

Response of fish and macroinvertebrate communities to a novel stream restoration at Hatchery Creek in central Kentucky

Michael B. Flinn

Murray State University, Murray, KY



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Hatchery Creek





Image USDA Farm Service Agency

Dam ?

Google earth

The Old Channel

- 40 years of heavy flow into small stream channel
- Low habitat quality
- Heavy erosion



Restoration Goals

1

Eliminate sediment load into
Lower Cumberland River

2

Support trout

3

Evidence of
redd
formation

4

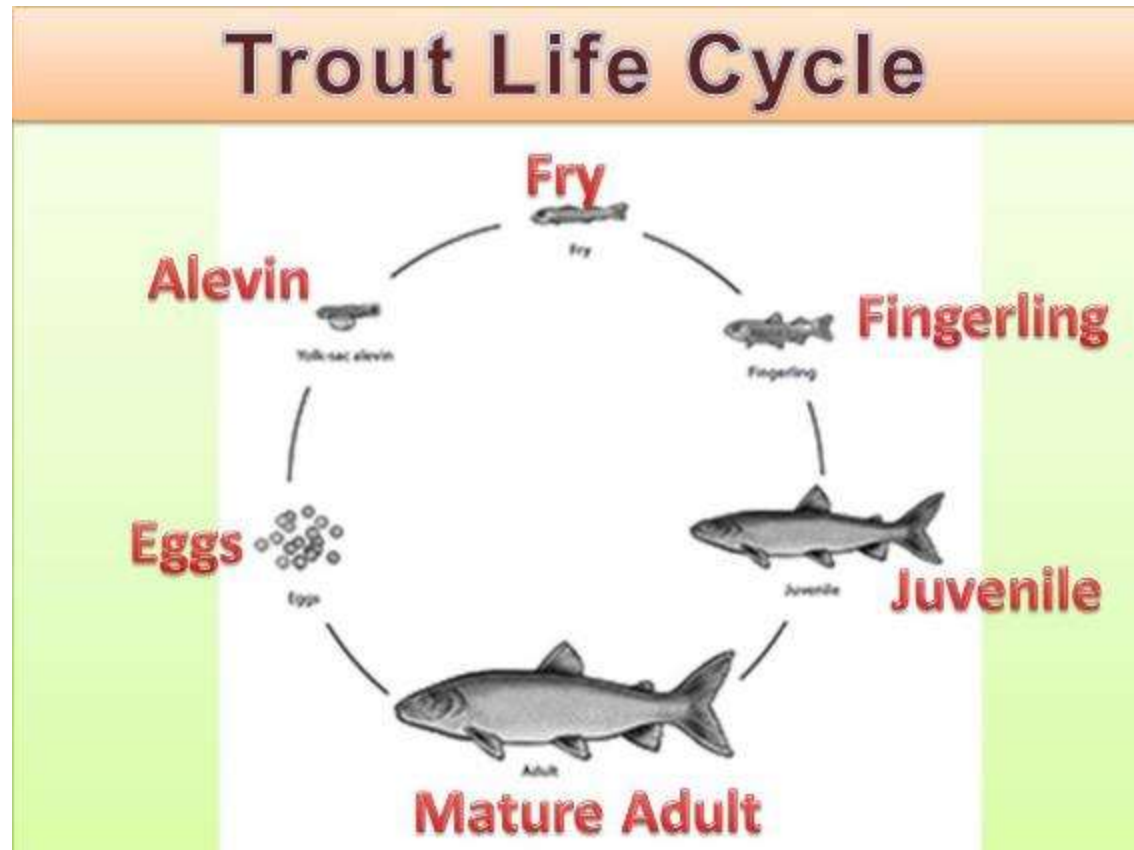
Natural
reproduction

5

Better
experience for
anglers

The New Channel

- Rosgen Stream Design
 - Low gradient riffle-run-pool
 - Step pools
 - Braided stream-wetland complexes
- Trout Habitat (all stages)
- Modeled after the Deschutes River in Oregon
 - Watershed ratio



The Field of Dreams Hypothesis:

“If you build it, they will come”

**Opportunity to quantify response of temperature,
nutrients, organic matter, bugs and fish**





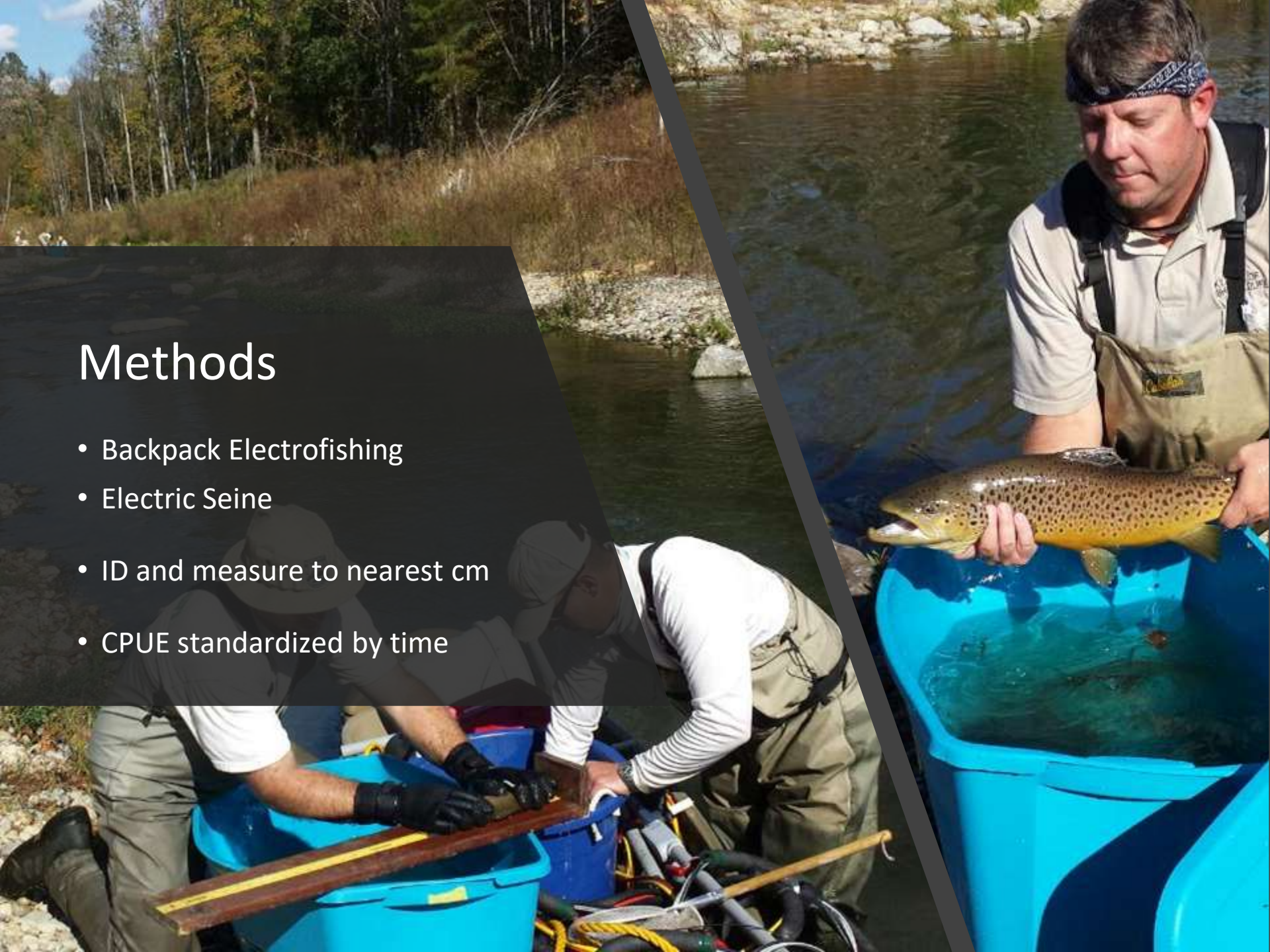
Hatchery Creek

Opportunity to understand how streams recover from restoration.

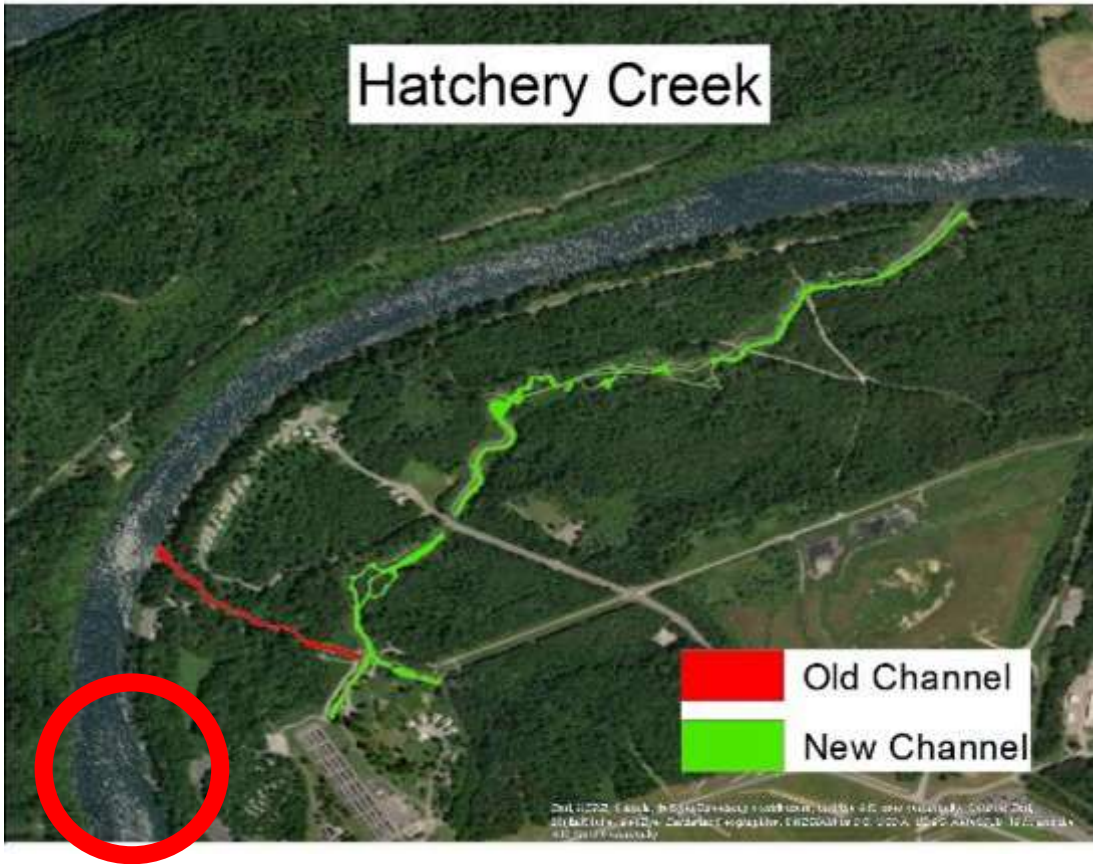


Methods

- Backpack Electrofishing
- Electric Seine
- ID and measure to nearest cm
- CPUE standardized by time



