Invasive Blue Catfish (*Ictalurus furcatus*) in Chesapeake Bay Tributaries: Comparative Status Based on Reproductive Parameters

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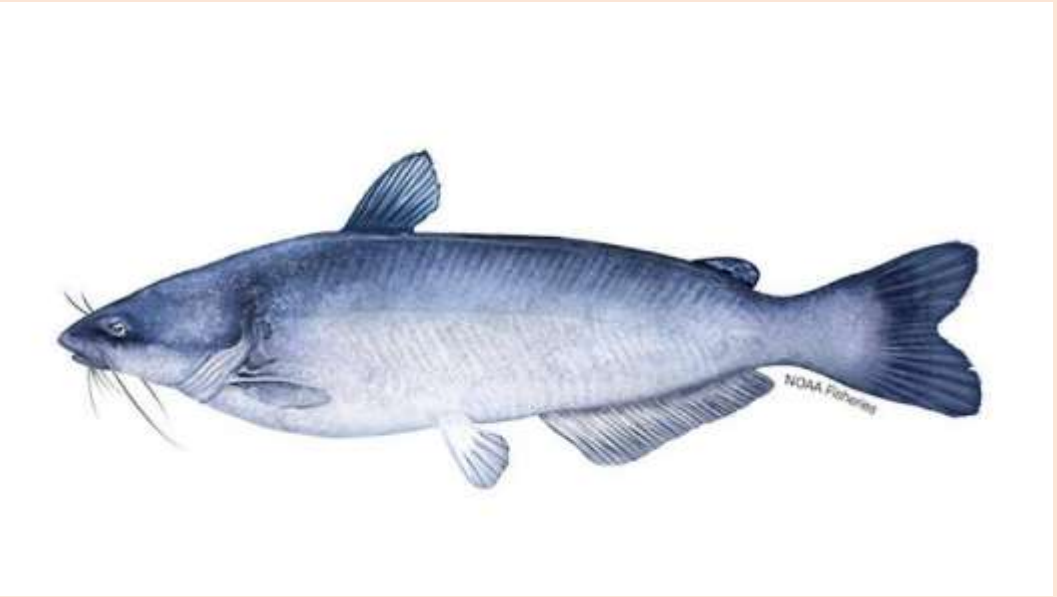


Blue Catfish in the Chesapeake Bay

- Invasive
  - Native to large rivers Midwest
  - Introduced in Virginia tidal rivers (James, Rappahannock, York) in 1970s & 1980s
    - Recreational fishery
    - Spread due to their salinity tolerance
      - Survive in waters up to 17 parts/thousand (psu) for up to 3 days
      - Juveniles: survive up to 10 psu for 112 days
      - Thrive in brackish waters
        - Nepal and Fabrizio (2019)

Blue Catfish – Why are they a threat?

- Density
  - Patuxent River (MD)
    - > 70,000 fish in a 5-mile stretch
    - 1,250 fish / acre (fish > 8 inches)
  - James & Rappahannock Rivers (VA)
    - 75% of total fish biomass
- Survival
  - > 20 years old
  - > 5 feet long
  - > 100 lbs
    - MD State Record = 84 lbs (2012)
    - VA State Record = 143 lbs (2011)

