

# Assessing Viability of Passive Integrated Transponder (PIT) Tags for Ecological Studies of Lamprey Ammocoetes

*Ichthyomyzon gagei*

SOUTHERN BROOK LAMPREY  
RESEARCH GROUP

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## INTRODUCTION

The Southern Brook Lamprey (*Ichthyomyzon gagei*) is a primitive, jawless, filiform fish that possesses two distinct life stages: larval (i.e. “ammocoete”) and adult. This species inhabits many streams of the southeastern United States and spends the majority of its life as an ammocoete. Adults are well studied, but burrowing behavior and unknown movement patterns have hindered ecological findings for the ammocoete life stage. Recent tagging advances may provide new opportunities for field research of lamprey ecology.

Passive integrated transponder (PIT) tags have been used for field research studies in a wide variety of species. However, the relatively large size has limited their applicability for small-bodied organisms. Smaller PIT tags could help to bridge the knowledge gap for many smaller species or species with life stages that were too small for previous tagging methods.

This study aimed to assess:

1. PIT tagging survival
2. Tag retention and detection in the small-bodied ammocoete of Southern Brook Lamprey.

## METHODS

### Collection and Tagging

- Fish were collected by dual backpack electrofishing
- 3-pass depletion of stream reach (50 m) then measured to the nearest 1 mm
- Life stage was determined by anatomical features, including mouth morphology and eye development
- Ammocoetes anesthetized in MS-222 (100 mg/L) bath
- Mid-ventral incision and tag insertion (8.0 x 1.4 mm, len. x dia.)

### Survival and Tag Retention

- Lamprey placed in plastic enclosures, *in situ*, for 7 days
- Biomark HPR Plus PIT tag reader with portable antenna used to determine tag presence and record unique ID

### Tag Detection and Monitoring

- 8 lamprey analogs (hot dogs and putty-filled straws) buried at random locations to assess detection probability
- Biomark HPR Plus used once per week to scan study reach (50 m)
- Approximately 8 passes completed per monitoring event; 4 moving upstream, 4 moving downstream, unique readers
- Individual ID recorded for each tag

