

Suckermouth Armored Catfish Management and Research in Central Texas



THE MEADOWS CENTER
FOR WATER AND THE ENVIRONMENT
TEXAS STATE UNIVERSITY
ECOLOGICAL RESEARCH GROUP



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San Marcos River

- 2nd largest spring system in Texas
- Stable 72° F (22° C)
- Highly urbanized
- High level of endemism
- Edwards Aquifer **Habitat Conservation Plan** (~4rkm)



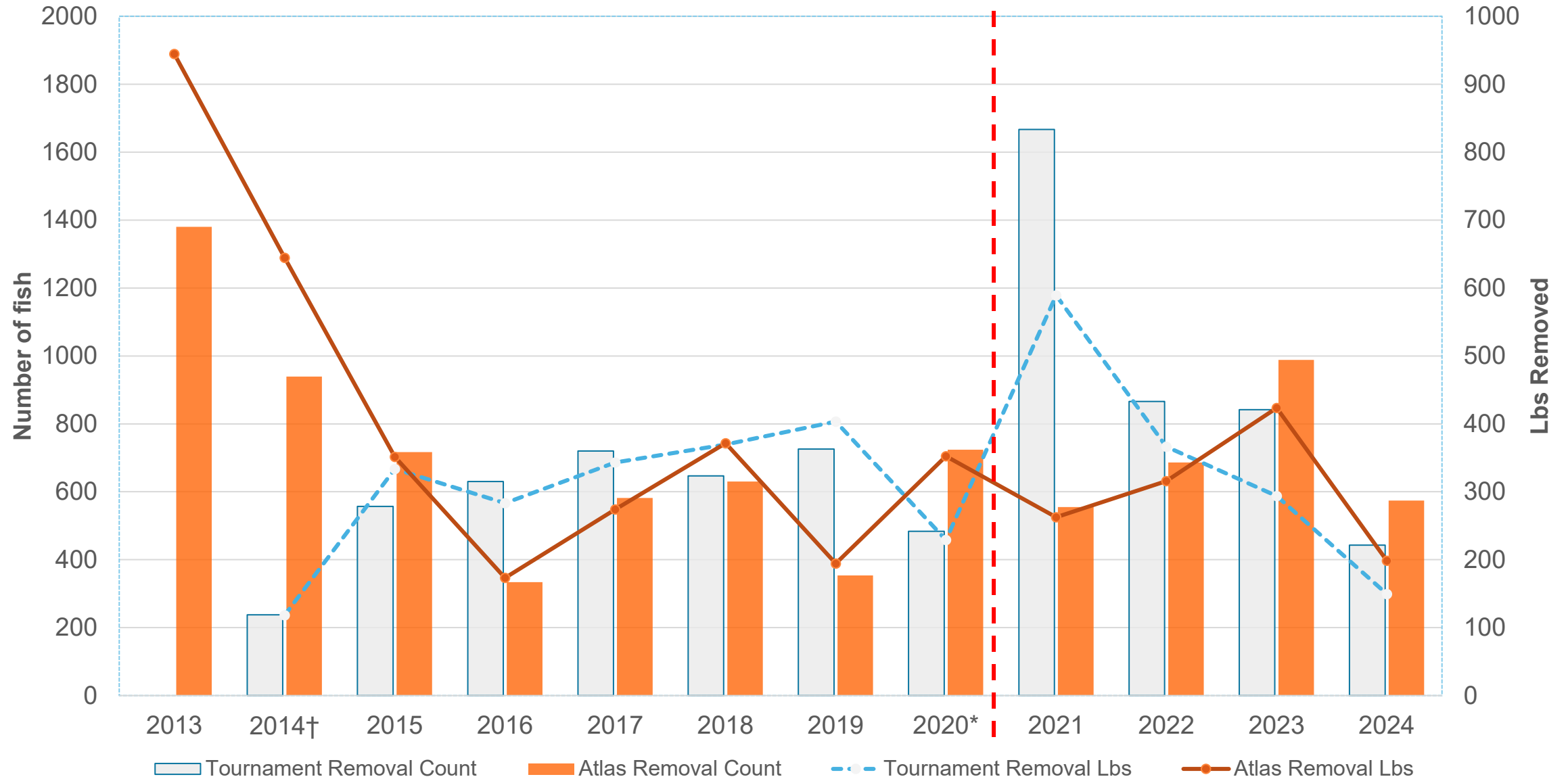


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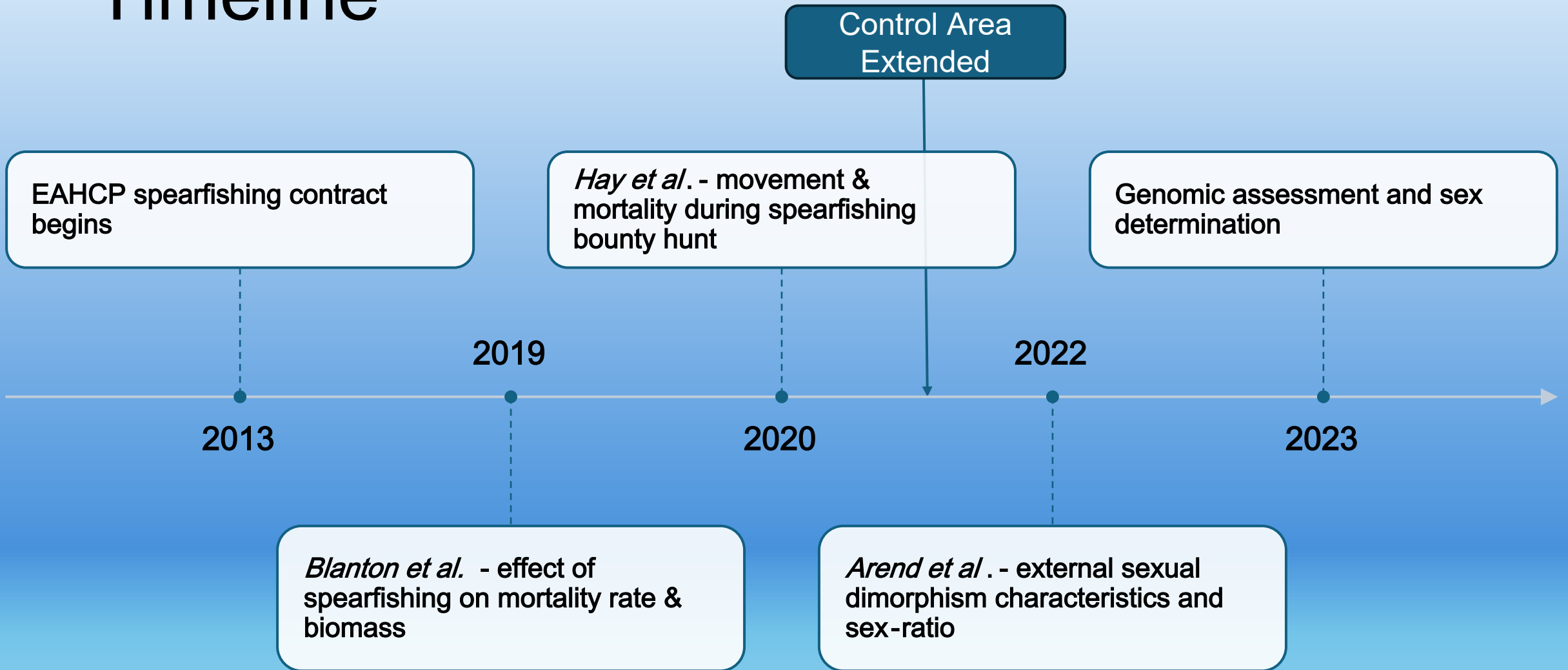
- *Hypostomus* sp.
 - "Pleco"
- *Pterygoplichthys* sp.
 - "Sailfin"

