

The Effects of Spraying Mosquitoes on Macroinvertebrates in Spring Creek, Laramie, WY

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Wyoming Natural
Diversity Database

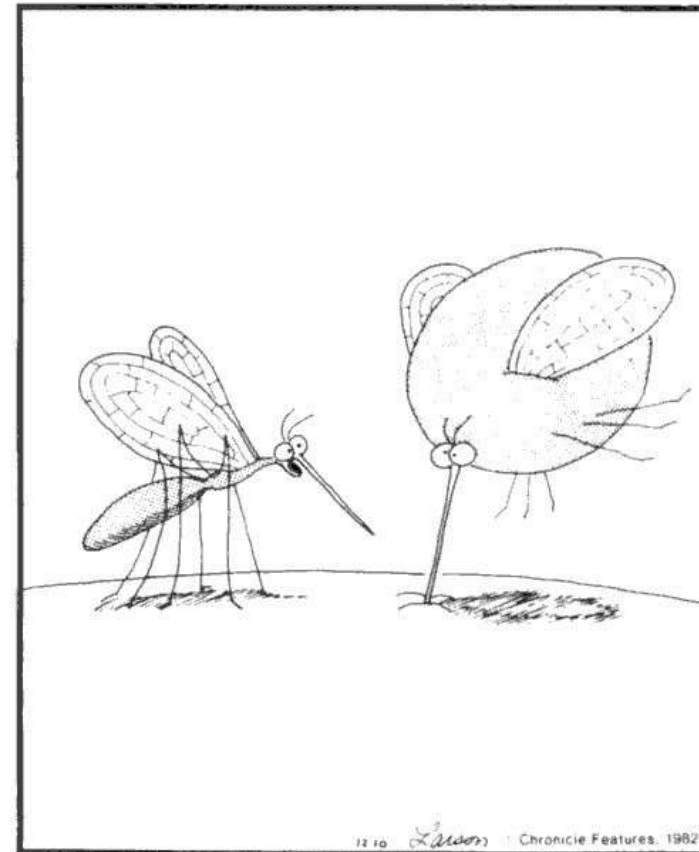


Mosquito Control Programs

- ▶ Widespread Throughout the Western United States
- ▶ Why?:
 - ▶ Disease Prevention, Zika and West Nile Virus
 - ▶ Nuisance
- ▶ Designed to target mosquitoes, but chemicals often affect larger spectrum of species

THE FAR SIDE

By GARY LARSON



12 10 Larson Chronicle Features, 1982

"Pull out, Betty! Pull out! . . . You've hit an artery!"

Permethrin as a Control Chemical

- ▶ Permethrin, common insecticide
 - ▶ Used to control adult mosquitoes
 - ▶ Used in treating clothes
 - ▶ Effectively controls many aquatic and terrestrial insects, especially mosquitoes
 - ▶ Laboratory studies indicate Permethrin being highly toxic to fish and other aquatic invertebrates



Laramie's Mosquito Control

- ▶ Use of larvacides
- ▶ Use of Permethrin
 - ▶ April/May- September/October
 - ▶ Ultra-Low Volume Foggers
 - ▶ Sprayed at night
 - ▶ Rotating schedule for residential treatment
 - ▶ Treat Parks Sunday-Thursday nights



How Does Permethrin Work?

- ▶ Insects and aquatic invertebrates affected by contact or consumption
- ▶ Targets nervous system and eventually causes death



<http://www.mosquitommarshals.com/bugs-diseases/>

Questions:

- ▶ To what degree does spraying mosquitoes affect aquatic invertebrates?
 - ▶ Do the density and biomass of invertebrates decrease during spraying periods?
 - ▶ Do different taxa respond differently to spraying?



The Study Sites



9th Street Bridge

- 1st treatment on 18 June 2013

LaPrele Park

- 1st treatment on 13 June 2013

1.4 miles between sites

Drift Samples



- ▶ 3 Nets spanning the stream (363 μ m)
- ▶ 20 minute intervals
- ▶ Measure flow rate (m/s)
- ▶ Determine invertebrate density (ind/m³)
- ▶ Identify invertebrates

Why do insects drift?

