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### Beaver Dam Analogs Change Macroinvertebrate Communities in Headwater Streams, Western Montana

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# Effects of Beaver Dam Analogs on Macroinvertebrate Communities in Intermountain Headwater Streams, Western Montana

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## Introduction

- Historic land and wildlife use and climate change are impacting our natural waterways and riparian areas
- Beavers are well known ecosystem engineers, but they no longer populate their historic range.
- Beaver dam analogs (BDAs) are one technique to restore aquatic systems.
- There are knowledge gaps in what is known about how BDAs affect entire stream-riparian communities

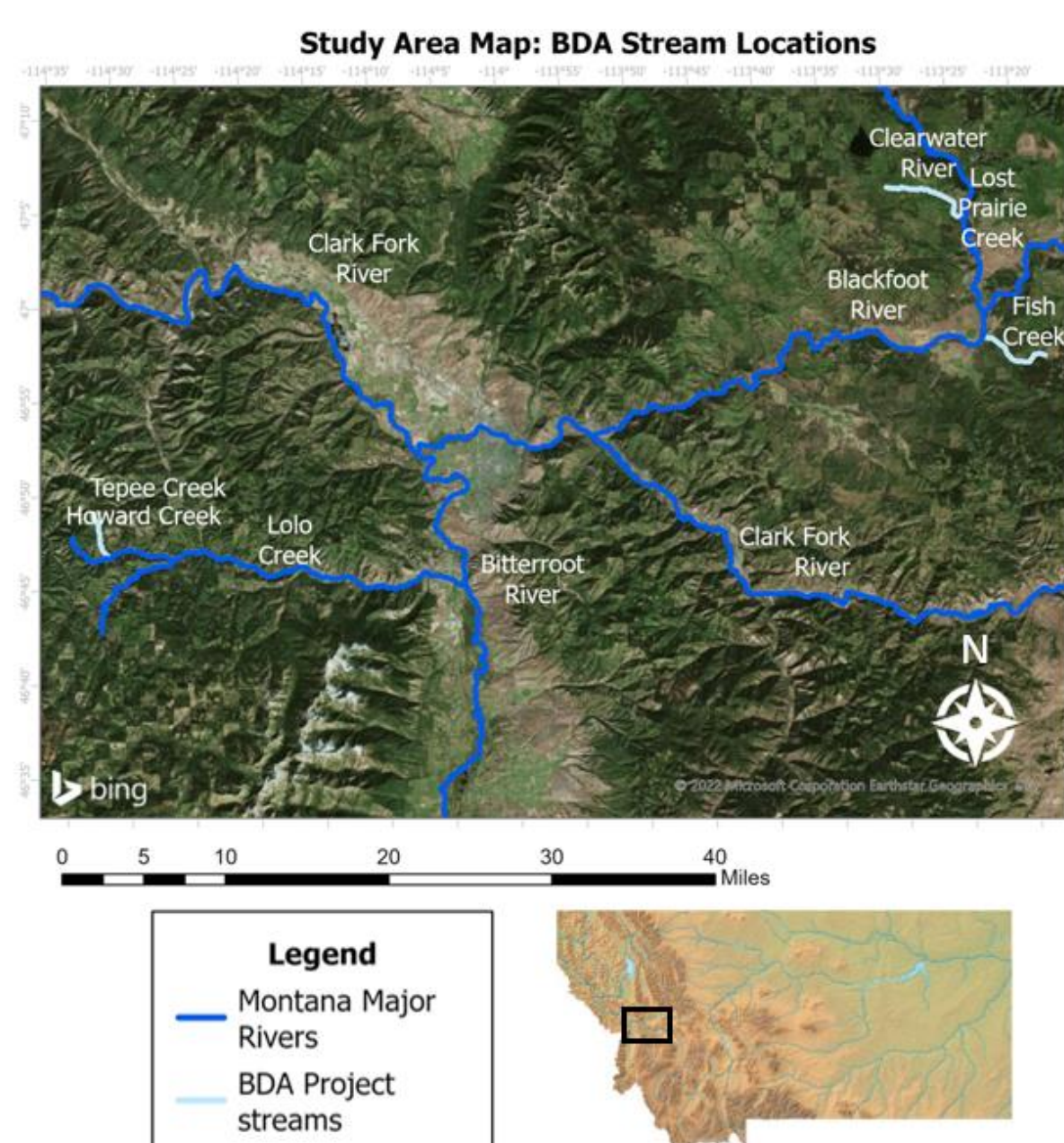


Example of a BDA used as a restoration technique to reduce incision and head cuts in Fish Creek, Montana

## Questions

- Q1: How does aquatic habitat composition differ between BDA-restored segments and unrestored segments?
- Q2: To what extent do aquatic benthic macroinvertebrate communities differ between BDA-restored segments and unrestored segments?
- Q3: How do BDAs alter macroinvertebrate fluxes across the aquatic-terrestrial interface?
- Q4: How do BDAs influence other riparian communities (i.e., birds and spiders)?

