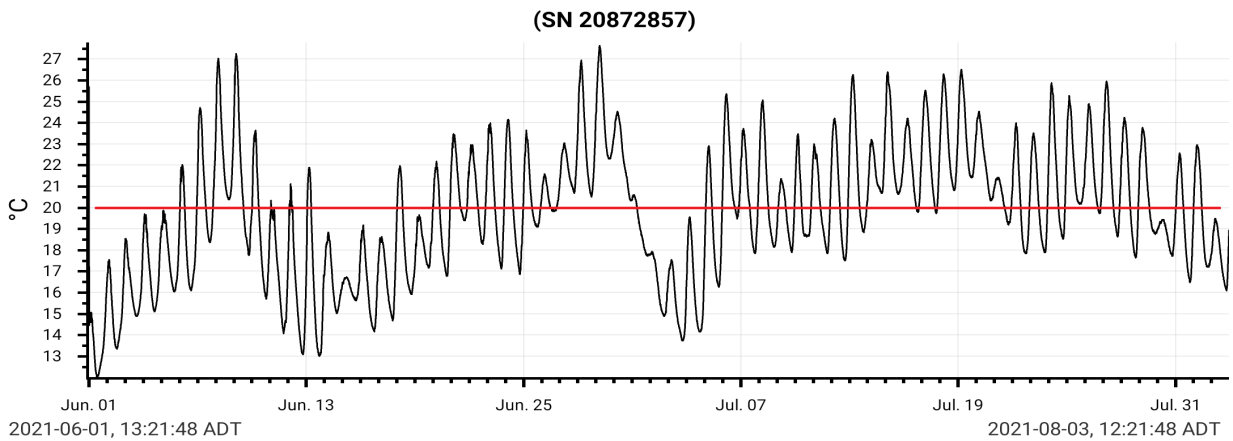
**Figure 22 b** (Knights Brook area)



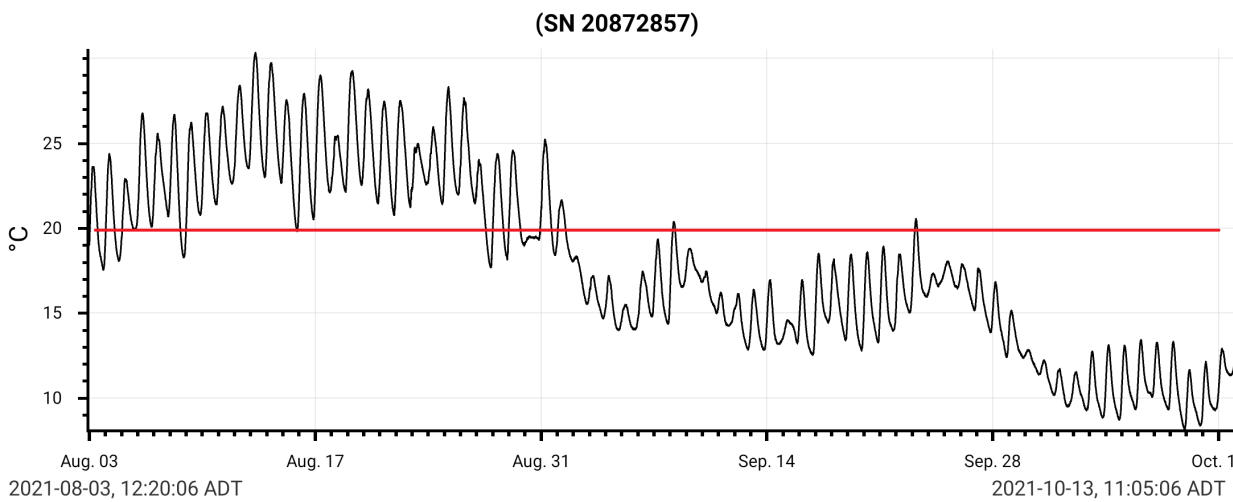
**Figure 22 a & b** – Knights Brook area on the Nepisiguit River temperature readings

From June 1<sup>st</sup>. to October 13<sup>th</sup>.

