Photo 19: Nulahugyuk Creek between Pond 2 and Pond 3, July 10, 2014

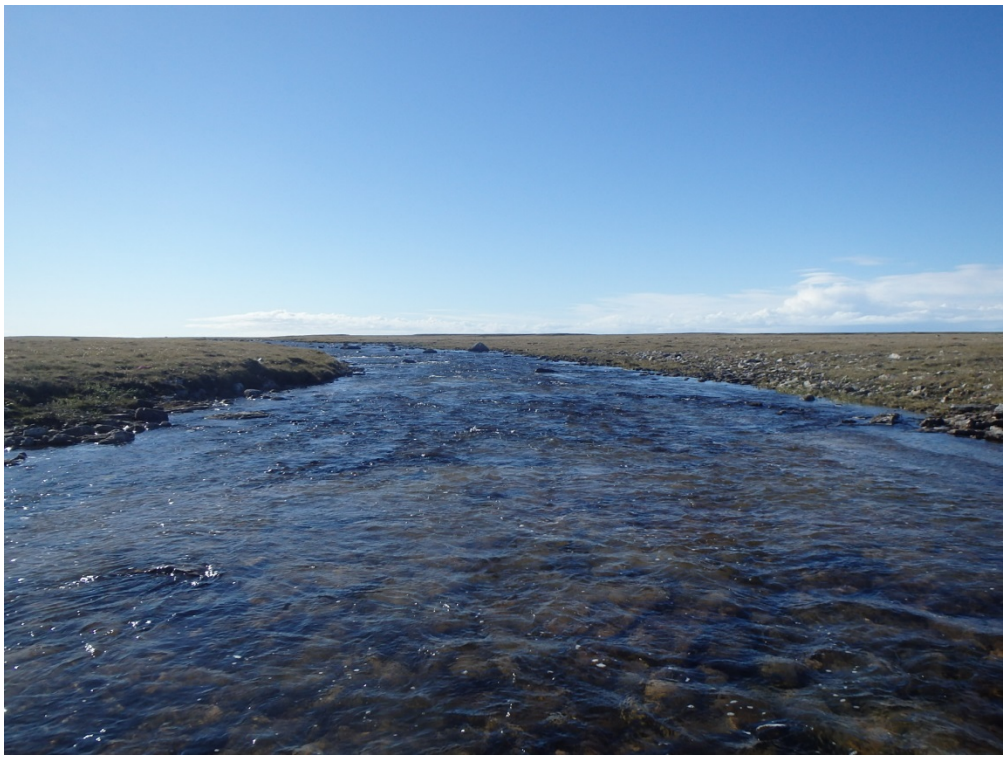


Photo 20: Nulahugyuk Creek between Pond 2 and Pond 3, July 10, 2014

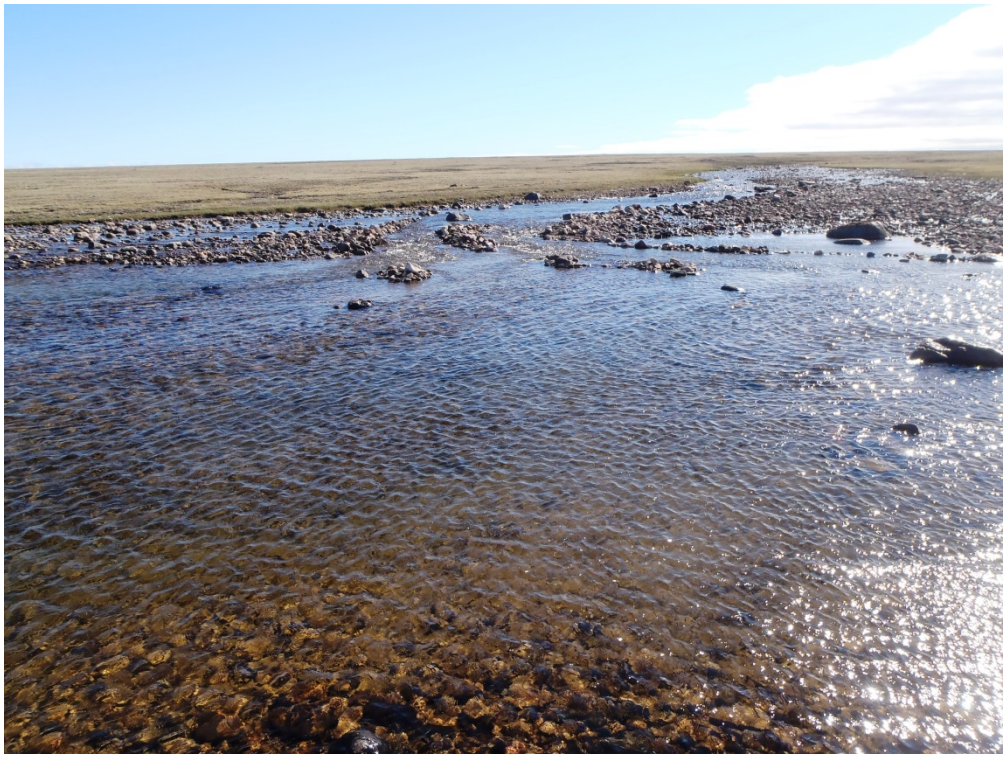


Photo 21: 2012 Low-Flow Project 2, Looking Upstream, July 18, 2014

Photo 22: 2012 Low-Flow Project 2, Looking Upstream, July 18, 2014

Photo 23: 2012 Low-Flow Project 2, Looking Downstream, July 18, 2014

Photo 24: 2012 Low-Flow Project 3, Looking Upstream, July 18, 2014

Photo 25: 2012 Low-Flow Project 3, Looking Downstream, July 18, 2014

Photo 26: View of Golder Aquatic Biologist and Kugluktuk student measuring water velocity in Nulahugyuk Creek, June 2014

APPENDIX B

Habitat Classification System

January 2015
Report No. 14-1373-0004

STREAM HABITAT CLASSIFICATION SYSTEM

(Modified from O'Neil and Hildebrand 1986)

Riffle - Portion of channel with increased velocity relative to Run and Pool habitat types; broken water surface due to effects of submerged or exposed bed materials; relatively shallow (less than 0.25 m) during moderate to low flow periods.

Riffle (RF) - Typical riffle habitat type; limited submerged or overhead cover for juveniles and adult life stages; coarse substrate

Riffle-Boulder Garden (RF/BG) - Riffle habitat type with significant occurrence of large boulders; availability of significant instream cover for juveniles (to lesser extent adults) at moderate to high flow events.

Rapids (RA) - Portion of channel with highest velocity relative to other habitat types. Deeper than Riffle (ranging from 0.25 m to 0.5 m); often formed by channel constriction. Substrate extremely coarse; dominated by large cobble and boulder material. Instream cover provided in pocket eddies (P3) and associated with cobble/boulder substrate.

