The many facets of eelgrass monitoring in the Great Bay Estuary, NH

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2025 Gulf of Maine Monitoring & Research Symposium

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Piscataqua Region Estuaries Partnership

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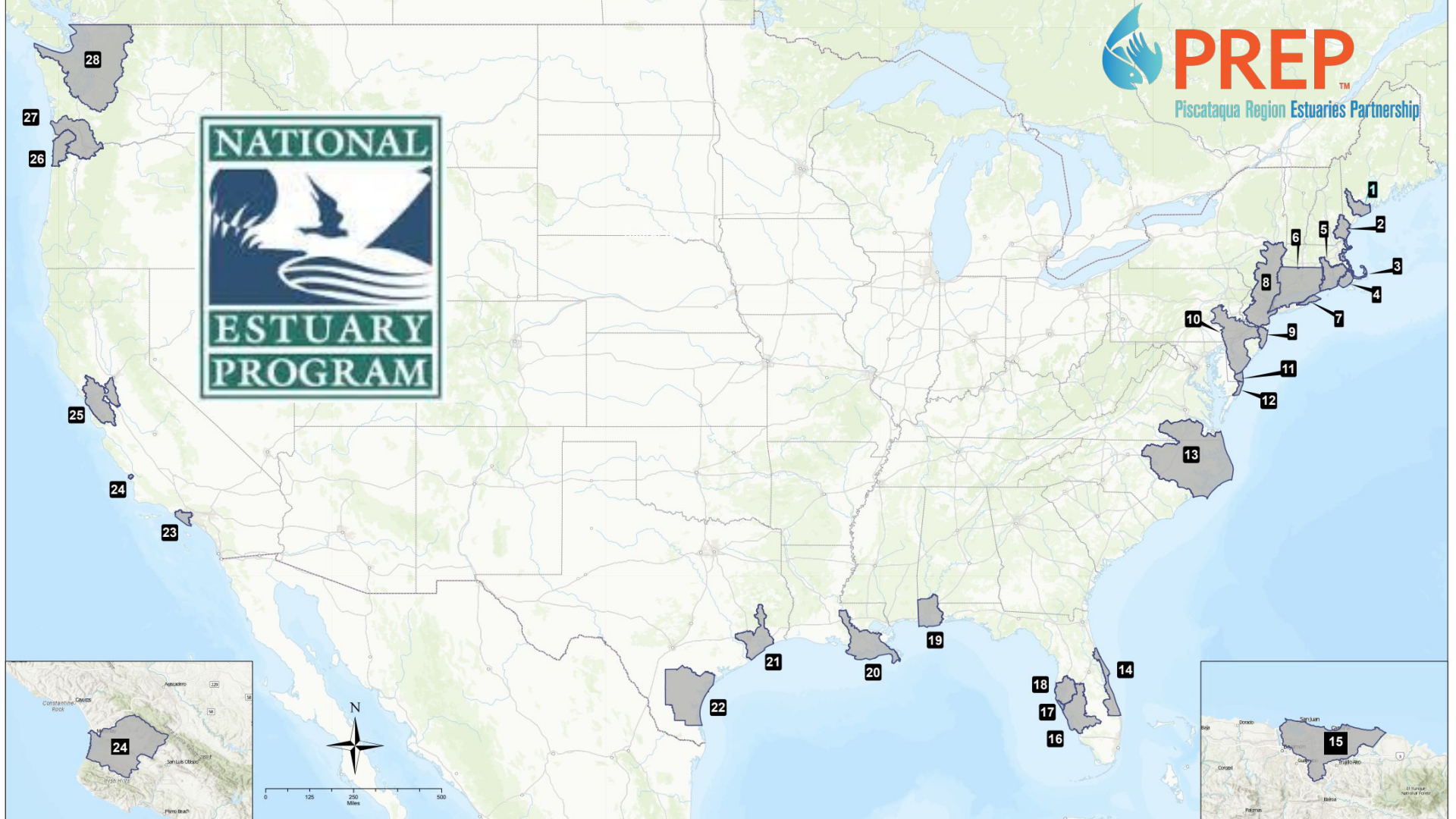
NATIONAL
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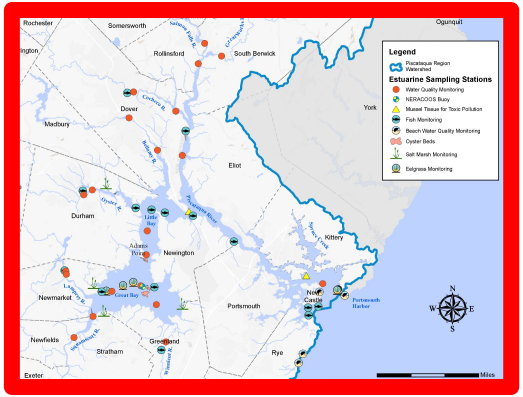
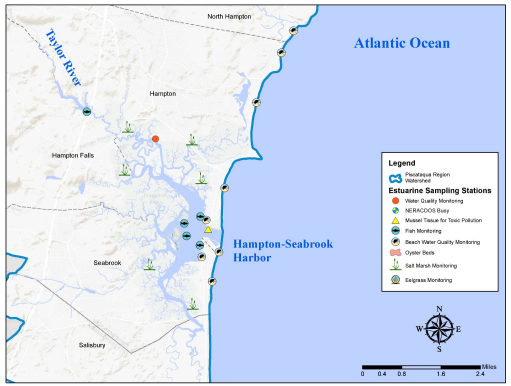
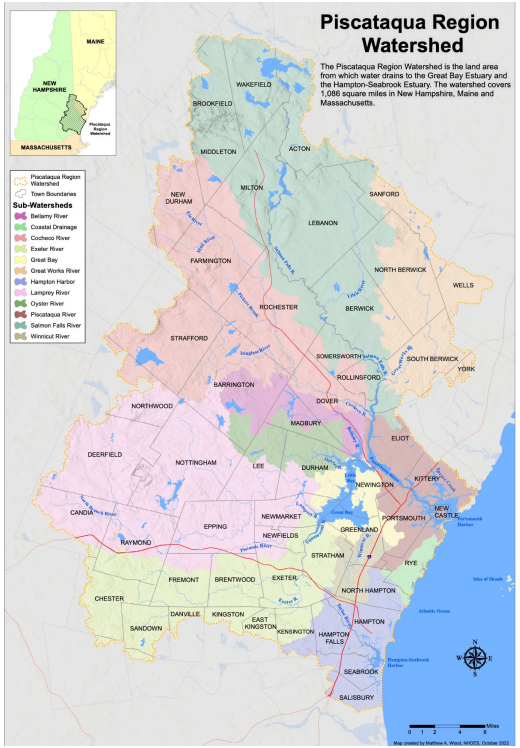
Where we work







