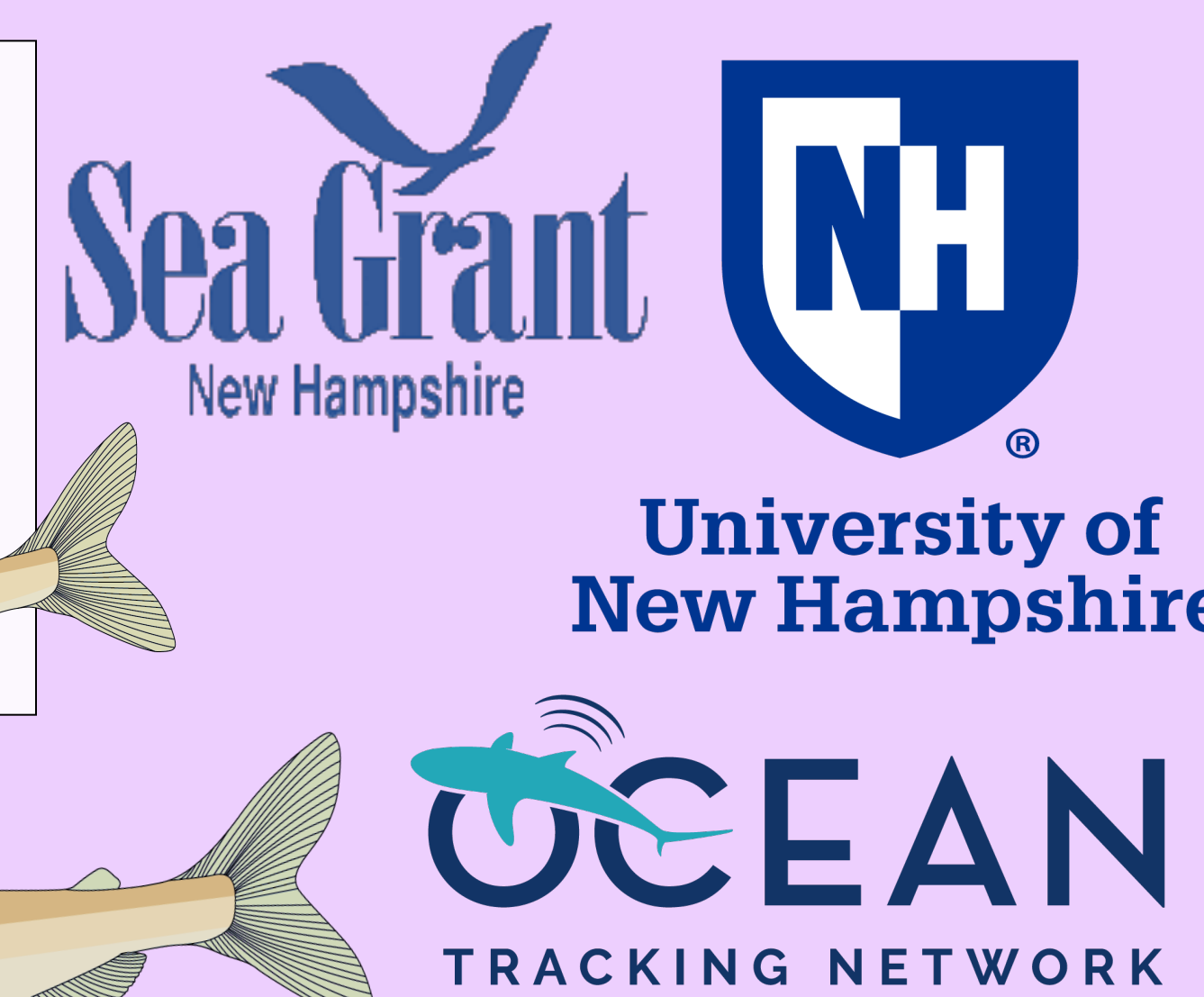
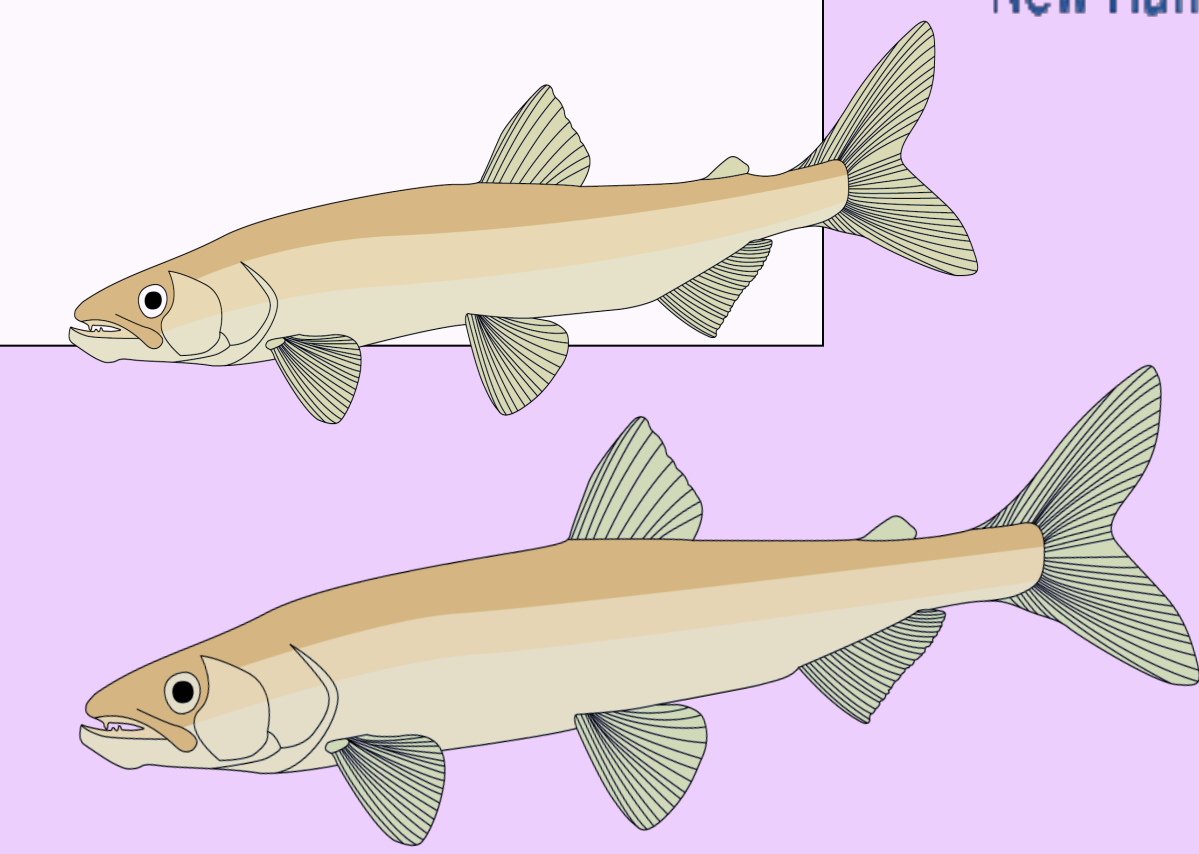