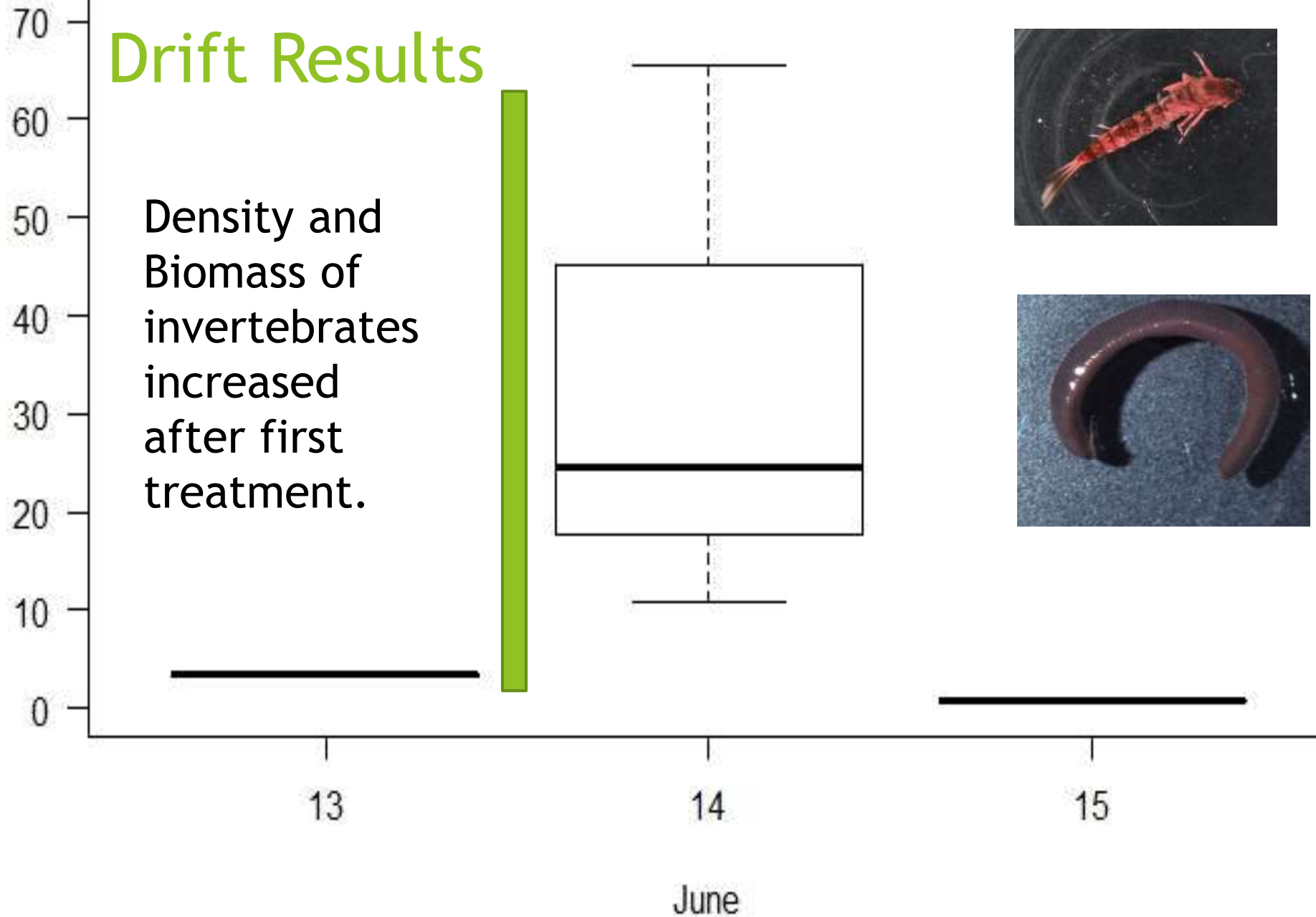
- ▶ Change location
- ▶ Loose footing
- ▶ Avoid :
 - ▶ Predation
 - ▶ Pollution
 - ▶ Undesirable water conditions



Drift Results

Density (ind./m³)

Density and Biomass of invertebrates increased after first treatment.