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Why we ❤
eelgrass

Tier-1 – Aerial Monitoring

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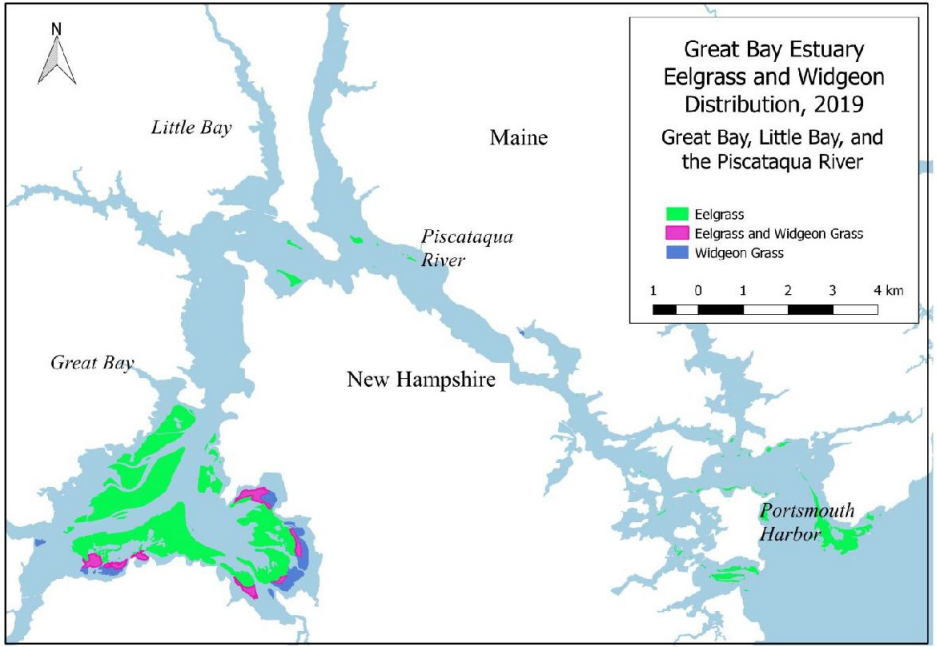
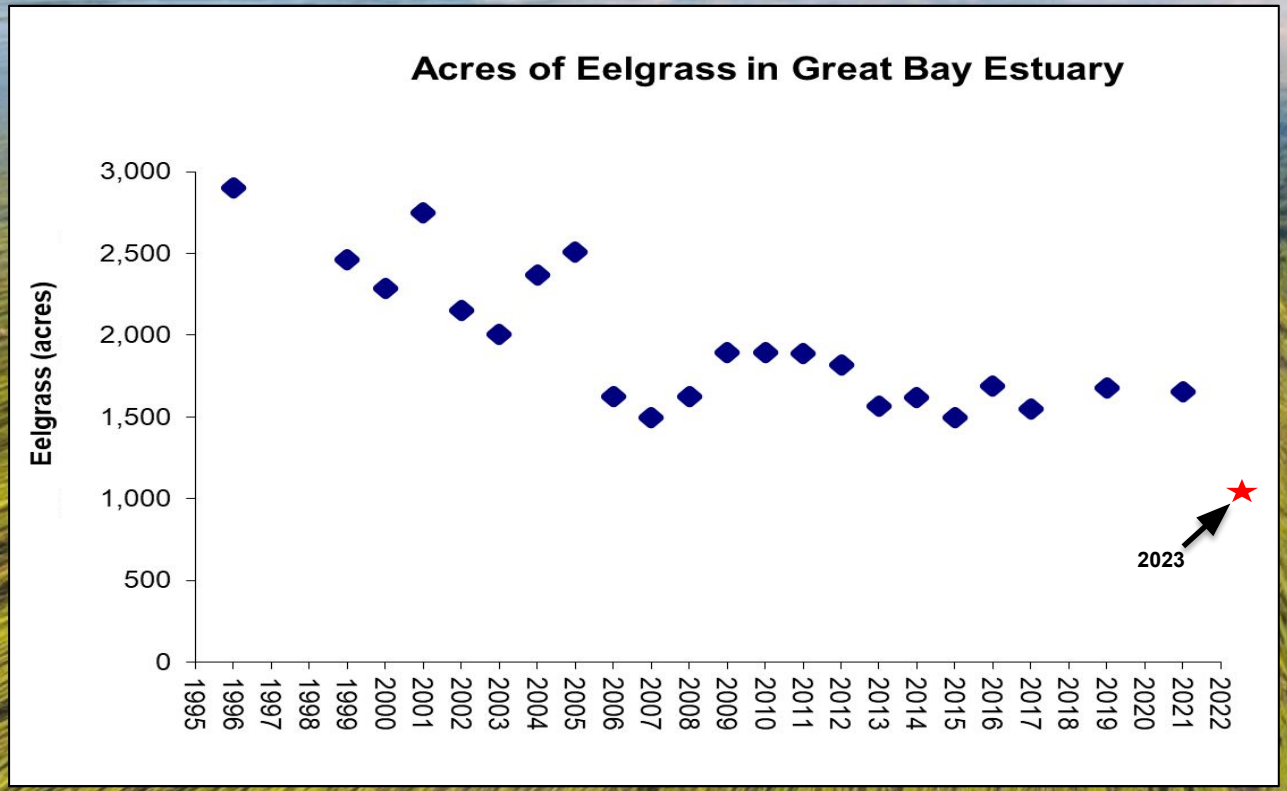
- Mid 1980's – Mapping of Great Bay proper by Dr. Fred Short (UNH)
- 1996 – Estuary-wide mapping
- 2003 – PREP funding annual flights
- 2019 – Widgeon grass mapping
- Pre-2020 – Images acquired via low-altitude aircraft
- 2021 – Imagery acquired via low-altitude drone & satellite



