Proposed title

Louis Creek, BC: A Biological Study of Streambank Restoration Effectiveness
Jessica McQueen; Supervisor: Dr. Brian Heise

Objectives

The objectives of this study were to:
Evaluate the macroinvertebrate community change of 1-yr and 2-yr old sections of stream bank to determine whether the restoration efforts are effective with respect to improving the aquatic diversity of Louis Creek, BC.

Background and rationale for the project

A report released by the Department of Fisheries and Oceans (DFO) labelled Louis Creek, a watershed of high priority for restoration efforts (2019). Salmon need optimal water temperatures and water quality with adequate depths, sufficient food sources and cover from predators and finally, adequate substrate (not too fine or it clogs the gills) (Bjornn and Reiser 1991). Therefore, without proper stream conditions, the fish are at a higher risk of stress and inability to survive.

Nonetheless, this follow-up report should help prove the value of post-streambank restoration monitoring, as a report by McQueen (2021) at the same sites saw significant increases in data collected, specifically total abundance, total biomass, and total EPT. Without monitoring, there is no way to determine whether restoration efforts were effective, and no learning to be done regarding optimal restoration techniques. Additionally, this supports the value of streambank restorations and the importance of data collection following streambank restoration efforts.

Materials and methods

Sample collecting

This project saw the use of two sampling sites, Site A and Site B – Site A was located downstream and was restored over the winter of 2021/2022; Site B, further upstream, was restored over the winter of 2020/2021. Note: The same collection and analysis techniques were used in 2021 and 2022; sample units corresponded with GPS coordinates taken in 2021
10 sampling units at each site (1 x 2 m each, totaling 20 m^2) were sectioned off.
Using a modified '3-minute travelling kick', samples were collected in a 250 μm mesh D-frame net. Samples were preserved in 80% ethanol in Whirl-Pak™ bags.

Sample sorting & data collection

Invertebrates were removed from all sediment, organic matter, and rocks. Invertebrates were identified to family level. Biomass was calculated by measuring the length of each invertebrate and using length-weight regression equations. Response variables included total abundance and total Ephemeroptera, Plecoptera, Trichoptera (EPT) and the ratio of EPT to Diptera (EPT/D)

Data analysis

Data was analyzed for both equal variances and normality. Should data not meet assumptions regarding having normally distributed and equal variance data, a non-parametric, Mann-Whitney U test, will be used for significance.

Expected results.

There is expected to be a significant difference in data collected in 2021 compared to the data collected in 2022 in all response variables. I also expect to be a higher number of EPT and fewer D in the treatment site (Site B) as they are more sensitive to environmental conditions including pollutants and erosion (Poulton and Tao 2019).

Timeline

October – collect samples.

February – samples sorted + biomass measurements taken.

March – data analysis completed + poster/paper being written.

March 20-24 – TRU Undergrad Research Conference

April – Directed studies final paper and poster submitted for marking.

April – UREAP final survey + paper submitted.

Literature sources

Benke AC, Huryn A and Smock L, and Wallace B. 1999. Length-Mass Relationships for Freshwater Macroinvertebrates in North America with Particular Reference to the Southeastern United States. North American Benthological Society, Vol. 18, No. 3, pp. 308-343

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Miyaska H, Genkai-Kato M, Miyake Y, Kishi D, Katano I, Doi H, Ohba S, and Kuhara N. 2008. Relationships between length and weight of freshwater macroinvertebrates in Japan. Limnology, 9:75-80.

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Poulton B and Tao J. 2019. Evaluation of EPT macroinvertebrate metrics in small streams located within the non-connected stormwater management region of Kansas City, Missouri, USA. Transactions of the Missouri Academy of Science. 21-34, 47.

(SPSS) IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp. [Software accessed Mar 2023].