

Sparkling Lake Biomanipulation



Predators

Primary Goal

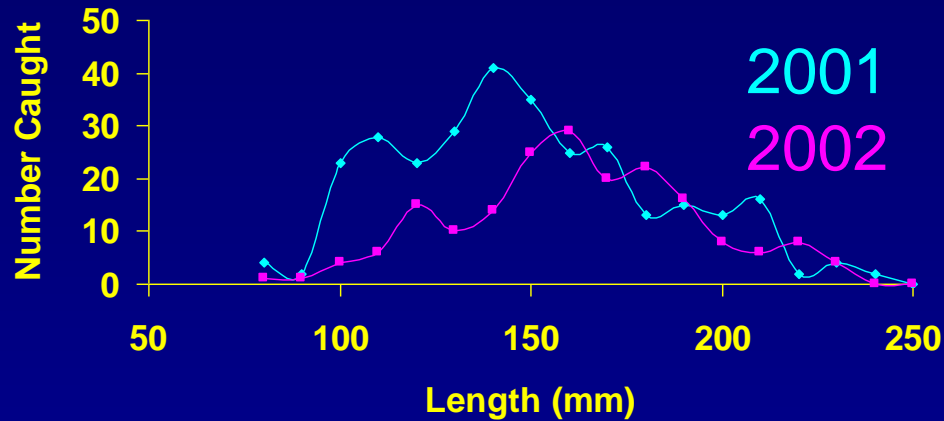
- To determine if native predators are a viable biological control agent of rusty crayfish and smelt

Crayfish and Smelt Predator Populations in Sparkling Lake

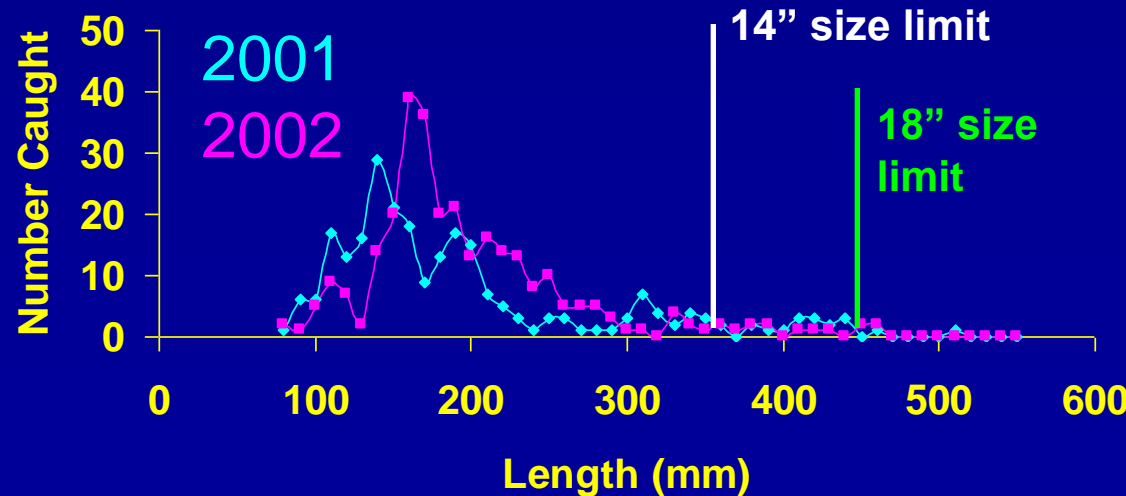
- Rock Bass
 - **2001:** 1,972 (1319-3502)
 - **2002:** 3,864 (2391-10,062)
- Smallmouth bass
 - **2001:** 1,248 (844-2172)
 - **2002:** 5,065 (3004-16122)
- Walleye
 - 2001: ??? (At least 500)
 - 2002: 701 (594-856)
- Muskies
 - 2001: ?
 - 2002: ?

