Zebra Mussels and its Effect on Freshwater Snail Populations

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The study for intended analysis

-In the study we plan on assessing the zebra mussels effect on freshwater snail populations.
-In the study we are using the algae as our dependent variable.
-The freshwater snails and zebra mussels are the independent variables.
-In the study we will have three charts with three different tables of data. Each container will be used to track data and then later graph results.
-The first container will have just zebra mussels and a set amount of algae in the tank.
-The second container will have just freshwater snails with that same set amount of algae in the tank.
-The last container will have both the freshwater snails and zebra mussels with that same set amount of algae in the tank.
-After the results come in we compare the algae amounts in each tank to reference the amount of food available in these small ecosystems.

Study Design

-The experiment will have 3 main containers and each container will replicate the ecosystem of a small pond. One container will have both 15 zebra mussels and 15 snails to compare how they react together. Another with just 30 zebra mussels and another with just 30 snails to see how they act independently.

Background

-Invasive species have a weak effects on their environment due to competition or limited resources, or strong effects due to a large density of consumers(Schuler, M.S. et al, 2020)

-Zebra mussels cause huge declines in various phytoplankton species, and the reduction of phytoplankton affected the zooplankton negatively which is linked to the decline of whitefish(Jones, T., Montz, G., 2020)

Hypothesis and Prediction

- We hypothesise that there is a relationship between zebra mussel population and freshwater snail populations.
-We predict that as the number of zebra mussels increase the amount of snails will decrease
-The zebra mussels will eat more algae faster than the freshwater snail populations

Figure 1. A picture of zebra mussels

Figure 2. A picture of a freshwater snail

Expected Results

-We expect the zebra mussels will respond quicker to the algae and this will make it so the snails won't be able to compete with them

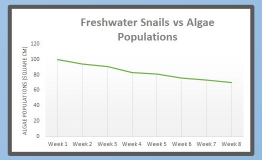

Figure 3 - Graph of freshwater snails vs algae

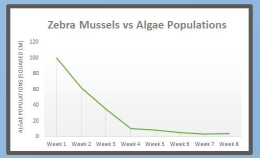

Figure 4 - Graph of zebra mussels vs algae

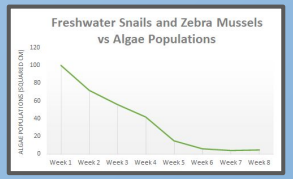

Figure 5 - Graph of freshwater snails and zebra mussels vs algae

Motivation

-Zebra mussels outcompete native freshwater mussels and they can also disrupt food webs which can change the ecosystem(Rodriguez-Rey, M. et al. 2020)
-Trying to eradicate the zebra mussel has limited success, and management on controlling them requires to limit the spread(Rodriguez-Rey, M. et al. 2020).
-**We plan to observe how zebra mussels interact with other organisms that feed on the same food source. This will show us how they affect the ecosystem.**

Literature cited: Schuler, M. S., Hintz, W. D., Jones, D. K., Mattes, B. M., Stoler, A. B., & Relyea, R. A. (2020). The effects of nutrient enrichment and invasive mollusks on freshwater environments. *Ecosphere*, *11*(10), 1–14. https://doi.org/10.1002/ecs2.3196 ; Jones, T., & Montz, G. (2020). Population increase and associated effects of zebra mussels Dreissena polymorpha in Lake Mille Lacs, Minnesota, U.S.A. *BioInvasions Records*, *9*(4),772–792.https://doi.org/10.3391/bir.2020.9.4.12 ; Fenlova, I. (2020). Effects of zebra mussels (Dreissena polymorpha) on phytoplankton community structure under eutrophic conditions. *Aquatic Invasions*, *15*(3), 435–454. https://doi.org/10.3391/ai.2020.15.3.05 ; Rodriguez-Rey, M., Consuegra, S., Borger, L., & Garcia De Leaniz, C. (2020, December 23).*Boat ramps facilitate the dispersal of the highly invasive zebra mussel (Dreissena polymorpha)* [PDF]. Biol Invasions. ; Benson, A. (1992). *Zebra Mussels*. USGS. USGS. https://www.usgs.gov/media/images/zebra-mussels-0. Gerlach, J. "Enid Snail". National Geographic. 2009. Photo Ark Home Enid Snail | NationalGeographic Society