EAGLE GOLD PROJECT
FISH AND FISH HABITAT MONITORING REPORT
2019

prepared for

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Eagle Gold Project
Fish and Fish Habitat
Monitoring Report
2019

Nicholas de Graff, Can-nic-a-nick Environmental Sciences
P.O. Box 10106, Whitehorse, YT Y1A 7A1

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Cover Photo: Beaver dam located at Lynx Creek monitoring site L1, September 2019.
Photo Credit: N. de Graff

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1.0 INTRODUCTION

Victoria Gold Corp's Dublin Gulch property is situated in central Yukon Territory, approximately 375 kilometers north of Whitehorse and approximately 85 kilometers from the town of Mayo. The Eagle Gold Project is located within the Dublin Gulch property and is accessible by an all-season road, and is connected to Yukon Energy's electrical grid. The construction of the Eagle Gold Project was completed in July of 2019, and gold production began in September 2019. The Project is comprised of an open pit mine, heap leach pad and a gold recovery plant. It is within the Mayo Mining District where placer mining activities on Haggart Creek and tributary streams have occurred intermittently since 1895 (Tempelman-Kluit 1964).

Monitoring efforts undertaken on the Project are in accordance with the Environmental Monitoring, Surveillance and Adaptive Management Plan (EMSAMP) version 2019-02 (StrataGold 2019). The purpose of this assessment is to report on fish and fish habitat monitoring completed during September 2019. All relevant data that have been previously collected (de Graff 2019; de Graff 2017; Stantec 2010) have been examined and is presented where appropriate.

2.0 STUDY AREA

The Eagle Gold Project is accessible via the Silver Trail and the South McQuesten and Haggart Creek Roads. The Project is situated within the traditional territory of the First Nation of the Na-Cho Nyäk Dun. The watersheds in the study area originate in the low-lying mountains between the East and South McQuesten drainage basins of the Stewart Plateau in the north-central Yukon.

The principle drainage is Haggart Creek of which Dublin Gulch, Eagle, Ironrust and Lynx creeks are tributaries. Haggart Creek flows south in the project area and eventually flowing more southwest before discharging into the South McQuesten River. The South McQuesten River is a tributary of the Stewart River, a large tributary of the Yukon River drainage basin.

The study area is located in the Boreal Cordillera ecozone which is characterized by mountain ranges that contain numerous high peaks and extensive plateaus, and are separated by wide valleys and lowlands. Landscape features of the region are primarily the result of past glacial activity, erosion and widespread deposits however the majority of the study area remained un-glaciated during the last glacial period (Bostock 1965). Much of the Project area displays physiographic characteristics of the unglaciated areas of the region, with narrow, deep valleys that extend to the headwaters of streams, where they rise steeply and end abruptly (StrataGold 2015).

Black spruce, trembling aspen, balsam poplar, and white birch are the most common forest types. At higher elevations, scrub birch and willow occur in subalpine sections with extensive landscapes of rolling alpine tundra characterized by sedge-dominated meadows, and lichen-colonized rock fields. The climate in this region is an interior subalpine type with long cold winters and summers that are brief and cool.

3.0 METHODS

A total of 5 monitoring sites (HC1, HC2, HC3, IR2, and L1) were assessed in Haggart, Ironrust and Lynx creeks during this monitoring project. Figure 1 depicts the locations of each monitoring site within each drainage. All monitoring sites are consistent with locations that were previously identified and assessed in previous baseline studies (de Graff 2019; de Graff 2017; Stantec 2015), and are referred to in the EMSAMP version 2019-02 (StrataGold 2019). The early September timing of fish and aquatic sampling was similar to the timing in all previous years. Detailed location descriptions of each monitoring site within the study area are presented in Table 1.

3.1 Aquatic Habitat Surveying

A section of the stream containing representative mesohabitat type (riffle, rapid, run, glide, pool or backwater) was surveyed at each monitoring site (HC1 225 meters, HC2 175 meters, HC3 160 meters, IR2 100 meters and L1 100 meters). CABIN (2018) field assessment sheets and British Columbia Fish and Fish Habitat Inventory (BCMSRM 2001) field protocols were used to record biophysical data. This included the geo-referencing of each monitoring site with a hand-held Garmin GPS (datum WGS 87). Determined attributes from field measurements included those related to site (date, elevation and UTM coordinates), channel characteristics (channel and wetted widths, gradient, stage, fish cover, residual pool depth, crown closure and riparian vegetation) and substrate makeup (Wolman pebble count, embeddedness, interstitial material and periphyton coverage). Digital photographs included upstream and downstream perspectives of each site. Basic water quality parameters were additionally recorded (relative clarity, conductivity, pH and temperature).

3.2 Fish Sampling

Fish sampling was conducted under a permit (XR 299 2019) obtained from Fisheries and Oceans Canada (Appendix III). At each monitoring site backpack electrofishing (Smith-Root model LR-24) and minnow trapping were the primary methods utilized to establish fish presence. The conductivity of the water was first noted prior to electrofishing. Captured fish were placed in a water filled bucket. Any fish that were observed or “flipped” and avoided capture with the dipnet were also noted. Voltage was adjusted to enable fish in the bucket to recover within 5 to 20

seconds. A standard waveform of between 265 to 450 volts was used throughout the assessment with a consistent frequency of 60 Hz. and a duty cycle ranging from 12 to 17 percent. A single-pass methodology with a minimum of 500 seconds of active fishing time was completed at each monitoring site. While trying to meet the CPUE guidelines as per DFO/ECCC guideline (e.g., 100 individuals), the resident fish population is too small to achieve within the 500 seconds of active fishing time.

Galvanized ¼ inch "Gee" type minnow traps, which were baited with suspended sacs of Yukon River salmon roe, were also utilized at each monitoring site using methods described by the Yukon River Panel (2007). Minnow traps were set in various habitat types such as scour pools, side-channels, undercut banks or in woody debris that provided cover for fish. A total of five minnow traps were set at each monitoring site for an overnight period. Soak times and resulting catch were recorded for each trap. Angling employed the use of small spinners. The time spent angling was used to denote sampling effort.

After determining fish species, all captured fish were measured for either a fork or total length (± 1 mm) and weight (± 0.1 gm). Weight was determined using a digital scale by first blotting excess water from the fish and then placing each fish into a container on the scale. Total length was recorded for slimy sculpin and burbot while fork lengths were noted for Arctic grayling and juvenile Chinook salmon. All captured fish were given time to recover in a water filled bucket before being live-released in a slack water area near the site of capture. No sampling mortalities were noted at any of the sampling sites.