Run - Portion of channel characterized by moderate to high current velocity relative to Pool and Flat habitat; water surface largely unbroken. Deeper than Riffle habitat type.

> **Run Class 1 (R1)** - Highest quality Run habitat type. Maximum depth exceeding 1.5 m; average depth 1.0 m. High instream cover at all flow conditions (submerged boulders/bedrock fractures, depth). Generally of deep-slow type (to lesser extent deep-fast) and situated proximal to upstream food production area (i.e., RF, R3).
>
> **Run Class 2 (R2)** - Moderate quality Run habitat type. Maximum depth reaching or exceeding 1.0 m, generally exceeding 0.75 m. High instream cover during all but low flow events (baseflow). Generally of either deep-fast type or moderately deep-slow type.
>
> **Run Class 2 / Boulder Garden (R2/BG)** - Moderate quality Run habitat type; presence of large boulders in channel; high instream cover (boulder, bedrock fractures, turbulence) at all but low-flow events (baseflow). Depth characteristics similar to R2; however, required maximum depth lower due to cover afforded by boulders.
>
> **Run Class 3 (R3)** - Lowest quality Run habitat type. Maximum depth of 0.75 m, but averaging <0.50 m. Low instream cover at all but high flow events.
>
> **Run Class 3 / Boulder Garden (R3/BG)** - Similar to R3 in depth and velocity characteristics; presence of large boulders in channel offers improved instream cover during moderate and high flow events.

