Evaluating Changes and Predicting Impacts to Freshwater Fish Communities in Florida

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Freshwater Fisheries Research

What's on the Agenda

- ✓ FWC's Role in MFLs
- ✓ What we've done and what we do
- ✓ Freshwater Fish Long Term Monitoring Program
- ✓ Specific studies and key results

FWC's Role
Agency Action Plan

Florida Fish and Wildlife Conservation Commission

Agency Action Plan

Issue: Establishment of Minimum Flows and Levels for Florida's Lakes, Rivers, Springs, and Estuaries

Issue Team: Sponsor-Tim Breault, Gil McRae and Darrel Scovell, Members- Eric Nagid (FWRI), Tom Champeau(DFFM), Bob McMichael (FWRI), Gary Warren(FWRI), Ted Hoehn(HSC), Kent Smith(HSC)

April 21, 2009

Plan Element 1: The FWC is dedicated to reinforcing and expanding partnerships with involved agencies in matters that affect fish and wildlife resources.

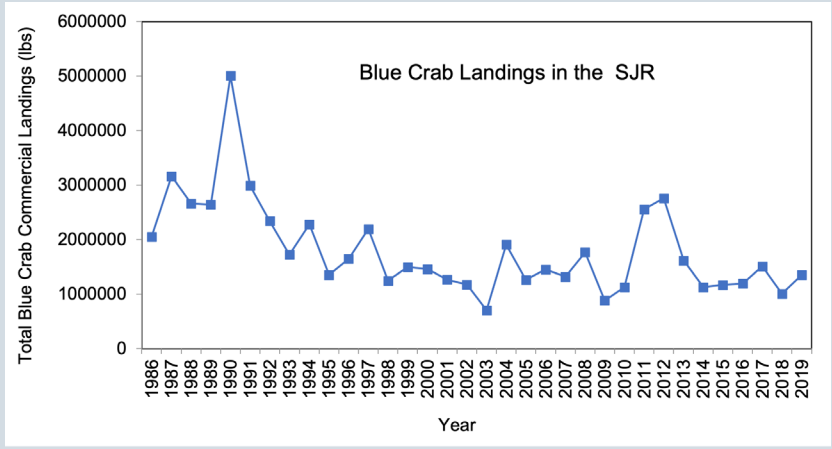
- **Approach 1:** The FWC will cooperatively assist…

Plan Element 2: The FWC has staff and expertise to provide science-based information...

- **Approach 2:** The FWC will assess data availability and information gaps to provide scientific information to WMD…

Work FWC has done in support of MFLs
Literature and Existing Data Reviews

- Effects of Water Levels on Fish Populations (Hill and Cichra 2002)
- Game and Non-game littoral species (Hill and Cichra 2005)
- A review water level fluctuation on diadromous fish (Harris and McBride 2004)
- Analysis of old (GFC) freshwater fish stream monitoring database (Allen and Rogers 2006)
- Blue Crab in Relation to Salinity and Freshwater Inflow (Crowley et al. 2011)



