

# Objectives

- Explore effects of abiotic and biotic variables on fish communities
  - Species richness and growth patterns
  - Among and within lakes
  - Emphasis on littoral structure





# Fish Community Hypotheses

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- Species richness explained primarily by landscape position (PRE=0.659) – *Hrabik et al. in press*
- Size-specific growth in bluegills negatively impacted by human development and removal of coarse woody habitat – *Schindler et al. 2000*
- Alternative: developed lakes promote growth via increased productivity and reduced density dependence (angling pressure)



# Fish species richness affected by?

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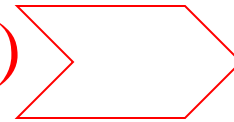
- Landscape position
- Secchi depth (productivity)
- Lake connectivity
- Lake size
- Housing density
- Macrophyte abundance or richness
- Coarse woody habitat
- Exotic species
- Piscivore abundance



# Fish species richness affected by...

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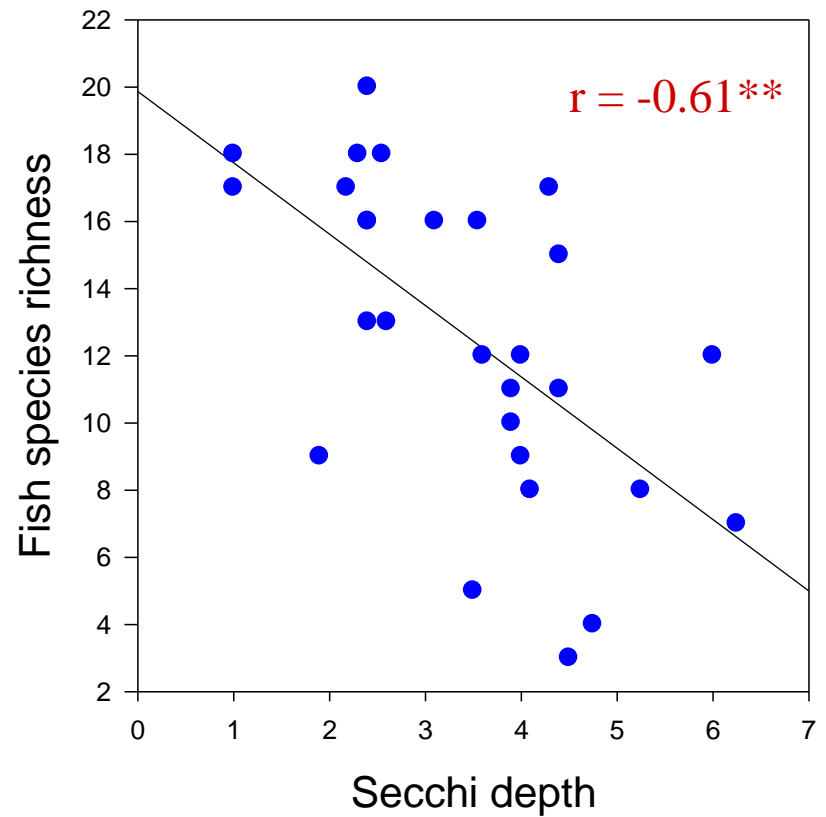
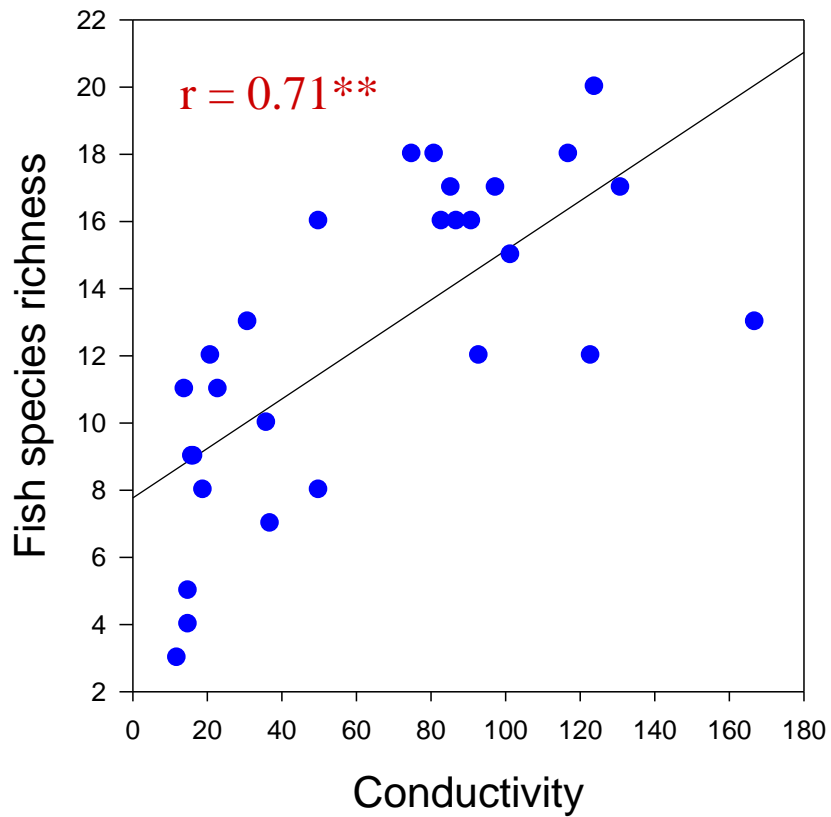
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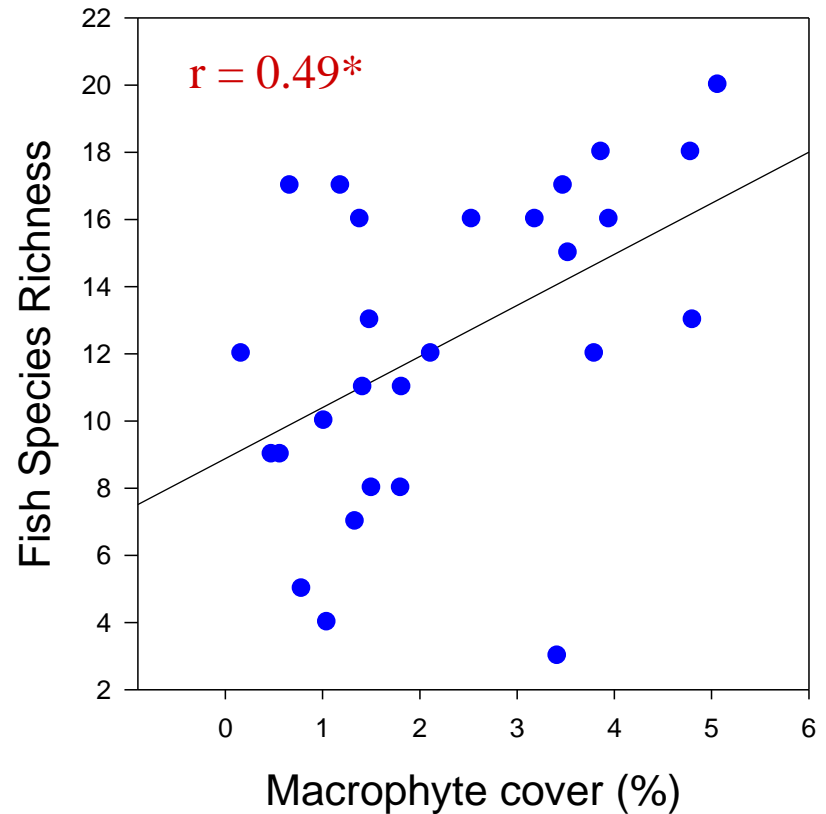
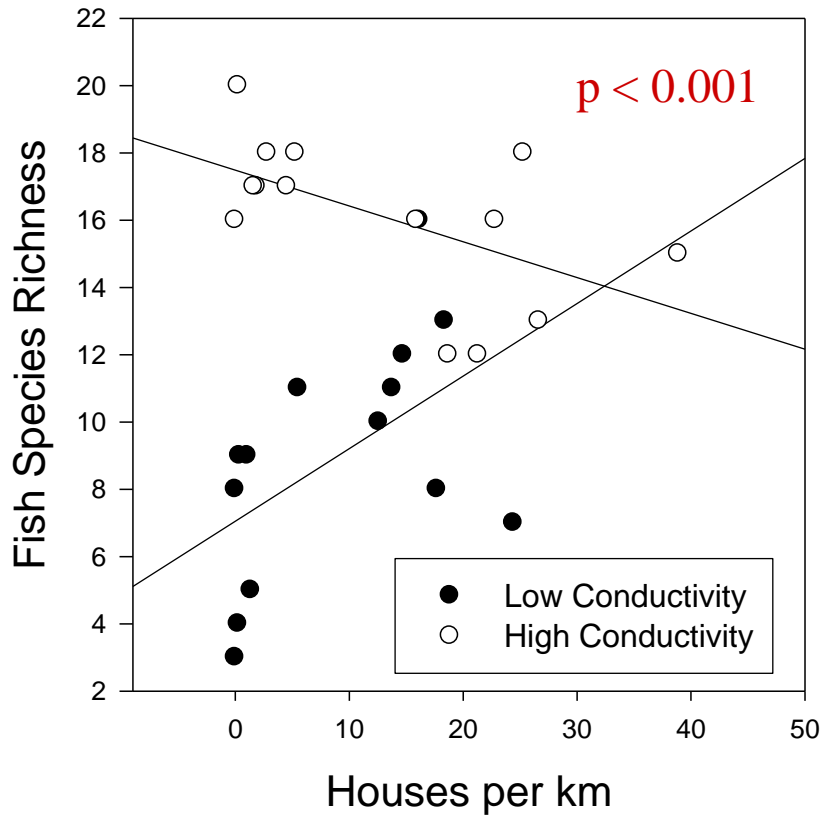
$$R^2 = 0.733$$

