



Jayla Brown<sup>1</sup>, BS and Katrina Knott<sup>2</sup>, MS, PhD

<sup>1</sup>College of Veterinary Medicine, University of Missouri-Columbia

<sup>2</sup>Ecological Health Unit, Science Branch, Missouri Department of Conservation

Veterinary Research  
Scholars Program  
University of Missouri

## Introduction

### Mercury

- Mercury is a heavy metal distributed throughout the world by the atmosphere that can cause a variety of health concerns for fish and consumers.
- Mercury biomagnifies through the food web, resulting in highest concentrations in apex predators.

### Flathead Catfish (*Pylodictis olivaris*)

- A fish favored by anglers in Missouri reservoirs, yet there is a knowledge gap of mercury concentrations in the species.
- Mercury concentrations are anticipated to be high due to the high trophic position.
- Flathead Catfish transition from invertivorous diet to a piscivorous diet, initiated by fish size, environment and available prey.
- Knowledge of the diet composition of Flathead Catfish and its variance with size, will improve the understanding of mercury accumulation and trophic transfer in this species.

### Flathead Catfish Diet

- Prey items contain various dosages of mercury based on their size and diet
- Crayfish may be important drivers of trophic transfer of mercury due to their high mercury concentration diet of necrophagy and small fish.
- Diet composition, including high proportions of crayfish, could result in Flathead Catfish acquiring high concentrations of mercury.

### Objective:

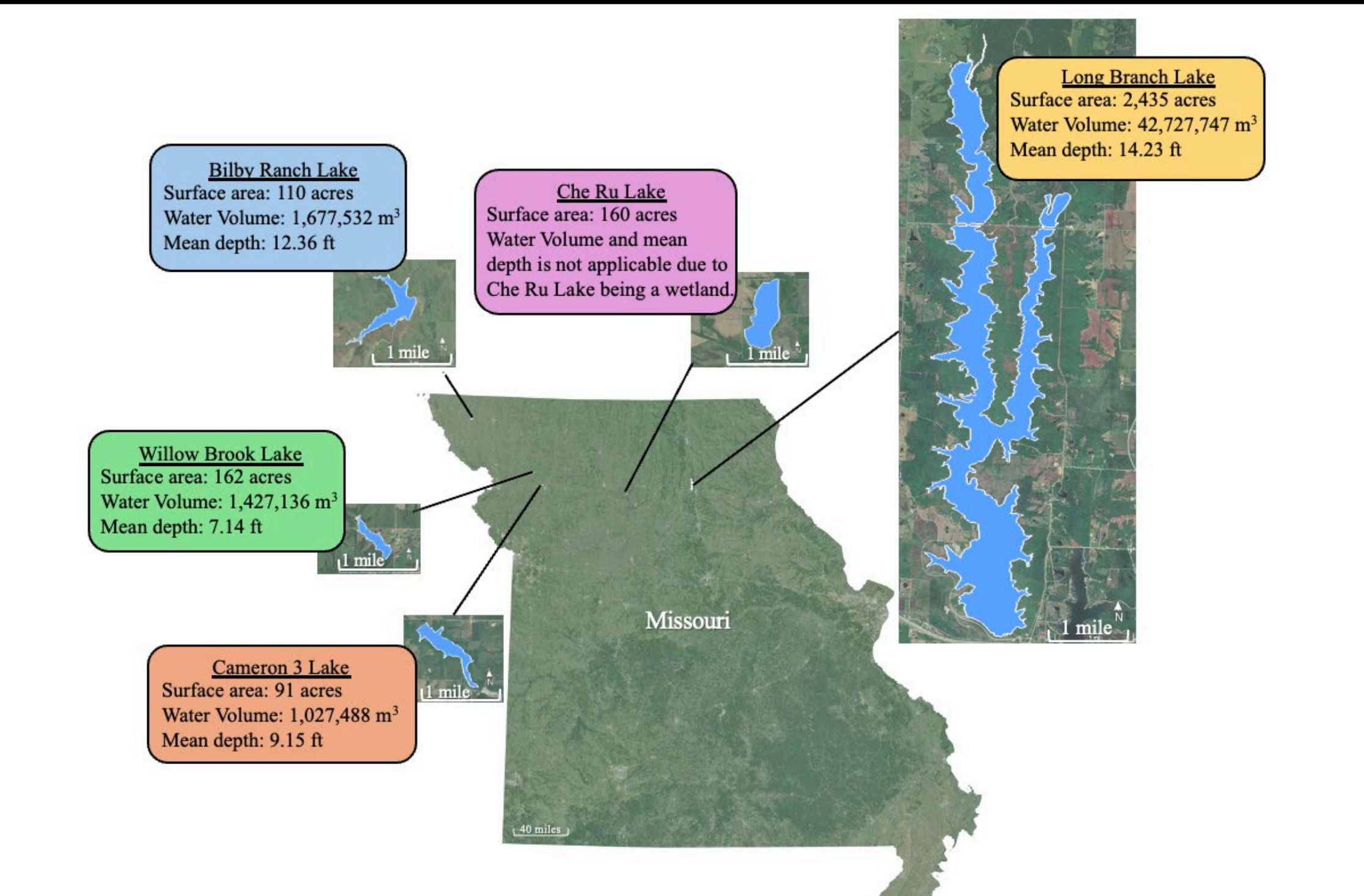
Determine diet composition of Flathead Catfish through examination of stomach contents.

