The Impact of Changing Water Temperature on Juvenile Fish Phenology in the Great Bay Estuary

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Introduction
- Rising global sea water temperatures are an anticipated consequence of climate change
- Temperature serves as a cue for the start of many events in nature, for example migration
- Our study focuses on three organisms:
  - Black Sea Bass (Centropristis striata)
  - Winter Flounder (Pseudopleuronectes americanus)
  - Cunner (Tautogolabrus adspersus)
- Our goal was to investigate possible changes in the day of arrival in the estuary for the juveniles of these species, in relation to rising regional water temperatures (3°C over 16 years)
- We expect to see fish arriving earlier in the year as high temperatures are also reached earlier in the year

Objective
- Track the day of arrival for the 10th percentile of annual abundance of specific juvenile fishes over time and look for a trend

Materials & Methods
- Long-Term Killitraps Survey
  - Biweekly wire mesh fish traps placed in Rutgers University Marine Field Station (RUMFS) boat basin
- Species selected based on key differences:
  - Black Sea Bass: Estuarine Dependent
  - Winter Flounder: Estuarine Resident
  - Cunner: No major fishery
- Tested for the 10th percentile of the population’s arrival
- Doing so standardizes for population size
- Along with the 10th, the 20th and 50th percentiles were also examined and showed no significant difference in trend

Study Site
- Aerial image of the RUMFS boat basin where ongoing sampling occurs

Equipment
- Wire mesh trap used in boat basin samplings (basketball for scale)

Results
- Figure 1: change in day of arrival over time for Black Sea Bass from the continental shelf
- Figure 2: change in day of arrival over time for Black Sea Bass returning from the continental shelf
- Figure 3: change in day of arrival over time for Winter Flounder
- Figure 4: change in day of arrival over time for Cunner

Study Organisms
- Estuarine Dependent: Juveniles move into estuaries early in the year, depart as winter approaches, only to return next year
- Estuarine Resident: Juveniles are full time residents of the estuary until adulthood is reached

Conclusion
1. Correlations of day of arrival with specific temperatures were weak with very high variance
2. Although not statistically significant, the trend is opposite of what is expected
3. Trend is similar for species both with and without fisheries

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