Reproductive Strategy

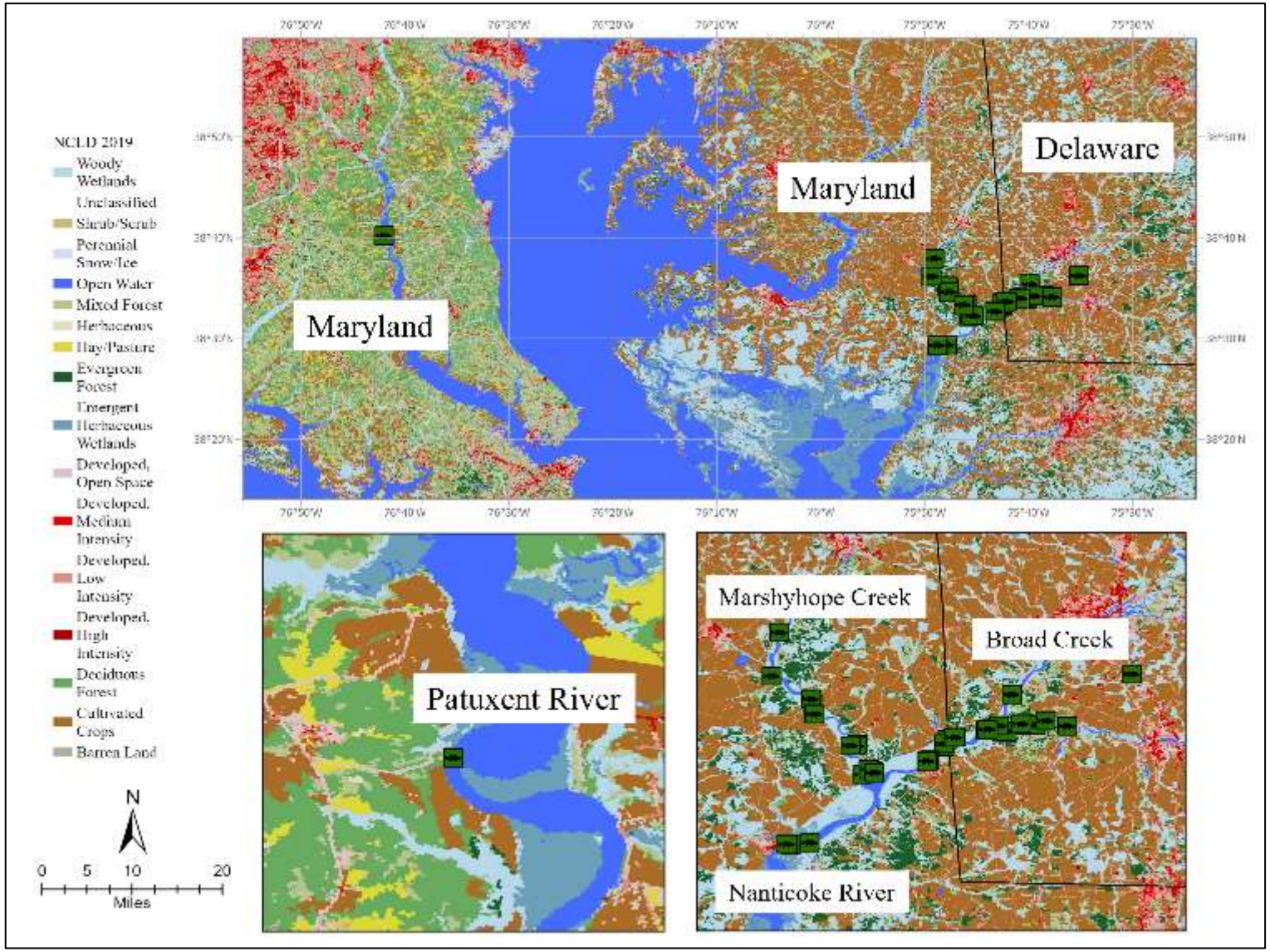
- Once a year
  - April – June
    - Water temps reach 70-84°F
      - ~80°F = ideal
  - Lower salinity streams, smaller tributaries
    - Rocks, woodcover
    - Shallow water (1-5ft deep)
  - Females lay eggs, males build and guard nests
    - Both parents provide care to fry
      - Males = primary caregivers
  - Adults – feed heavily prior to and after spawning

Reproductive Study – Nepal & Fabrizio 2021

- James & York Rivers, VA
  - Matured between 6-10 years old
  - Spawned May - July
    - Larger fish spawn earlier & produce more eggs
  - Produced ~ 2,600 – 68,000 eggs
  - James River – more densely populated
    - Females matured at an older age & smaller size
    - Allocated more energy to reproduction
    - Greater GSI, relative fecundity, egg organic content, proportion of organic content
  - Relative fecundity decreased with size
  - Recommendation: incorporate population-specific reproductive traits into stock assessment models

Reproductive Study – Maryland & Delaware

- Sites
  - Nanticoke River (n=155)
    - July – October 2020, June 2021, March – May & July – October 2022
  - Broad Creek (n=21)
    - June 2021
  - Marshyhope Creek (n=102)
    - Nanticoke River Tributary
    - March – May & July – September 2022
  - Patuxent River (n=53)
    - September 2020