Fish ranging in sizes of 100-899 mm were targeted from 5 reservoirs to determine the transition from benthic feeding to piscivory.

### Hypothesis:

Prey composition of flathead catfish will vary among reservoir and size of fish.

## Methods



Between mid-May and mid-June, Flathead Catfish from 5 reservoirs were collected by electrofishing

The following parameters were measured and recorded:

Weight (g)

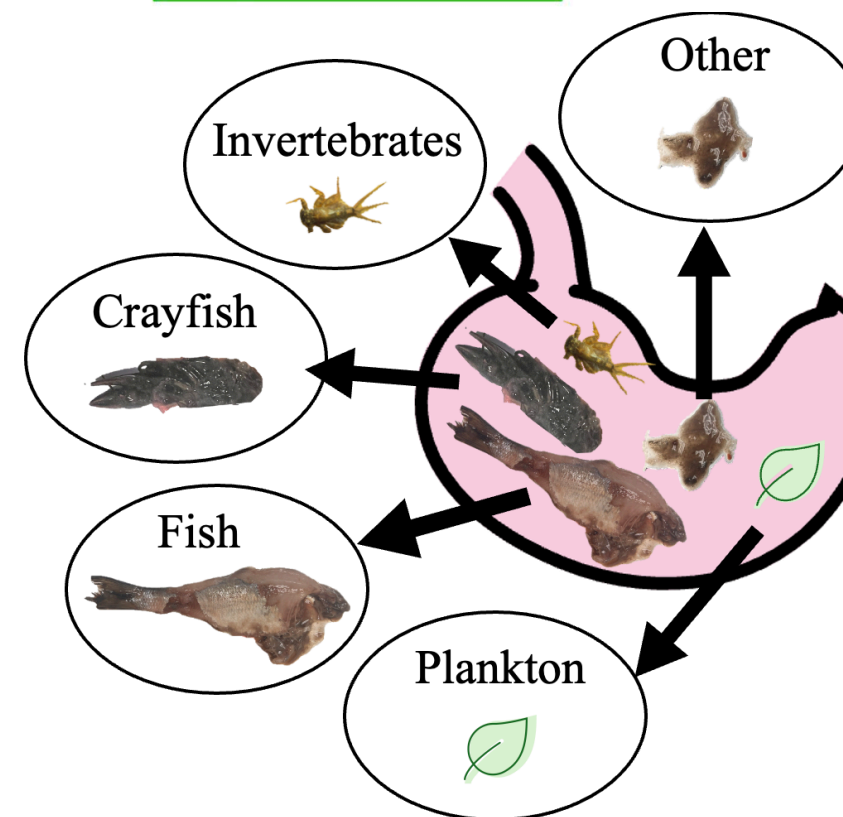
Total Length (mm)

Sex

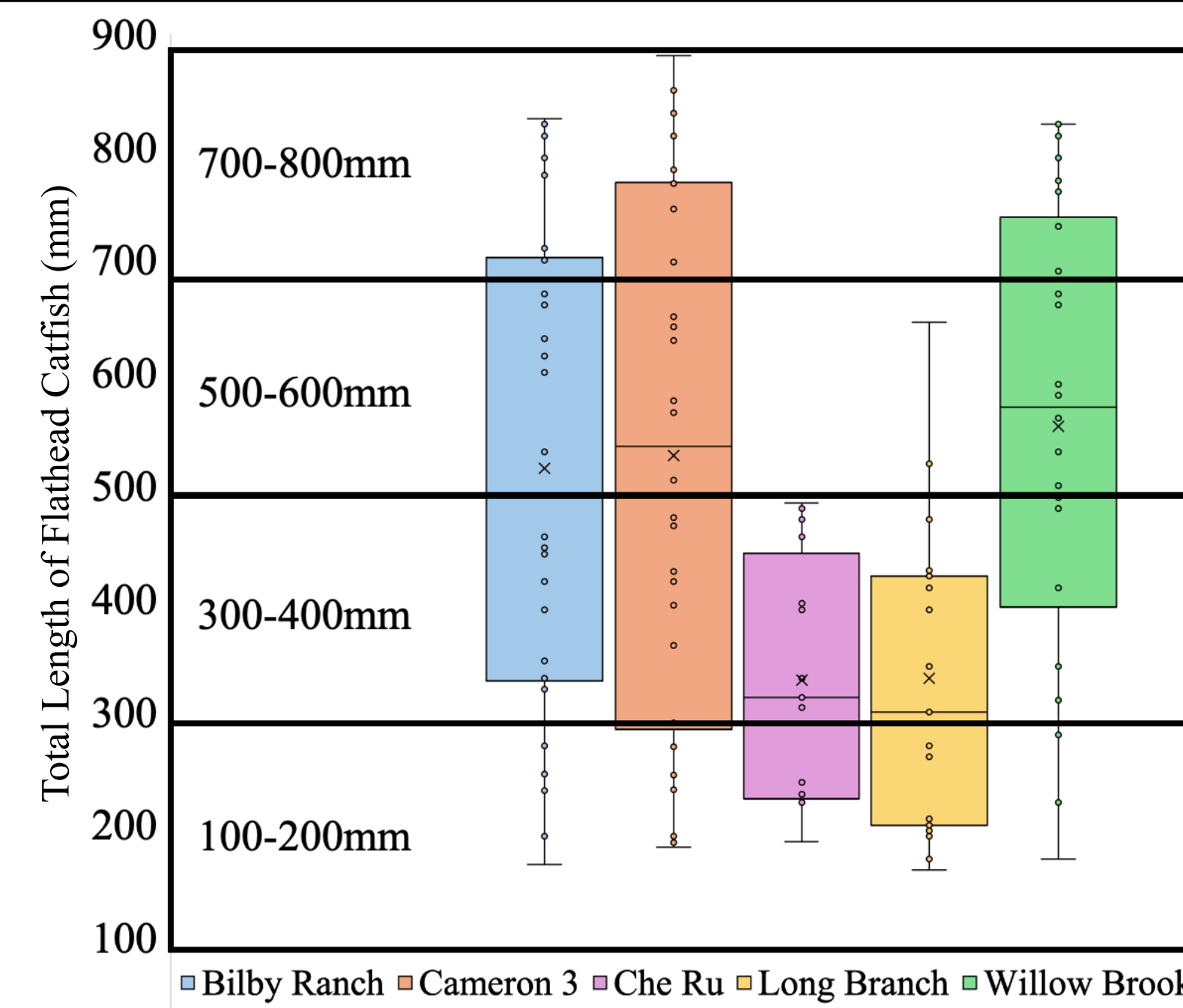
Gape height (mm) & Gape width (mm)