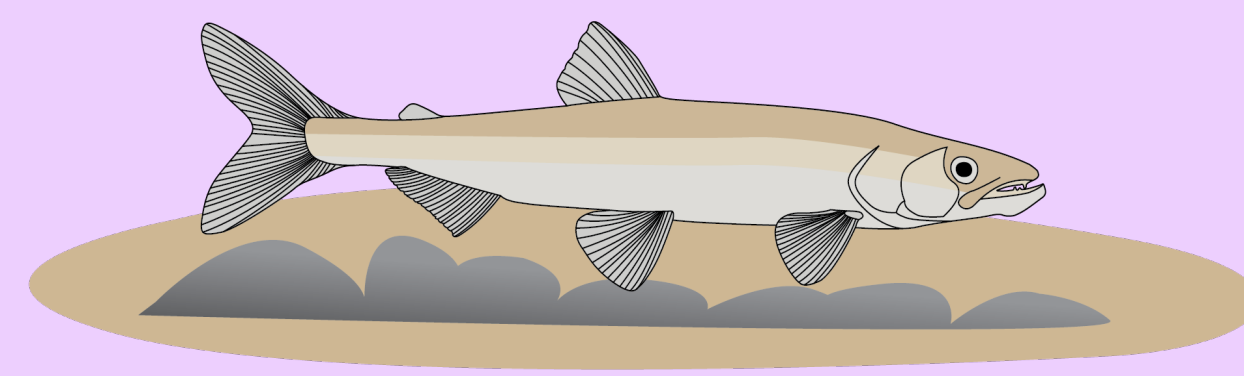