Benthic Samples



- ▶ Hess sampler placed in creek bed
- ▶ Two pre-application, Two post-application
- ▶ Purpose:
 - ▶ Identify invertebrates
 - ▶ Measure invertebrate density
 - ▶ Calculate invertebrate biomass

Benthic Taxa

► LaPrele Park



Worms



Crane flies



Leeches



Seed shrimps



Non-biting Midges

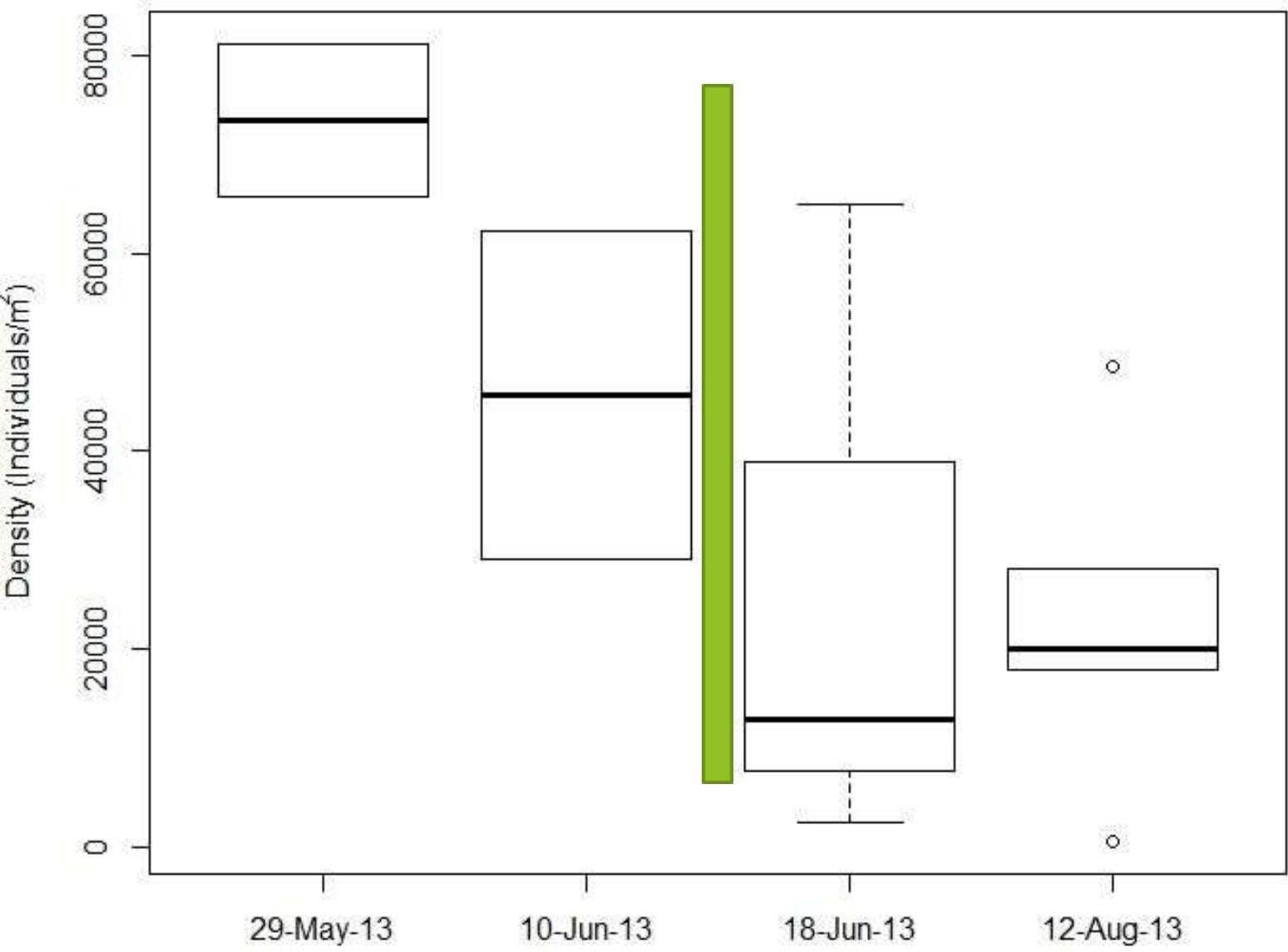


Water Mites



Snails

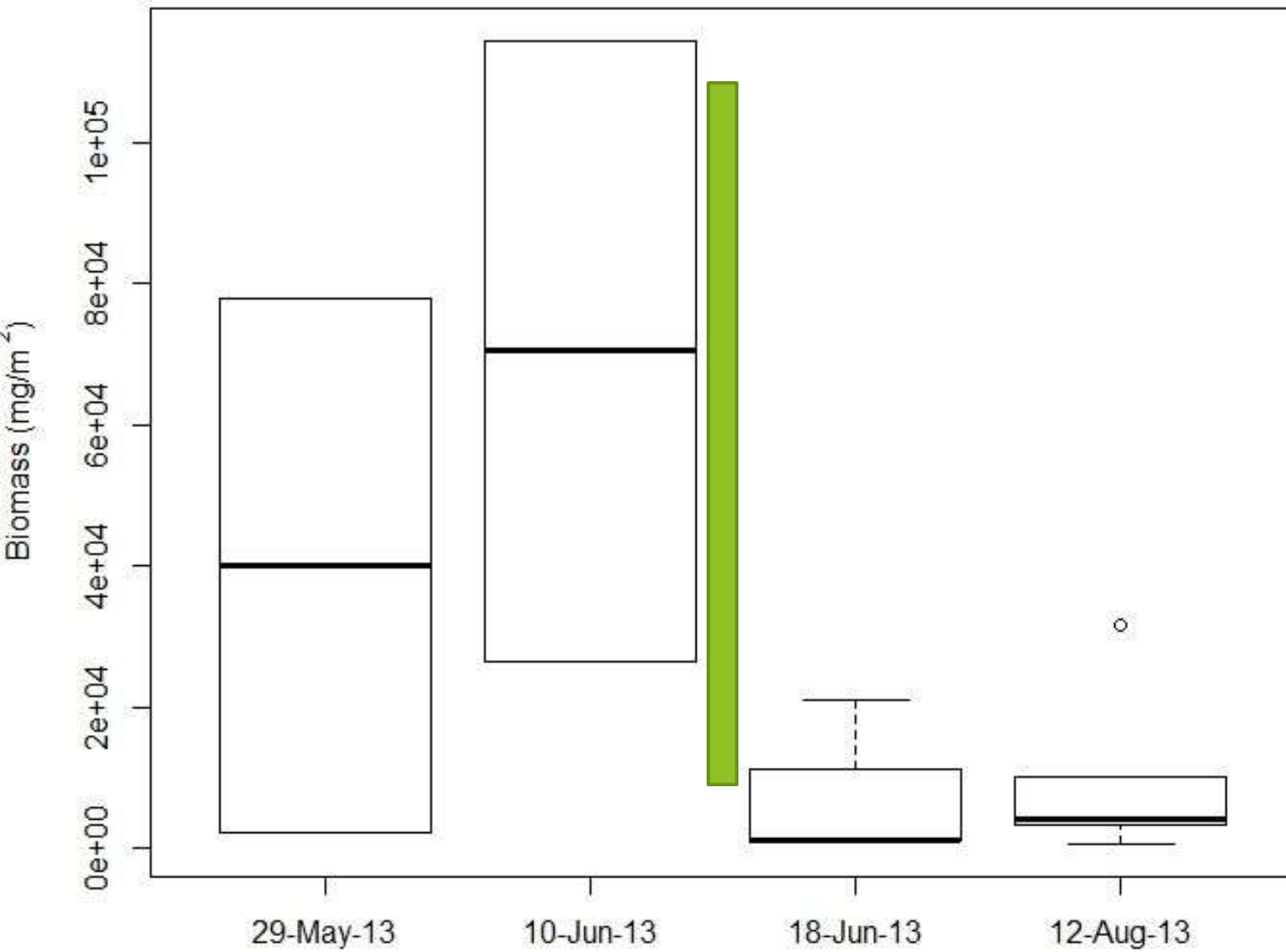
