

Site Description

Study Name	CBWQ-Elk
Site	NGALX-03
Sampling Date	Sep 12 2016
Know Your Watershed Basin	Central Kootenay
Province / Territory	British Columbia
Terrestrial Ecological Classification	Montane Cordillera EcoZone Northern Continental Divide EcoRegion
Coordinates (decimal degrees)	49.65544 N, 114.73069 W
Altitude	4278
Local Basin Name	Alexander Creek
	Elk River Watershed
Stream Order	4

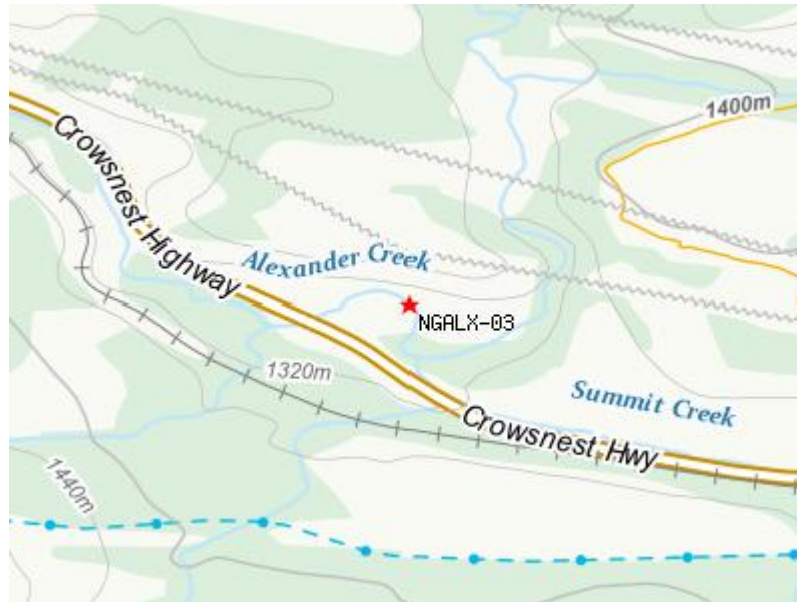


Figure 1. Location Map



Across Reach



Down Stream

Field Crew: Ayla, Masha, Beth Site Code: ALX-03
Sampling Date: (DD/MM/YYYY) 12/09/2016

Occupational Health & Safety: Site Inspection Sheet completed

PRIMARY SITE DATA
CABIN Study Name: NGALX-03 Local Basin Name: Elk River Watershed
River/Stream Name: Alexander Creek Stream Order (map scale 1:50,000): 4

Select one: Test Site Potential Reference Site

Geographical Description/Notes
Site 3 on Alexander Creek

Surrounding Land Use: (check those present) Information Source: visual/local knowledge
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other hwy 3, rifle range

Dominant Surrounding Land Use: (check one) Information Source:
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other

Location Data
Latitude: 47°37'46"N Longitude: -114°49'55"W (DMS or DD)
Elevation: 150ft (feet or meters) GPS Datum: GRS80 (NAD83/WGS84) Other

Site Location Map Drawing

The map drawing shows a stream flowing from left to right. A road labeled 'range access rd' crosses the stream. A 'kick-net area' is marked with two arrows pointing to the stream. A 'y-sect' is marked with a vertical line across the stream. 'XWD samples' are marked with an 'X' on the stream. A 'rifle range' and 'bank erosion' are marked on the right bank. A 'meter' is marked on the stream. A 'parking' area is marked on the right bank. A north arrow is in the top left. A note says 'Note: Indicate north'. The flow direction is indicated by an arrow labeled 'flow'.

CABIN Field Sheet June 2012 Page 1 of 6

CABIN
Agriculture & Forestry

Field Sheet



Up Stream

Cabin Assessment Results

Reference Model Summary					
Model	Columbia-Okanagan Preliminary March 2010				
Analysis Date	February 21, 2017				
Taxonomic Level	Family				
Predictive Model Variables	Depth-Avg Latitude Longitude Reg-Ice Reg-SlopeLT30%				
Reference Groups	1	2	3	4	5
Number of Reference Sites	9	43	17	12	33
Group Error Rate	22.2%	24.5%	22.2%	25.0%	32.4%
Overall Model Error Rate	26.4%				
Probability of Group Membership	0.1%	0.2%	85.9%	12.3%	1.5%
CABIN Assessment of NGALX-03 on Sep 12, 2016	Similar to Reference				