Barker 2020

2021: The Switch to Drone

A disturbing trend…



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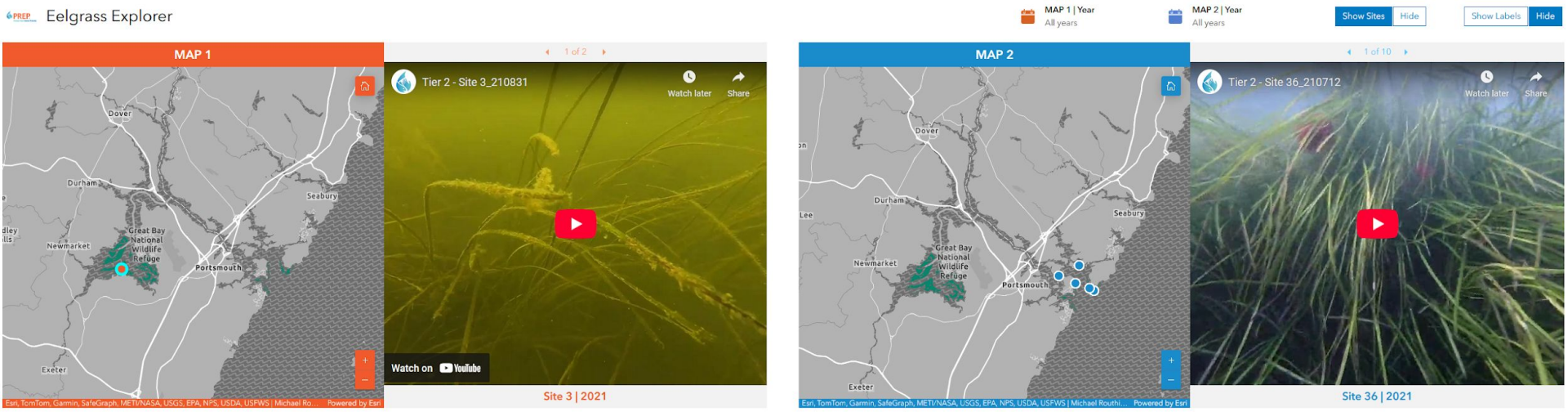
Tier-2 – In-water Eelgrass/Seaweed Monitoring

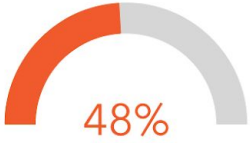
- Percent cover
- Canopy height
- Shoot density
- Biomass
- Reproductives

- Wasting disease
- Epiphytes
- C:N ratio
- Nutrient Pollution Index
- Light attenuation

- Sediment organic matter
- Sediment grain size
- Seaweed percent cover
- Seaweed canopy depth
- Seaweed biomass