**Figure 23 a (Middle Landing)**



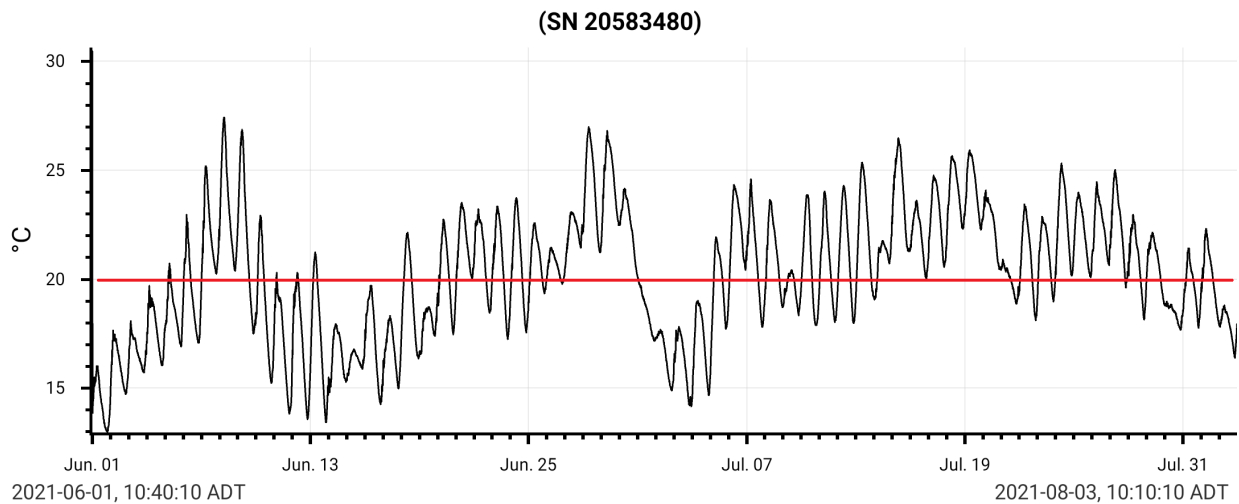
**Figure 23 b (Middle Landing)**



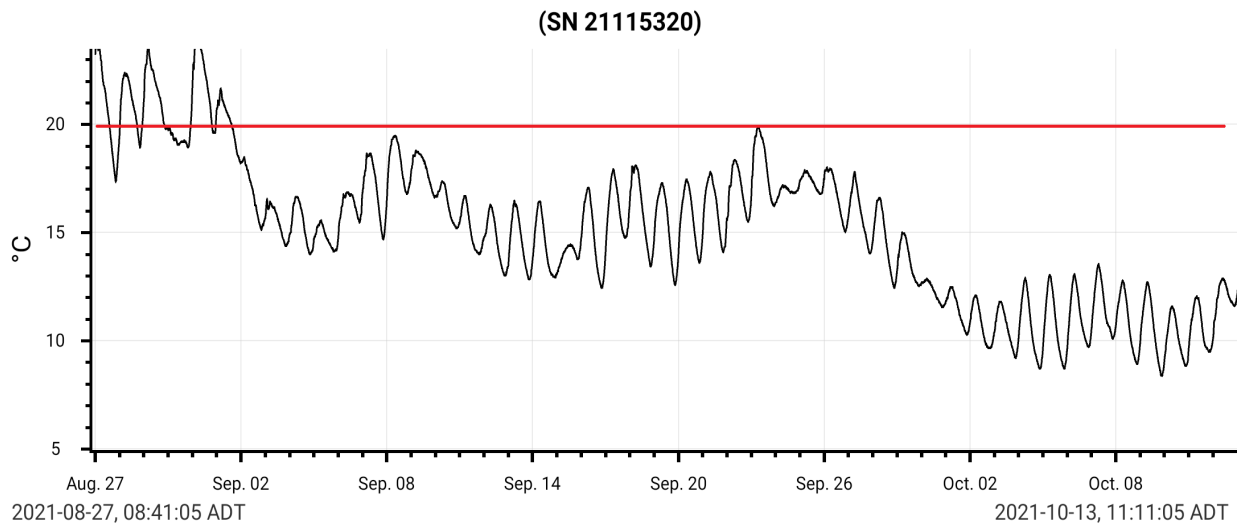
**Figure 23 a & b – Middle Landing on the Nepisiguit River temperature readings**  
from June 1<sup>st</sup>. to October 13<sup>th</sup>



**Figure 24 a (Cable Pool)**



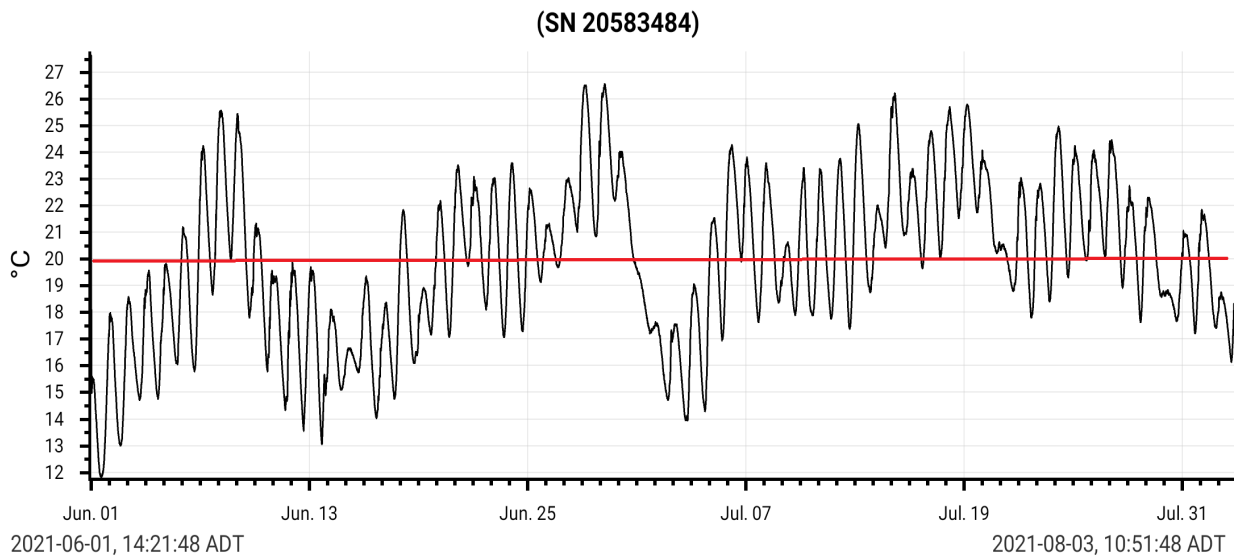
**Figure 24 b (Cable Pool)**



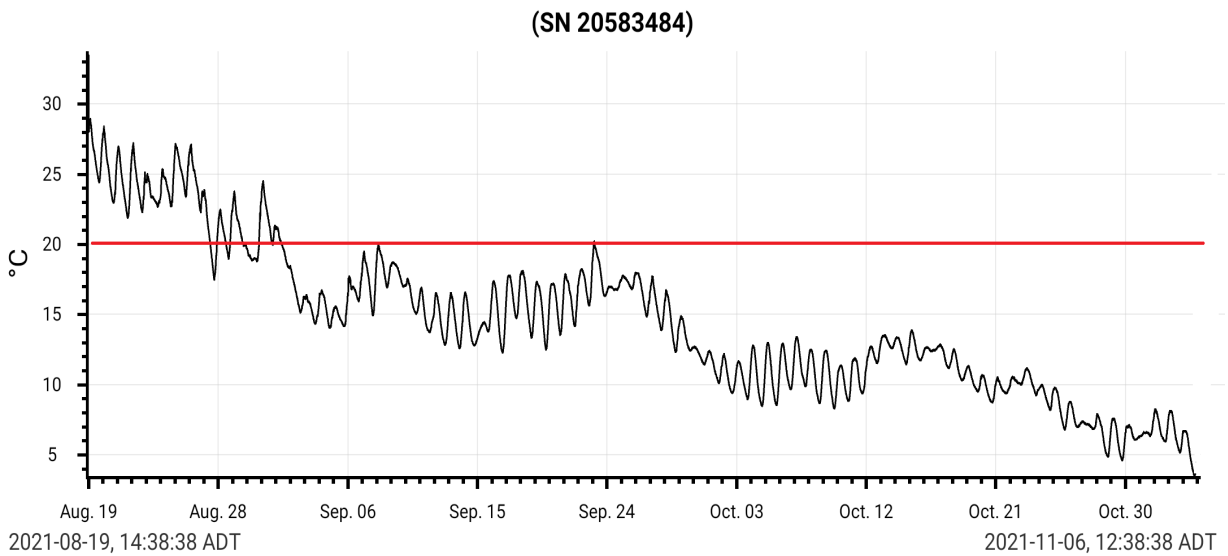
**Figure 24 a & b – Cable Pool on the Nepisiguit River temperature readings**

from June 1<sup>st</sup>. to October 13<sup>th</sup>

**Figure 25 a** (Pabineau Counting Fence)



**Figure 25 b** (Pabineau Counting Fence)



**Figure 25 a & b** – Pabineau Counting Fence area on the Nepisiguit River temperature readings from June 1<sup>st</sup>. to October 29<sup>th</sup>

