

Impacts of Road Salts on Aquatic Detritivores and Ecosystem Processes

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Introduction

Study System:

Amphipods are crustaceans which can act as decomposers in aquatic ecosystems¹. They are integral to the health of an ecosystem, returning nutrients used by other organisms².

Road Salt:

Winter road salt has been linked to an increase in chloride ions in natural water ways, which can be damaging to organisms not adapted to these higher salinity levels³. In our research, we focused on two commonly used road salts: sodium chloride (NaCl) and calcium chloride (CaCl₂).

Research Questions

1: How does NaCl versus CaCl₂ impact amphipod survival and reproduction?

2: How do these road salts impact decomposition of organic leaf matter by amphipods?

3: How do temperature and salinity interact to impact amphipods?



Mesocosm Methods

- 18 110-gallon tanks were filled with water, dried leaf litter, and inoculated with plankton.
- 37 amphipods were added to each tank. Mesocosms were left for a month with water quality measurements being taken weekly.
- Mesocosms were sampled after a month with amphipod survival and colonisation by other macroinvertebrates being recorded.

Importance

This project allows us to assess the impacts of salinity on amphipod survival, reproduction, and decomposition, as well as the impacts of road salts on colonization of water bodies by other macroinvertebrates such as dragonflies.

Laboratory Methods

- 24 5-gallon tanks were set up in the laboratory at KSR with heaters (23 and 28 degrees C) and bubblers. NaCl and CaCl₂ were added for a concentration of 1 g/L Cl⁻.
- 10 amphipods were added to each tank along with a leaf litter pouch.
- Tanks were left for two weeks, with amphipod survival being checked each day for a week and then every other day for the next week.
- Leaf litter bags were removed, checked for amphipods. Leaves were dried for further processing and amphipods were preserved in ethanol.

Importance

This provides us with an understanding of how salinity impacts decomposition and amphipod survival, complementing the long-term mesocosm experiment. It allows us to examine how temperature as an additional stressor to salinization can impact amphipods.

Discussion

- Potential that calcium chloride will have a less negative impact due to amphipods having calcium carbonate exoskeleton⁴.
- Increase our understanding of factors that impact decomposition.
- Push individuals and cities to use less road salt and find more sustainable alternatives.

Next Steps

- Weigh and sift leaf litter matter to analyze decomposition.
- Identify macroinvertebrates (including amphipods) to species level.
- Perform data analysis.



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