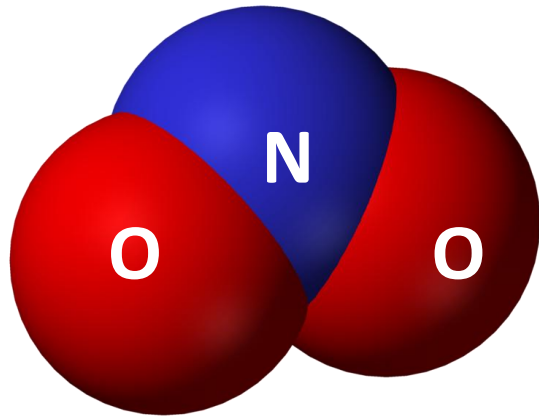


Nitrite tolerance in the eastern mosquitofish (*Gambusia holbrooki*): regional patterns shape interpopulation differences



Oriol Cano-Rocabayera^{1,2}, Kevin J Kroll², Jonas Jourdan¹, Nancy D Denslow²

1

2

1. INTRODUCTION

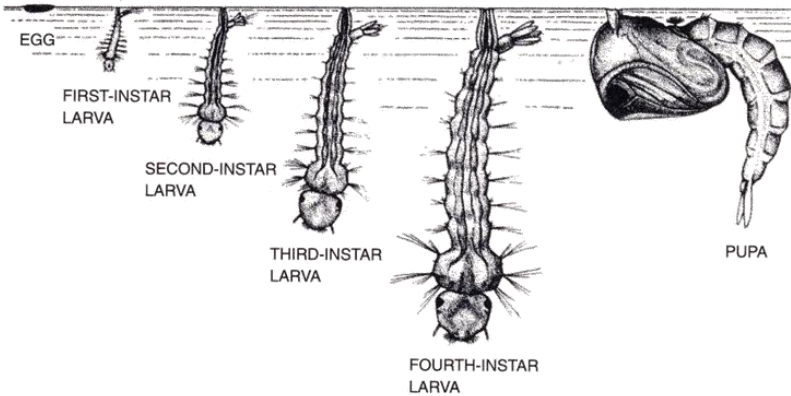
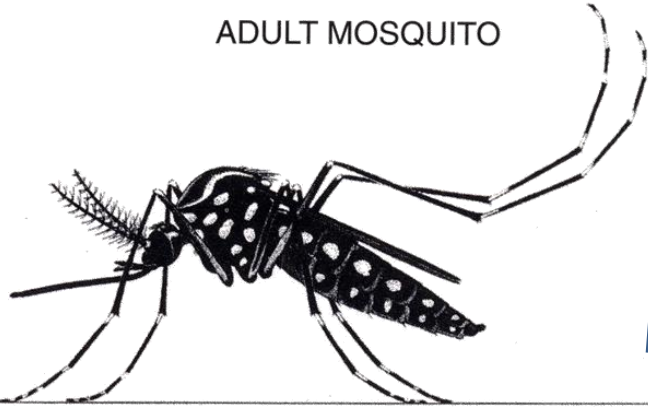
Alteration of the nitrogen cycle



1. INTRODUCTION

Eutrophication

ADULT MOSQUITO



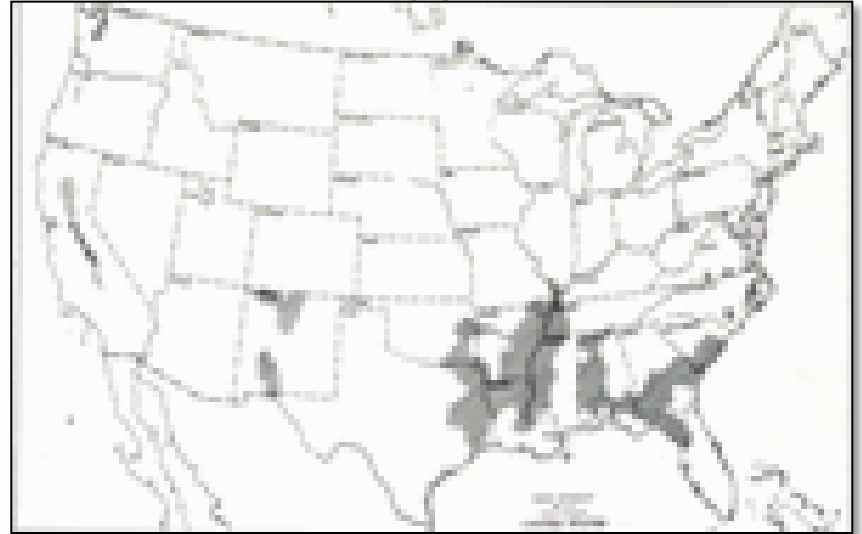
1. INTRODUCTION

Malarious area of the United States (WHO, 1969)

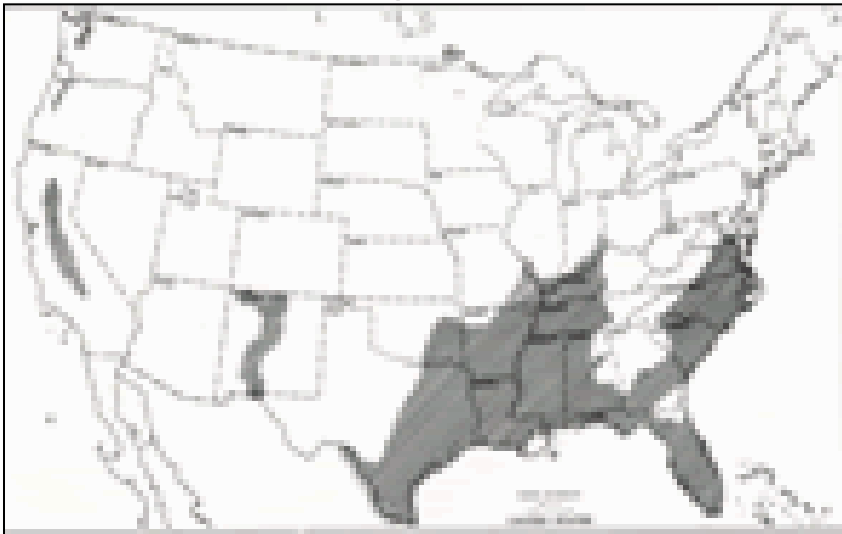
1882



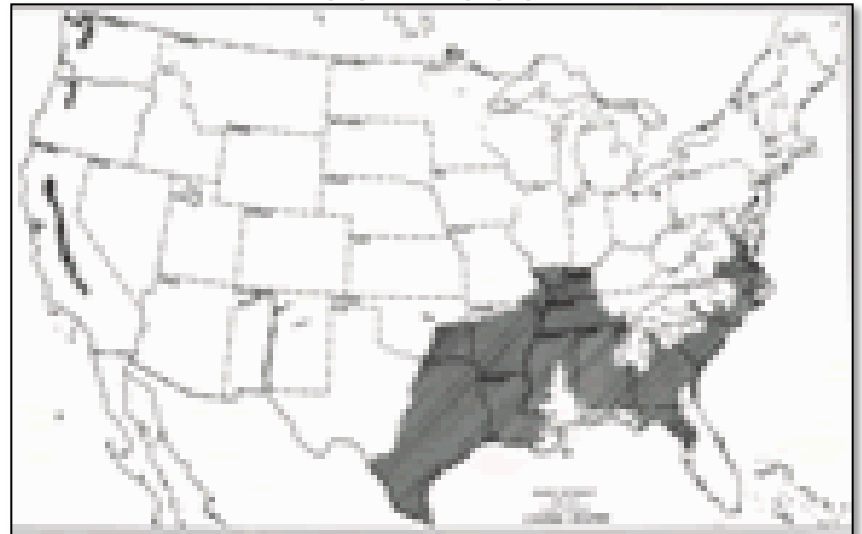
1932



1912



1934-1935



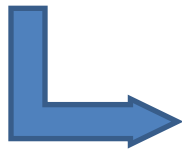
1. INTRODUCTION



Gambusia holbrooki (Girard, 1859)