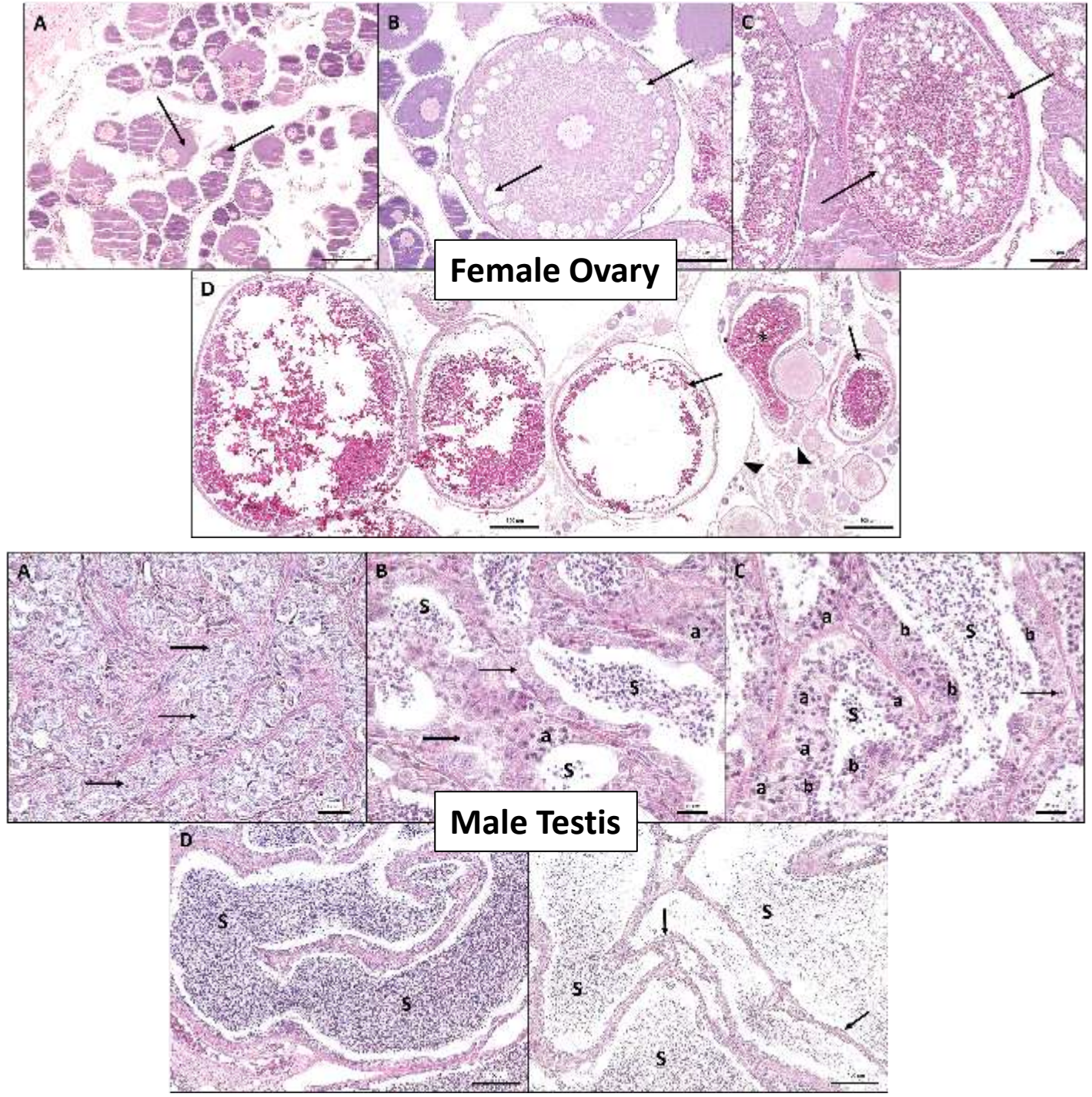


Blue Catfish Collections

- Boat electroshocking
- Gill nets
- Trot lines
- Trawling
- Tournaments
- Collected by:
  - MD Dept. of Natural Resources
  - Salisbury University (2022)
  - DE Dept. of Natural Resources & Environmental Control (DNREC)
  - DNREC Division of Fish & Wildlife