Work FWC has done in support of MFLs
Research – Freshwater Habitats

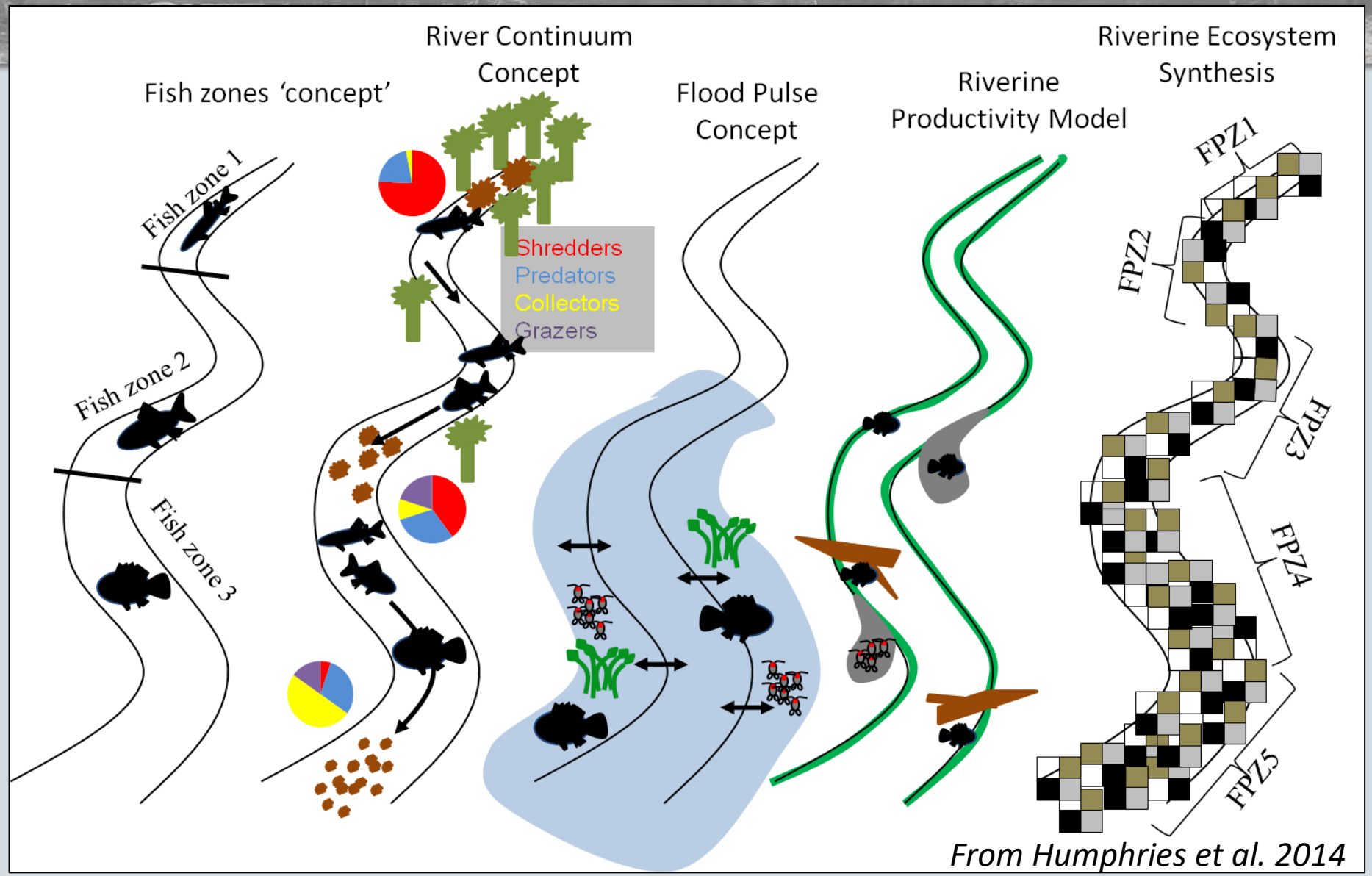
Community Assessments

- Wekiva River fish and aquatic inverts (Warren et al. 2000)
- Fish population response to floodplain inundation (Strong and Nagid 2006)
- Peace River and major tributaries fish community assessment (Call et al. 2011).
- Fish Assemblages in the Oligohaline Stretch of the Peace River (Stevens et al. 2013).
- Springs Coast long-term fish community assessment (Johnson et al. 2018)
- Lower Withlacoochee River Fish Community Assessment (Nagid 2021)

Habitat Suitability Studies

- Habitat suitability indices of fish and aquatic inverts in Withlacoochee River North (Warren and Nagid 2009)
- Habitat suitability indices in Gum Slough (Nagid at al. 2014)
- Habitat suitability criteria for Bluenose Shiner using a Delphi approach (Nagid 2019).
- Habitat suitability curve analysis (Nagid, in progress)

River Ecosystem Concepts



From Humphries et al. 2014

Long Term Monitoring
Fish Community Sampling Approach

Stratified random design

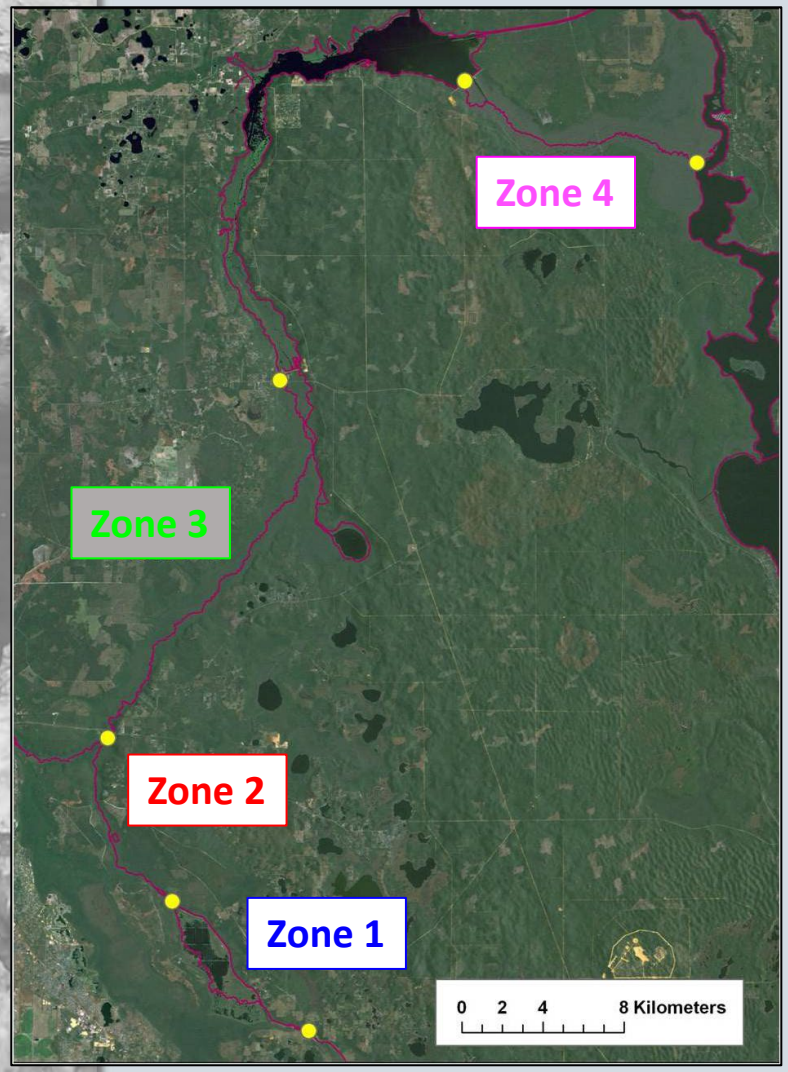
- Stream segments
- Mesohabitats (Runs, Inside bends, Outside bends)