Fish were humanely euthanized via cervical dislocation

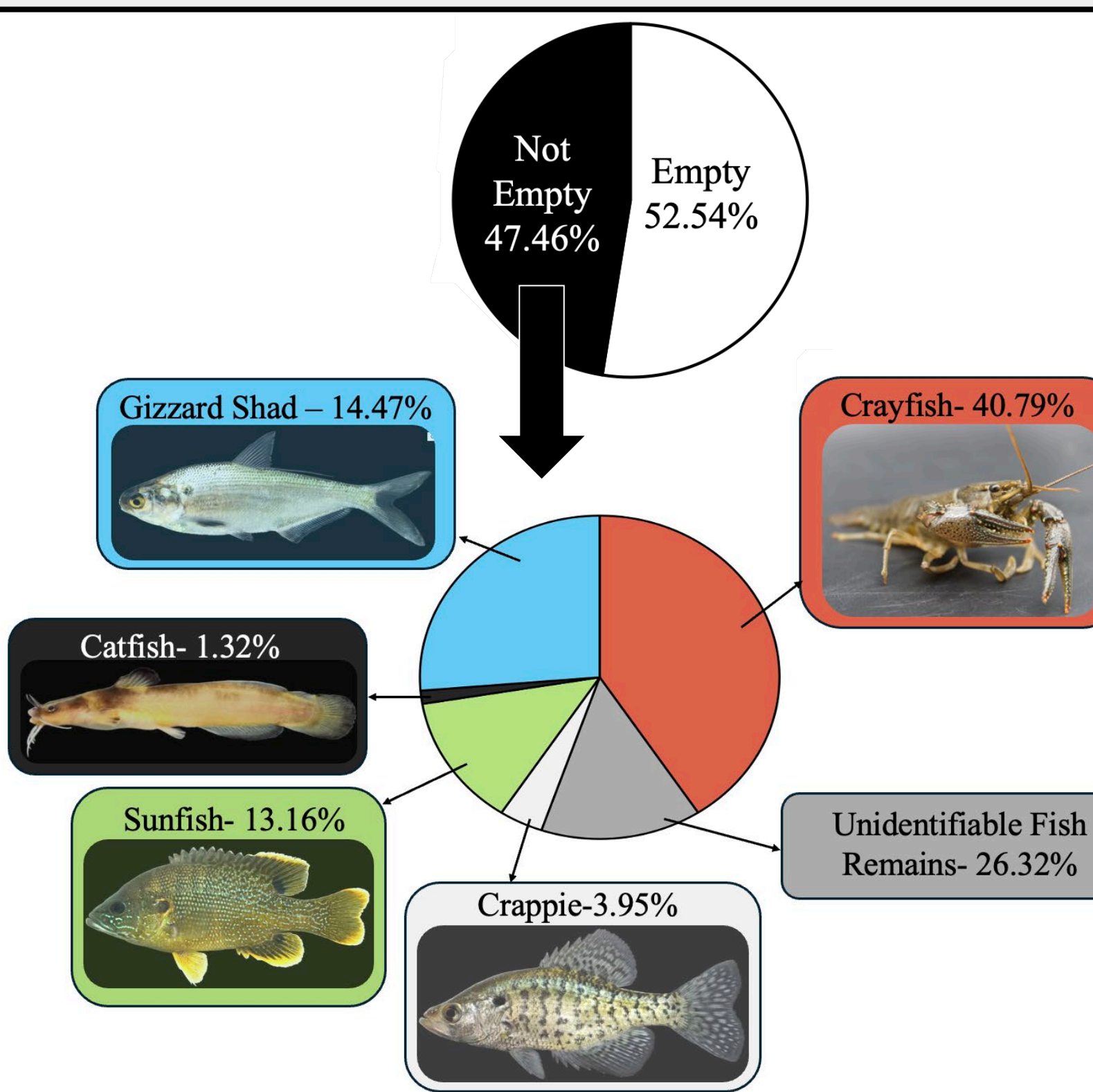
The stomach, liver, gonads, head with pectoral spines and fillets were weighed and collected.