## Study Area

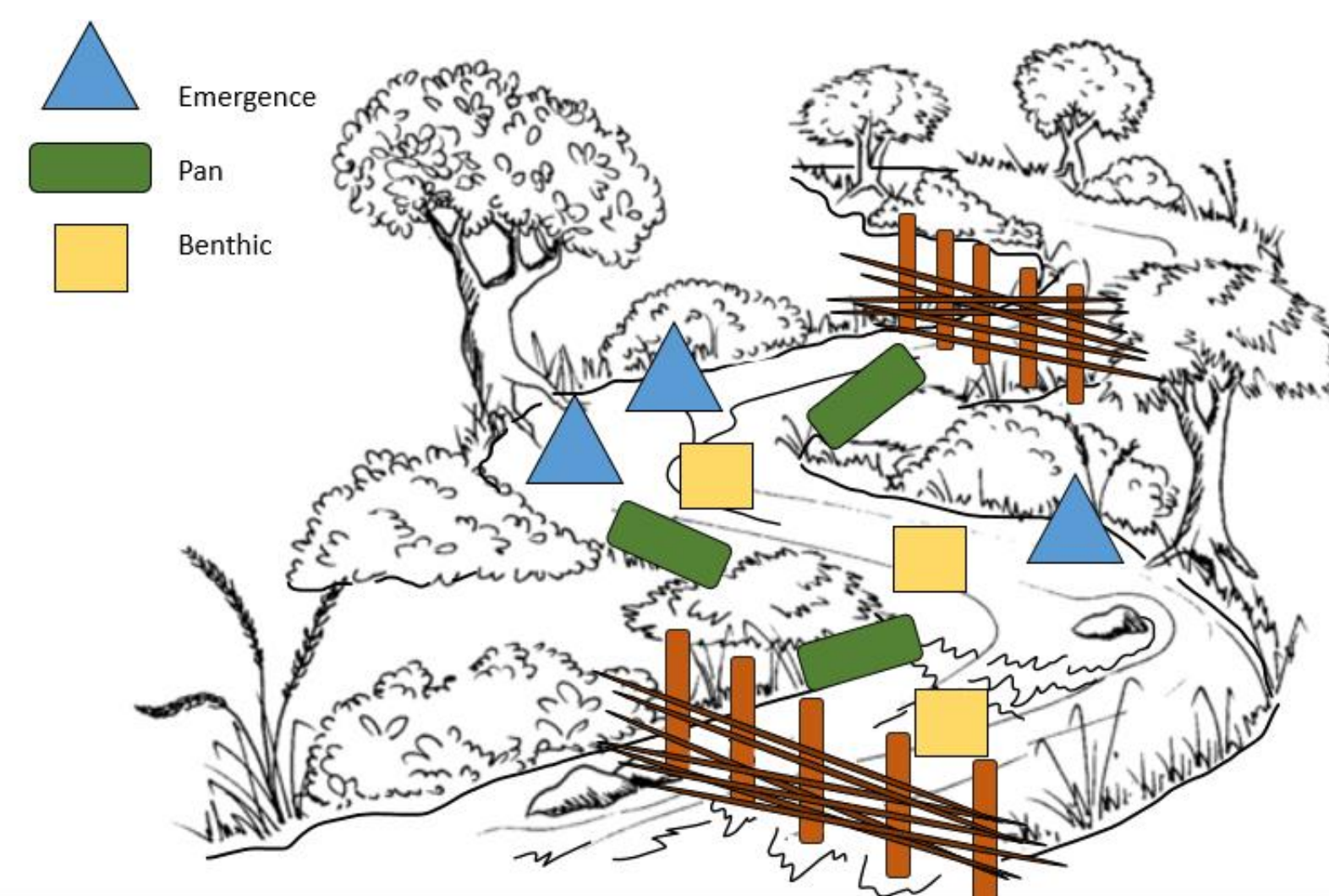


Study stream locations and the reference and BDA segments of the streams. BDAs were constructed in fall 2019



