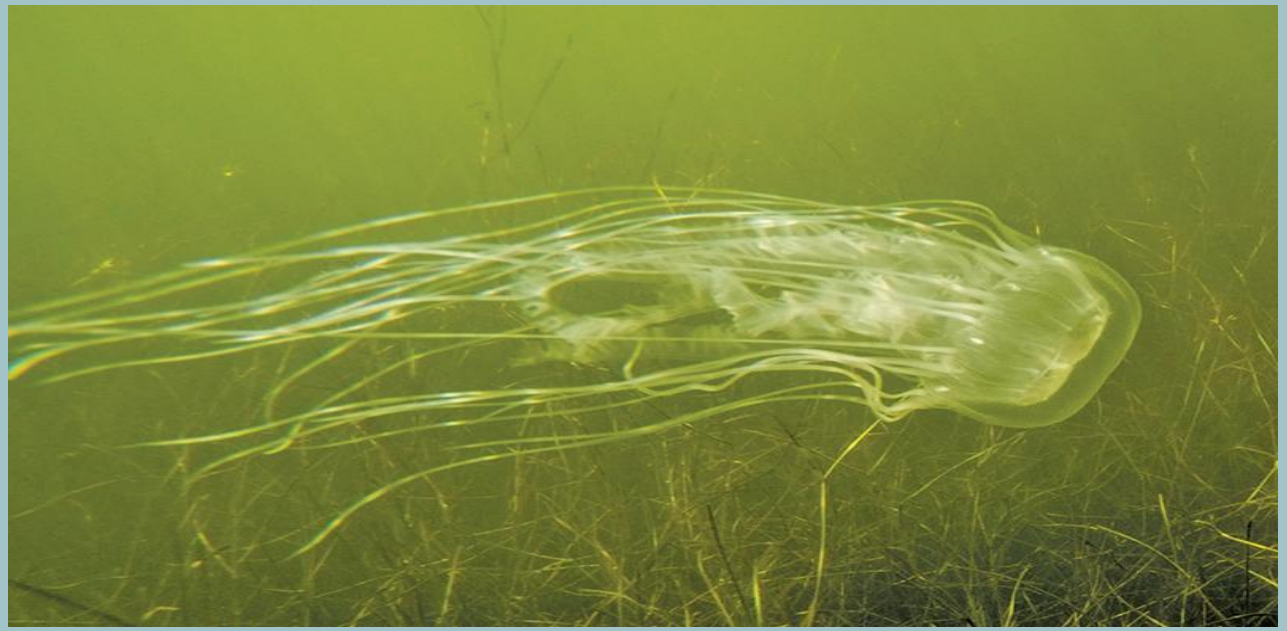
Impact of Salinity on Population Dynamics of Atlantic Sea Nettle in the Patuxent River