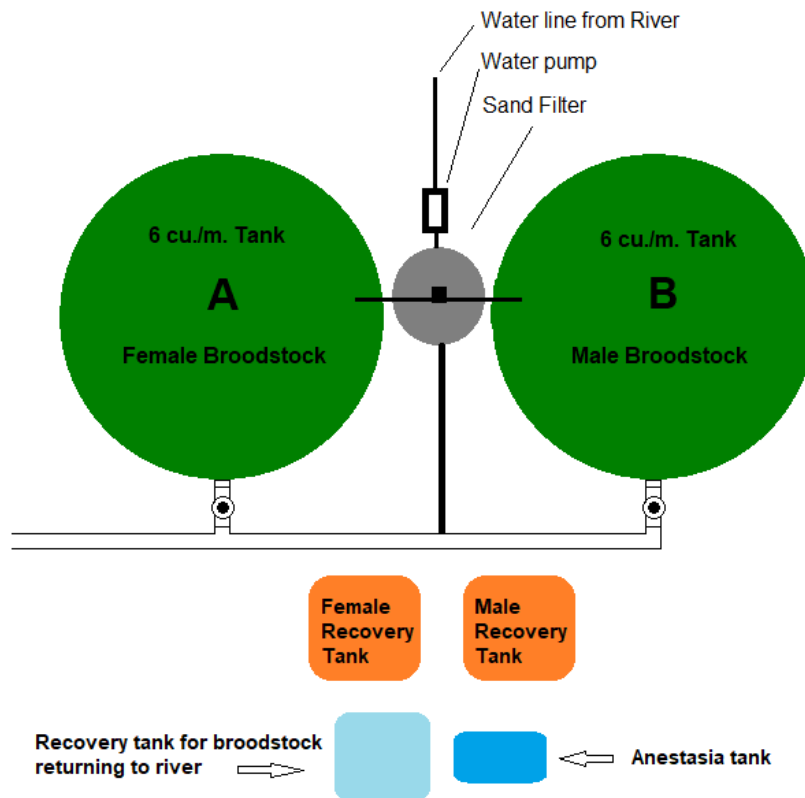
#### Streamside Fertilization Project

The streamside fertilisation project has been a concept that was in the planning stage for over 1 year, its reasoning was to reduce fish stress during broodstock transfer for annual fertilisation and improving fish health. The Charlo hatchery is located 84 kilometers from Pabineau First Nation counting area.

This was simply achieved rather transferring the broodstock to the hatchery, from only transferring fertilized Atlantic salmon eggs within 24 hours to the Charlo hatchery for the winter season and immediately returning the broodstock in the Nepisiguit River from the artificial spawning process.

The proposal concept was submitted to Pabineau First Nation of October 2020, and all equipment and supplies was on site in the summer of 2021.

2- 6 cubic meter tanks, oxygen generator and saturator, 1– sand filter for sedimentation were placed next to the river for the initial test. (**Illustration 2**)



**Illustration 2 – Placement of fertilization equipment**

The installation was carefully planned and tested to ensure fish health. To ensure cooler water provision, a natural spring fed vein pool was located in the Nepisiguit River. This was located 200 feet from the equipment installation, 2 weeks of water flow and available dissolved oxygen parameters had to be respected. See (**Appendix 9**) on daily tank activities and data recordings.

These results were very promising, another 1 week of testing was observed with 8 Atlantic Salmon retrieved from the Pabineau First Nation counting fence project in the 2 – 6 cubic meter tanks. Again, all fish were in great health, and water parameter readings of temperature, dissolved oxygen, pH, and water flow rate were taken twice a day.

At this point the organised placement of equipment for the fertilization process was installed. Fish were placed under a natural clove oil and ethanol anesthetic solution, diluted in 2ml. per 5 litres of water. Fish were recovered in good health in the respected recovery tank, and then released back in the Nepisiguit River.

All proper authority permits and transfer permits were approved by the Department of Fisheries and Oceans Canada.

With all respected parameters and procedures in place for stream side fertilization in place, On September 28<sup>th</sup>, the first collection of broodstock were retrieved from the Pabineau First Nation counting fence project. 13 females and 20 males' Atlantic salmon were retained for fertilization.

All procedures of reproduction fertilisation and incubation is referred from "Fascicule 3" from MAPAQ (Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec).



Ruby Aubie From Pabineau First Nation

On October 28<sup>th</sup>, the first Atlantic salmon stream side fertilization was executed, with 5 out of 8 female salmon verified produced a total of **33,869** eggs. The eggs were fertilized with 2 male salmon to 1 female to insure fertilization.

- Average eggs size 5mm. in diameter = 8913 eggs per litre
- 3.8 litre of eggs retained (stripped) from 5 female salmon
- 3.8 liters X 8913 eggs per litre = **33,869** Total Salmon Eggs

On November 1<sup>st</sup>, the second Atlantic salmon stream side fertilization was executed, with 7 female salmon producing a total of **57,310** eggs. The eggs were fertilised with 2 male salmon to 1 female to insure fertilization.

- Average eggs size 5mm. in diameter = 8913 eggs per litre
- 6.43 litre of eggs retained (stripped) from 7 female salmon
- 6.43 liters X 8913 eggs per litre = **57,310** Total Salmon Eggs

-

On November 11<sup>th</sup>, the third Atlantic salmon stream side fertilization was executed, with 1 female salmon producing a total of **9804** eggs. The eggs were fertilized with 2 male salmon to 1 female to insure fertilisation.

- Average eggs size 5mm. in diameter = 8913 eggs per litre
- 1.1 litre of eggs retained (stripped) from 7 female salmon
- 1.1 liters X 8913 eggs per litre = **9804** Total Salmon Eggs

A grand total of **100,983** fertilised Atlantic salmon eggs were attained this year with 13 adult female salmon were used and 24 adult male and grilse salmon used. All eggs were transferred to SNC Charlo Hatchery for winter storage at their facilities.



Broodstock holding tanks



Sedation tank





Stripping eggs from broodstock



Stripping male product on the eggs



Fertilization of the eggs



Rinsing of the eggs





Hardening of the eggs at rest



Recovery Tank



Fish released back into the river



### Training for First Nations Technicians

Due to COVID-19 restrictions, all protocols were respected during these sessions. A safety check list and a COVID-19 symptom self-health check were conducted daily.

This season a variety of training sessions were conducted by the Pabineau First Nations aquaculture technician Michel Poitras. These sessions involved; Water quality, Fish health and development, Open and Closed aquaculture rearing systems, Water circulations in tanks and filtration systems, Local fish disease awareness, Local fish species, Electrofishing and Streamside fertilization project.

These on hand training sessions involved on site and physical awareness involved in the field of subject matter. This included in class introduction of subjects and practicum of water testing, Electrofishing, and fish species identification.

All subjects were applied all through the season, everyone on hand experienced and developed the applied topics and realised the installation of the streamside fertilization project and understanding. Including the installation of broodstock tanks, filtration and oxygen application for fish health.

Also, Atlantic Salmon egg fertilization and incubation being done on site, this successful project concluded the development and realisation to insure better fish health management in the future.