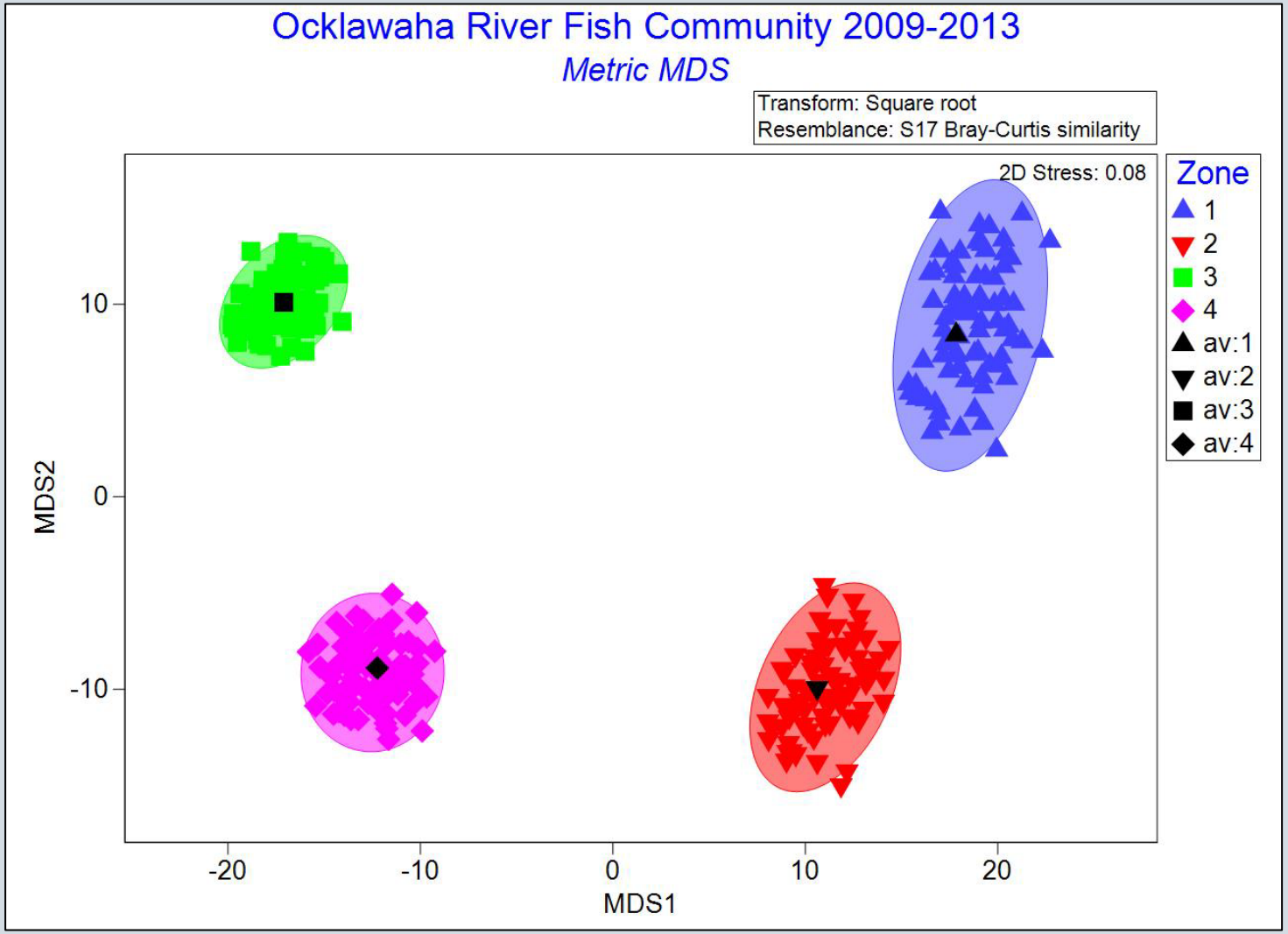
Effort

- 100 m boat-electrofishing transects
- Target of 30-40 transects per river
- Based on 90% similarity in PSI and JSI
- Transect selection weighted proportionally by stream segment
  (and mesohabitat in panhandle streams)

Segment	Proportion	Transect Goal
A	0.45	18
B	0.31	12
C	0.24	10
Total	**1.00**	**40**

Fish community differences between stream segments



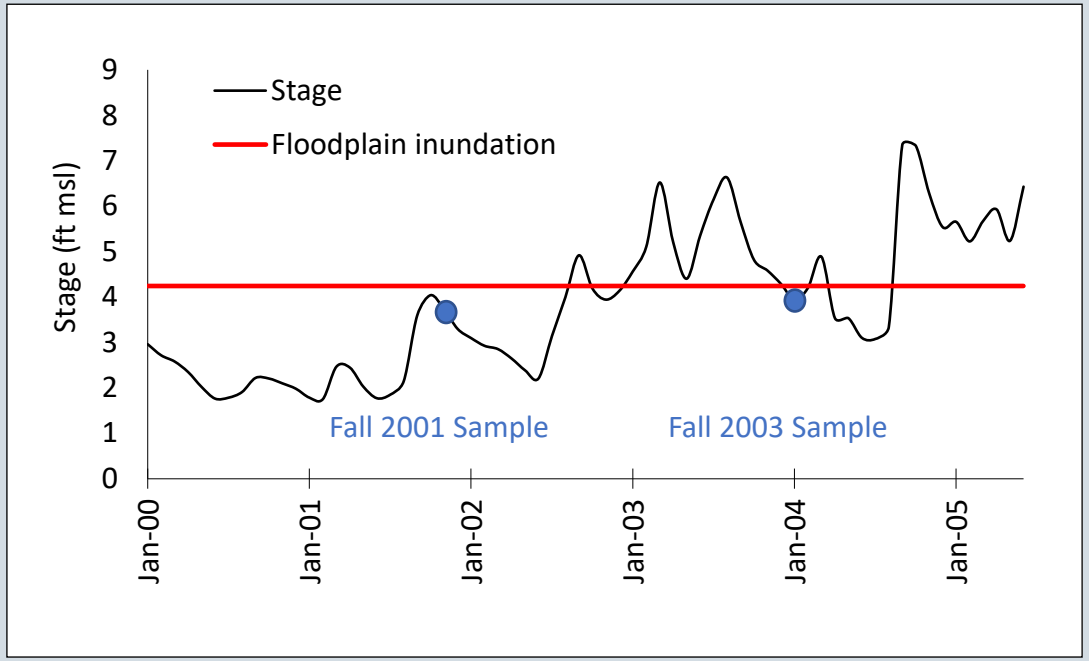


Fish population response to floodplain inundation

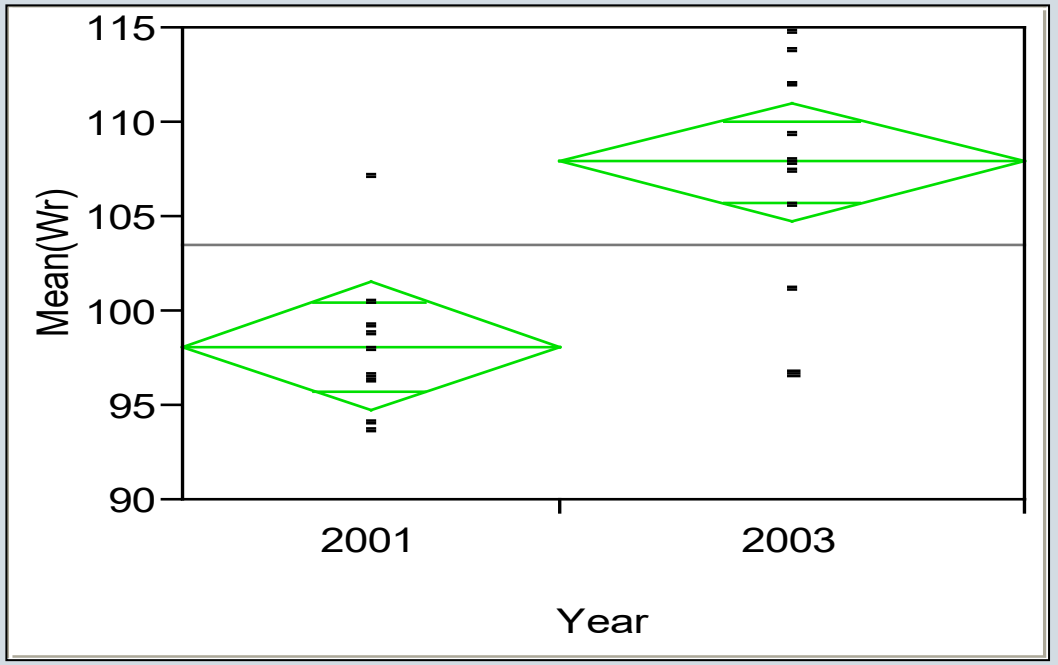
Samples only collected when:

