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Eel Ramps and eDNA Detect Recruitment of American Eel (*Anguilla rostrata*) in Texas

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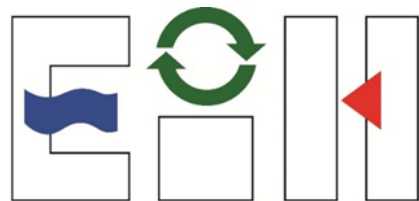
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University
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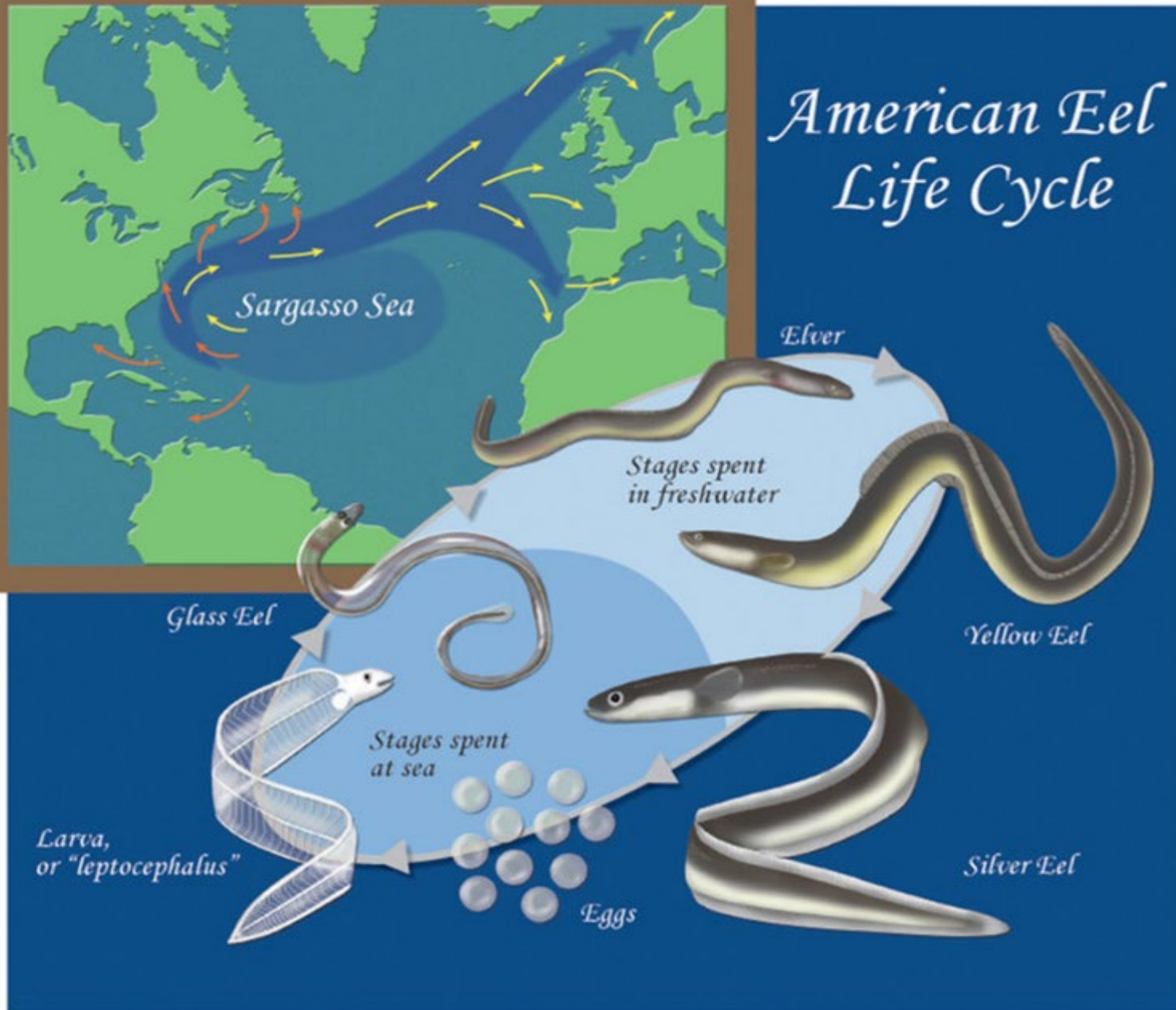
Nacogdoches, TX