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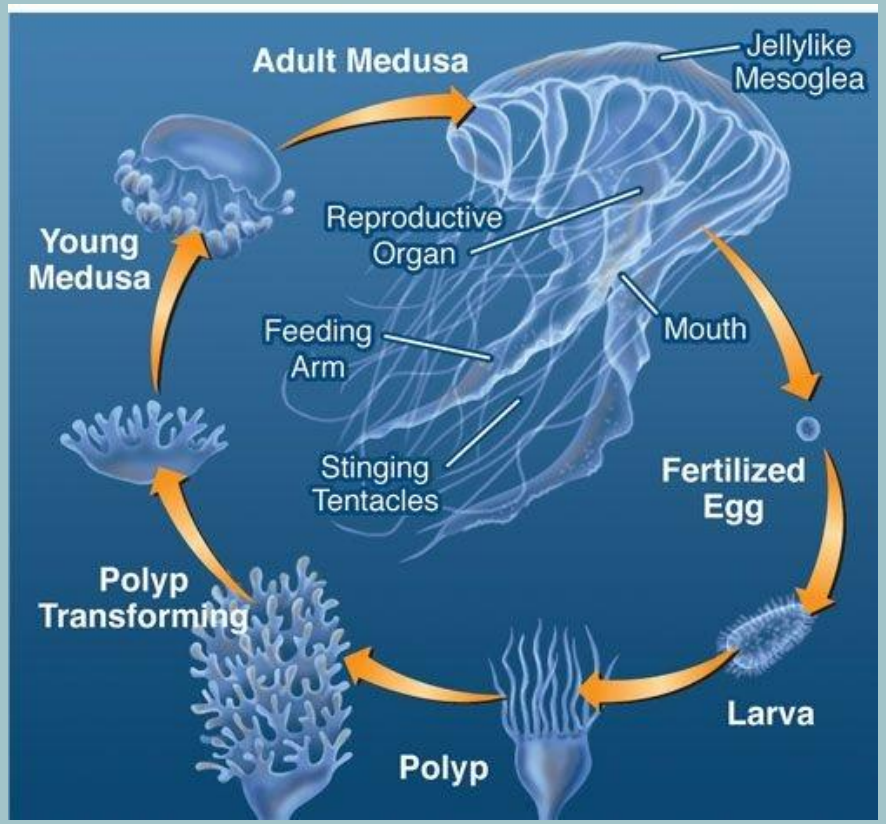
Background

- Chrysaora quinquecirrha prefer salty, warm water
- Carnivorous
  - Comb jellies
  - Small fish, anchovy eggs, etc.
- Considered a keystone species

- Two main stages:
- Podocyst→ Polyp
  - Float freely until finding a suitable landing place, then become sessile
  - Remain dormant over winter months
- Polyp→ Medusa
  - Free floating
  - Constantly moving
  - Unable to swim during winter months
  - Stinging tentacles

Polyps of C. Quinquecirrha, right: polyp (red arrow) underneath two anemones (white arrows) in Barnegat Bay, NJ



- Possible Environmental Factors:
  - Salinity
  - Streamflow
  - Water temperature
  - Tidal amplitude
  - Food availability

Hypothesis and Objective

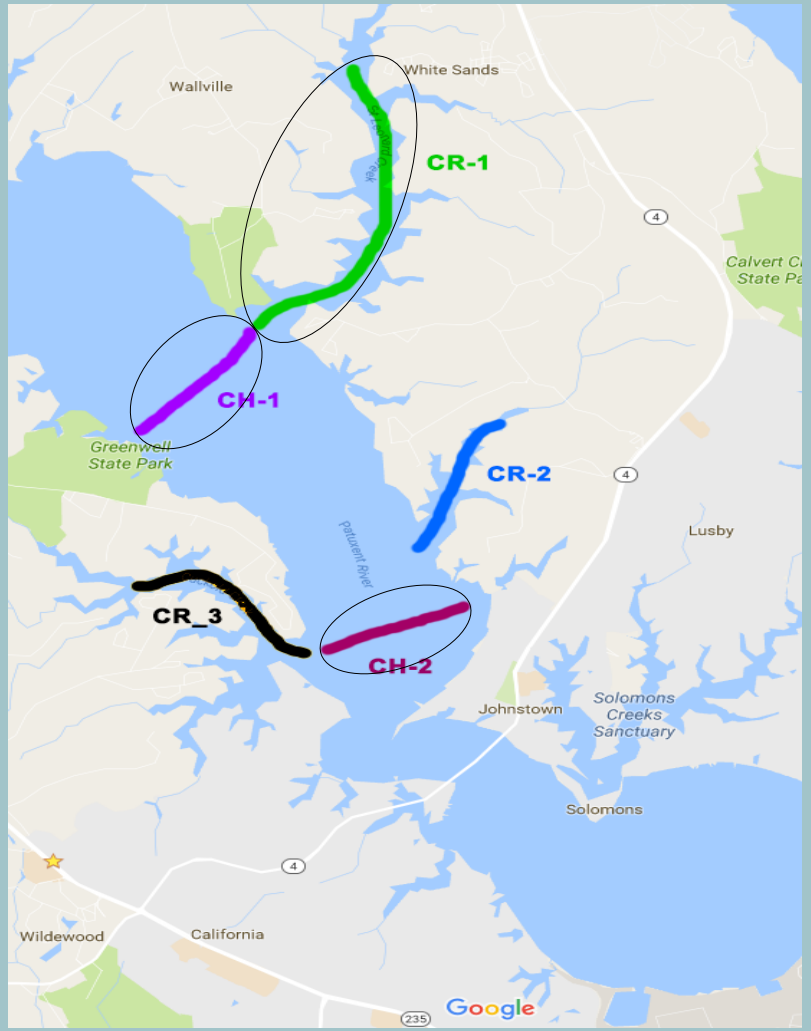
- Objective
  - Determine the population density of the Atlantic Sea Nettle (*Chrysaora quinquecirrha*) in the Patuxent River and three adjacent creeks
  - Study the various environmental factors that may contribute to the population dynamics
- Hypothesis
  - The population density of the Atlantic Sea Nettle is significantly affected by salinity.