Hatchery Creek



Things to Consider

- 161,000 rainbow trout stocked into the Lower Cumberland yearly from May to November
 - 9-11inches
- 38,000 brown trout
- Hatchery Creek public access
 - Stocked with 27,000 rainbows all throughout the year
 - Stocked for fishing events



Banded sculpin



Stoneroller



Brook trout



White sucker



Fathead minnow



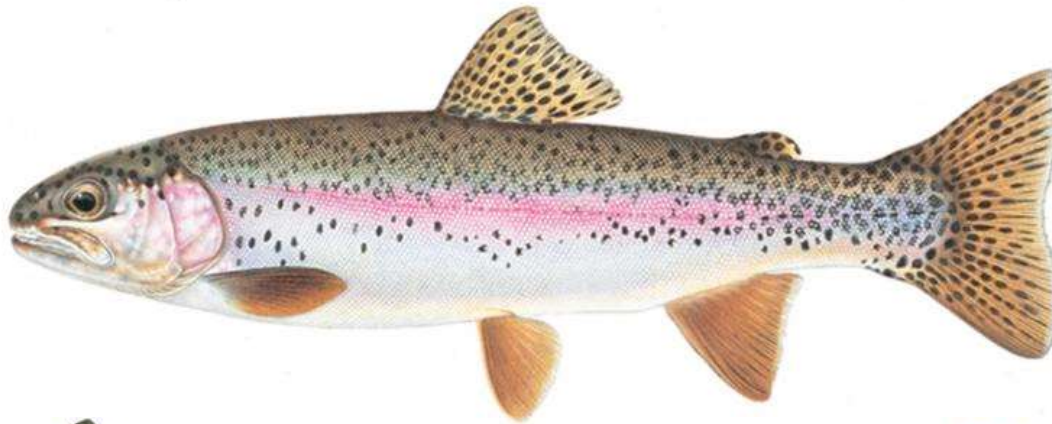
Brown trout



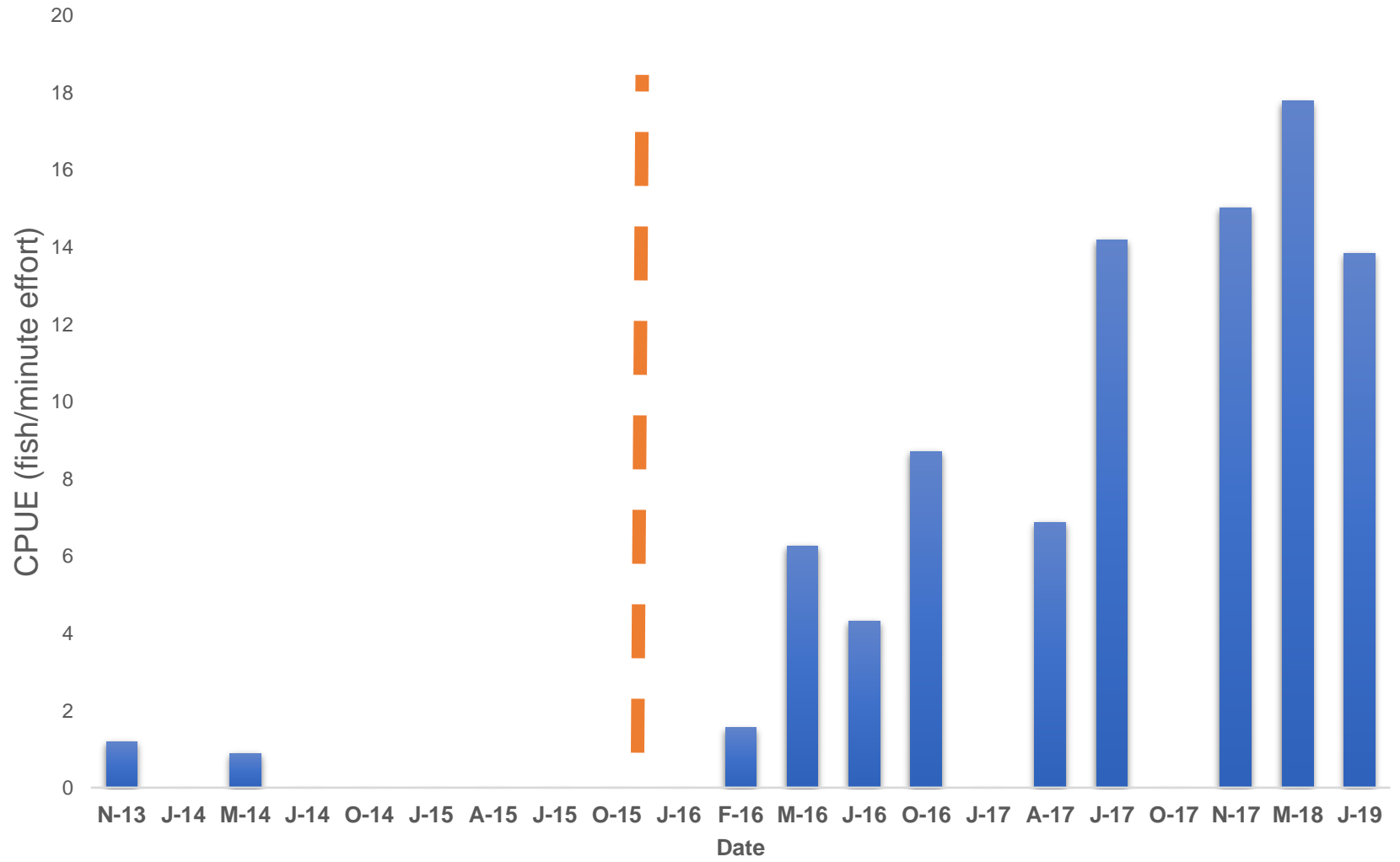
Rainbow trout

Fish Community (Old Channel)

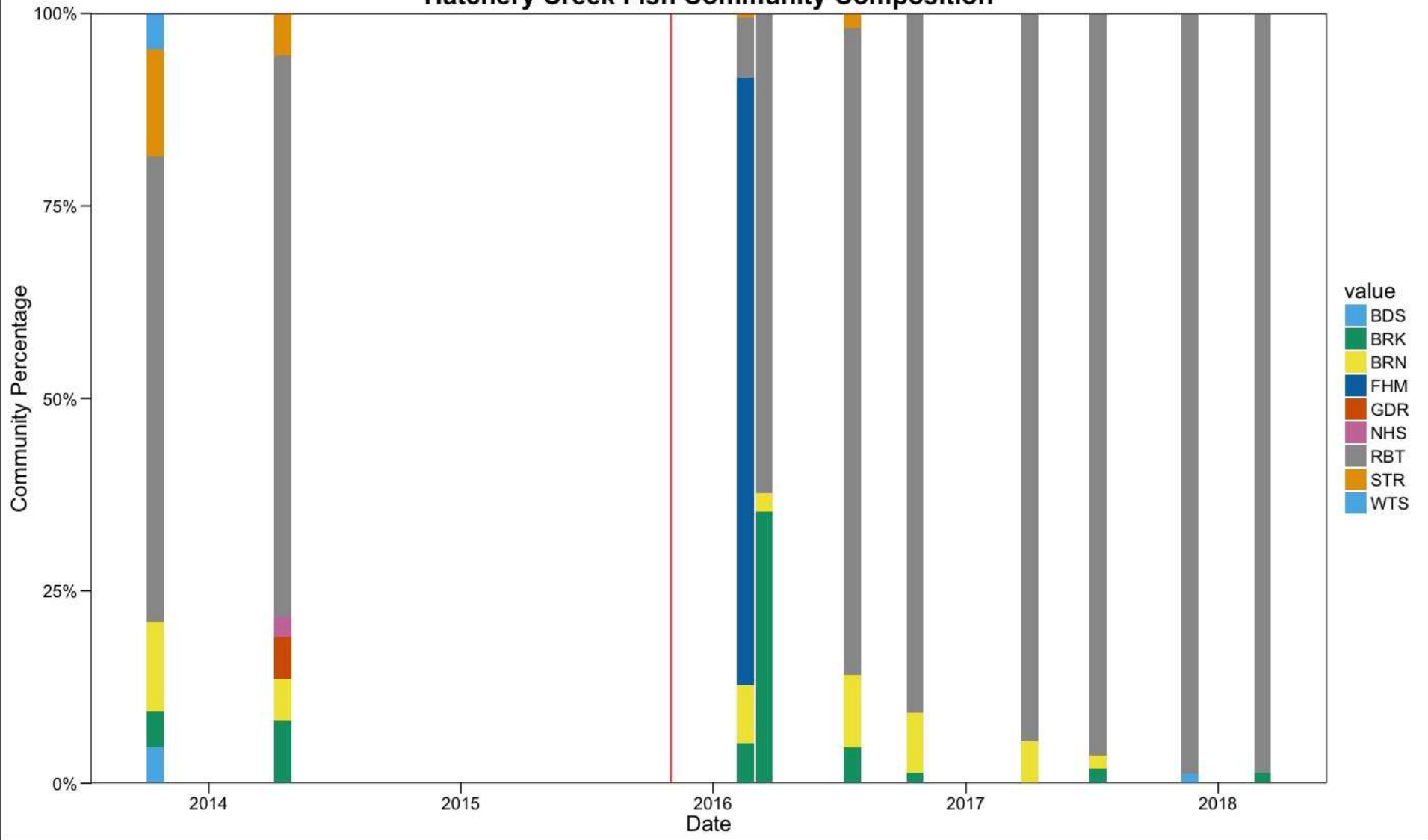
Fish Community (New Channel)