Flat - Area of channel characterized by low current velocities (relative to RF and Run cover types); near-laminar (i.e., non-turbulent) flow character. Depositional area featuring predominantly sand/silt substrate. Differentiated from Pool habitat type on basis of high channel uniformity and lack of direct riffle/run association. More depositional in nature than R3 habitat (sand/silt substrate, lower food production, low cover).

Flat Class 1 (F1) - High quality Flat habitat type. Maximum depth exceeding 1.5 m; average depth 1.0 m or greater.

Flat Class 2 (F2) - Moderate quality Flat habitat type. Maximum depth exceeding 1.0 m; generally exceeding 0.75 m.

Flat Class 3 (F3) - Low quality Flat habitat type. Maximum depth of 0.75 m, averaging less than 0.50 m.

Pool - Discrete portion of channel featuring increased depth and reduced velocity (downstream oriented) relative to Riffle and Run habitat types; formed by channel scour.

Pool Class 1 (P1) - Highest quality Pool habitat type. Maximum depth exceeding 1.5 m; average depth 1.0 m or greater; high instream cover at all flow-conditions (submerged boulder, bedrock fractures, depth, bank irregularities). Generally featuring high Riffle and/or Run association (i.e., food input). Often intergrades with deep-slow type of R1.

Pool Class 2 (P2) - Moderate quality Pool habitat type. Maximum depth reaching or exceeding 1.0 m, generally exceeding 0.75 m. High instream cover at all but low flow events (baseflow).

Pool Class 3 (P3) - Low quality pool habitat type. Maximum depth of 0.75 m, averaging <0.50 m. Low instream cover at all but high flow events. Includes small pocket eddy type habitat.

Impoundment - Pools formed behind dams; tend to accumulate sediment/organic debris more than scour pools; may have cover associated with damming structure.

Impoundment Class 1 (IP1) - Maximum depth exceeding 1.5 m; average depth 1.0 m or greater.

Impoundment Class 2 (IP2) - Maximum depth reaching or exceeding 1.0 m, average depth generally exceeding 0.75 m.

Impoundment Class 3 (IP3) - Maximum depth of 0.75 m, averaging <0.50 m.

Backwater (BW) - Discrete, localized area of variable size, exhibiting reverse flow direction; generally produced by bank irregularities; velocities variable but generally lower than the main flow; substrate similar to adjacent channel, but with higher proportion of fines.