4.0 RESULTS AND DISCUSSION

4.1 Aquatic Habitat

A comparative summary of aquatic habitat characteristics determined for the five monitoring sites is presented in Table 2. Individual site summary tables are presented in Appendix I. While all sites share a similar riffle-pool-run morphology, specific habitat characteristics varied and were dependent on the gradient and hydrological conditions specific to each site and reflected in the substrate size classes, and channel characteristics that were observed.

Site HC1 is situated on the mainstem of Haggart Creek upstream of the Lynx Creek confluence. The mean channel width at this location was 9.8 meters with a wetted width of 7.4 meters at the time of the survey. The gradient of the site was estimated to be about 1 percent. The aquatic habitat at this site continued to provide ample fish cover primarily in the form of deep pools and undercut banks. When combined with other cover types that included small woody debris and overhanging vegetation, it was estimated that total cover occupied about 15 percent of the entire channel. The average residual pool depth of 0.6 m was greater than the other Haggart Creek sites. Pools were also more frequently encountered and generally larger in area. Based on the pebble counts, course gravel dominated the substrates

and the embeddedness of individual rocks averaged 50 percent. Course sand (0.1-0.2 cm) was the predominant type of interstitial material. Periphyton coverage was moderate with a noticeable slippery feel on the rocks. There were also patches of thicker green algae that were observed (Figure 3). The irregular meandering channel contained some disturbance indicators from changes in sediment supply and/or discharge variability that included elevated bars, eroding banks, abandoned and multiple channels that appear to reflect past upstream activities related to historic placer mining.

Monitoring site HC2 is situated between sites HC1 and HC3 at the Dublin Gulch confluence, the principle drainage associated with the Eagle Gold Project. The landscape at this location has been previously disturbed from historic placer mining. Access roads and construction activities associated with the current mine development were in close proximity. The mean channel width at this location was similar to site HC1 and of slightly higher gradient. Total fish cover was low and estimated to be only 5 percent of the available aquatic habitat. Fish cover was mainly in the form of deep pools and undercut banks however other cover types included boulders, overhanging vegetation and clumps of small woody debris. The pools that were present were the result of water scour and erosion with the average residual depth of about 0.4 meters. Course gravels dominated the substrate and the embeddedness of individual rocks averaged 63 percent. The interstitial material was largely composed of gravel (0.2 to 1.6 cm). Periphyton coverage was noticeable with rocks having a definite slippery feel with a yellow brown to light green coloration on the surface. The channel pattern was sinuous with several disturbance indicators including elevated bars, eroding banks, multiple and abandoned channels, and areas of extensive bed scour that appeared to be all linked to historical placer mining.

Monitoring site HC3 is situated less than a kilometer upstream of site HC2 and upstream of all project influence. Higher stream velocities associated with the more confined channel (5.7 meters) resulted in the predominance of riffles, rapids and straight runs at this site. Boulders and undercut banks were the dominant forms of fish cover. The only other cover type present was overhanging vegetation along the channel margins. Total cover was estimated to be only 10 percent of the available habitat in the channel. Course gravel dominated the substrate. The embeddedness of individual rocks averaged 63 percent and the interstitial material was predominantly gravel (0.2 to 1.6 cm). Similar to site HC2 further downstream, periphyton coverage was again noticeable with rocks having a definite slippery feel with a yellow brown to light green coloration on the surface. The channel was sinuous in pattern and occasionally confined by the valley wall. No disturbance indicators were observed in the channel.

The stream morphology at monitoring site IR2 in Ironrust Creek, a water course upstream of project activities, was dominated by riffles, rapids and the occasional shallow scour pool. The channel width of approximately 3.5 meters was the narrowest of the sites surveyed. Fish cover was low and represented only 5 percent

of the aquatic habitat that was present. Boulders and overhanging vegetation were the primary fish cover types. Scour pools, when present, had low residual depths (<0.2 meters). While course gravel dominated the substrate, there were good quantities of small cobble throughout the width of the channel. The slope of the site was estimated to be 2.9 percent and the higher gradient was reflected by the substantial cobble armoring that characterized the stream bed. The embeddedness of individual rocks averaged 50 percent and the interstitial material was composed of gravel (0.2 to 1.6 cm). Periphyton thickness on substrates was noticeable with a definite slippery feel and a yellow brown to light green coloration on the surface. The sinuous channel was frequently confined in the valley and the disturbance indictors were limited to a few small areas where the stream bank was sloughing.

The stream channel at site L1 of Lynx Creek, a proximal water course that joins Haggart Creek south of the Project, is within a drainage basin that has no current or planned Project facilities or activities, and has previously been characterized as a classic riffle-pool-glide sequence. Recently constructed beaver dams near L1, however, have reduced stream velocities and created more standing water throughout the reach. Total fish cover, nevertheless, remained relatively high and thought to represents about 20 percent of the aquatic habitat that was present. Deep pools and undercut banks were the dominant fish cover types with small woody debris and overhanging vegetation also contributing where present. The average residual pool depth of 0.7 meters provided excellent cover and refuge for fish. Course gravel dominated the bed material making for some of the best substrates observed in the project area. The interstitial material was mostly composed of fines (<0.1 cm) and the embeddedness of the rocks was 44 percent, which had increased from the previous year. It is believed there is more sediment deposition at this site which can be attributed to an increase in area of standing water associated with the beaver dams. Periphyton on the rock surfaces was thin with only a slightly slippery feel apparent. The channel pattern was characterized with irregular meanders, well-defined streambanks which were unconfined by the valley walls. The site is situated near the center of the Lynx Creek valley and beaver dams were the only disturbance that were observed.

A comparison between 2017, 2018 and 2019 substrate size classes as determined by pebble counts is presented in Figure 2. With the exception of some of the class proportions, mainly between small cobble and coarse gravel, little change is apparent between years. The slight differences at each of the sites are thought to be mainly due to the natural variability of the substrate that was chosen to complete the survey. In particular, the dry conditions and low stream stage in 2019 allowed the surveying of substrates that were not as accessible in previous monitoring years.

