Qalipu
FIRST NATION

Atlantic Salmon Conservation Foundation – Aquatic Conservation Plan for Warm Brook, Newfoundland and Labrador 2019

Stephen Rose
Natural Resources Technician
Qalipu First Nation
1 Church Street, Corner Brook, NL
A2H 2Z4

Background

This project was conducted as a result of Qalipu First Nation member interest in the Warm Brook sub watershed system and their concern for its ecological integrity. Warm Brook was assessed from the mouth, where it meets St. George's Bay, upstream approximately 9.2 kilometers. A desktop review of the surrounding area upstream was completed with Google Earth. Warm Brook, and the area surrounding it, is a sub-watershed that has been subjected to significant development since colonial settlement.

Warm Brook is one of the three brooks running through the community of Stephenville, NL, one of Qalipu First Nation's 67 communities. These brooks were used traditionally by our people, which speaks to the concern for their ecological sustainability and integrity. Since settlement, the lower ~6km of Warm Brook have been rerouted during the development of Ernest Harmon Air Force Base, and surrounding shorelines heavily developed in subsequent years for a wide range of land uses.

As a result, we feel it is important to ensure the ecological sustainability of this system along with it's salmonid and trout populations. Where there has been such a high level of activity, which can and have provided impact on our system, it is pertinent that a plan to conserve this ecological community be developed.

Methodology

Information was gathered on Warm Brook from conversations with local knowledge holders and a DFO report titled "Surveyor's Report Outlining the Potential of Warm Creek and Tributaries as a Salmon and Trout Producing System". Surveys that were completed on this brook, and are complimentary to it, are those for salmon redds and an aquatic connectivity

study. During this season, stream surveys were conducted which documented bank type, stabilization, riparian vegetation, benthic sediment, suitability for spawning, and environmental impacts. A desktop exercise was also completed looking at the land use zones surrounding the area and the activities around warm brook to document land use. Uses include but are not limited to agriculture, forestry, undeveloped, industrial, green space, residential, environmental protection, etc. Data were compiled and analysed to develop statistics on the characteristics of Warm Brook and recommendations generated to improve the ecological integrity and sustainability of the Warm Brook sub-watershed.

Results & Discussion

Warm Brook is surrounded by a variety of land use zones in the surveyed area. In order to simplify the visuals and calculations, we have grouped them into the following categories:

- Residential
- Commercial
- Industrial
- Open Space Recreation
- Public Space
- Comprehensive Development Area – Community Service
- Environmental Protection
- Rural
- Floodway
- Airport

The immediate area overlaying the brook and proximate shoreline are zoned as Climate Change Flood, Floodway Fringe and Designated Floodway. For the purposes of our analysis, we've combined the three zones and renamed it Floodway. Zones adjacent to the Floodway zone, where the floodway zone exceeded thirty meters from the river were not included in the figures in Table 1.1. Land use adjacent to the floodway is represented in Table 1.1 for the area west of 490. From Route 490 east, Floodway dominates the adjacent land use zone well past the 30m buffer used for this analysis and is then bordered by Rural.

Table 1.1: Land Use Zones adjacent to Warm Brook by distance and percentage (see Appendix I, Map 1 of 3)

Land Use Zone	Length Bordering Warm Brook (m)	Percentage of surveyed distance (~6.5km mouth to Route 490) (%)
Residential	1005	15.46
Commercial	250	3.85
Industrial	1666	25.63
Open Space Recreation	245	3.77
Public Space	302	4.65
Comprehensive Development Area – Community Service	50	0.77
Environmental Protection	642	9.88
Rural	441	6.78
Floodway	0	23.76
Airport	354	5.45

A number of developments have occurred or are currently ongoing within the riparian zone of 15m. Examples include subdivision development (Figure 1 and Figure 2) and watercourse diversion (Figure 3 and Figure 4).

Figure 1: Satellite Image 9/12/2011 - Shaded areas are as follows: Light Blue – Designated Floodway, Dark Blue – Floodway Fringe, Yellow – Climate Change Flood

Figure 2: Satellite image 8/1/2019 - Shaded areas are as follows: Light Blue – Designated Floodway, Dark Blue – Floodway Fringe, Yellow – Climate Change Flood

Figure 3: Satellite image 9/12/2011 – Pre watercourse diversion

Figure 4: Satellite imagery 8/1/2019 – Post watercourse diversion

A number of features were documented while surveying Warm Brook and are outlined in the table below. Associated maps and pictures can be found in Appendix I.