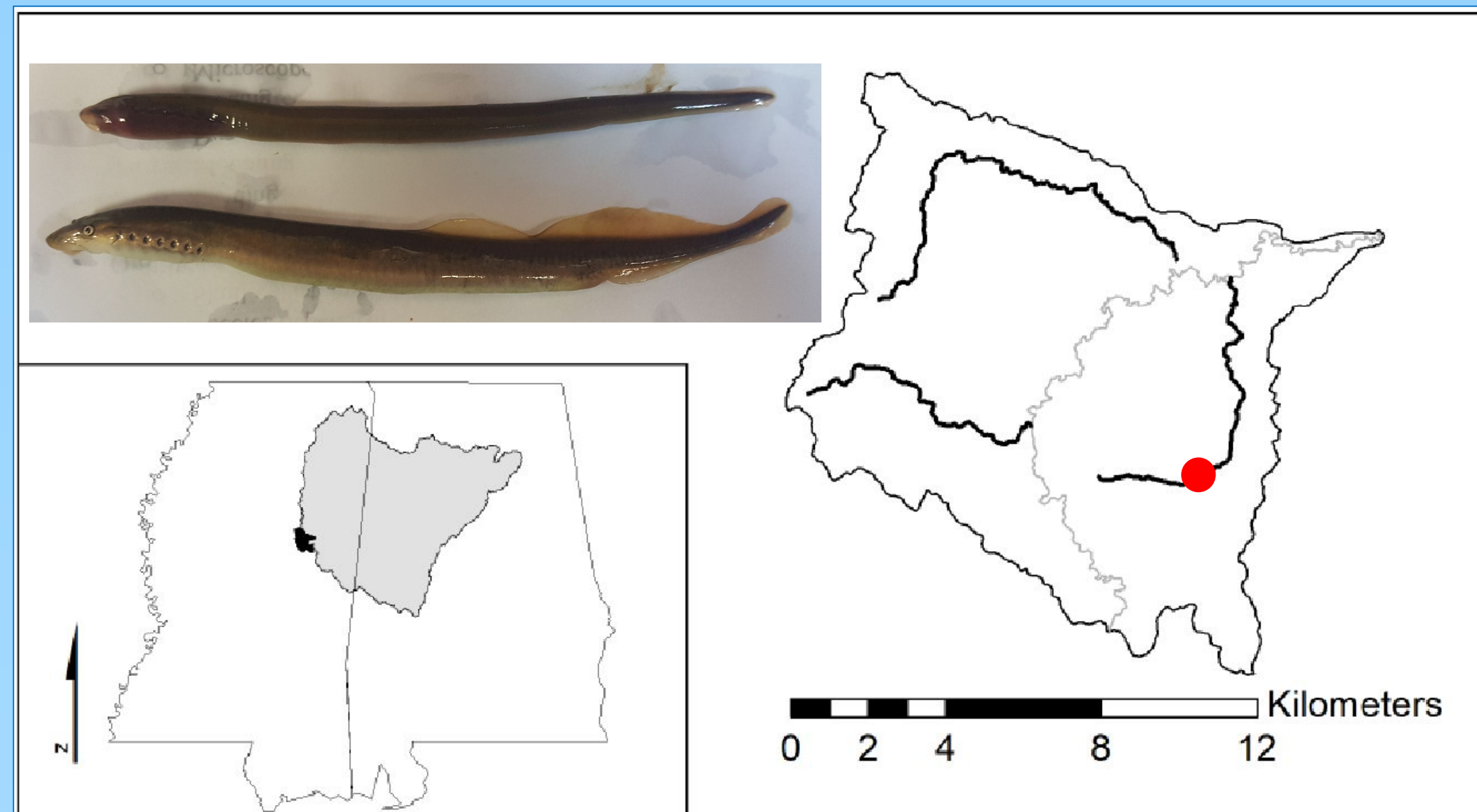


Figure 1. Map of Tombigbee National Forest (inset; grey). Major tributaries (black lines) of the Noxubee River (light lines). Panther Creek study area denoted by red dot. Figure credit: D. A. Schumann



Lamprey collection via backpack electrofishing

PIT tagging Southern Brook Lamprey ammocoetes



PIT tag detection, once per week, using mobile PIT tag reader (Biomark)

Figure 2. General flow chart of field methods.

