

Assessing White Perch (*Morone americana*) and Atlantic Striped Bass (*Morone saxatilis*) Abundance Through Cooperative Fisheries Research in Great Bay, New Jersey

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Abstract:

Fishery independent research is critical to document abundance trends in commercially and recreationally important finfish as well as formulate testable hypotheses for future work. Using an array of fyke nets tended cooperatively by a commercial fisher, this research conducted a winter / spring inventory of white perch (*Morone americana*) and Atlantic striped bass (*Morone saxatilis*) abundance in Great Bay, NJ from November 2016 - April 2018. Abundance and length information were collected and combined with YSI water quality data and archived weather data to better understand the distribution of these two moronid species during a seasonally under-sampled time period. Abundance and environmental data suggest lower numbers of white perch in 2017/18 may be the result of a bay-wide freezing event coupled with higher-than-average snowfall / precipitation. Future work is needed to test the mechanisms behind these initial observations.

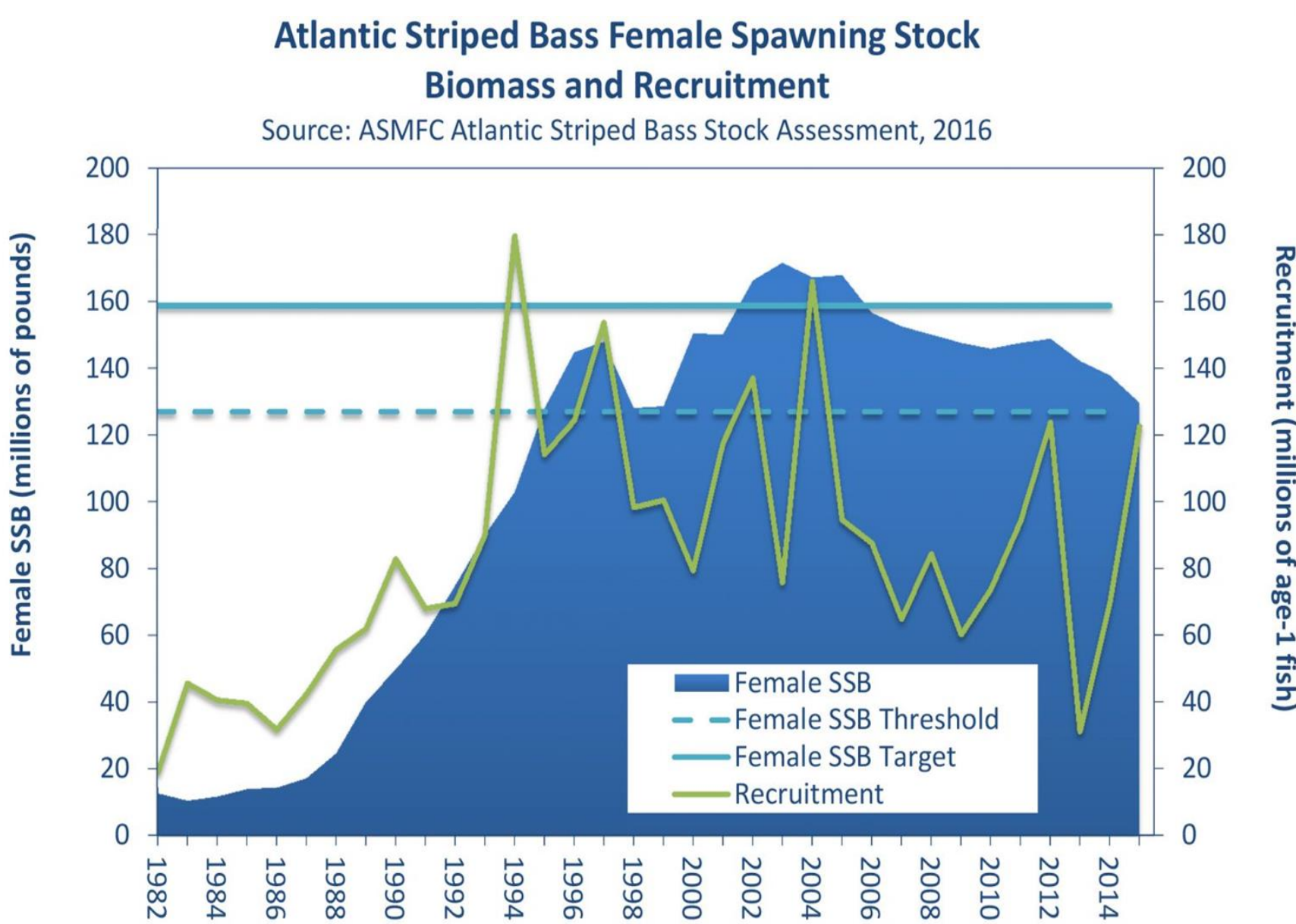


Fig. 1 – Female spawning stock biomass and recruitment from 1982-2015 for *Morone saxatilis*. Graph courtesy of the Atlantic States Marine Fisheries Commission.

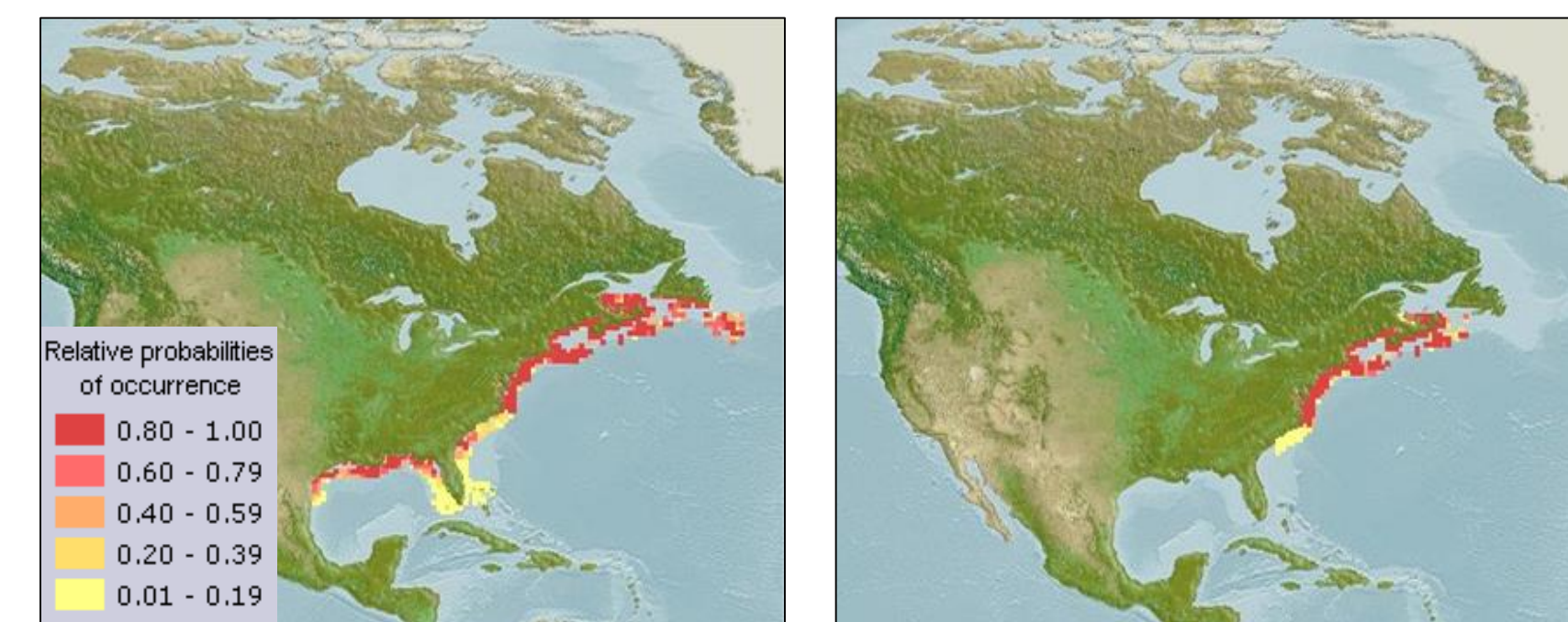


Fig. 2 – Distribution probabilities along the US East Coast for *Morone saxatilis* (left) and *Morone americana* (right). Images courtesy of FishBase.