# Movement Patterns of Adult Rainbow Smelt in Great Bay Estuary, NH, USA



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Rainbow smelt (*Osmerus mordax*)

## Introduction

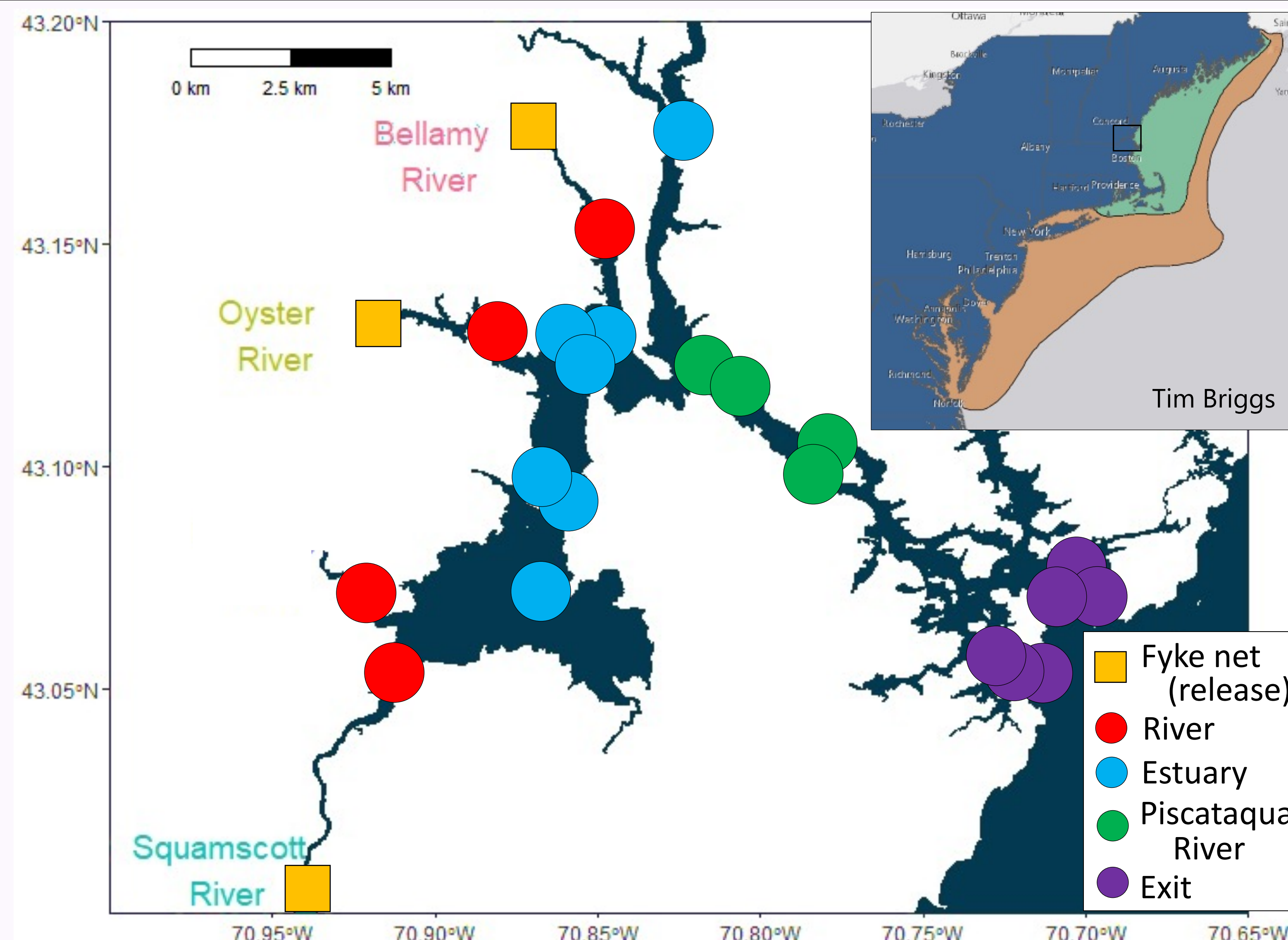
- Rainbow smelt support popular ice fisheries in New Hampshire, Maine, and Massachusetts
- In the past few decades undergone range contraction and population decline (Fig. 1)
- In 2004 NOAA labeled anadromous rainbow smelt as a federal species of concern