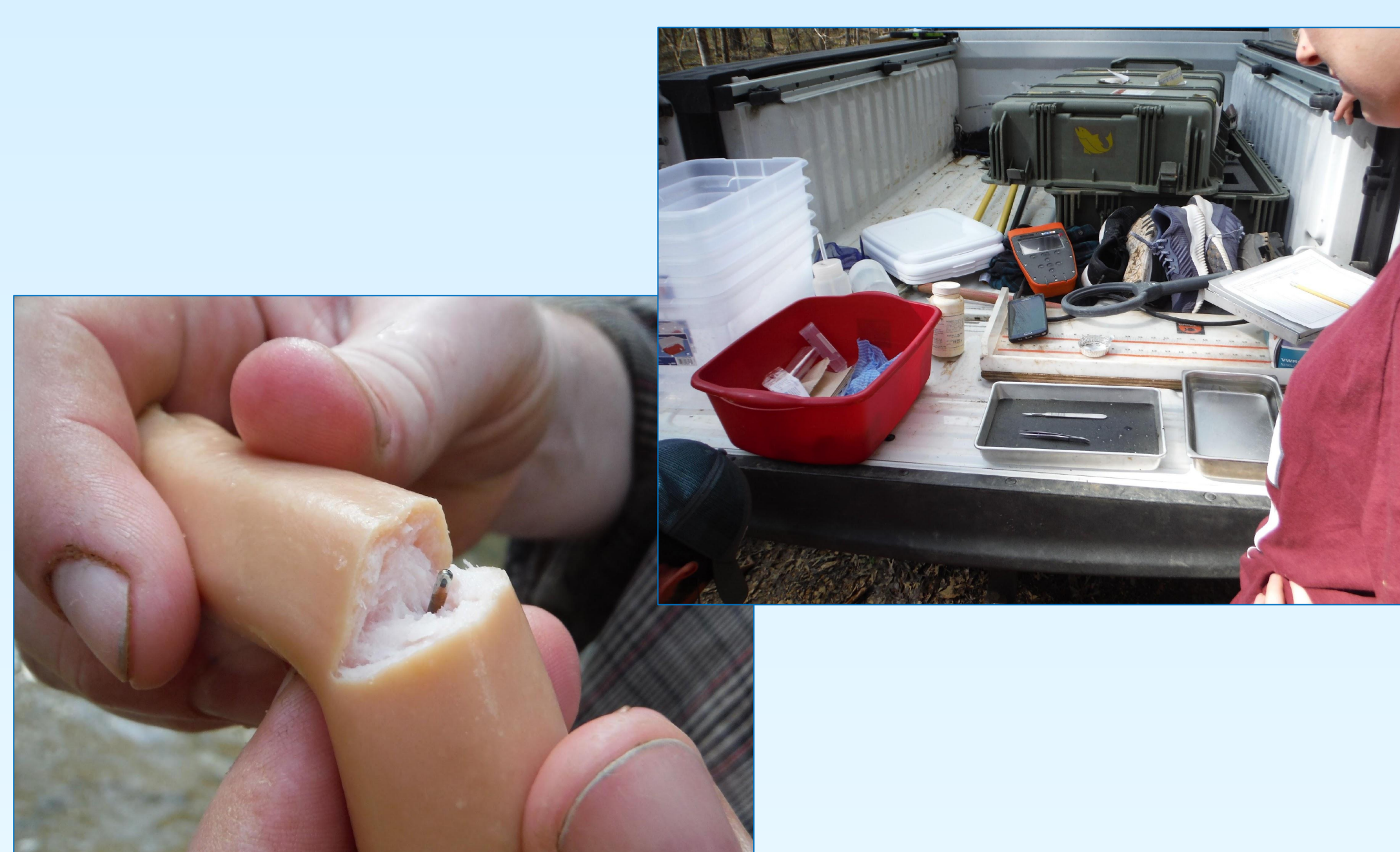


Figure 3. Example of equipment used. Micro-PIT tag in one version of analog (left). Basic tagging/detection equipment used (right). Note orange PIT tag reader with ring wand.

## RESULTS

### Survival and Tag Retention

- 33 total individuals captured, 24 received PIT tags
- Captured individuals ranged from 40 to 148 mm. Tagged lamprey were  $116.2 \pm 19.5$  mm (mean  $\pm$  s.d.)
- Initial post-surgery survival was 100% Tag retention was 100% for surviving enclosure lamprey

### Tag Detection and Monitoring

- 93 detections occurred throughout this study, of a possible 448 tags (lamprey + analogs \* total stream passes; 20.8%)

Table 1. 7-day post-tagging survival of lamprey placed in enclosures. Two enclosure types used (tub vs. pipe). Unrecovered lamprey considered as mortalities.

Enclosure	No. Stocked	No. Survived	Percent Survival
1 - Tub	8	3	38%
2 - Tub	7	2	29%
3 - Pipe	12	3	25%

