JFSA Experts-conseils en ressources hydriques et en environnement

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JFSA file: 1217-01

July 21th, 2014

Qikiqtaakuk environnemental inc.
922 Niaqunngusiaq Rd,
Iqaluit, Nunavut
XOA OHO

Intention: Greg Johnson

Object: **Technical note:** Validation of the presence of fish habitat in a ditch near Iqaluit international airport. Iqaluit, Nunavut.

Mr. Johnson,

Following the mandate you have granted us on July 8th, 2014, we have prepared this report of validation of the presence of fish habitat for the project cited in the object line. This expertise is integrated into the project of facilities expansion of the Iqaluit International Airport. Inventories have shown that the ditch is a fish habitat and a population of Arctic char (*Salvelinus alpinus*) is present. The field sampling was conducted on July 12th and 13th 2014 by JFSA Inc. staff, in collaboration with Qikiqtaakuk environmental Inc staff.

The present study had for objective to validate the presence of fish habitat under section 35 of the Fisheries Act. The information contained in this technical note is preliminary and more extensive inventories are necessary to validate various elements such as the biophysical environment.

The location of the study area is shown in Figure 1. The coordinates of the center of the study area are: 63 º 45 ‘27’’ N and 68 º 32 '43'' W.

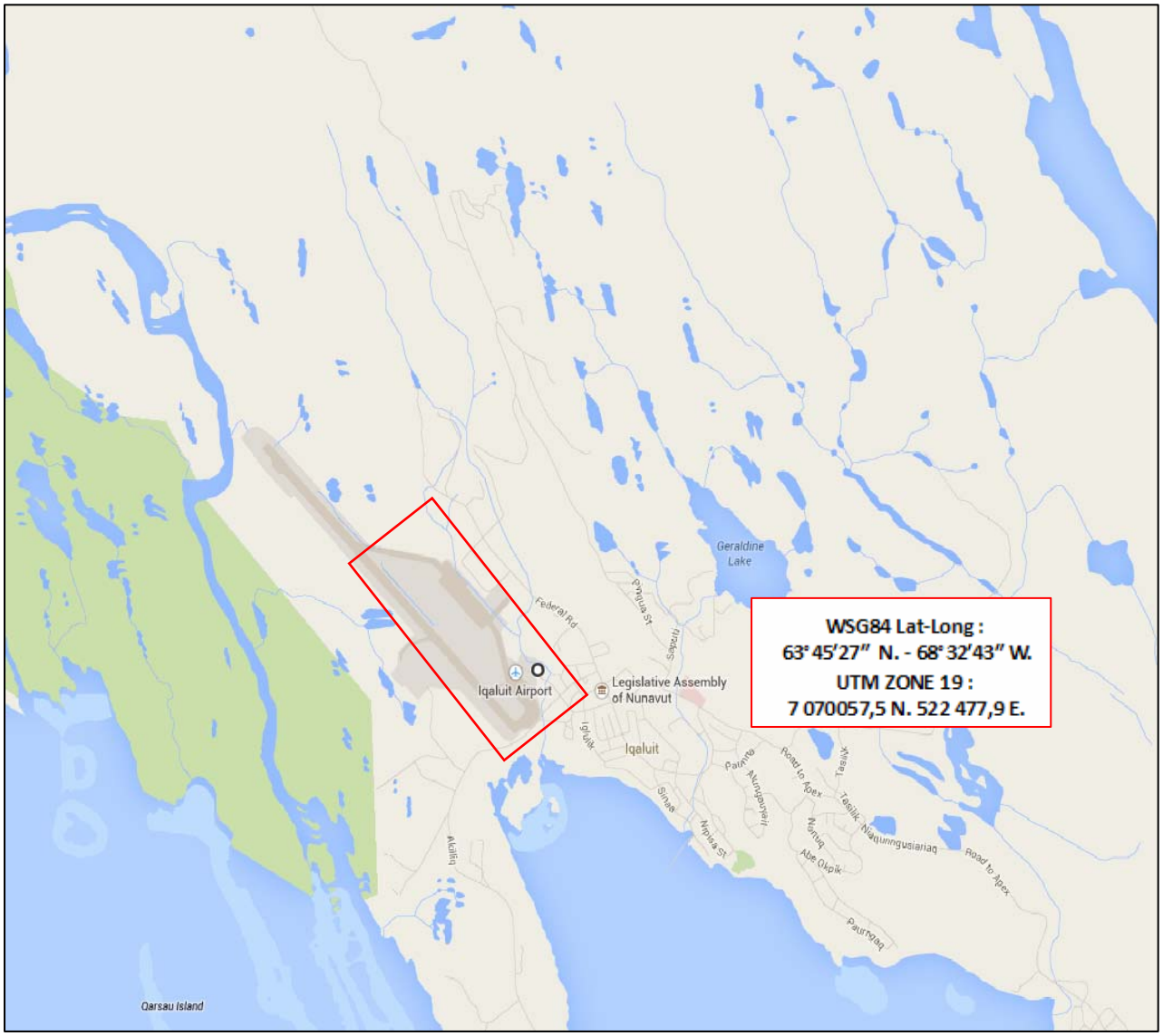

Figure 1: Location of the study site

1. Methodology

The approach used here is the standard methodology for fish populations and more specifically for salmonids species from MNRQ (Ministry of Natural Resources of Québec). Map 1 shows the location of electro-fishing survey stations in the ditch bordering the airport. A total of 5 closed survey stations were determined on a linear length of + / - 1500 meters. Sections were defined by the presence of physical barrier (culverts, roads, ponds etc.). Inventories were completed by a hydrogeomorphologist /environment technologist from JFSA Inc., and an auxiliary staff from Qikiqtaakuk environmental Inc.

Halltech aquatic electrofishing equipment, model HT-2000 ©, was used for the sampling process. In general, a direct current of 175 volts was used; and frequency was adjusted as necessary. One person was maneuvering the aquatic electrofishing equipment, while another person was collecting the fish using a net. For the entire study area, closed stations were used. These closed stations had a minimum area of 350 m^2. A small mesh seine was used to surround the closed area; rocks were placed at the base of the seine to prevent fish from getting in and out of the station zone during the sampling process. Electrification was performed, at all times, from downstream to upstream, to properly cover the entire area. The objective of this closed station sampling approach was to minimize fish loss in the studied section. The approach was not dedicated for quantitative inventory achievement by fishing effort.