## Methods

- In March 2021, smelt were caught in fyke nets (Fig. 1) and tagged with Innovasea V5-H2 180kHz tags (n = 44)
  - Bellamy River n = 7
  - Oyster River n = 19
  - Squamscott River n = 18
- Individual detections were recorded on Innovasea 180kHz receivers deployed throughout Great Bay Estuary (n = 22) (Fig. 1)

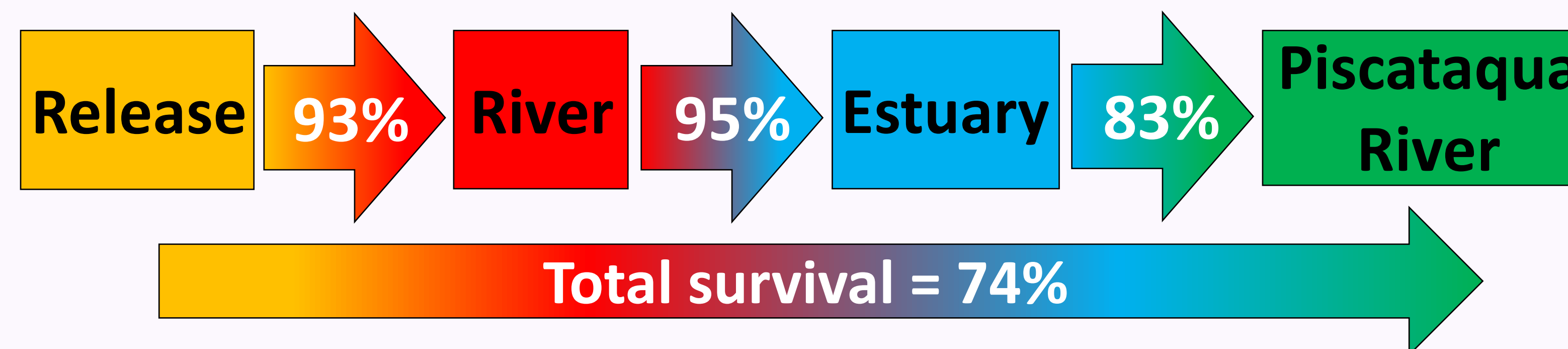
## Research Questions:

- What percent of smelt **survive** emigration from estuaries?
- Where are smelt **spending time** during emigration and how long do they remain in each habitat?
- What factors contribute to **variation in behavior**?



