



Abundance of Invasive New Zealand Mudsnails in Coldwater Lake and Coldwater Creek, Mount St. Helens National Volcanic Monument



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Figure 1: A locator map showing the location of Coldwater Lake within Washington State

Introduction

- New Zealand mudsnails (NZMS) are able to reproduce rapidly and outcompete other native snail species for food (Myers et al. 2024)
- NZMS are very small ranging in size from 4-6 mm (Figure 2) appearing dark brown or black in color with 5 to 6 whorls (Palador [date unknown])
- With the ability to close their operculum, the NZMS can pass through the digestive system of native fish unharmed providing no nutritional value to the fish (WDFW 2022)
- NZMS were first found in fish intestines along the southern shore of Spirit Lake in 2015 (Myers et al. 2024)
- Spirit Lake is connected to Coldwater Creek through an outlet tunnel
- eDNA sampling done in 2019 showed no signs of NZMS in Coldwater Creek or Coldwater Lake (Figure 1; Myers et al. 2024)
- Our study goal is to see to what extent NZMS may have moved downstream from Spirit Lake into Coldwater Creek & Coldwater Lake since 2019



Figure 2: The average size of the NZMS compared to a penny. WALPA. 2020. <https://www.walpa.org/waterline/september-2011/new-zealand-mudsnails-found-in-thornton-creek/>

Methods

Lake Sample Collection:

- Samples were collected from Coldwater Lake and the Coldwater Creek outlet from shore or from a boat using a double-sided rake on a rope
- Collected samples were placed in a plastic bin and agitated for 60 seconds to remove snails (Figure 4)
- After agitation, vegetation volume was measured in a graduated beaker
- Snails were sieved from water in bin (Figure 4) and stored on ice for transportation from the sites to the lab

Creek Sample Collection:

- Snail samples in Coldwater Creek were collected using either a 0.09 m² surber net in flowing waters, or sieves in slow-moving waters (Figure 3)
- Velocity was measured at multiple locations across the creek cross section using a Swoffer flow meter

Lab Sorting/Counting:

- Snails were separated from sediment and vegetation using 4 mm – 710 µm sieves
- Snails and remaining sediment were identified and counted under a dissecting microscope



Figure 3: Samples collected using surber net and sieves (Photo credit: Archer Boday)



Figure 4: Vegetation sample collection using a double-sided rake to place within a plastic bin for vegetation agitation (Photo credit: Hailey Germeau)