Introduction:

- The Mullica River-Great Bay Estuary (MRGB) is a drowned river valley that provides nursery and adult habitat for a variety of commercially and recreationally important finfish species.
- Fishery independent surveys are critical to help better document these fluctuating trends in abundance and formulate testable hypotheses for future work (Able 2016).
- *Morone americana* and *Morone saxatilis* (two migratory moronids – Fig. 2) are mobile predators present in Great Bay, NJ during the winter / spring months, yet frequently under-sampled by scientists.
- Formal stock assessment information for *M. americana* is absent from this region while *M. saxatilis* female spawning stock biomass has been declining in recent years (Fig. 1; ASMFC 2016).
- Both species were successfully sampled by a local commercial fyke net partner from 2016-2018.



Fig. 3 – Fyke net sampling locations and continuous water quality station in Great Bay, NJ (2016-2018). Data produced with Google Earth.

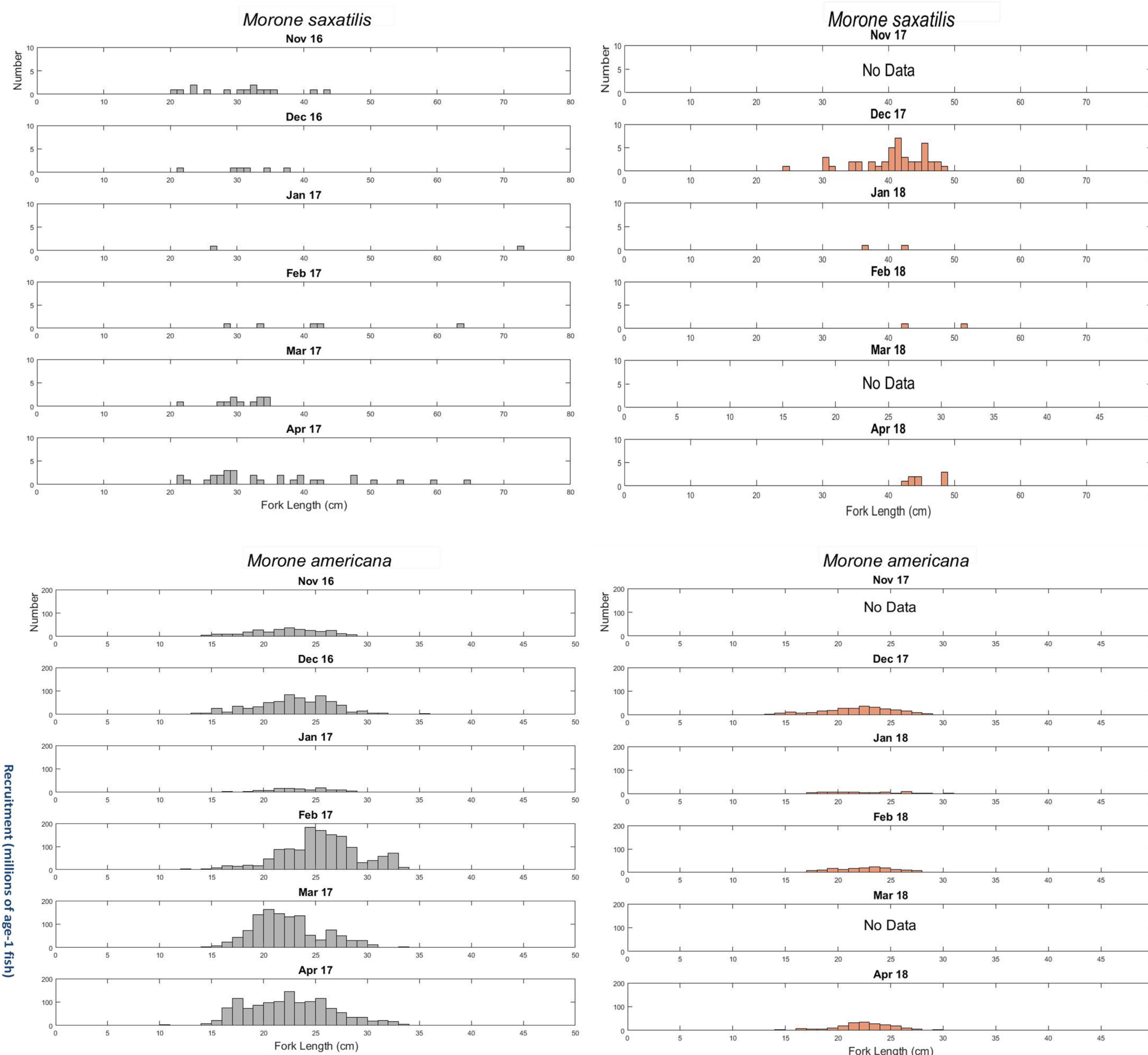


Fig. 4 – Length-frequency histograms for *Morone saxatilis* (top) and *Morone americana* (bottom) during winter/spring 2016-2017 (gray) and winter/ spring 2017-2018 (orange). No data collected during November 2017 and March 2018.

