

Interactions of the invasive New Zealand
Mudsnail (*Potamopyrgus antipodarum*) and native
macroinvertebrates in Polecat Creek, WY

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Summer 2016 EPSCoR Project

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Invasive Species

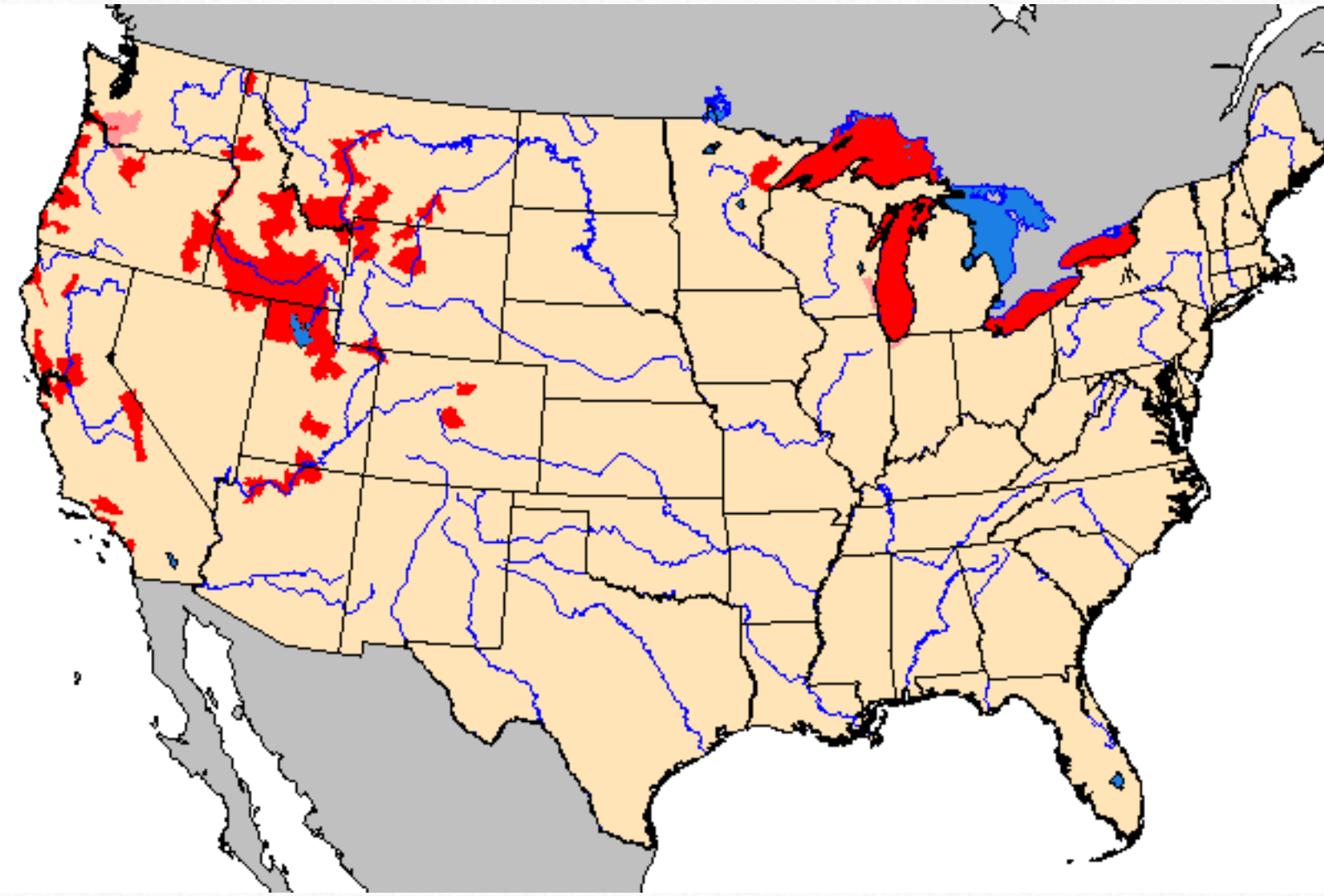
- Non-native species that spreads rapidly and causes ecological or economic harm (Lockwood et al. 2007).
- Long-term effects of invasive species are largely unknown.
- Invasive species are second largest threat to biodiversity worldwide (Wilcove et al. 1998).
- 52% of invertebrates are imperiled due to invasive species (Wilcove et al. 1998).

