

# The Effects of Experimental Lake Fertilization on Condition and Diet of Slimy Sculpin (*Cottus cognatus*) in Oligotrophic Arctic Lakes, North Slope, AK

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## Introduction

- The Arctic is warming faster than any other region on Earth, the mean annual air temperature on the North Slope of Alaska has increased 2.1°C in the past 30 years.
- Lakes in the area are small, highly oligotrophic, kettle lakes with an ice off period of ~100 days.
- Area sentinel lakes have not shown an increase in mean annual temperature, rising air temperatures are predicted to increase nutrient inputs from allochthonous sources via increased fire frequency, nutrient runoff, and thermokarst activity.
- Sculpins are an important prey species for the piscivorous fish on the North Slope.
- Piscivores are important for local subsistence fisheries.
- A whole-lake fertilization experiment from 2001-2013 simulated increased nutrient inputs.

## Methods

### Field

- 95 Sculpins were collected from the littoral zone of the fertilized lake (E5) and two control lakes by beach seine in July 2014.
- All fish were sacrificed immediately upon capture.
- Total length (mm) and wet weight (g) were recorded.

### Laboratory

- Stomachs were removed, weighed, and preserved.
- Stomach contents were identified to genus if possible.



## Diet Composition

- Sculpin diets consisted mainly of larval chironomids.
- More collector chironomids were found in the diet of Sculpins from lake E5 (fertilized) than in both control lakes.

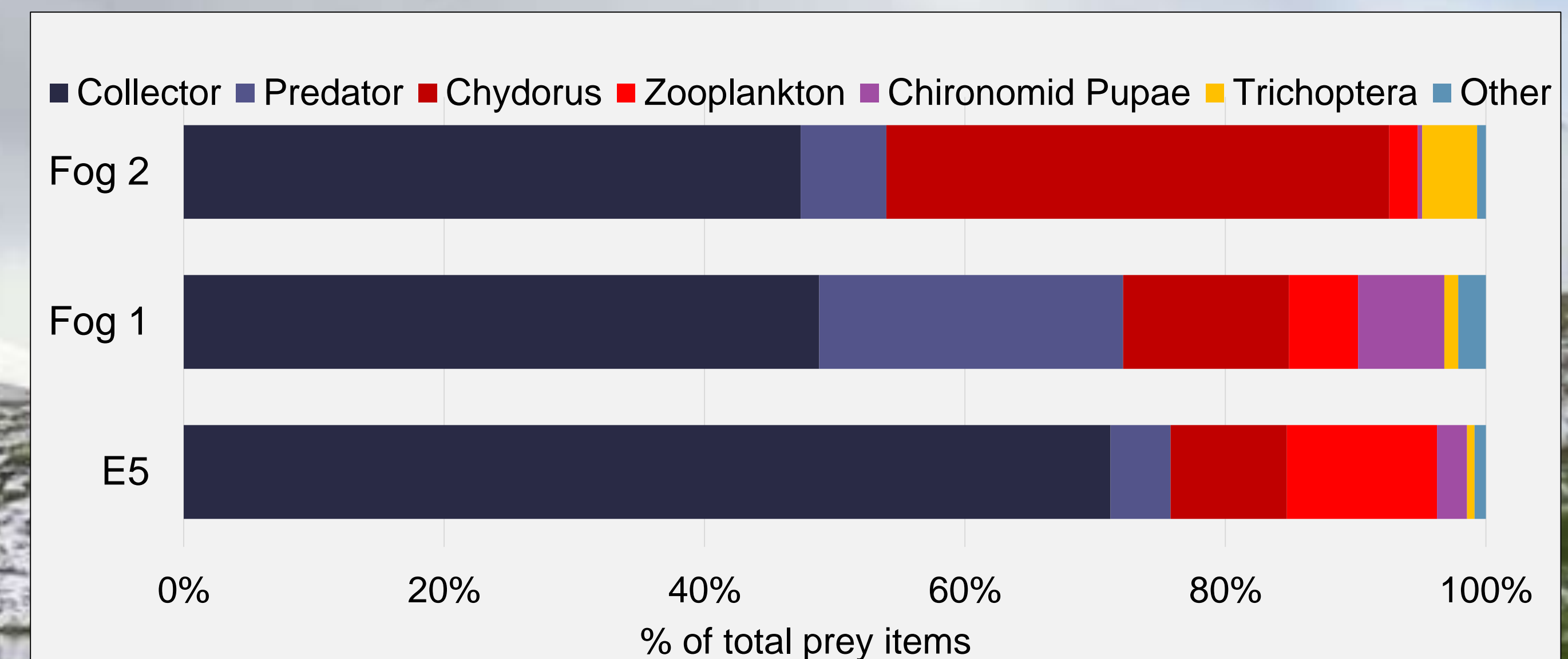


Figure 2. Percent of prey items found in Sculpin diets.