New ways to share data





Coverage

Plants / m²

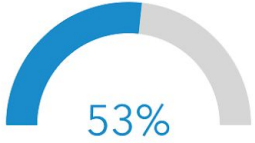
Canopy height

Above ground

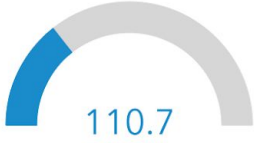
23.2

Total biomass g/m²

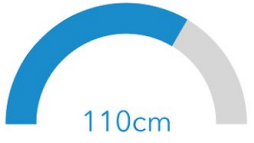
Below ground



Coverage



Plants / m²



Canopy height

Above ground

141.7

Total biomass g/m²

Below ground

Map 1 | Map 2 | Compare

Tier-3 – SeagrassNet

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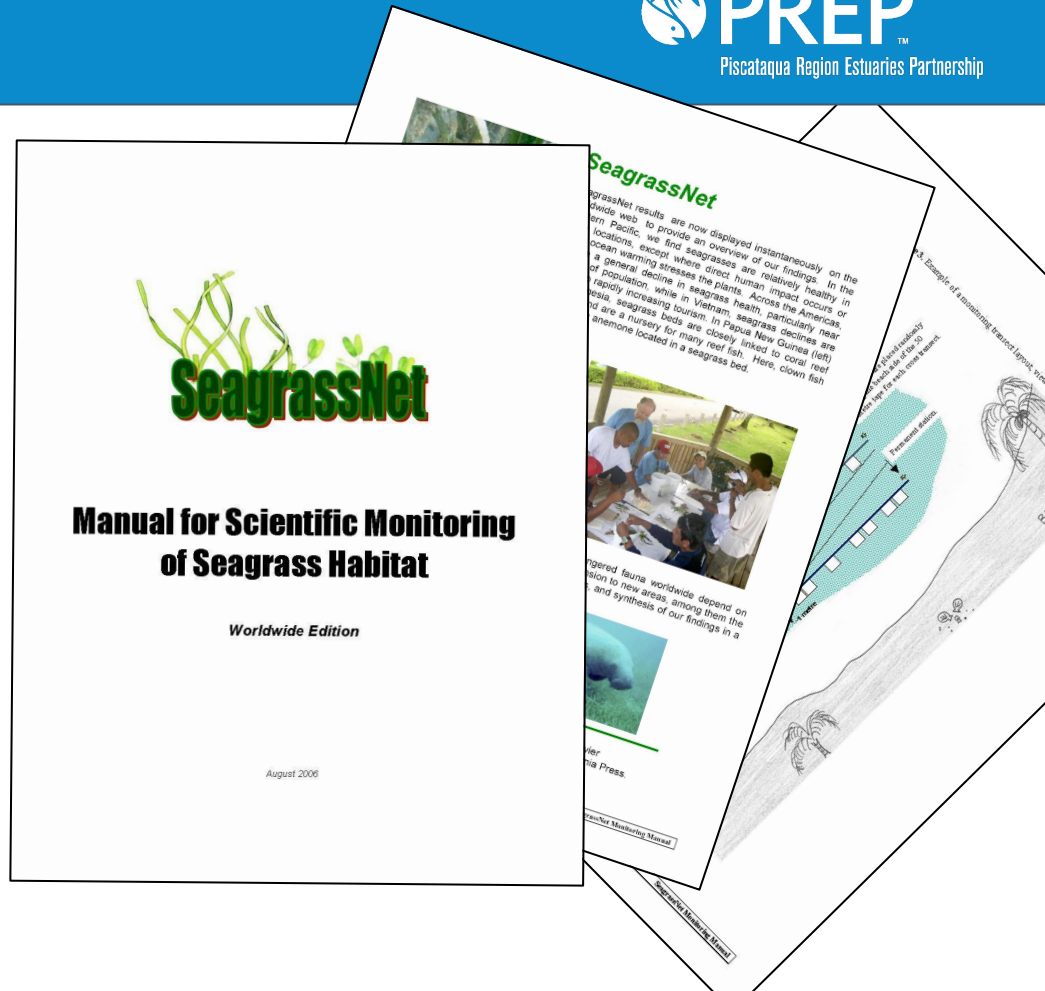
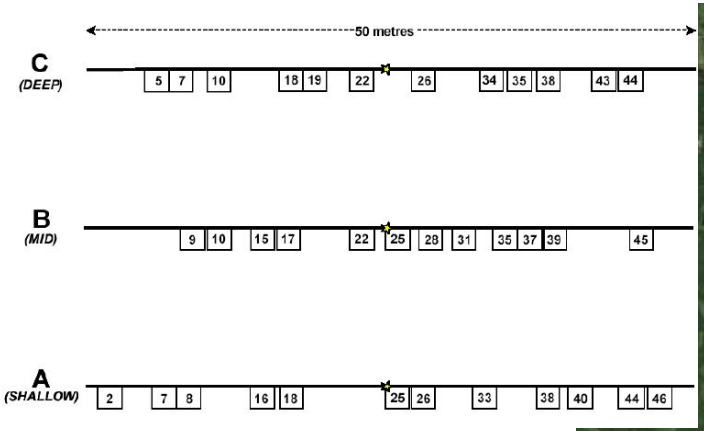
- The largest and longest-running monitoring program to document the status of seagrass resources worldwide
- Est. 2001 by Drs. Fred Short, Eva Marie Koch, & Rob Coles
- Observations in 35 countries
- Currently hosted by the Center for Coastal Studies in Provincetown, MA (seagrassnet.org)

