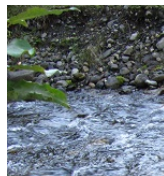


Site Description

| | |
|--|--|
| Study Nam | CBWQ-Arrow |
| Site | NEMCD01 |
| Sampling Date | Sep 28 2015 |
| Know Your Watershed (KYW) Basin | Central Columbia |
| Province / Territory | British Columbia |
| Terrestrial Ecological Classification | Montane Cordillera EcoZone Columbia Mountains and Highlands EcoRegion |
| Coordinates (decimal degrees) | 50.14500 N, 117.79389 W |
| Altitude | 1545 |
| Local Basin Name | McDonald Ck. |
| | Columbia River |
| Stream Order | 4 |



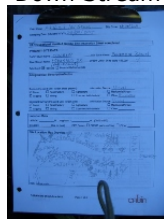
Figure 1. Location Map



Across Reach
Aerial (No image found)



Down Stream



Field Sheet
Miscellaneous (No image found)



Substrate



Up Stream

Cabin Assessment Results

| Reference Model Summary | | | | | |
|--|---|----------|----------|----------|----------|
| Model | Columbia-Okanagan Preliminary March 2010 | | | | |
| Analysis Date | July 28, 2016 | | | | |
| 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 | 0.3% | 4.9% | 8.0% | 62.8% | 24.0% |
| CABIN Assessment of NEMCD01 on Sep 28, 2015 | Similar to Reference | | | | |

