

The Effects of Water Horsetail on Wetlands Ecosystems

Kieran De Savornin Lohman

INTRODUCTION/BACKGROUND

Background – Wetlands are important ecosystems that are flooded by water, and are home to a lot of plants and wildlife. They are essential to the environment because of their many ecosystem services. What is seen as a random swamp to many is actually a vibrant ecosystem that supports many organisms that in turn support us and the land we live on.

Major Problem #1

- Pollution of the water and soil from developed land.

Major Problem #2

- Invasive species that take away from wetlands functioning services.



Fig. 1. The water horsetail shown in the top image has impacts on both invasive species (left) and water filtering, or protecting from water pollution (right).

OBJECTIVES

Objectives:

- To discover the effects of water horsetail on wetlands ecosystems both in aiding the environment through filtering out toxins and on dealing with invasive species.

Hypotheses:

- We hypothesize that there will be a negative relationship between the amount of water horsetail present, and both the amount of phosphorus present in the water and the number of invasive organisms present in the area.
- The water horsetail is known to be aggressive towards invasive species (Bebeau, 2014), and is proven helpful in absorbing heavy metals and filtering toxins.

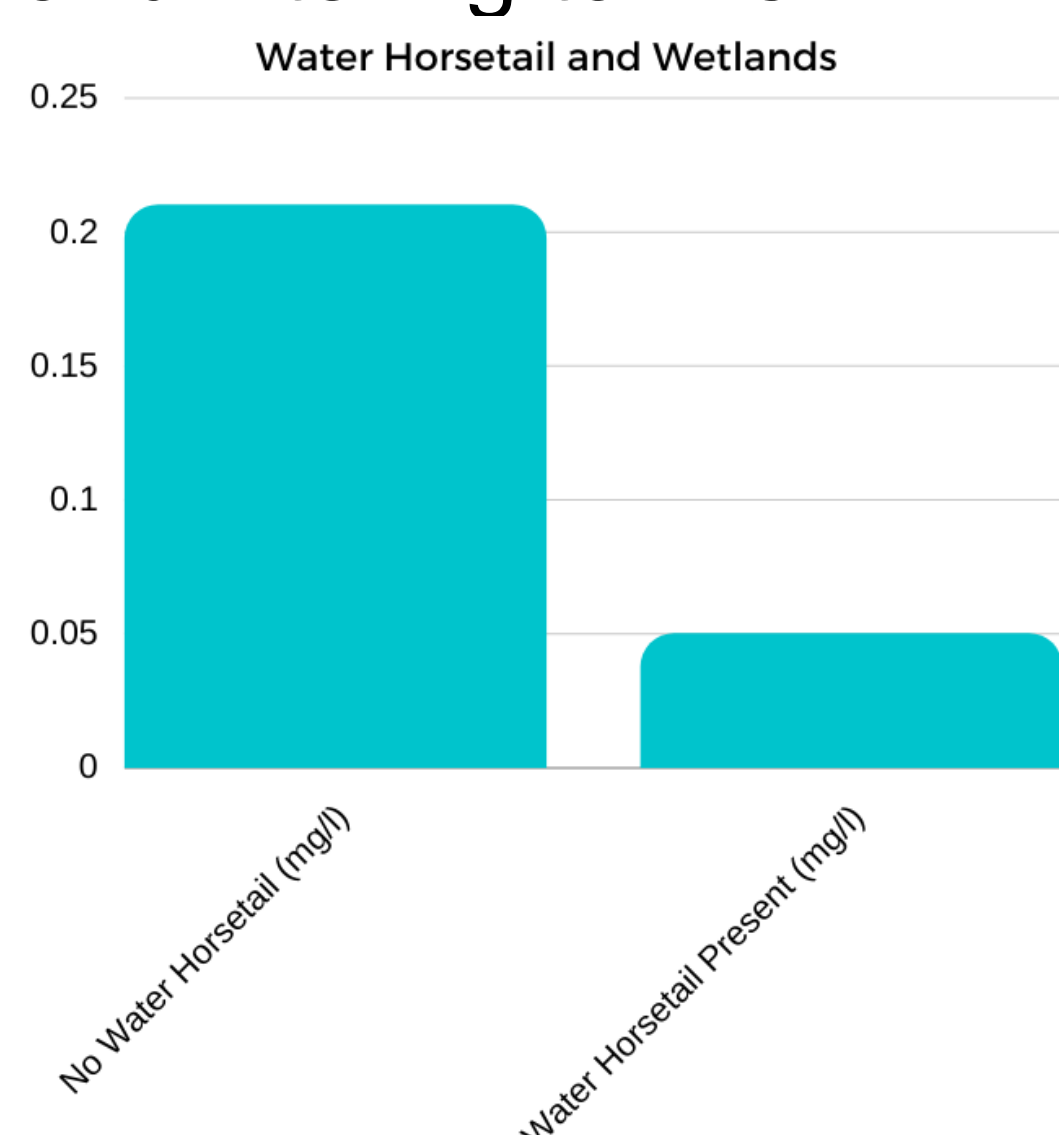


Fig. 2 This chart shows the predicted outcome of the study, showing how the presence of water horsetail is predicted to lessen the pollution of water (specifically phosphorus pollution for this chart).

METHODS

Experimental Design:

- We will conduct an observational study comparing a control group (a wetland ecosystem without water horsetail) and an ecosystem with a significant amount of water horsetail.
- This will be a before-after-control-impact study.
- The data collected will for both sites will be the amount of phosphorus in the water (mg/l). And the amount of invasive organisms within the bounds of the ecosystem being observed.
- The study will have two treatment groups which will both be treated for the same two things. So the control group and water horsetail group will be studied for both water pollution and invasive species.



Fig. 3. This image depicts water horsetail in a wetland swamp. These will inhabit one of the treatment groups, while the other will be a similar ecosystem just without any water horsetail present.

Intended Analysis

- The predictor variable in this study is the presence of water horsetail because we are looking to see its impact on the wetlands ecosystem.
- The response variable is the amount of toxins in the water, specifically phosphorus measured in the unit mg/l.
- We will be using a T-test to determine the statistical significance of our findings due to the independent variable being categorical and only having two categories.



Fig. 4. Wetlands are essential ecosystems to humans and many different organisms. They exist as habitats for a diverse lot of plants and animals, and provide many ecosystem services that keep our planet healthy.

MANAGEMENT IMPLICATIONS

- Wetlands are being destroyed at incredible speeds and it is speculated that upwards of half of the world's wetlands have disappeared since 1900 (WWF, 2020). Therefore it is very important to understand the impacts of study management on the ecosystem. Our study will follow trusted procedures to make sure there is no negative impact on the natural area being examined.

"The Friends of the Wild Flower Garden, Inc." *Water Horsetail, Equisetum Fluviatile L.*, www.friendsofeloisebutler.org/pages/plants/waterhorsetail.html.

"Wetlands." WWF, World Wildlife Fund, www.worldwildlife.org/habitats/wetlands.