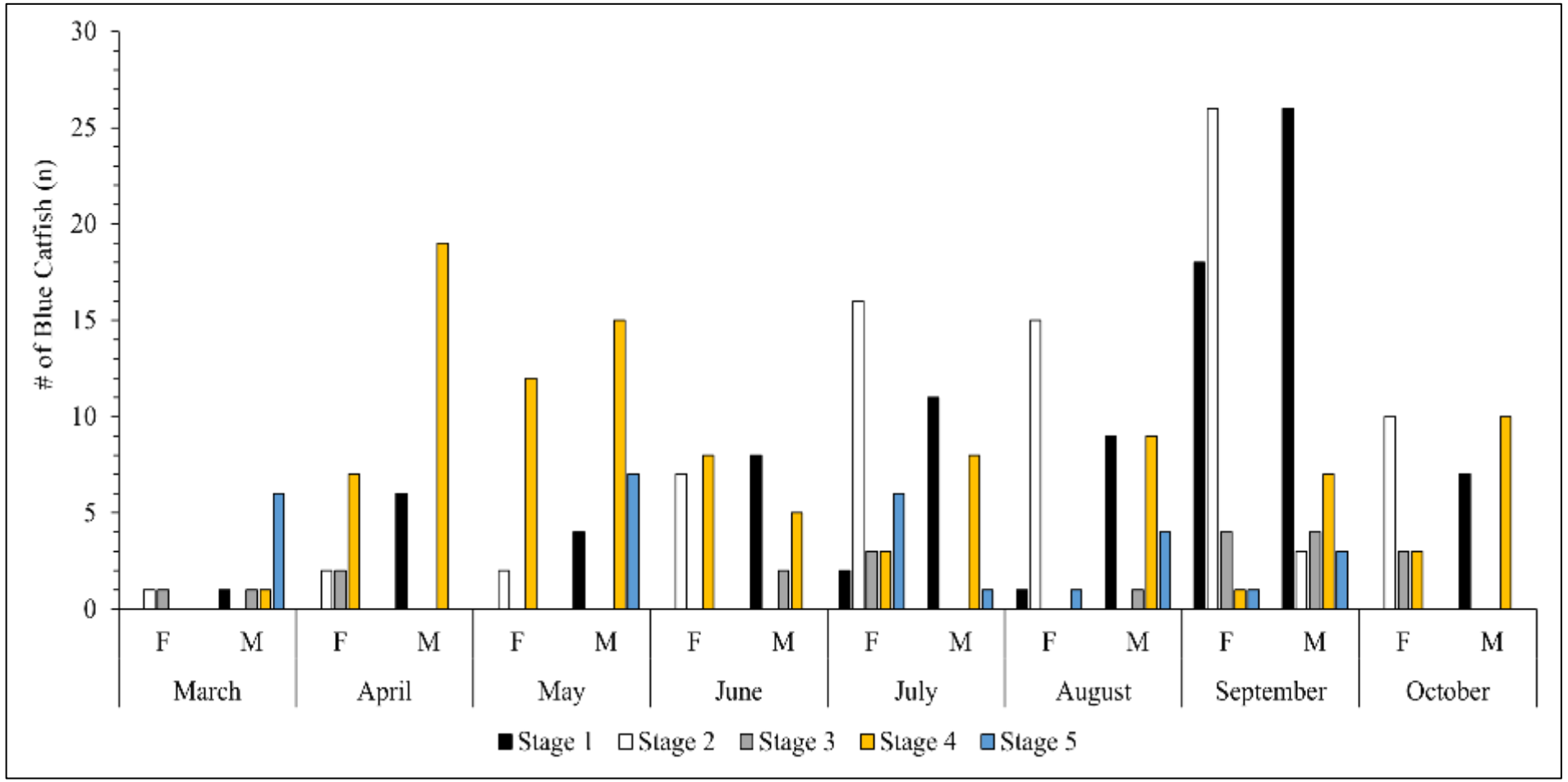
Tissue Collection

- Gonads removed and preserved in formalin
  - Histological staging
    - Blazer et al. 2002, “Histopathological assessment of gonadal tissue in wild fishes”
- Blood collection
  - Plasma
    - E2
    - Total Protein
    - Calcium