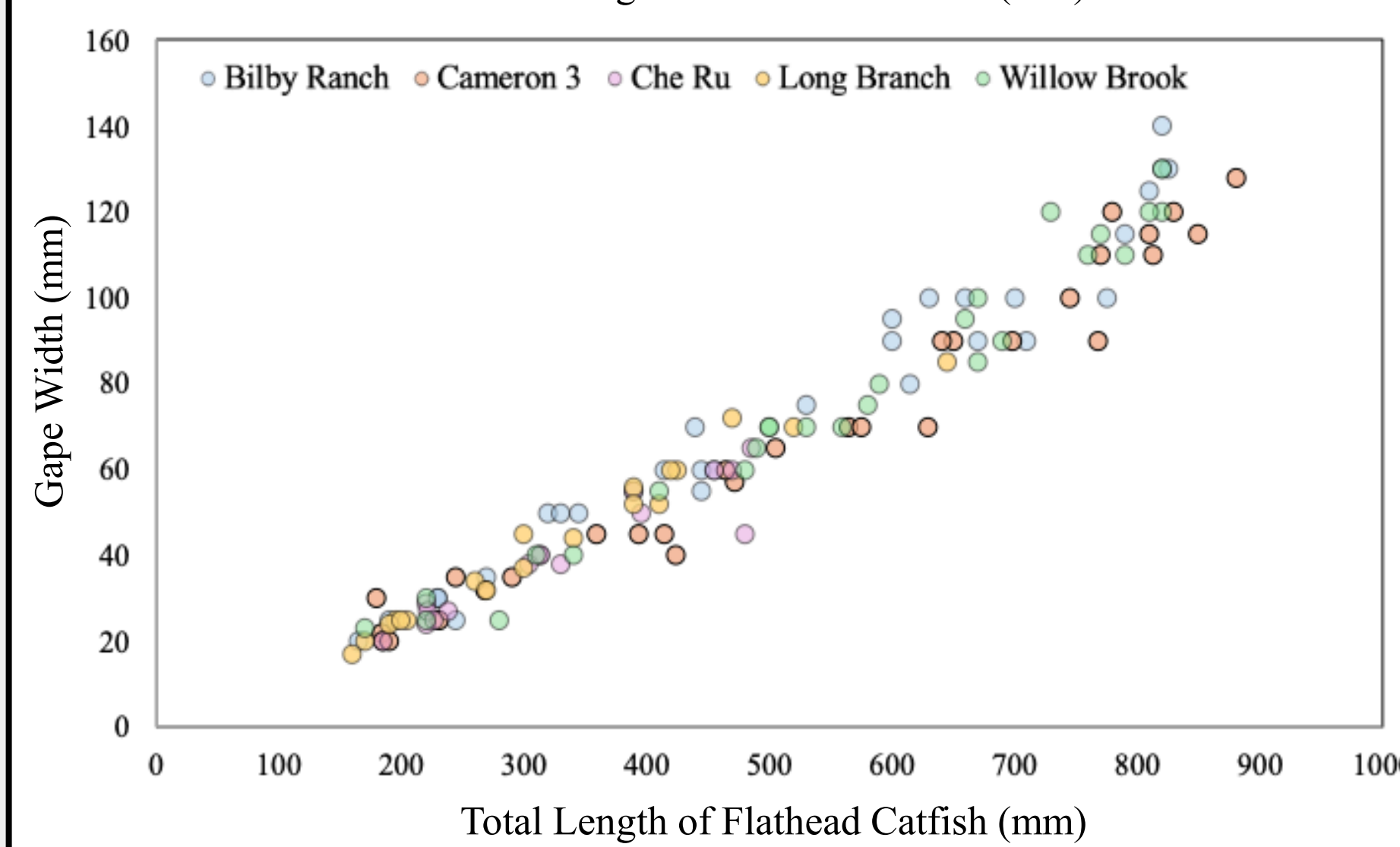
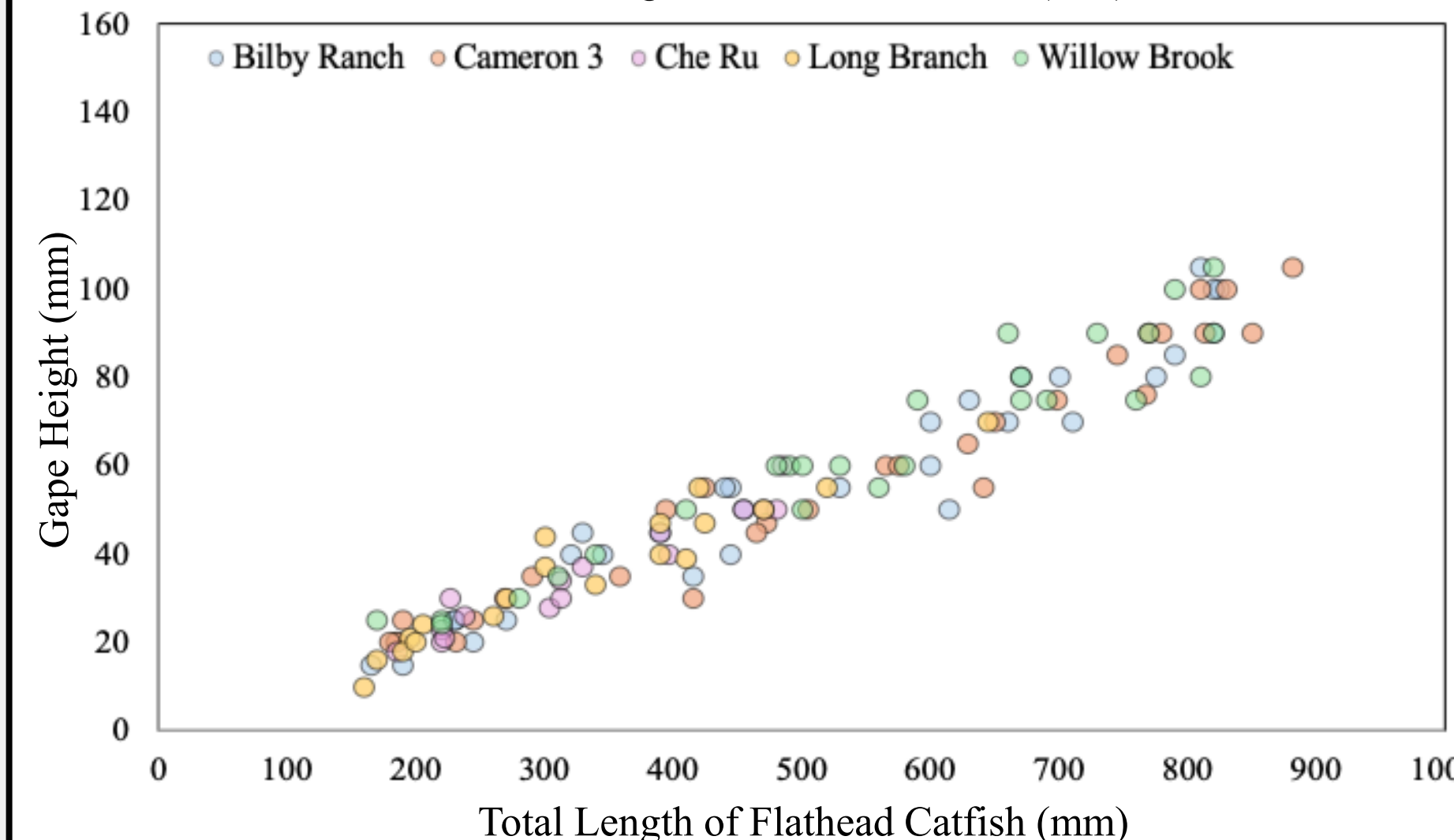
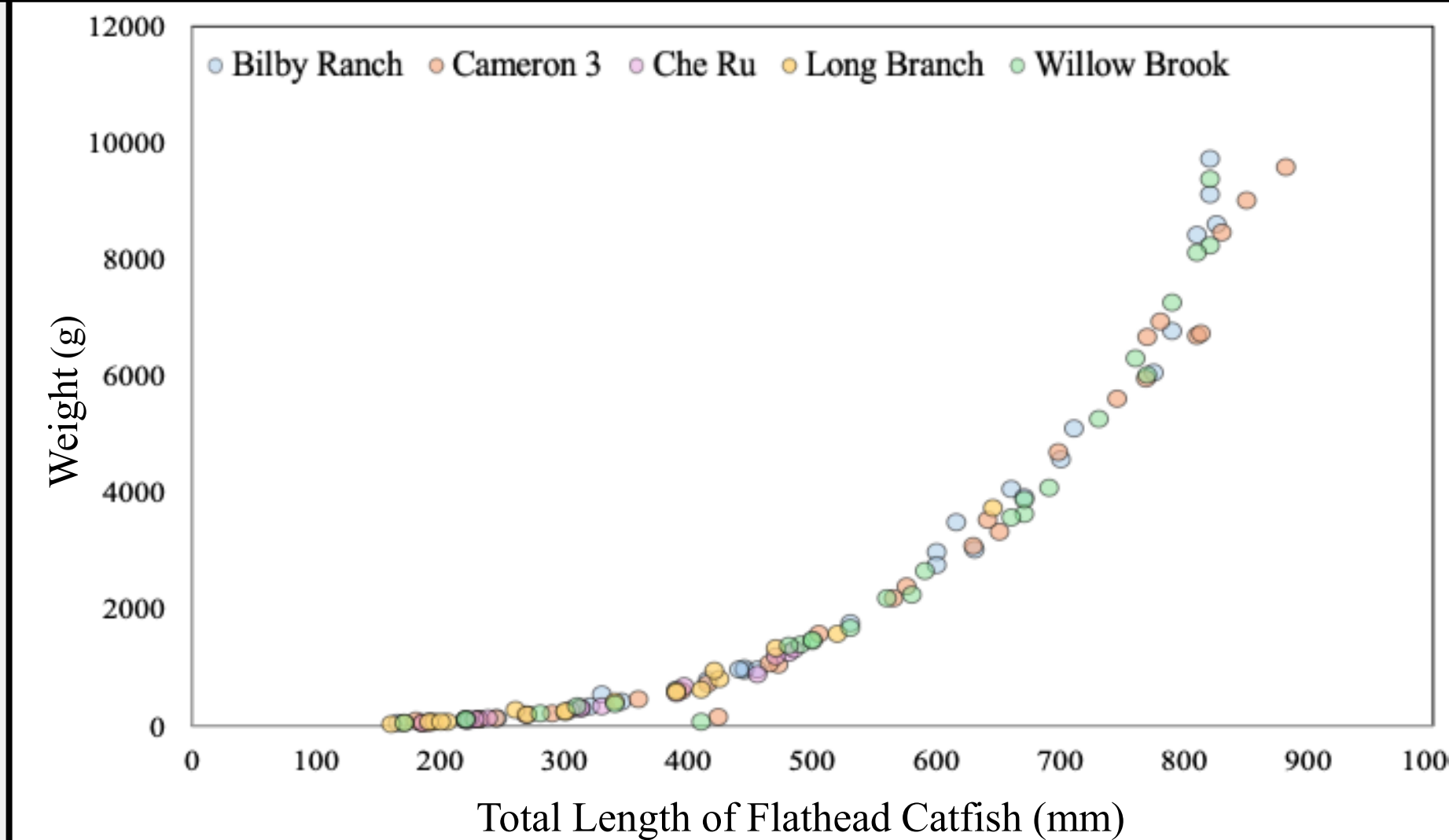
## Results