## Condition (Length-Weight Regression)

- Sculpins of equal length were generally heavier in the control lakes than in the fertilized lake.

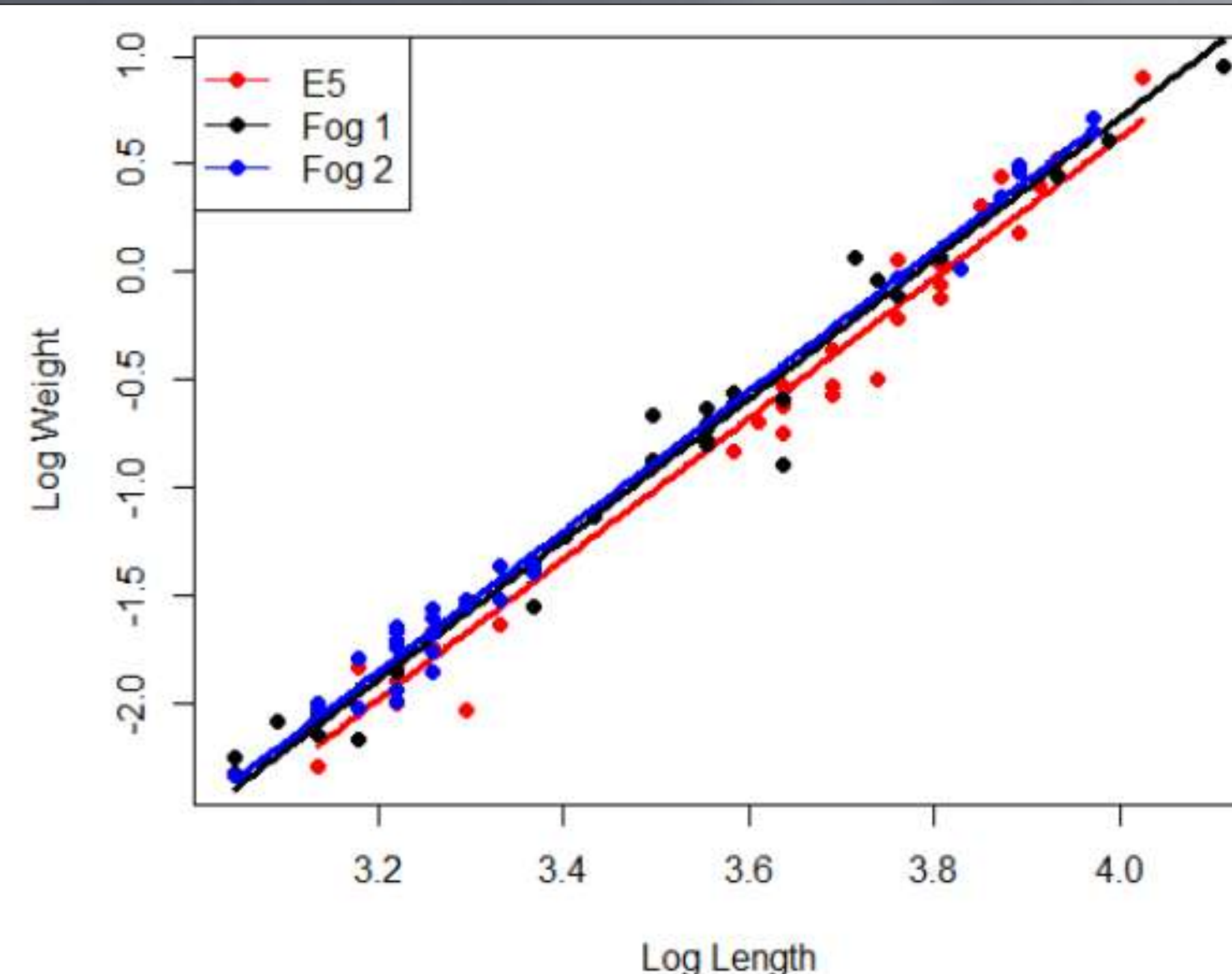


Figure 1. Fitted line plot of the natural log weight versus natural log length of Sculpins in the fertilized (red) and control lakes (black and blue).

## Discussion

- Increased nutrient loading due to climate change may cause a decrease in Sculpin condition.
- Increased nutrient levels may also cause a slight shift in Sculpin diet toward more collector (herbivorous and detritivorous) chironomids.

## Acknowledgements

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## Objectives

- 1) Compare Sculpin diet between fertilized and control lakes.
- 2) Compare Sculpin relative condition (length-weight relationship) between fertilized and control lakes.
- 3) Use diet information to help understand the role of Sculpins in food webs and nutrient cycling.