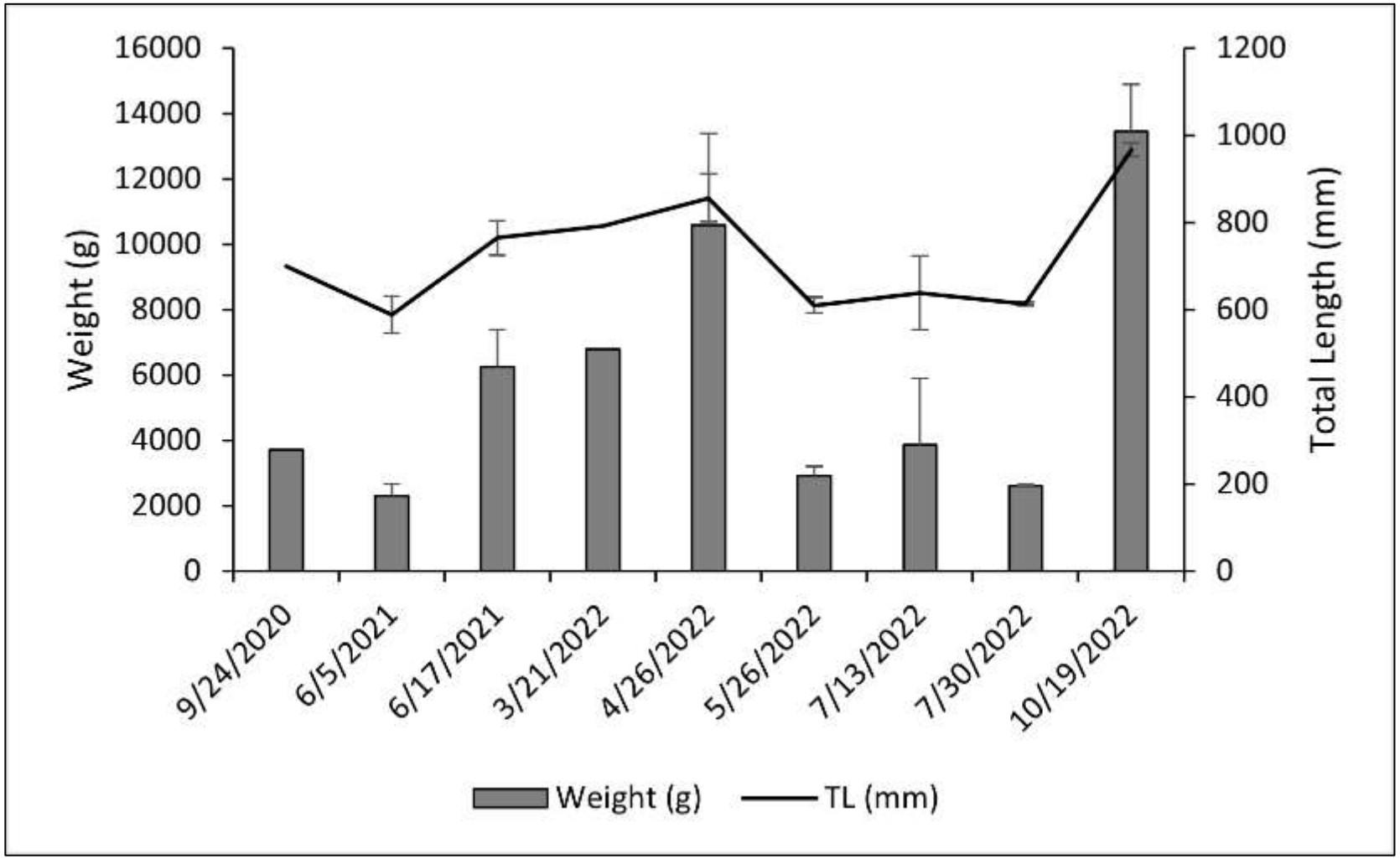


Results: Histology, Gonad Staging

- Adults targeted
  - Immature fish collected
    - Sexually immature, yet adult size
    - Marshyhope Creek, n = 13
    - Nanticoke River, n = 36
    - Patuxent River, n = 38
    - Broad Creek, n = 6