Centrarchid Length-Frequency

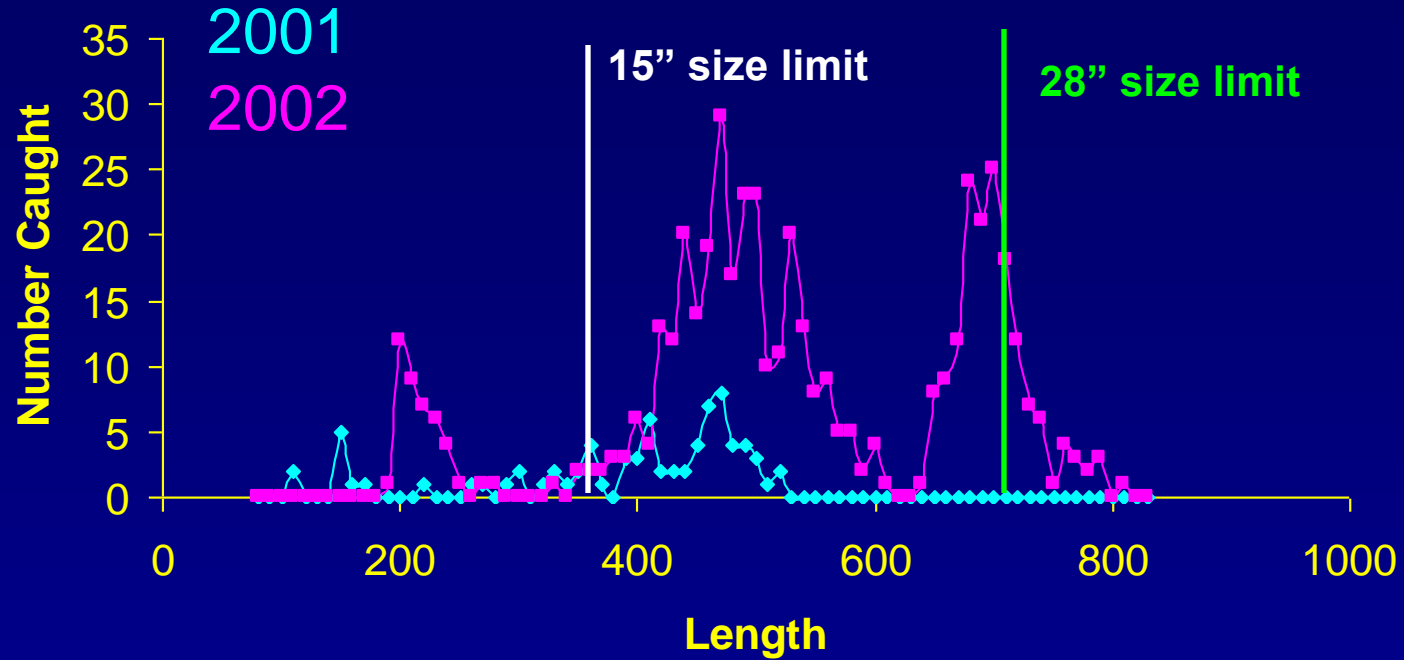
Rock Bass



Smallmouth Bass



Walleye Length-Frequency



Walleye Stocking

- May 2001: ~ 400 adults between 18-24 inches
- May 2002: ~6.4 million fry
- October 2002: 2540 hatchery hold-overs (6-8")