4.2 Fish Distribution and Abundance

The composition of captured fish in 2019 was represented by four species that included in decreasing frequency: slimy sculpin (35) Arctic grayling (24) Chinook salmon (10) and burbot (1). A summary of sampling effort and catch at each of the

five monitoring sites is presented in Table 3. A comparison of annual fish catches in 2017, 2018 and 2019 is presented in Table 4. The four fish species captured in 2019 have been previously documented to inhabit Haggart Creek (Hallam Knight Piésold 1995, 1996; Madrone 2006; Stantec 2010, de Graff 2017). Other fish species reported to occur in the drainage, primarily in the lower reaches of Haggart Creek, include round whitefish, northern pike and Arctic lamprey. Chinook salmon fry (age 1^{+}) were once again captured at site HC1 and HC3 in 2019 and also for the first time at site IR1. In the baseline study by Stantec (2010) only slimy sculpin and Arctic grayling were reported to inhabit 10 watercourses representing 38 sampling sites within the current study area.

Slimy sculpin dominated the overall catch in 2019 and were found at all five monitoring sites. Sites HC1 and HC3 in Haggart Creek were locations that had the highest frequency of capture. Only modest numbers (5 or less) were encountered at sites HC2, IR2 and L1. Sculpin total lengths ranged from 50 to 125 mm indicating the presence of both juvenile and adult life history stages. This size range was similar to those reported by Stantec (2010) in their baseline study. A length frequency histogram that includes all captured sculpin from each yearly monitoring program is presented in Figure 4. Based on captures, the implied densities of sculpin encountered at the Haggart Creek sites were generally greater than in 2018 and similar to 2017 (Table 4). It is believed that the cold-water temperatures and ice conditions during the 2018 assessment negatively influenced catch.

Arctic grayling were most frequently captured at site HC1 as was the case during the 2017 and 2018 assessments. Only a few were captured at the other sites (3 or less) with the exception of site IR2 where they were neither observed or caught. All captures during this assessment, with the exception of one large male that was angled at site L1, were believed to be young-of-the-year and ranged in fork length from 67 to 85 mm. Older age classes were noticeably absent in the catch. This artifact may have been a function of their distribution in the watershed during the September sampling window.

Previous reports have confirmed the occurrence of juvenile Chinook salmon in the lower reaches of Haggart Creek (Madrone 1996; Hallam Knight Piésold 1995, 1996). In the baseline study by Stantec (2010) juvenile Chinook salmon were not captured at any of the current Haggart Creek monitoring sites. During this assessment six were captured at site HC1, three at site HC3 and one at site IR2. The presence of juvenile Chinook salmon at these locations represents their furthest upstream occurrence to date in the Haggart Creek watershed. Chinook salmon juveniles (age 0^{+}) were not captured during the 2018 assessment and their absence is believed to be related to either a weaker brood year and/or cold environmental conditions at the time of sampling in mid-September influencing their distribution in the drainage.

5.0 CONCLUSION

The results from the current monitoring program was comparable to the 2017 and 2018 assessments as well as past baseline studies as indicated by the measured biophysical characteristics and fish species found inhabiting each of the five monitoring sites. While the absolute number of fish captures varied, the species composition continues to be consistent and indicative of a stable fish community. The presence of Chinook salmon juveniles (age 0^{+}) in the mainstem of Haggart Creek is consistent with the 2017 assessment program. Chinook salmon juveniles have only been sporadically documented previously in the upper reaches of Haggart Creek (i.e. upstream of the Lynx Creek confluence).

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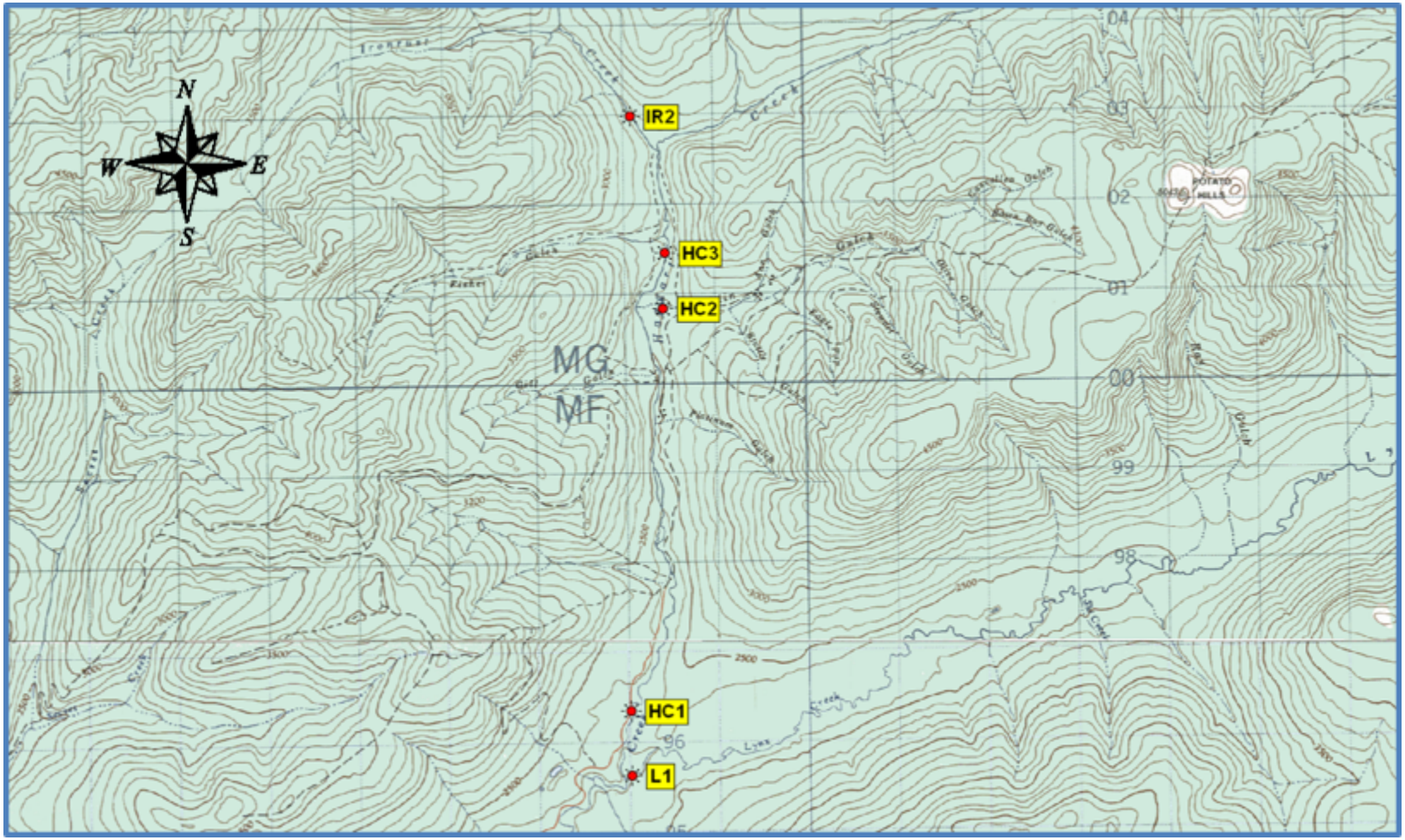
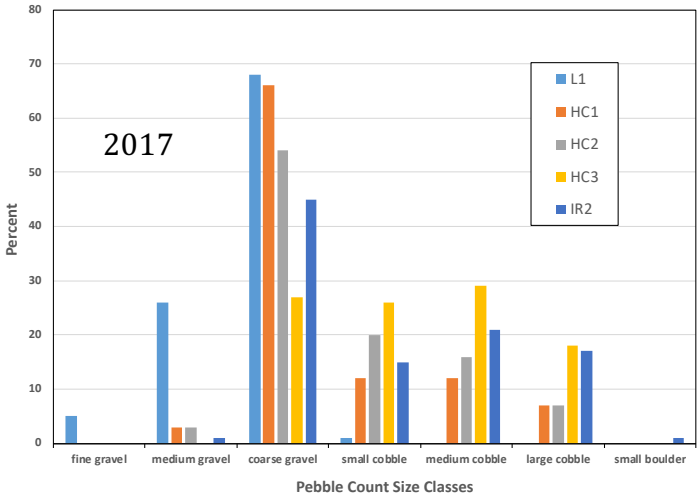
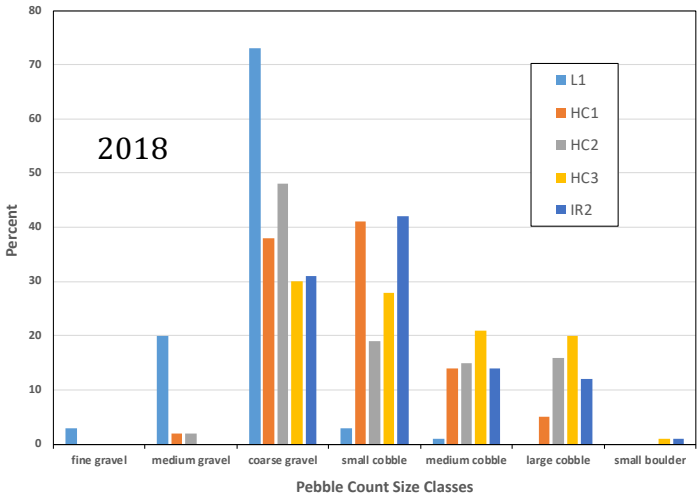