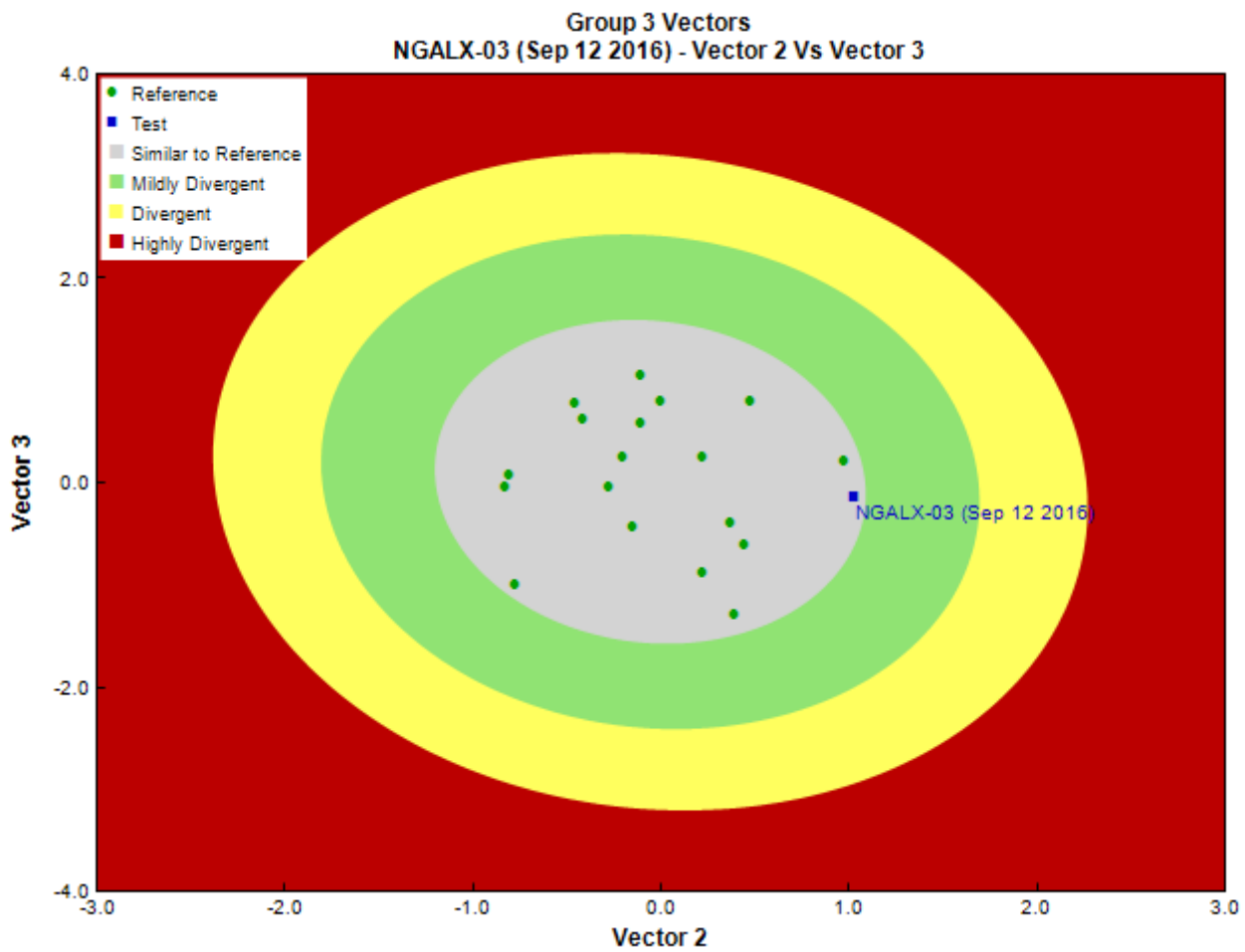


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	Pina Viola, Consultant
Date Taxonomy Completed	October 24, 2016
	Marchant Box
Sub-Sample Proportion	6/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count	
Arthropoda	Arachnida	Trombidiformes		1	16.7	
			Hygrobatidae	1	16.7	
			Lebertiidae	2	33.3	
			Sperchontidae	1	16.7	
	Insecta	Coleoptera	Diptera	Elmidae	7	116.7
				Ceratopogonidae	3	50.0
		Chironomidae	Empididae	1	16.7	
			Psychodidae	17	283.3	
			Simuliidae	1	16.7	
			Tipulidae	1	16.7	
			Ephemeroptera	Ameletidae	2	33.3
				Baetidae	50	833.3
				Ephemerellidae	112	1,866.7
				Heptageniidae	44	733.3