Table 1.2: Identified features in Warm Brook, NL while conducting field surveys. (See Map 2 of 3 and 3 of 3 in Appendix I; photos in Appendix II)

ID #	Coordinates		Photo	Notes
	Northing - UTM	Easting - UTM		
1	383361	5377732	1, 2	Coastal Wetland/dune area
2	383336	5377855	2	Small Bank Destabilization
3	383574	5377850	3	Banks mostly stable and vegetated
4	383609	5377848		Start of hard stabilization (gabion cages and rip rap)
5	384107	5378301		Some patchy potential spawning ground
6	384107	5378301		Bank destabilization
7	384488	5378780		Rocky substrate (poor suitability for spawning)
8	384593	5379256	4	Obstructions in river
9	384648	5379309	5	Old concrete structure
10	384792	5379408	6	Recommend planting trees on bank
11	384884	5379423	7	Riparian buffer development
12	384911	5379369	8	Riparian buffer cleared, shoreline mostly stable and vegetated. Substrate improving
13	384911	5379369	9	Concrete debris in river and riparian buffer issue
14	384979	5379258		Mostly riprap shoreline
15	385172	5379315	10, 11, 12	Development within riparian buffer
16	385212	5379319		Potential spawning habitat
17	385276	5379280	13, 14, 15	Vegetation cleared within riparian buffer
Coordinates below are in decimal degrees				
18	48.5582	58.51323	16, 17	Bank destabilization and evidence of beaver cuttings
19	48.558185	58.51284	18	Suitable spawning habitat ~80ft up and downstream

20	48.559196	58.511806		End of potential spawning habitat, more bank destabilization and limited vegetation
21	48.559648	58.511923		potential spawning habitat ~100ft up and down
22	48.560108	58.511565		Start of potential spawning habitat
23	48.560254	58.51109		End of potential spawning habitat
24	48.560898	58.509908	19, 20	Bank destabilization and erosion
25	48.562419	58.507933	21, 22, 23	Small oxbow with erosion and bank destabilization
26	48.562717	58.507564	24, 25	Flood area
27	48.563612	58.507152	26,27, 28,29, 30,31, 32	Riparian vegetation cleared and deposition of debris within spring highwater zone
28	48.564092	58.507478	33, 34	Evidence of unapproved berm built and failed armour stone
29	48.564092	58.507478	35, 36	Armour Stone at end of drainage ditch, across from new berm
30	48.566063	58.507534	37, 38 39, 40	Construction debris deposited in unapproved berm development, alteration of river flow (see also Appendix III)
31	48.56864	58.506215		Riparian vegetation cleared

Threats and their effects

- Trash/litter: Microplastics, chemical pollution, and obstructions are all results from trash or litter entering the Warm Brook System. The effects of microplastics on aquatic and marine environments are well documented. Use of old construction debris in berms to redirect natural flow of river (asphalt, concrete, brick, steel) contribute to potential chemical leachate into aquatic systems from tar sealant and binding chemicals.

- Exposure: increased susceptibility to predation (birds), warmer temperatures from sun exposure, increased evaporation are all results of increased exposure to a river system
- Development: Recent residential development inside flood zone and fringe area. These areas should be reserved for green zones with strong rooted vegetation to reduce the effects of sedimentation/siltation, erosion, and act as buffers for flooding events. Tree cover on riverbanks also reduce exposure. The lower ~6.5km is a highly developed area and should focus on restoring riparian vegetation and mitigating potential runoff/leachate from industrial areas which constitutes approximately 25% of the lower section of Warm Brook.
- Clearing of riparian buffer: Riparian buffers should be restored to reduce impacts of flooding (erosion, sedimentation/siltation) and exposure.
- Erosion-sedimentation/siltation: negative effect on fish health and habitat (choking out spawning beds, sediment/silt in fish gills), increases flood zone areas in places with bank destabilization.
- Barriers to migration: Barriers exist in the study area (i.e. dam in Noel's Pond). The dam has potential to act as barrier to upstream migration depending on plunge depths and the number of stop logs in the dam. The beginnings of a small beaver dam were also identified just north of where the decommissioned railway line to the old mill crosses
- Clearcutting: clearcutting by commercial wood harvesters upstream has increased the susceptibility of warm brook to flash flooding which increases erosion (sedimentation/siltation), bank destabilization, and effects are amplified by the lack of riparian vegetation and forested areas to reduce flash runoff