New Zealand Mud Snail

Potamopyrgus antipodarum

- Found in Greater Yellowstone Ecosystem in 1994 (Kerans et al. 2005).
- Change carbon and nitrogen cycling in Polecat Creek (Hall et al. 2003).
- Consume 75% of gross primary producer biomass (Hall et al. 2003).
- Change native macroinvertebrate community composition (Kerans et al. 2005; Cross et al. 2010; Brenneis et al. 2011).
- Have reached densities of 500,000 ind./m² in Polecat Creek (Hall et al. 2006).





USGS 2016

Invasive Abilities of New Zealand Mud Snails

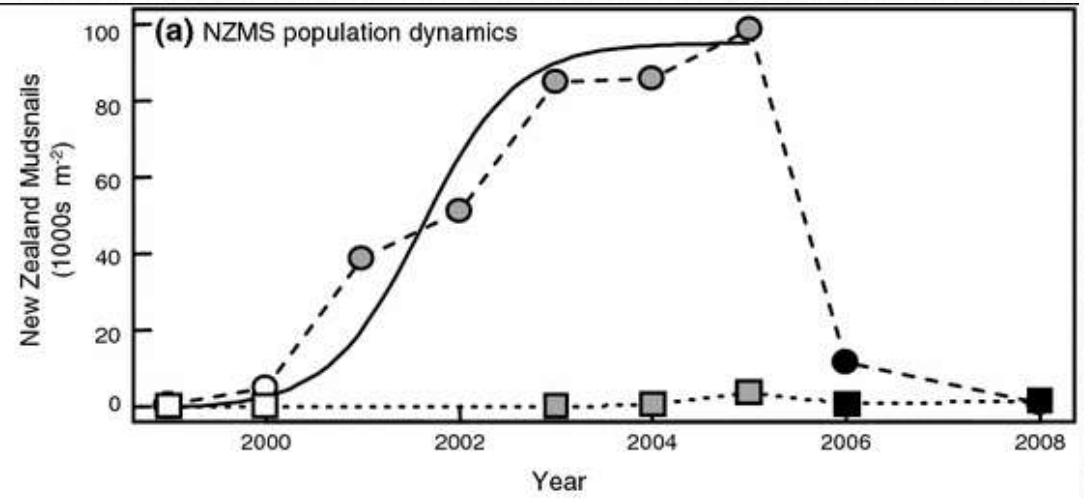
- Parthenogenic reproduction
- Few natural predators/parasites in invaded habitats
- High tolerance for desiccation
- Wide environmental tolerances
- Easy to spread