All fish caught were placed in a bucket, to count and identify the observed species. Fish lengths were classified using four (4) categories: 0-5 cm, 5-10 cm, 10-15 cm and 15 cm and longer. Some specimens were measured precisely using a rule. No otoliths and / or scales sampling was done on specimens of Arctic char (*Salvelinus alpinus*)

Following the measurements and identification process, all fish were released into the streams. In case of mortality, or non-viability, fish were buried near capture area. During the study, our observations resulted in a mortality rate of less than 5 %.

Sections were positioned using a Promark 3 device (accuracy + / - 1 m) in order to ensure that future fisheries can be set at the same locations. Figure 2 shows the equipment used during the field sampling.

Figure 2: Technique and equipment used

2. Results

The electro-fishing technique performed resulted in an inventory of 42 specimens of Arctic char (*Salvelinus alpinus*). The presence of Arctic char was observed throughout the length of the ditch, at the exception of section 5 located in the upstream portion of the ditch. The average sizes of the specimens observed were +/- 12 cm. Map 1, in annex B, shows the location of segments and table 1 summarizes the results by segment.

	Sections						
Size categories		**1**	**2**	**3**	**4**	**5**	**TOTAL**
0 to 5 cm		*1*	*-*	*2*	*2*	*-*	*5*
5 to 10 cm		*9*	*2*	*6*	*6*	*-*	*23*
10 to 15 cm		*2*	*-*	*3*	*8*	*-*	*13*
15 cm and more		*-*	*-*	*-*	*1*	*-*	*1*
	TOTAL	*12*	*2*	*11*	*17*	*-*	*42*

Table1: Specimen sizes of Arctic Charr (*Salvelinus alpinus*) in different sections.

Figures 3 to 6, on the next page, show example of specimens observed during the sampling procedure.

Figure 3: Arctic Charr (*Salvelinus alpinus*) specimen

Figure 5: Arctic Charr (*Salvelinus alpinus*) in section 3

Figure 4: Average size of Arctic Charr (*Salvelinus alpinus*)

Figure 6: Arctic Charr (*Salvelinus alpinus*) in section 4

To complete the information, table 2 shows various information in relation to the length of segments surveyed, type of dominant substrate, habitat type classification according to *Gibson et al.,* (1987) the general habitat classification according to *Beak (1980)(*Annex A), and finally the potential fish habitat functions.

All classification criteria and results should be used with caution as they are, for the most part, a judgment according to preliminary information available. For instance, the presence of known spawning in section 1 should be considered as a potential habitat function. More data are needed to confirm this affirmation. Figures 7-10 illustrate the general characteristics of inventoried segments.

