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## Abstract

## 1 Introduction

Focus on two time periods: full record and recent decline

Focus on two physical parameters: temperature and salinity

Temp background for TB: NOAA coastwatch trends

## 2 Methods

Seagrass changes over time in [Figure 1](#fig-seagrasschg).

Observed trends aggregated by year and bay segment across stations and months in [Figure 2](#fig-saltempraw).

The conceptual stressor diagram [Figure 3](#fig-concept).

Salinity tolerance: Ruppia > Halodule> Thalassia > Syringodium

Halodule:

* Temp: 20-30 (range, Lewis III et al. (1985))
* Salinity: grows well in most salinity ranges (Lirman and Cropper 2003), like Syringodium but more tolerant (Lewis III et al. 1985), 10-35 (range) or < 10 (S. Scolaro)

Thalassia:

* Temp: 20-30 (range, Lewis III et al. (1985), Zieman (1975)), 30-31 (upper, from SS)
* Salinity: 25 (lower, Lewis III et al. (1985)); 30, lowest at 5 (lower, Lirman and Cropper (2003)), 33-38 (range, Phillips (1960)); 24-35 (range, Zieman (1975) citing Phillips (1960)); 15 (SS)

Syringodium:

* Temp: 20-30 (range, Lewis III et al. (1985)), 29 (upper from SS)
* Salinity: 20 (lower, Lewis III et al. (1985)), 25 (lower, Lirman and Cropper (2003)); 20

Lewis III et al. (1985) review of seagrass in Tampa Bay. Lirman and Cropper (2003) conducted exposure experiments to evaluate seagrass growth in response to a range of salinity conditions. McMillan and Moseley (1967) discusses growth of halodule, syringodium, thalassia, and ruppia in response to salinity increases (up to 75 psu), no info on lower limit. Cites Phillips (1960) for a salinity range of Thalassia in Florida of 33 - 38 psu. Zieman (1975) discusses seasonal variation of thalassia relative to temp and salinity

* Get FIM, Pinellas, Manatee data

## 3 Results

For [Figure 2](#fig-saltempraw), salinity shows much higher inter-annual variability, but lower intra-year variation among stations. Trends are similar for bottom vs top, temperature shows stronger trend than salinity.

## 4 Discussion

Other areas showing seagrass loss - Florida Bay is different, less water flowing out of everglad and compounding SLR has elevated salinity and likely stress in other direction. Also, Biscayne Bay and IRL is a lot like OTB, poor flushing for example.

## Acknowledgments

## Figures

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| Figure 1: Seagrass changes over time in Tampa Bay for (a) areal coverage and (b) frequency occurrence of major species. Changes are shown for major bay segments. Note the different time scale between (a) and (b). Coverage maps in (a) began in 1988 and seagrass transect monitoring in (b) began in 1998. Red lines in (a) show approximate capacity of seagrass coverage based on the baywide target of 40,000 acres. OTB: Old Tampa Bay, HB: Hillsborough Bay, MTB: Middle Tampa Bay, LTB: Lower Tampa Bay. |

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| Figure 2: Long-term salinity and temperature trends for major bay segments from 1975 to 2022. Points are colored by sampling location in the water column. Points show the average and 95% confidence interval across all stations and sampling months for each year in each bay segment. OTB: Old Tampa Bay, HB: Hillsborough Bay, MTB: Middle Tampa Bay, LTB: Lower Tampa Bay. |

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| Figure 3: Conceptual stressor diagram |

## Tables

## References

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