Figure 1 Monitoring sites associated with the Eagle Gold Project, September 2019.

Table 1 Drainages and monitoring sites associated with the Eagle Gold Project, September 2019.

DRAINAGE	DESCRIPTION	MONITORING SITES
Haggart Creek	Receiving waters from the Eagle Gold Project and discharges into the South McQuesten River.	HC1
Haggart Creek	Receiving waters from the Eagle Gold Project and discharges into the South McQuesten River.	HC2
Haggart Creek	Downstream of the Ironrust Creek confluence and upstream of the Eagle Gold Project.	HC3
Ironrust Creek	Creek draining the west face of Haggart Dome and discharges into Haggart Creek upstream of the Eagle Gold Project.	IR2
Lynx Creek	Creek draining the south face of Potato Hills and discharges into Haggart Creek downstream of the Eagle Gold Project.	L1





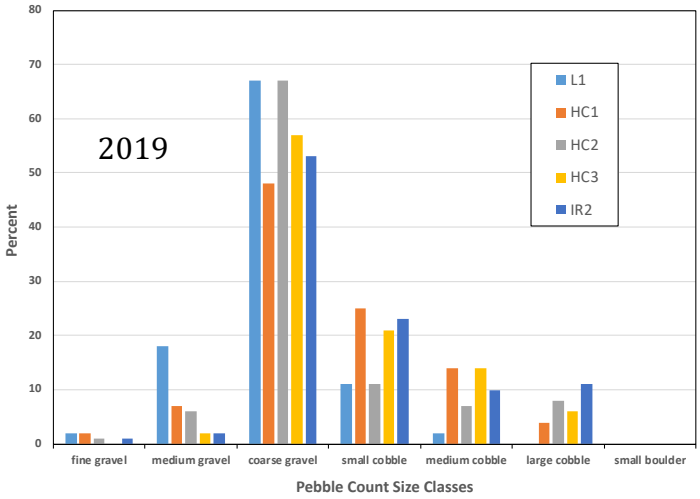


Figure 2 Comparison of 2017, 2018 and 2019 substrate size classes based on pebble counts at monitoring sites associated with the Eagle Gold Project.

Table 2 Summary of biophysical characteristics determined at monitoring sites associated with the Eagle Gold Project, September 2019.

PARAMETER		MONITORING SITES				
		Haggart Creek Drainage			Ironrust Creek Drainage	Lynx Creek Drainage
		HC1	HC2	HC3	IR2	L1
SITE	Survey Date	Sept 6, 2019	Sept 7, 2019	Sept 7, 2019	Sept 8, 2019	Sept 6, 2019
	Site Elevation (m)	719	783	783	818	712
	UTM (08 V)	E 457967 N 7096518	E 458085 N 7101152	E 458427 N 7101584	E 458005 N 7103153	E 458003 N 7095825
SITE BIOPHYSICAL DATA	Mean channel width (m)	9.8	10.0	5.7	3.5	7.0
	Mean wetted width (m)	7.4	5.6	4.2	2.5	5.3
	Gradient (%)	1.0	1.4	1.1	2.9	0.1
	Stage	low	low	low	low	low
	Total fish cover (%)	15	5	10	5	20
	Dominant cover types	undercut banks, deep pools	undercut banks, deep pools	boulders, undercut banks	boulders, overhanging vegetation	undercut banks, deep pools
	Subdominant cover types	small woody debris, overhanging vegetation	boulders, overhanging vegetation, small woody debris	overhanging vegetation	undercut banks	small woody debris, overhanging vegetation
	Residual pool depth (m)	0.6	0.4	0.4	< 0.2	0.7
	Crown closure (%)	0	0	0	0	0