$$p < 0.0001$$

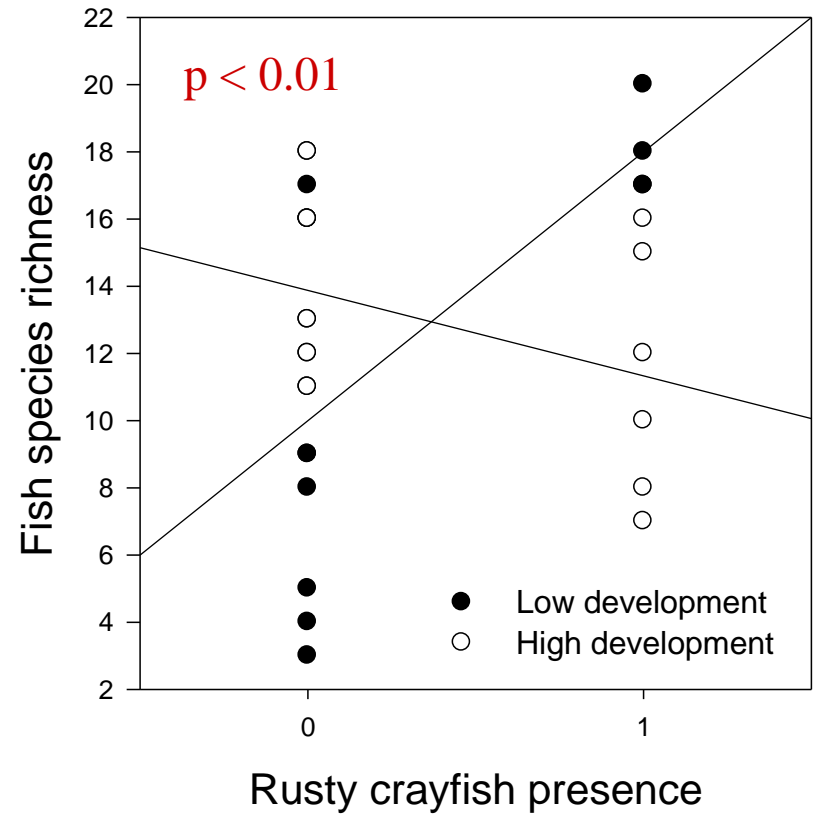
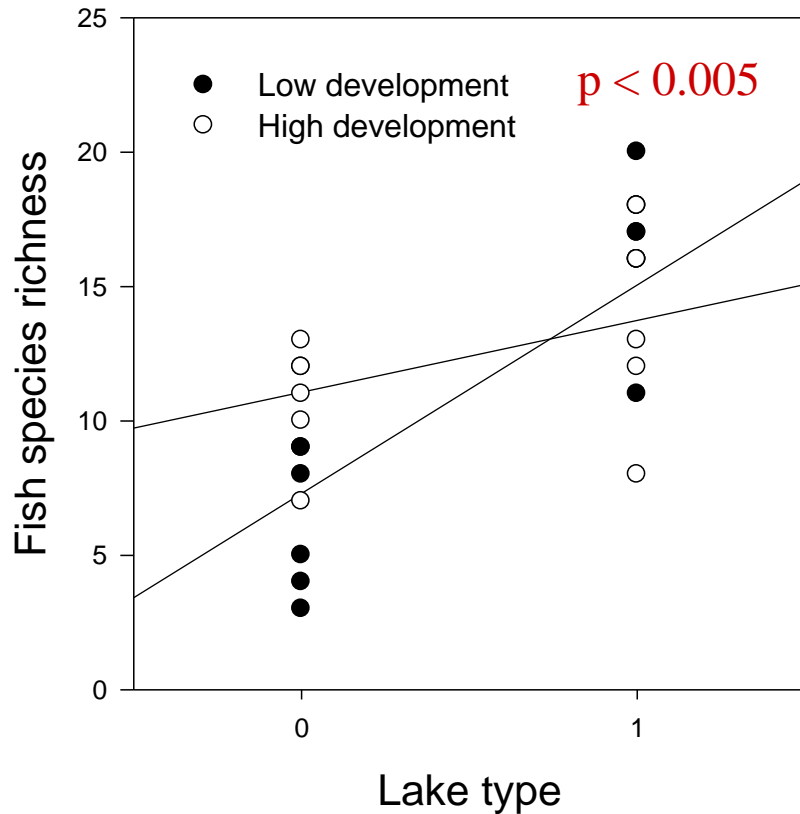
# Fish Species Richness I