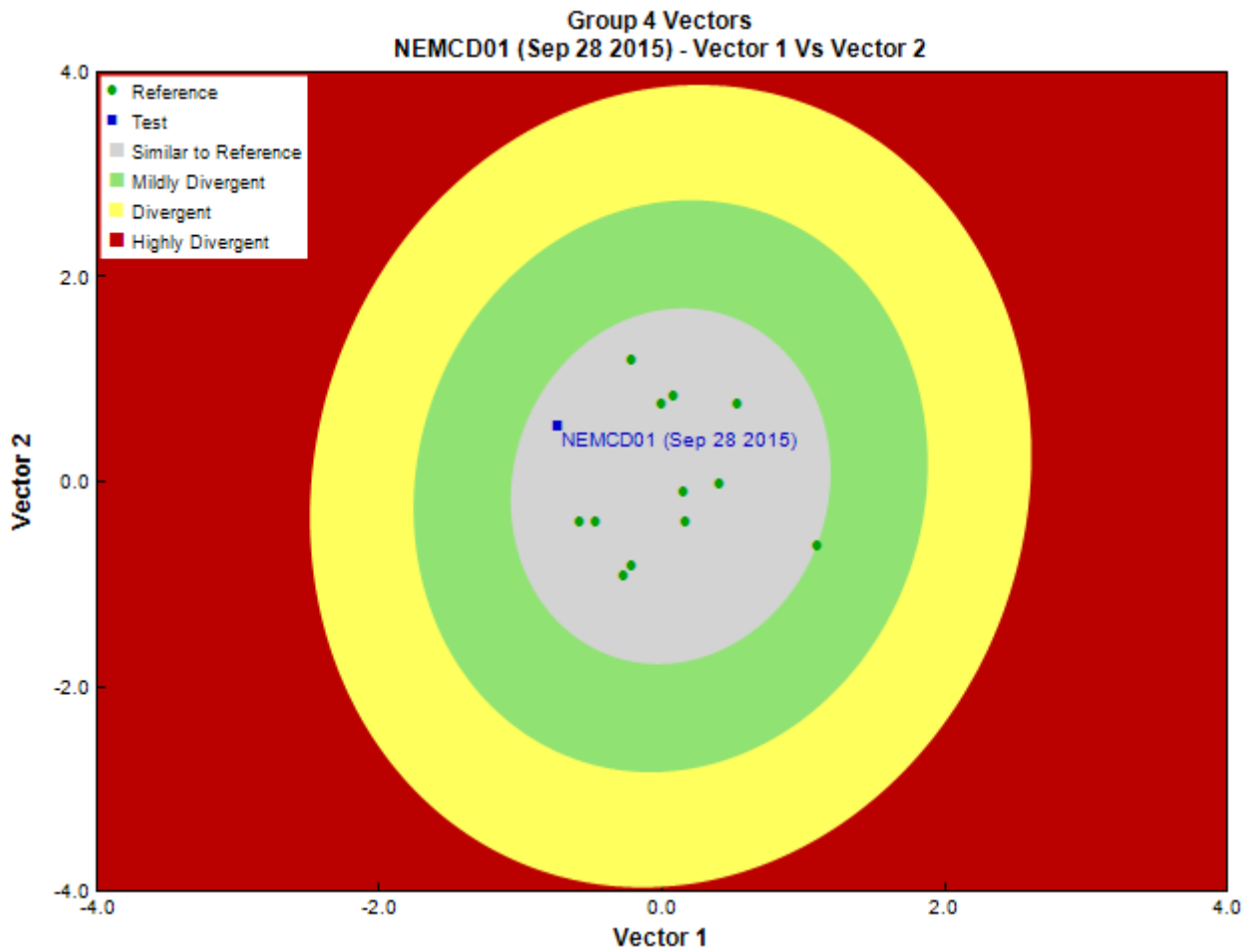


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

| | |
|--------------------------------|------------------------|
| Sampling Device | Kick Net |
| Mesh Size | 400 |
| Sampling Time | 3 |
| Taxonomist | Pina Viola, Consultant |
| Date Taxonomy Completed | December 12, 2015 |
| | Marchant Box |
| Sub-Sample Proportion | 28/100 |

Community Structure

| Phylum | Class | Order | Family | Raw Count | Total Count |
|------------|-------------|----------------|-----------------|-----------|-------------|
| Annelida | Oligochaeta | Lumbriculida | Lumbriculidae | 1 | 3.6 |
| Arthropoda | Arachnida | Trombidiformes | Lebertiidae | 2 | 7.1 |
| | | | Sperchontidae | 1 | 3.6 |
| | | | Torrenticolidae | 2 | 7.1 |
| | Insecta | Coleoptera | Elmidae | 20 | 71.4 |
| | | Diptera | Chironomidae | 26 | 92.9 |
| | | | Empididae | 12 | 42.8 |
| | | | Psychodidae | 29 | 103.6 |
| | | | Tipulidae | 4 | 14.3 |
| | | Ephemeroptera | Ameletidae | 2 | 7.1 |
| | | | Baetidae | 106 | 378.6 |
| | | | Ephemerellidae | 7 | 25.0 |
| | | | Heptageniidae | 47 | 167.9 |
| | | Plecoptera | Chloroperlidae | 1 | 3.6 |
| | | | Leuctridae | 5 | 17.9 |

Community Structure

| Phylum | Class | Order | Family | Raw Count | Total Count |
|--------|-------|-------------|------------------|-----------|-------------|
| | | | Nemouridae | 10 | 35.7 |
| | | | Perlidae | 1 | 3.6 |
| | | | Perlodidae | 9 | 32.1 |
| | | | Taeniopterygidae | 20 | 71.4 |
| | | Trichoptera | | 1 | 3.6 |
| | | | Brachycentridae | 2 | 7.1 |
| | | | Glossosomatidae | 6 | 21.4 |
| | | | Hydropsychidae | 1 | 3.6 |
| | | | Rhyacophilidae | 9 | 32.1 |
| | | | Uenoidae | 3 | 10.7 |
| | | | Total | 327 | 1,167.8 |