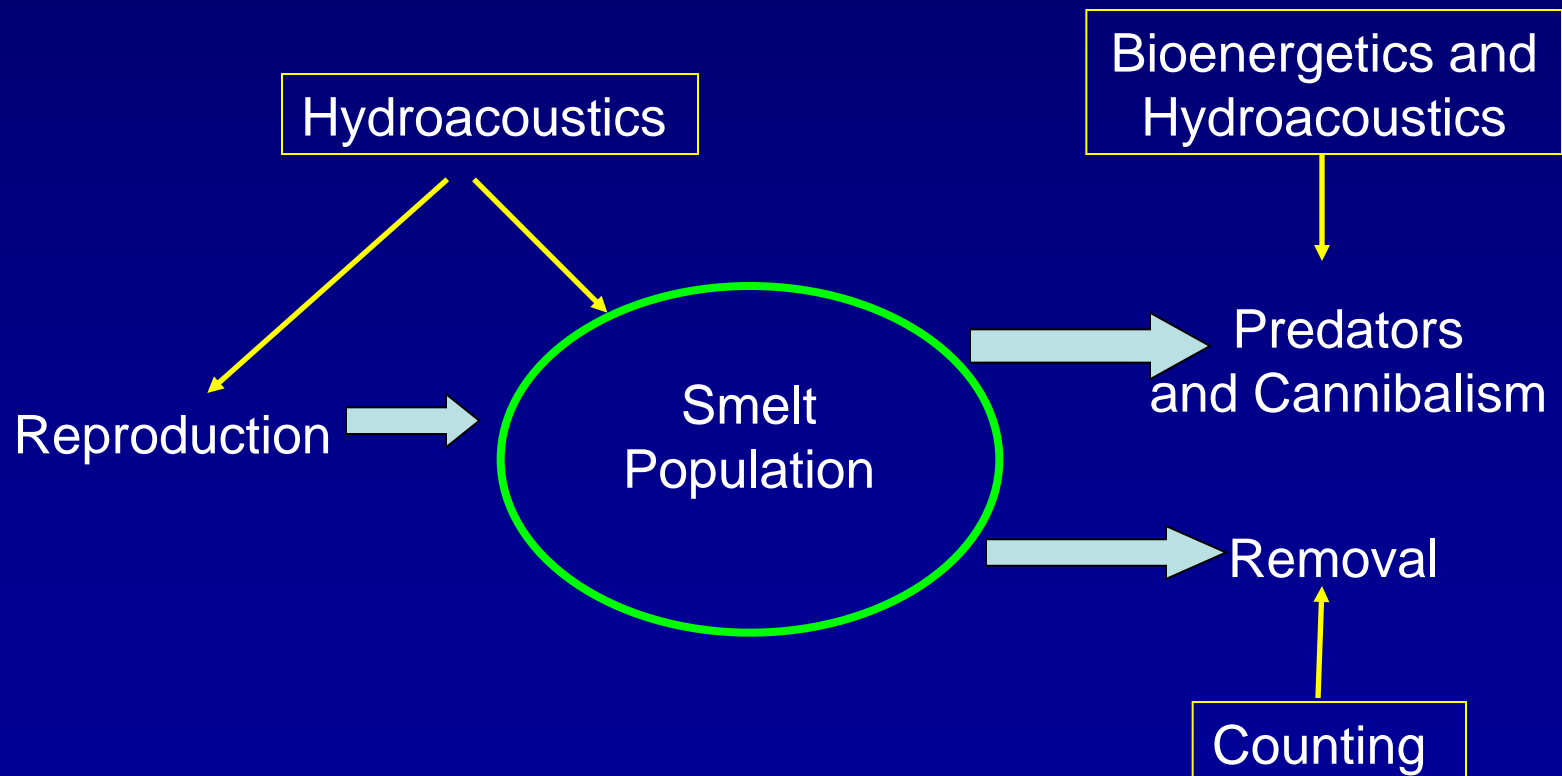
Sparkling Lake Mass Balance Model (SLaMBaM)

- Goals
 - To quantify the effect of removal effort and predation on SpL smelt population
- Necessary data
 - Smelt diets
 - Predator diets
 - Population estimates of predators and smelt (adult and YOY)
 - Removal estimates

SLaMBam Collaborators

- Tom Hrabik
- Damon Krueger
- Brian Roth
- Stacy Lischka
- Norman Mercado-Silva

SLaMBaM Schematic



SLamBam Progress

- Smelt Diets Analyzed (2002 only)
- Predator Diets Analyzed (2001-2002)
- Hydroacoustics Completed (2001-2002)
- Bioenergetics of Predators

Predator Consumption of Smelt

- Walleye (2002): 249,565g of smelt consumed
 - 20,797 smelt (12g/smelt)
- Smallmouth (2002): 45,678g of smelt consumed
 - 3,807 smelt (12g/smelt)
- Total: 24,604 fish

But what about crayfish?

- Crayfish population characterization
 - Determine if crayfish populations are susceptible to depensation
- Consumption of crayfish by predators
 - Just how many crayfish do predators eat in Sparkling Lake?

Crayfish Population Characterization

- 12-lake survey across a gradient of crayfish trap catches
- Density estimates of all 4 crayfish year-classes
- Cobble substrate only



How will the crayfish population react to exploitation?