Benthic Results



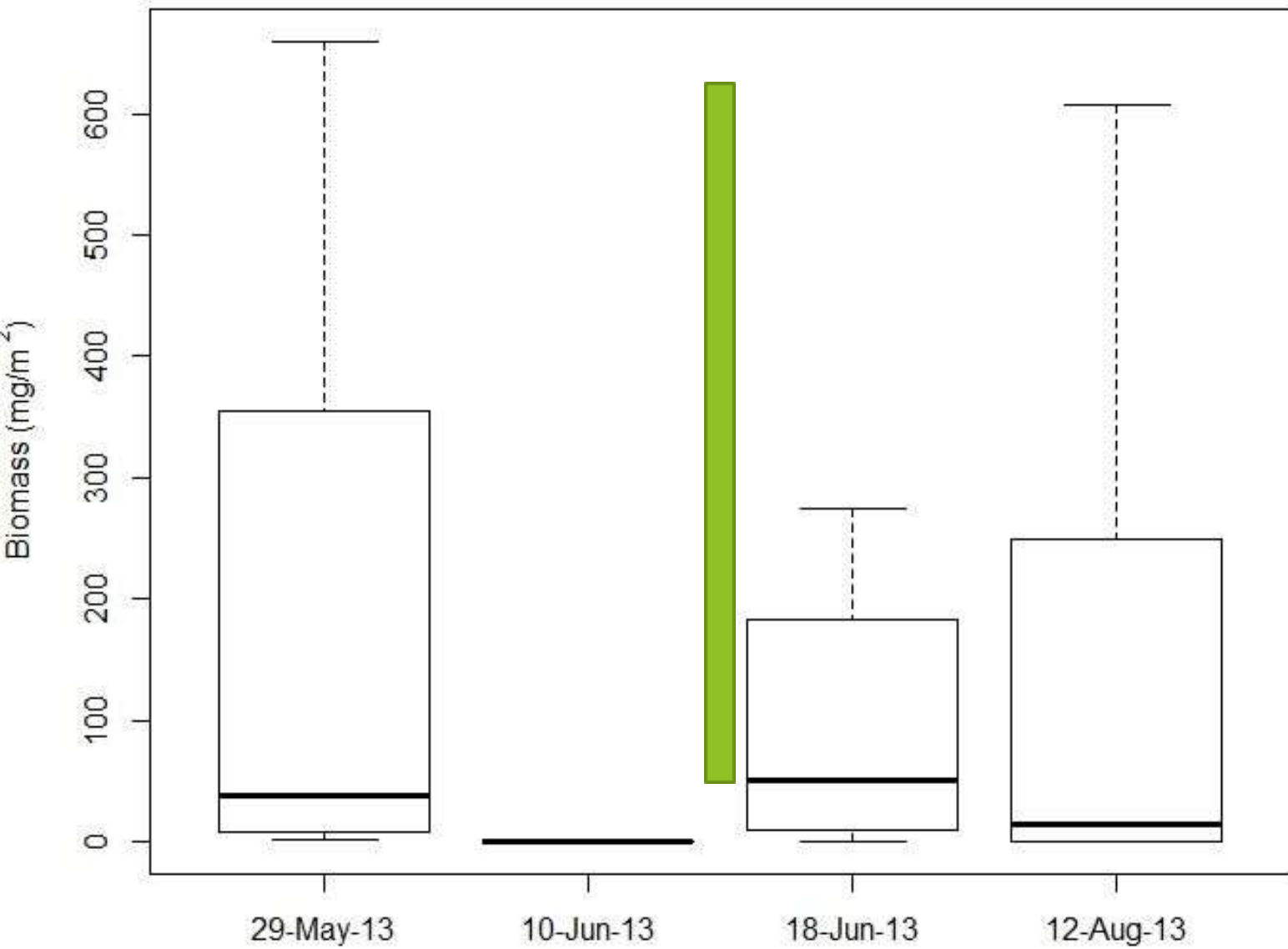
Total Invertebrate Density



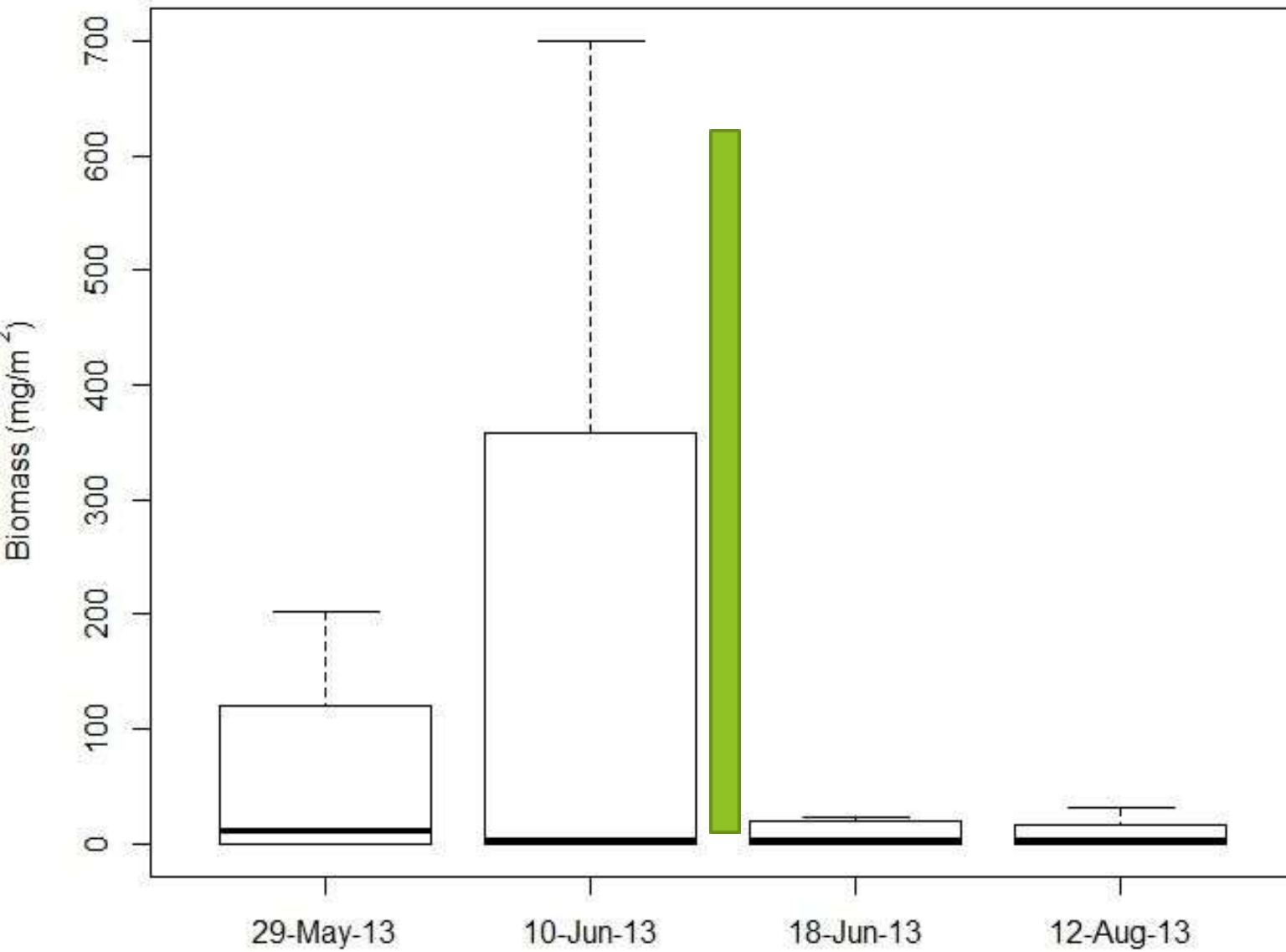