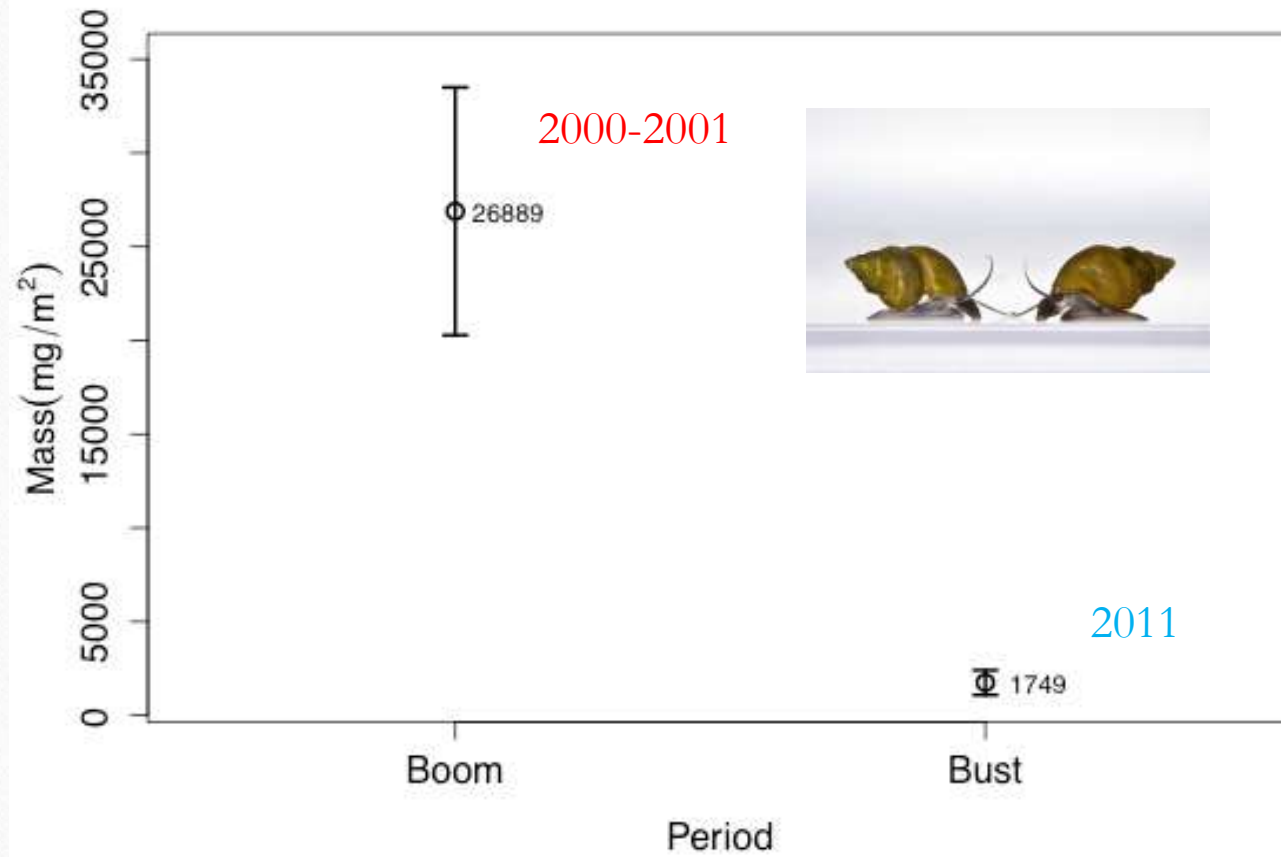
Alonso and Castro-Diez 2008

“Boom and Bust”

- Population density grows rapidly and later crashes due to ecological constraints.
- “Boom and bust” *P. antipodarum* cycle observed in the Upper Owens River, California (Moore et al. 2012).
- Polecat Creek *P. antipodarum* population has likely declined in recent years (Thon et al. in prep).



New Zealand Mudsnail



Greenwood et al. in prep

Effects on Native Macroinvertebrates

- What are effects of the large decline of *P. antipodarum* on community assemblage of native macroinvertebrates in Polecat Creek, WY?