February 23, 2024



American Eel

- Catadromous
- Semelparous
- Distinct life stages
 - Leptocephalus
 - Glass Eel
 - Elver
 - Yellow Eel
 - Silver Eel
- Texas: SGCN





Objectives

1. Determine American Eel recruitment window
2. Document size and life stage of recruiting American Eel
3. Investigate the use of eel ramps and eDNA to document American Eels

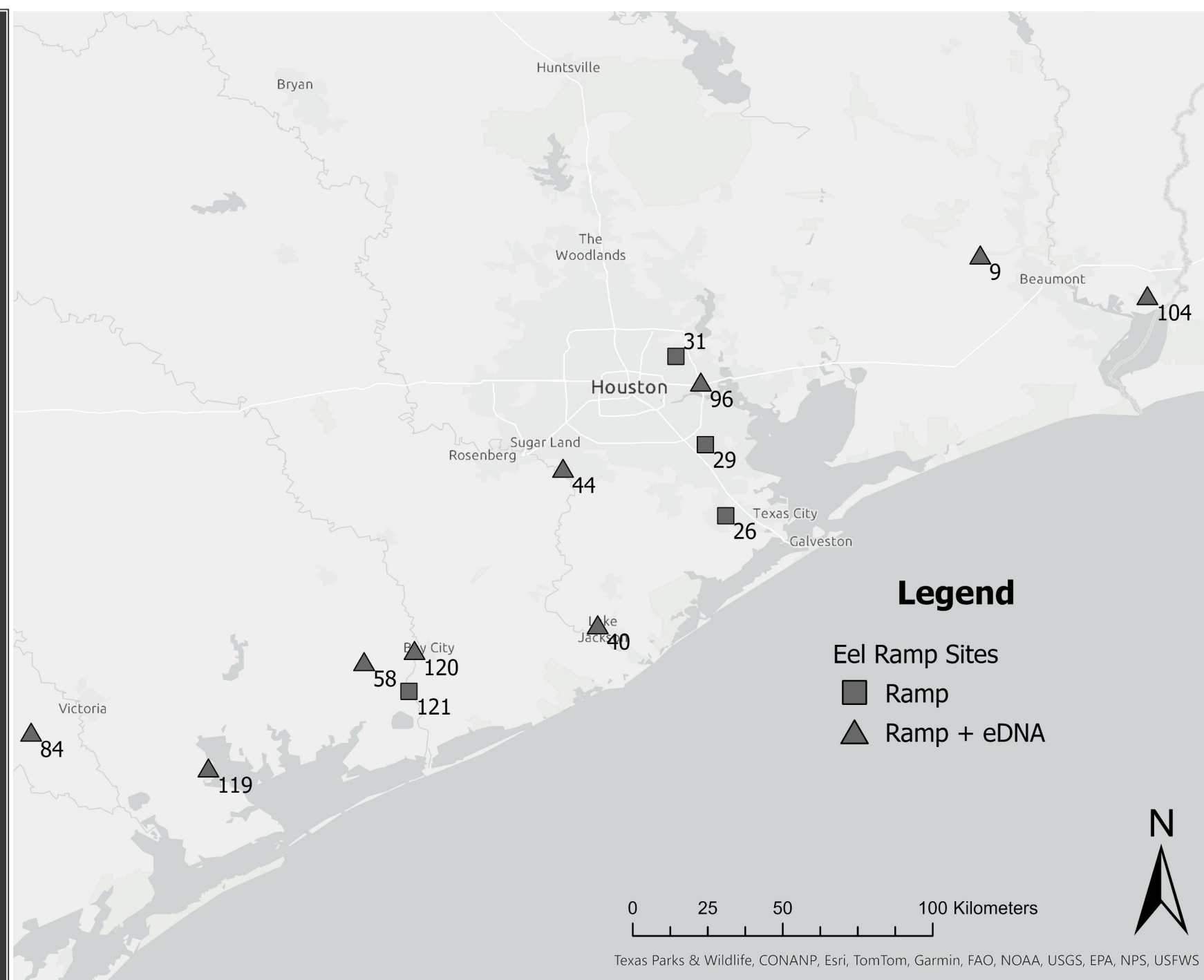
Study Design

- Eel Ramps (Irish ramp)
 - Continuous passive selective gear type.
 - ½” Miradrain