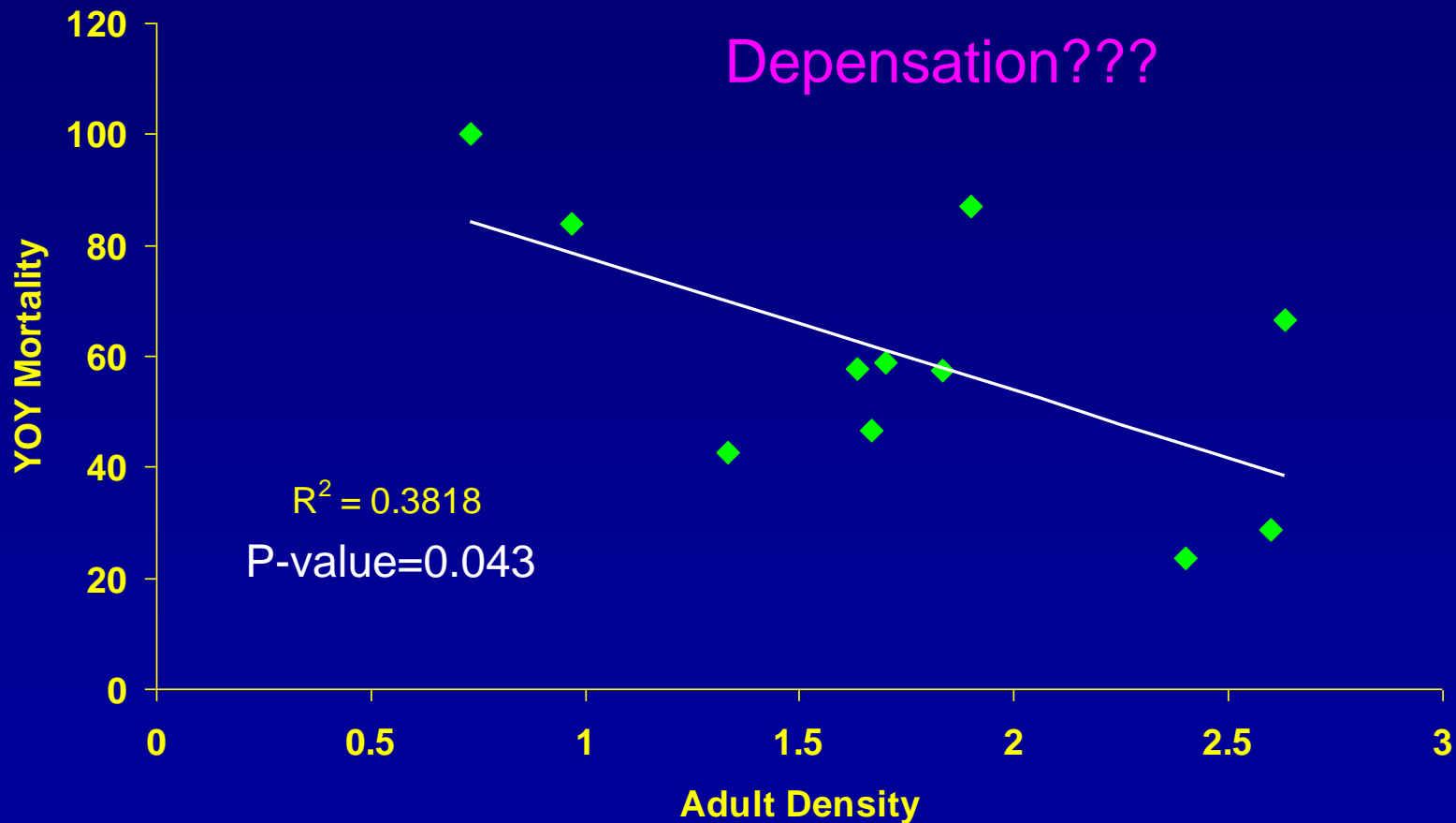
- 1. Increased survival of juveniles
 - Compensation
- 2.
- 2. Decreased survival of juveniles
 - Depensation
- 3.
- 3. Allee effect?
 - Lower reproduction at low adult densities