- Dredging of brook: dredging disrupts benthic habitats that support all life stages of fish, along with benthic macroinvertebrate communities.
- Alteration of natural river succession: diverting the direction of flow of a river can cause negative effects on the succession of the river. These effects can include increased erosion, sedimentation/siltation, alteration of benthic environments with respect to spawning beds for salmon and increasing the impact of flooding in downstream locations.
- Flooding: Flooding increases erosion (sedimentation/siltation), flood zones, the potential to damage infrastructure, and the potential for litter in the river system.

Assets

- Slope and flow: The slope and flow of the surveyed portion of Warm Brook is beneficial for upstream migration of salmonids as there are no large natural falls that occur. The flow is relatively consistent in the majority of the surveyed section and has enough water to permit migration most of the year.
- Diversity in benthos: the diversity of the benthic habitat provides suitable environment for varying life stages of fish species.
- Wetlands: wetlands are beneficial in mitigating flooding and permitting a slow release of water to the brook over time after times of
- Forested area: Provides protection from the effects of exposure and helps to control the release of groundwater to the brook
- Land use zones: Land use zones and their respective development regulations protect the integrity of environmental assets and river systems when enforced.

- Documented use for spawning by Atlantic salmon: Where there is a diverse array of benthic habitats throughout Warm Brook, along with documented use throughout the system, it is important that the whole system is protected. Qalipu staff identified spawning areas in the lower sections of Warm Brook while conducting redd surveys, while local interviews revealed that the area north of the bridge at Route 460 is also a spawning area.

Mitigation Tools and Conservation Guidelines

Below is a list of mitigation tools and conservation guidelines which can be followed to help ensure the ecological integrity of the Warm Brook sub-watershed

- Plant native vegetation in riparian zone and on riverbanks within 15m buffer from spring high water mark to reduce exposure, erosion, and the effects of flooding
- Protect riparian buffers
- Encourage containment of industrial contaminants by industry
- End development in floodway, flood fringe, and climate change flooding areas
- Remove trash and debris from brook and riparian area
- Restore recent river diversions to state before alteration
- Remove barriers to migration
- Refrain from dredging brook and damaging benthic habitats
- Plant vegetation in large unvegetated areas in close vicinity to Warm Brook to reduce erosion
- Encourage progressive regeneration strategies upstream in commercial cut blocks adjacent to Warm Brook tributaries and headwaters