Family Poeciliidae

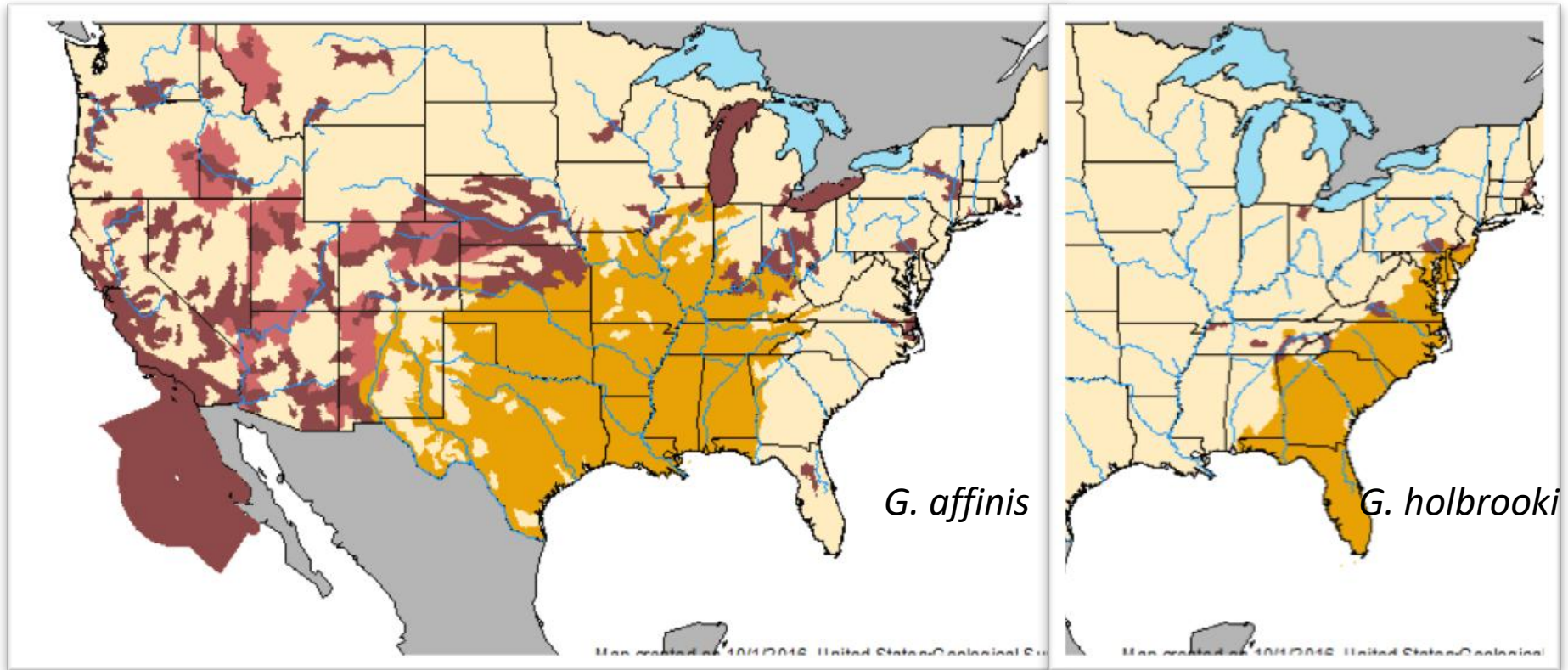


ovoviviparous

Sexual dimorphism, females < 60 mm, males < 35 mm

Omnivorous species, eurihaline (< 20 ‰) and eurithermal

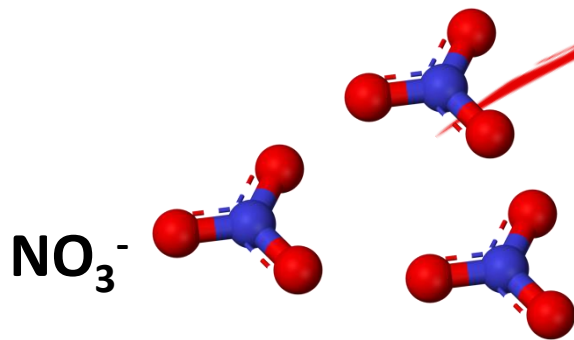
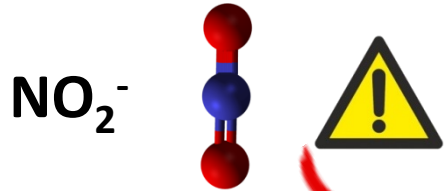
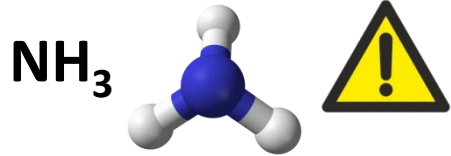
1. INTRODUCTION