Table 2 Continued

PARAMETER		MONITORING SITES				
		Haggart Creek Drainage			Ironrust Creek Drainage	Lynx Creek Drainage
		HC1	HC2	HC3	IR2	L1
SITE SUBSTRATE	**Dominant Bed Material**	coarse gravel	coarse gravel	course gravel	course gravel	course gravel
	Subdominant Bed Material	small cobble	small cobble	small cobble	small cobble	medium gravel
	Embeddedness (%)	50	63	63	50	44
	Interstitial Material (cm)	0.1-0.2	0.2-1.6	0.2-1.6	0.2-1.6	< 0.1
	Periphyton thickness (mm)	1.0-5.0	0.5-1.0	0.5-1.0	0.5-1.0	0.5-1.0
SITE MORPHOLOGY	**Channel Pattern**	irregular meandering	sinuous	sinuous	sinuous	irregular meandering
	Confinement	unconfined	occasionally confined	occasionally confined	frequently confined	unconfined
	Disturbance Indicators	elevated bars, abandoned/multiple channels, eroding banks	abandoned/multiple channels, elevated bars, eroding banks	none	eroding banks	none

Figure 3 Picture of green algae (*Chlorophytes*) that was attached to the substrate at monitoring site HC1, September 2019.

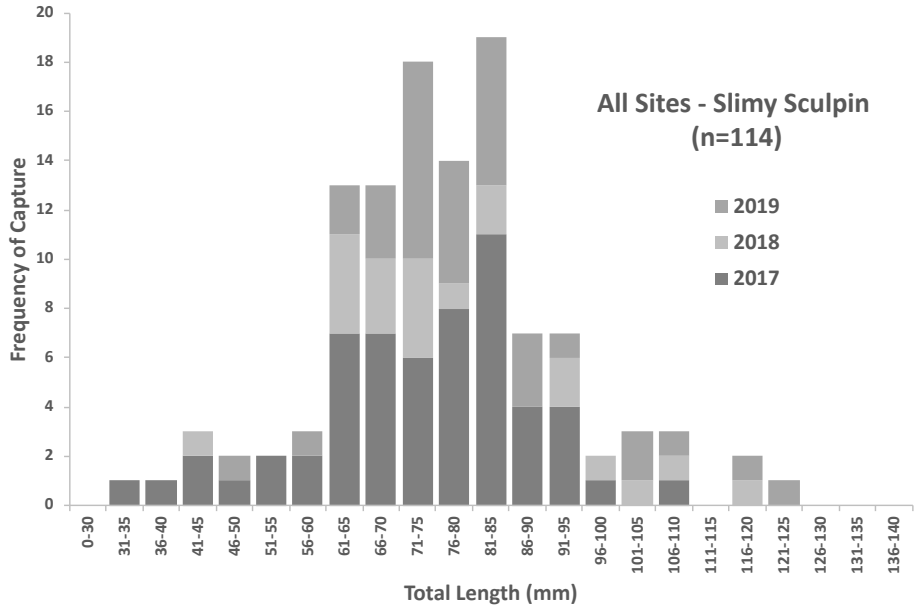


Figure 4 Length frequency of captured slimy sculpin associated with monitoring sites at the Eagle Gold Project 2017 to 2019.

Table 3 Summary of sampling effort and catch using three fish capture techniques at monitoring sites associated with the Eagle Gold Project, September 2019.

MONITORING SITE		CAPTURE METHOD	SAMPLE EFFORT	CATCH				OBSERVED
				Arctic Grayling	Burbot	Chinook Salmon	Slimy Sculpin	
Haggart Creek	HC1	Angling	35 min	0	0	0	0	1 adult and 1 juvenile AG
	HC1	Electro	637 sec	9	0	3	12	2 juvenile AG and 2 SS
	HC1	MNT	24.5 hrs	8	1	3	1	
	HC2	Electro	748 sec	3	0	0	1	1 adult AG
	HC2	MNT	25.5 hrs	0	0	0	0	
	HC3	Electro	626 sec	2	0	3	13	2 subadult and 15 - 20 juvenile AG
	HC3	MNT	23.0 hrs	0	0	0	2	
Ironrust Creek	IR2	Electro	650 sec	0	0	1	1	
	IR2	MNT	21.0 hrs	0	0	0	0	
Lynx Creek	L1	Angling	35 min	1	0	0	0	
	L1	Electro	596 sec	1	0	0	5	2 SS
	L1	MNT	22.5 hrs	0	0	0	0	

Legend: MNT = Minnow trap (5 traps) Electro = Electrofishing AG = Arctic grayling
BB = burbot CH = Chinook Salmon SS = slimy sculpin

Table 4 Comparison of fish capture data at five monitoring sites at the Eagle Gold Project, September 2017 to 2019.

SPECIES	SAMPLE SITE	CATCH (#)		
		2017*	2018	2019
Arctic grayling	HC1	13	8	17
	HC2	1	2	3
	HC3	1	0	2
	IR2	0	0	0
	L1	5	1	2
Burbot	HC1	0	0	1
	HC2	0	0	0
	HC3	0	0	0
	IR2	0	0	0
	L1	0	1	0
Chinook salmon	HC1	2	0	6
	HC2	0	0	0
	HC3	5	0	3
	IR2	0	0	1
	L1	0	0	0
Slimy sculpin	HC1	10	4	13
	HC2	11	3	1
	HC3	9	1	15
	IR2	2	1	1
	L1	26	12	5

***** Electroshocking was not conducted at monitoring site IR2 in 2017.

APPENDIX I
SITE SUMMARY SHEETS

SITE – HAGGART CREEK (HC1)

UTM Coordinates: E 457967 **N** 7096518 **Watercourse Name:** Haggart Creek

Surveyed Length (m): 225 **Survey date:** September 6, 2019

Baseline Fish-bearing Status: Fish-bearing

UPSTREAM VIEW

DOWNSTREAM VIEW

BIOPHYSICAL DATA

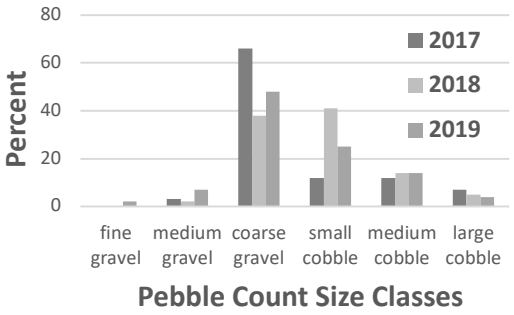
Mean channel width (m): 9.8
Mean wetted width (m): 7.4
Channel gradient (%): 1.0