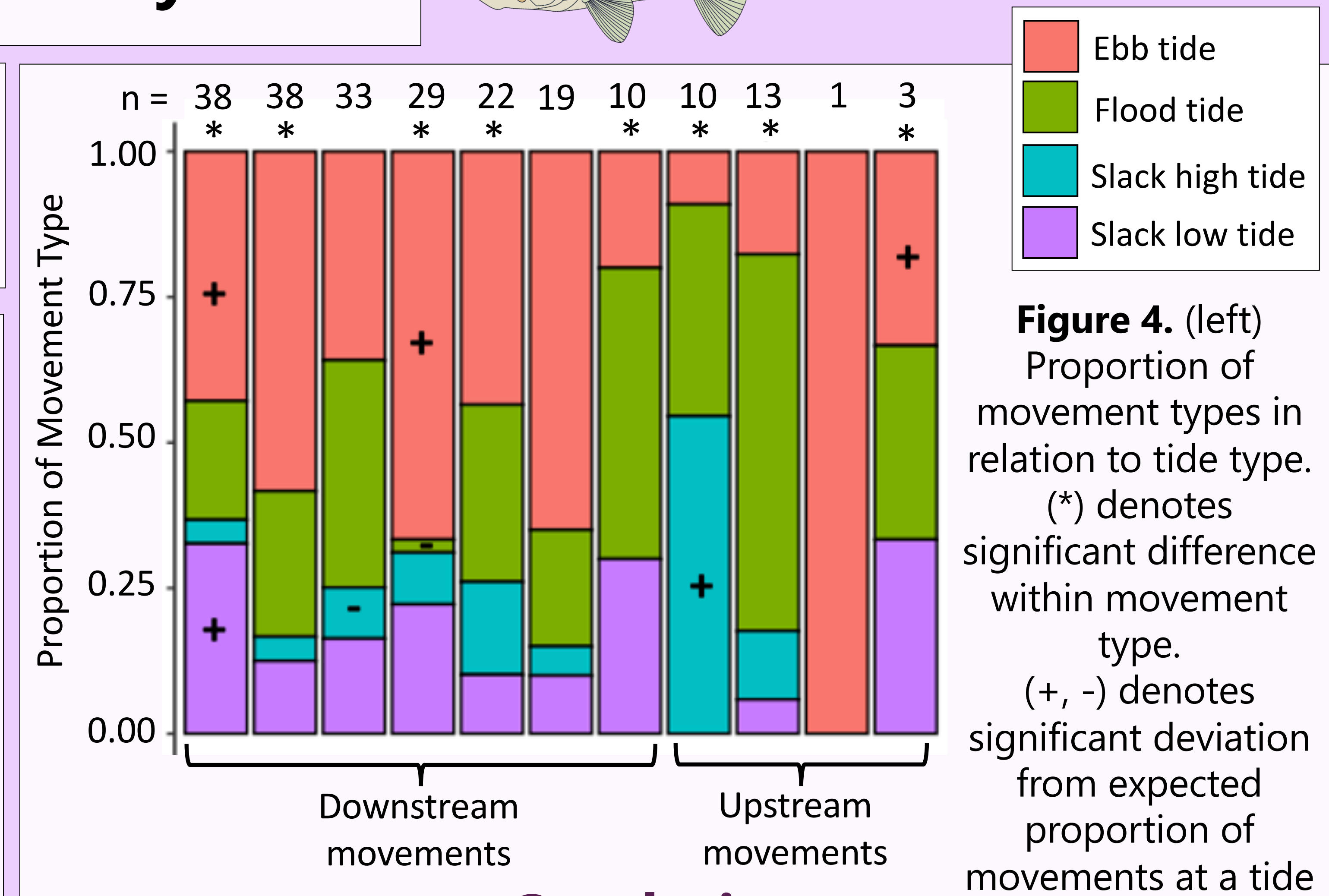
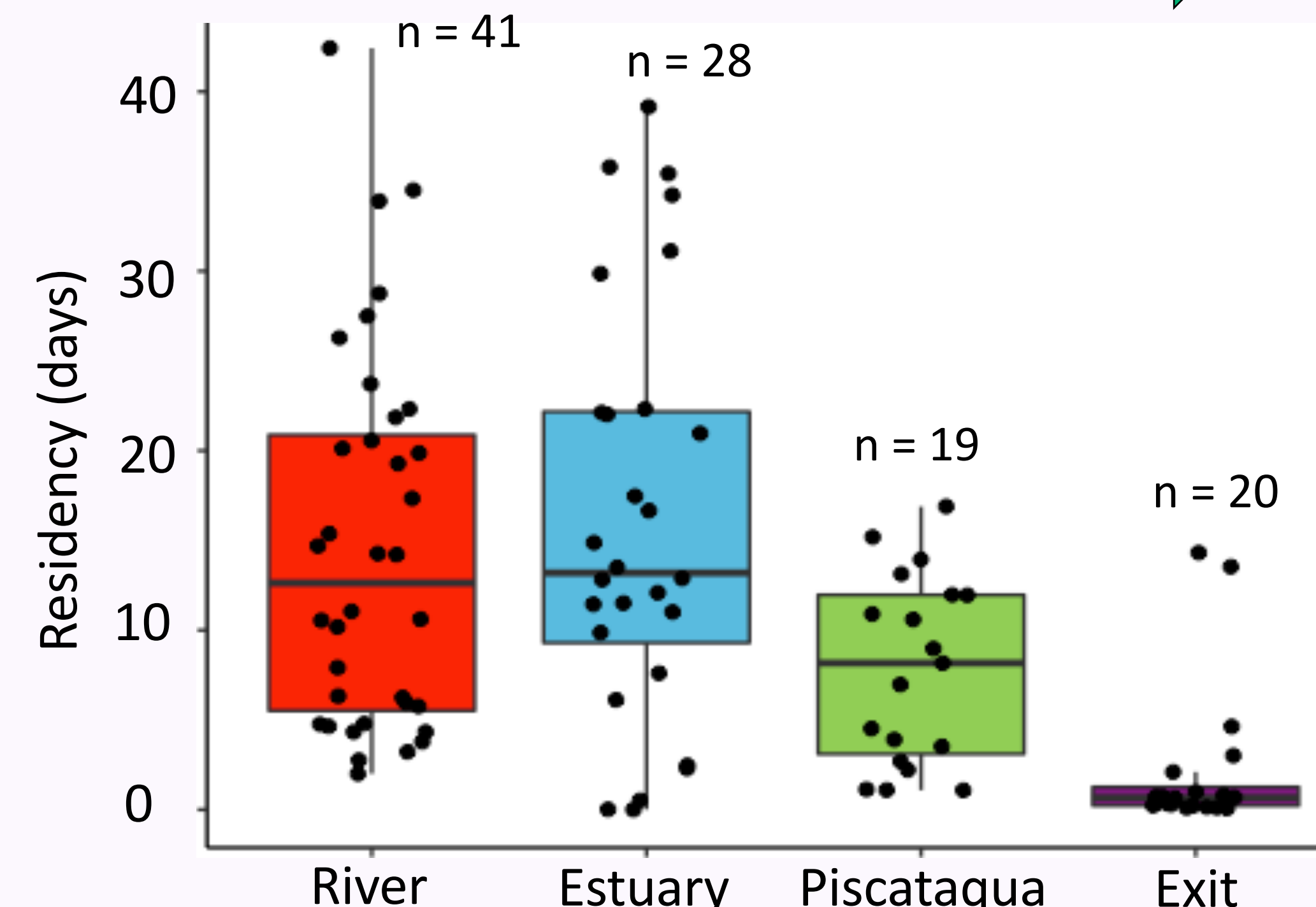
**Figure 1.** Receivers deployed in Great Bay Estuary (n = 22). Receiver location classified as River (red), Estuary (blue), Piscataqua River (green), or Exit (purple).

## Results:



**Figure 2.** (above) Survival calculated using mark-recapture model. Detection efficiency of 95%

**Figure 3.** (right) Individual residency (days) in rivers, estuary, Piscataqua River (Piscataqua), and the exit



**Figure 4.** (left) Proportion of movement types in relation to tide type. (\*) denotes significant difference within movement type. (+, -) denotes significant deviation from expected proportion of movements at a tide

## Conclusions:

**Great Bay estuary provides more than spawning habitat to rainbow smelt**

- Smelt use **multiple rivers** during the spawning run, potentially **moving with the tides** to facilitate habitat transitions
- Smelt experience **similar or higher survival** than other small coastal migratory fishes
- Smelt rely on a **variety of riverine and estuarine habitats** to complete their life history, **remaining in the estuary** post-spawning vs immediately emigrating

## Suggested Future Research

- Investigate what services the estuary provides for post-spawning rainbow smelt (protection, food, etc.)

**Why do they stay?**

## Acknowledgements

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Pictures and illustrations by Tim Briggs

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