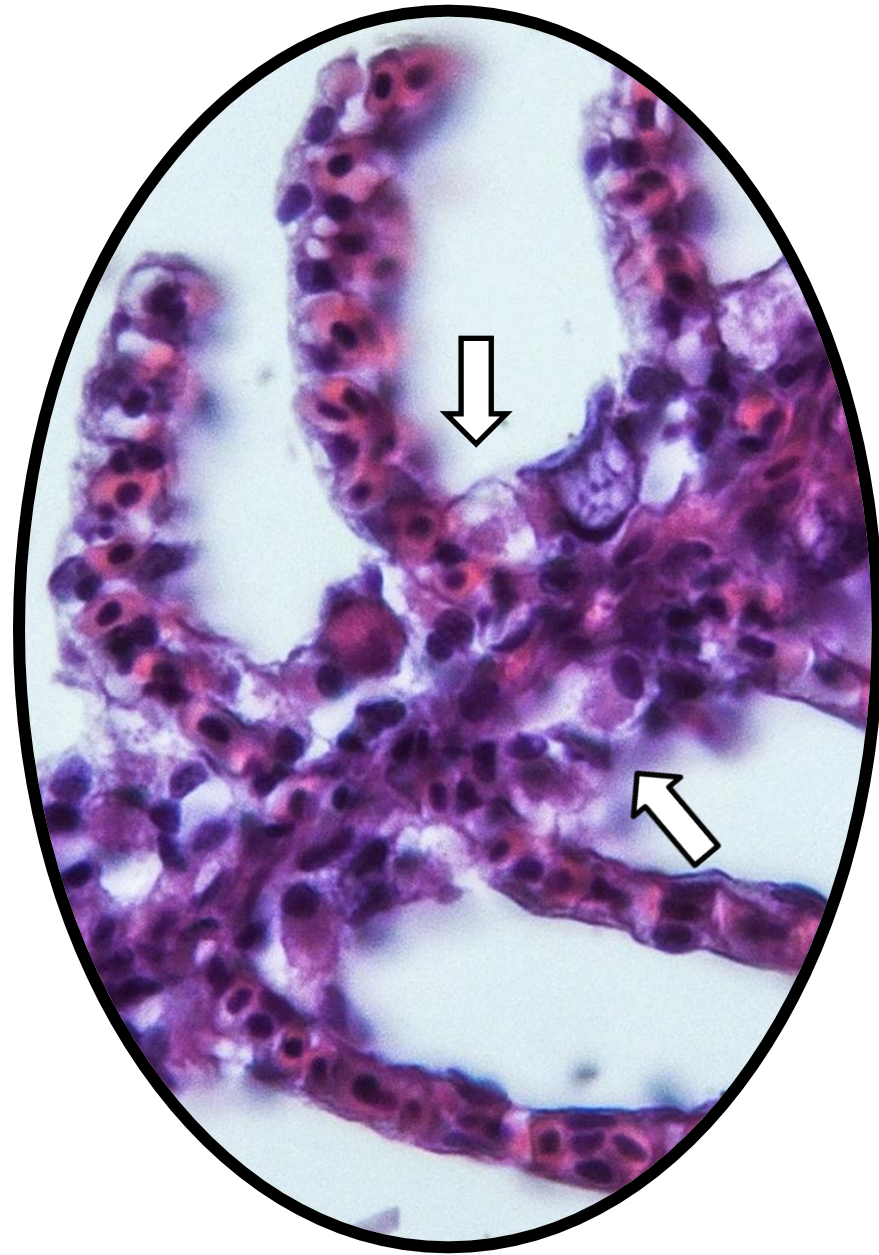
- Both species widely introduced throughout US including Hawaii, American Samoa, Guam, and the Northern Mariana Islands, as well as Canada.
- Present in all continents except for the Anctartica.

2. TOXICITY NITRITE EXPOSURE

Toxicity of nitrite



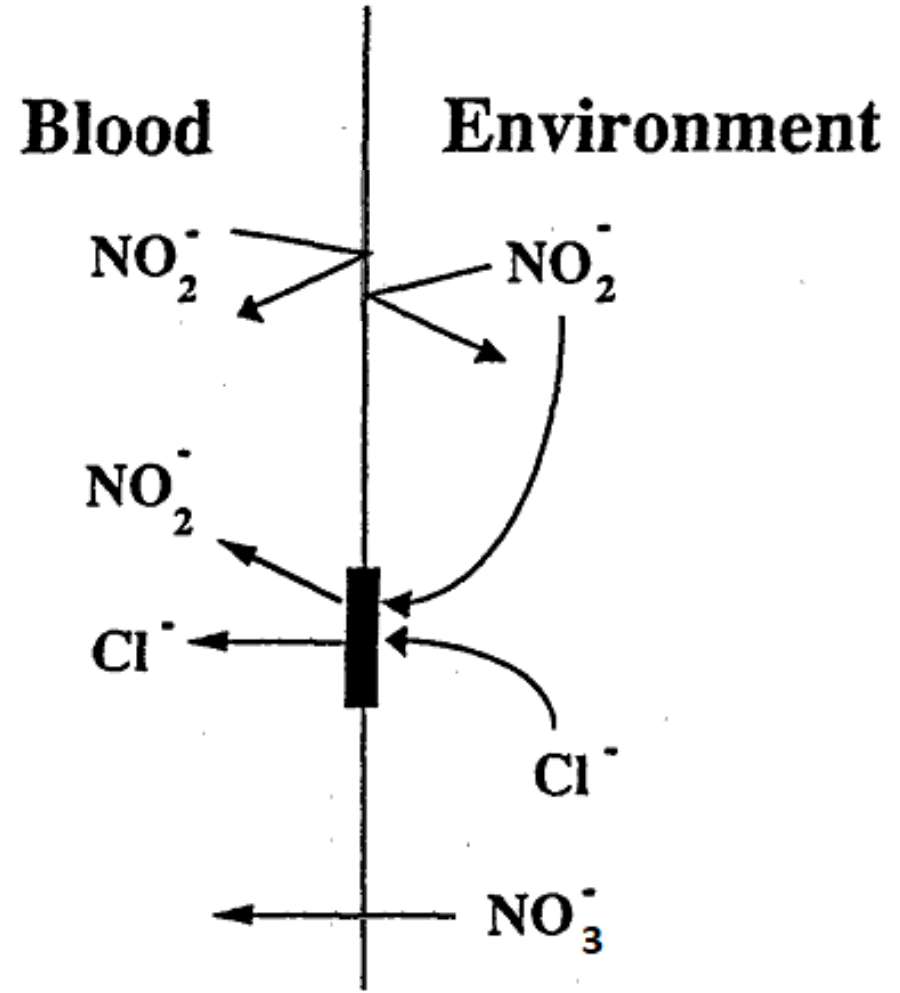
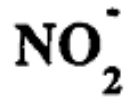
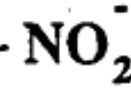
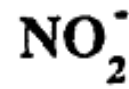
2. TOXICITY OF NITRITE EXPOSURE