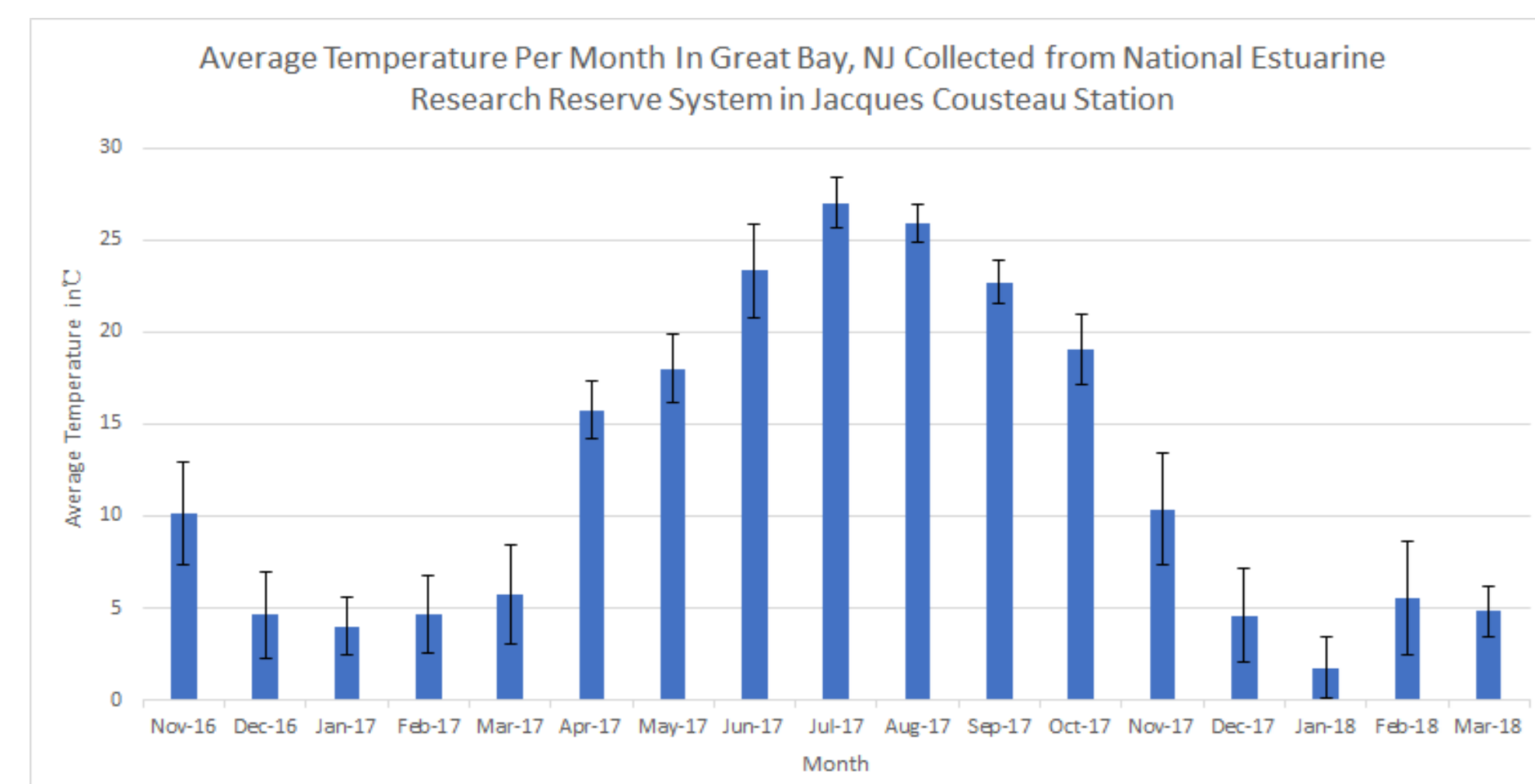


Fig. 5 – Average monthly water temperature (°C) at the Chestnut Neck Boatyard (Mullica River-Great Bay Estuary, NJ) from November 2016 to March 2018. Data downloaded from the National Estuarine Research Reserve Centralized Data Management Office.