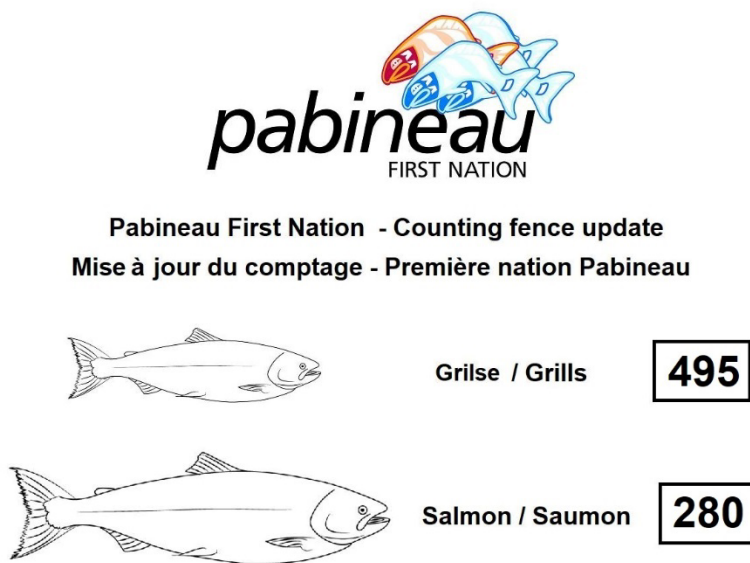
All subject matter were in references of MAPAQ (Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec), and learning references of the former CCNB curriculum of Aquaculture Technician in Caraquet, NB.

### Pabineau Counting Fence

The Pabineau Counting Fence had a much better season than 2020; from 342 salmon and grilse returned to 775 in 2021(**Table 8**). A few challenges with regards to high water that damaged the fence which allowed salmon to pass without being counted, therefore Pabineau First Nation extended the season an extra 4 weeks. **Page 55** is a comparison of graphs indicating the water level and total fish count at the Pabineau Counting Fence area. An interesting note is there is more active fish migrating above the 30cm. water level.

The significant increase of water levels and the counting fence damage have been challenging as well, only 13 Female Salmon, 6 Male Salmon & 14 Male Grilse a total of 34 fish. Our permit for fish transfer was for 58 for the season. This transfer permit is for the holding of the broodstock on site for later streamside fertilization in the season, and transfer of eggs.

This season we have posted on our Facebook page an updated result of migrating salmon going up stream via the counting fence (**Figure 26**). With the permission of Pabineau First Nation and collaboration with NSA, it has kept the general public and anglers of the activities conducted.



**Figure 26** – Salmon results posting on (Facebook) multi-media



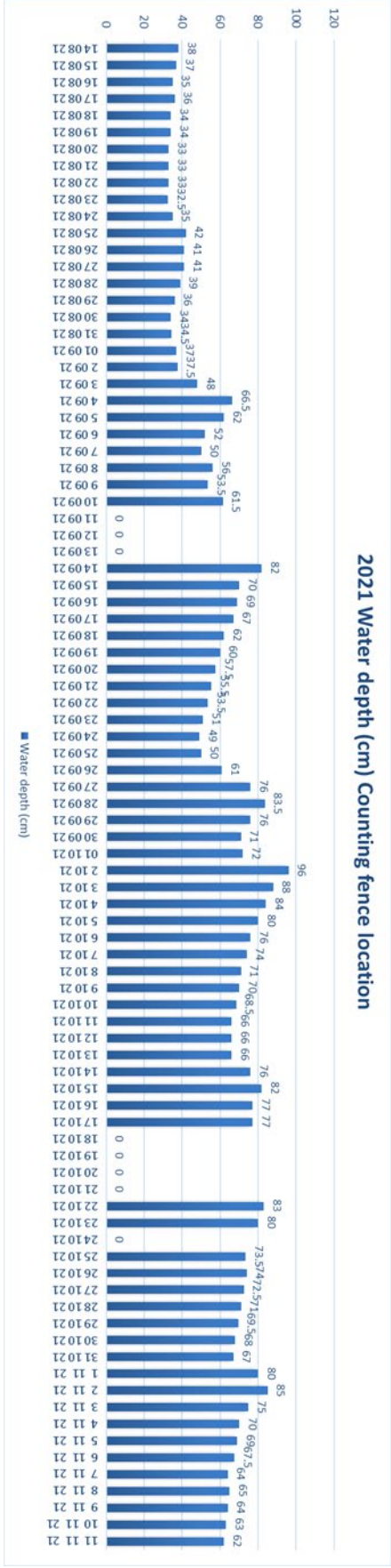
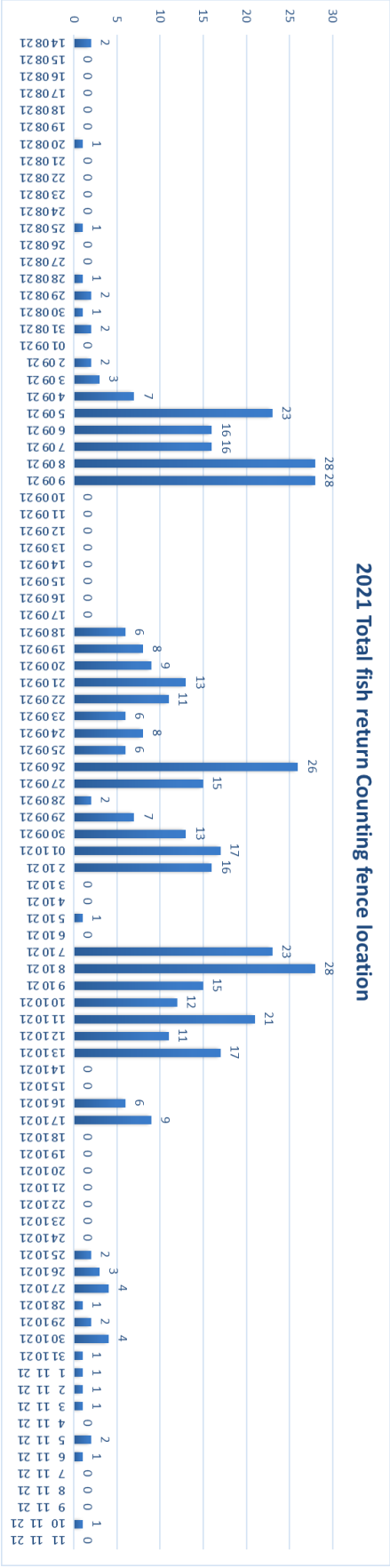
Pabineau First Nation Counting fence on the Nepisiguit River