Air temperature (°C): 14.0
Water temperature (°C): 4.3
Stage: Low
Turbidity: Clear
Conductivity ($\mu s/\mathrm{cm}$): 430
pH: 7.6

Fish cover: Moderate (15%)
Functioning LWD: Few
Dominant cover types: DP, U
Subdominant cover types: SWD, OV
Residual pool depth (m): 0.6
Crown closure (%): 0

Habitat types: Riffle, rapids and pool
Dominant surrounding land use: Forest
RB riparian vegetation: Grasses and shrubs
LB riparian vegetation: Grasses and shrubs

SUBSTRATE



Embeddedness (%): 50
Interstitial material (cm): 0.1-0.2
Periphyton thickness (mm): 1.0-5.0

MORPHOLOGY
Channel pattern: Irregular meandering
Confinement: Unconfined
Disturbance indicators: EBr, AC, MC, EBa

FISH
Sampling method(s): Electrofishing (single pass), minnow trapping and angling
Fish captured: Arctic grayling, burbot, Chinook salmon and slimy sculpin

SITE – HAGGART CREEK (HC2)

UTM Coordinates: E 458085 **N** 7101152 **Watercourse Name:** Haggart Creek

Surveyed Length (m): 175 **Survey date:** September 7, 2019

Baseline Fish-bearing Status: Fish-bearing

UPSTREAM VIEW

DOWNSTREAM VIEW

BIOPHYSICAL DATA

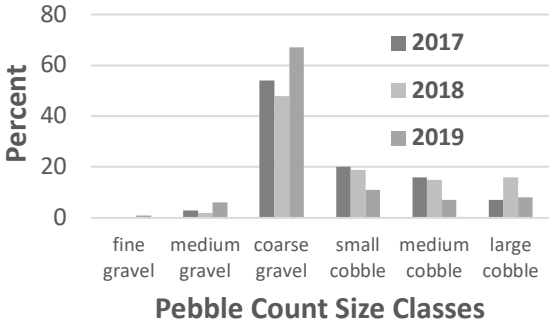
Mean channel width (m): 10.0
Mean wetted width (m): 5.6
Channel gradient (%): 1.4

Air temperature (°C): 7.0
Water temperature (°C): 2.7
Stage: Low
Turbidity: Clear
Conductivity ($\mu s/cm$): 410
pH: 8.1

Fish cover: Moderate (5%)
Functioning LWD: None
Dominant cover types: U, DP
Subdominant cover types: OV, B, SWD
Residual pool depth (m): 0.4
Crown closure (%): 0

Habitat types: Riffle, rapids and pool
Dominant surrounding land use: Forest, mining
RB riparian vegetation: Grasses and shrubs
LB riparian vegetation: Grasses and shrubs

SUBSTRATE



Embeddedness (%): 63
Interstitial material (cm): 0.2-1.6
Periphyton thickness (mm): 0.5-1.0

MORPHOLOGY
Channel pattern: Sinuous
Confinement: Frequently confined
Disturbance indicators: AC, MC, EBr, EBk

FISH
Sampling method(s): Electrofishing (single pass) and minnow trapping
Fish captured: Arctic grayling and slimy sculpin

SITE – HAGGART CREEK (HC3)

UTM Coordinates: E 458427 **N** 7101584 **Watercourse Name:** Haggart Creek

Surveyed Length (m): 160 **Survey date:** September 7, 2019

Baseline Fish-bearing Status: Fish-bearing

UPSTREAM VIEW

DOWNSTREAM VIEW

BIOPHYSICAL DATA

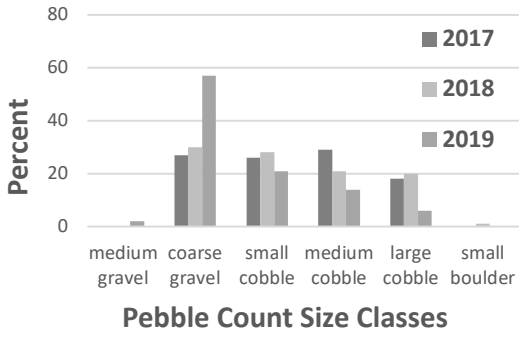
Mean channel width (m): 5.7
Mean wetted width (m): 4.2
Channel gradient (%): 1.1

Air temperature (°C): 20.0
Water temperature (°C): 7.0
Stage: Low
Turbidity: Clear
Conductivity ($\mu s/\mathrm{cm}$): 380
pH: 8.1

Fish cover: Moderate (10%)
Functioning LWD: None
Dominant cover types: B, U
Subdominant cover types: OV
Residual pool depth (m): 0.4
Crown closure (%): 0

Habitat types: Riffle, rapids and straight run
Dominant surrounding land use: Forest
RB riparian vegetation: Shrubs
LB riparian vegetation: Shrubs

SUBSTRATE



Embeddedness (%): 63
Interstitial material (cm): 0.2-1.6
Periphyton thickness (mm): 0.5-1.0

MORPHOLOGY
Channel pattern: Sinuous
Confinement: Occasionally confined
Disturbance indicators: None

FISH
Sampling method(s): Electrofishing (single pass) and minnow trapping
Fish captured: Arctic grayling, Chinook salmon and slimy sculpin

SITE – IRONRUST CREEK (IR2)

UTM Coordinates: E 458005 **N** 7103153 **Watercourse Name:** Ironrust Creek

Surveyed Length (m): 100 **Survey date:** September 8, 2019

Baseline Fish-bearing Status: Fish-bearing

UPSTREAM VIEW

DOWNSTREAM VIEW

BIOPHYSICAL DATA

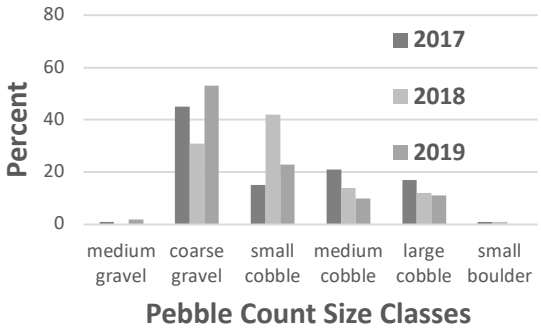
Mean channel width (m): 3.5
Mean wetted width (m): 2.5
Channel gradient (%): 2.9

Air temperature (°C): 4.3
Water temperature (°C): 1.5
Stage: Low
Turbidity: Clear
Conductivity ($\mu s/\mathrm{cm}$): 300
pH: 8.2