- Flow within banks for a minimum of 3 months
- Floodplain inundated for a minimum of 3 months

Ocklawaha River Fish Community Samples

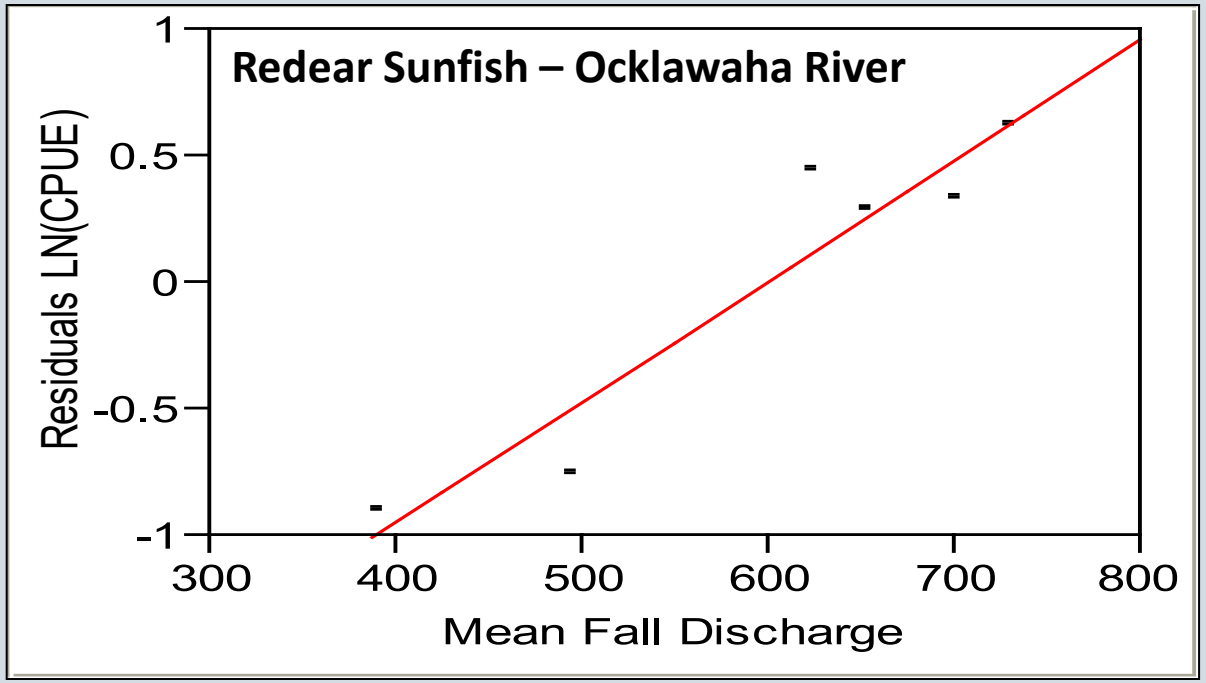


Spotted Sunfish Condition (Relative Weight)



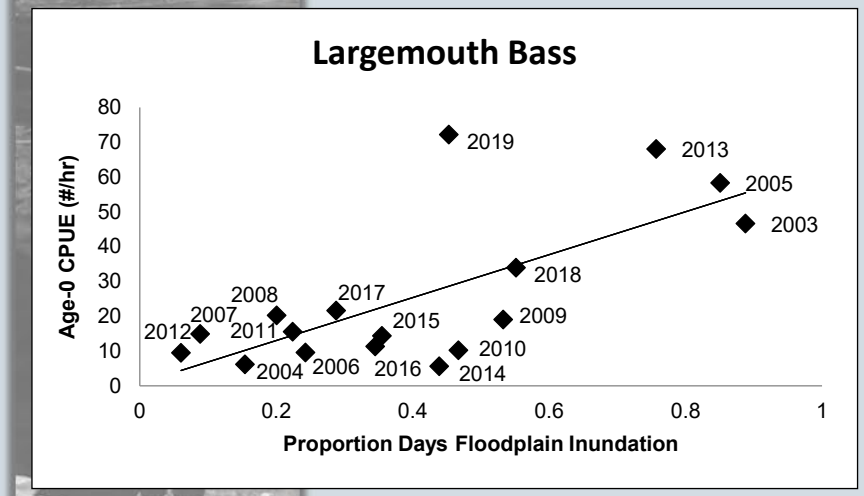
Fish population response to floodplain inundation

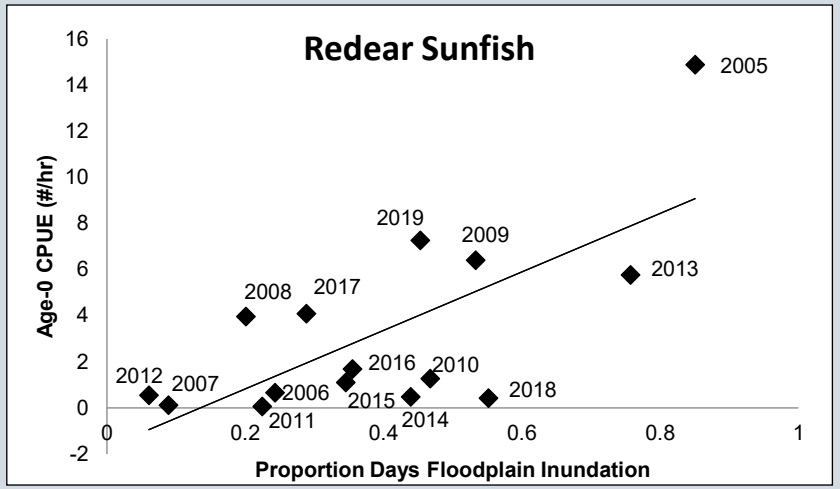
Fish year class strength correlations with hydrologic parameters (36 tests per species)
Annual and seasonal mean, min, max stage
Annual and seasonal stage range
Annual and seasonal # days above/below bankfull