The Why

- Overpopulation can halt various activities
- Consume large amounts of bay anchovies
- Stinging tentacles
- Sea nettles protect oyster larvae

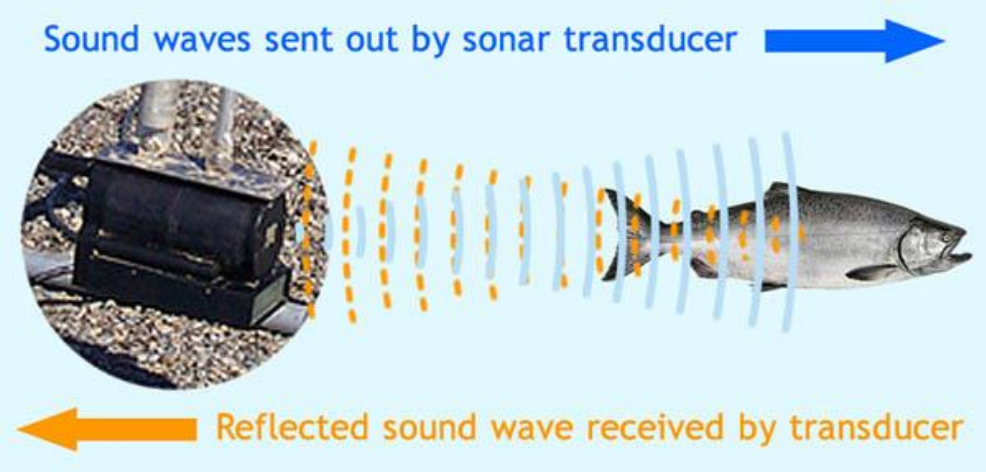
Methods

- 5 transects were chosen along the Patuxent river and three adjoining creeks
- Three research cruises personally conducted on May 16th, June 21st, and July 6th
- CTD instrument was also deployed to collect salinity (PSU) and temperature (Celsius) of transects