San Marcos River *Hypostomus* sp. Removal Efforts

†Fall tournament only
*Spring Bounty Hunt



Timeline

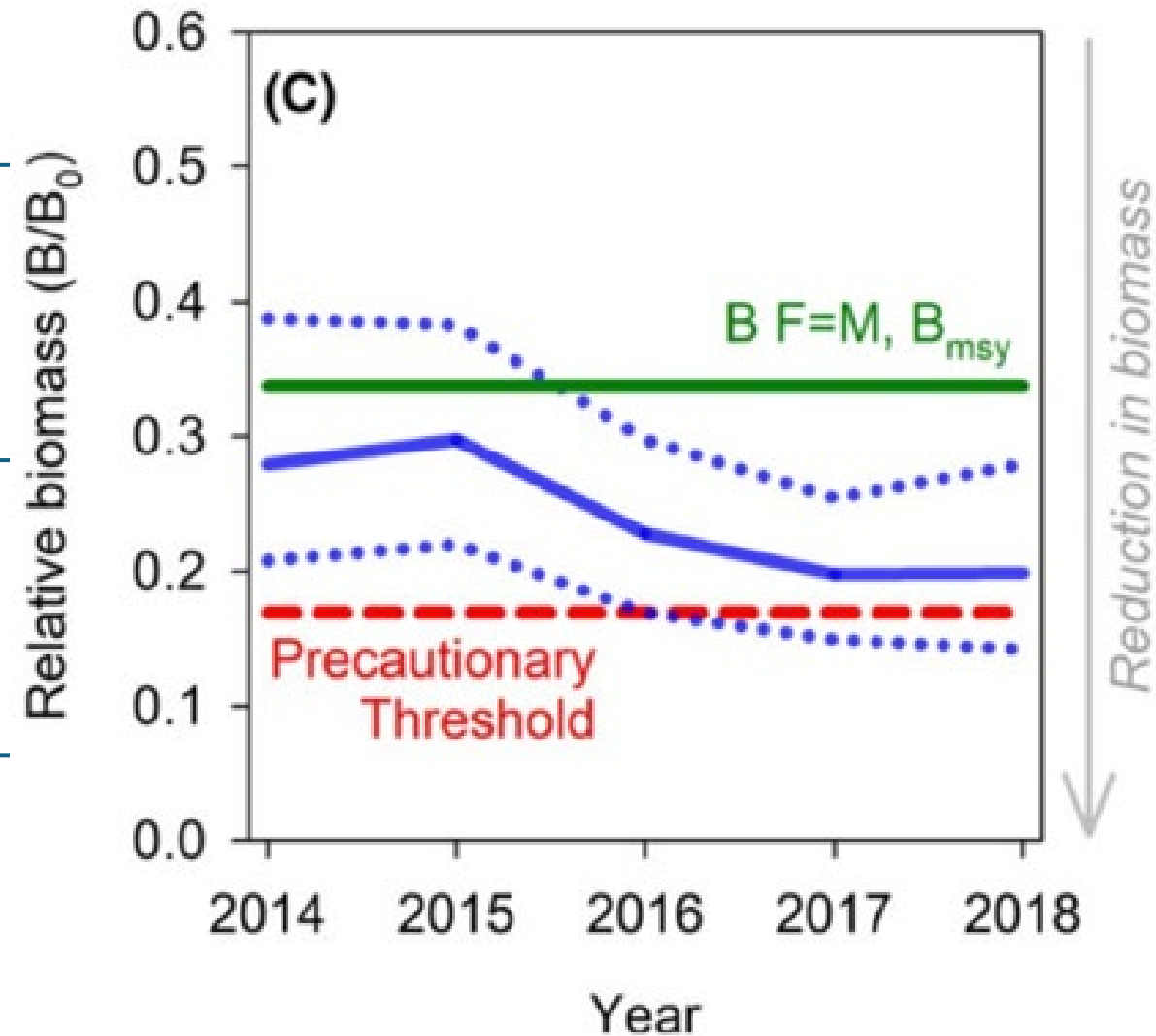


Blanton *et al*, 2020

Relative fishing pressure was 1.00-1.76 times higher than natural mortality (2015-2018)

Estimated to reduce biomass to 20-30% of unsuppressed biomass