Gill Respiratory Membrane

Blood

Environment





3. OBJECTIVES AND HYPOTHESES

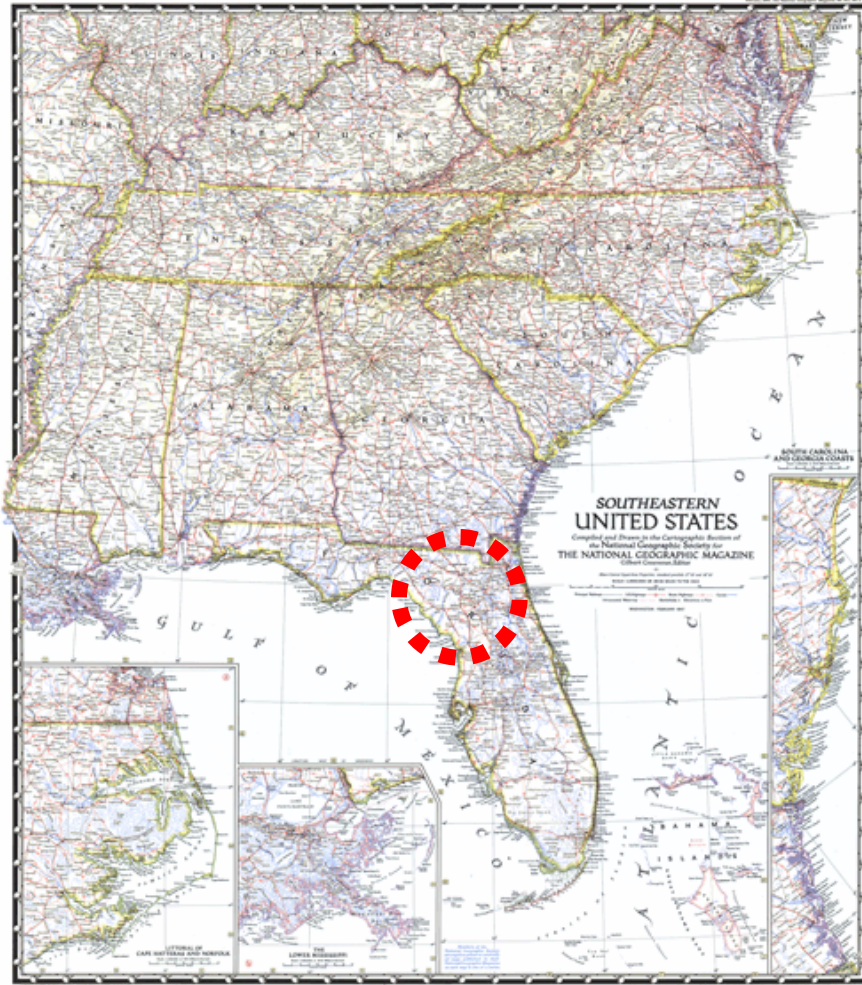
General objective

Assess the toxicity of nitrite on eastern mosquitofish (*Gambusia holbrooki*) on individuals from 6 different populations (FL, NC) at varying background nitrogen pollution.

Main hypothesis

Biomarkers in fish from polluted sites will show less shifted responses between lab-exposed treatment and controls due to evolved mechanisms of tolerance in these phenotypes.

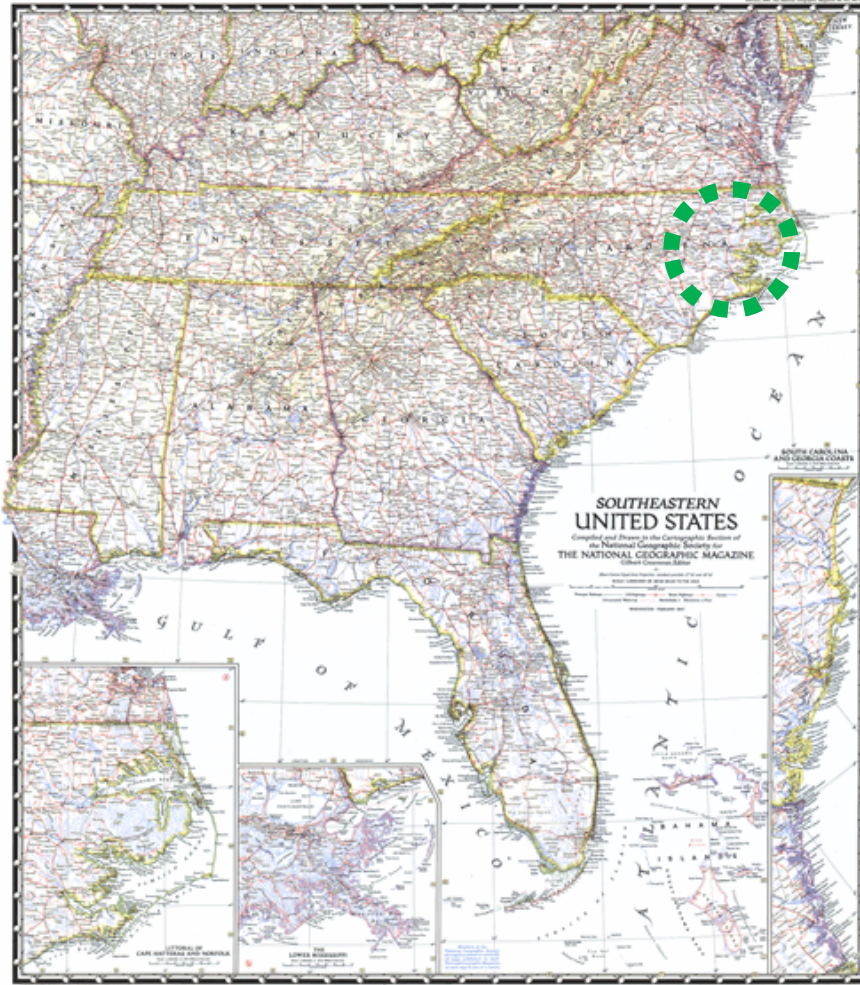
4. METHODOLOGY: EXPER. DESIGN



- Wild-caught fish.
- 3 months acclimation in the lab at clean freshwater.
- Daily feeding.

	$\text{NO}_3^- \text{-N}$ mg/l
Poe springs	0.6
Owens springs	6.5
Ruth springs	7.6

4. METHODOLOGY: EXPER. DESIGN



- Wild-caught fish.
- 3 months acclimation in the lab at clean freshwater.
- Daily feeding.

	$\text{NO}_3^- \text{-N mg/l}$
Edenton hatchery	0.15
Newbold pond	0.2
Albemarle canal	2.3