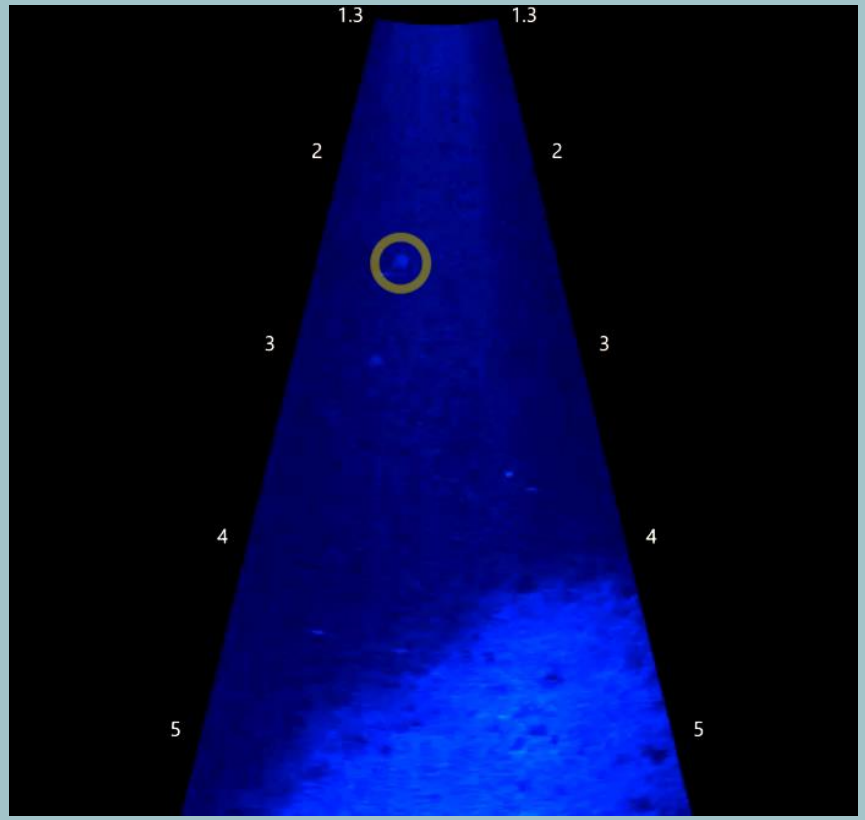
ARIS Explorer 3000

- Detection frequency- 1.8 MHz
- Identification frequency- 3 MHz
- 128 distinct beams allows for high resolution



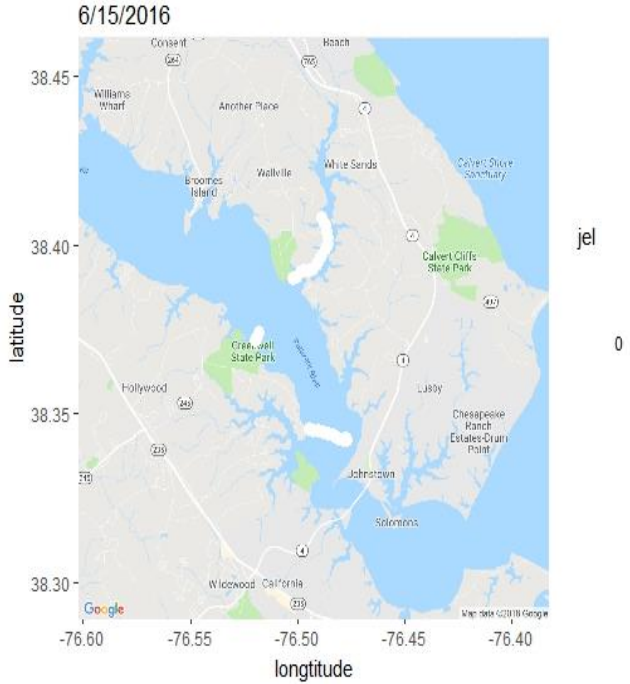
Adaptive Resolution Imaging Software (ARIS)

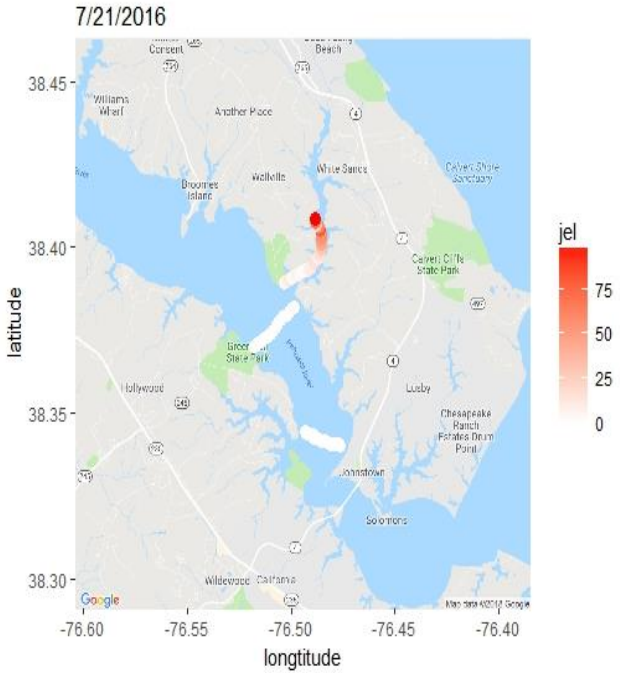
- ARISscope
  - Detect jellyfish populations without disrupting environment
- ARISfish
  - Counting jellyfish
  - Geographic Coordinates