Relative biomass suppressed well below maximum sustainable yield and nearing a depletion threshold



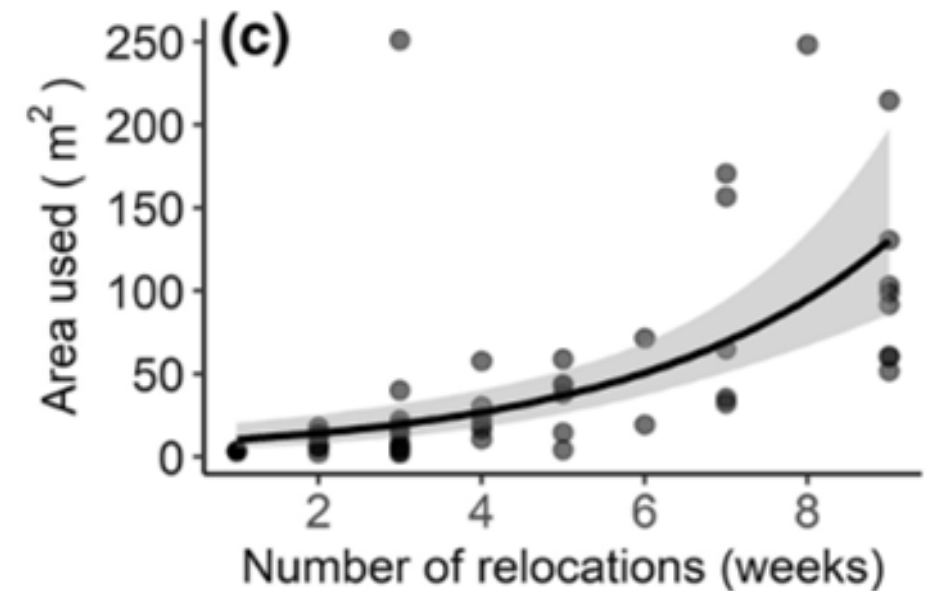
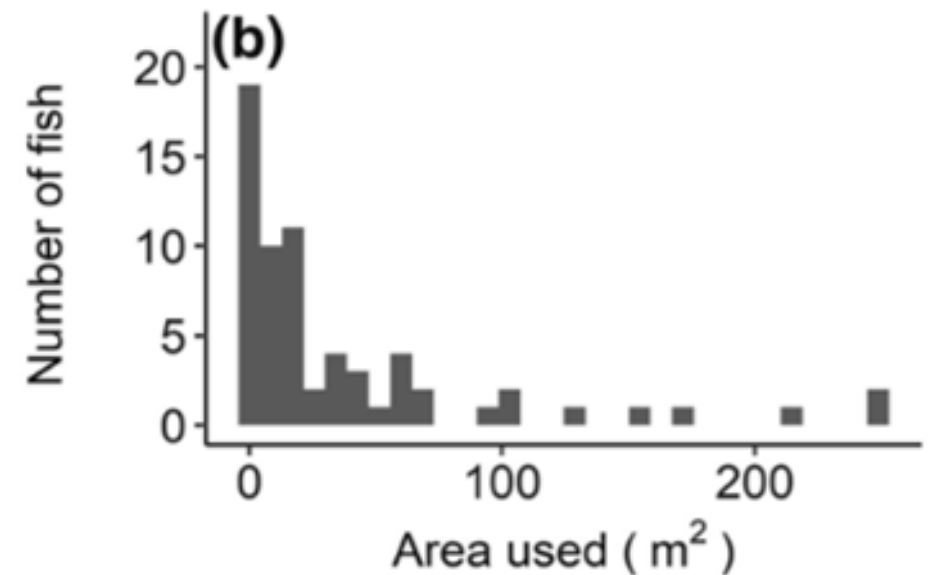
Hay *et al*, 2022

Spearing mortality was 1.6 times higher than natural mortality.