Section	Section length	Dominant substrate	General habitat type	General Habitat classification [1]	Potential habitat fonctions[2]	Remarks
Section 1	265 meters	Cobble/ Rubble	Riffle	Type II	1,2,3,5	Channelized section with limited pool
Section 2	210 meters	Cobble/ Rubble	Riffle	Type II	1,2,3,5	Channelized section with limited pool
Section 3	310 meters	Sand/ Rubble	Flat (steady)	Type IV	1,2	Large section with no pool/ very anthropogenic
Section 4	308 meters	Sand/ Rubble	Flat (steady)	Type IV	1,2,5,7	Presence of pool. Flat segment. Very anthropogenic
Section 5	400 meters	Gravel	Riffle	Type IV	2	Very anthropogenic.
Total	1493 meters					

Table 2: General characterization of habitats per section

[1] See annex A (*Beak (1980)*)

[2] Potential habitat functions (See descriptions below)

1 Growth
2 Supply
3 Spawning
4 Nursery
5 Rest
6 Shelters
7 Wintering

Figure 7: Section 1 and 2, look to north-west

Figure 9: Section 4, look to north-west

Figure 8 : Section 3, look to north

Figure 10: Section 5, look to north-west

3. Discussions and conclusions

The field surveys have identified the presence of Arctic char (*Salvelinus alpinus*) at the juvenile stage in the ditch bordering the airport infrastructure. Overall, the biophysical conditions of this ditch are not optimal for all fish habitat functions (spawning and nursering, feeding, resting, etc.).

Despite the lack of information in this regard, we also assume that the water quality of this ditch could be poor due to the presence of a dump and various waste materials (fuel, oil, machinery etc.) upstream and at the head of the drainage ditch. This aspect must be validated later, if applicable.

To complete a more complete picture of the biophysical conditions, information on hydrologic situations, hydraulic and hydrogeomorphological conditions as well as water quality data should be gathered and collected in this ditch.

All information in this technical note should be analyzed in relation to the planned expansion of infrastructure for the Iqaluit International Airport Improvement project (IIAIP). All of aspects cited before are well beyond the objectives of this expertise.

Do not hesitate to contact us if you have any questions regarding this technical note.

J-F Sabourin and associates Inc.

Hugues Lachance B.sc
Hydrogeomorphologist Env.Tech
Technical director –Environnemental sciences

Cédric Beaudin B.Sc
Biologist

4. Bibliography

Beak Consultants Ltd. 1980. Fisheries Investigation for the Upper Salmon Hydroelectric Development. Report prepared for: Newfoundland and Labrador Hydro, St. John's, NF. 95 p. + appendices and figs.

Gibson, R.J., T.R. Porter, and K.G. Hillier. 1987. Juvenile Salmonid Production in the Highlands River, St. George's Bay, Newfoundland. Can. Tech. Rep. Fish. Aquat. Sci. 1538, v + 109 pp

ANNEX

A

Habitat classification *Beak (1980)*

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Habitat Classification (Type I, II, III, IV)

Habitat survey information should be used to group similar habitat types. The preferred habitat classification system was developed by Beak (1980), which grouped salmonid macro-habitat into four classifications for easy reference. Table 4.1 presents flow, current, depth and substrate parameters used to categorize habitat into the four classification types.

Table 4.1 Characteristics of the Four Habitat Classification Types Identified by Beak (1980)

Type I	Good salmonid spawning and rearing habitat; often with some feeding pools for larger age classes: **flows:** moderate riffles; **current:** 0.1 - 0.3 m/s; **depth:** relatively shallow, 0.3 - 1 m; **substrate:** gravel to small cobble size rock, some larger rocks or boulders; and **general habitat types[1]:** primarily riMe, pool.
Type II	Good salmonid rearing habitat with limited spawning, usually only in isolated gravel pockets, good feeding and holding areas for larger fish in deeper pools, pockets or backwater eddies: **flows:** heavier riffles to light rapids; **current:** 0.3-lm/s; **depth:** variable from 0.3 - 1.5 m ; **substrate:** larger cobble/rubble size rock to boulders and bedrock, some gravel pockets between larger rocks; **general habitat types[1]:** run, riffle, pocketwater, pool.
Type III	Poor rearing habitat with no spawning capabilities, used for migratory purposes: **flows:** very fast, turbulent, heavy rapids, chutes, small waterfalls, **current:** 1 m/s or greater; **depth:** variable, 0.3 - 1.5 m; **substrate:** large rock and boulders, bedrock; and **general habitat types[1]:** run, pocketwater, cascades.
Type IV	Poor juvenile salmonid rearing habitat with no spawning capability, provides shelter and feeding habitat for larger, older salmonid (especially brook trout): **flows:** sluggish; **current:** 0.15 m/s; **depth:** variable but often 1 m; **substrate:** soft sediment or sand, occasionally large boulders or bedrock, aquatic macrophytes present in many locations; and **general habitat types[1]:** flat, pool, glide.