Crayfish Population Characterization

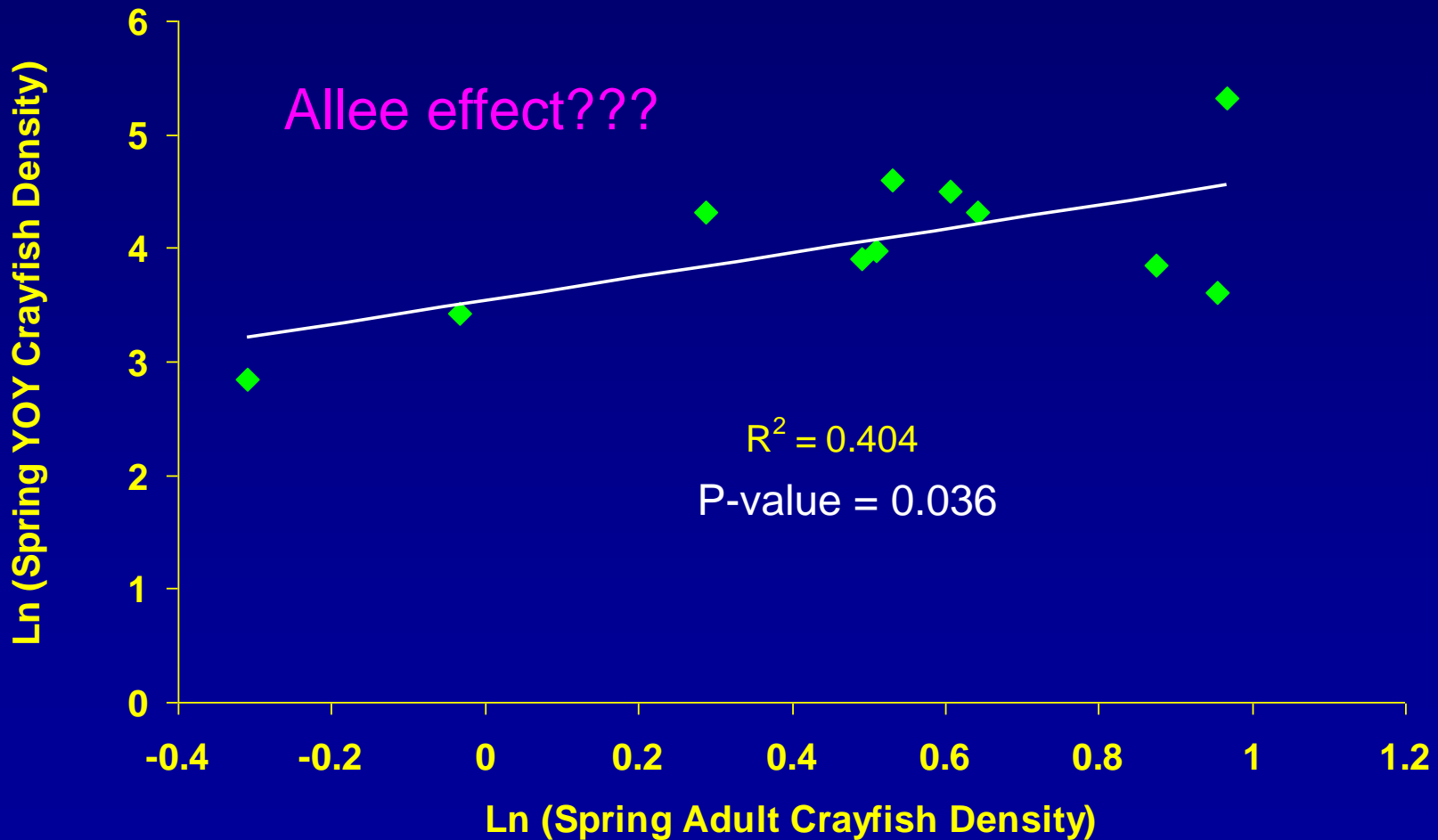
- How is juvenile mortality related to adult abundance?
- Stock-recruitment curve for rusty crayfish
- Are crayfish traps a good indicator of crayfish density?