# Fish Species Richness II

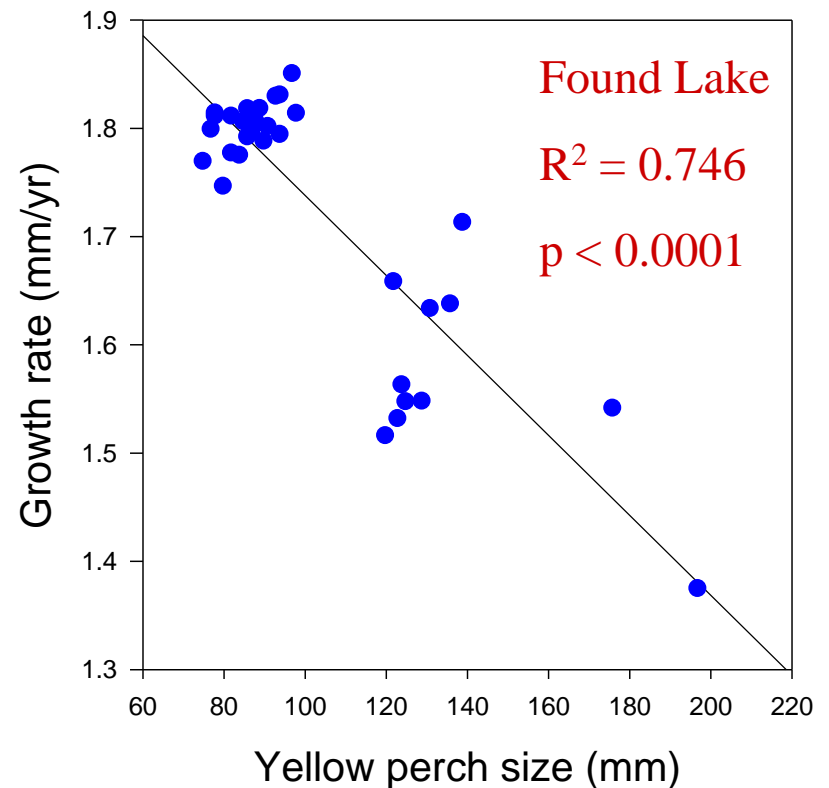


# Development Interactions



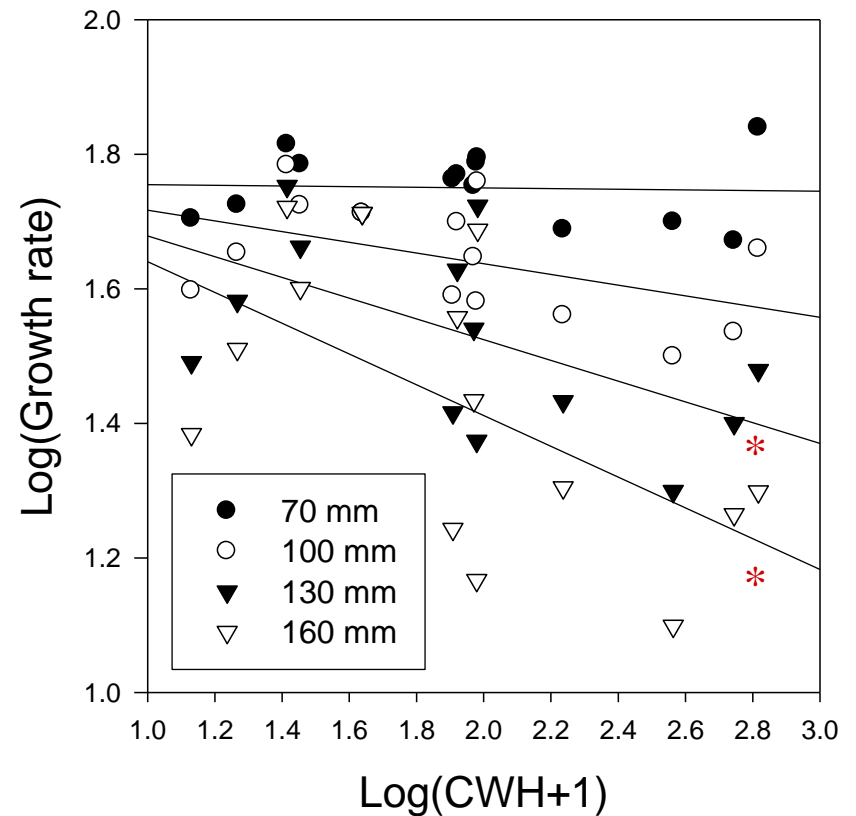
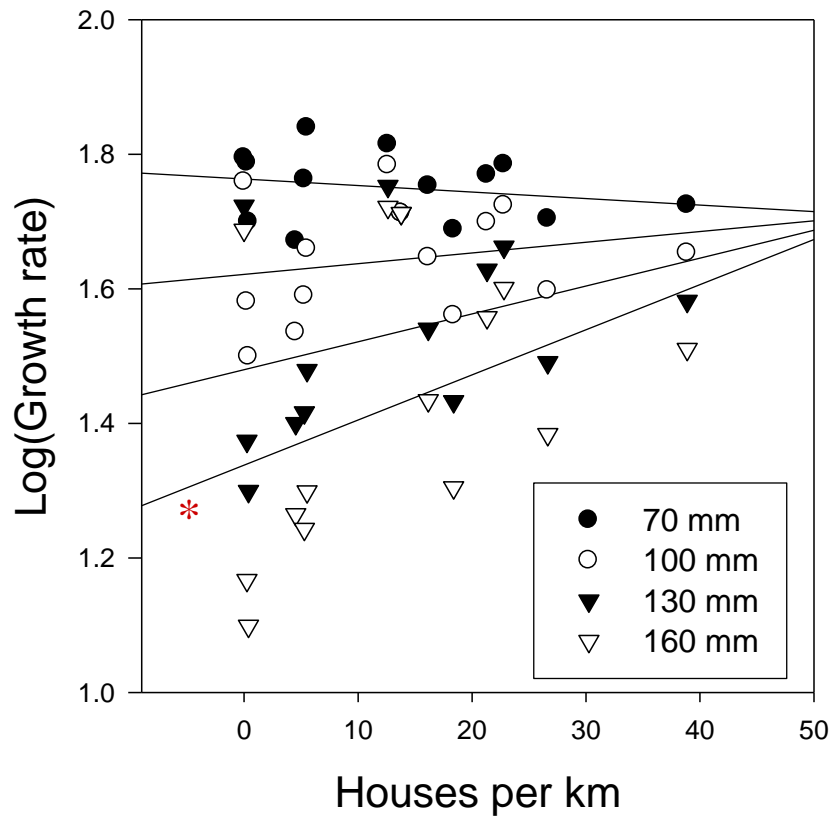
# Size-Specific Growth Rates

- Schindler et al. 2000
- Size vs. growth rates
- Regression for each lake
- Compare predicted rates for select sized fishes





# Size-Specific Growth of Yellow Perch



# Summary

- **Species richness**

- Positive correlation with conductivity, connectivity, and macrophytes
- Negative correlation with secchi depth
- Interactions with development and crayfish



# Summary

- **Size-specific YP growth**

- Positive correlation with housing density
- Negative correlation with CWH
- Consequence of productivity?



