

# Developing Carp Removal Schemes Using Social Learning Behaviors: Acoustic Conditioning in Silver Lake (1<sup>st</sup> Field Season)



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## Background

There is a need for effective, safe, and cost-efficient strategies to remove common carp from lakes.

Bait and removal strategies have proven to be effective, however, there are limitations in the number of carp that can be caught at once due to carp feeding at different times.

Acoustic conditioning might synchronize carp feeding aggregations and help attract more carp to the bait from larger areas.

This would accelerate carp management and reduce associated costs creating a practical management strategy for carp in Minnesota and elsewhere.

## Methodology

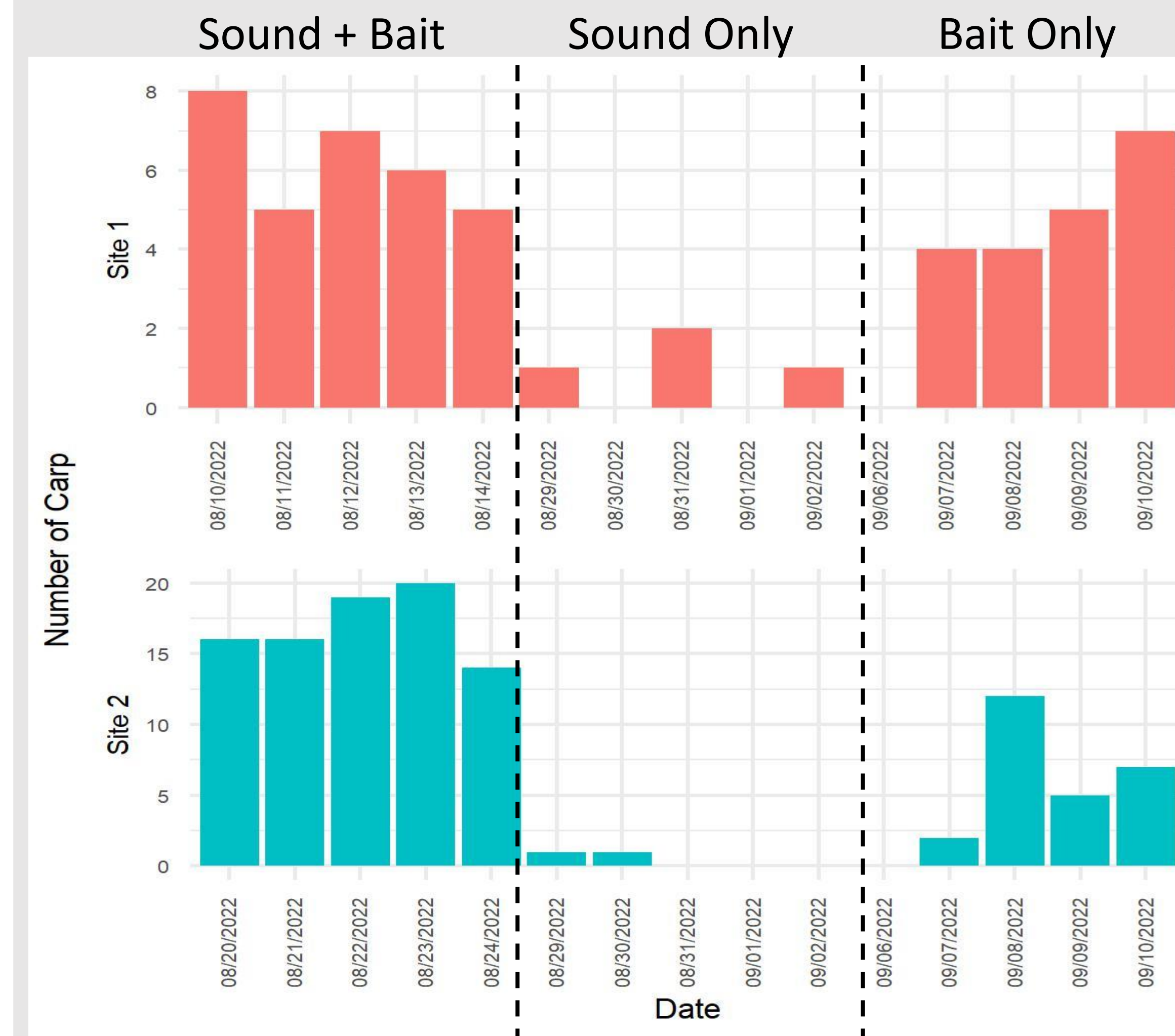
- Two sites were established in Silver Lake, St. Anthony, MN.