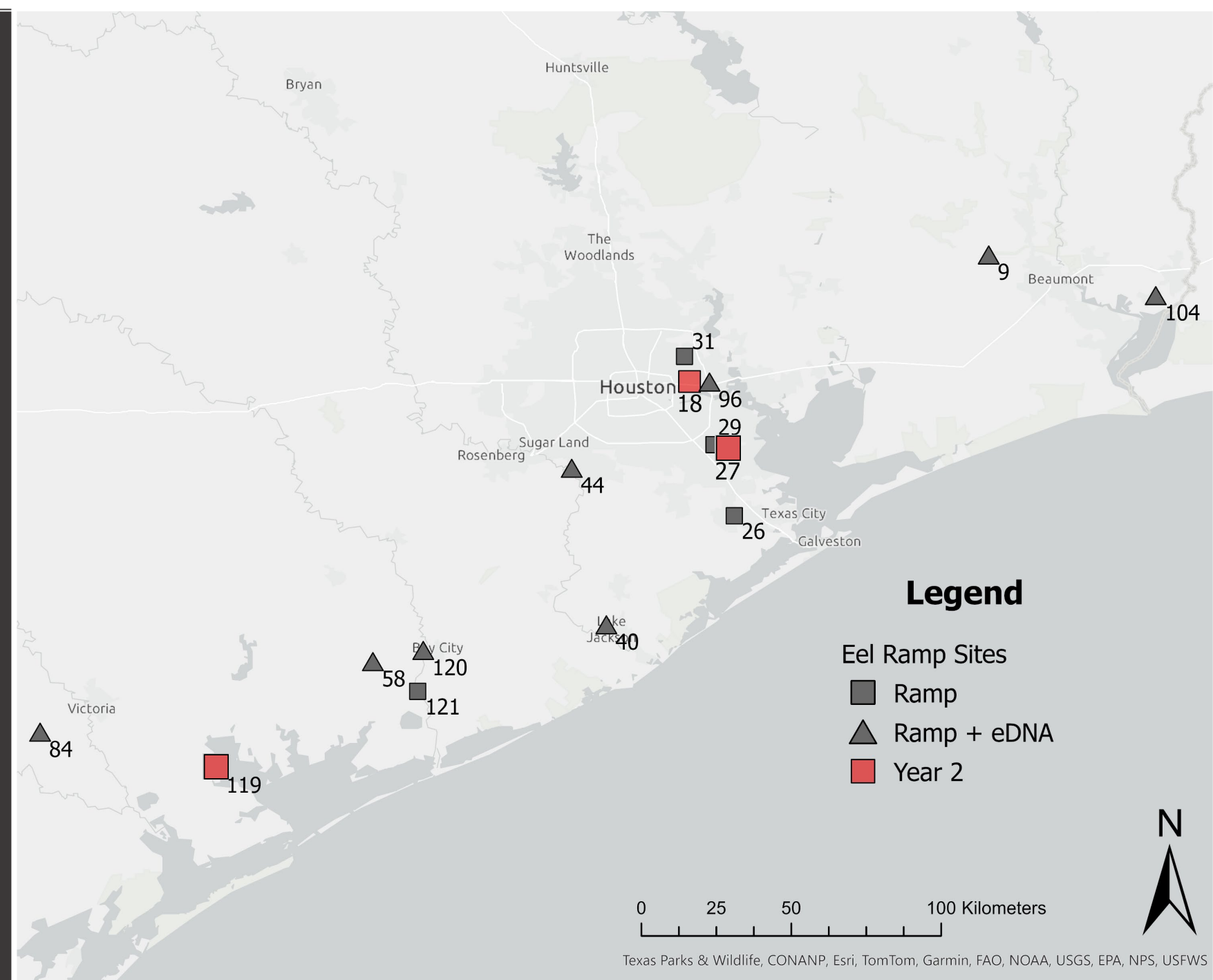
Study Design

- Eel Ramps
 - Continuous passive selective gear type.
 - 1/2" Miradrain
- Site Selection
 - 1' elevation – gravity-fed siphon.
 - Shallow receiving water
 - Coastal connectivity