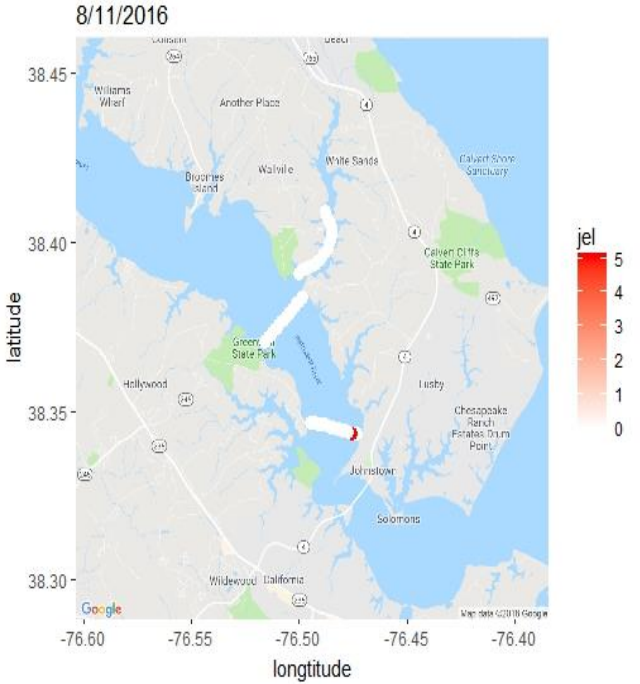


Results

Sea Nettle population density showed large spatial and temporal variation







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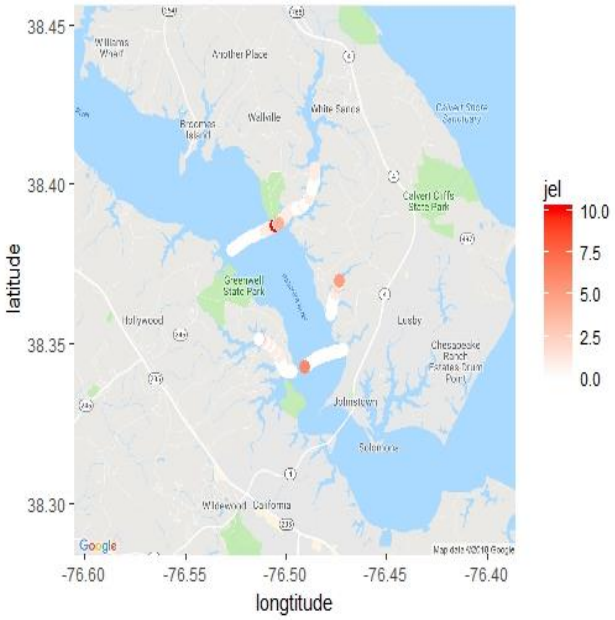