Conclusion

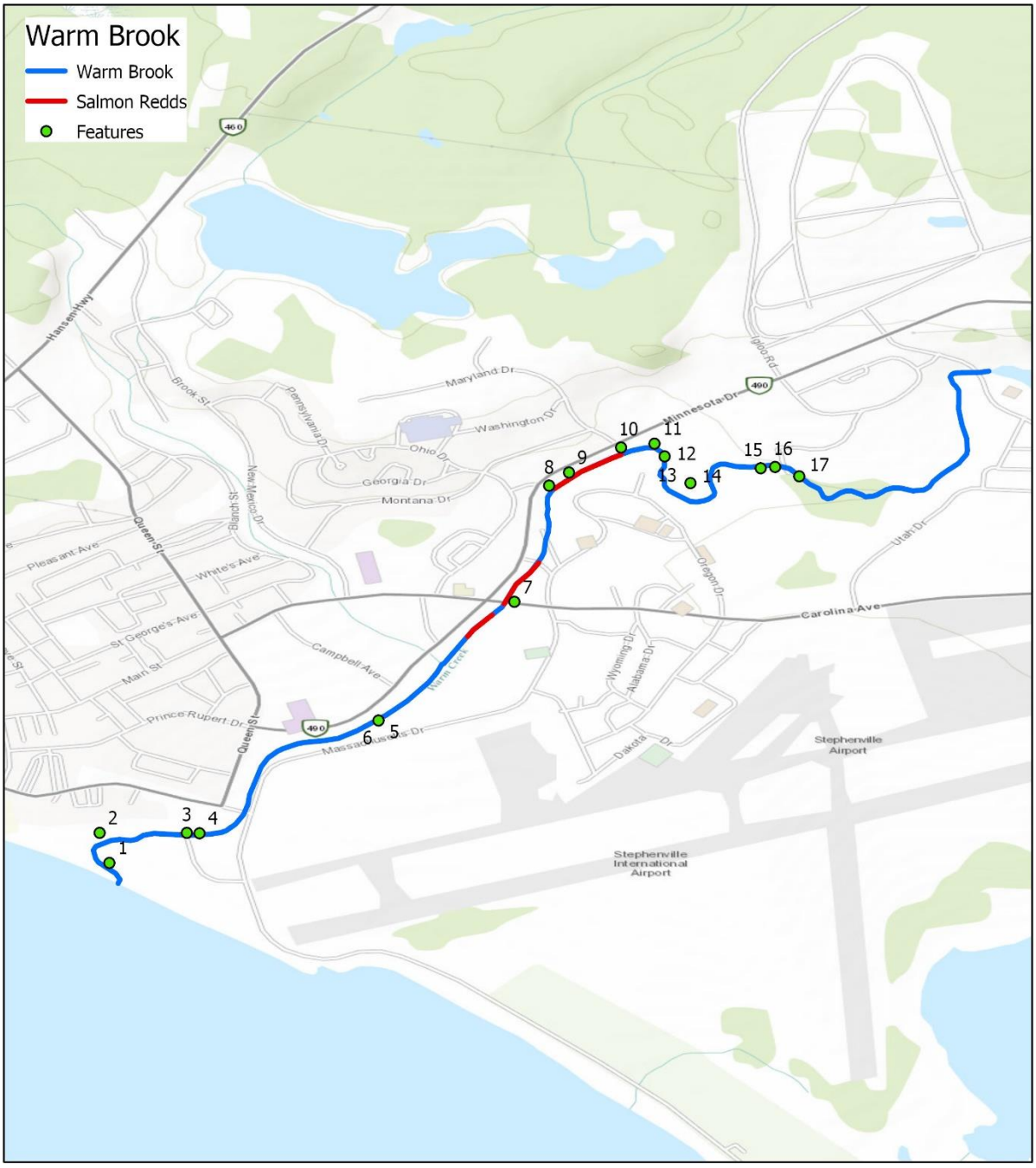
While there are a number of threats and issues surrounding Warm Brook, the tools to mitigate and/or ameliorate them are relatively simple. By following the mitigation tools and conservation guidelines outlined in this document, along with closely monitoring development near climate change flood, floodway fringe, and floodway zones, the ecological integrity and flood security of Warm Brook can be improved upon simultaneously. If strategic partnerships are formed between environmental non-governmental organizations, the Town of Stephenville, and government departments, these goals can be actualized.