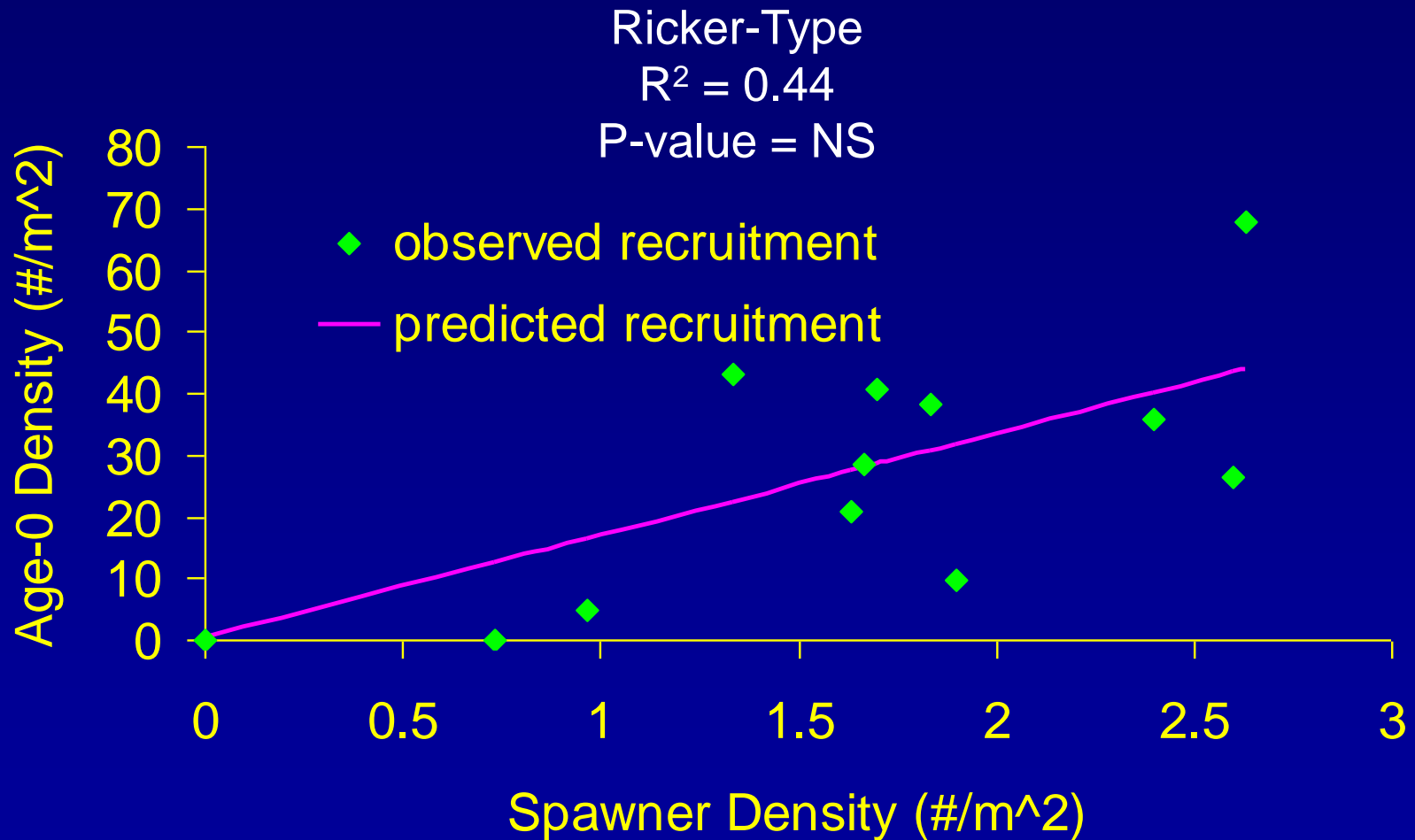
Relationship Between YOY Mortality and Adult Density