Metrics

| Name | NEMCD01 | Predicted Group Reference Mean \pm SD |
|---|---------|--|
| Bray-Curtis Distance | 0.47 | 0.4 \pm 0.1 |
| Biotic Indices | | |
| Hilsenhoff Family index (North-West) | 4.2 | 3.2 \pm 0.3 |
| Intolerant taxa | -- | |
| Long-lived taxa | 4.0 | 2.1 \pm 1.0 |
| Tolerant individuals (%) | -- | |
| Functional Measures | | |
| % Filterers | 0.9 | |
| % Gatherers | 38.2 | |
| % Predatores | 19.6 | |
| % Scrapers | 62.1 | |
| % Shredder | 18.7 | |
| No. Clinger Taxa | 28.0 | 23.2 \pm 6.3 |
| Number Of Individuals | | |
| % Chironomidae | 8.0 | 7.4 \pm 6.4 |
| % Coleoptera | 6.1 | 1.5 \pm 3.9 |
| % Diptera + Non-insects | 23.6 | 10.8 \pm 7.6 |
| % Ephemeroptera | 49.7 | 51.7 \pm 18.8 |
| % Ephemeroptera that are Baetidae | 65.4 | 40.6 \pm 30.0 |
| % EPT Individuals | 70.2 | 87.7 \pm 7.4 |
| % Odonata | -- | 0.0 \pm 0.0 |
| % of 2 dominant taxa | 46.9 | 57.9 \pm 14.2 |
| % of 5 dominant taxa | 69.9 | 81.6 \pm 7.9 |
| % of dominant taxa | 32.5 | 39.8 \pm 14.9 |
| % Plecoptera | 14.1 | 31.4 \pm 15.4 |
| % Tribe Tanyatarisini | -- | |
| % Trichoptera that are Hydropsychida | 4.8 | 27.0 \pm 26.2 |
| % Tricoptera | 6.4 | 4.5 \pm 2.8 |
| No. EPT individuals/Chironomids+EPT Individuals | 0.9 | 0.9 \pm 0.1 |
| Total Abundance | 1167.9 | 587.4 \pm 299.1 |
| Richness | | |
| Chironomidae taxa (genus level only) | 1.0 | 1.0 \pm 0.0 |
| Coleoptera taxa | 1.0 | 0.4 \pm 0.5 |
| Diptera taxa | 4.0 | 3.3 \pm 1.0 |
| Ephemeroptera taxa | 4.0 | 3.8 \pm 0.8 |
| EPT Individuals (Sum) | 817.9 | 526.0 \pm 285.8 |
| EPT taxa (no) | 15.0 | 13.3 \pm 2.7 |
| Odonata taxa | -- | 0.0 \pm 0.0 |
| Pielou's Evenness | 0.7 | 0.7 \pm 0.1 |
| Plecoptera taxa | 6.0 | 6.3 \pm 1.1 |
| Shannon-Wiener Diversity | 2.4 | 1.9 \pm 0.4 |
| Simpson's Diversity | 0.8 | 0.8 \pm 0.1 |
| Simpson's Evenness | 0.3 | 0.3 \pm 0.1 |
| Total No. of Taxa | 24.0 | 19.3 \pm 3.7 |
| Trichoptera taxa | 5.0 | 3.2 \pm 1.4 |

Frequency and Probability of Taxa Occurrence

| Reference Model Taxa | Frequency of Occurrence in Reference Sites | | | | | Probability Of Occurrence at NEMCD01 |
|----------------------|--|---------|---------|---------|---------|--------------------------------------|
| | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 | |
| Baetidae | 100% | 100% | 100% | 100% | 97% | 0.99 |
| Capniidae | 78% | 55% | 50% | 92% | 68% | 0.81 |
| Chironomidae | 100% | 100% | 100% | 100% | 95% | 0.99 |
| Chloroperlidae | 78% | 88% | 94% | 100% | 100% | 0.99 |
| Ephemerellidae | 78% | 100% | 100% | 100% | 100% | 1.00 |
| Heptageniidae | 100% | 100% | 100% | 100% | 100% | 1.00 |
| Hydropsychidae | 11% | 92% | 78% | 92% | 86% | 0.89 |
| Nemouridae | 100% | 100% | 100% | 100% | 100% | 1.00 |
| Perlidae | 11% | 84% | 33% | 100% | 3% | 0.70 |
| Perlodidae | 78% | 78% | 89% | 92% | 81% | 0.88 |
| Rhyacophilidae | 100% | 92% | 100% | 100% | 95% | 0.98 |
| Taeniopterygidae | 89% | 49% | 100% | 92% | 97% | 0.92 |

RIVPACS Ratios

| | |
|--------------------------------|-------|
| RIVPACS : Expected taxa P>0.50 | 13.48 |
| RIVPACS : Observed taxa P>0.50 | 15.00 |
| RIVPACS : O:E (p > 0.5) | 1.11 |
| RIVPACS : Expected taxa P>0.70 | 11.15 |
| RIVPACS : Observed taxa P>0.70 | 11.00 |
| RIVPACS : O:E (p > 0.7) | 0.99 |