Study Design

- Eel Ramps
 - Continuous passive selective gear type.
 - 1/2" Miradrain
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 - Coastal connectivity
 - Year 2: fresh into salt



Study Design

- Eel Ramps
 - Continuous passive selective gear type.
 - ½” Miradrain
- Site Selection
 - 1’ elevation – gravity-fed siphon.
 - Shallow receiving water
 - Coastal connectivity
 - Year 2: fresh into salt
- Deployment Schedule
 - Year 1 (Jul 22-Jun 23)
 - Weekly checks (50)
 - Year 2 (Dec 23-Apr 24)
 - Bi-weekly checks



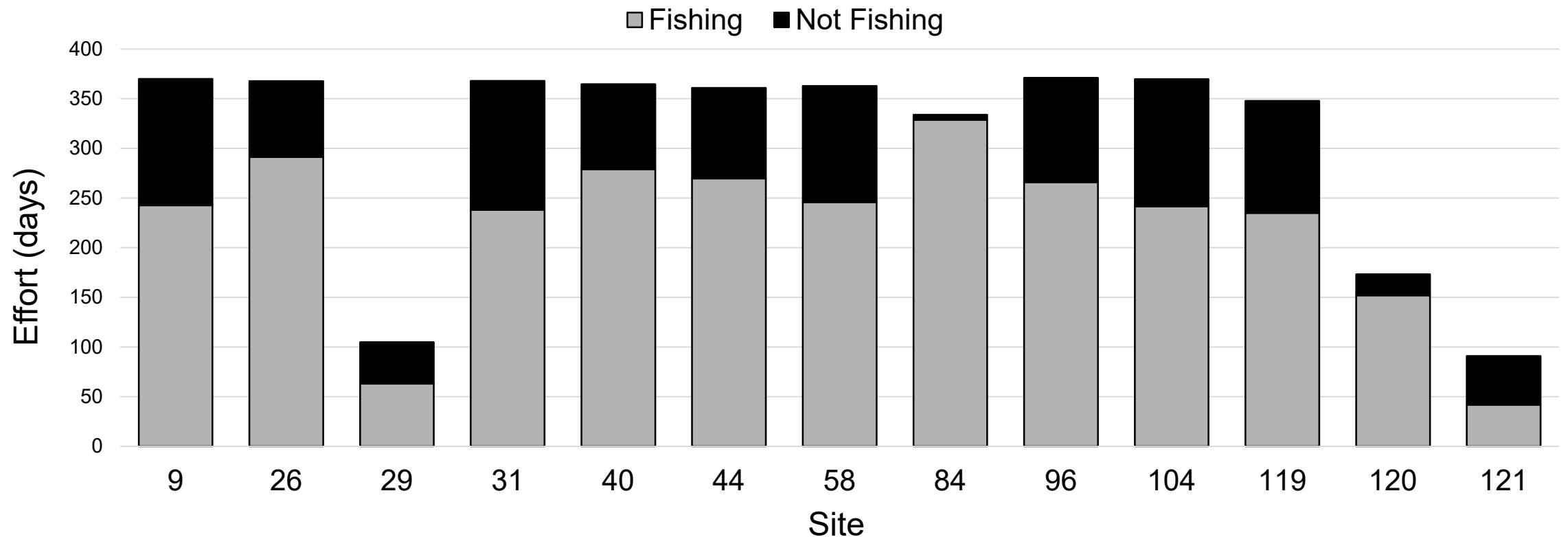
Study Design

- eDNA
 - 1L grab from bottom ½ of water column
 - 2 locations: D and R
 - Filter: 1.5µm (Smith-Root)
 - Extraction: DNeasy PowerSoil Pro Kit (Qiagen, Inc.)
 - qPCR (Eppendorf RealPlex)
 - Dual primer/probe (AME1 and AME2) (Applied Biosystems)
 - Dual amplification = Positive
 - QC Steps