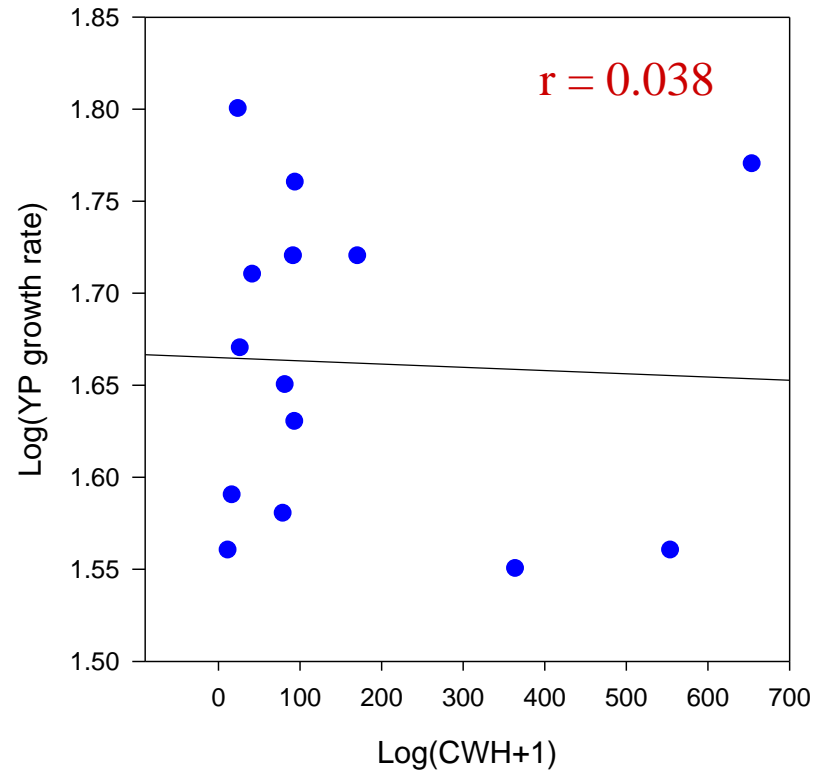
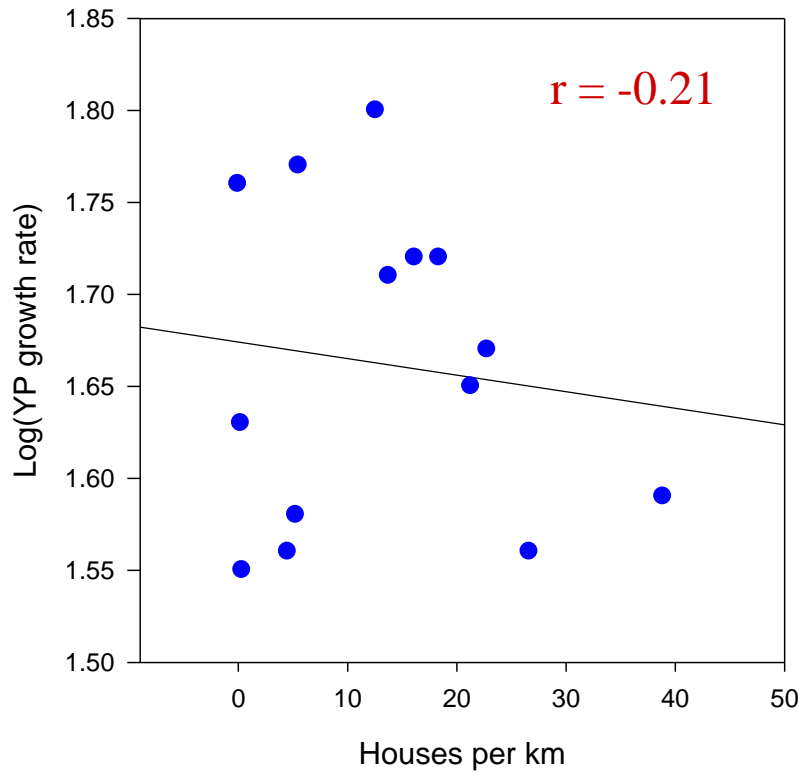