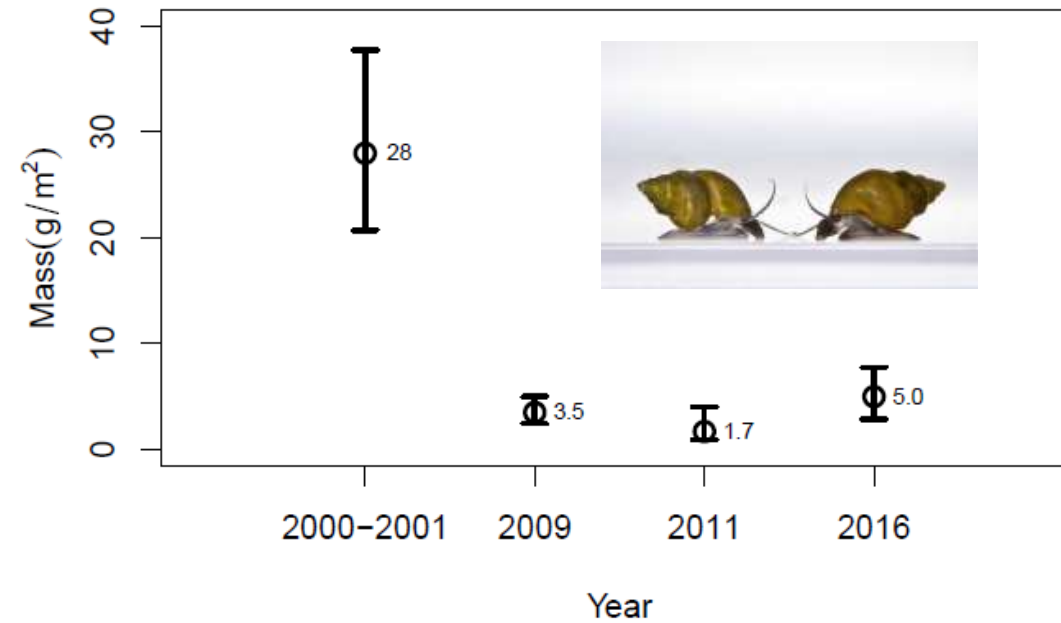
Methods

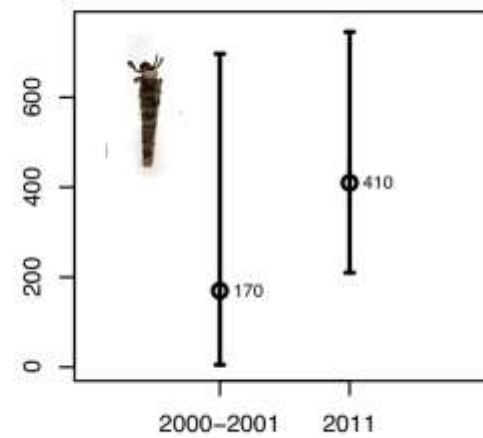
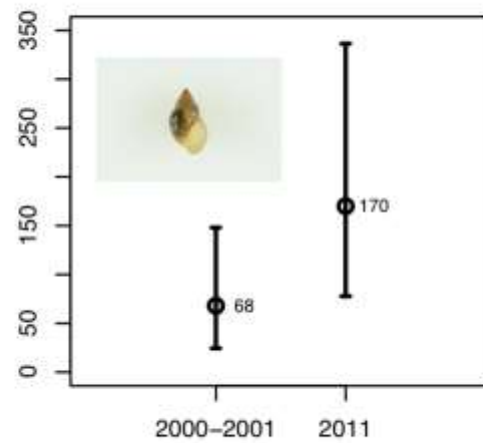
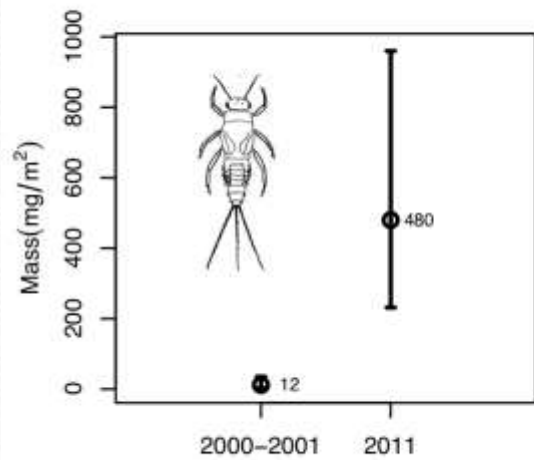
Field Survey

- 6 Stovepipe samples taken monthly June-September 2016
- Sampled at same location and used same methods as Hall et al. 2006
- Stovepipe sampling method
 - Elutriated samples
 - Samples transported into 70% ethyl alcohol
 - Samples sorted and snails/macroinvertebrates identified and measured in lab