Fish cover: Moderate (5%)
Functioning LWD: None
Dominant cover types: B, OV
Subdominant cover types: U
Residual pool depth (m): <0.2
Crown closure (%): 0

Habitat types: Riffle and rapids
Dominant surrounding land use: Forest
RB riparian vegetation: Shrubs
LB riparian vegetation: Shrubs

SUBSTRATE



Embeddedness (%): 50
Interstitial material (cm): 0.2-1.6
Periphyton thickness (mm): 0.5-1.0

MORPHOLOGY
Channel pattern: Sinuous
Confinement: Frequently confined
Disturbance indicators: EBk

FISH
Sampling method(s): Minnow trapping
Fish captured: Chinook salmon and slimy sculpin

SITE – LYNX CREEK (L1)

UTM Coordinates: E 458003 **N** 7095825 **Watercourse Name:** Lynx Creek

Surveyed Length (m): 100 **Survey date:** September 6, 2019

Baseline Fish-bearing Status: Fish-bearing

UPSTREAM VIEW

DOWNSTREAM VIEW

BIOPHYSICAL DATA

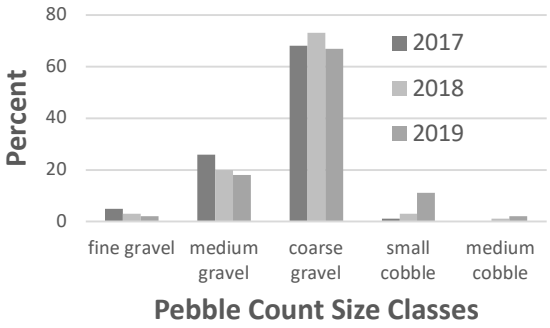
Mean channel width (m): 7.0
Mean wetted width (m): 5.3
Channel gradient (%): 0.1

Air temperature (°C): 14.0
Water temperature (°C): 4.3
Stage: Low
Turbidity: Clear
Conductivity ($\mu s/\mathrm{cm}$): 430
pH: 7.6

Fish cover: Moderate (20%)
Functioning LWD: Few
Dominant cover types: DP, U
Subdominant cover types: SWD, OV
Residual pool depth (m): 0.7
Crown closure (%): 0

Habitat types: Riffle, straight run and pool
Dominant surrounding land use: Forest
RB riparian vegetation: Grasses and shrubs
LB riparian vegetation: Grasses and shrubs

SUBSTRATE



Embeddedness (%): 44
Interstitial material (cm): < 0.1
Periphyton thickness (mm): 0.1-0.2

MORPHOLOGY
Channel pattern: Irregular meandering
Confinement: Unconfined
Disturbance indicators: None

FISH
Sampling method(s): Electrofishing (single pass), minnow trapping and angling
Fish captured: Arctic grayling and slimy sculpin

APPENDIX II
FISH MORPHOMETRIC DATA

APPENDIX II Length and weight data of fish captured at monitoring sites within drainages associated with the Eagle Gold Project, September 2019.

Monitoring Site	Species	Length (mm)	Weight (gm)
HC1	AG	67	2.9
HC1	AG	68	2.7
HC1	AG	69	7.2
HC1	AG	70	3.0
HC1	AG	70	2.9
HC1	AG	73	3.9
HC1	AG	73	3.3
HC1	AG	73	3.9
HC1	AG	73	3.4
HC1	AG	73	2.9
HC1	AG	74	4.3
HC1	AG	74	3
HC1	AG	74	3.3
HC1	AG	77	3.8
HC1	AG	78	4.6
HC1	AG	80	5.2
HC1	AG	85	4.8
HC1	BB	245	89.6
HC1	CH	67	3.9
HC1	CH	69	4.3
HC1	CH	72	3.4
HC1	CH	75	5.5
HC1	CH	80	5.3
HC1	CH	81	5.6
HC1	SS	62	2.0
HC1	SS	62	2.4
HC1	SS	66	3.0
HC1	SS	74	3.4
HC1	SS	75	3.6
HC1	SS	77	4.0
HC1	SS	77	4.5
HC1	SS	78	3.9
HC1	SS	81	4.5
HC1	SS	83	5.0
HC1	SS	89	7.2
HC1	SS	90	8.2
HC1	SS	91	9.2
HC2	AG	72	3.9
HC2	AG	74	4.2
HC2	AG	77	4.7
HC2	SS	77	4.0
HC3	AG	77	5.0
HC3	AG	79	4.8

Monitoring Site	Species	Length (mm)	Weight (gm)
HC3	CH	65	3.7
HC3	CH	75	5.6
HC3	CH	78	5.5
HC3	SS	50	1.2
HC3	SS	57	1.9
HC3	SS	67	2.5
HC3	SS	72	3.5
HC3	SS	72	3.4
HC3	SS	73	3.5
HC3	SS	73	3.6
HC3	SS	74	3.6
HC3	SS	79	6.0
HC3	SS	82	6.2
HC3	SS	87	7.4
HC3	SS	104	11.1
HC3	SS	109	13.8
HC3	SS	120	16.3
HC3	SS	125	17.5
IR2	CH	72	5.0
IR2	SS	102	12.8
L1	AG	78	6.0
L1	AG	365	-
L1	SS	68	3.0
L1	SS	68	3.0
L1	SS	74	5.4
L1	SS	82	5.9
L1	SS	83	6.4
L1	SS	83	6.3

AG = Arctic grayling BB = burbot CH = Chinook Salmon SS = slimy sculpin

APPENDIX III
DFO COLLECTION PERMIT

Fisheries and Oceans Canada | Pêches et Océans Canada

Licence Number: XR 299 2019
Valid From: 20-Aug-2019
Expiry Date: 31-Oct-2019

This licence and/or permit is issued under the authority of SECTION 52 OF THE FISHERY (GENERAL) REGULATIONS.

This licence and/or permit authorizes the person(s) listed below, subject to the following terms and conditions, to collect the species and quantity of fish identified below for: Scientific purposes. Non-compliance with any condition of this licence and/or permit may result in the cancellation of this licence and/or permit.

Licence/Permit Activity Description:
To sample fish within various tributaries associated with Haggart Creek to monitor fish presence/absence/utilization and population density.

Licence Holder:
FIN: 125575

CAN-NIC-A-NICK
ENVIRONMENTAL SERVICES

BOX 10106, 138 ARCTIC DRIVE
WHITEHORSE YT Y1A 7A1

Contact Number: 867-668-4682

Contact Party:
FIN: 125576 DE GRAFF, NICHOLAS Contact Number: 867-335-4099

Individuals or groups assisting with the authorized activity:

Any additional assistants not listed below, must be named as part of the notification prior to sampling. Detailed information requirements is found under conditions of this licence.