Atlantic Salmon waiting for processing and release back in the river



Atlantic salmon being released back into the river by Percy Sewel



Grilse			Salmon			Total Fish		
Date	Total	Accumulative	Date	Total	Accumulative	Total	Accumulative	
12-Jul	0	0	12-Jul	0	0	0	0	
13-Jul	7	7	13-Jul	7	7	14	14	
14-Jul	20	27	14-Jul	3	10	23	37	
15-Jul	13	40	15-Jul	3	13	16	53	
16-Jul	15	55	16-Jul	8	21	23	76	
17-Jul	13	68	17-Jul	9	30	22	98	
18-Jul	5	73	18-Jul	8	38	13	111	
19-Jul	6	79	19-Jul	7	45	13	124	
20-Jul	9	88	20-Jul	1	46	10	134	
21-Jul	7	95	21-Jul	2	48	9	143	
22-Jul	2	97	22-Jul	0	48	2	145	
23-Jul	6	103	23-Jul	18	66	24	169	
24-Jul	19	122	24-Jul	27	93	46	215	
25-Jul	7	129	25-Jul	8	101	15	230	
26-Jul	6	135	26-Jul	4	105	10	240	
27-Jul	10	145	27-Jul	5	110	15	255	
28-Jul	8	153	28-Jul	1	111	9	264	
29-Jul	1	154	29-Jul	1	112	2	266	
30-Jul	2	156	30-Jul	0	112	2	268	
31-Jul	1	157	31-Jul	0	112	1	269	
01-Aug	1	158	01-Aug	2	114	3	272	
02-Aug	2	160	02-Aug	2	116	4	276	
03-Aug	1	161	03-Aug	2	118	3	279	
04-Aug	5	166	04-Aug	0	118	5	284	
05-Aug	2	168	05-Aug	0	118	2	286	
06-Aug	1	169	06-Aug	1	119	2	288	
07-Aug	1	170	07-Aug	1	120	2	290	
08-Aug	1	171	08-Aug	1	121	2	292	
09-Aug	0	171	09-Aug	1	122	1	293	
10-Aug	0	171	10-Aug	0	122	0	293	
11-Aug	0	171	11-Aug	1	123	1	294	
12-Aug	1	172	12-Aug	0	123	1	295	
13-Aug	8	180	13-Aug	12	135	20	315	
14-Aug	2	182	14-Aug	0	135	2	317	
15-Aug	0	182	15-Aug	0	135	0	317	
16-Aug	0	182	16-Aug	0	135	0	317	
17-Aug	0	182	17-Aug	0	135	0	317	
18-Aug	0	182	18-Aug	0	135	0	317	
19-Aug	0	182	19-Aug	0	135	0	317	
20-Aug	1	183	20-Aug	0	135	1	318	
21-Aug	0	183	21-Aug	0	135	0	318	
22-Aug	0	183	22-Aug	0	135	0	318	
23-Aug	0	183	23-Aug	0	135	0	318	
24-Aug	0	183	24-Aug	0	135	0	318	
25-Aug	0	183	25-Aug	1	136	1	319	
26-Aug	0	183	26-Aug	0	136	0	319	
27-Aug	0	183	27-Aug	0	136	0	319	
28-Aug	1	184	28-Aug	0	136	1	320	
29-Aug	0	184	29-Aug	2	138	2	322	
30-Aug	0	184	30-Aug	1	139	1	323	
31-Aug	2	186	31-Aug	0	139	2	325	
01-Sep	0	186	01-Sep	0	139	0	325	
02-Sep	1	187	02-Sep	1	140	2	327	
03-Sep	2	189	03-Sep	1	141	3	330	
04-Sep	2	191	04-Sep	5	146	7	337	
05-Sep	6	197	05-Sep	17	163	23	360	
06-Sep	8	205	06-Sep	8	171	16	376	
07-Sep	8	213	07-Sep	8	179	16	392	
08-Sep	9	222	08-Sep	19	198	28	420	
09-Sep	15	237	09-Sep	13	211	28	448	



10-Sep	0	237	10-Sep	0	211		0	448	NO FENCE
11-Sep	0	237	11-Sep	0	211		0	448	NO FENCE
12-Sep	0	237	12-Sep	0	211		0	448	NO FENCE
13-Sep	0	237	13-Sep	0	211		0	448	NO FENCE
14-Sep	0	237	14-Sep	0	211		0	448	NO FENCE
15-Sep	0	237	15-Sep	0	211		0	448	NO FENCE
16-Sep	0	237	16-Sep	0	211		0	448	NO FENCE
17-Sep	2	239	17-Sep	0	211		2	450	PARTLY STILL DOWN
18-Sep	3	242	18-Sep	1	212		4	454	PARTLY STILL DOWN
19-Sep	7	249	19-Sep	1	213		8	462	PARTLY STILL DOWN
20-Sep	5	254	20-Sep	4	217		9	471	PARTLY STILL DOWN
21-Sep	11	265	21-Sep	2	219		13	484	
22-Sep	9	274	22-Sep	2	221		11	495	
23-Sep	4	278	23-Sep	2	223		6	501	
24-Sep	5	283	24-Sep	3	226		8	509	
25-Sep	2	285	25-Sep	4	230		6	515	
26-Sep	21	306	26-Sep	5	235		26	541	
27-Sep	11	317	27-Sep	4	239		15	556	
28-Sep	0	317	28-Sep	2	241		2	558	
29-Sep	0	317	29-Sep	7	248		7	565	
30-Sep	3	320	30-Sep	10	258		13	578	
01-Oct	15	335	01-Oct	2	260		17	595	
02-Oct	16	351	02-Oct	0	260		16	611	PARTLY STILL DOWN
03-Oct	0	351	03-Oct	0	260		0	611	PARTLY STILL DOWN
04-Oct	0	351	04-Oct	0	260		0	611	PARTLY STILL DOWN
05-Oct	1	352	05-Oct	0	260		1	612	PARTLY STILL DOWN
06-Oct	0	352	06-Oct	0	260		0	612	
07-Oct	22	374	07-Oct	1	261		23	635	
08-Oct	23	397	08-Oct	5	266		28	663	
09-Oct	11	408	09-Oct	4	270		15	678	
10-Oct	11	419	10-Oct	1	271		12	690	
11-Oct	19	438	11-Oct	2	273		21	711	
12-Oct	9	447	12-Oct	2	275		11	722	
13-Oct	13	460	13-Oct	4	279		17	739	
14-Oct	0	460	14-Oct	0	279		0	739	PARTLY STILL DOWN
15-Oct	0	460	15-Oct	0	279		0	739	No Fence
16-Oct	6	466	16-Oct	0	279		6	745	No fence
17-Oct	9	475	17-Oct	0	279		9	754	no fence
18-Oct	0	475	18-Oct	0	279		0	754	No Fence
19-Oct	0	475	19-Oct	0	279		0	754	No Fence
20-Oct	0	475	20-Oct	0	279		0	754	No Fence
21-Oct	0	475	21-Oct	0	279		0	754	No Fence
22-Oct	0	475	22-Oct	0	279		0	754	No fence
23-Oct	0	475	23-Oct	0	279		0	754	No fence
24-Oct	0	475	24-Oct	0	279		0	754	No fence
25-Oct	0	475	25-Oct	0	279		0	754	No Fence
26-Oct	2	477	26-Oct	0	279		2	756	No Fence
27-Oct	3	480	27-Oct	1	280		4	760	No Fence
28-Oct	1	481	28-Oct	0	280		1	761	No Fence
29-Oct	2	483	29-Oct	0	280		2	763	No Fence
30-Oct	4	487	30-Oct	0	280		4	767	No Fence
31-Oct	1	488	31-Oct	0	280		1	768	No Fence
01-Nov	1	489	01-Nov	0	280		1	769	NO Fence
02-Nov	1	490	02-Nov	0	280		1	770	No Fence
03-Nov	1	491	03-Nov	0	280		1	771	Parcial Fence
04-Nov	0	491	04-Nov	0	280		0	771	Parcial Fence
05-Nov	2	493	05-Nov	0	280		2	773	Parcial Fence
06-Nov	1	494	06-Nov	0	280		1	774	Parcial Fence
07-Nov	0	494	07-Nov	0	280		0	774	Parcial Fence
08-Nov	0	494	08-Nov	0	280		0	774	Parcial Fence
09-Nov	0	494	09-Nov	0	280		0	774	Parcial Fence
10-Nov	1	495	10-Nov	0	280		1	775	Parcial Fence
11-Nov	0	495	11-Nov	0	280		0	775	Parcial Fence