Results – Year 1

- 52 weeks (July 2022 – June 2023)
- 559 ramp checks
- Challenges keeping the ramps fishing



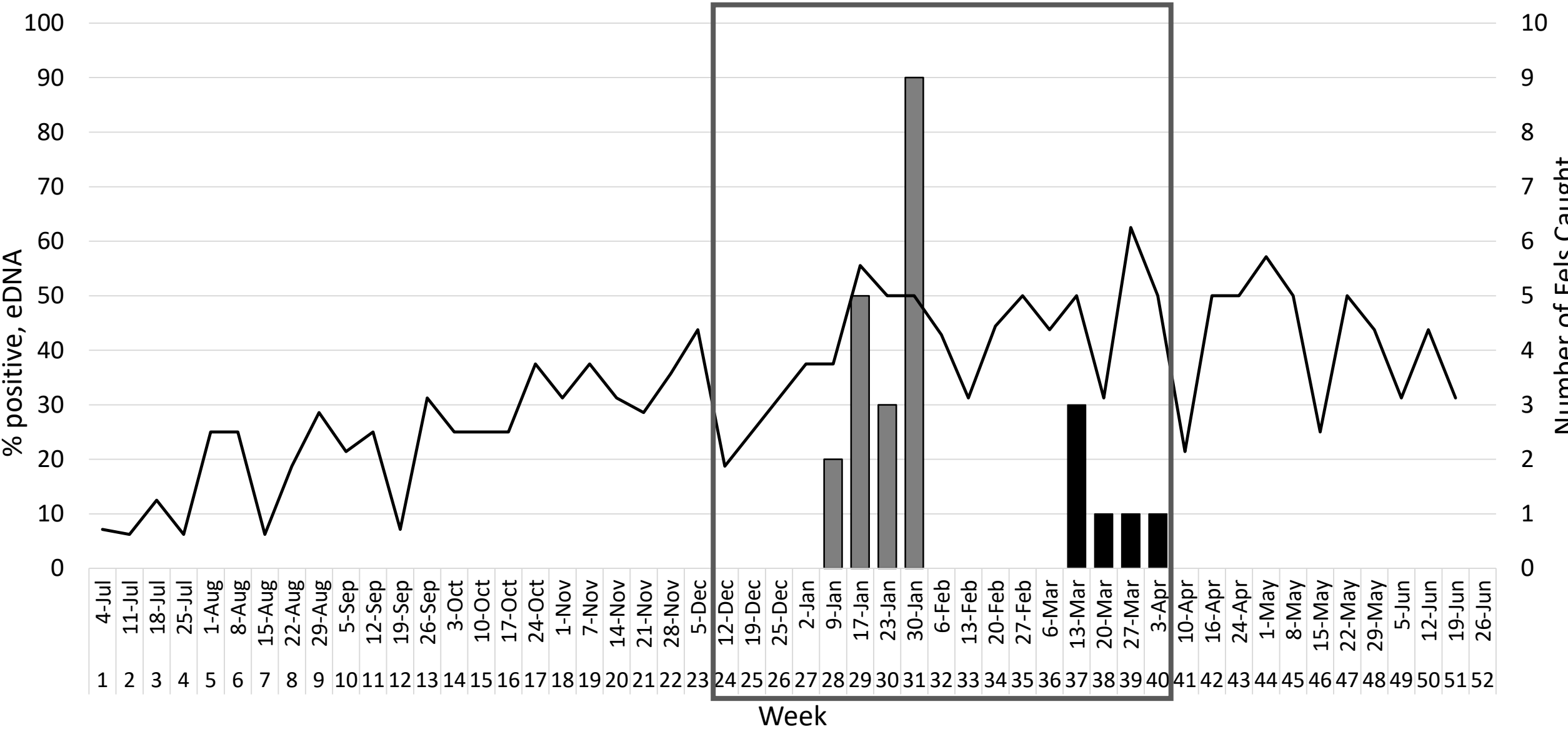
Results

- Year 1:
 - 28 American Eels captured
 - 19 glass eels
 - 6 elvers (+ 3 outside of scope of study)
 - Eels detected at sites:
 - Eel Ramp 2 sites (119 and 120)
 - eDNA (all but one: 104)
- Year 2: (as of 2/20/24)
 - 45 American Eels captured
 - 30 glass eels (+ 15 outside of scope of study)
 - 15 elvers
 - Eels detected at site:
 - Eel Ramp 1 site (119)
 - Fyke Net and Eel Mop LCRA site (121)