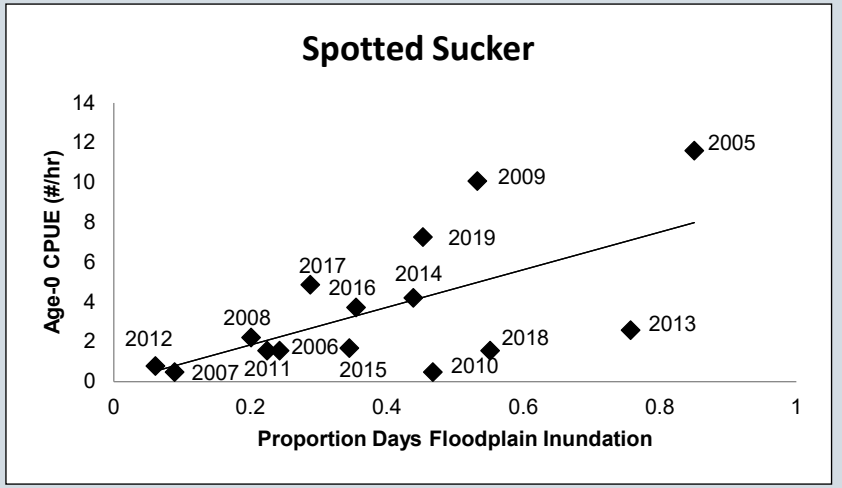


Fish population response to floodplain inundation

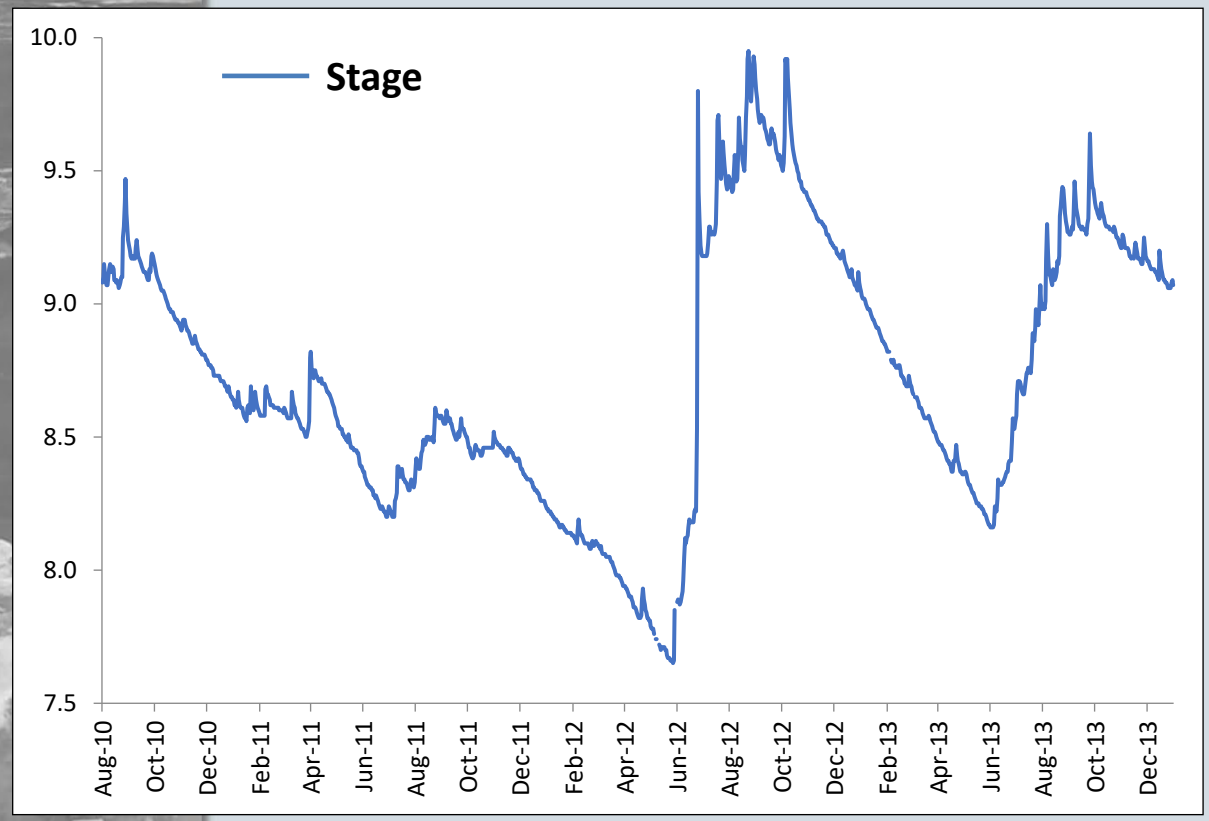
Apalachicola proportion of days with a discharge ≥ 460 m^3/s between March 1 and September 30