Results

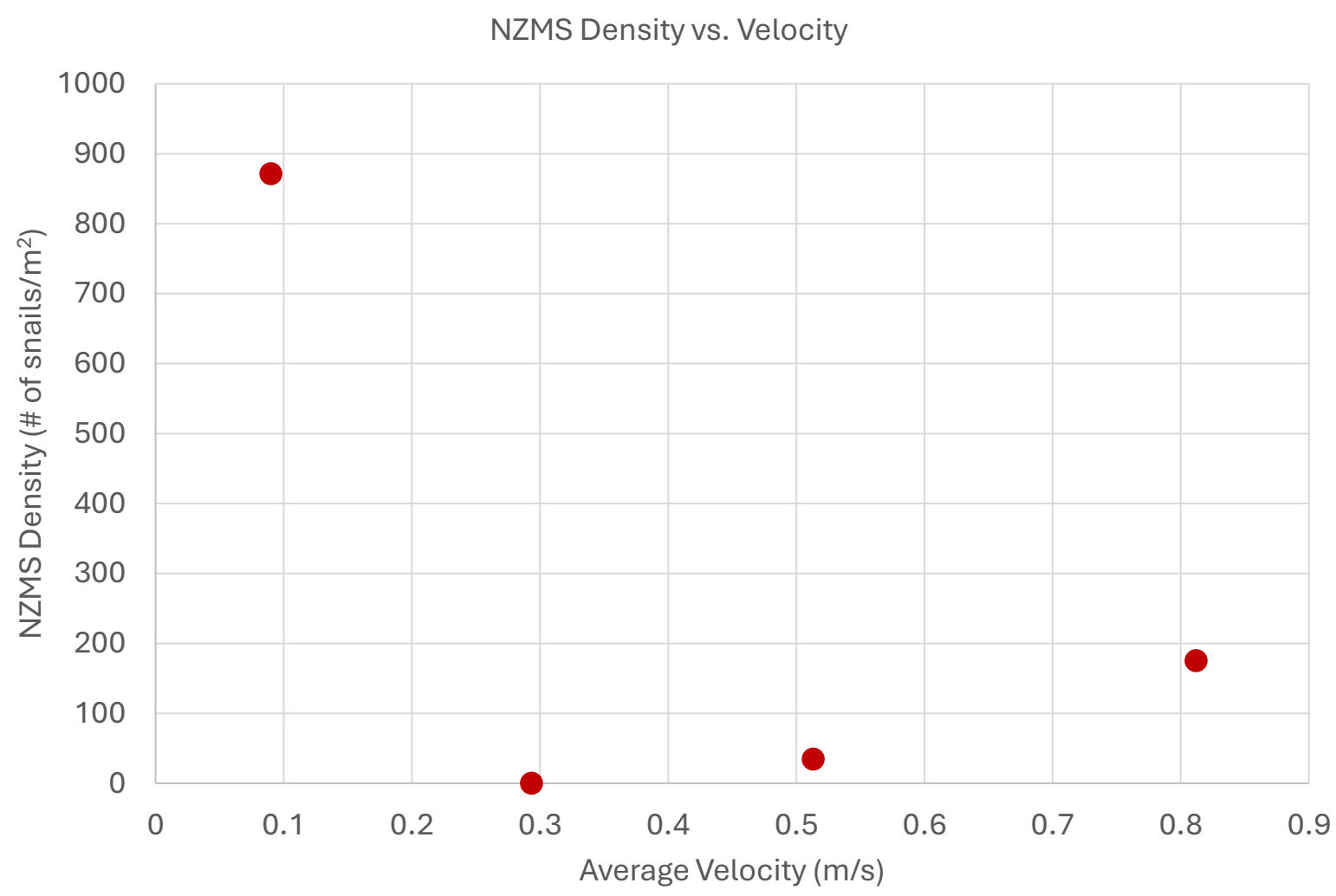


Figure 5 (Far Left): Population densities of both NZMS and native snail species measured in # of snails per plant volume (m³). Site CL-NZMS-04 had an assumed volume similar to the other sites as the volume was not recorded. Both sites CC-NZMS-07 and CC-NZMS-08 are in the outlet channel exiting the lake, but upstream of the confluence with Coldwater Creek.

Figure 6 (Left): A scatterplot of the measured NZMS density in # of snails/m² versus the average velocity (m/s) at sites CC-NZMS-02, CC-NZMS-03, CC-NZMS-04, and CC-NZMS-05 along Coldwater Creek.



Figure 7: Population densities of both NZMS and native snail species measured in # of snails/m² along Coldwater Creek. Site CC-NZMS-01 was located upstream of the outlet tunnel that connects Spirit Lake and Coldwater Creek. Site CC-NZMS-04 was located in a feeder stream that leads from the Hummocks Pond.

Discussion

- Results showed that no NZMS were found within Coldwater Lake (Figure 5), but other native snail species were found within the lake
- Site CC-NZMS-08 had 1 NZMS recorded when counting results, and this site is closest to the confluence with Coldwater Creek (Figure 5)
- The absence of NZMS in Coldwater Lake could be due to lack of vegetation because of previous aquatic plant management activities
- NZMS highest density found at CC-NZMS-05 along Coldwater Creek downstream of the outlet from Coldwater Lake (Figure 7)
- Site CC-NZMS-05 had the lowest average velocity compared to other creek sites (Figure 6)
- The density of native species was lower than NZMS at multiple stream sites (Figure 6), suggesting that that NZMS may possibly outcompete other native snail species in Coldwater Creek, but there is not enough evidence to confirm this currently

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References

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