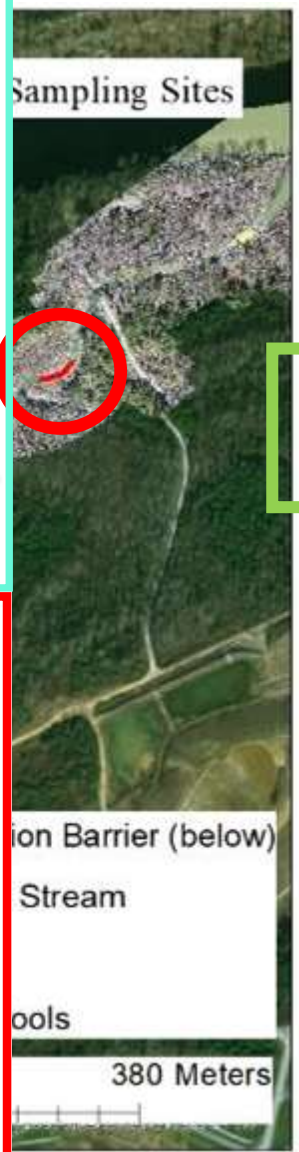
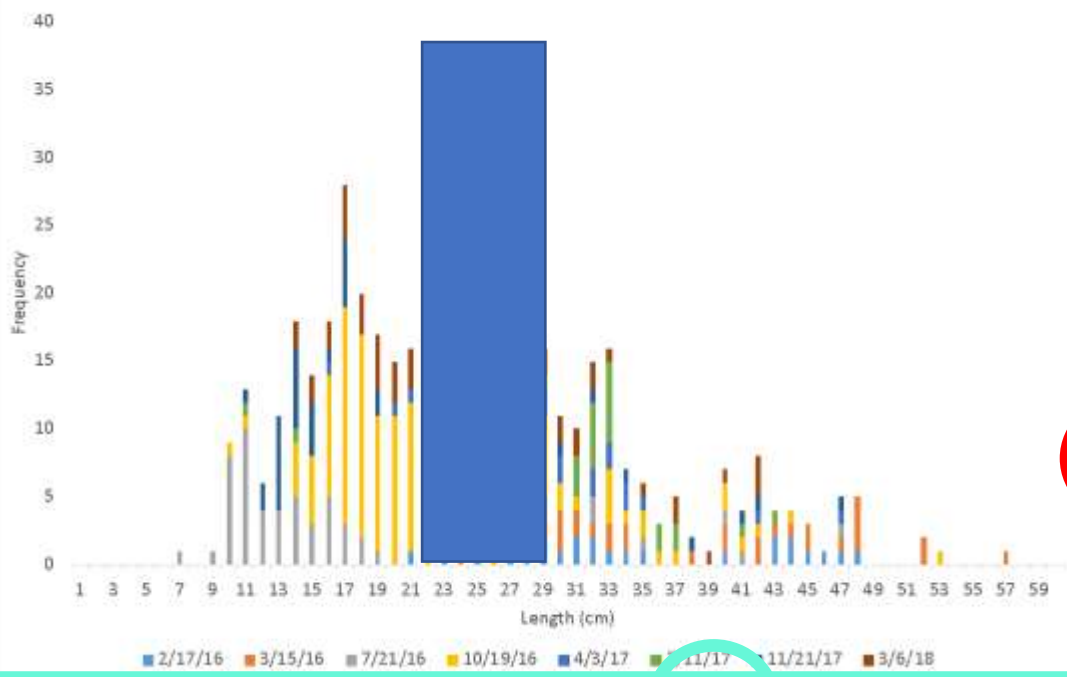
Hatchery Creek Fish Abundance



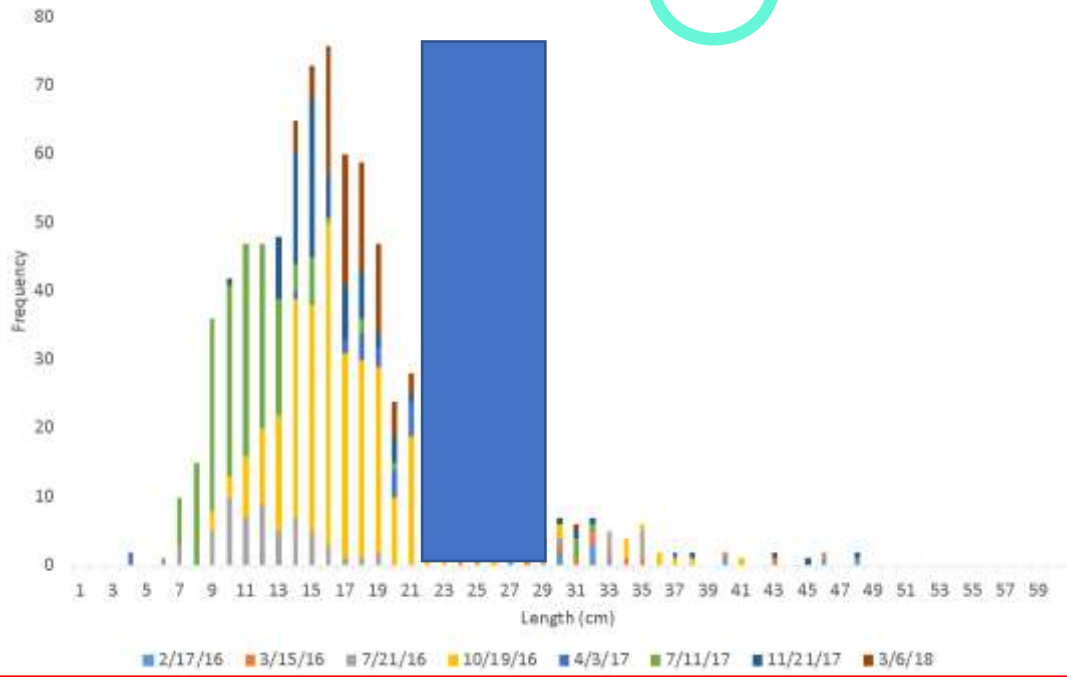
Hatchery Creek Fish Community Composition