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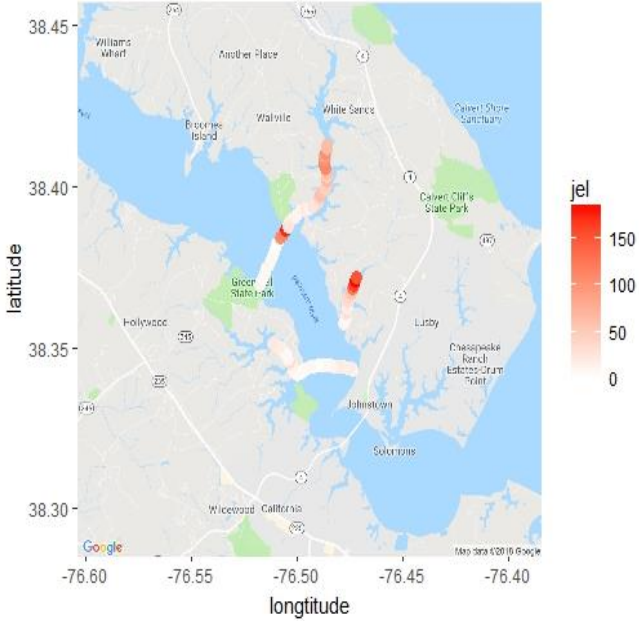

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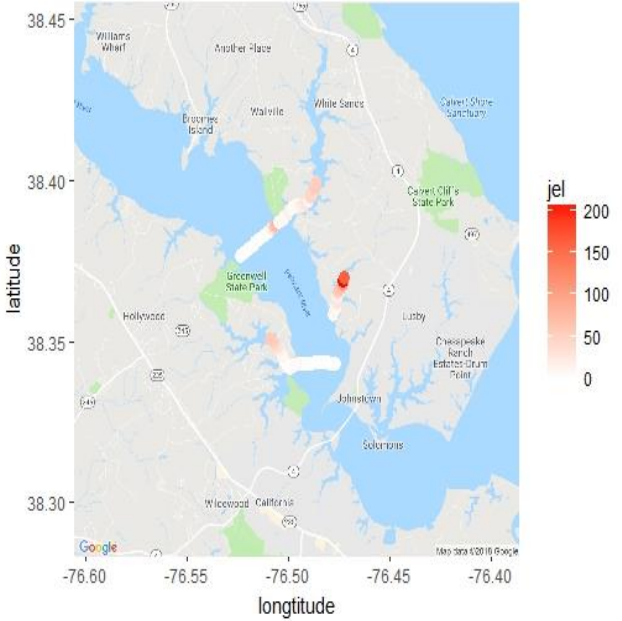
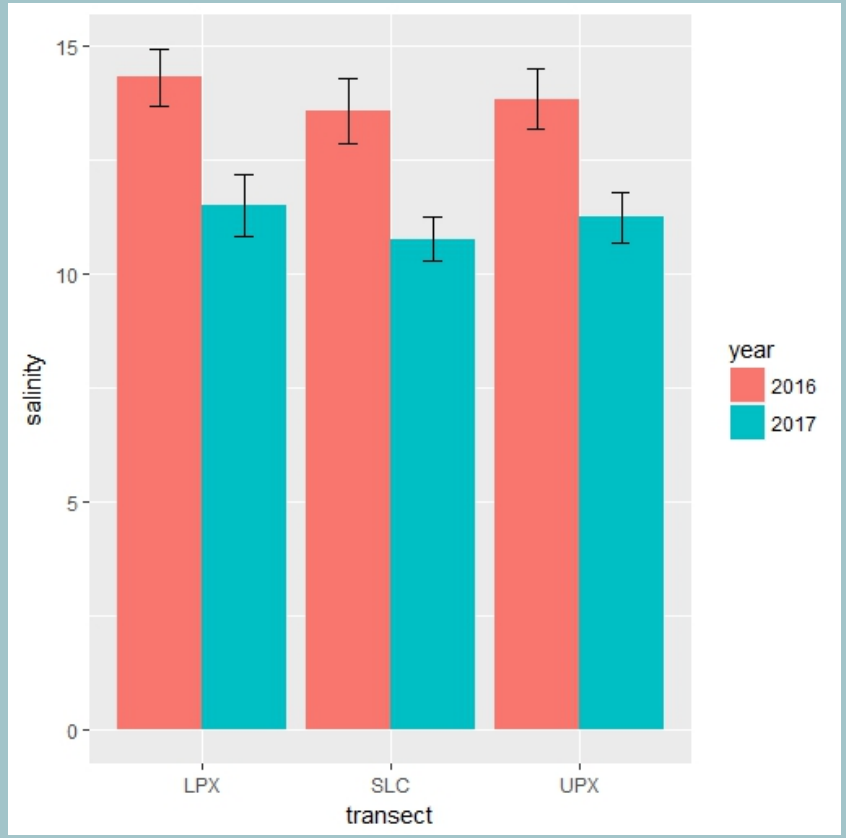