Each with:

- UW-30 underwater speaker
- Remotely controlled bait feeder
- Antenna for monitoring carp presence
- 140 carp individually tagged
- Carp use of each site was documented prior to the experiment
- Three experimental treatment periods used at each site:
  - Sound + Bait:** A 400 Hz pure tone played for 1s while bait was released from the feeder. This sequence was repeated 9 times every 10 min each night between 10:00 and 11:20 pm for 5 nights.
  - Sound Only:** as above but only sound was used
  - Bait Only:** as above but only bait was used
- Data Analysis
  - Acoustic cue test by comparing the number of carp present during Sound + Bait vs Sound Only vs Bait Only
  - Logistic regression on individual carp presence/absence after Sound + Bait vs Bait Only cue; 1<sup>st</sup> feeding/cue interval only

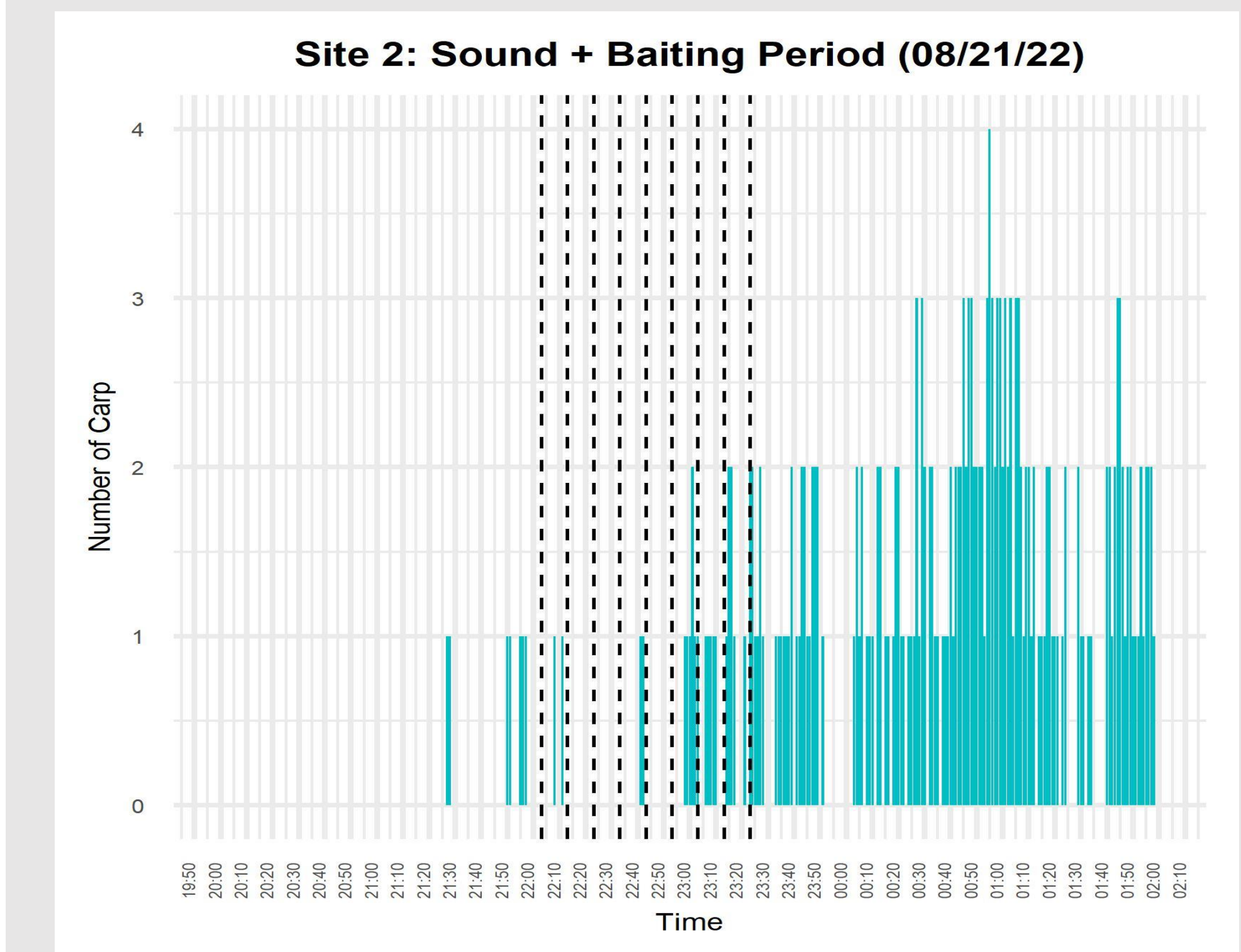


## Results



**Figure 1:** Daily carp detections at each site for all three treatments. Significantly fewer carp were present during Sound Only period.

**Table 1:** Logistic regression testing whether carp that were already present at the site, remained at the site after the first Bait + Sound vs Bait Only cue was administered. Non-significant BaitOnly effect over Bait+Sound suggests that the acoustic cue had no positive or negative effect on carp presence.



**Figure 2:** An example of carp detections during a feeding period at Site 2. The black dotted lines represent when the acoustic cue was played, and bait was released.

### Coefficients:

	Estimate	Std. Error	z value	P Value
<b>(Intercept)</b>	-1.1527	0.4683	-2.461	0.0138 *
<b>Trt Bait Only</b>	0.2654	0.6488	0.409	0.6825

## Objectives

- Demonstrate acoustic conditioning of common carp in a natural lake.
- Determine if common carp can localize source of sound.

## Outcomes

Carp responded **positively** to baiting.  
The **acoustic cue** had **no effect** on carp presence at the bait in a natural lake during 1<sup>st</sup> field season.

## Acknowledgements

Many thanks to my seasonal technicians Natalie Windels and Tiana DeGrande and the Silver Lake community. This field season would not have been possible without their support.

## Future Work

We will be performing a lab study in the Fall of 2022 that will focus on acoustic conditioning, the retention of acoustic cue and frequency of baiting. We hope to apply the results from the lab study in the field for the Summer of 2023.

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