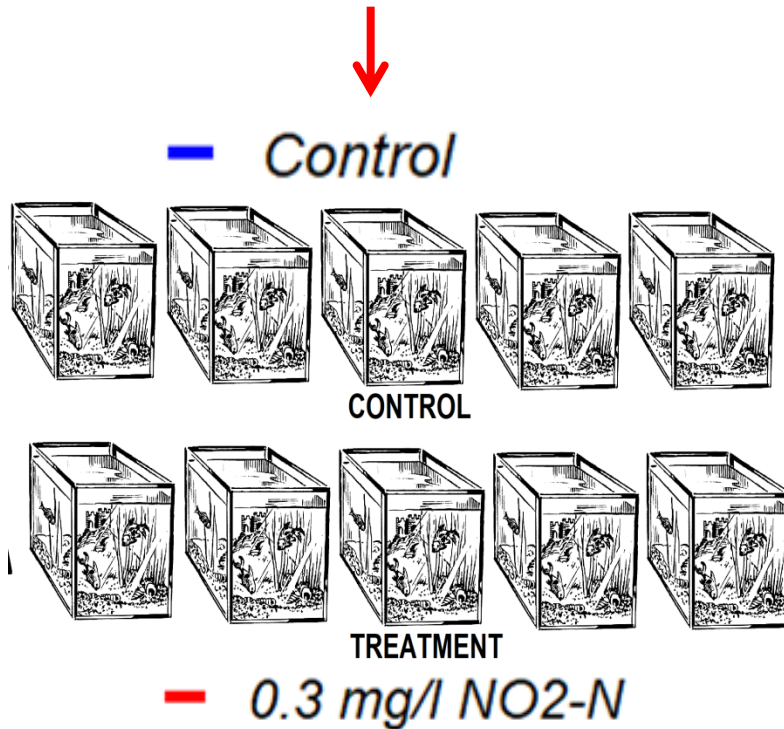
4. METHODOLOGY: EXPER. DESIGN



NO_2^- EXPERIMENT, 10-day exposure

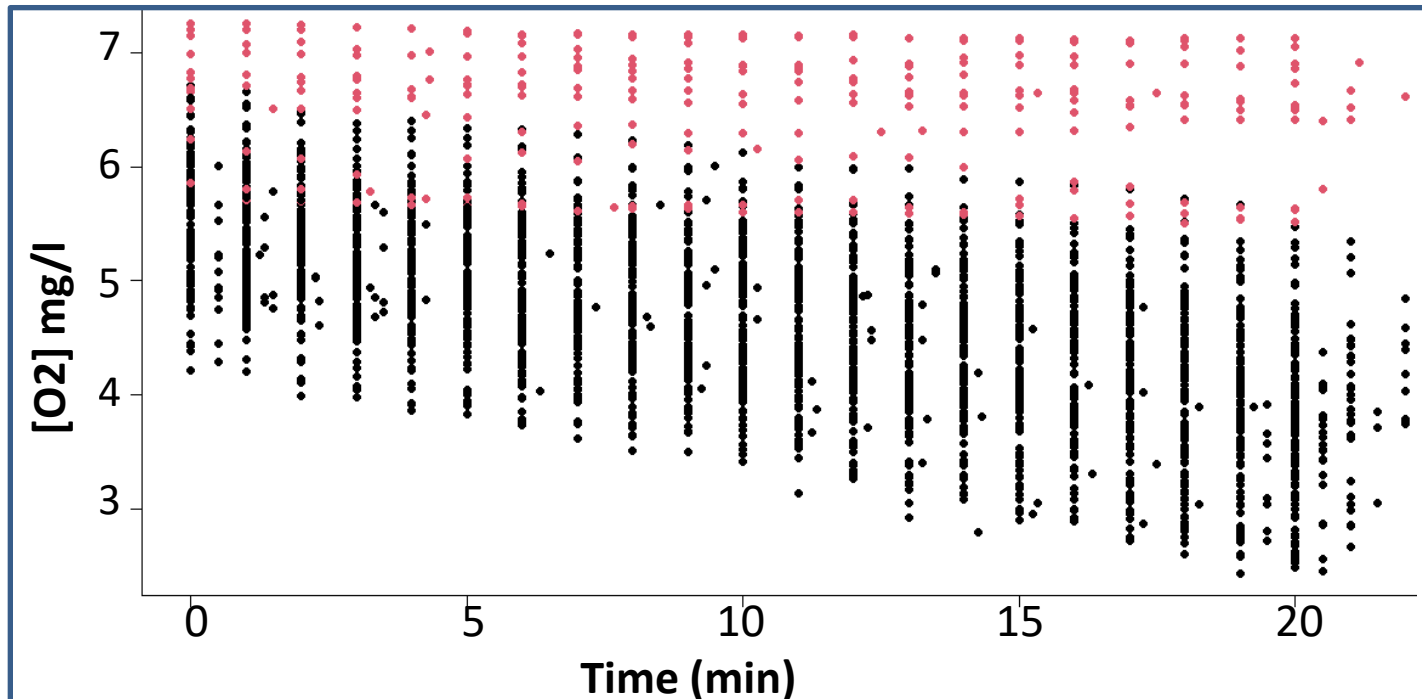
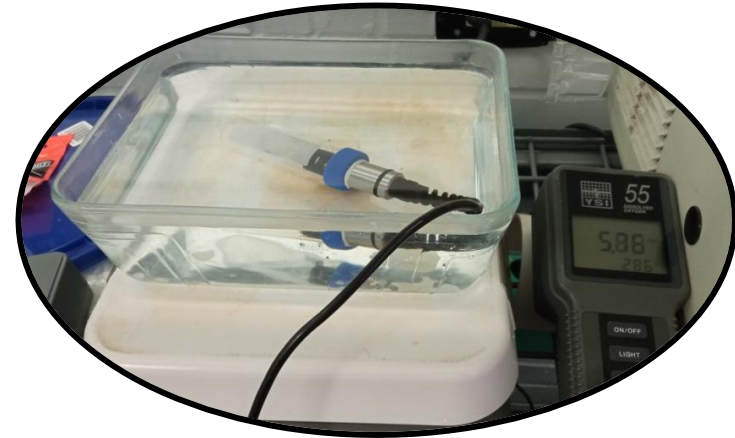
Endpoints

- **Respiratory rates**
- **Blood parameters**
- Gene expression (liver, gill)
- Histopathology
- Embryo development



4. METHODOLOGY

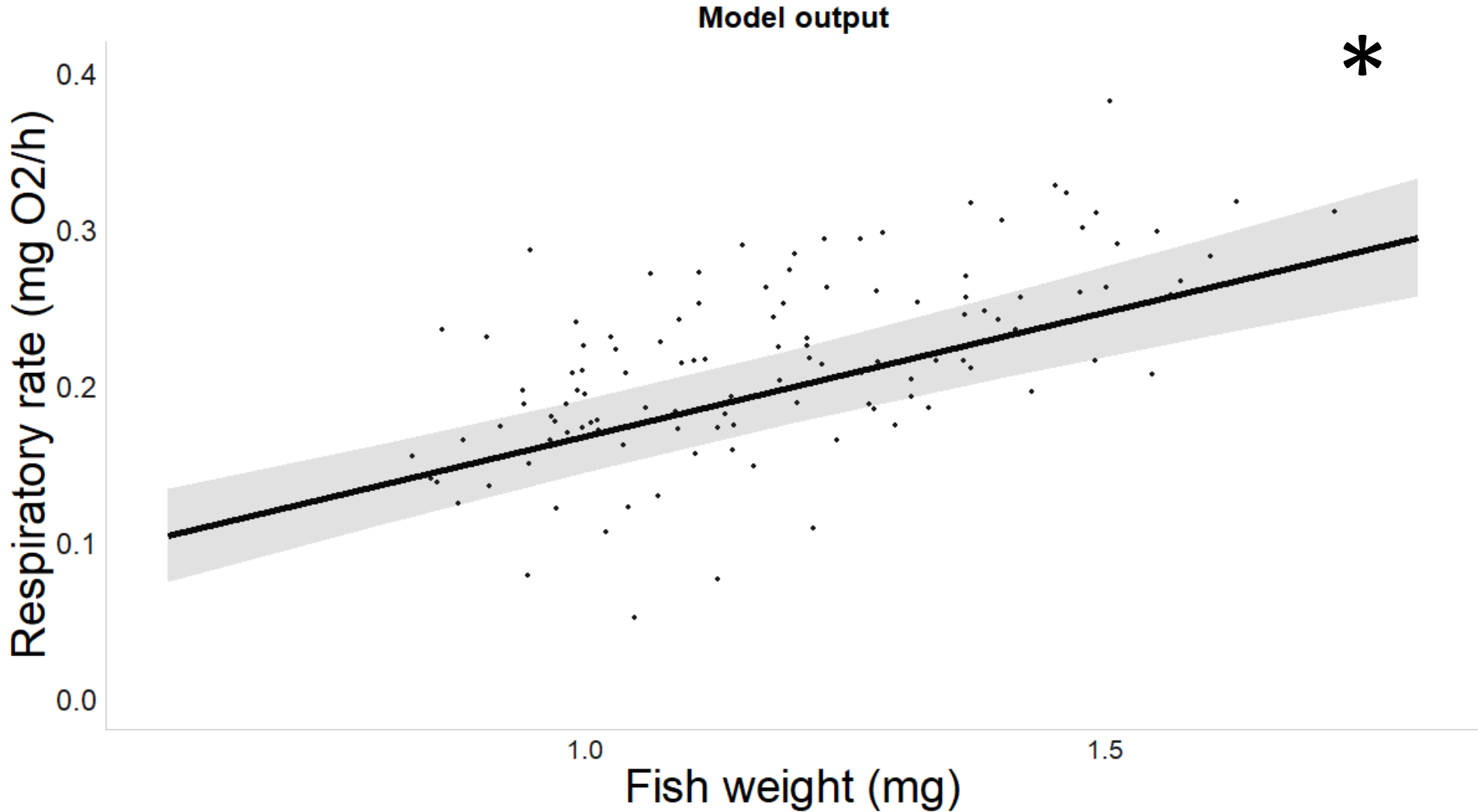
Respiratory rates ('metabolism')