Appendix I

ASCF - Warm Brook Conservation Plan
Warm Brook, Stephenville
2019
Map No. 1 of 3

Qalipu FIRST NATION

0 0.5 1 2
Kilometers

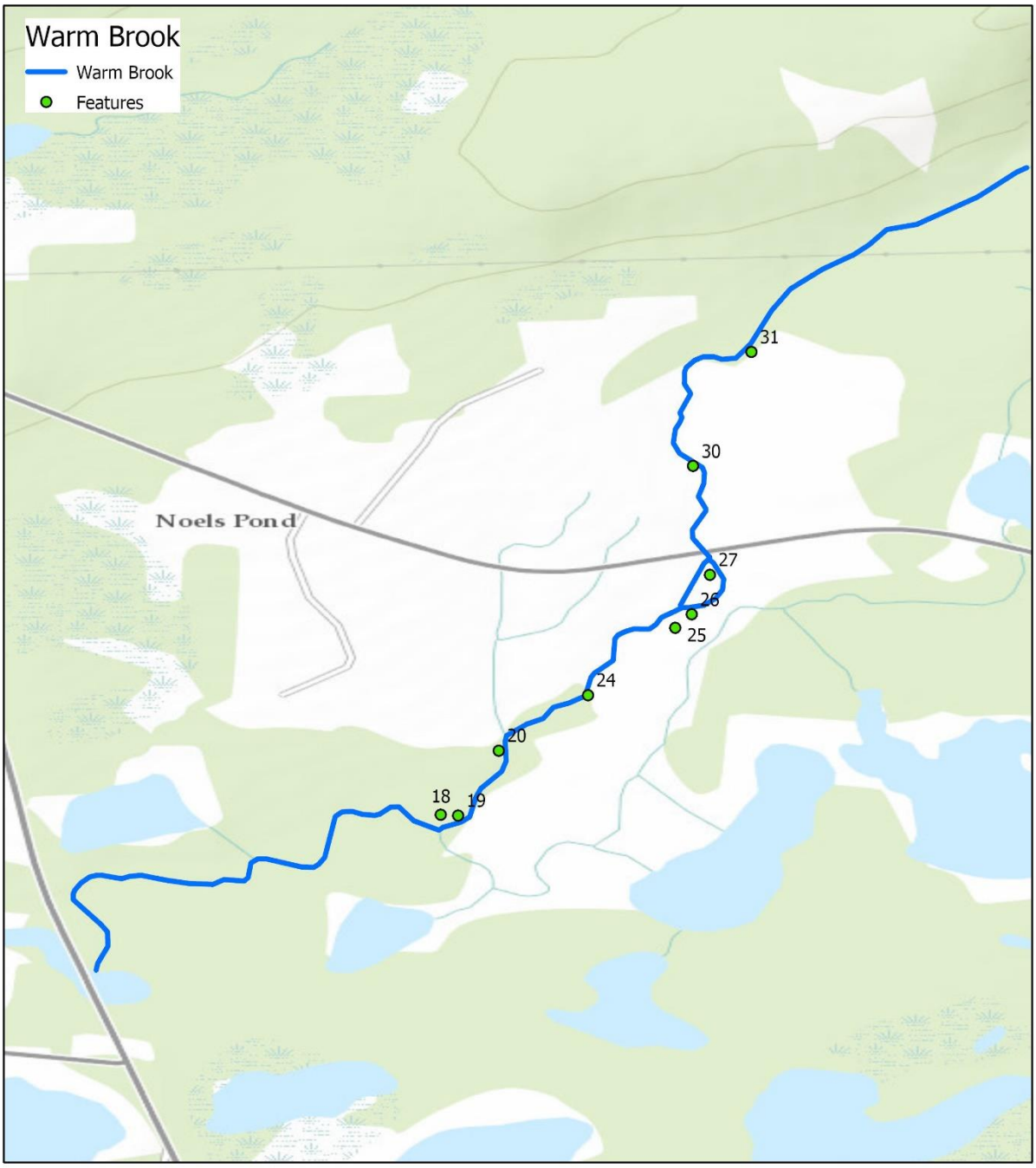


ASCF - Warm Brook Conservation Plan
Warm Brook, Stephenville
2020
Map No. 2 of 3

Qalipu FIRST NATION

0 295 590 1,180
Meters

See Table 1.2



ASCF - Warm Brook Conservation Plan
Warm Brook, Noel's Pond
2020
Map No. 3 of 3

Qalipu FIRST NATION

0 175 350 700
Meters

See Table 1.2

Appendix II

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

Photo 13

Photo 14

Photo 15

Photo 16

Photo 17

Photo 18

Photo 19

Photo 20

Photo 21

Photo 22

Photo 23

Photo 24

Photo 25

Photo 26

Photo 27

Photo 28

Photo 29

Photo 30

Photo 31

Photo 32

Photo 33

Photo 34

Photo 35

Photo 36

Photo 37

Photo 38

Photo 39

Photo 40

Photo 41

Appendix III

Member submitted photos documenting construction debris used in berm development

(Features 28, 29, 30)


10/04/2018


10/04/2018


07/01/2019 05:24


CAT
08/17/2019 07:30


08/17/2019 09:41