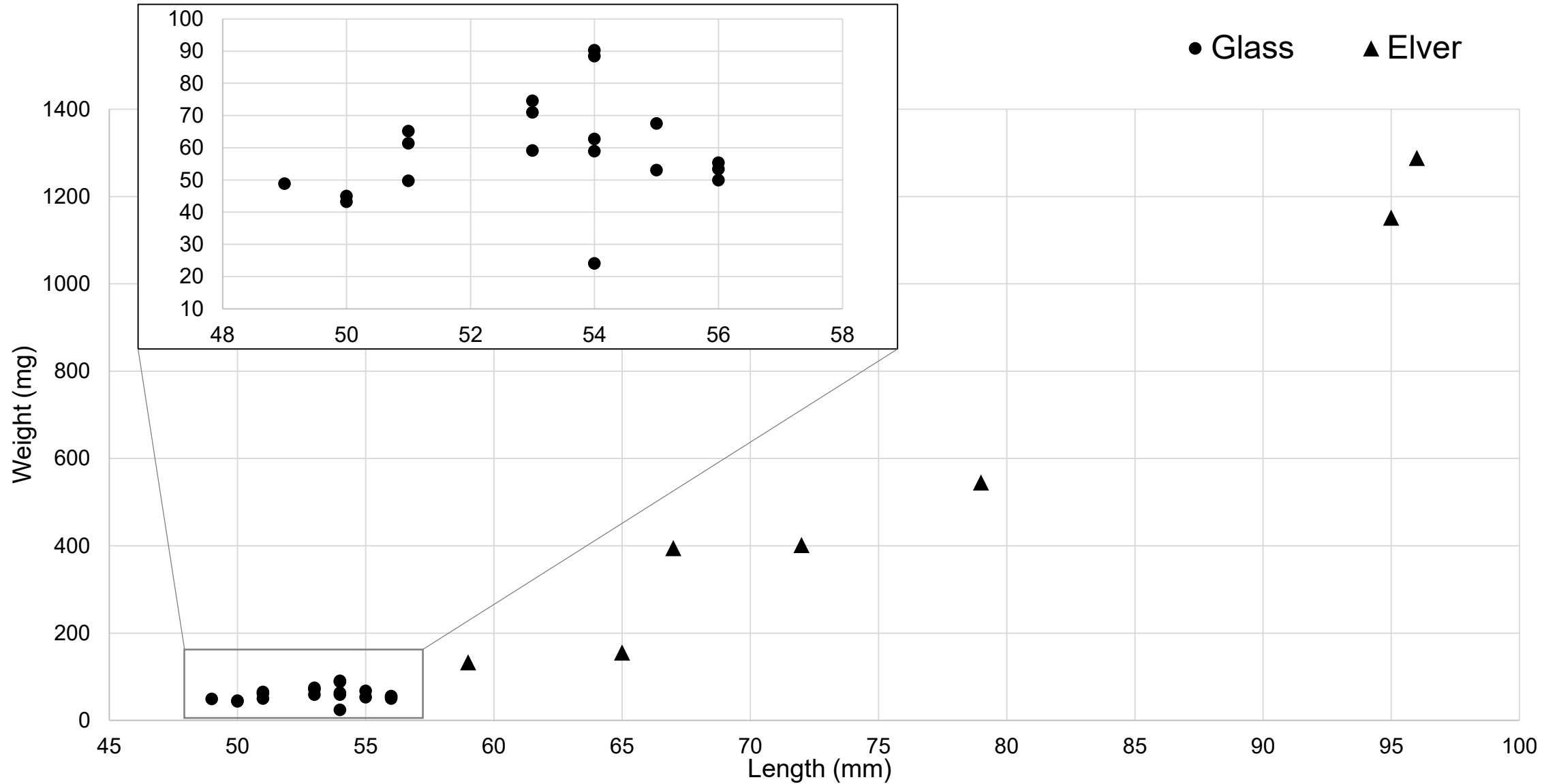


Results – Year 1

Glass Eels
 Elver Eels
 % positives for eDNA

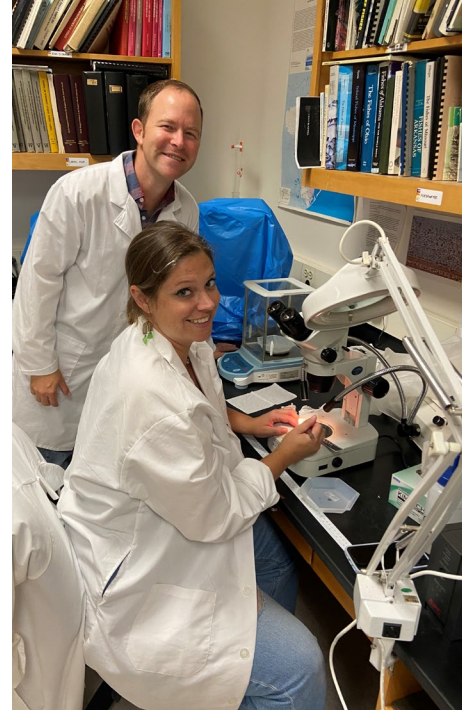


Results – Year 1 Eels



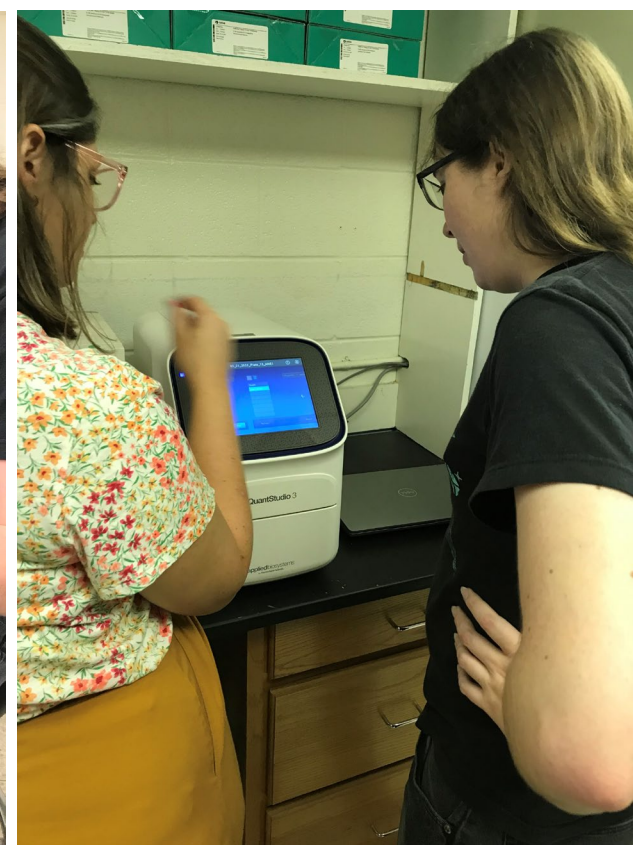
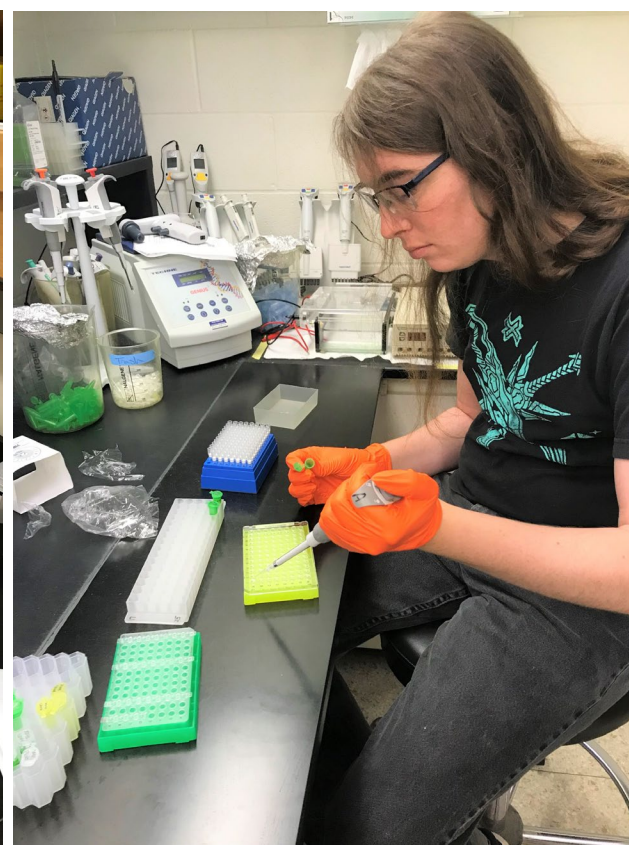
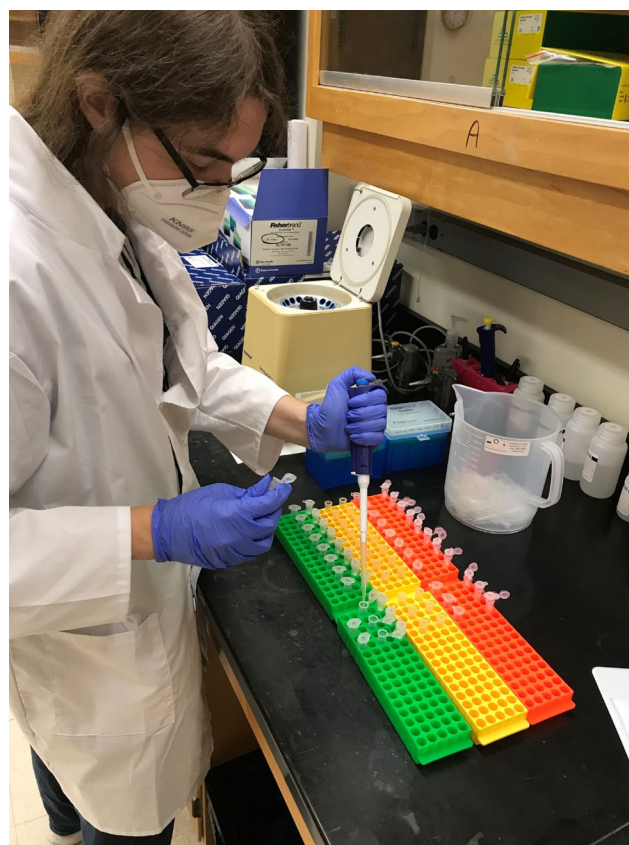
Discussion

- Caught 88 American Eels to date (64 glass and 24 elvers).
- Preliminary Recruitment Window: December through May
 - Florida: January – May (Bonvechio 2016)
 - Virginia: February – June (VIMS)
- Nova Scotia – SST correlate with recruitment timing. (Jessop 2021)
- Catch has been restricted to three locations
 - 119: ~ 40km to nearest pass, fresh water flowing directly into brackish water
 - 120: major impediment to upstream movement
 - 121: Chemical plant water treatment outfall



Discussion

- eDNA % positives appears to correlate with the recruitment window
- Site 119 had highest eDNA % positives
- Relative quantitative estimates (CPUE for eDNA) (Chin et al. 2021)



18



27



119



Future Work

- Continue monitoring current ramp sites through April 2024 (or until catch stops)
- Repeat during recruitment window in 2024-25 season – site suggestions?
- Process additional eels to better describe early life stage morphometrics
- Revisit previously used gears such as fyke net and eel mop focused at recruitment window

5000 μm

Photo Credit: Polly Hajovsky

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