5. RESULTS AND DISCUSSION



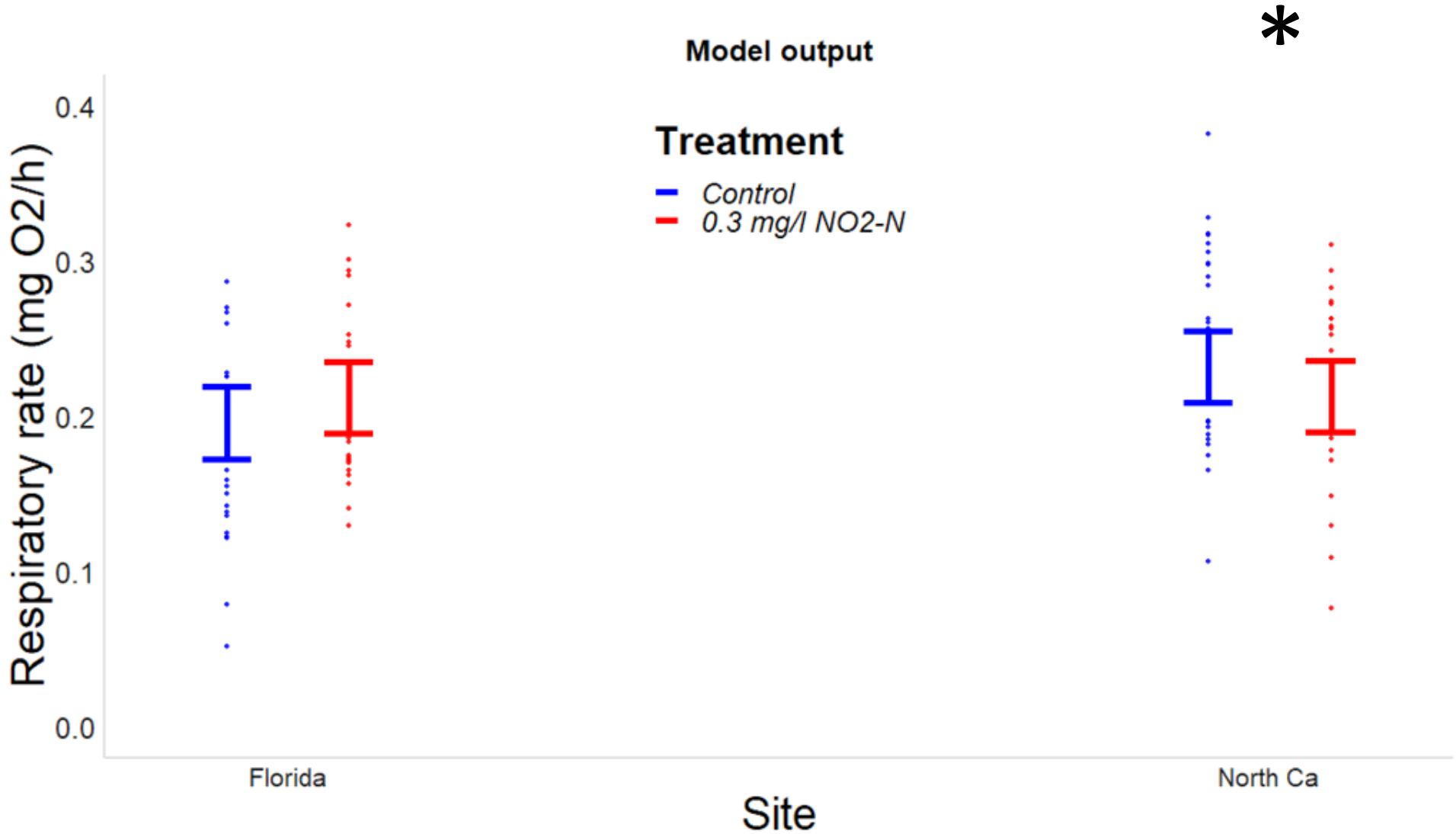
Respiratory rates ('metabolism')



5. RESULTS AND DISCUSSION



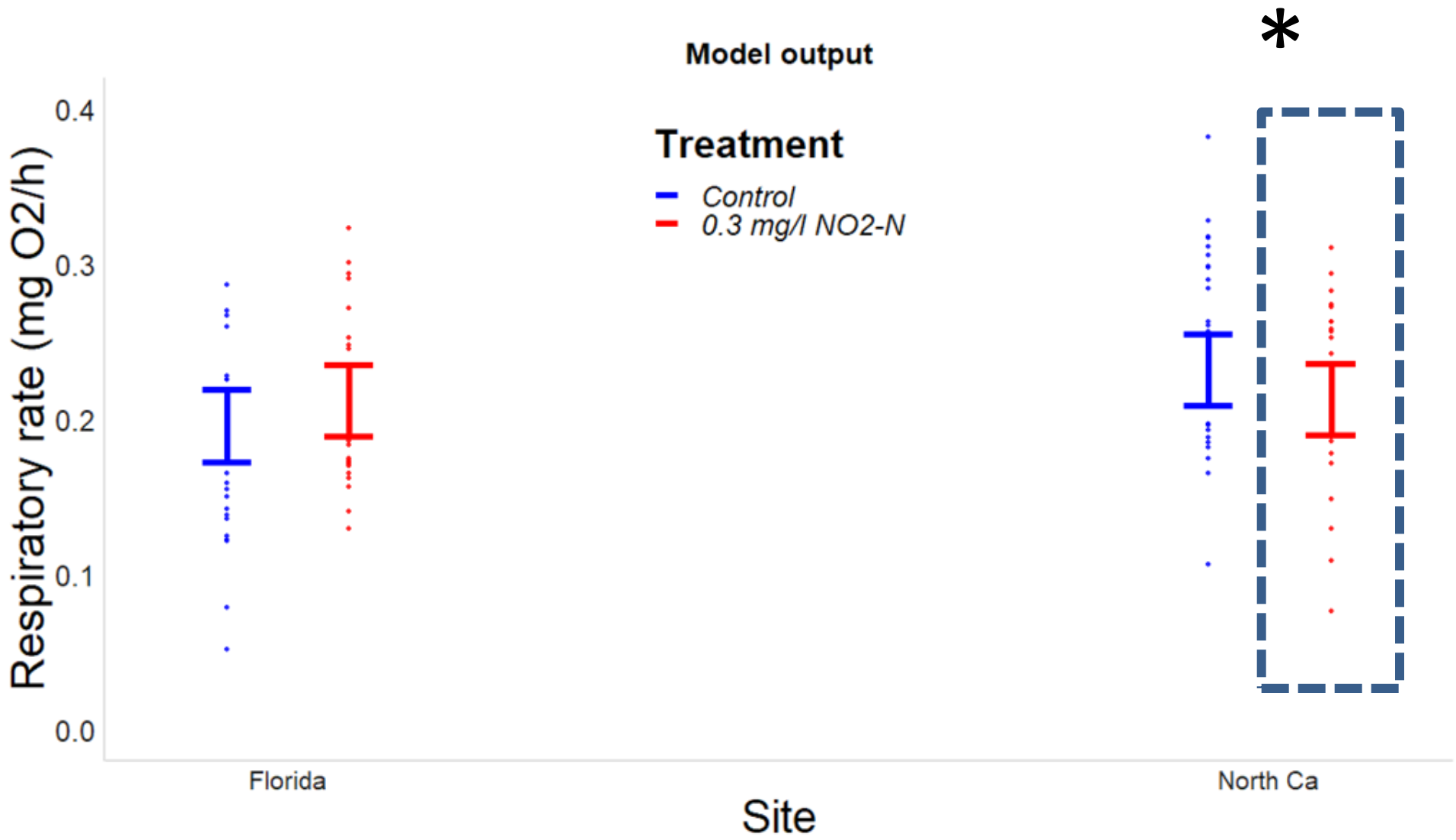
Respiratory rates ('metabolism')