>25 fish removed per week significantly reduces survivability

Population fits diffusive spread but heterogeneous

Could repopulate from outside control area between tournaments – **added another managed section**



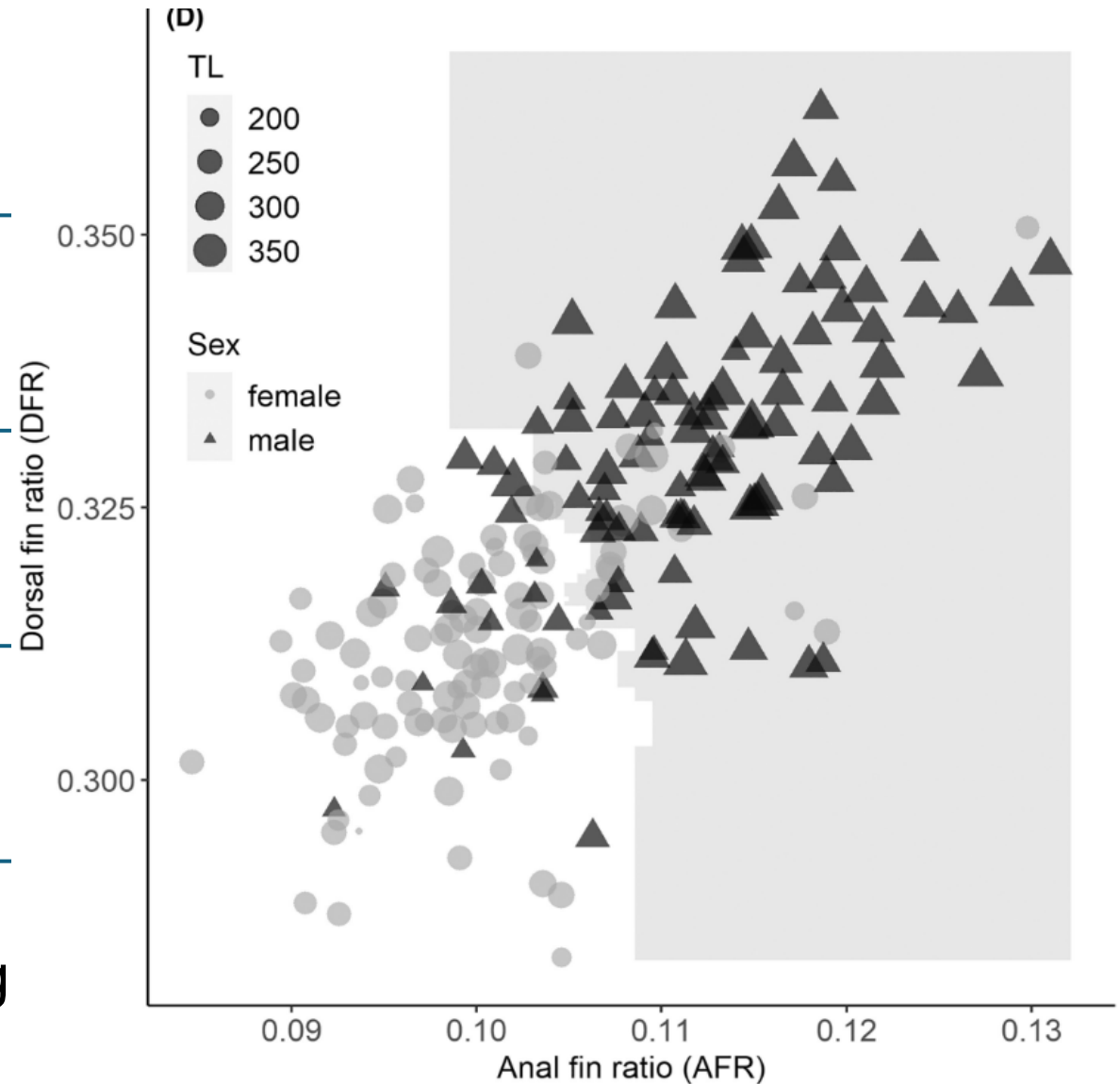
Arend *et al*, 2023

Determined external sexual dimorphism features for adult SAC

Anal fin/total length to dorsal fin/total length (83% accurate, 75% @ 240mm TL)

60% female 40% male dewatering event collection

Successful validation of application by "untrained" students – currently assessing speared tournament fish