ANNEX

B

Site Cartography

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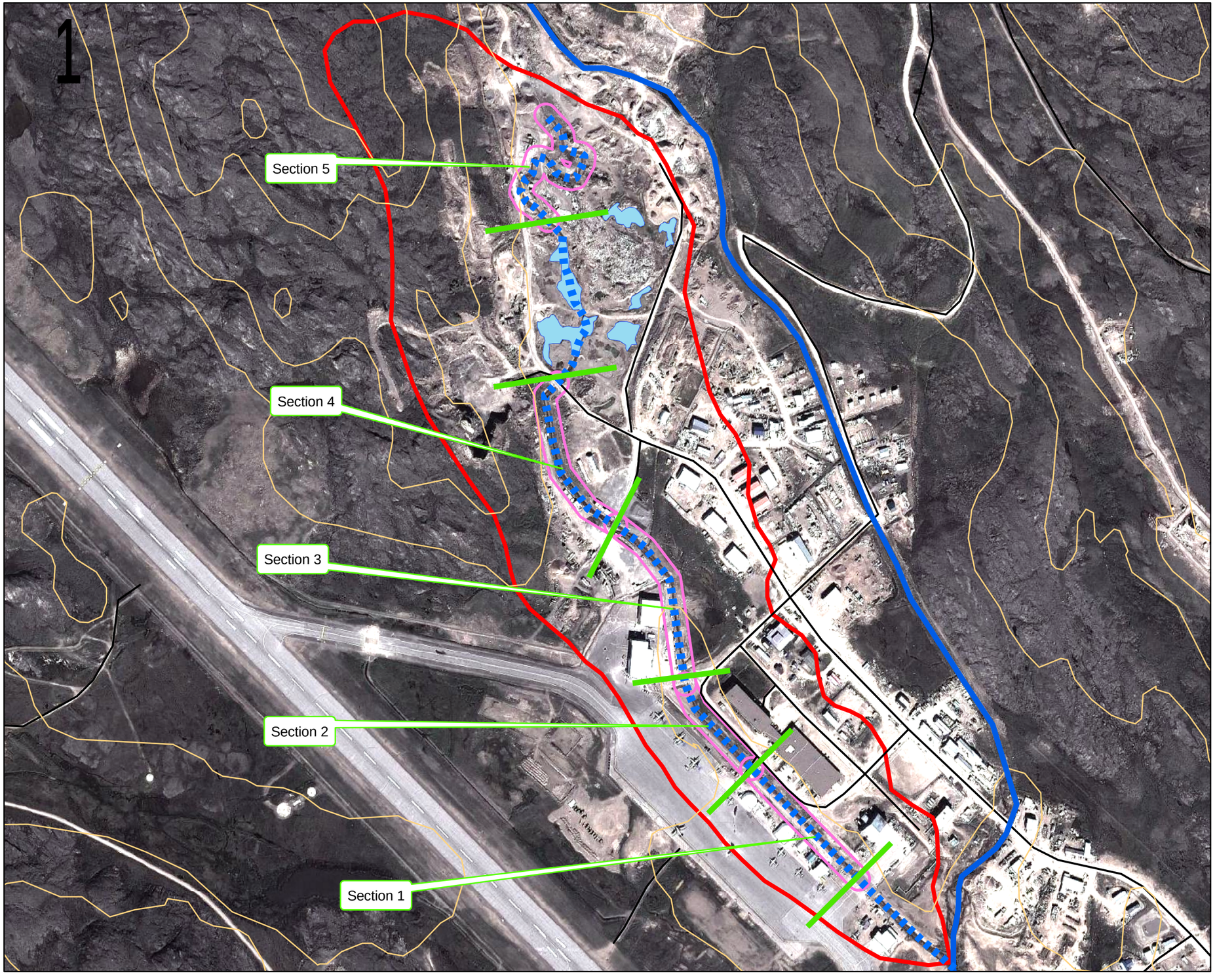
1



Technical note
electro-fishing
Ditch sections

Legend

- Approximated Watershed
- Ponds
- Sections delimitation
- Coutour line (10m)
- Ditch A
- Watercourse A
- Roads

WSG84 Lat-Long :
63°45'27? N. - 68°32'43? W.
UTM (NAD 1983) ZONE 19 :
7 070 057,5 N. 522 477,9 E.

BY :

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Presented to :

Qikiqtaakuk environnemental Inc.

Project : Iqaluit International Airport Improvement Project (IIAIP)

No.	BY	DATE	DESCRIPTION	APPR.

SCALE: 1:7 000

100 50 0 100 200 300 Meters

Plan 1

FIELD SURVEY : H.L
DREW BY : C.B
VERIFIED BY : G.L
APROUVED BY : H.L

DRAWING REF.
1217_ELECTRO-FISHING_SECTIONS_CB

DATE: July 21th, 2014

PROJET N0.: JFSA-1217