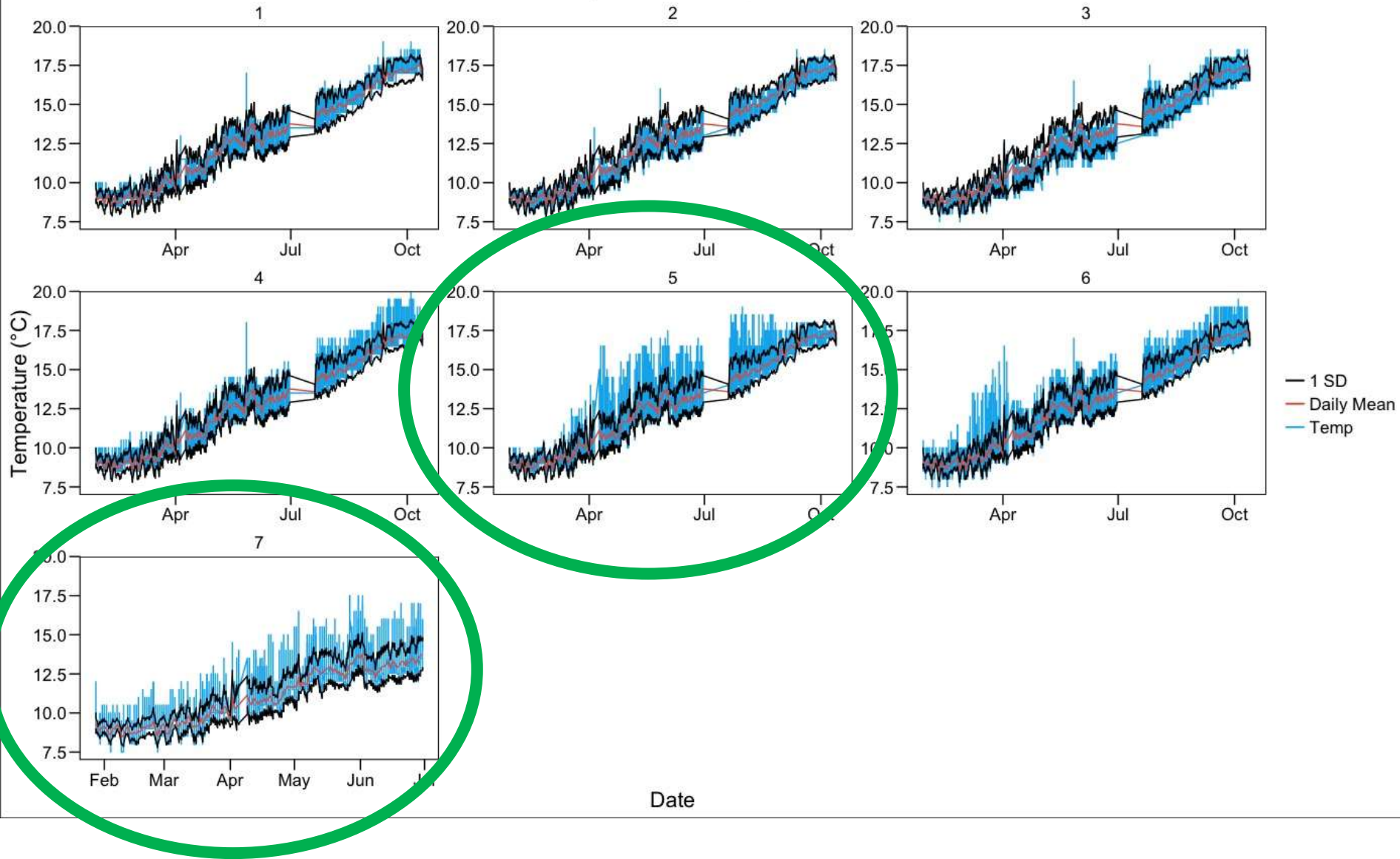
Dream Stream



Site 2



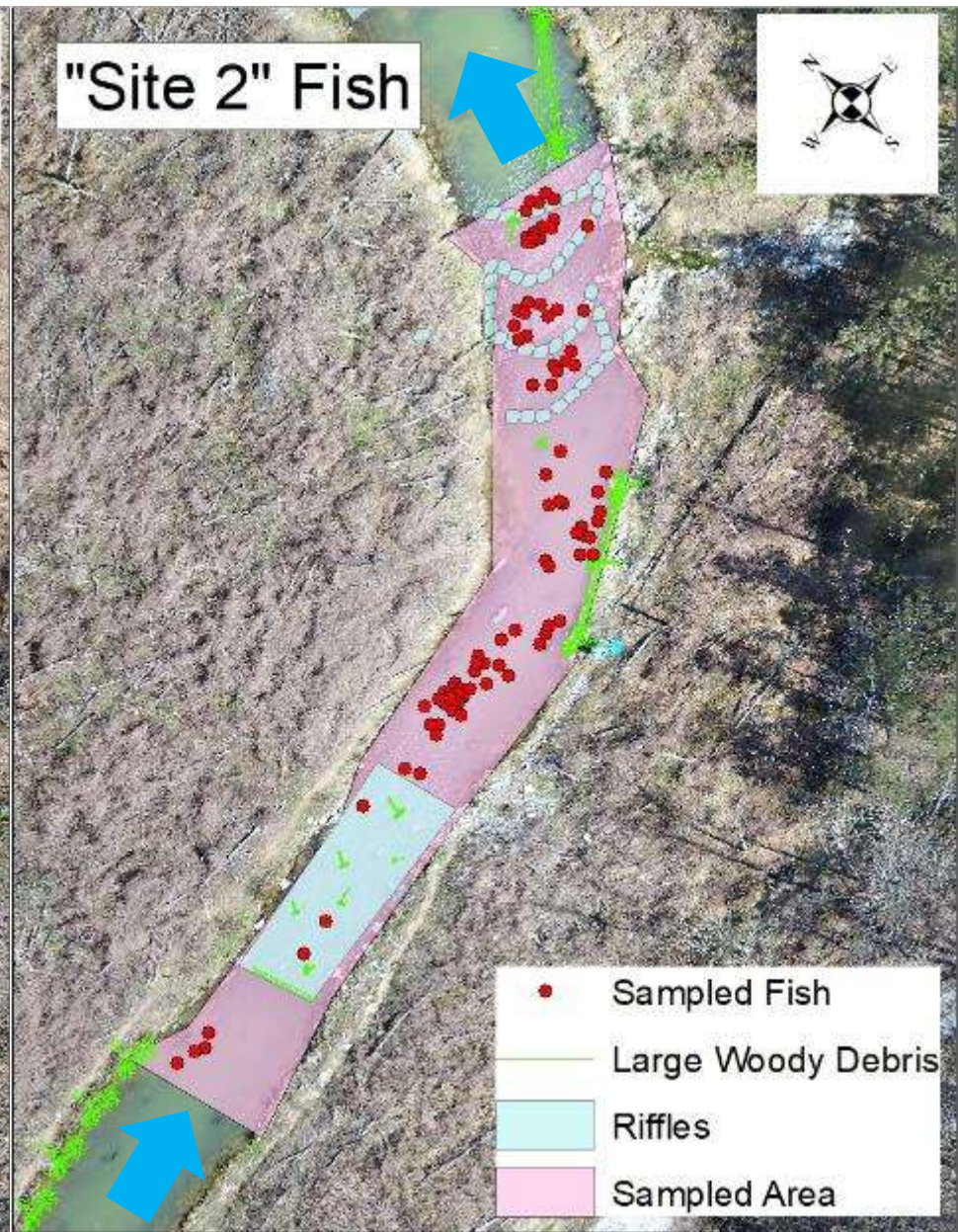
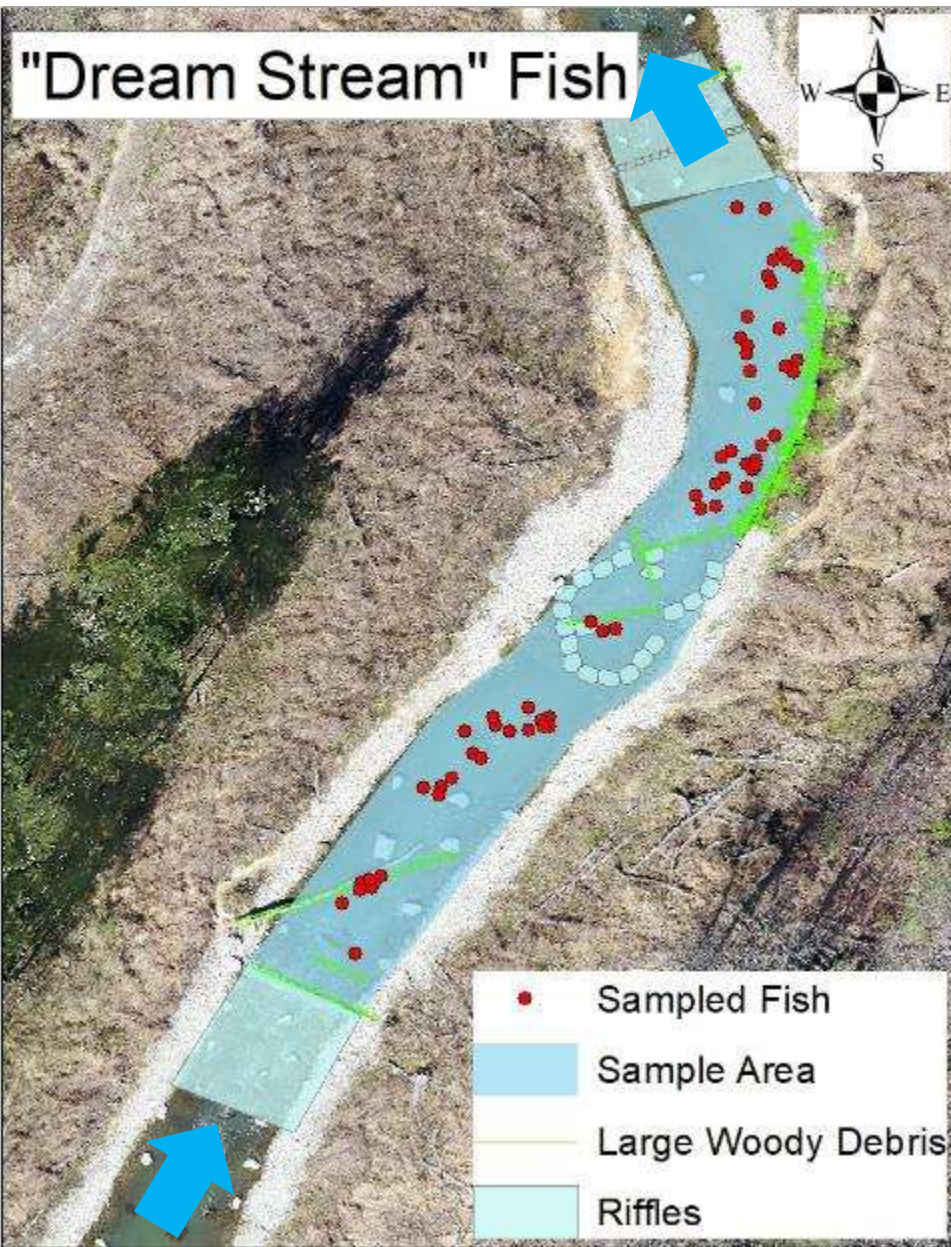
Hatchery Creek Temperature

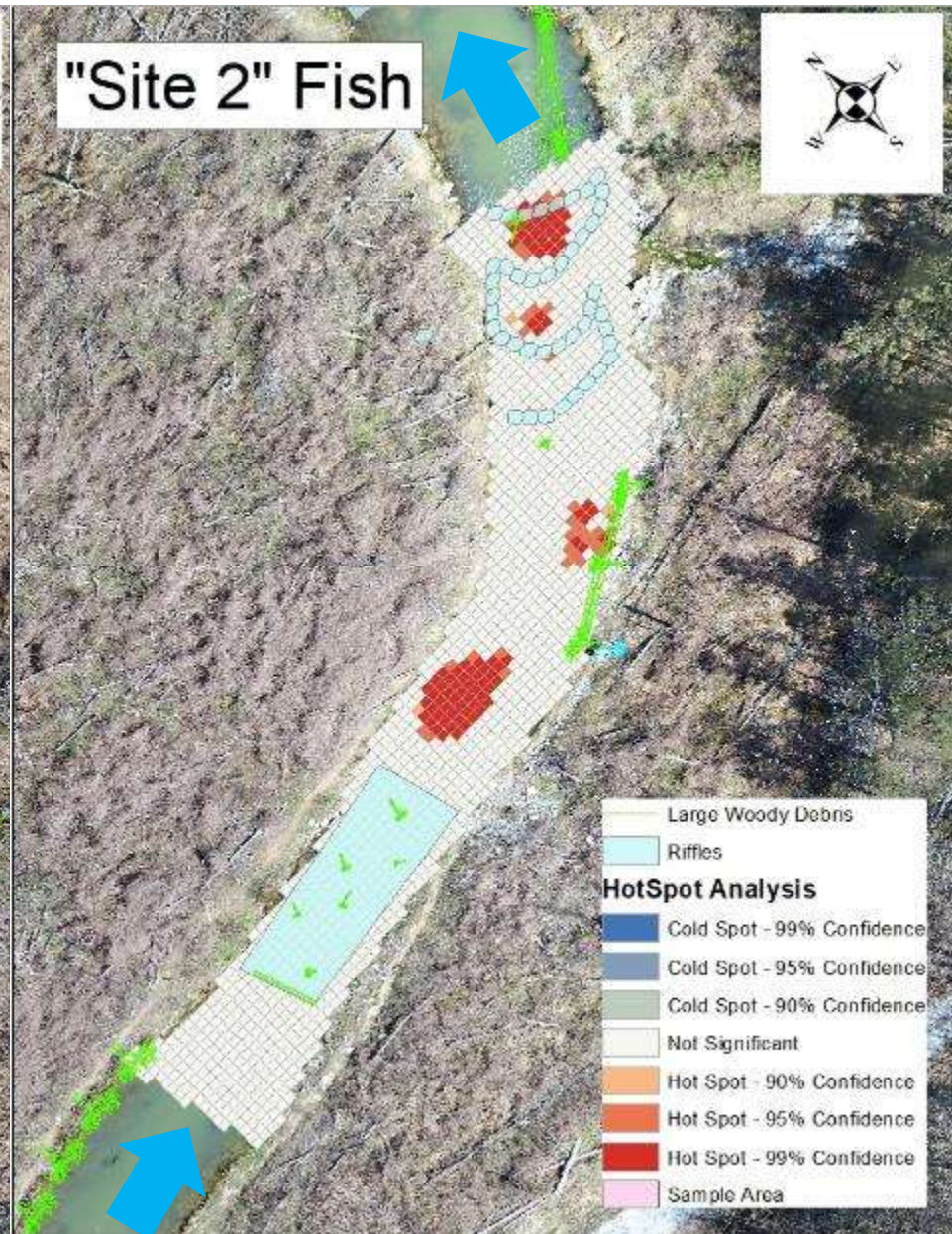
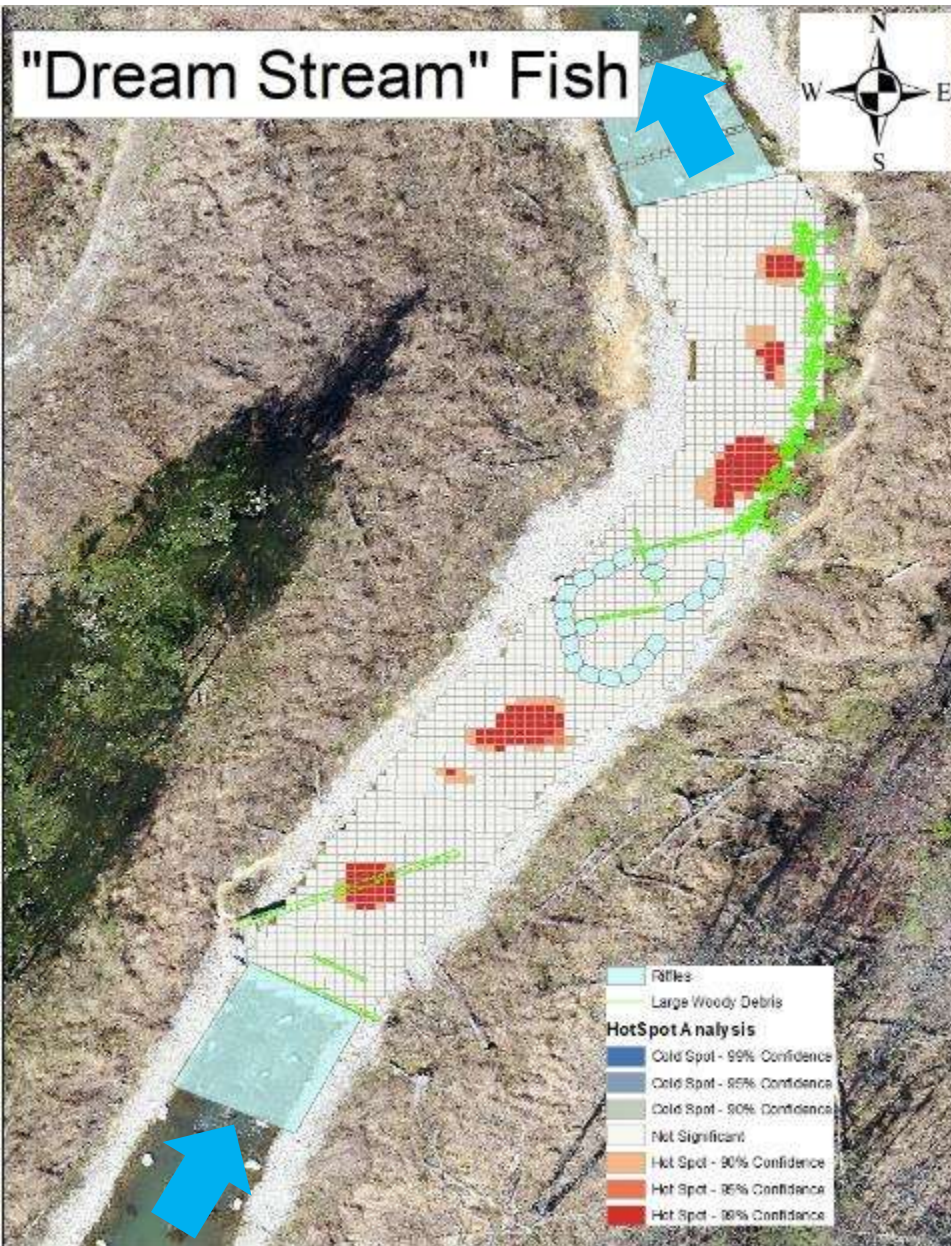