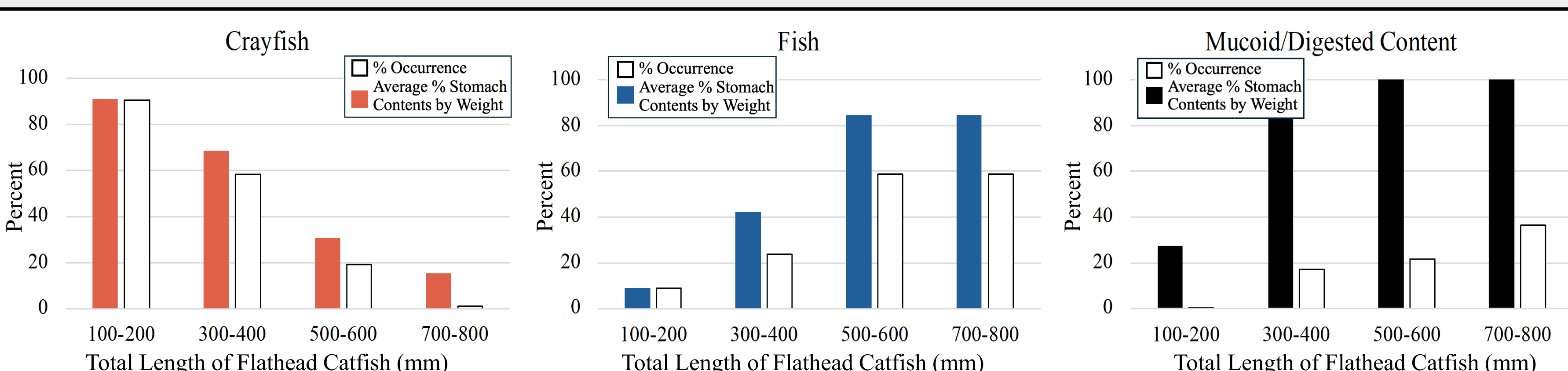
Comparison of total length across lakes. We were able to collect individuals across all size classes in Bilby Ranch, Cameron 3, and Willow Brook lakes, but were not able to collect individuals in the larger size classes in Che Ru and Long Branch lakes.