**Table 8 – Total cumulative fish count at Pabineau Counting Fence area**

## Charlo Hatchery (SEC) Inventory Report

Below is the inventory spread sheet inventory from the Charlo Hatchery (SEC), a total of **100986** eggs were transferred on October 29<sup>th</sup>, November 2<sup>nd</sup> and November 12<sup>th</sup>. Note at this time there are **5720** white eggs removed, totaling **95266** Atlantic salmon eggs.

100986							95266	
DATE	EGGS ADDED	UNIT	DRAWER	WHITE EGGS	ML FOR FORM 37% TX DRAWER	ML FOR FORM 37% FLOW TX (12L/MIN)	WATER TEMPERATURE	TOTAL EGGS
2021-10-29	6774	1	2	103	20	360	4.5	6671
2021-10-29	6774	1	3	93	20	360	4.5	13352
2021-10-29	6774	1	4	156	20	360	4.5	19970
2021-10-29	6774	1	5	74	20	360	4.5	26670
2021-10-29	6774	1	6	190	20	360	4.5	33254
2021-11-02	6368	1	7	441	20	360	5.3	39181
2021-11-02	6368	1	8	441	20	360	5.3	45108
2021-11-02	6368	2	10	384	20	360	5.3	51092
2021-11-02	6368	2	11	343	20	360	5.3	57117
2021-11-02	6368	2	12	368	20	360	5.3	63117
2021-11-02	6368	2	13	318	20	360	5.3	69167
2021-11-02	6368	2	14	431	20	360	5.3	75104
2021-11-02	6368	2	15	422	20	360	5.3	81050
2021-11-02	6368	2	16	634	20	360	5.3	86784
2021-11-12	4902	3	18	575	20	360	0.5	91111
2021-11-12	4902	3	19	747	20	360	0.5	95266
<b>Total</b>	<b>100986</b>			<b>5720</b>				



## 2021 Beaver Dam Assessment and Obstructions

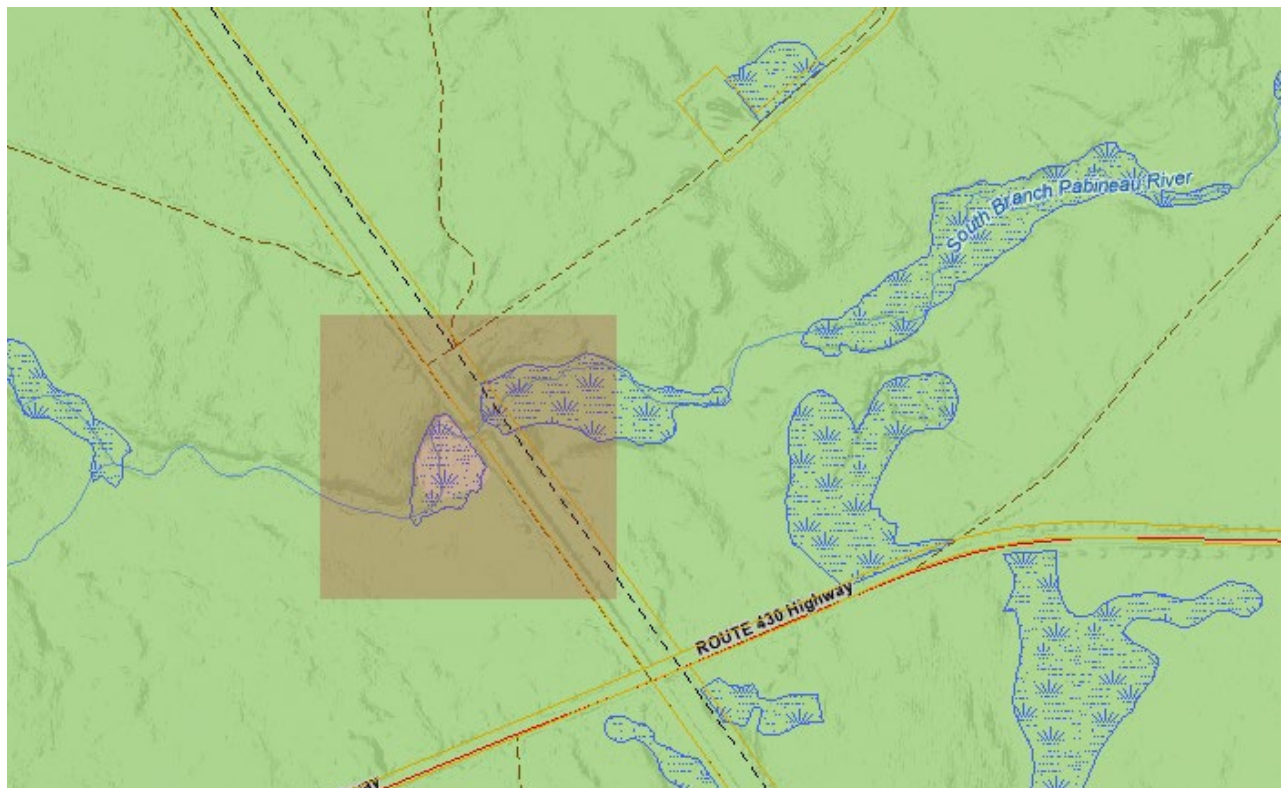
This year Pabineau First Nation has observed various obstructions to fish passage. Overall beaver dams have been the issue; it was seen through the season where active beaver dams on Pabineau Brook and Gordon Meadow became inactive. A detailed review of obstructions on Gordon Meadow and Pabineau Brooks was not completed in 2021.

As some colonies of beavers either moved or was eliminated last year by trapping, and other beaver dams have been established.

Pabineau First Nations had a trapping training session this fall, and succeeded trapping many beavers on the Little River.

Additional trapping will be conducted next year, and a strategic plan will be implemented to breach inactive beaver dams in the summer season, this is to ensure the security of salmon redds, to allow fish passage and to ensure salmon fry are not obstructed in the spring once they are hatched.

An area of concern is above Pabineau River South Branch, where habitat activity and ATV traffic beaver were monitored.



Area of concern – South Branch of Pabineau Brook



Above the South Branch of Pabineau River

This area has been flooded and receded many times through the season; also next to the former bridge that spans the river is an ATV trail that crosses the river. Its water retention has significant reaction downstream during warm and dry periods.