Habitat Description

| Variable | NEMCD01 | Predicted Group Reference Mean \pm SD |
|---|-----------|---|
| Channel | | |
| Depth-Avg (cm) | 21.8 | 23.6 \pm 11.1 |
| Depth-BankfullMinusWetted (cm) | 21.80 | 51.38 \pm 29.42 |
| Depth-Max (cm) | 29.0 | 34.6 \pm 12.3 |
| Discharge (m ³ /s) | 1.120 | 0.000 \pm 0.000 |
| Macrophyte (PercentRange) | 0 | 0 \pm 0 |
| Reach-%CanopyCoverage (PercentRange) | 2.00 | 1.33 \pm 0.78 |
| Reach-%Logging (PercentRange) | 0 | 0 \pm 0 |
| Reach-DomStreamsideVeg (Category (1-4)) | 3 | 4 \pm 1 |
| Reach-Pools (Binary) | 1 | 1 \pm 0 |
| Reach-Rapids (Binary) | 1 | 0 \pm 0 |
| Reach-Riffles (Binary) | 1 | 1 \pm 0 |
| Reach-StraightRun (Binary) | 0 | 1 \pm 1 |
| Slope (m/m) | 0.0233600 | 0.0988017 \pm 0.1465915 |
| Veg-Coniferous (Binary) | 1 | 1 \pm 0 |
| Veg-Deciduous (Binary) | 1 | 1 \pm 0 |
| Veg-GrassesFerns (Binary) | 0 | 1 \pm 0 |
| Veg-Shrubs (Binary) | 1 | 1 \pm 0 |
| Velocity-Avg (m/s) | 0.98 | 0.48 \pm 0.22 |
| Velocity-Max (m/s) | 1.13 | 0.76 \pm 0.36 |
| Width-Bankfull (m) | 9.0 | 13.4 \pm 9.9 |
| Width-Wetted (m) | 6.6 | 8.5 \pm 5.8 |
| XSEC-VelMethod (Category (1-3)) | 1 | 1 \pm 0 |
| Landcover | | |
| Reg-Ice (%) | 0.00000 | 0.02487 \pm 0.06034 |
| Substrate Data | | |
| %Bedrock (%) | 0 | 0 \pm 0 |
| %Boulder (%) | 11 | 9 \pm 9 |
| %Cobble (%) | 82 | 51 \pm 15 |
| %Gravel (%) | 0 | 3 \pm 3 |
| %Pebble (%) | 7 | 37 \pm 20 |
| %Sand (%) | 0 | 0 \pm 0 |
| %Silt+Clay (%) | 0 | 0 \pm 0 |
| D50 (cm) | 13.25 | 14.58 \pm 14.69 |
| Dg (cm) | 13.7 | 8.2 \pm 2.8 |
| Dominant-1st (Category(0-9)) | 7 | 7 \pm 1 |