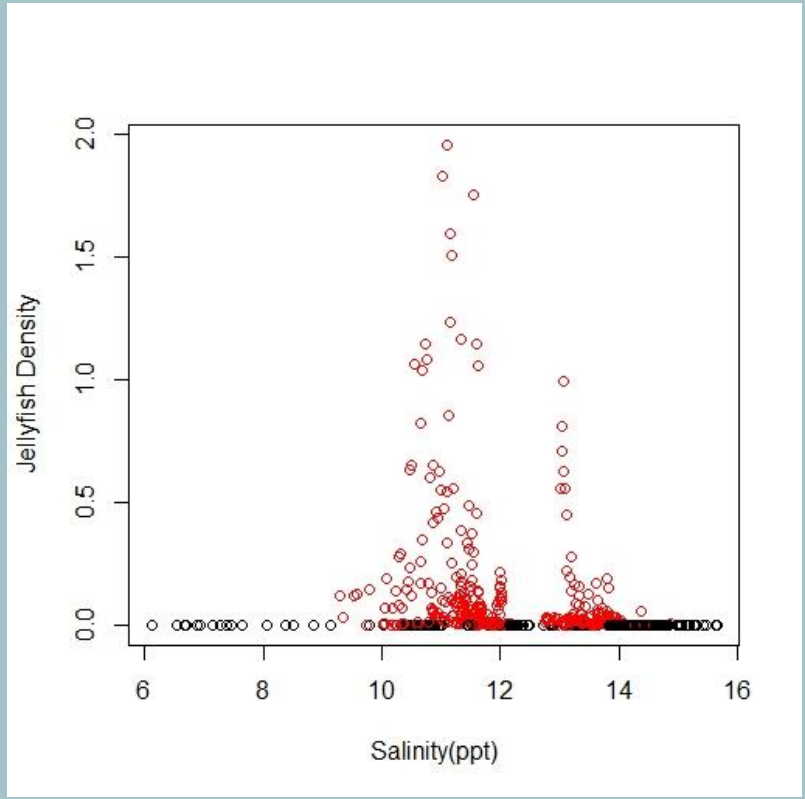
Salinity

- Salinity did not exhibit a large variation among transects
- In 2018, very few jellyfish were found, but when they were found, the salinity was above 9 ppt