Significant water damage to bridges on Little River was observed, possibly due to extreme rain. This caused the elimination of bridge on LR-17, and extensive damage to the bridge on NB-13.



Bridge on NB-13

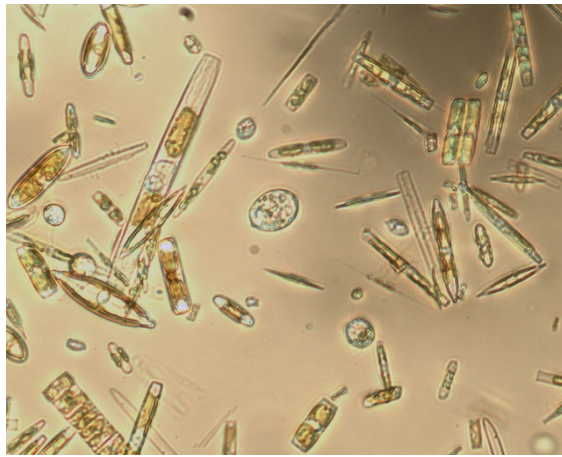


### Diatom deposits

Again in 2021 it was brought to our attention by the public of white powder deposits on rocks along the Nepisiguit River.

These diatoms are natural organisms in our ecosystems, and may be only apparent due to climate change and increasing water temperatures. They have many benefits overall and not evasive to our river systems. **Photo 19** that are diatoms, **photo 20** of the area taken at the Nepisiguit Falls area.

Additional study should be conducted to explain the increase of diatoms present.



**Photo 19 – Diatoms**



**Photo 20 – Nepisiguit Falls area**

### Garbage Cleanup

Throughout the 2021 season staff actively removed garbage at electrofishing sites, trails, roads and tourist attractions such as the Pabineau Falls. Most of the garbage was removed from the Pabineau Falls Road and the parking lot at the Pabineau Falls where 2 garbage bins were placed and emptied every week.



**Photo 21** – Eric Guinard and Guianluca Richardson picking up garbage at Pabineau Falls

### 2021 Fish Friends Program

Due to the Covid-19 pandemic, the Fish Friends Program was cancelled again for this season. Next year we are planning to implement; “Friends of Plamu”, an interactive educational program, in conjunction with Pabineau First Nation.

### 2021 Ron Gauthier Award

Due to the Covid-19 pandemic, the Ron Gauthier Award was cancelled again for this season.

### Observed Wildlife Habitat 2021

Many species were observed this season, for the 2022 season a more accurate system will be in place for species and location accuracies including time and date.

## Redd Counts

On October 26 volunteers from Roy Consultants Group Ltd. and DNRE staff conducted a redd count with the use of a Drone and canoe. Approximately 599 redds were found between the Knight's Brook area to Gordon Meadow pool [Table 9] with the use of a canoe. We have not been able to do redd counts with a canoe for several years due to weather and water conditions.

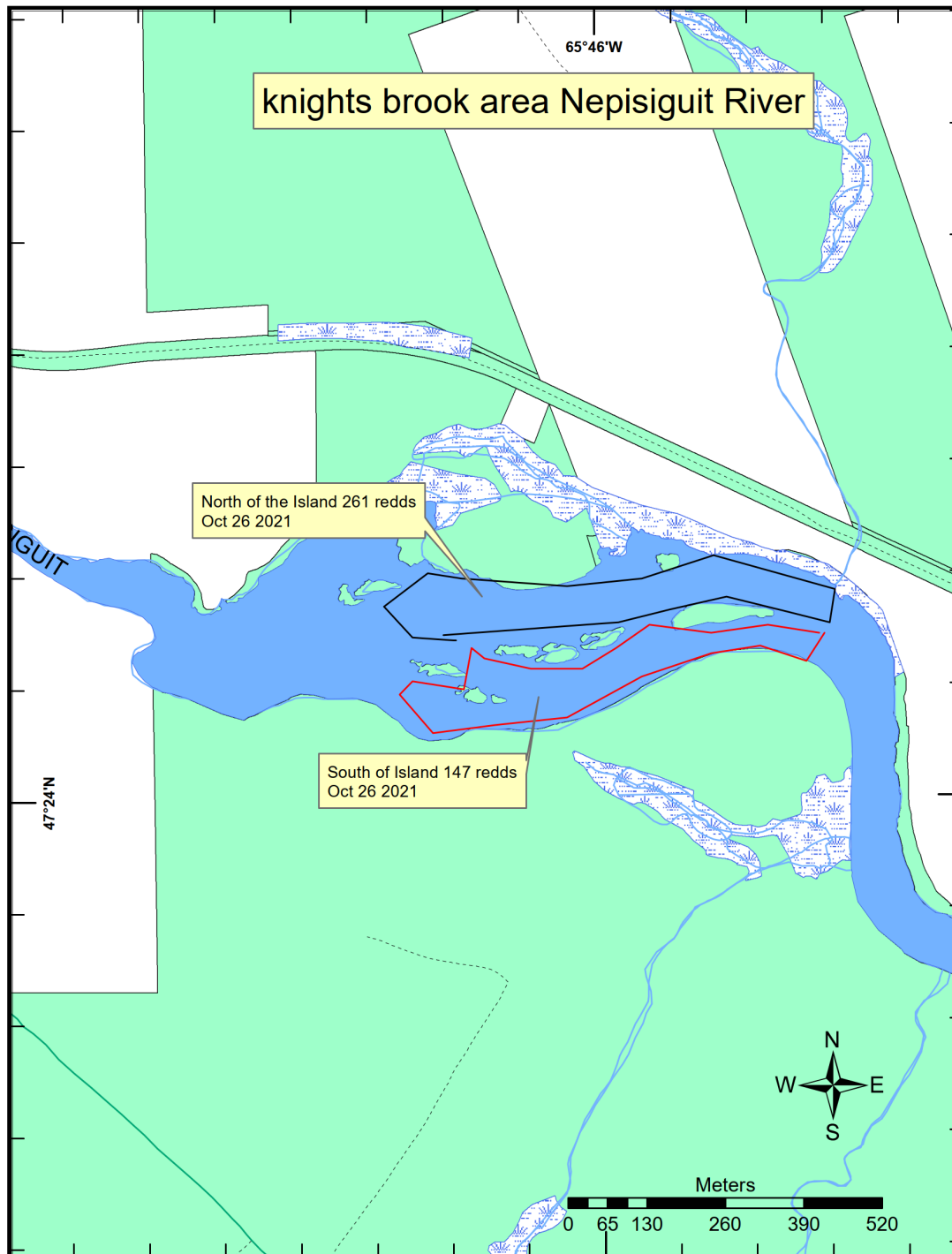
### SALMON SPAWNER SURVEY RIVER: Nepisiguit River