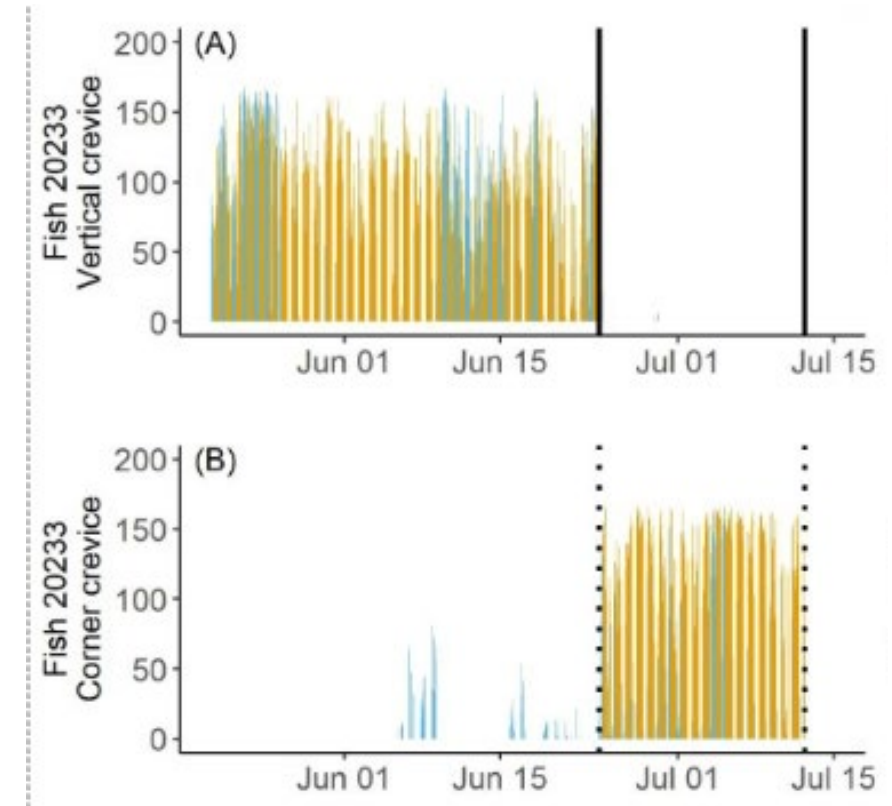
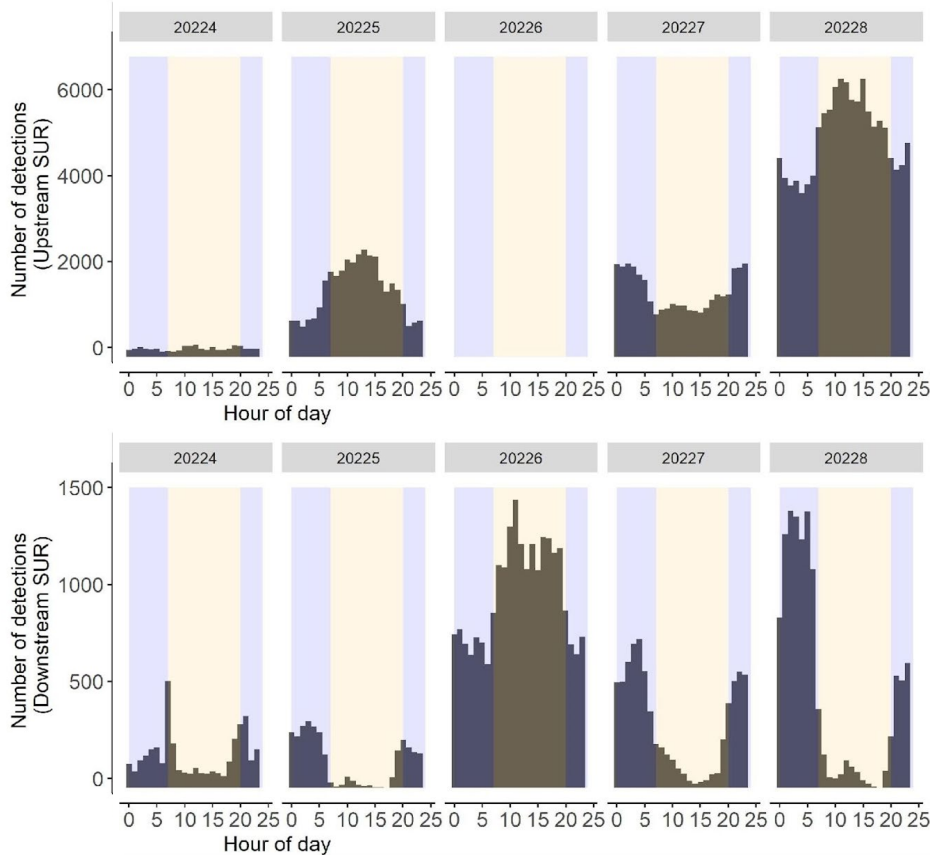