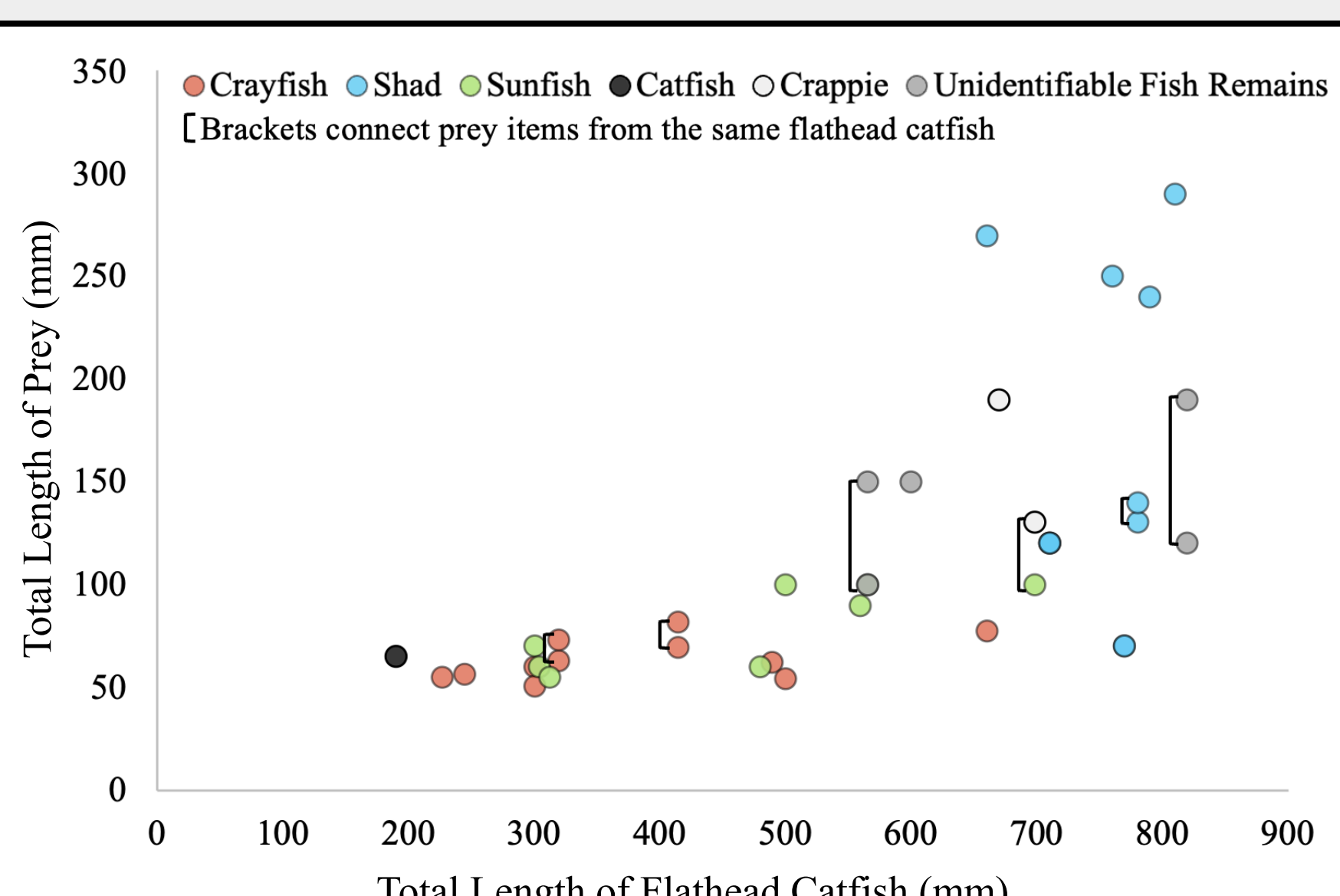
Diet composition of Flathead Catfish. Crayfish made up most of the contents. Of the identifiable fish, Gizzard Shad and Sunfish were most common.