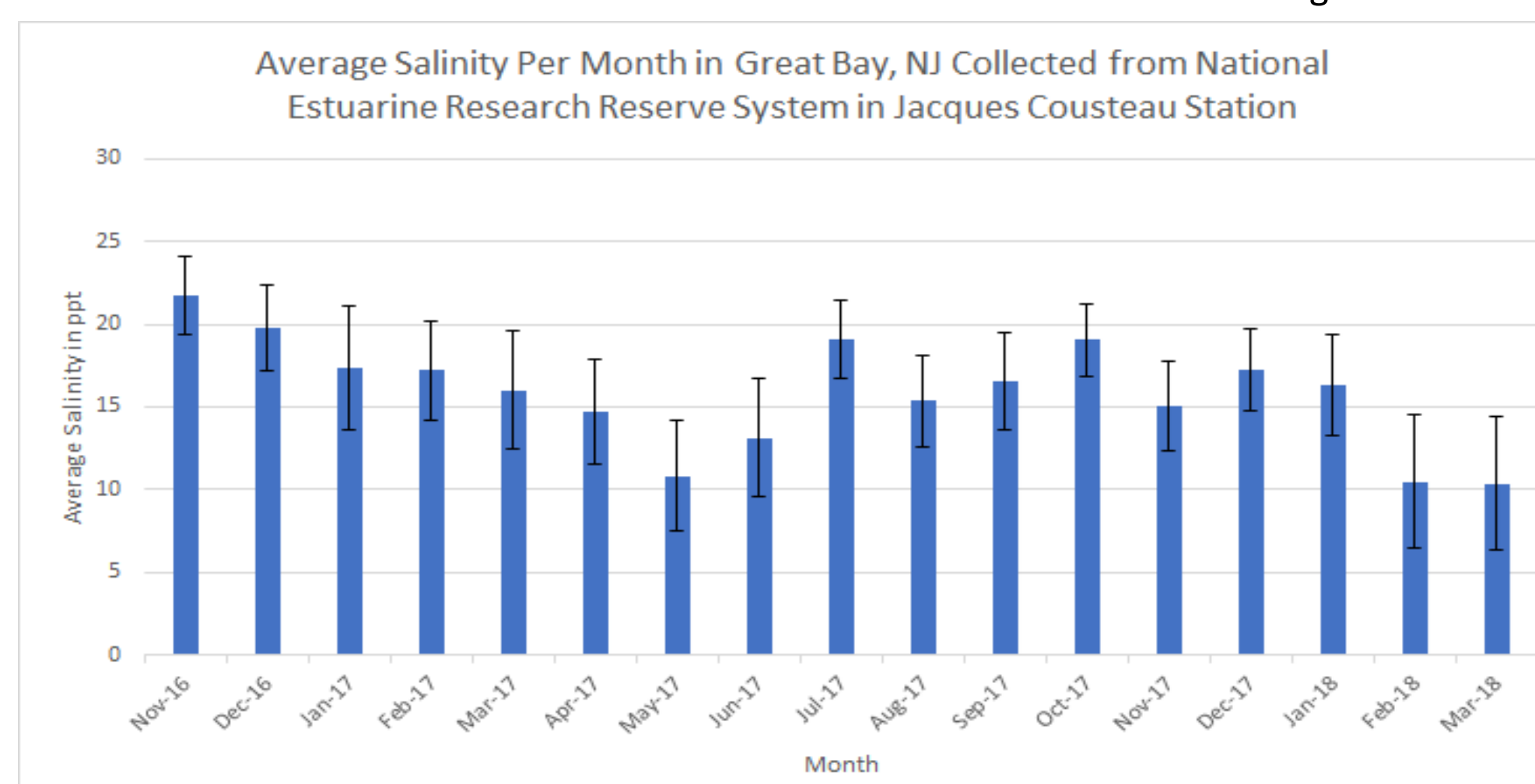


Fig. 6 – Average monthly salinity (ppt) at the Chestnut Neck Boatyard (Mullica River-Great Bay Estuary, NJ) from November 2016 to March 2018. Data downloaded from the National Estuarine Research Reserve Centralized Data Management Office.



Fig. 7 – (L-R) Students on Stockton's R/V Skimmer. YSI water quality data collection. A catch of *Morone americana*. Fyke net operations (background).

Methods

- Fyke net sets (upper, mid-bay) were conducted 3 days per week/once per month in winter-spring with a commercial fyke net partner supported by NJ Department of Environmental Protection (Figs. 3, 7, 8).
- All finfish were identified, counted, and measured to fork or total length (Fig. 7).
- Water temperature (°C), salinity (ppt), dissolved oxygen (mg/l), and pH recorded with a YSI (Fig. 7).
- Data entered into Microsoft Excel and quality controlled. Fish length frequencies plotted with MATLAB.
- Additional water quality data (collected at the Chestnut Neck Boatyard) downloaded from the National Estuarine Research Reserve Centralized Data Management Office (Fig. 3).
- Corresponding atmospheric data at Atlantic City, NJ downloaded from Weather Underground.

Results:

- *M. americana* catch was lower between winter/spring sampling periods (2016-17, 2017-18). *M. saxatilis* catch was of a similar magnitude between sampling periods, with consistently higher abundance in November / December and March / April (Fig. 4).
- Great Bay froze in early January 2018 due to 3°C lower than average water temperatures (Fig. 5).
- Average salinity was lower in February and March 2018 compared to previous sampling period (Fig. 6).