Identifying Redds









Fish Summary

✓Goals met (exceeded)

- Depends on what your goals are?
- Diversity or abundance of target taxa

✓Evidence of reproduction?

- Redds (substrate specific)
- YOY trout – can we say for sure?
- 80% of fish sampled over course of project were less than stocking size

✓Habitat and design

- This is a trout stream
- Runs/lunker bunkers (opportunity for application) – some features \$60k did not hold fish

Fishing Pressure

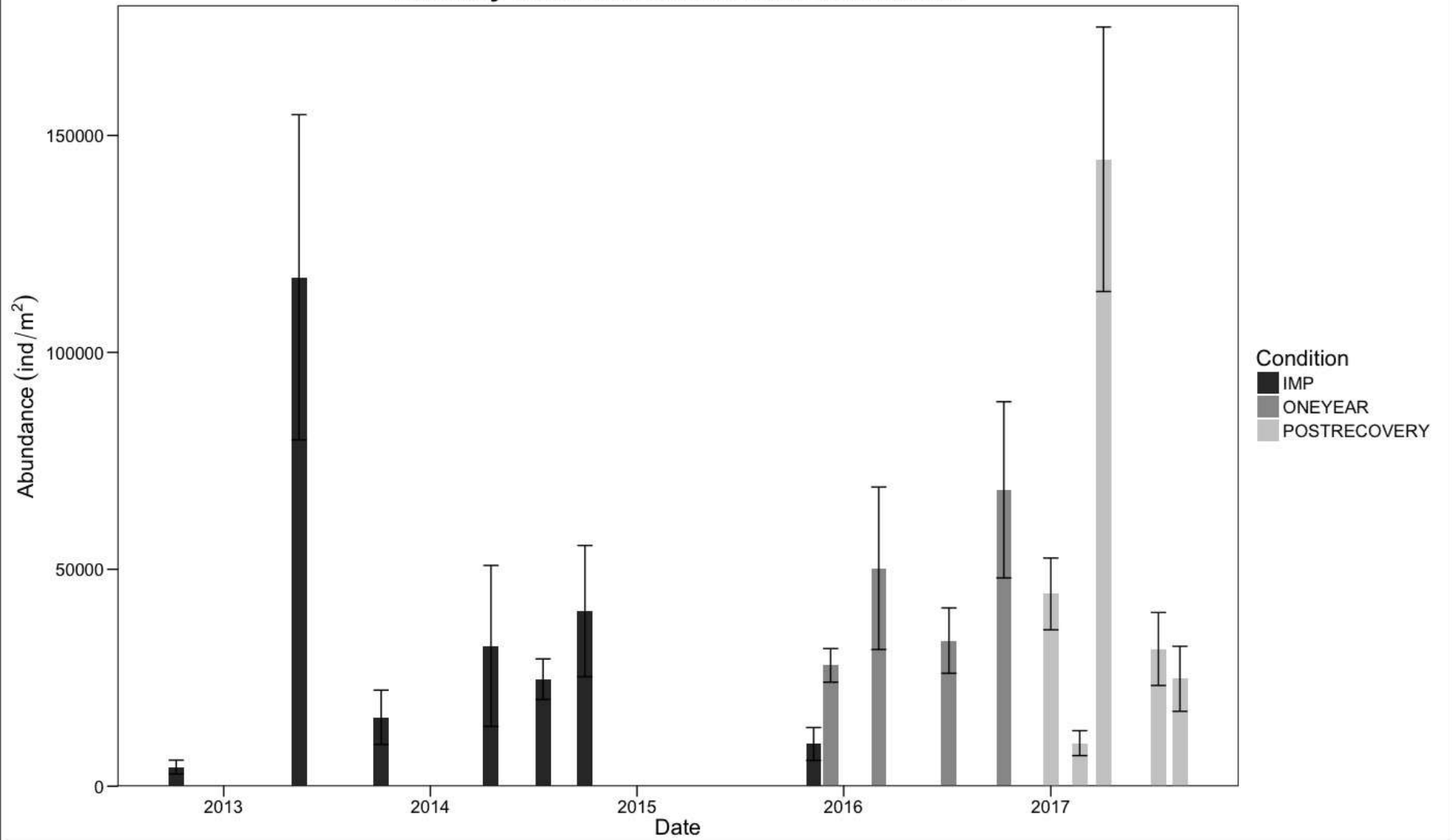


Macroinvertebrates

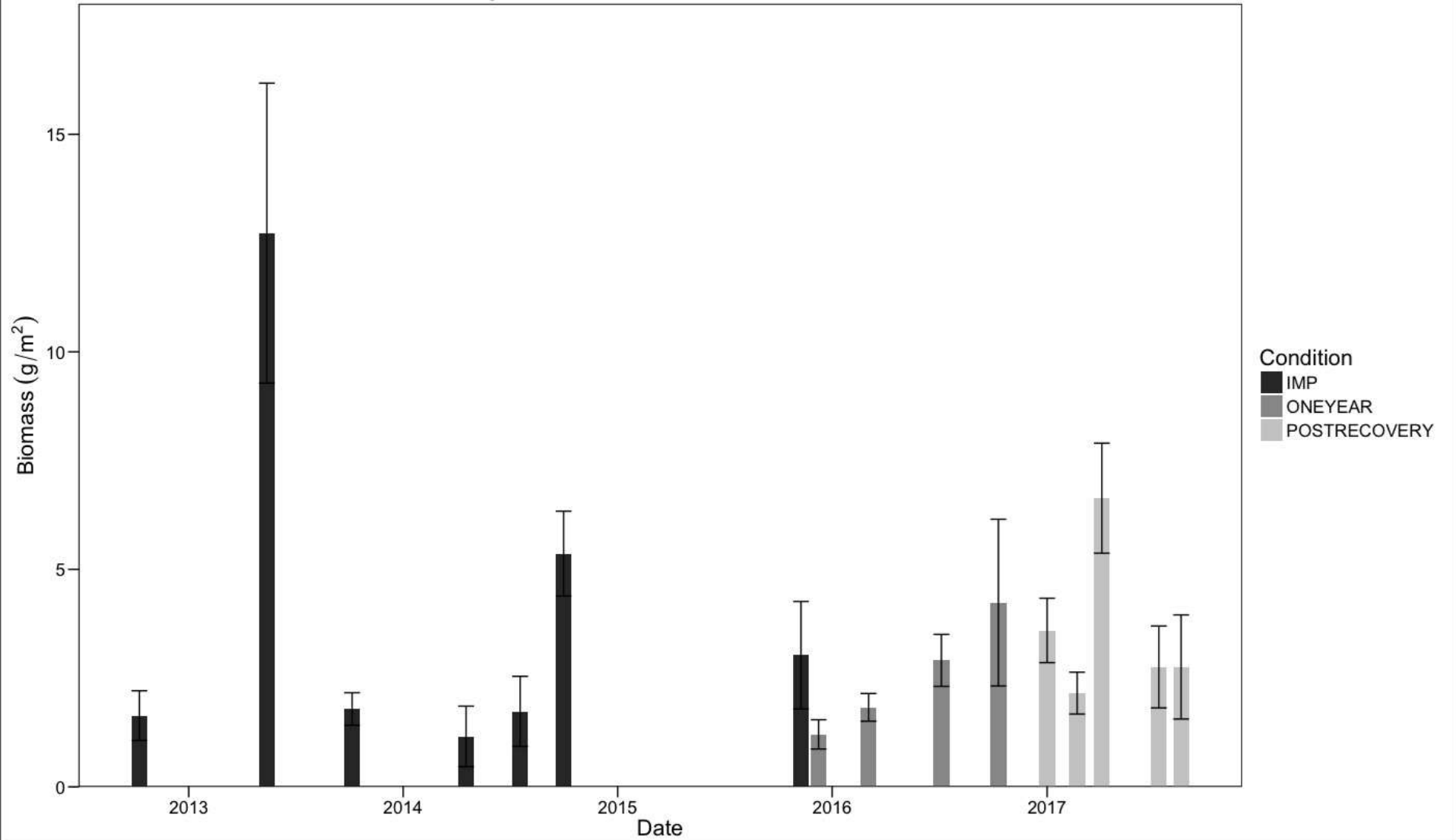
- Old channel vs new channel
- Recovery?
- Abundance, Biomass, Diversity, MBIs
- Surber (quantitative) and multihab dipnets (qualitative)