Habitat Description

| Variable | NEMCD01 | Predicted Group Reference Mean \pm SD |
|-------------------------------------|-------------|--|
| Dominant-2nd (Category(0-9)) | 6 | 7 \pm 1 |
| Embeddedness (Category(1-5)) | 5 | 5 \pm 1 |
| PeriphytonCoverage (Category(1-5)) | 2 | 1 \pm 0 |
| SurroundingMaterial (Category(0-9)) | 7 | 4 \pm 1 |
| Topography | | |
| Reg-SlopeLT30% (%) | 17.35368 | 18.88386 \pm 9.29866 |
| Water Chemistry | | |
| Ag (mg/L) | 0.0000100 | 0.0000000 \pm 0.0000000 |
| Al (mg/L) | 0.0072000 | 0.0000000 \pm 0.0000000 |
| As (mg/L) | 0.0007400 | 0.0000000 \pm 0.0000000 |
| B (mg/L) | 0.0025000 | 0.0000000 \pm 0.0000000 |
| Ba (mg/L) | 0.0179000 | 0.0000000 \pm 0.0000000 |
| Be (mg/L) | 0.0000500 | 0.0000000 \pm 0.0000000 |
| Bi (mg/L) | 0.0005000 | 0.0000000 \pm 0.0000000 |
| Ca (mg/L) | 48.2000000 | 0.0000000 \pm 0.0000000 |
| Cd (mg/L) | 0.0000240 | 0.0000000 \pm 0.0000000 |
| Chloride-Dissolved (mg/L) | 0.6400000 | 0.9750000 \pm 2.6309780 |
| Co (mg/L) | 0.0002500 | 0.0000000 \pm 0.0000000 |
| CO3 (mg/L) | 0.2500000 | 0.0000000 \pm 0.0000000 |
| Cr (mg/L) | 0.0005000 | 0.0000000 \pm 0.0000000 |
| Cu (mg/L) | 0.0011300 | 0.0000000 \pm 0.0000000 |
| Fe (mg/L) | 0.0120000 | 0.0000000 \pm 0.0000000 |
| General-DO (mg/L) | 10.0000000 | 11.4175000 \pm 0.7986708 |
| General-Hardness (mg/L) | 155.0000000 | 84.2750000 \pm 70.6251066 |
| General-pH (pH) | 7.5 | 7.9 \pm 0.4 |
| General-SolidsTSS (mg/L) | 2.0000000 | 0.8849836 \pm 1.2378575 |
| General-SpCond (μ S/cm) | 196.8000000 | 168.9833333 \pm 123.7858182 |
| General-TempAir (Degrees Celsius) | 12.0 | 26.0 |
| General-TempWater (Degrees Celsius) | 7.7000000 | 7.3183333 \pm 2.7240839 |
| General-Turbidity (NTU) | 0.3300000 | 0.2020000 |
| HCO3 (mg/L) | 148.0000000 | 0.0000000 \pm 0.0000000 |
| Hg (ng/L) | 5.0000000 | 0.0000000 \pm 0.0000000 |
| K (mg/L) | 0.6880000 | 0.0000000 \pm 0.0000000 |
| Li (mg/L) | 0.0025000 | 0.0000000 \pm 0.0000000 |
| Mg (mg/L) | 8.4000000 | 0.0000000 \pm 0.0000000 |
| Mn (mg/L) | 0.0012000 | 0.0000000 \pm 0.0000000 |
| Mo (mg/L) | 0.0023000 | 0.0000000 \pm 0.0000000 |
| Na (mg/L) | 2.2900000 | 0.0000000 \pm 0.0000000 |
| Ni (mg/L) | 0.0005000 | 0.0000000 \pm 0.0000000 |
| Nitrogen-NO2 (mg/L) | 0.0025000 | 0.0027500 \pm 0.0062831 |
| Nitrogen-NO2+NO3 (mg/L) | 0.0100000 | 0.0690000 |
| Nitrogen-NO3 (mg/L) | 0.0100000 | 0.0546667 \pm 0.0498148 |
| Nitrogen-TN (mg/L) | 0.0570000 | 0.0000000 \pm 0.0000000 |
| Pb (mg/L) | 0.0001000 | 0.0000000 \pm 0.0000000 |
| Phosphorus-OrthoP (mg/L) | 0.0103000 | 0.0002727 \pm 0.0004671 |
| Phosphorus-TP (mg/L) | 0.0025000 | 0.0045833 \pm 0.0049992 |
| S (mg/L) | 7.9000000 | 0.0000000 \pm 0.0000000 |
| Sb (mg/L) | 0.0002500 | 0.0000000 \pm 0.0000000 |
| Se (mg/L) | 0.0018100 | 0.0000000 \pm 0.0000000 |
| Si (mg/L) | 4.8400000 | 0.0000000 \pm 0.0000000 |
| Sn (mg/L) | 0.0025000 | 0.0000000 \pm 0.0000000 |
| Sr (mg/L) | 0.3180000 | 0.0000000 \pm 0.0000000 |
| Ti (mg/L) | 0.0025000 | 0.0000000 \pm 0.0000000 |
| Tl (mg/L) | 0.0000250 | 0.0000000 \pm 0.0000000 |
| U (mg/L) | 0.0003800 | 0.0000000 \pm 0.0000000 |
| V (mg/L) | 0.0025000 | 0.0000000 \pm 0.0000000 |
| Zn (mg/L) | 0.0025000 | 0.0000000 \pm 0.0000000 |
| Zr (mg/L) | 0.0002500 | 0.0000000 \pm 0.0000000 |