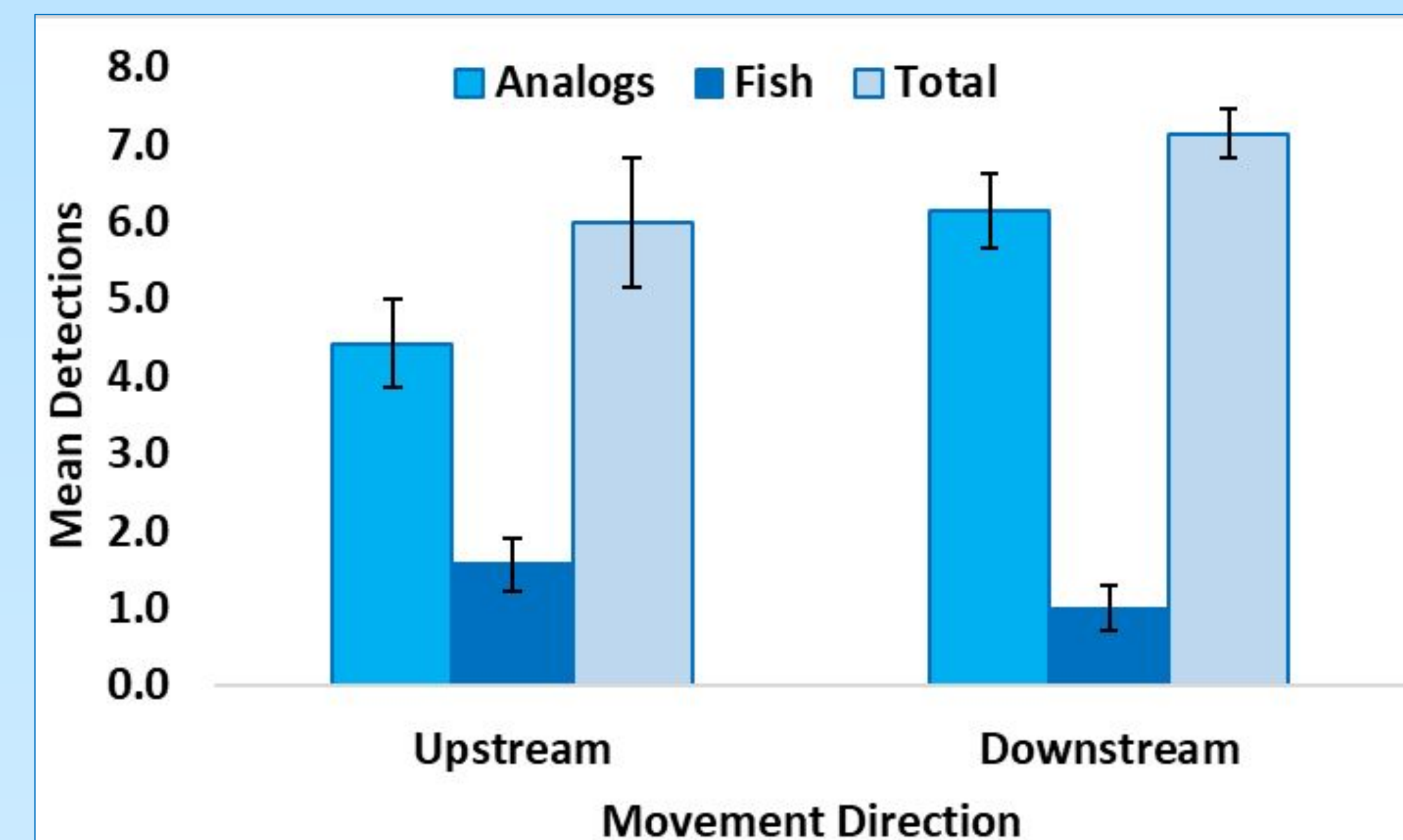


Figure 4. Bar plot of mean detections. Detections are separated by tag type (color) and direction of wand movement (cluster). Error bars show  $\pm$  1 S.E.

## Conclusions & Implications

- Small PIT tags were successfully implanted and retained in the peritoneal cavity of ammocoete lamprey
- Burrowing behavior of ammocoetes does not appear to cause shedding of tags
- Tagging surgeries did not effect short-term survival of individuals
- Moderate to high analog detections but low fish detections may indicate movement out of study reach or deep burrowing
- Enclosure mortalities may be related to enclosure design or tagging and handling.

## ACKNOWLEDGEMENTS

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