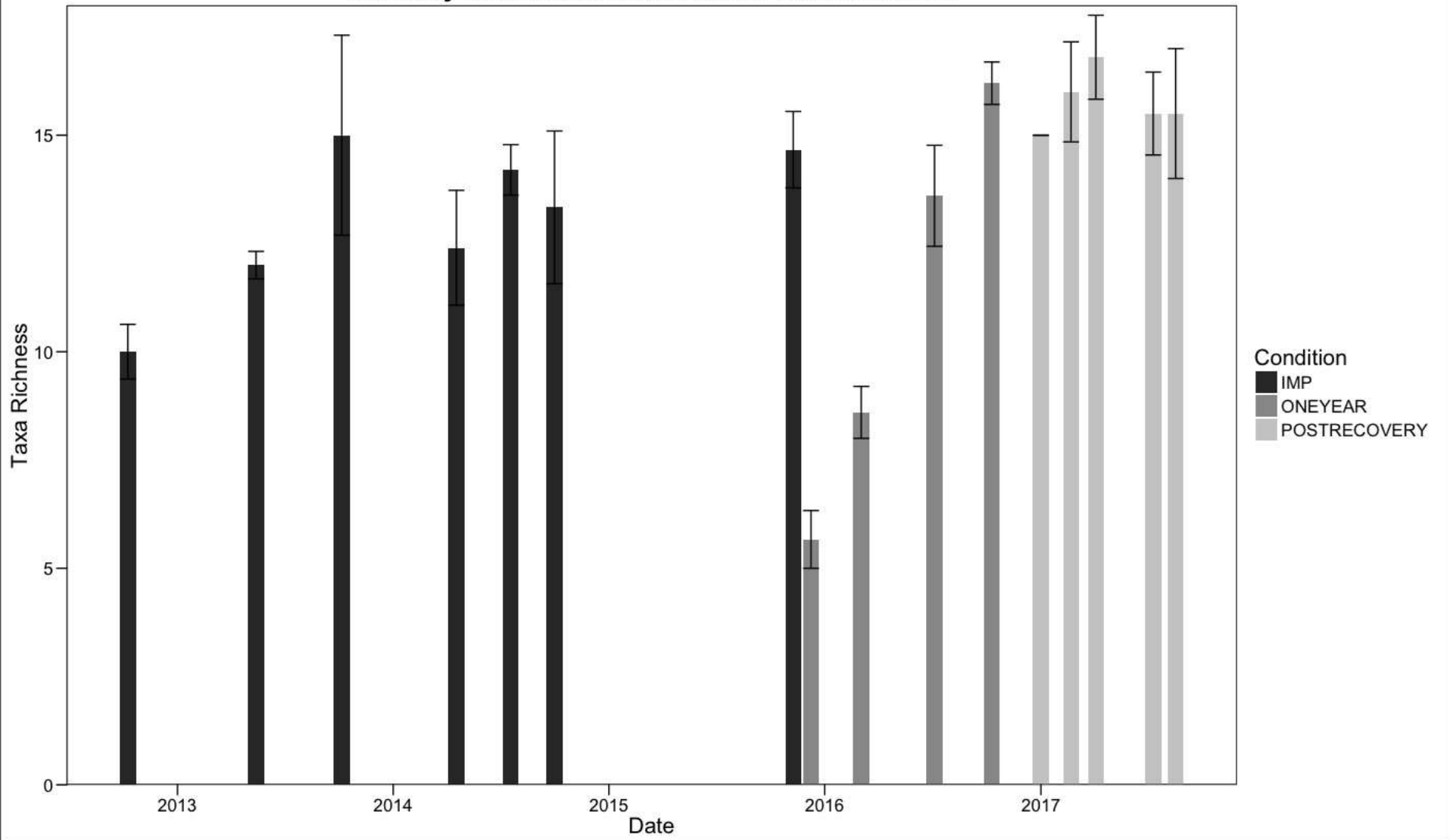
Hatchery Creek Macoinvertebrate Abundance



Hatchery Creek Macoinvertebrate Biomass

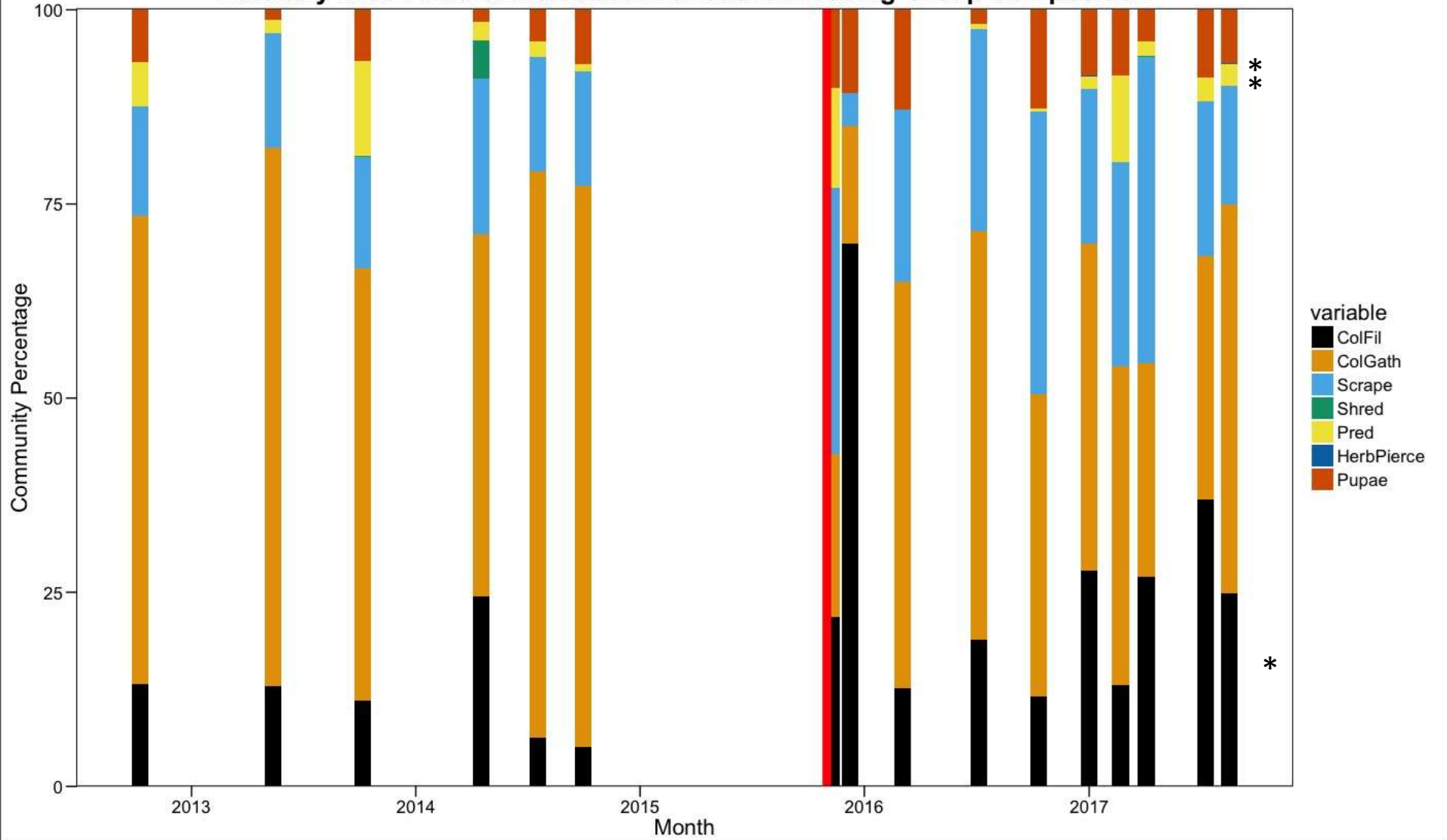


Hatchery Creek Macoinvertebrate Taxa Richness

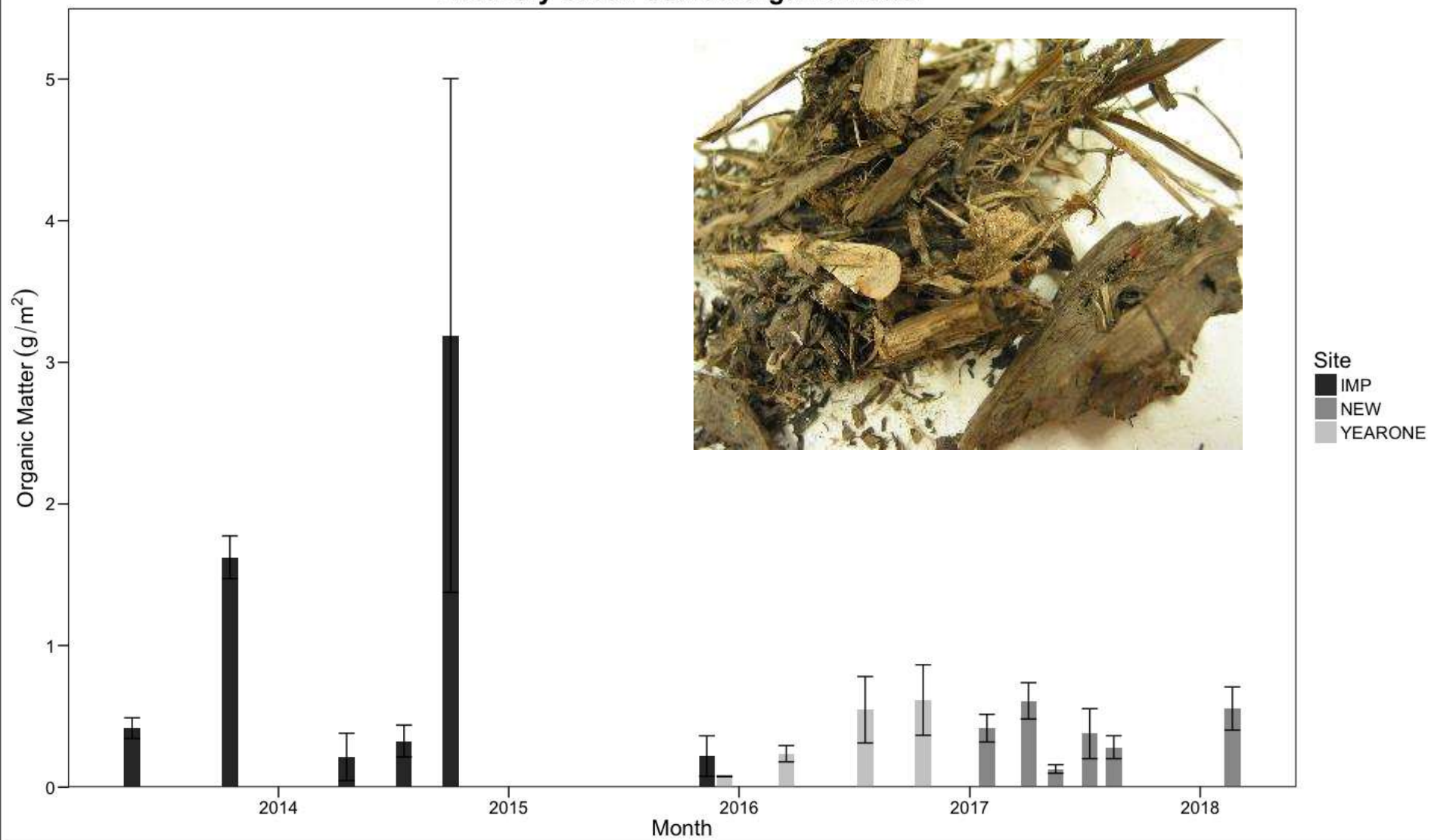


($F_{2,65}=10.34, p=0.003$)