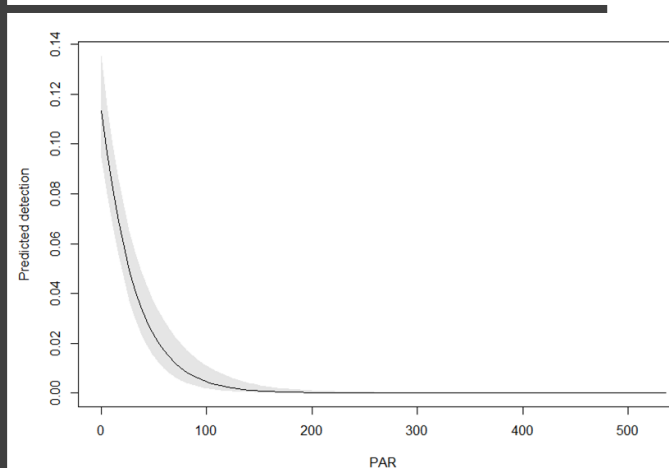
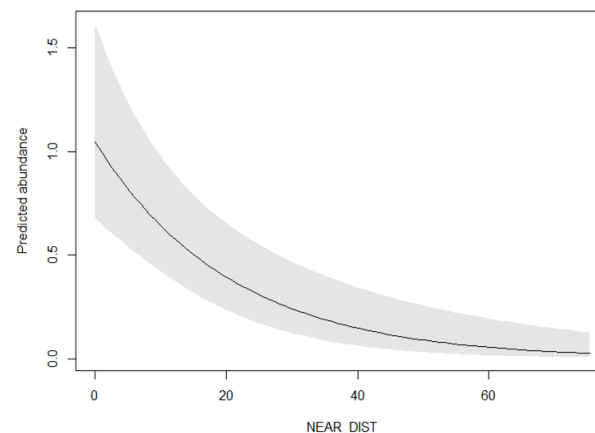
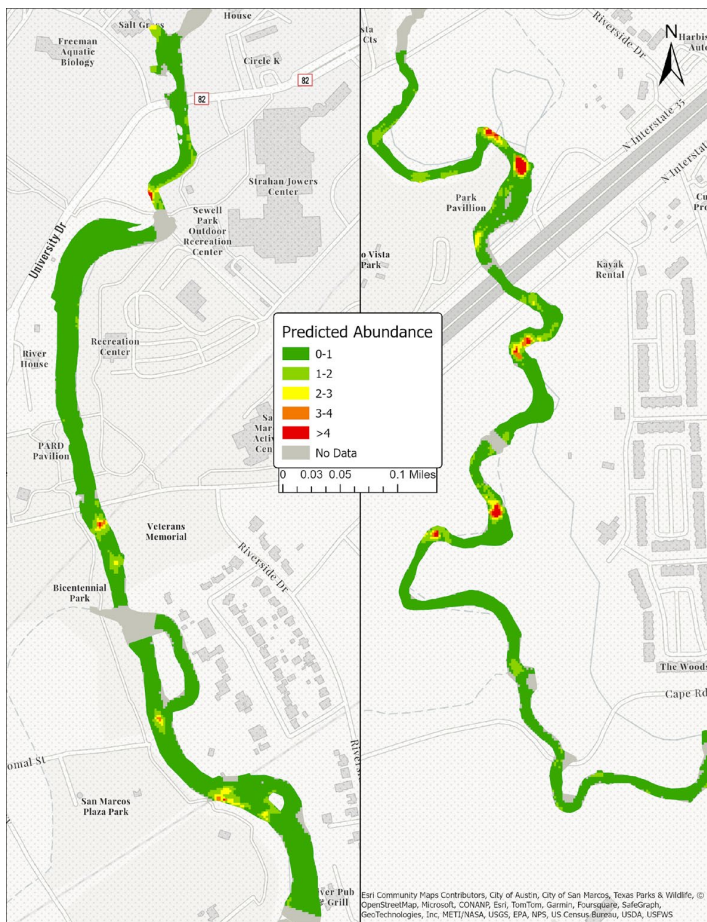
Arend, W. A., Mangold, R. D., Riggins, C. L., Garoutte, C., Rodriguez, Y., Heard, T. C., ... & Perkin, J. S. (2023). Sexual dimorphism in an invasive population of suckermouth armored catfish: Implications for management. *North American Journal of Fisheries Management*, 43(6), 1735-1749.

Acoustic Tracking

Summer 2022 & 2023

- Diel patterns of habitat/cover use
- Site fidelity and movement
- Predictable temporal/spatial patterns
- Testing of exclusionary device





Population Surveys and Environmental Covariates

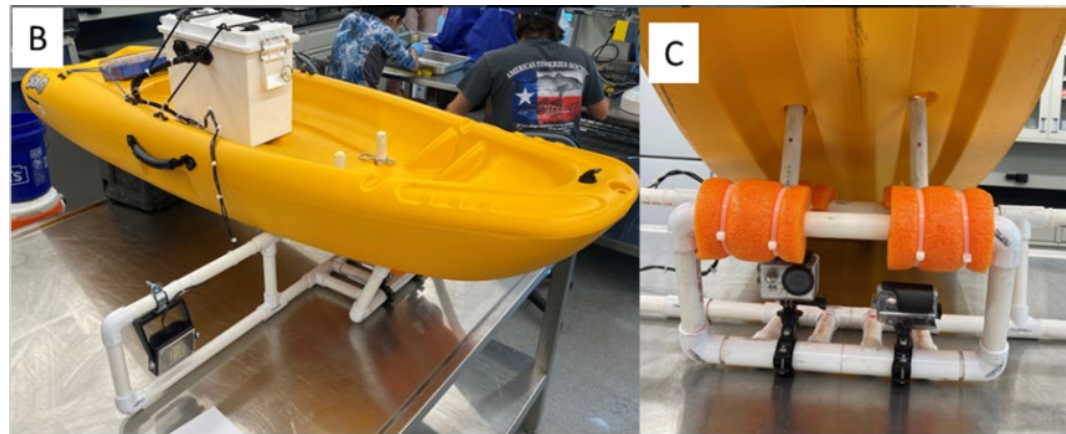
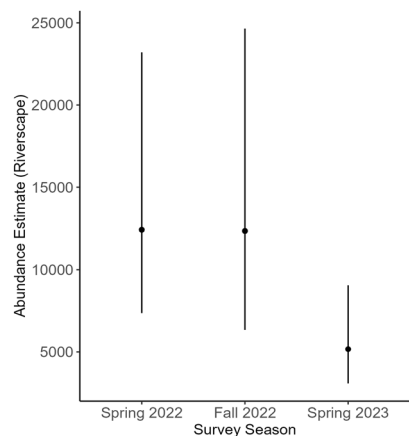
N-mixture model