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
		Plecoptera	Chloroperlidae	11	183.3
			Leuctridae	5	83.3
			Nemouridae	17	283.3
			Perlodidae	5	83.4
			Taeniopterygidae	4	66.7
		Trichoptera	Apataniidae	4	66.7
			Brachycentridae	1	16.7
			Glossosomatidae	81	1,350.0
			Hydropsychidae	2	33.4
			Rhyacophilidae	10	166.7
			Uenoidae	4	66.7
			Total	426	7,100.3

Metrics

Name	NGALX-03	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.58	0.4 \pm 0.2
Biotic Indices		
Intolerant taxa	--	
Long-lived taxa	2.0	1.9 \pm 1.3
Tolerant individuals (%)	--	0.3
Number Of Individuals		
% EPT Individuals	82.8	84.9 \pm 14.3
No. EPT individuals/Chironomids+EPT Individuals	0.9	0.9 \pm 0.1
Total Abundance	7100.0	5780.5 \pm 4895.3
Richness		
EPT Individuals (Sum)	5866.7	4527.1 \pm 3161.8
EPT taxa (no)	15.0	11.5 \pm 1.2
Total No. of Taxa	25.0	17.7 \pm 2.6

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites					Probability Of Occurrence at NGALX-03
	Group 1	Group 2	Group 3	Group 4	Group 5	
Ameletidae	56%	53%	22%	50%	68%	0.26
Apataniidae	22%	24%	28%	25%	3%	0.27
Athericidae	0%	2%	0%	17%	0%	0.02
Aturidae	0%	8%	0%	0%	0%	0.00
Baetidae	100%	100%	100%	100%	97%	1.00
Blephariceridae	0%	0%	0%	0%	5%	0.00
Brachycentridae	11%	69%	0%	42%	3%	0.05
Capniidae	78%	55%	50%	92%	68%	0.55
Ceratopogonidae	0%	55%	28%	42%	5%	0.29
Chironomidae	100%	100%	100%	100%	95%	1.00
Chloroperlidae	78%	88%	94%	100%	100%	0.95
Corixidae	11%	0%	0%	0%	0%	0.00
Curculionidae	0%	4%	0%	0%	0%	0.00
Deuterophlebiidae	0%	0%	0%	0%	3%	0.00
Dixidae	0%	10%	0%	0%	0%	0.00
Dytiscidae	0%	8%	6%	0%	0%	0.05
Elmidae	0%	86%	50%	50%	5%	0.49
Empididae	67%	55%	50%	67%	57%	0.52
Enchytraeidae	11%	14%	0%	8%	0%	0.01
Ephemerellidae	78%	100%	100%	100%	100%	1.00
Ephydriidae	0%	2%	0%	0%	0%	0.00
Glossosomatidae	11%	49%	39%	42%	35%	0.39
Heptageniidae	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	4%	0%	0%	0%	0.00
Hydrophilidae	11%	2%	0%	0%	0%	0.00
Hydropsychidae	11%	92%	78%	92%	86%	0.80
Hydroptilidae	11%	8%	0%	0%	0%	0.00
Hydrozetidae	0%	10%	17%	8%	16%	0.16