Hatchery Creek Macroinvertebrate Functional Feeding Group Composition



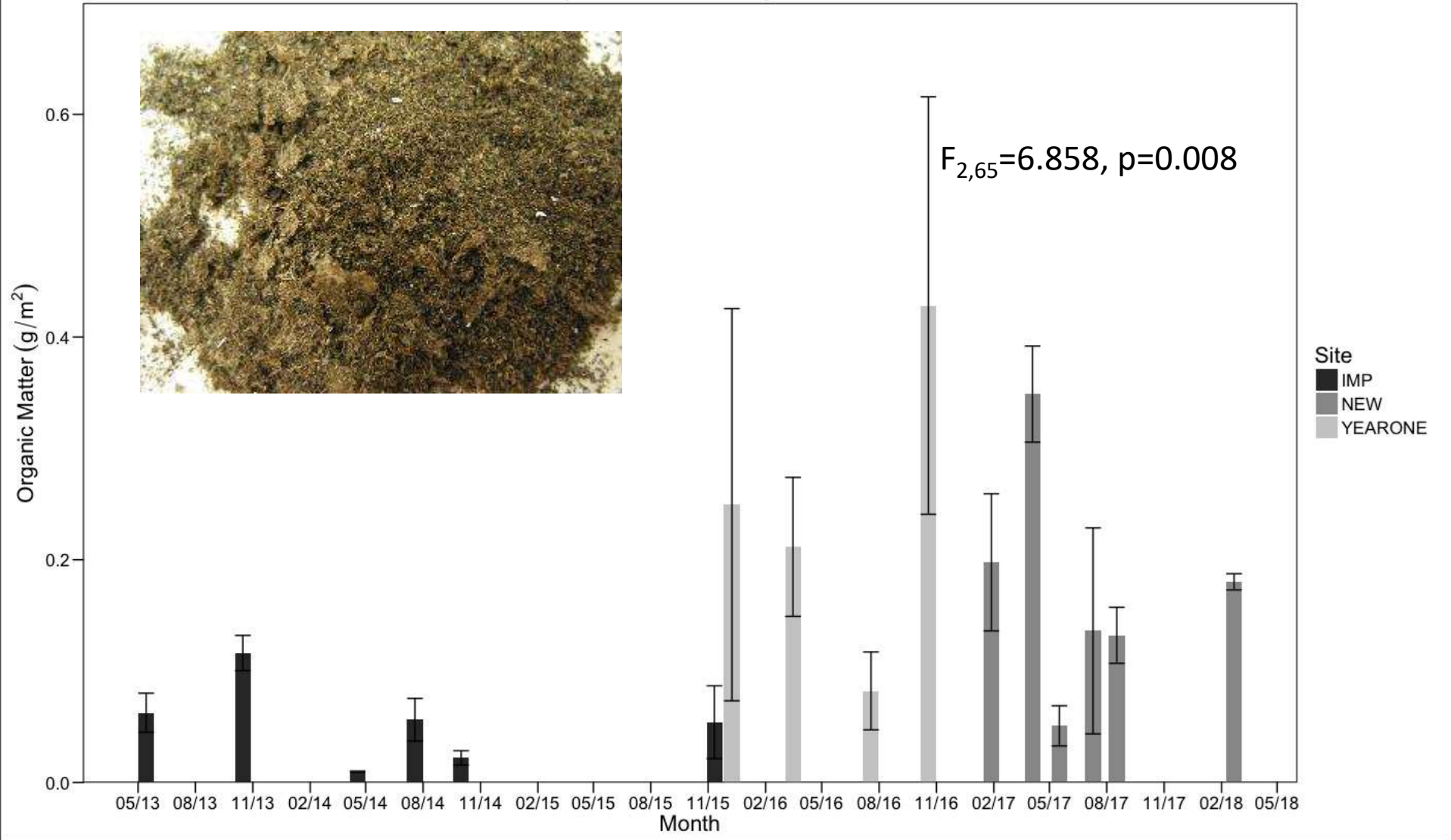
Hatchery Creek Coarse Organic Matter



Hatchery Creek Fine Organic Matter



$F_{2,65}=6.858, p=0.008$



Macroinvertebrate summary

- Trends suggest community has recovered and improving
- Higher evenness reflects habitat heterogeneity
- MBI's (KDOW) reflect stability in scores

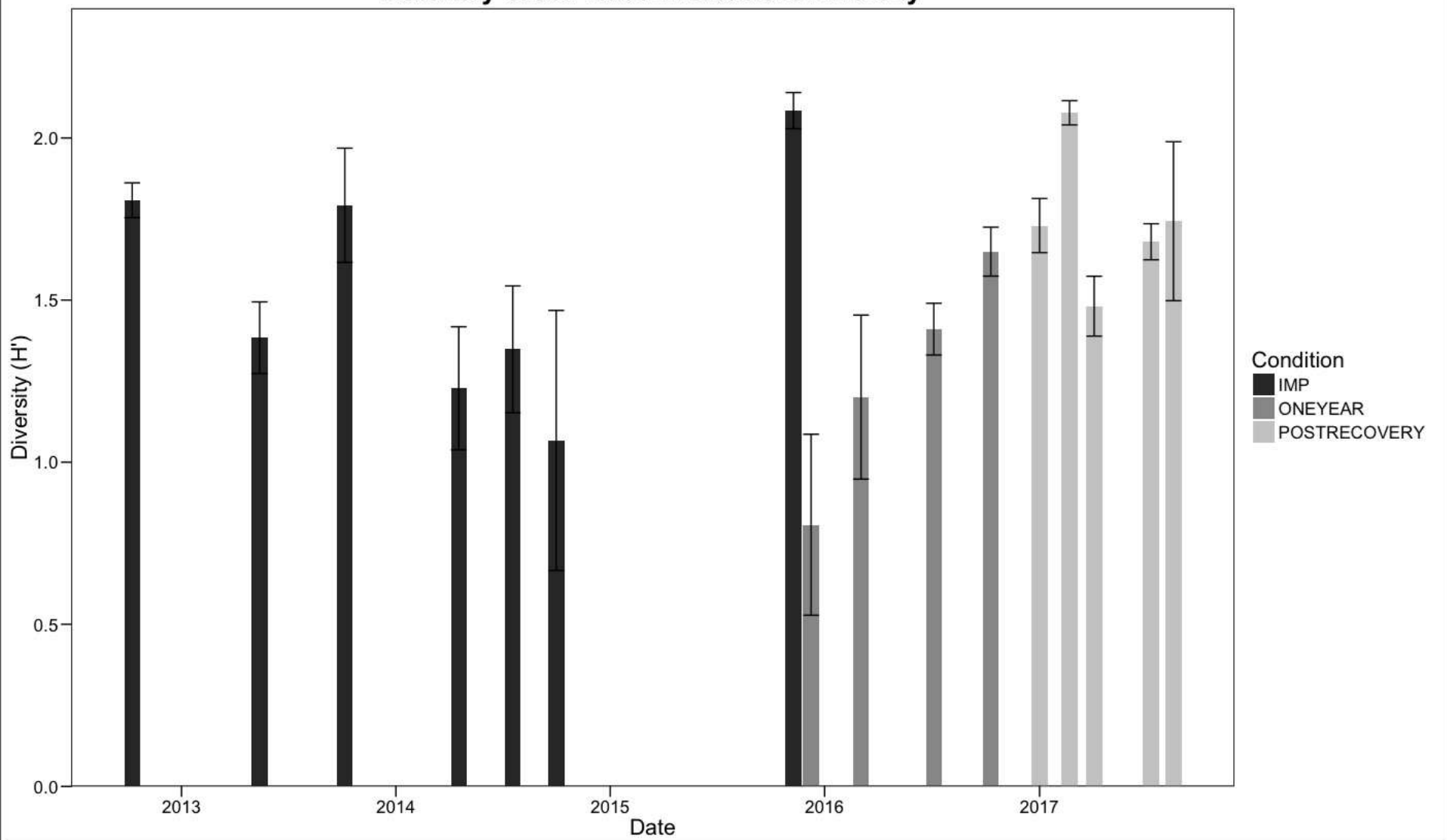
- Particulate Organic Matter
 - Switch from coarse to fine dominated
 - Sources still changing
 - Vegetation on banks
 - Coarse woody debris
 - In-stream algae (filamentous vs epilithic)



