Impact of Rising Sea Surface Temperature on Length Frequency Distribution in *Gobiosoma ginsburgi* Over a 16 Year Time Period

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INTRODUCTION

Increased water temperatures affect larval growth in *Gobiosoma ginsburgi* by increased yolk sac absorption, oil globule resorption, and mouth opening development3. Stunted larval growth leads individuals struggling to grow as large and survive as long. With reduced lifespans, a species is less likely to reach spawning age and sustain a steady population growth rate. Gobies can serve a role as an indicator species for oyster reef health in warming estuaries. A negative impact on oyster reefs consequently affects local food webs. NOAA indicates an increase in the global average of sea surface temperature from 1991-2007, from 0.192F to 0.426F1. *G. ginsburgi* populates the East coast of the US, commonly from Massachusetts to Florida2. Dr. Christensen's data on the gobies' total lengths (TL in mm) (1991-2007) is used to investigate a possible observable change in TL, and if it could be attributed to rising sea temperatures due to climate change.

METHODOLOGY

Dr. Christensen's data was collected as part of a much larger effort called Bridge Netting. RUMFS has been conducting weekly larval fish sampling in a coastal estuary in NJ for 26 years using plankton nets4. This data emphasizes the importance of data collection at the larval stage to indicate early change in ecosystems. Only the data sets including *ginsburgi* gobies were used, and all data manipulations were performed in R studio. Each graph was generated post data-wrangling to investigate aspects of the research question - length frequency over the 16 years, and TL relationship to temperatures.

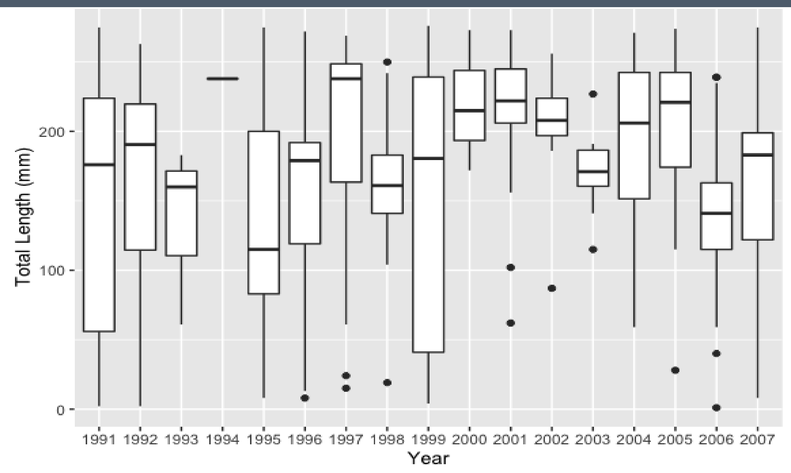

Figure 1. Distribution of TL (mm) for relative year.

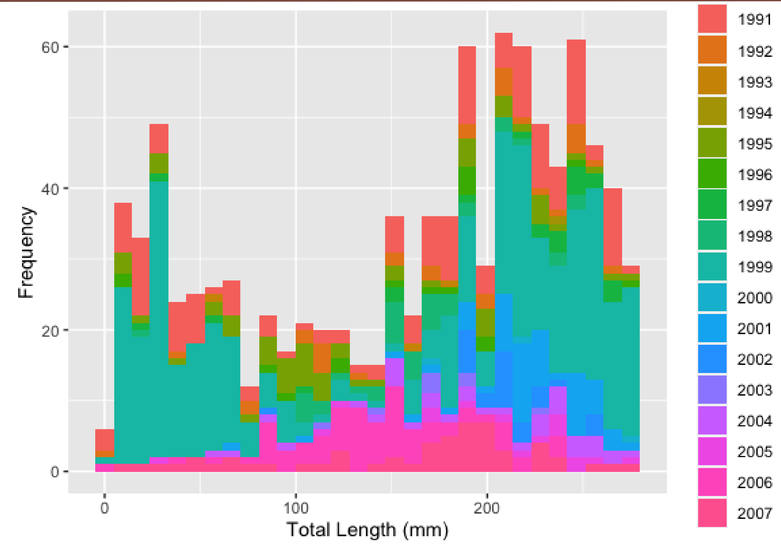

Figure 2. Frequency of TL (mm) filled by relative year.

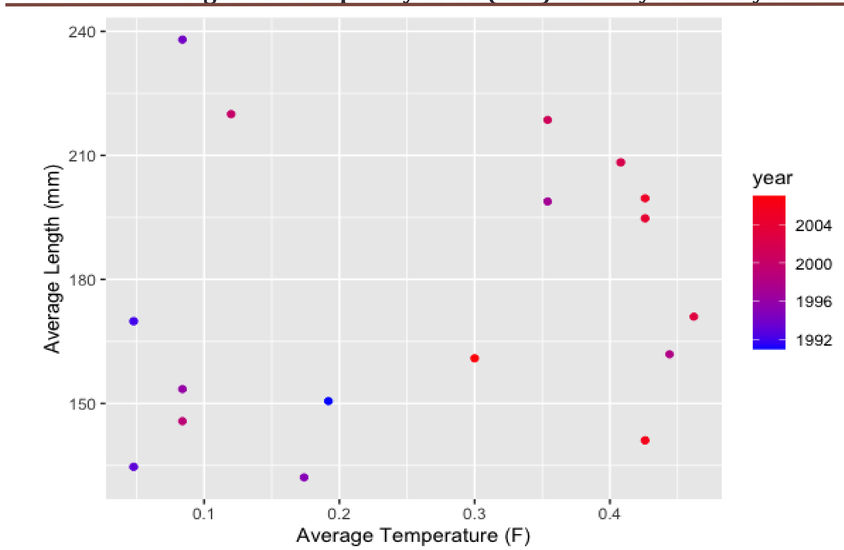

Figure 3. Yearly average TL (mm) correlation to average temperature (F).

RESULTS

Fig. 1 - Distribution of TL (mm) for each year. No distinguishable trend is seen throughout all years. After 1999, however, each individual plot decreased, signifying less versatility in Goby TL as waters warmed.

Fig. 2. - Indicates a higher frequency for gobies greater than 180 mm. The years that contained the highest frequency for gobies of that size were 1997 to 1999.

Fig. 3 - Relationship between average sea temperature (F) and average TL (mm) from 1991 - 2007. No clear trend line is found. Except for the two outliers in 1994 and 2000, the data suggests a potential switch – data after 2000 contain fish with greater TL, but warmer waters. Years prior to 2000 indicate a higher abundance for lower TL and colder waters.

DISCUSSION

No clear relationship is found between increasing sea surface temperature and total lengths of *G. ginsburgi* larvae. It is possible that water temperatures have not increased enough for developmental change to occur. Many of the effects of increased temperatures are studied for other gobies, specifically amphidromous gobies. *G. ginsburgi* are not amphidromous, therefore, we do not have sufficient information on their correlation between temperature and growth. *G. ginsburgi* can serve as a reliable indicator species for oyster reef habitat - which provide essential habitats to forage fish, invertebrates, and other shellfish.

REFERENCES AND ACKNOWLEDGMENTS

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