Fish community response to discharge – Gum Slough



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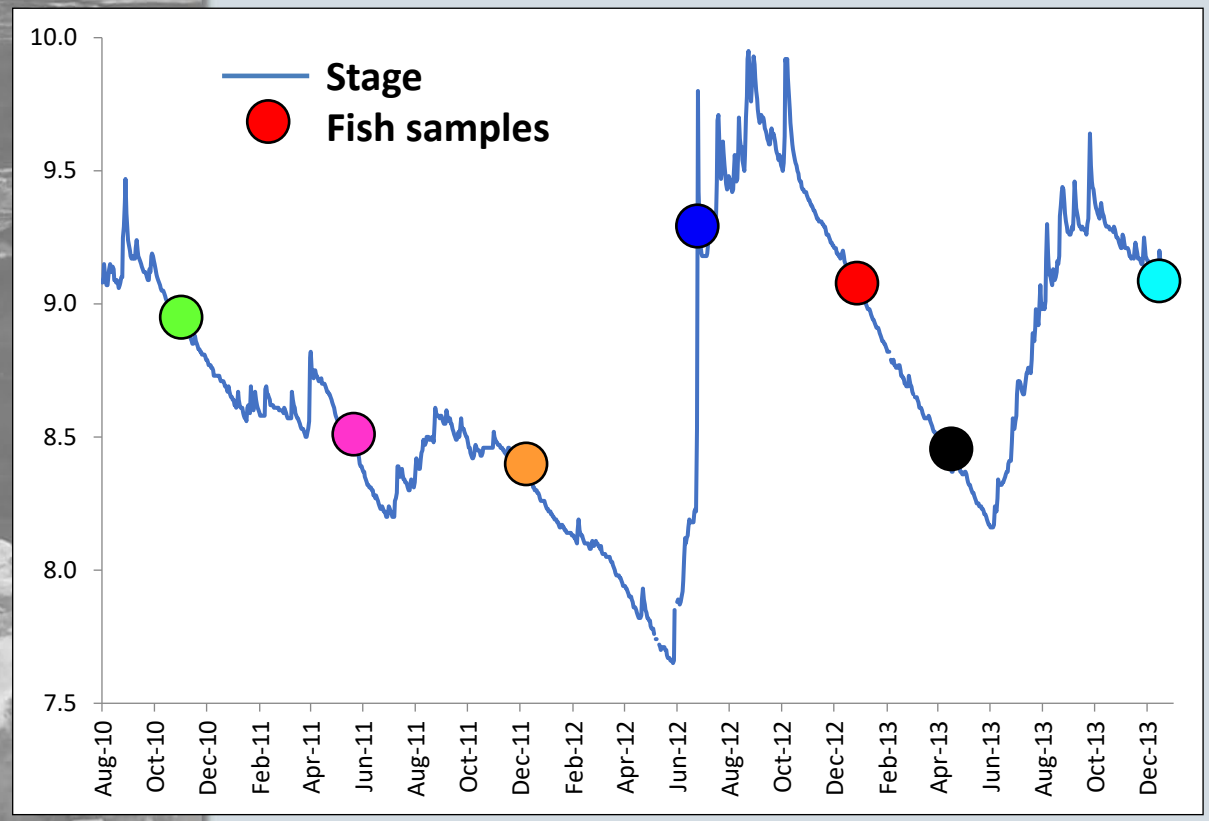