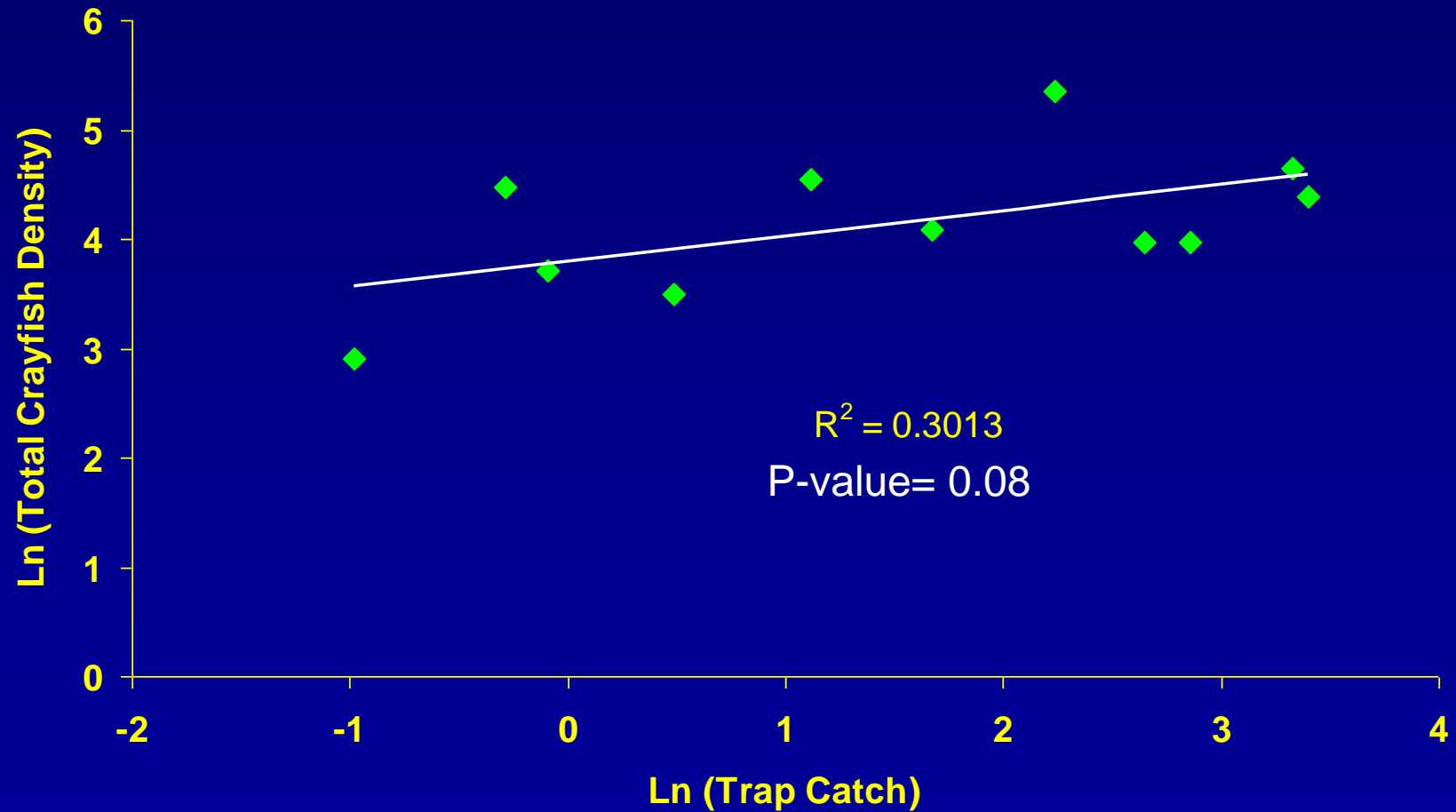
Relationship Between Adult and Juvenile Crayfish Densities