FIN: 125576	NICHOLAS DE GRAFF	Contact Number: 867-335-4099
FIN: 129960	JOE DE GRAFF	Contact Number: 867-668-4682
FIN: 142042	CRYSTAL DAWN	Contact Number: 867-335-4099

Species, Quantity of Fish, Area(s) and Gear:

Species:	CHINOOK SALMON (Oncorhynchus tshawytscha); NORTHERN PIKE (Esox lucius); SLIMY SCULPIN (Cottus cognatus); ARCTIC GRAYLING (Thymallus arcticus); ARCTIC LAMPREY (Lampetra camtschatica); BURBOT (Lota lota);
Gear:	Seine Net, Beach Rod & Reel (unspecified) Electroshocker (Maximum Second per Site: 600 Seconds) Trap, Gee/Minnow (Set Duration Max: 24 Hours)
Licence Area:	Yukon/Transboundary: Haggart Creek - inc tributaries of (Watershed code: 83199973027969)
To be Retained:	0
Additional Descriptions:	Note: as per conditions of this licence electrofishing is not permited in the vicinity of spawning fish or their redds. Electrofishing activities will cease if spawning-condition fish are encountered.

Fisheries and Oceans Canada | Pêches et Océans Canada

Licence Number: XR 299 2019
Valid From: 20-Aug-2019
Expiry Date: 31-Oct-2019

Reporting Requirements:

XR 299 2019 Data Report **Due Date** 31-Dec-19
See "Terms and Conditions" of this licence for detailed reqirements.

Terms and Conditions:

This licence authorizes collections to be made by the licensee and employees, volunteers and students of the licensee provided that all persons, other than minors who are engaged in activities under the authority of this licence, are carrying suitable photo identification to be produced upon request of a Fishery Officer or Guardian.

This license is subject to immediate termination upon written or verbal notice from a representative of the Yukon Government- Department of Environment, or of Fisheries and Oceans Canada.

Samplers: It is the responsibility if the license holder to ensure that samplers are experienced and competent in the fish collection methods authorized in this license.

Need to carry and produce permit: A copy of this license must be in the immediate possession of the samplers during sampling, and must be produced upon the request of any representative designated as a Fishery Officer or Fishery Guardian pursuant to the Fisheries Act (Canada).

Notice: Prior to commencing sampling, notice is to be given to:

• Fisheries and Oceans Canada, Yukon/Transboundary Rivers Area - Tel: (867) 393-6722 Fax (867) 393-6738 or Email: YTLicence@dfo-mpo.gc.ca

• YG Fisheries - Email: fisheries@gov.yk.ca

• Appropriate First Nation Government in whose Traditional Territory the activity is taking place.

The notice is to include following information:
i. The Collection License number,
ii. The watercourse or water body on which, and the location where the sampling is to take place,
iii. The dates on which sampling will occur
iv. The names of all assistants which will be engaged in the sampling.

• Note: Notice is also to be given to the Government of Yukon Conservation Officer responsible for any area where sampling is to take place at least 24 hours prior to the start of sampling.

Release of fish: All live fish must be released unharmed into the water body or course from which they originated and as near as possible to the location from which they were captured. Exception to this is where fish are retained for identification or forensic purposes.

Electrofishing: Is not permitted in the vicinity of spawning fish or their redds. A trained and certified electrofisher operator must be a part of the electrofishing crew.

Gear: All gear left unattended must be clearly labelled with the Licence Number and must not interfere with the public right of navigation.

Aquatic Invasive Species To prevent the introduction of aquatic invasive species there are a few simple things that

can be considered: a) Before leaving an area: Drain water from boat, trailer and gear, remove all plant parts and mud and b) Before entering another water body: Wash all your gear including waders with soapy water. For Further Information:
http://www.dfo-mpo.gc.ca/species-especes/index-eng.htm,
http://www.dfo-mpo.gc.ca/science/environmental-environnement/ais-eae/publications/plan/page01-eng.html

Disposition of fish: Any fish captured and retained under the authority of this license are not to enter any commercial markets or establishments. Any fish collected and retained, or incidental mortalities associated with non-lethal sampling, are not to be utilized for human consumption or personal use purposes unless authorized by Fisheries & Oceans Canada.

Species at Risk: Section 32 (1) of the federal Species at Risk Act prohibits killing, harming, harassing, capturing or taking an individual of a wildlife species which is listed on Schedule 1 as an extirpated species, an endangered species or a threatened species. Refer to the SARA Public Registry at http://www.sararegistry.gc.ca to determine if species at risk may be in your research area and to apply for a permit if required.

Transport or transplant of live fish and/or eggs/milt: Live fish and/or eggs (spawn) cannot be transported without prior written approval of the transplant committee or transplanted without a licence granted pursuant to Section 56 of the Fishery (General) Regulations.

Report: A report must be submitted after completion of sampling, in electronic spreadsheet form as provided by email with permit. The report must be in the form of the spreadsheet provided but is not limited to and may also include photocopied data sheets or field notes, or the final report for the project, and must include the following:

a. The Collection License number
b. The location(s) of the sampling with GPS coordinates (lat & long decimal degrees), where GPS coordinates were not possible a map or detailed described may be submitted;
c. Names of all individuals engaged in sampling;
d. The dates on which the sampling occurred;
e. The number of fish sampled, by species;
f. Any mortalities

If no sampling takes place a "nil report" is required in the form of a letter or identified in the mandatory spreadsheet provided.
A summary report is to be submitted by December 31, 2019 to:

Area Licensing Manager
Fisheries and Oceans Canada
100-419 Range Rd
Whitehorse Yukon
Y1A 3V1
Email: YTLicence@dfo-mpo.gc.ca

By signing on this document, the person(s) listed below, agree to be bound by the terms and conditions that pertain to each person as an individual and to the group as a whole.

Fisheries and Oceans Canada | Pêches et Océans Canada

Licence Number: XR 299 2019
Valid From: 20-Aug-2019
Expiry Date: 31-Oct-2019

125575	Nicholas de Graff		22-Aug-2019
FIN	Licence Holder - Print Name	Signature	Date

Licence Issued: 22 August 2019

Licence Printed: 22 August 2019
Licence Issued By: LOUISE NAYLOR, Fisheries and Oceans Canada