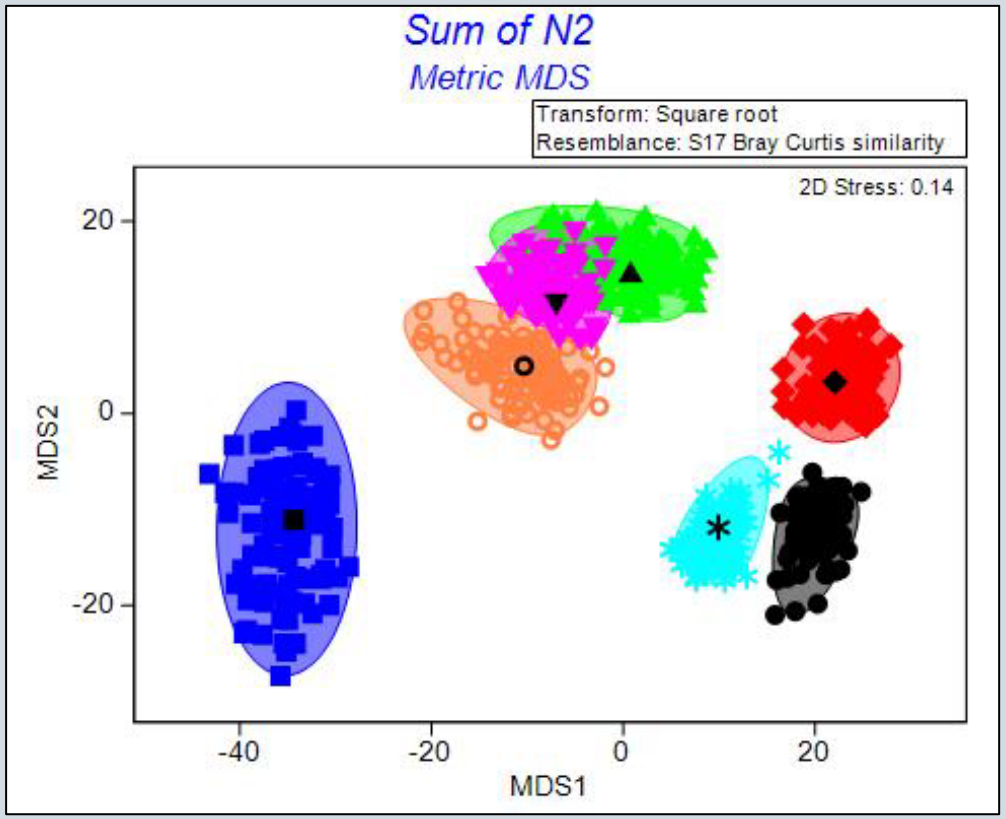

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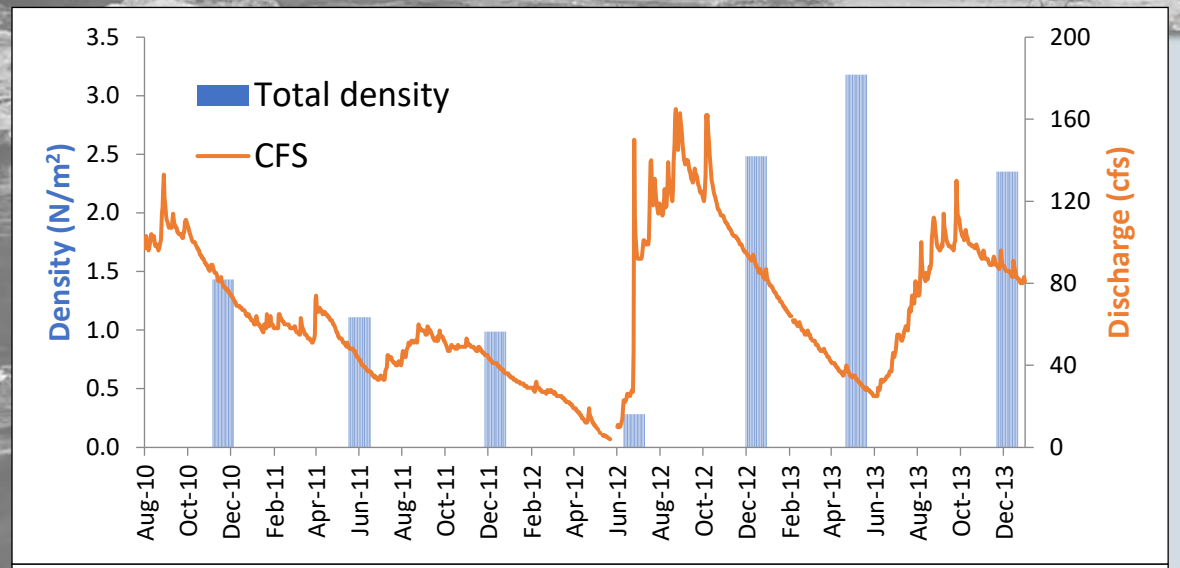
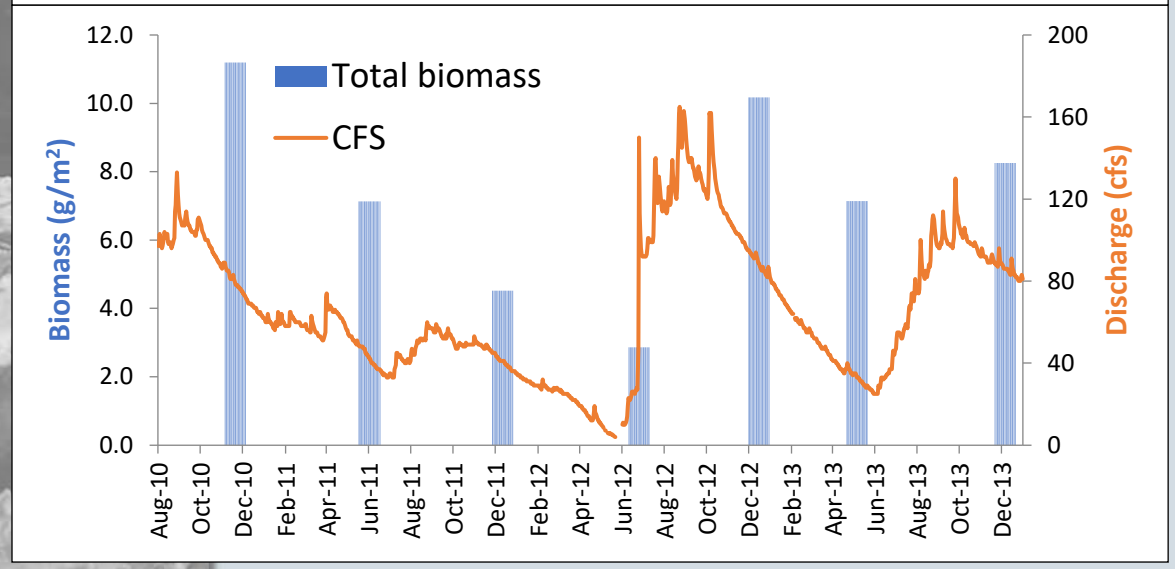
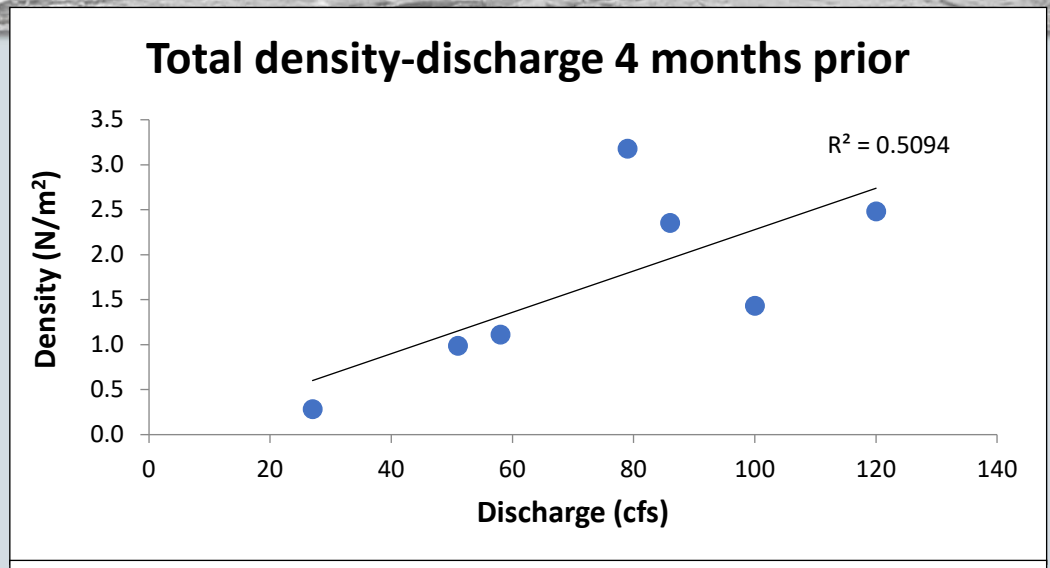
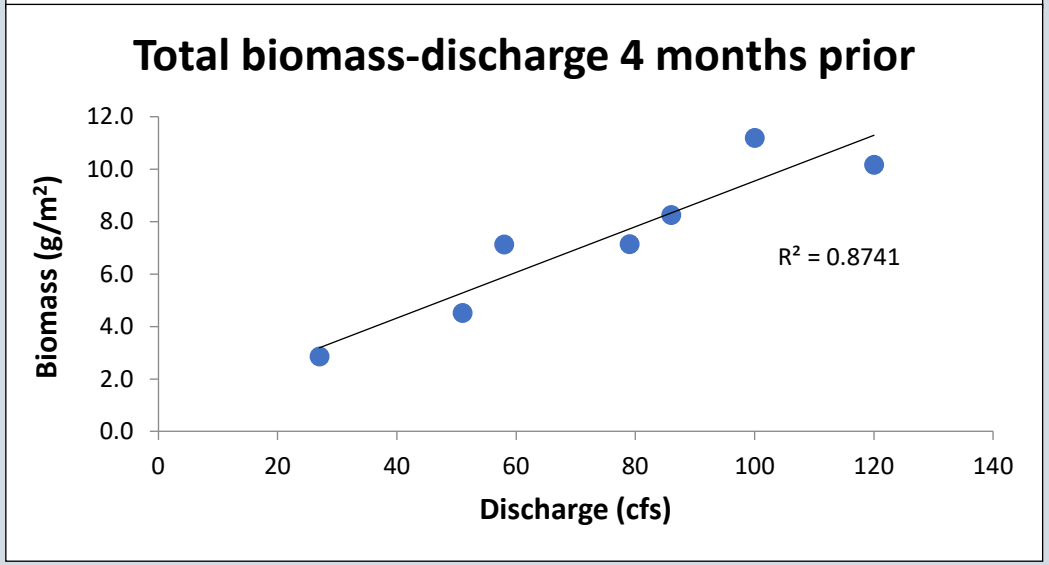
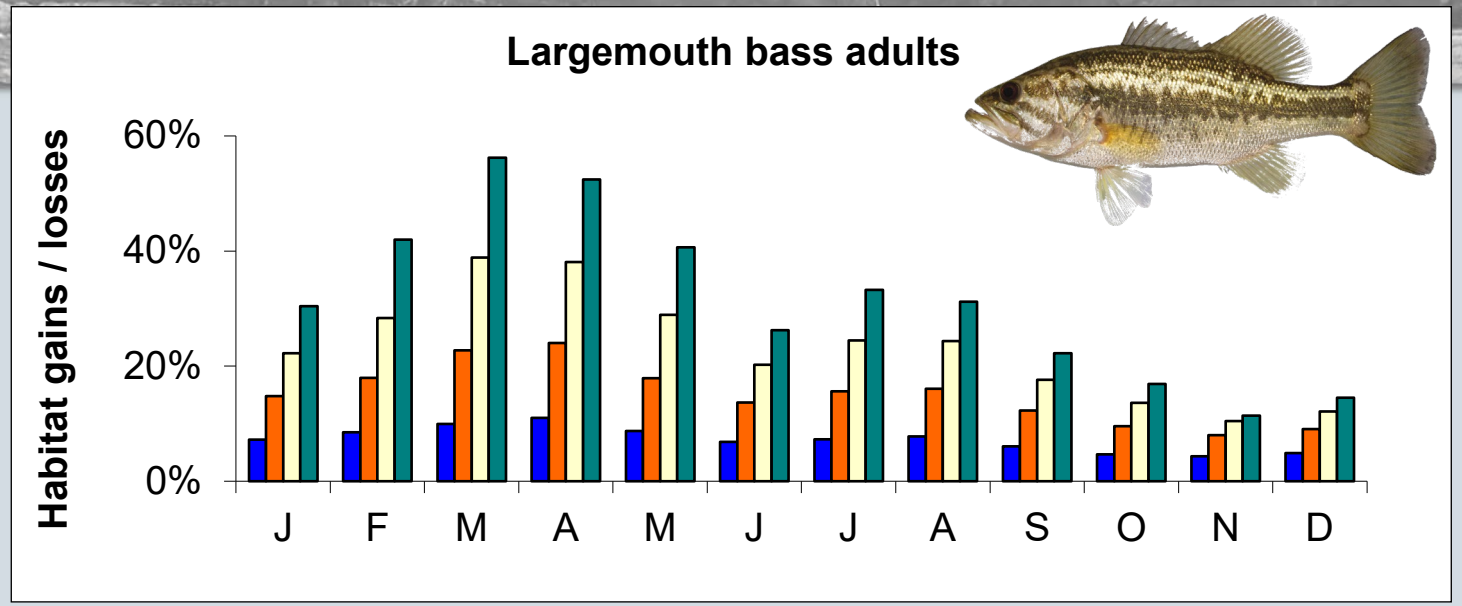