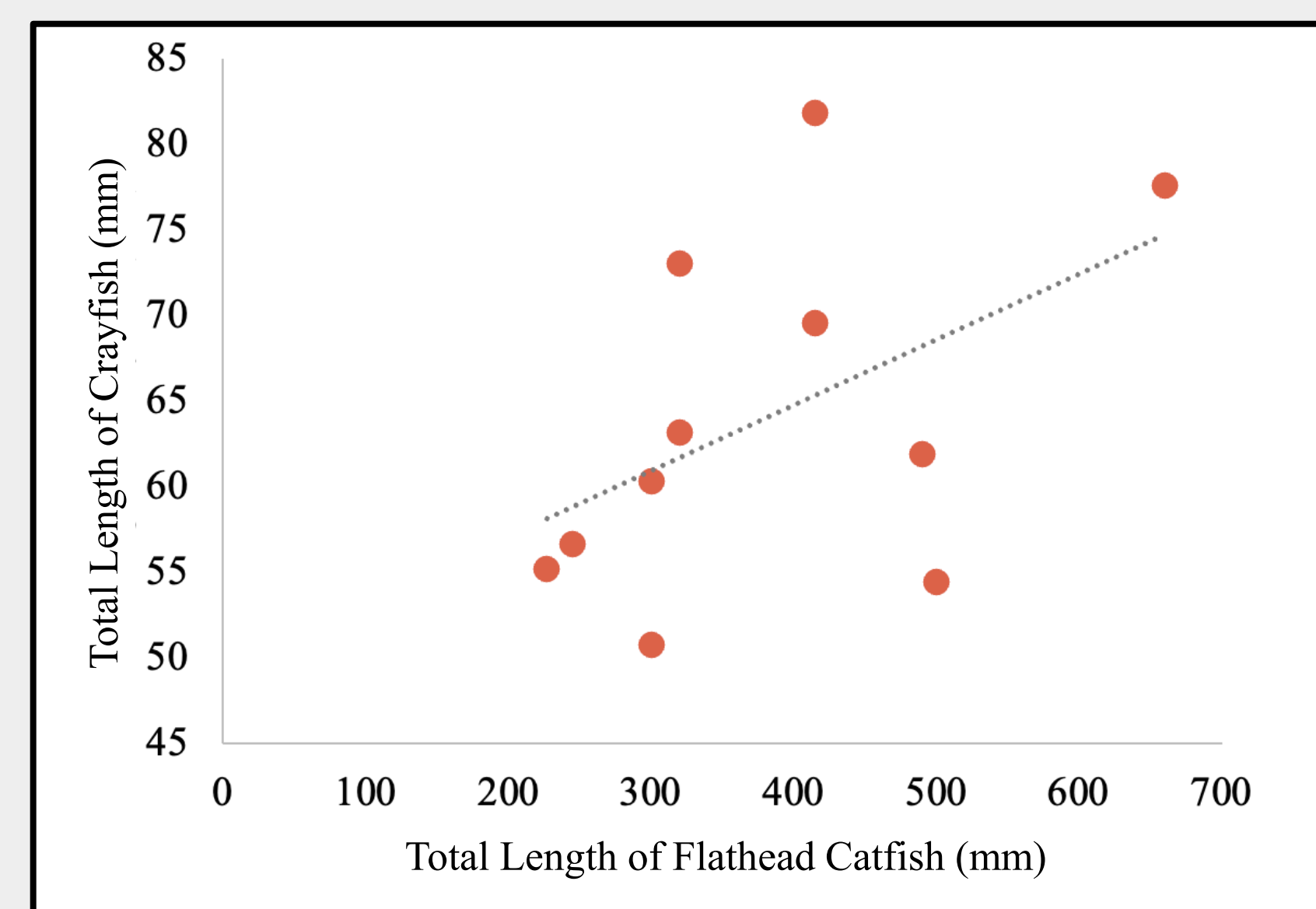
Representations of weight, gape height and gape width across total length. Weight, gape height and gape width are correlated with total length. Total length is used in this project as the parameter for size, but can be considered relative to weight, gape height, and gape width.