# Future Directions

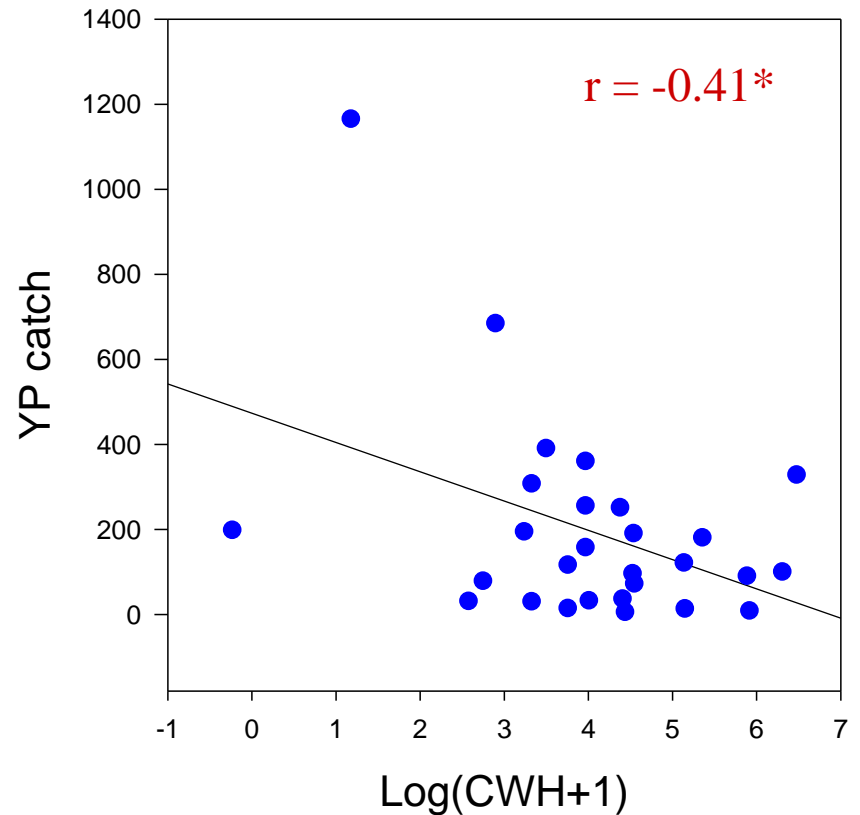
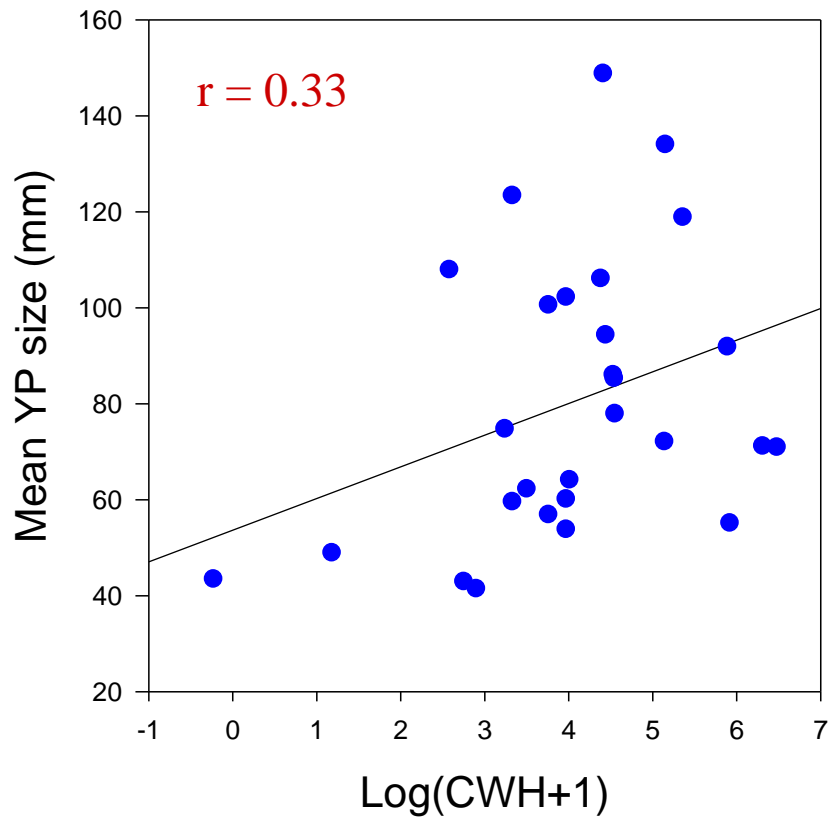
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- Improved measures
  - Wood quality, habitat complexity, angling
- More growth data
  - YP and other species
- Site level analysis
  - Fish behavior and mechanistic understanding
- Conceptual model
  - Hypothesis generation