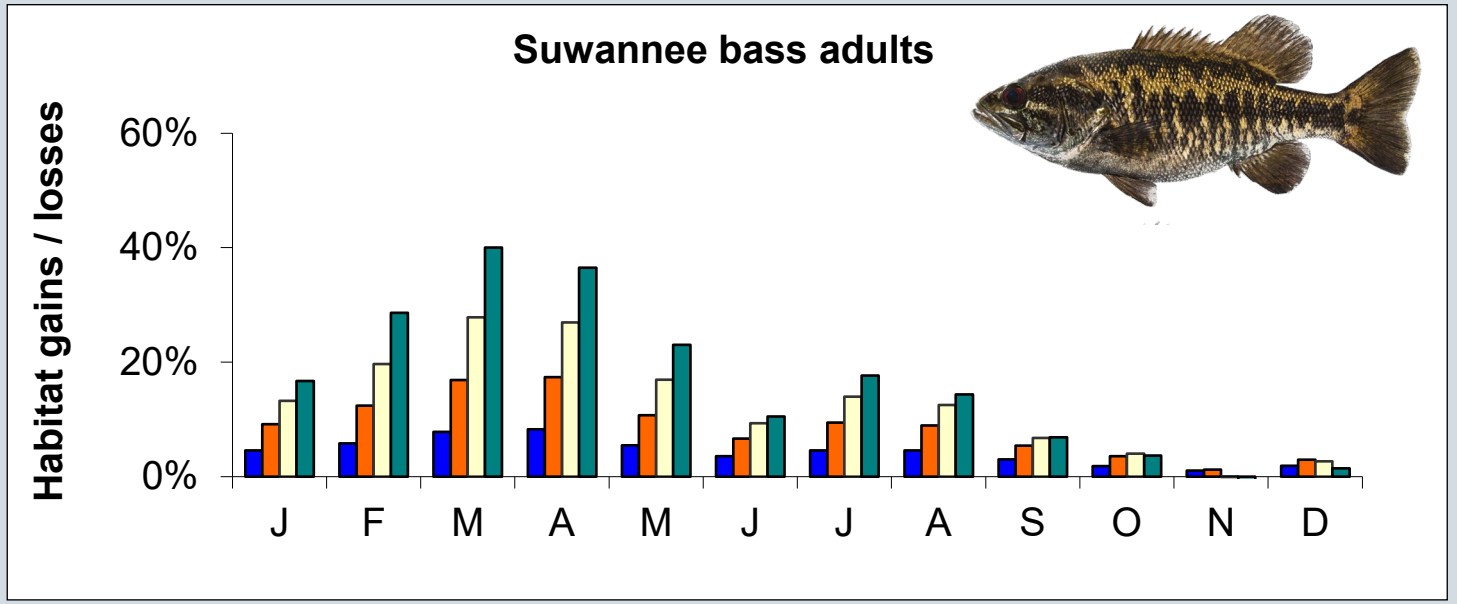






Habitat Suitability Studies – Potential ecological shifts





Flow Reduction

- 10% reduction
- 20% reduction
- 30% reduction
- 40% reduction