Crayfish Stock-Recruit Function



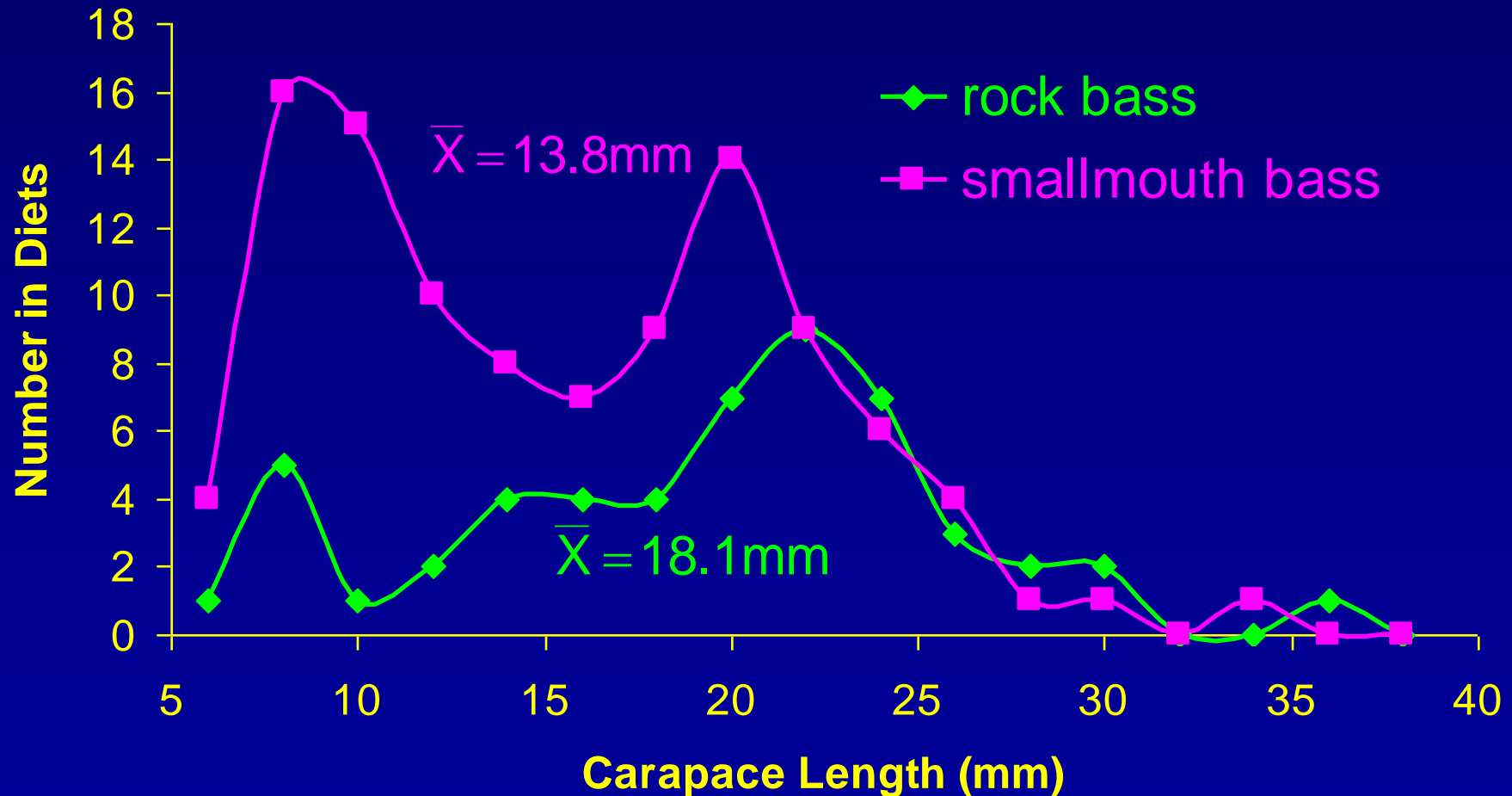
Can Traps Predict Crayfish Densities?



Crayfish Removal Idea

- Overexploit adult crayfish (Katie's job)
- Increase predation on juvenile crayfish

Crayfish Size Distributions in Predator Diets



Consumption of Crayfish

- Smallmouth Bass
(2001): 40,292 ind.
(2002): 63,319 ind.

- *What does this mean?*



Future Directions

- Continue multi-lake crayfish survey
- Gillnet predators in Sparkling Lake pelagic zone
- Collect more diets
- Better population estimates for SMB and RB

Acknowledgements

- Steve Gilbert
- Jim Kitchell, Jake Vander Zanden, John Magnuson
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% Cobble the Best Predictor of Total Crayfish Density