Total Invertebrate Biomass



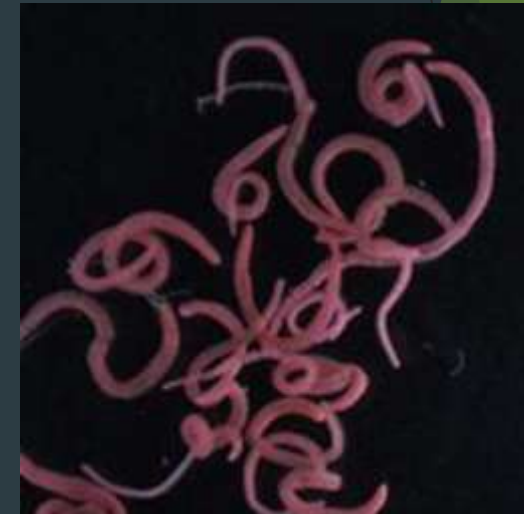
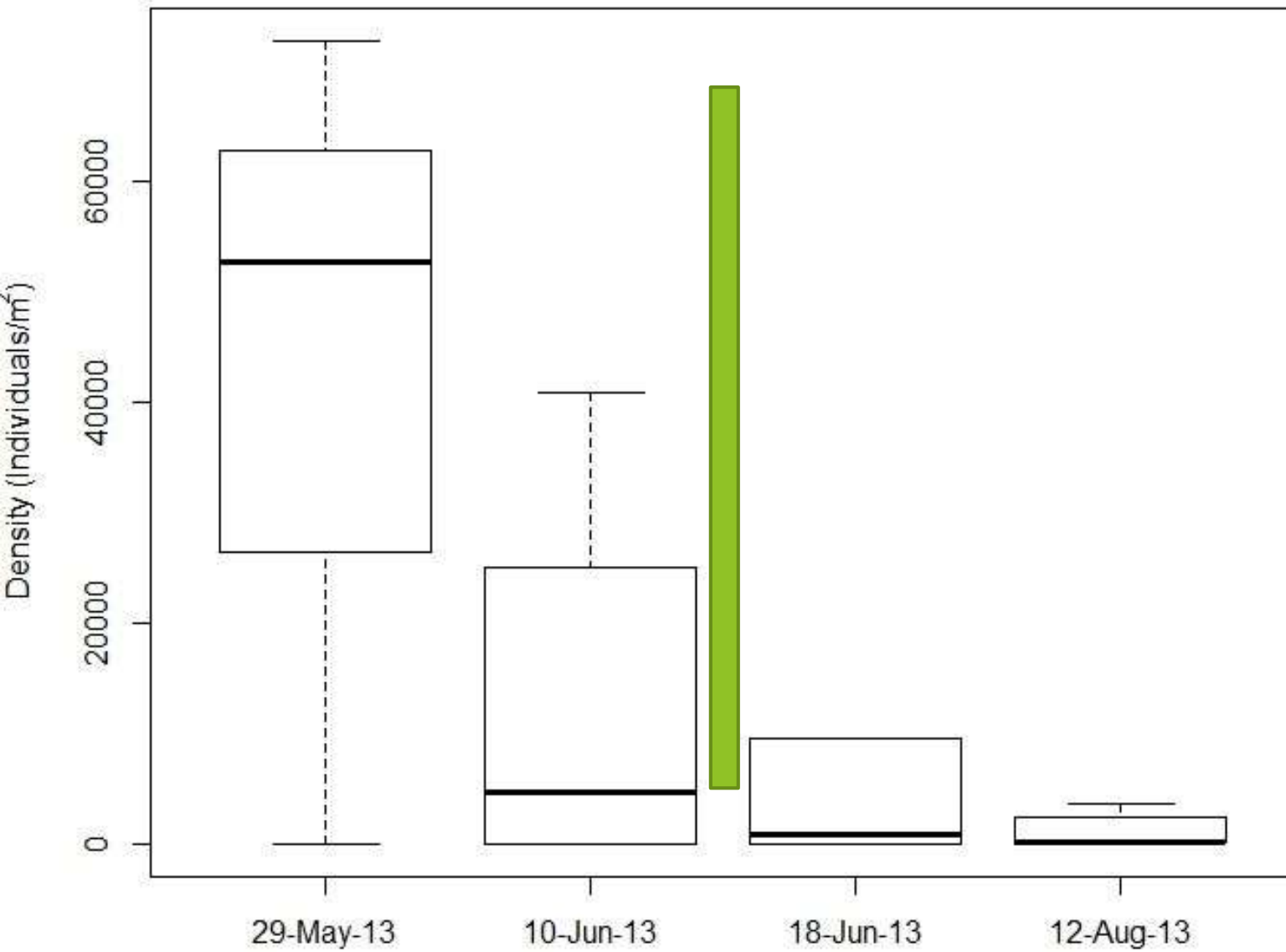
Insect Biomass