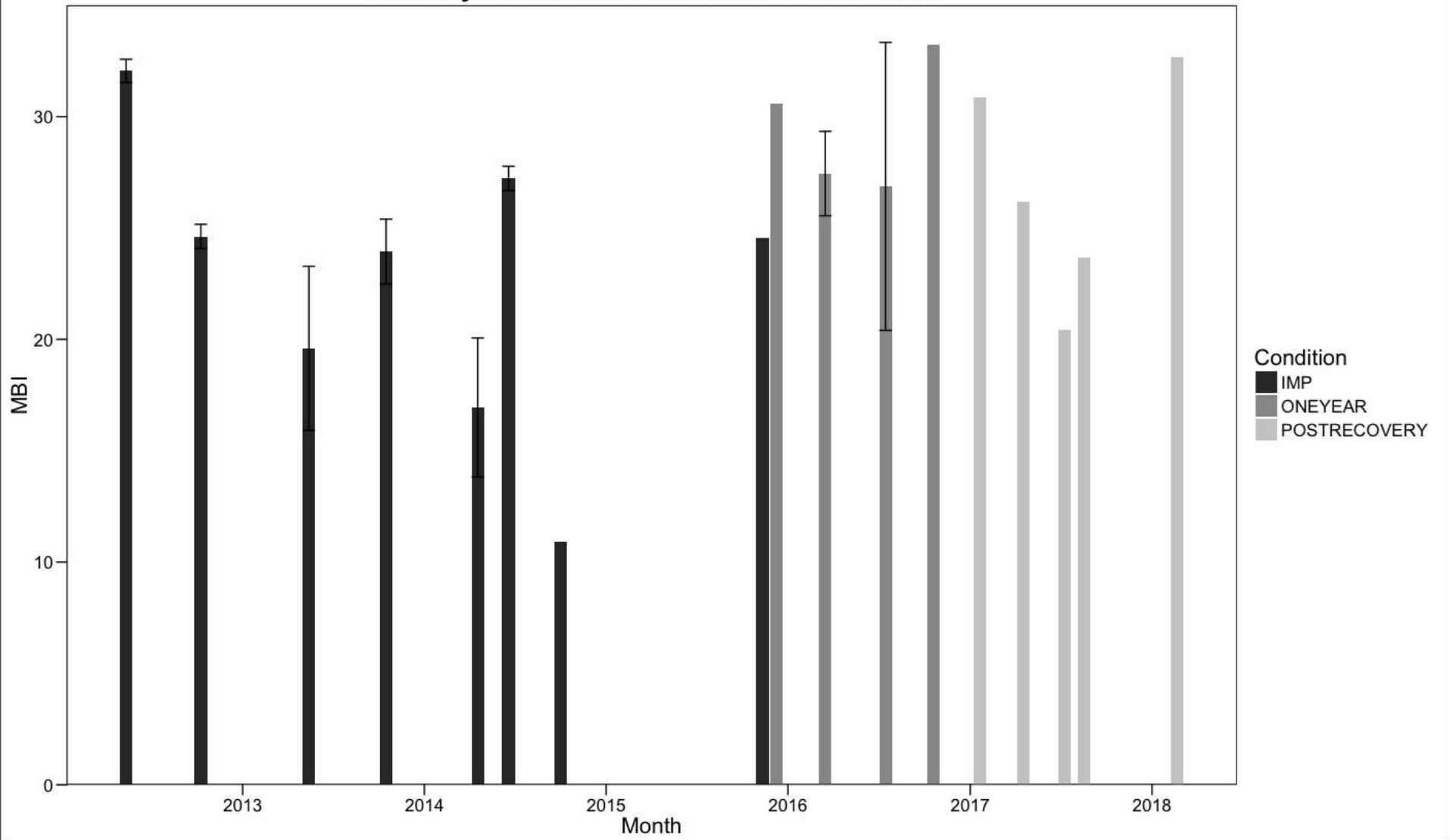


Questions?

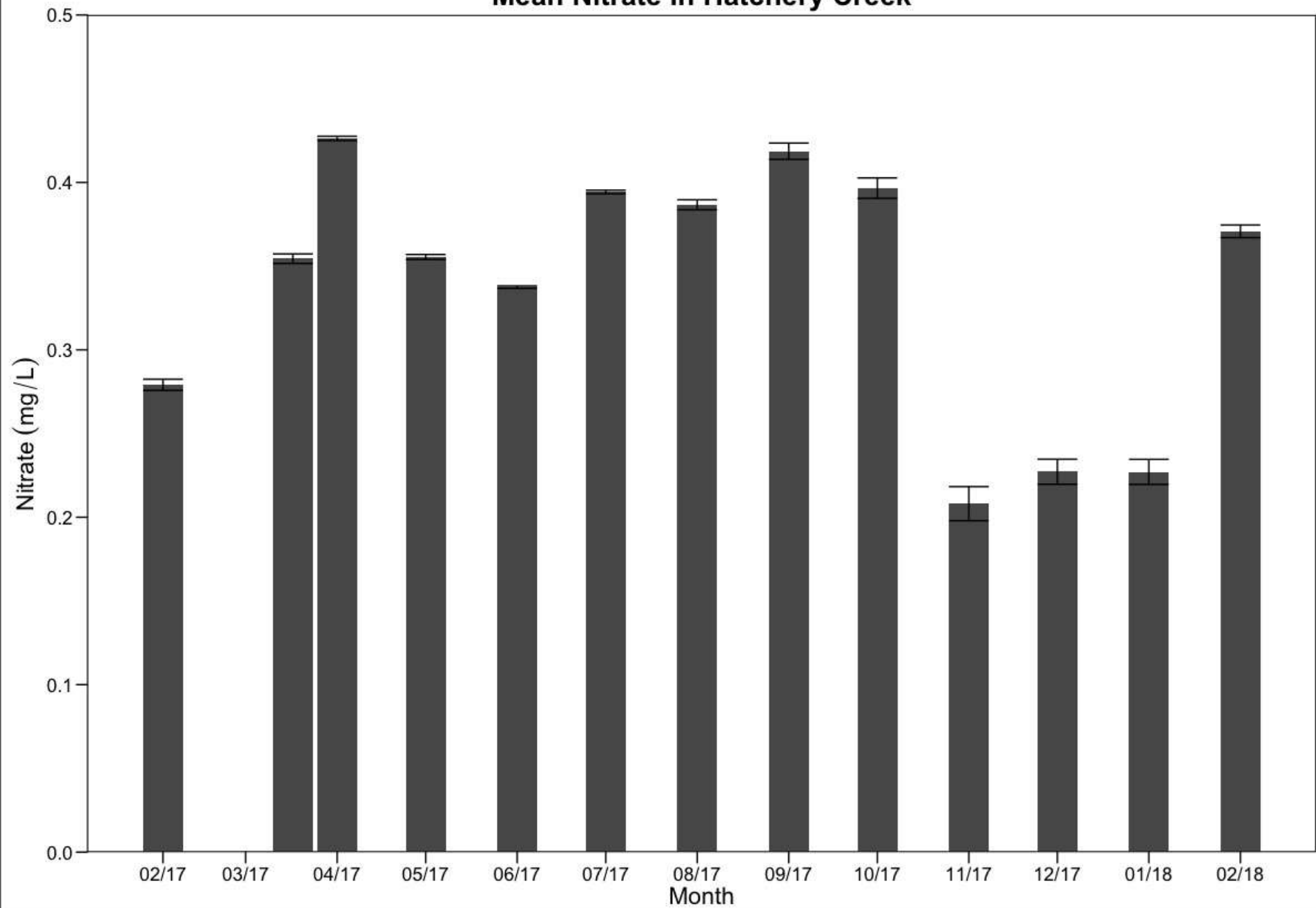
Hatchery Creek Macoinvertebrate Diversity



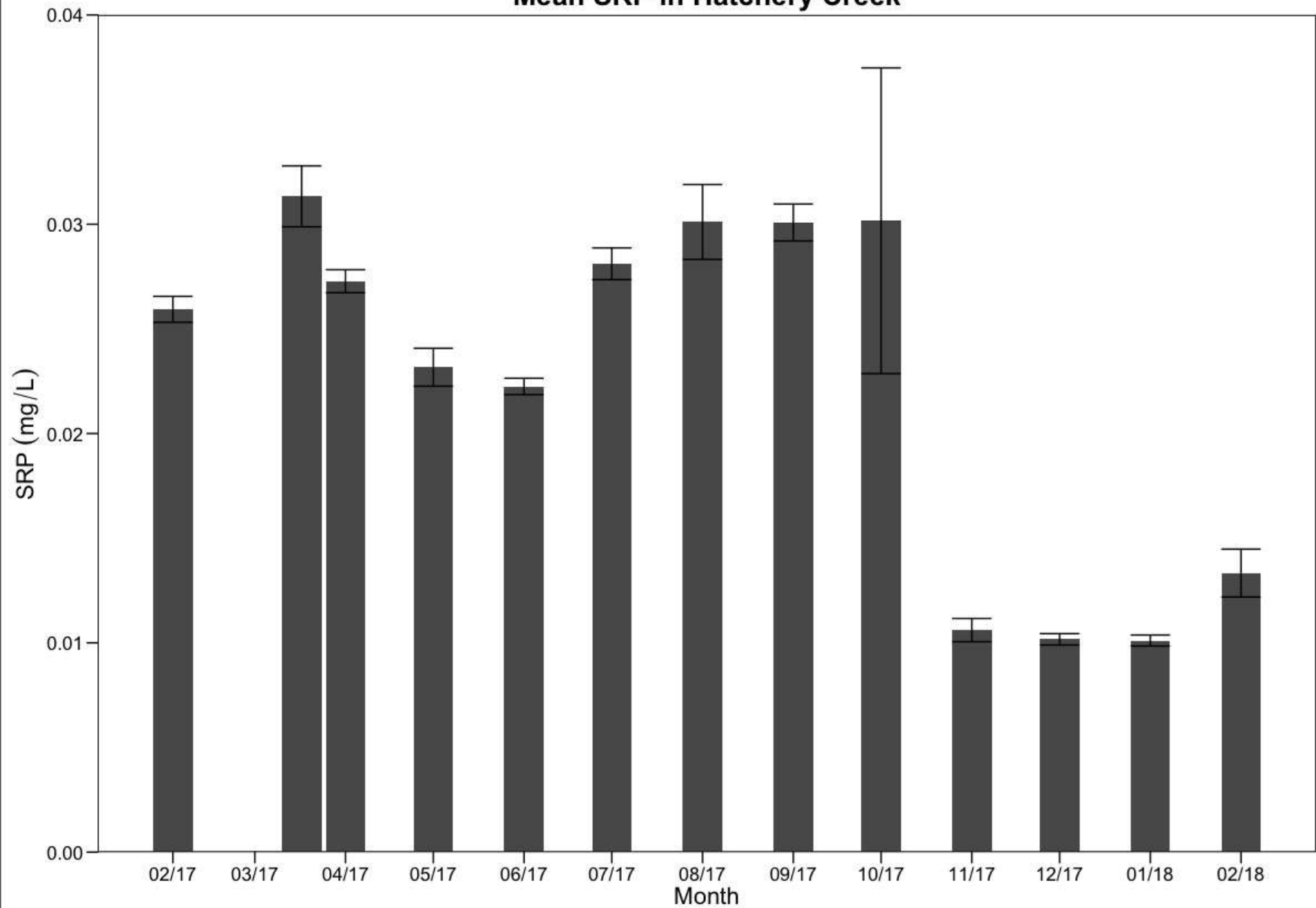
Hatchery Creek Macoinvertebrate Biotic Index



Mean Nitrate in Hatchery Creek



Mean SRP in Hatchery Creek



Hatchery Creek Fish Abundance