5. RESULTS AND DISCUSSION

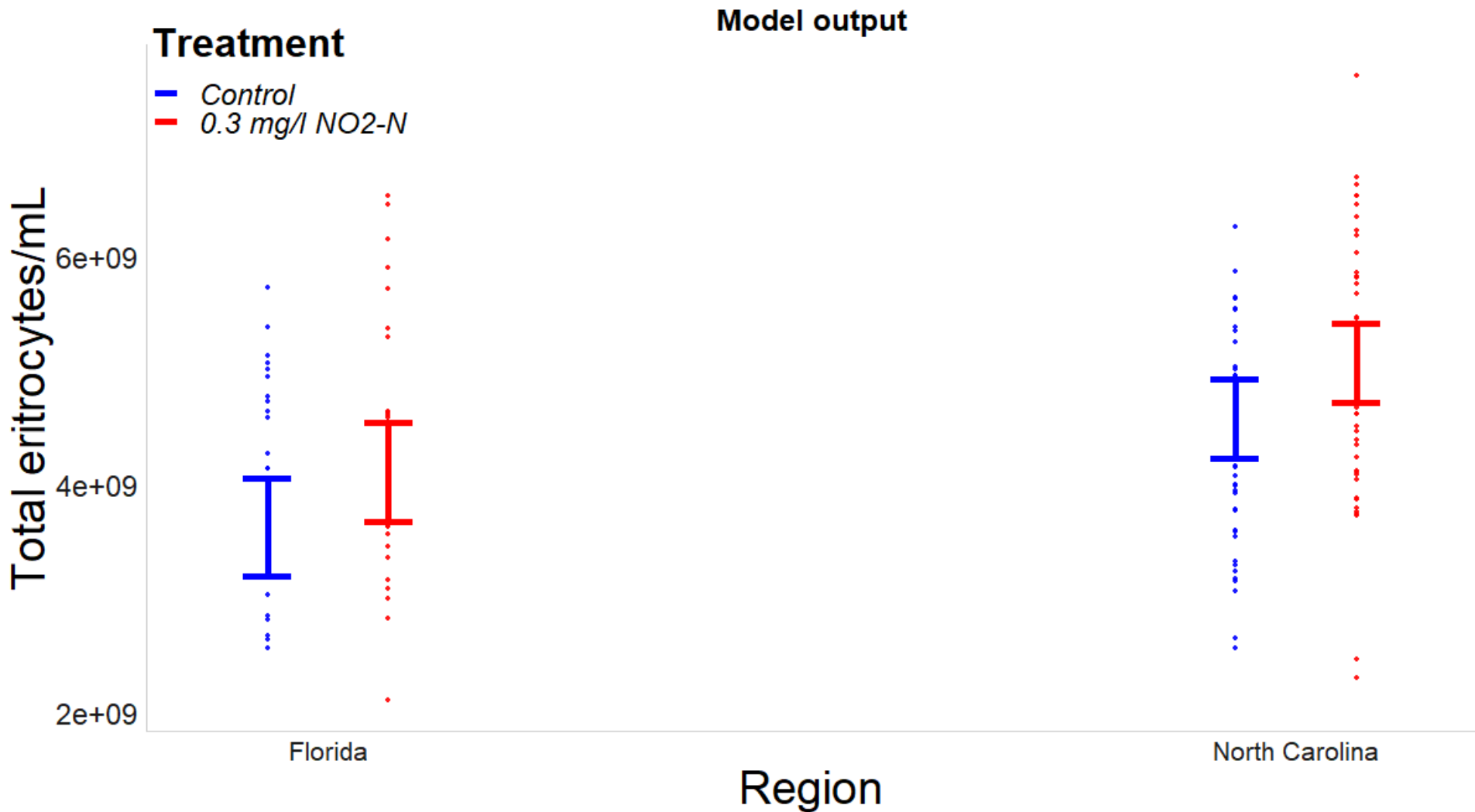
Respiratory rates ('metabolism')