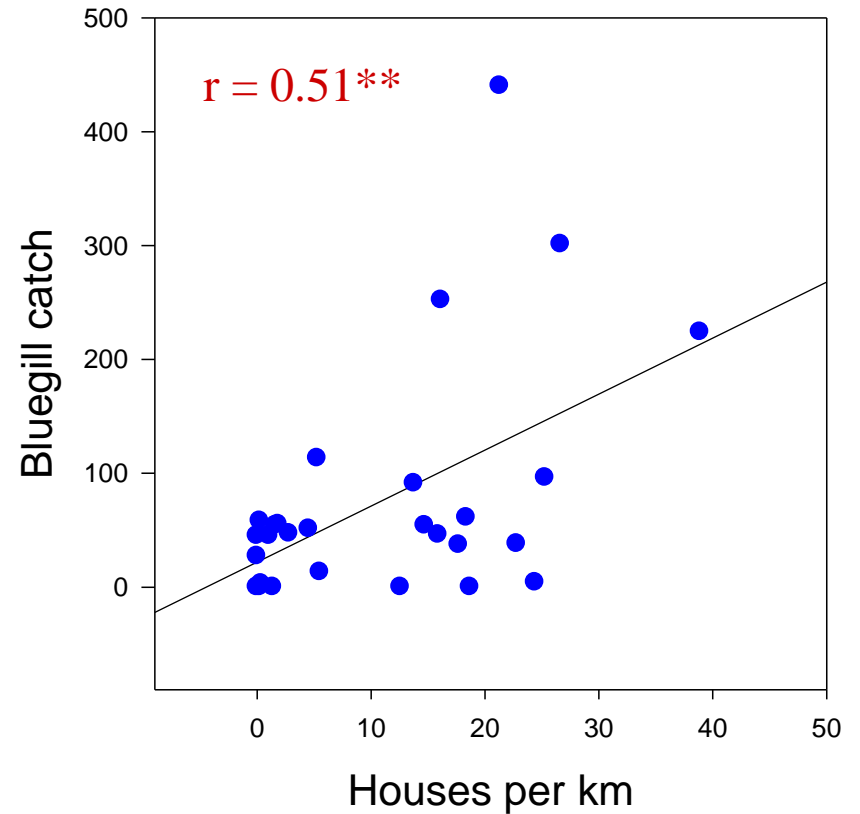
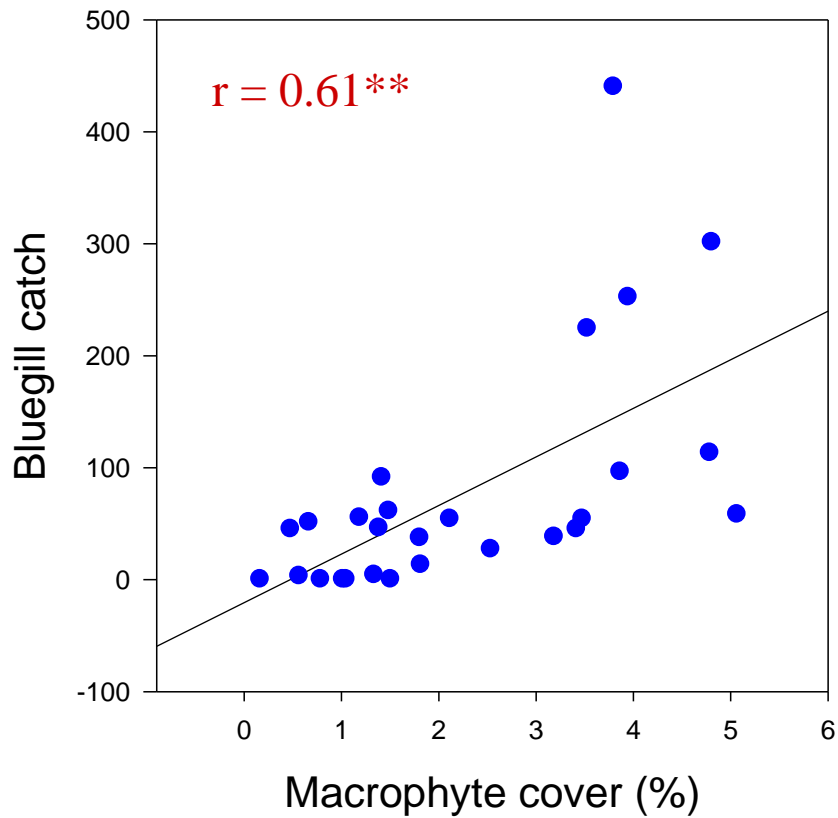
# Yellow Perch Growth Rates



# Yellow Perch (*Perca flavescens*)



# Bluegill (*Lepomis macrochirus*)



# Largemouth Bass (*Micropterus salmoides*)