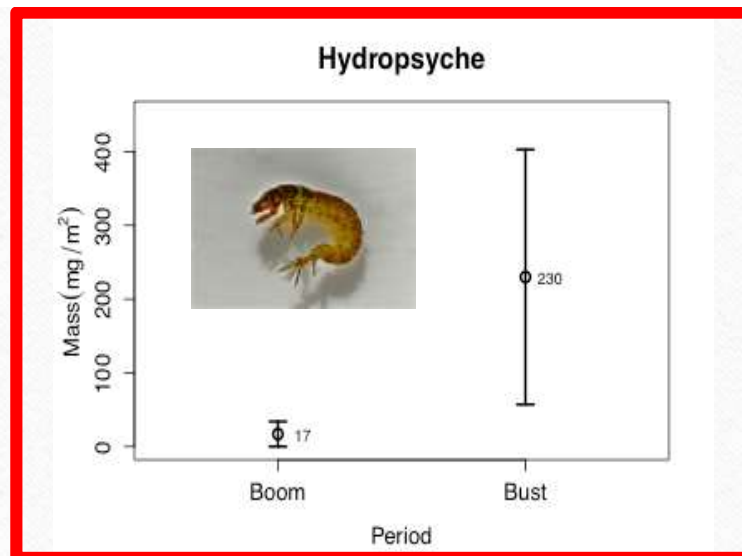


Population Density Results





Boom= 2001
Bust= 2011



Effects on Native Macroinvertebrates

- What are effects of the large decline of *P. antipodarum* on community assemblage of native macroinvertebrates in Polecat Creek, WY?
- What is the mechanism that explains the increase in biomass of *Hydropsyche* caddisflies?

Methods

What is the mechanism that explains the increase in biomass of *Hydropsyche* caddisflies?

- Assessed direct impacts of *P. antipodarum* on native *Hydropsyche* caddisfly
- Placed 4 *Hydropsyche* in experiment chambers and observed net building
- *Hydropsyche* under 3 treatments for 10 days:
 - Control (no *P. antipodarum*)
 - Ambient (162 snails/cage)
 - Dense (430 snails/cage)



Experiment Results

- Mean number of *Hydropsyche* and their nets decreased in all treatments
- Mean number of nets after 10 days did not differ significantly among treatments
- Shows *P. antipodarum* do not actively destroy *Hydropsyche* nets
- May instead interfere with feeding





Special Thanks To:

Lab Assistance:

Jaide Wachtel Callahan Jobe

AMK Staff

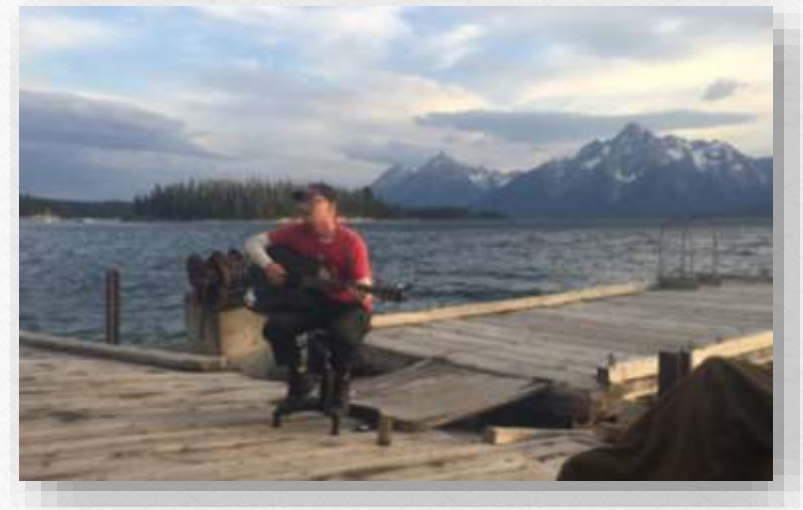
Mentor: Daniel Greenwood

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Wyoming EPSCoR/NSF

Field Assistance:

Daniel Greenwood Callahan Jobe



Questions?



Effects on Native Macroinvertebrates

- Native grazing invertebrates decreased by 80% during “boom” of *P. antipodarum* In Upper Owens River, California (Moore et al. 2012)
- Invertebrates doubled in population size after *P. antipodarum* “bust” (Moore et al. 2012)
- Evidence for increased native macroinvertebrates in Polecat Creek since “bust” of *P. antipodarum* (Greenwood et al. in prep)