## Methods

- Habitat was assessed using pebble counts; observing the amount of riffles, runs, and pools; and measuring wetted width, thalweg depth, and canopy cover
- Macroinvertebrate samples were taken using pan traps, emergence traps, and a Surber sampler
- Spider counts, bird point counts, and game cameras were also part of the study



- Three replicates of each sample type were taken in representative habitats in lower, middle, and upper reaches of the BDA restored and unrestored segments

- In the lab, samples were rough sorted, identified, enumerated, then representative samples were dried and weighed



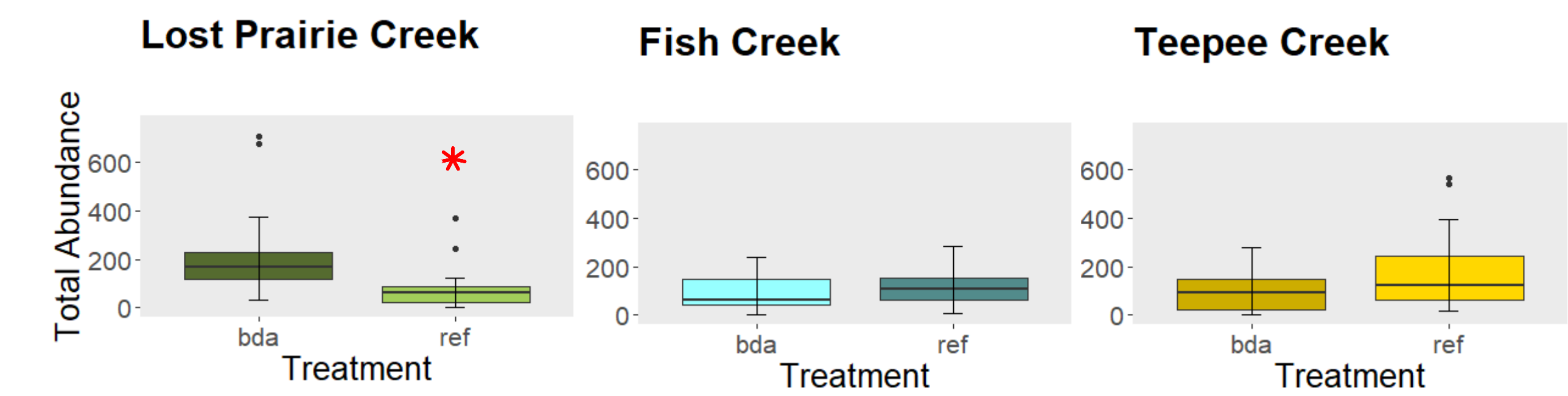
Subsample of a large benthic sample and microscope used to identify macroinvertebrates