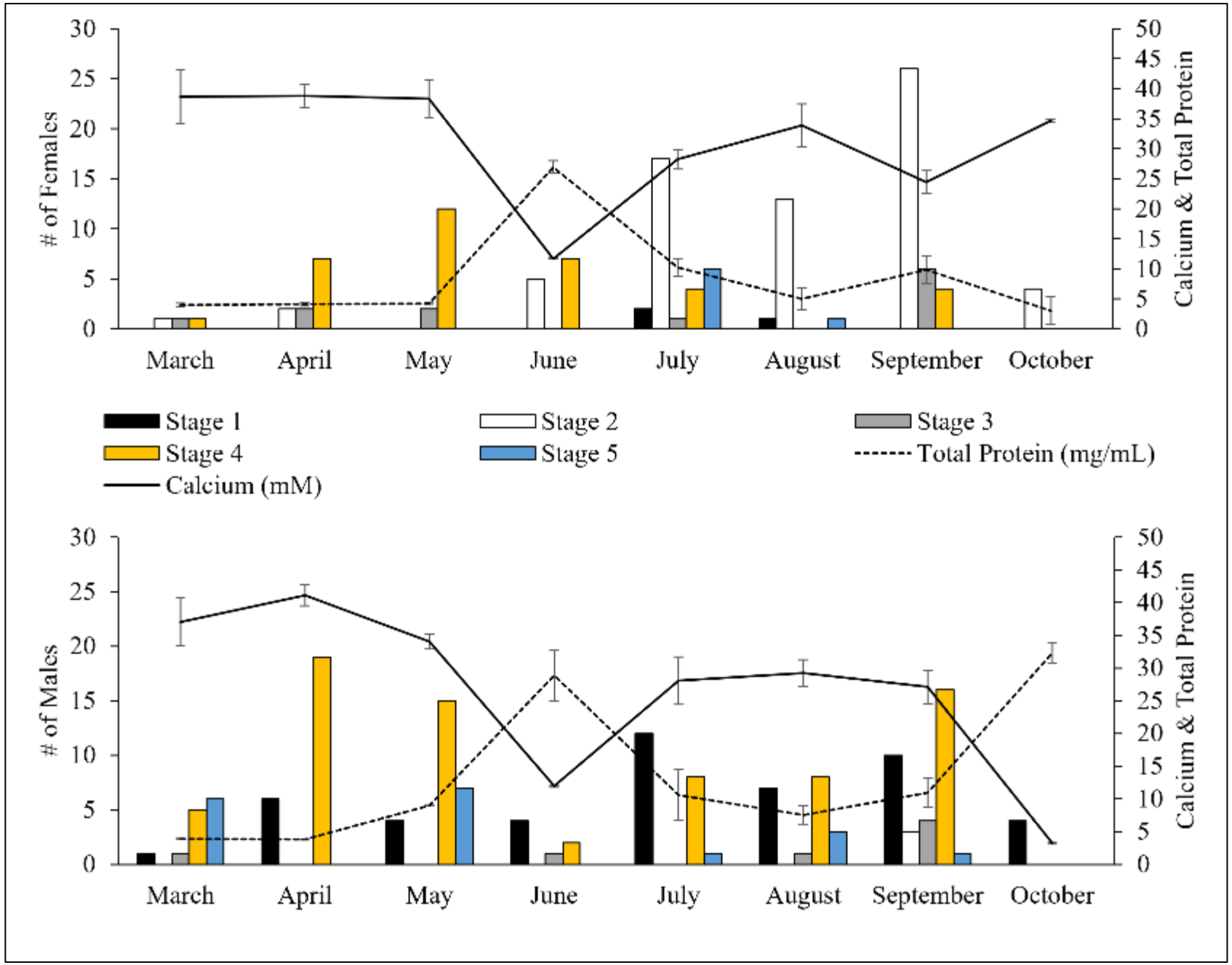


Late Pre-spawn Females

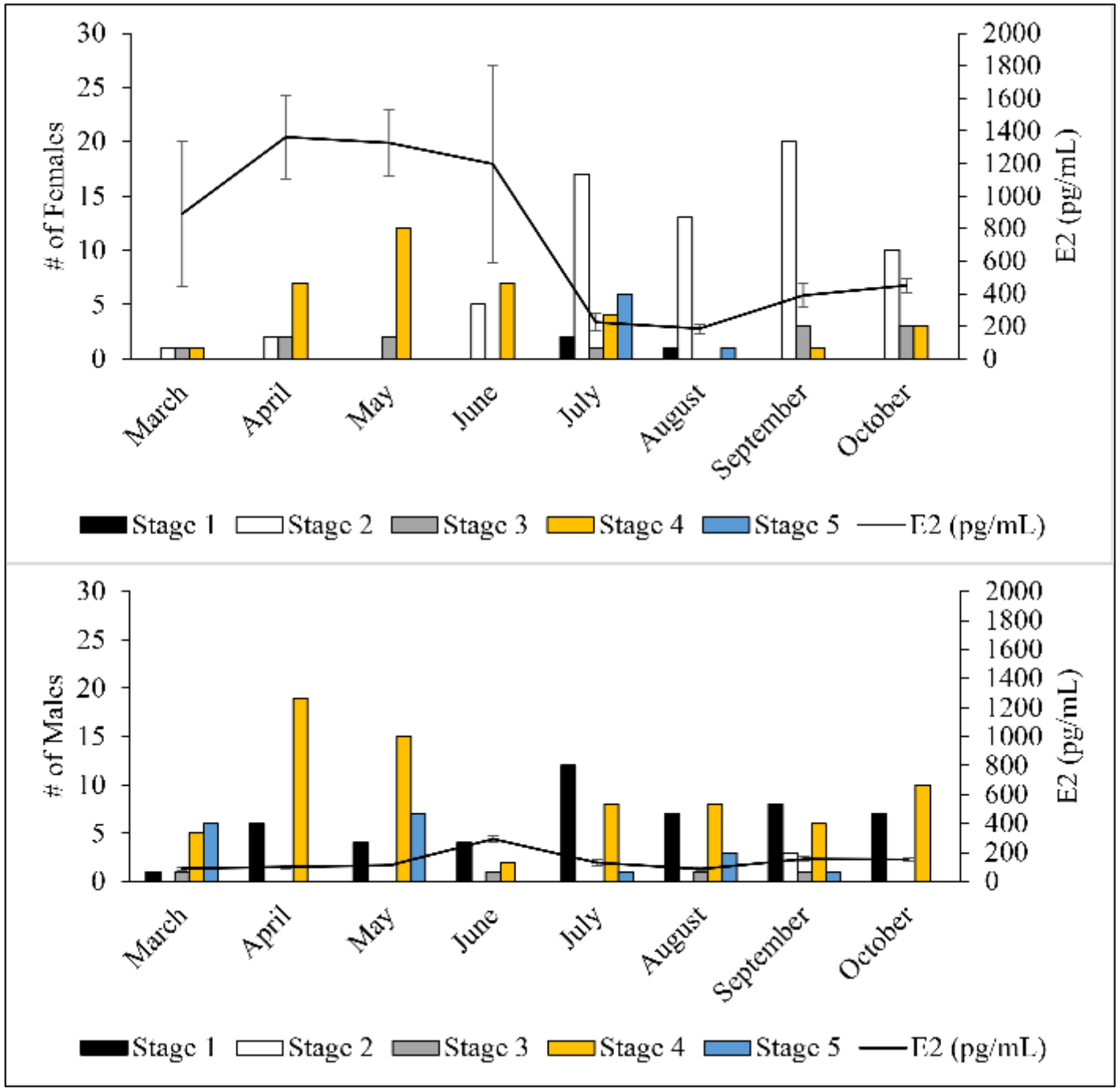


- Determine best time to harvest largest females to mitigate spawning
  - Or manage trophy stock
- Late pre-spawn females
  - Largest females collected April & October

Results: Plasma Protein & Calcium



Results: 17β-estradiol (E2)



Conclusion

- Histology (gonad staging) and E2
  - Most conclusive results
    - Total protein & calcium results were not as expected
  - Spawning begins late April
  - Peaks in May
  - Tapers off in June and ends in July
- Stage 4, late pre-spawn fish in fall
  - Diapause
  - Skipped or year-round spawning
  - Overwintering for next spawning season

Future Directions

- Perform year-round sampling in Patuxent River
  - MD DNR has data collected on Blue Catfish density
- Identify another river system for comparison
- Perform similar types of analyses as Nepal & Fabrizio, 2021

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Questions???