Analysis of diet composition by percent occurrence and average proportion of stomach contents by weight (crayfish, fish and other) by length class. As Flathead Catfish approach approximately 500mm in total length, diet composition switches from primarily crayfish to primarily fish. When consumption of fish increases, mucoid/digested content also increases.



Size of prey across total length of Flathead Catfish. Stomach contents contained crayfish in only 1 individual longer than 600mm.



Total length of crayfish consumed compared to total length of flathead catfish. When flathead catfish consumed crayfish, there was a correlation between fish and crayfish size.

## Discussion

- The results of this study may underestimate stomach contents.
- Catfish are known to regurgitate their stomach contents during stress.
  - The higher percentage of fish without stomach contents in Cameron 3 Lake (79% compared to 26-66% in other lakes) is likely because fish were left overnight in a bubbler tank, allowing regurgitation and digestion.
- Fish consumption may be underestimated because of rapid digestion due to have higher water content.
- Invertebrates were only identified in 2 stomachs, meaning they could have been digested too quickly or degraded during freeze-thawing.
- Future recreations of this study may benefit from usage of pulsed gastric lavage quickly after fish collection to conserve stomach contents in more individuals, especially in smaller size classes.
- Diet composition did not differ by reservoir but was most influenced by fish size.
  - Fish <500mm consumed small (50-100mm) Crayfish and Sunfish.
  - Fish >500mm consumed large (120-290mm) Crappie and Gizzard Shad.
- The high proportion of crayfish in the diet of small Flathead Catfish suggests the transition away from benthic feeding occurs at a larger size for individuals from northern Missouri reservoirs than previously described.
  - A 1961 publication by Brown and Dendy found Flathead Catfish diet transitions from an aquatic insect/crayfish to fish at ~280mm in total length.

## Next Steps

- Data are needed on the mercury concentration and trophic position of prey items to determine their contribution to mercury bioaccumulation in Flathead Catfish.
  - Samples were collected from Flathead Catfish and identifiable prey items for analyses of mercury and the feeding ecology by stable isotope analyses.
- If Crayfish contain higher mercury concentrations than prey fish, we expect to see minimal change in mercury concentrations, or even mercury biodilution, in Flathead Catfish as total length increases and diet shifts from benthic feeding to piscivory.
  - However, if large Flathead Catfish consume proportionately more high trophic level fish (Crappie) than low trophic level fish (Gizzard Shad), mercury concentrations would be expected to increase with size.

## References

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