Examples of macroinvertebrates found in emergence, pan, and benthic samples

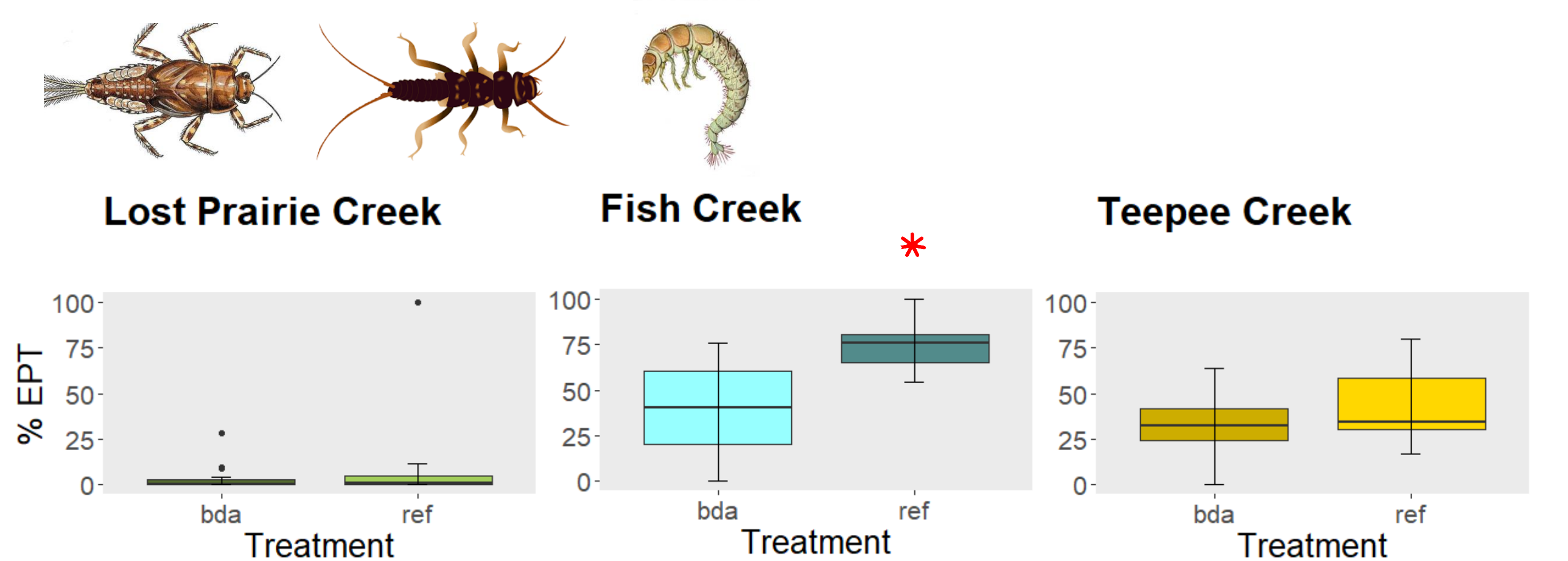
## Preliminary Results

### Total Abundance



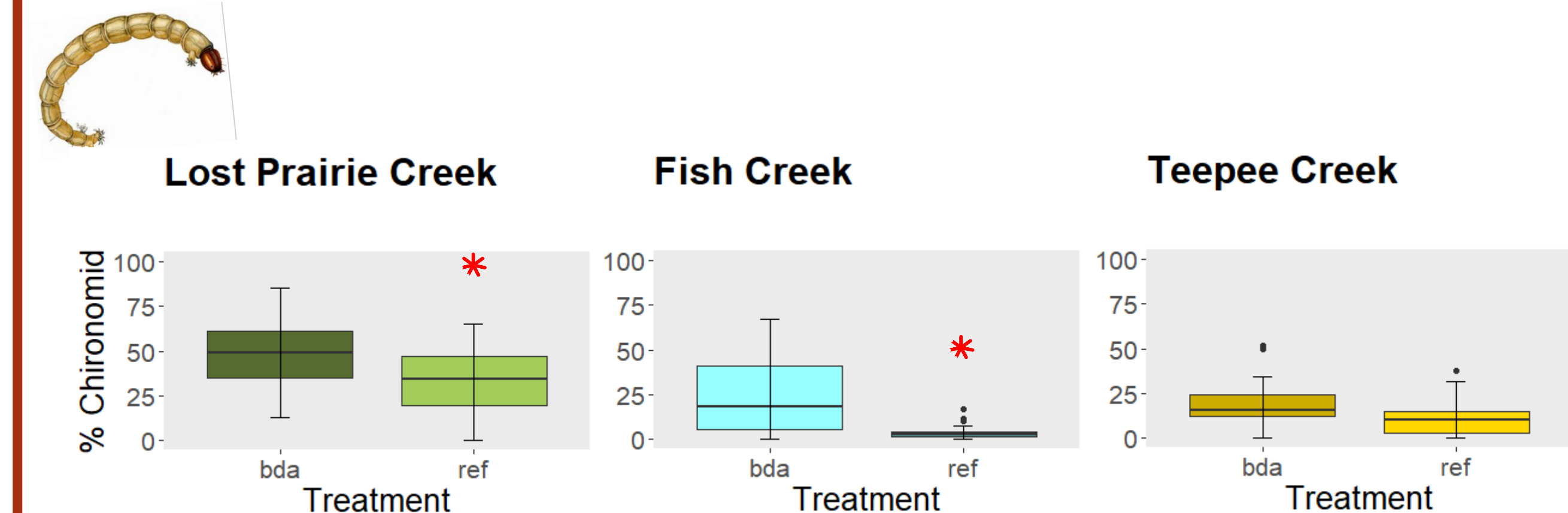
Plot 1: Total number of insects found in benthic samples from 2021

### Percent EPT



Plot 2: Percent from the total of Ephemeroptera, Plecoptera, and Trichoptera found in benthic samples from 2021. EPT represent sensitive taxa

### Percent Chironomid



Plot 3: Percent from the total of chironomids in benthic samples from 2021. Chironomids are thought to be tolerant to most habitat types and disturbances

## Future Steps

- We still have a lot of samples to sort, identify, and dry, so more to come!
- More in-depth analysis including: community metrics, nonmetric multidimensional scaling, and generalized linear mixed effect model (GLMM)