- Data from Weather Underground indicate total precipitation in February 2017 was 34.79 mm compared to 163.32 mm in February 2018.
- Lower salinity in February and March 2018 may have resulted from a high influx of fresh water due to precipitation and ice melt.



Fig. 8 – Winter/spring 2016-2017 sampling operations (high abundance of *M. americana* visible in fish tote).

Conclusions and Future Work:

- Inventory studies are critical for assessing stocks and developing testable hypotheses for future work.
- Additional data is needed to determine a mechanism driving the lower observed abundance of *M. americana*.
- *M. americana* is semi-anadromous, undergoing migrations related to temperature and salinity cues (Murdy et al. 2013).
- *M. americana* typically occupies temperatures between 4.7-18.2°C with a mean of 10.2°C.
- During winter/spring 2017-18, *M. americana* may have sought refuge in deeper, thermally stable water outside of fyke net range. Similarly, migratory behavior may have been triggered by changes in salinity.
- Future research using expanded fyke net stations and/or acoustic tracking could be implemented to test these hypotheses.

Acknowledgements:

Special thanks: David Ambrose (NJDEP Inventory lead technician) and Newt Sterling (commercial fyke net partner); *Stockton Principal Investigators:* Mark Sullivan, Steve Evert; *Stockton Marine Field Station support:* Nathan Robinson, Elizabeth Zimmermann, Colby Capri; *Stockton course student support:* Spring 2018 NJ Field Ichthyology, Spring 2018/Spring 2017 Fisheries Science and Management, Spring 2017 Independent Study Students: Angelica Anglero, Jessie Dominick, Kathleen McLean; *Funding generously provided by:* NJ Department of Environmental Protection.

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