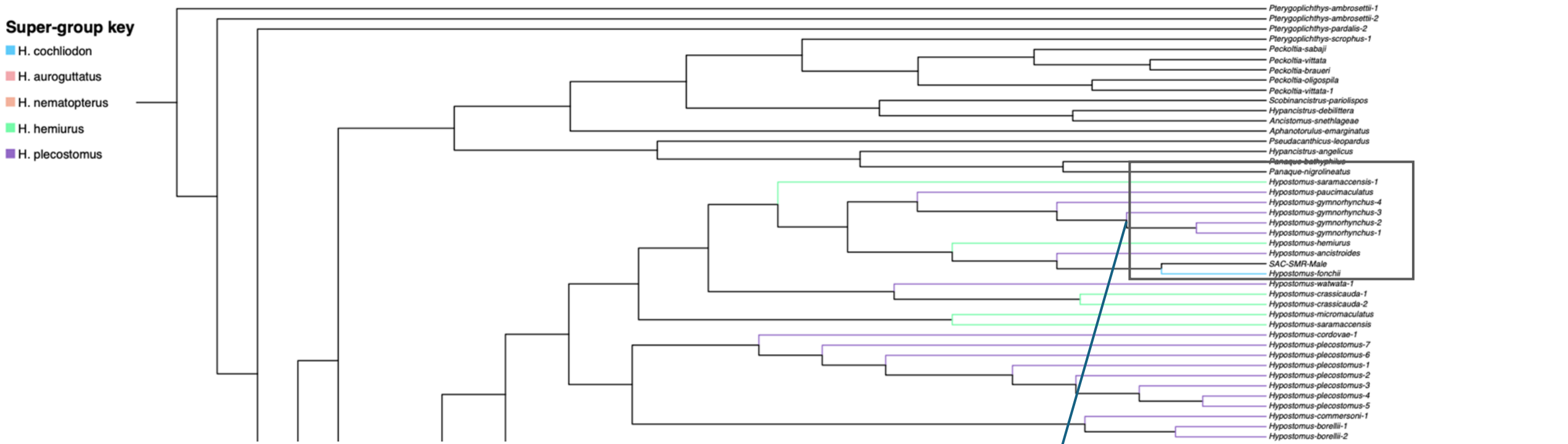
- Vegetation coverage
- Depth
- Velocity
- Failing Infrastructure

Open population model

☐ daylight intensity (solar radiation)