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites					Probability Of Occurrence at NGALX-03
	Group 1	Group 2	Group 3	Group 4	Group 5	
Hydryphantidae	11%	31%	11%	8%	8%	0.11
Hygrobatiidae	0%	29%	0%	0%	11%	0.00
Lebertiidae	78%	65%	39%	58%	5%	0.41
Lepidostomatidae	0%	53%	6%	17%	8%	0.07
Leptohephidae	0%	2%	0%	0%	0%	0.00
Leptophlebiidae	0%	90%	11%	33%	3%	0.14
Leuctridae	22%	43%	56%	67%	54%	0.57
Limnephilidae	22%	31%	6%	25%	41%	0.09
Limnesiidae	0%	2%	0%	0%	0%	0.00
Lumbriculidae	0%	20%	17%	25%	3%	0.17
Mideopsidae	0%	2%	0%	0%	0%	0.00
Naididae	0%	6%	39%	0%	3%	0.33
Nemouridae	100%	100%	100%	100%	100%	1.00
Pelecophryniidae	0%	22%	6%	0%	0%	0.05
Peltoperlidae	22%	12%	6%	8%	41%	0.06
Perlidae	11%	84%	33%	100%	3%	0.41
Perlodidae	78%	78%	89%	92%	81%	0.89
Philopotamidae	0%	31%	0%	0%	3%	0.00
Pisidiidae	0%	6%	0%	8%	0%	0.01
Planariidae	0%	8%	67%	17%	3%	0.59
Planorbidae	0%	0%	0%	0%	3%	0.00
Psychodidae	22%	65%	94%	8%	11%	0.82
Pteronarcyidae	0%	12%	6%	0%	3%	0.05
Rhyacophilidae	100%	92%	100%	100%	95%	1.00
Simuliidae	33%	49%	39%	33%	16%	0.38
Sperchontidae	78%	63%	50%	42%	65%	0.49
Stygothrombidiidae	0%	4%	0%	17%	0%	0.02
Taeniopterygidae	89%	49%	100%	92%	97%	0.99
Thaumaleidae	11%	4%	0%	0%	0%	0.00
Tipulidae	56%	55%	28%	67%	43%	0.33
Torrenticolidae	11%	86%	11%	17%	11%	0.12
Tubificidae	0%	2%	0%	0%	0%	0.00
Uenoidae	22%	37%	17%	25%	46%	0.18
Valvatidae	0%	2%	6%	0%	0%	0.05

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.69
RIVPACS : Observed taxa P>0.50	13.00
RIVPACS : O:E (p > 0.5)	1.02
RIVPACS : Expected taxa P>0.70	10.45
RIVPACS : Observed taxa P>0.70	11.00
RIVPACS : O:E (p > 0.7)	1.05

Habitat Description

Variable	NGALX-03	Predicted Group Reference Mean \pm SD
Channel		
Depth-Avg (cm)	29.7	22.5 \pm 10.5
Depth-BankfullMinusWetted (cm)	12.00	67.33 \pm 71.65
Depth-Max (cm)	35.6	32.9 \pm 17.9
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	1.00	0.94 \pm 0.80
Reach-DomStreamsideVeg (Category (1-4))	1	3 \pm 1
Reach-Riffles (Binary)	1	1 \pm 0
Slope (m/m)	0.0096600	0.0235102 \pm 0.0284557
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	1	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.62	0.50 \pm 0.25