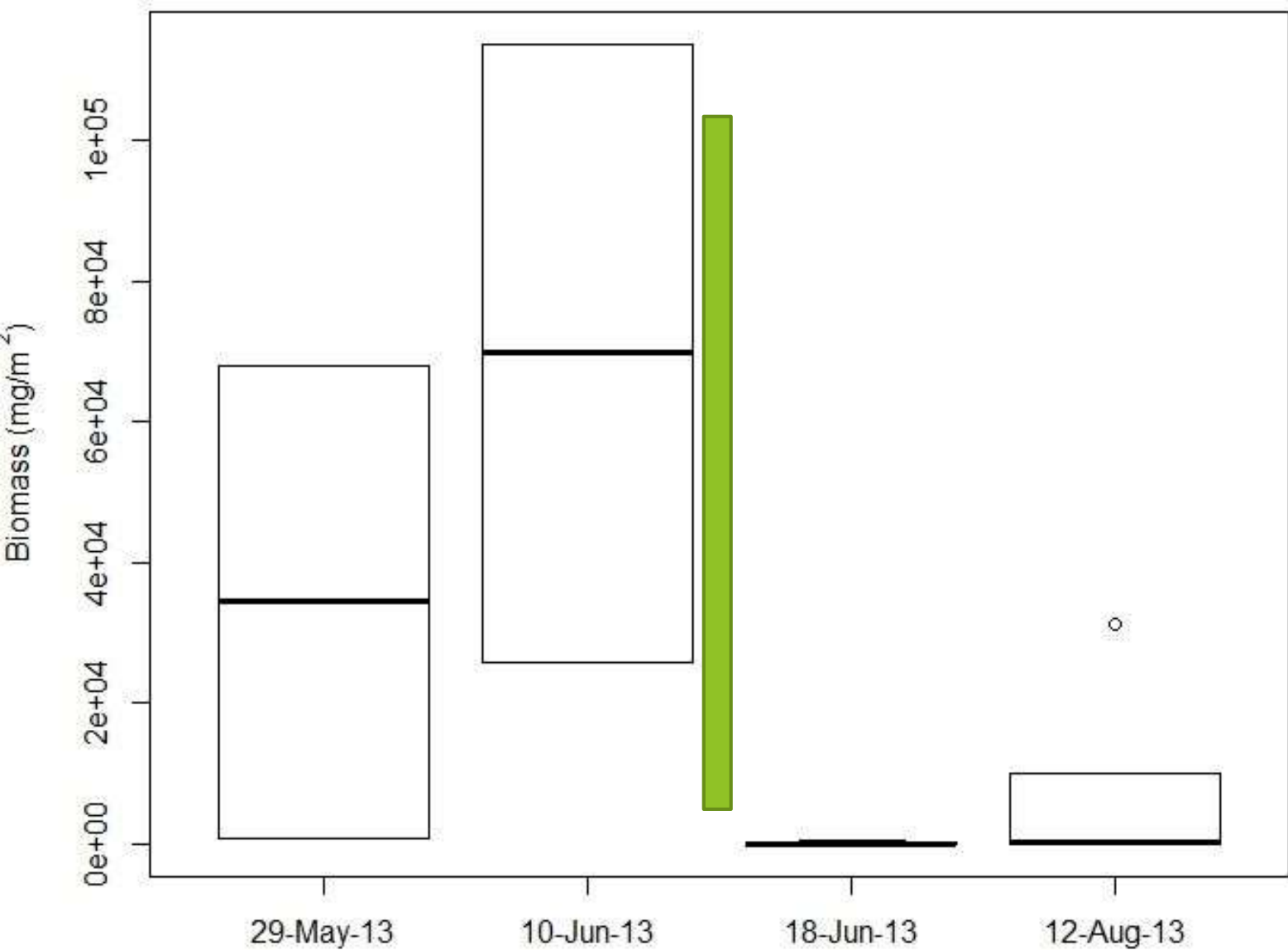


Non-Insect Biomass



Annelid Density





Worm Biomass



Conclusion

- ▶ Increase in invertebrate drift following treatment
- ▶ Decrease in invertebrate density and biomass in benthos
- ▶ Benthic samples still being processed
- ▶ If invertebrates reduced, changes in food webs could result:
 - ▶ Reduction in invertebrate predators
 - ▶ Increases in bacteria and algae



Future Work

- ▶ Finish processing benthic samples
- ▶ Analyze all data
- ▶ Write manuscript
- ▶ Give results to the City of Laramie Mosquito Control
- ▶ Additional studies of Spring Creek ecosystem



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- ▶ Jeff McDonald (photo credit)



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