☐ day/night survey – robust model



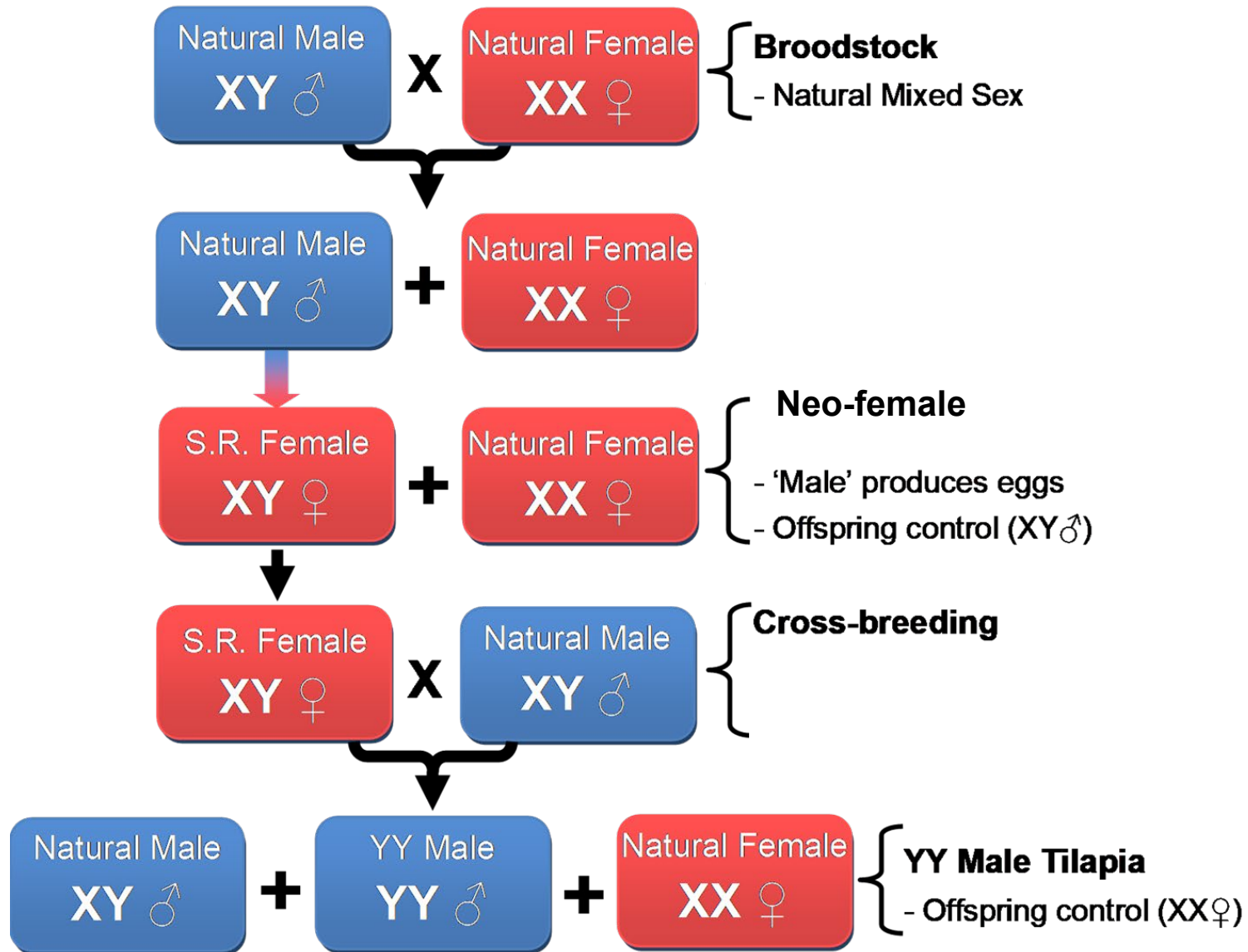


Genetic Sequencing

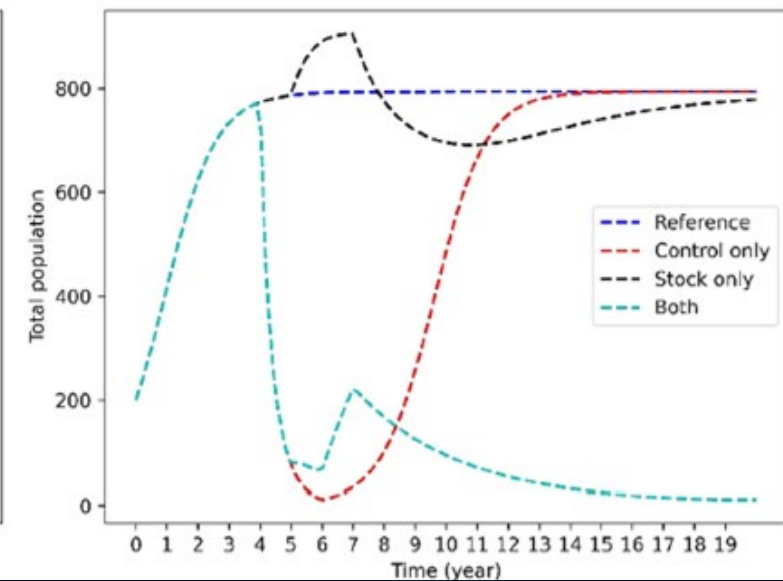
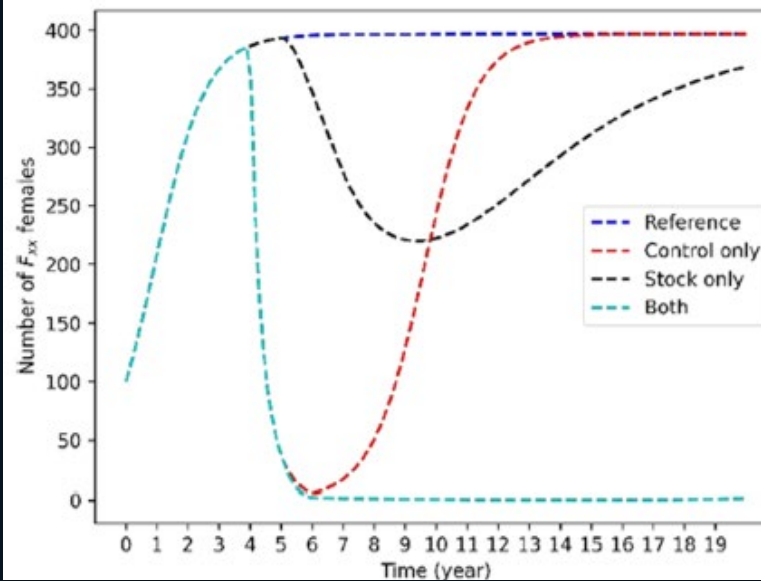
- Male and female (WGS) samples from San Marcos River, Comal River, San Felipe Creek, San Antonio River
- Identify species – *H. fonchii* based on nuclear gene phylogeny
- Genomic population estimate
- Verify chromosomal sex determination (XX/XY)



Development of the YY-line: Males



Next Steps



- *Hypostomus* sp. from San Marcos River currently housed at Heart of the Hills Fisheries Science Center.
 - Planned spawning & estradiol treatment to induce YY male progeny.
- Refining population estimates and standardizing protocols across invaded systems - San Felipe Creek, Comal River, San Antonio River.
- Modeling biocontrol method - suppression and stocking estimates