Habitat Description

Variable	NGALX-03	Predicted Group Reference Mean \pm SD
Velocity-Max (m/s)	0.83	0.75 \pm 0.28
Width-Bankfull (m)	11.5	15.6 \pm 12.8
Width-Wetted (m)	9.5	10.2 \pm 7.0
XSEC-VelMethod (Category (1-3))	1	2 \pm 1
Landcover		
Reg-Ice (%)	0.00000	0.46949 \pm 1.15785
Substrate Data		
%Bedrock (%)	0	0 \pm 0
%Boulder (%)	5	6 \pm 7
%Cobble (%)	59	61 \pm 27
%Gravel (%)	13	1 \pm 2
%Pebble (%)	19	31 \pm 28
%Sand (%)	3	0 \pm 0
%Silt+Clay (%)	1	0 \pm 1
D50 (cm)	8.75	79.45 \pm 47.98
Dg (cm)	4.8	73.9 \pm 48.0
Dominant-1st (Category(0-9))	6	6 \pm 1
Dominant-2nd (Category(0-9))	7	6 \pm 2
Embeddedness (Category(1-5))	5	4 \pm 1
PeriphytonCoverage (Category(1-5))	3	2 \pm 1
SurroundingMaterial (Category(0-9))	2	3 \pm 1
Topography		
Reg-SlopeLT30% (%)	37.34105	27.92073 \pm 14.83033
Water Chemistry		
Ag (mg/L)	0.0000100	0.0000004 \pm 0.0000014
Al (mg/L)	0.0032000	0.0059500 \pm 0.0039700
As (mg/L)	0.0001100	0.0002175 \pm 0.0001795
B (mg/L)	0.0250000	0.0500000
Ba (mg/L)	0.0661000	0.0639025 \pm 0.0450861
Be (mg/L)	0.0000500	0.0000025 \pm 0.0000062
Bi (mg/L)	0.0005000	0.0000004 \pm 0.0000014
Ca (mg/L)	47.6000000	38.6142857 \pm 14.8464843
Cd (mg/L)	0.0000050	0.0000059 \pm 0.0000067
Chloride-Dissolved (mg/L)	1.1000000	3.5428571 \pm 8.1653449
Co (mg/L)	0.0002500	0.0000043 \pm 0.0000057
CO3 (mg/L)	2.4700000	0.0000000 \pm 0.0000000
Cr (mg/L)	0.0005000	0.0000833 \pm 0.0001403
Cu (mg/L)	0.0002500	0.0001875 \pm 0.0001434
Fe (mg/L)	0.0150000	0.0090000
General-Alkalinity (mg/L)	150.0000000	121.5944444 \pm 36.7225924
General-DO (mg/L)	11.0000000	10.4922222 \pm 0.8833463
General-Hardness (mg/L)	169.0000000	146.8222222 \pm 41.6699011
General-pH (pH)	8.6	8.0 \pm 0.6
General-SolidsTSS (mg/L)	2.0000000	0.5604289 \pm 1.4627232
General-SpCond (μ S/cm)	312.6000000	214.2437500 \pm 77.1891440
General-TempAir (Degrees Celsius)	7.0	10.5 \pm 4.2
General-TempWater (Degrees Celsius)	6.0000000	6.6716667 \pm 2.0277755
General-Turbidity (NTU)	1.3000000	0.0000000 \pm 0.0000000
HCO3 (mg/L)	178.0000000	0.0000000 \pm 0.0000000
Hg (ng/L)	5.0000000	0.0000000 \pm 0.0000000
K (mg/L)	0.3760000	0.6471429 \pm 0.7154652
Li (mg/L)	0.0025000	0.0011817 \pm 0.0004768
Mg (mg/L)	12.3000000	9.8814286 \pm 6.1601202
Mn (mg/L)	0.0015000	0.0011426 \pm 0.0016097
Mo (mg/L)	0.0005000	0.0024883 \pm 0.0065339
Na (mg/L)	1.3400000	2.6357143 \pm 3.7712414
Ni (mg/L)	0.0005000	0.0000808 \pm 0.0000811
Nitrogen-NO2 (mg/L)	0.0025000	0.0023889 \pm 0.0063351
Nitrogen-NO2+NO3 (mg/L)	0.0380000	0.0130000 \pm 0.0088111
Nitrogen-NO3 (mg/L)	0.0380000	0.0245003 \pm 0.0229452
Nitrogen-TN (mg/L)	0.1920000	0.0688889 \pm 0.0759171
Pb (mg/L)	0.0001000	0.0000224 \pm 0.0000176

Habitat Description

Variable	NGALX-03	Predicted Group Reference Mean \pmSD
Phosphorus-OrthoP (mg/L)	0.0025000	0.0035000 \pm 0.0018292
Phosphorus-TP (mg/L)	0.0025000	0.0032778 \pm 0.0061816
S (mg/L)	6.1000000	5.0000000
Sb (mg/L)	0.2500000	0.0000361 \pm 0.0000135
Se (mg/L)	0.0006000	0.0004382 \pm 0.0004486
Si (mg/L)	2.3100000	3.0657143 \pm 1.4070046
Sn (mg/L)	0.0025000	0.0000167 \pm 0.0000078
SO4 (mg/L)	17.3000000	14.9647059 \pm 10.8432549
Sr (mg/L)	0.1100000	0.1159167 \pm 0.0982749
Ti (mg/L)	0.0025000	0.0009000
Tl (mg/L)	0.0000250	0.0000038 \pm 0.0000064
U (mg/L)	0.0005800	0.0005298 \pm 0.0003220
V (mg/L)	0.0025000	0.0001642 \pm 0.0001203
Zn (mg/L)	0.0025000	0.0004083 \pm 0.0008361
Zr (mg/L)	0.0002500	0.0000000 \pm 0.0000000