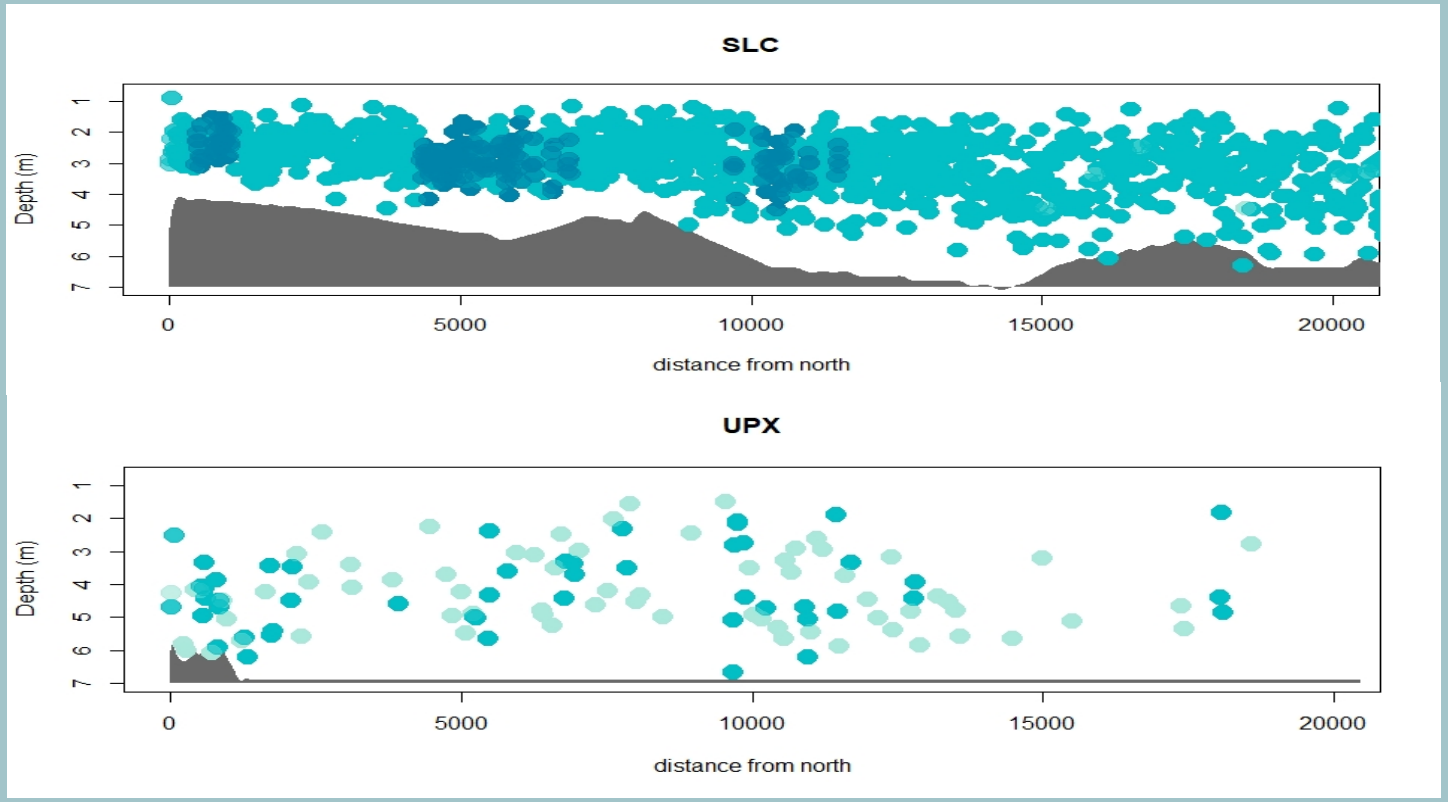


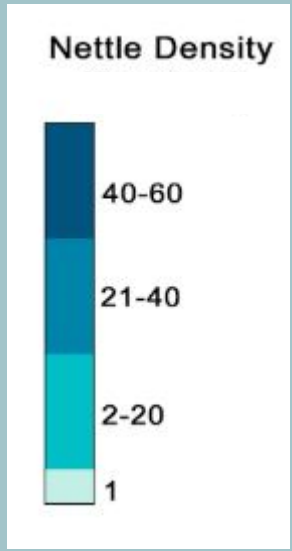
Salinity vs. Population Density

- No jellyfish were found when salinity was under 9 ppt
- When salinity was above 9 ppt, there was no significant correlation between the salinity and the sea nettle population density



Other Factors? - Early Survival and Dispersal





Conclusion

- The spatial and temporal dynamics of the Atlantic Sea Nettle population were not determined by the summer salinity
- Other environmental drivers could also influence Sea nettle population dynamics such as:
  - Winter-spring runoff
  - Jellyfish early survival rate
  - Jellyfish dispersal from source habitats

Acknowledgements

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