5. RESULTS AND DISCUSSION



Red blood cell counts

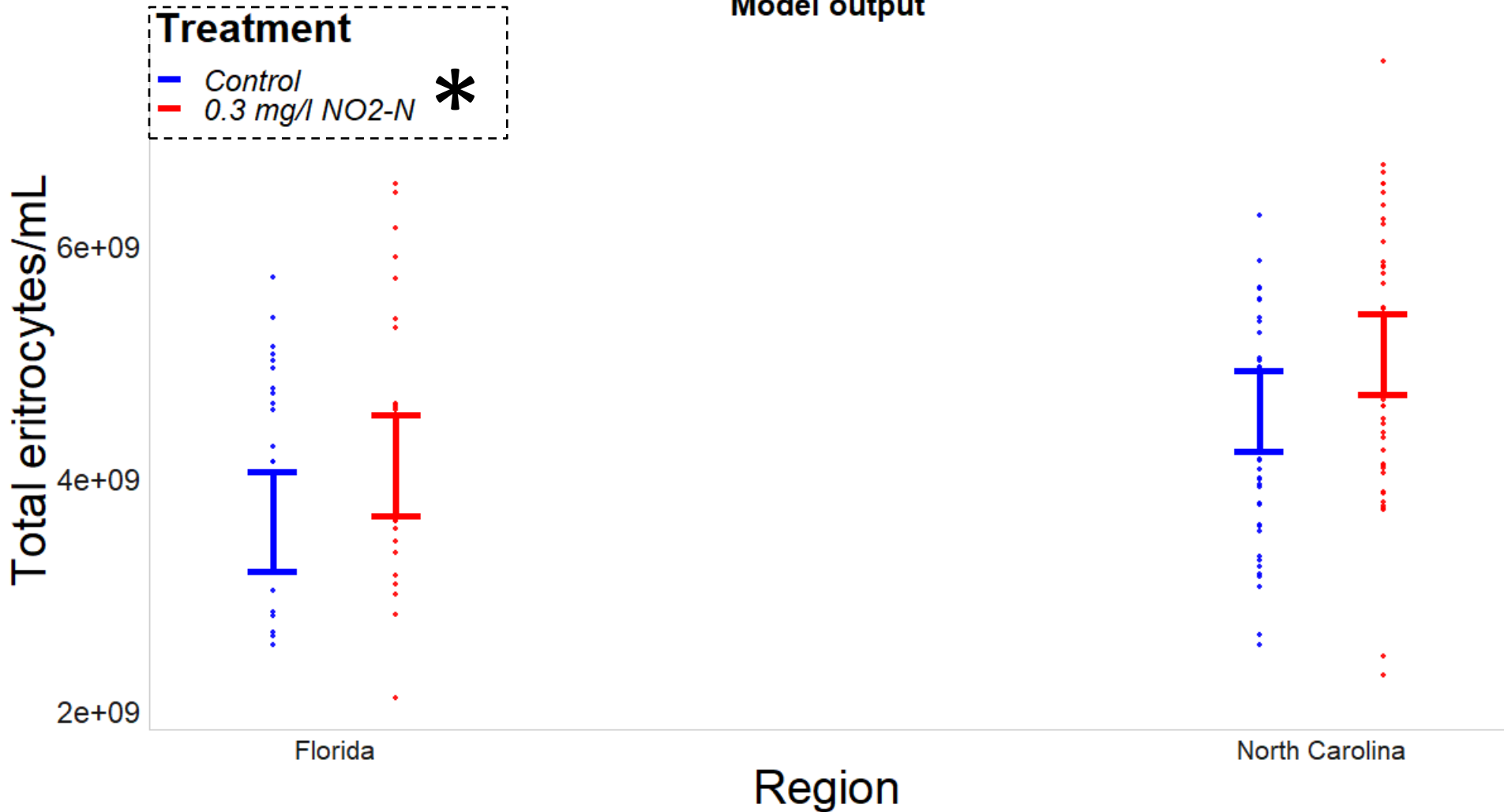




5. RESULTS AND DISCUSSION

Red blood cell counts

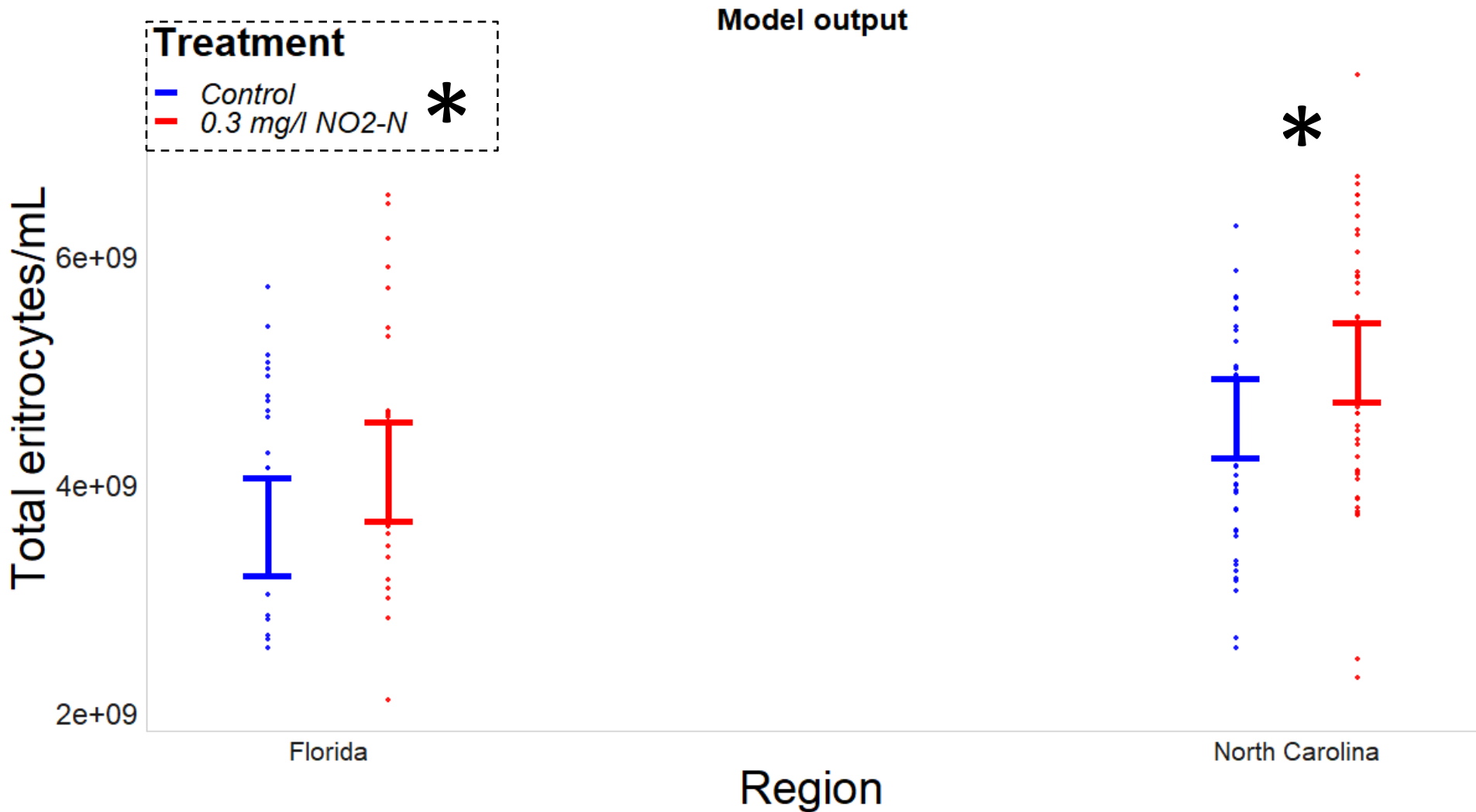
Model output





5. RESULTS AND DISCUSSION

Red blood cell counts



ACKNOWLEDGEMENTS



University of Florida

DENSLOW lab 

**Goethe
Frankfurt (Germany)**

Jonas Jourdan

Universität



**IDAEA-CSIC
(Spain)**

Carlos Barata



**Universitat de Barcelona
(Spain)**

Adolfo de Sostoa
Alberto Maceda Veiga
Sergi Vargas



UNIVERSITAT DE
BARCELONA

Servei de Control de Mosquits (Spain)

Carles Aranda





GOETHE
UNIVERSITÄT
FRANKFURT AM MAIN



UF UNIVERSITY of
FLORIDA