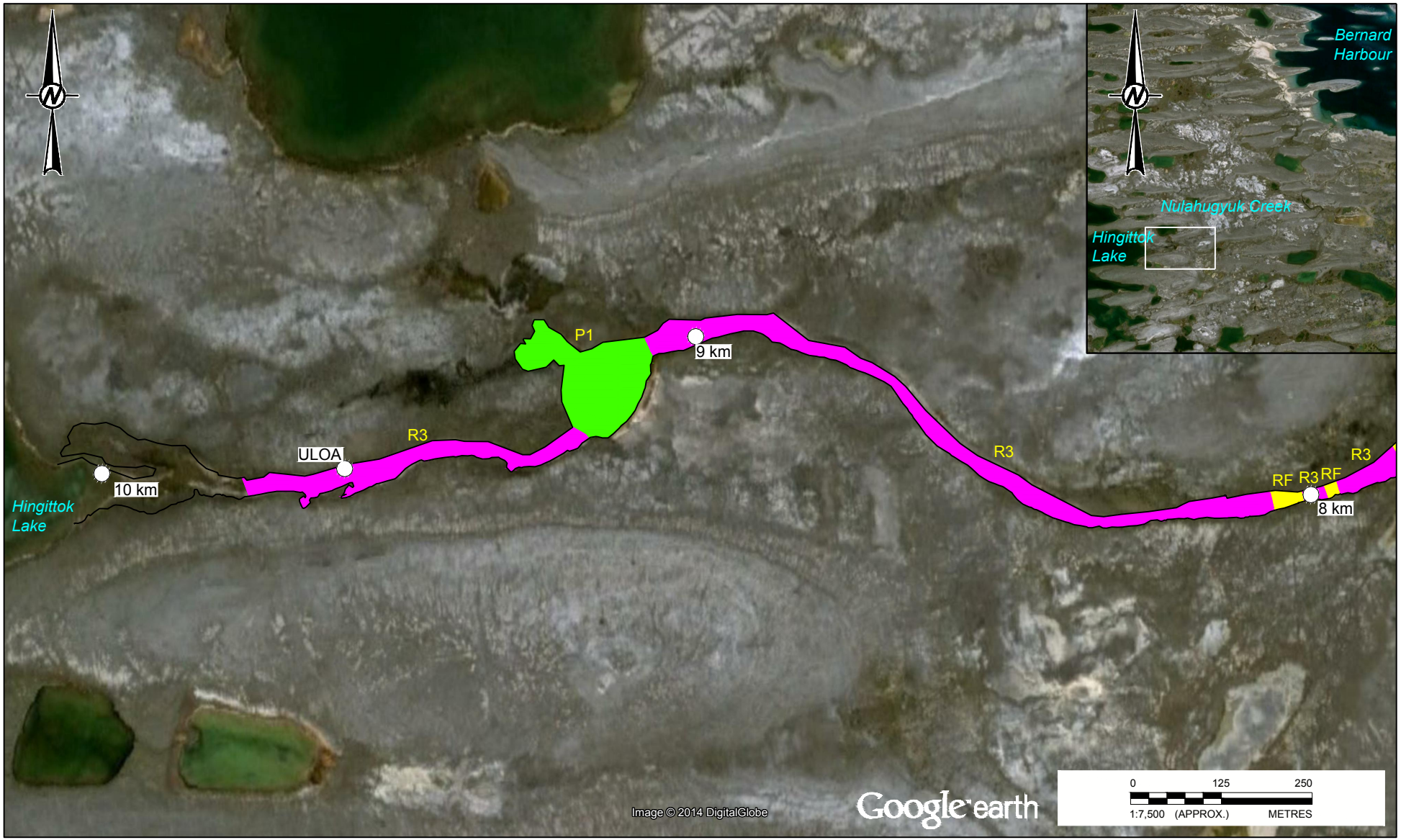
References

O'Neil, J. and L. Hildebrand. 1986. Fishery resources upstream of the Oldman River Dam. Prepared for Alberta Environment, Planning Division. R.L. & L. Report No. 181: 131 p. + 7 appendices.

APPENDIX C

Habitat Map of Nulahugyuk Creek (July 10 to 14, 2014)

January 2015
Report No. 14-1373-0004



LEGEND

RA	Rapids; Very Swift, Deep, With Cover
RF	Riffle; Swift, Shallow, Turbulent
R1	Class 1 Run; Moderately Swift, Deep With Cover
R2	Class 2 Run; Moderately Swift, Moderate Depth and Cover
R3	Class 3 Run; Moderately Swift, Shallow, Limited Cover
P1	Class 1 Scour Pool; Slow, Deep
P2	Class 2 Scour Pool; Slow, Moderate Depth

REFERENCE(S)

IMAGE OBTAINED FROM GOOGLE EARTH, USED UNDER LICENSE.
IMAGERY DATE: AUGUST 21, 2006. GOOGLE EARTH IMAGE IS NOT TO SCALE.
DATUM: NAD83 PROJECTION: UTM ZONE 11.

CLIENT
SABINA GOLD AND SILVER CORP.

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-01-26
PREPARED	AW
DESIGN	KN
REVIEW	JPO
APPROVED	CES

PROJECT
BERNARD HARBOUR PROJECT -
ARCTIC CHAR RUN BASELINE STUDY

TITLE
NULAHUGYUK CREEK HABITAT AS OF JULY 10-14, 2014 - 10 km to 8 km

PROJECT No.	CONTROL	Rev.	FIGURE
1413730004	2200-RF-0001	A	C1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
0 25 mm