STRETCH	NO. GRILSE	NO. SALMON	TOTAL OF GRILSE & SALMON	NO. REDDS	DATE	COMMENTS
Knights Brook area North side of Islands	5	5	10	261	Oct. 26 2021	High water and clear, good visibility but not very far. Some glare on the water. All fish were on bars.
Knights Brook area South side of Islands	3	4	7	147	Oct. 26 2021	High water; possible to miss some redds.
Knights brook to long pool				30	Oct. 26 2021	Probably miss some redds because of the high water.
Long pool to Chain of rock	5	5	10	142	Oct. 26 2021	.
Chain of rock to Gordon Meadow pool		4	4	19	Oct. 26 2021	Probably miss 10 to 15% of the redds because of the high water level.
<b>Total:</b>	<b>13</b>	<b>18</b>	<b>31</b>	<b>599</b>		

Water Level : High,  
Air Temp: 7 degree C (a.m.)  
Visibility : good  
Method : canoe polling  
Personnel : Denis Guitard, Joel Gauvin, Roland Roy  
Level of Confidence: 90%

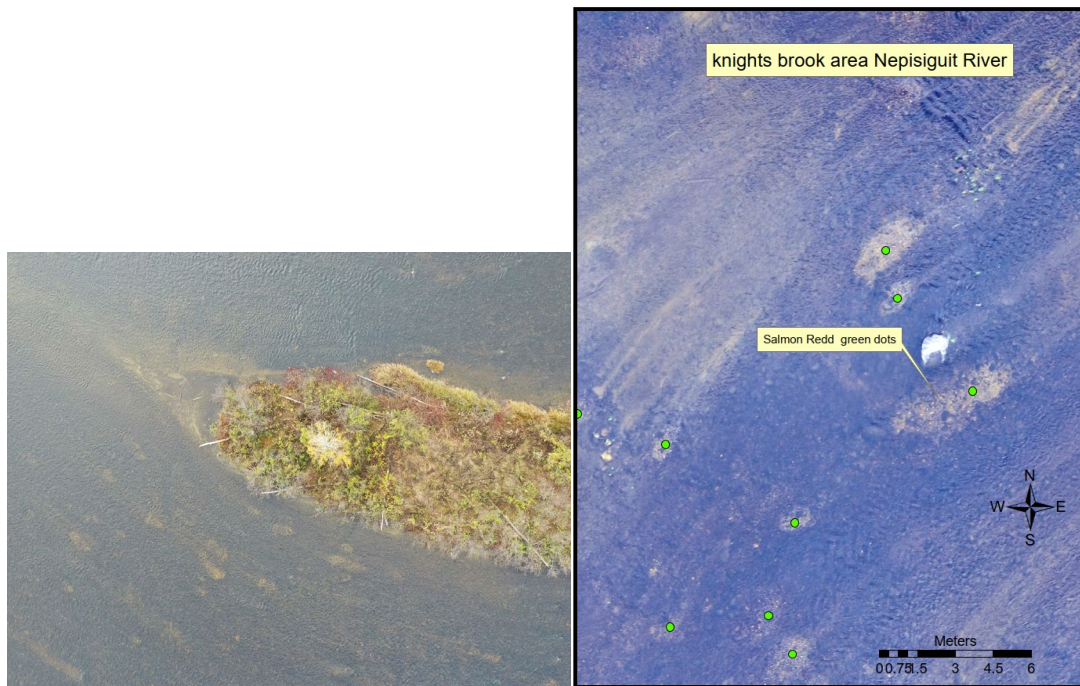
**Table 9 – Redd Count Survey Results**

A drone was used in the knight's Brook area to take grid pattern pictures in order to compare the visual observations with the drone's imagery survey. Figure 27 shows a map of the area flown by the drone. Initial analysis indicates that only half of redds [221] could be seen with the pictures from the drone as compared to the visual field analysis. A sample picture from the drone is shown in Photo 22.



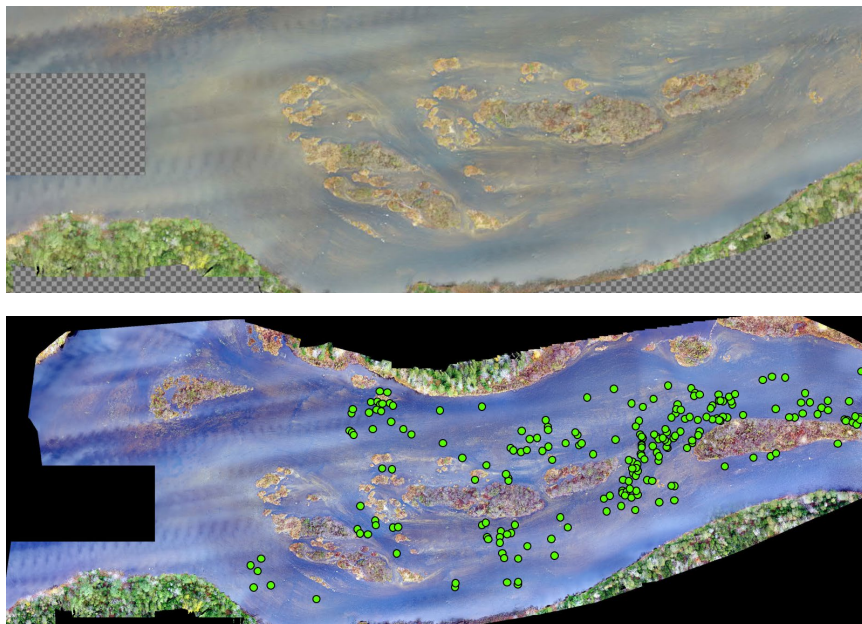
**Figure 27** – Map showing where drone survey was done





**Photo 22** – Drone image capture examples at Knight's Brook (Redd Count Survey 2021)

Some of the pictures are very clear and redds are visible; some have a glare which makes it difficult to see. Experience from 2020 was to use the drone on a somewhat overcast day. The flight path elevation may have been too high and water levels were high as well, both may have contributed to difficulties in interpreting the photo images.



Next year the intent is to GPS redds found by canoe and then it will be easier to overlay the drone images for analysis. More analysis will take place this winter as it may be possible to make 3D images which should show redds.

### Angler Surveys

Surveys by NSA of member anglers indicate a fairly good fishing year taking into consideration the times the angling was restricted or closed due to warm water. Members hooked and released 185 grilse and 85 salmon for a total of 270 fish.

The fishing club at the Gorge had an excellent year with 306 grilse and 53 salmon being hooked and released for a total of 359 salmon.

It appears that salmon returns were good early and late in the season which is good news for the Nepisiguit!

### Other Projects GMRC

The Gespe'gewaq Mi'gmaq Resource Council [GMRC] conducted a couple of projects on the Nepisiguit River this year; one involved tagging Atlantic salmon in April in order to track them as they leave the Nepisiguit. NSA volunteers helped with the collection of salmon for a two day period. It will be most interesting to see the data from this project.

The other project involved some restoration work along the shorelines of the river in order to limit runoff, siltation and block traffic to four wheelers. Work was done at Black's Meadow and long Hole pools and at a canoe landing above Pabineau Falls. Please see Appendix 10 for a copy of the report. Much thanks to Dr. Carole-Anne Gillis and GMRC for this most valuable work.