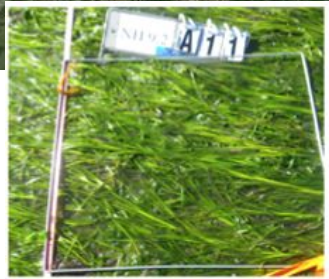


Long-term dataset



- Percent cover
- Canopy height
- Shoot density
- Biomass
- Reproductive density
- Light
- Temperature
- Salinity

- Sediment organic matter
- Sediment grain size
- Seaweed percent cover



Short 2017

Phenology Surveys

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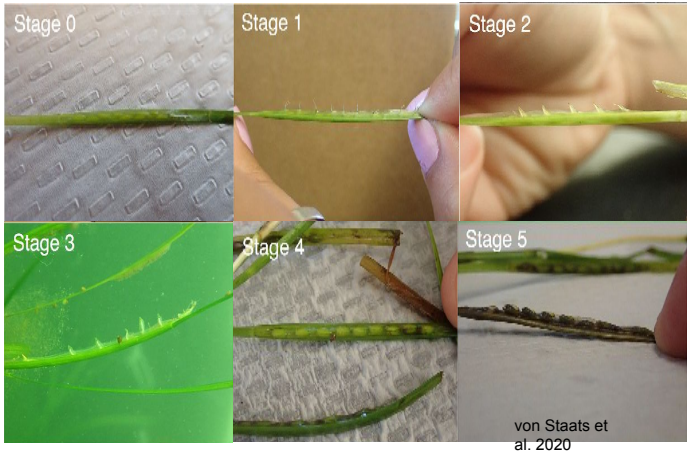
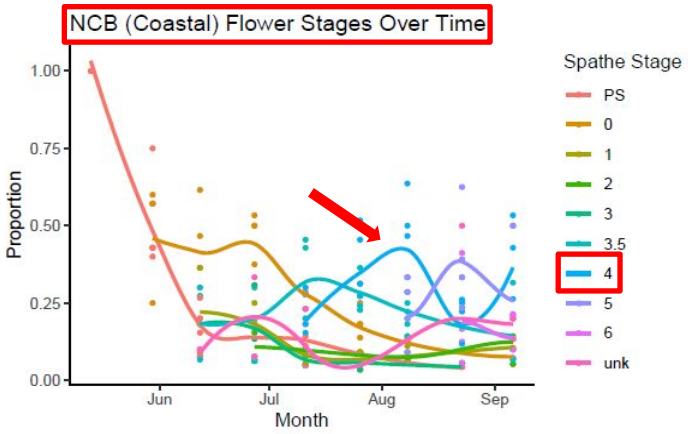
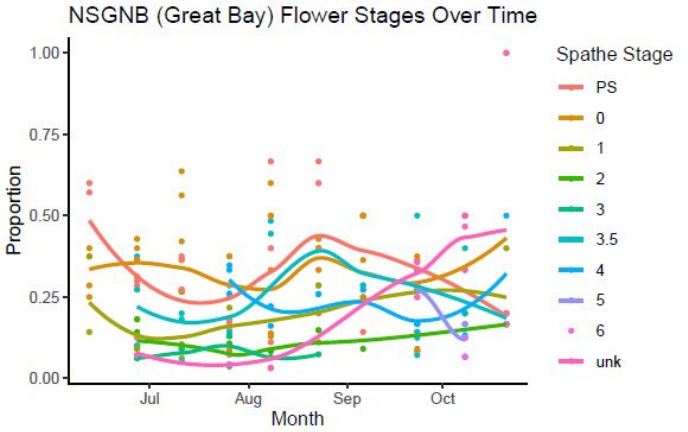


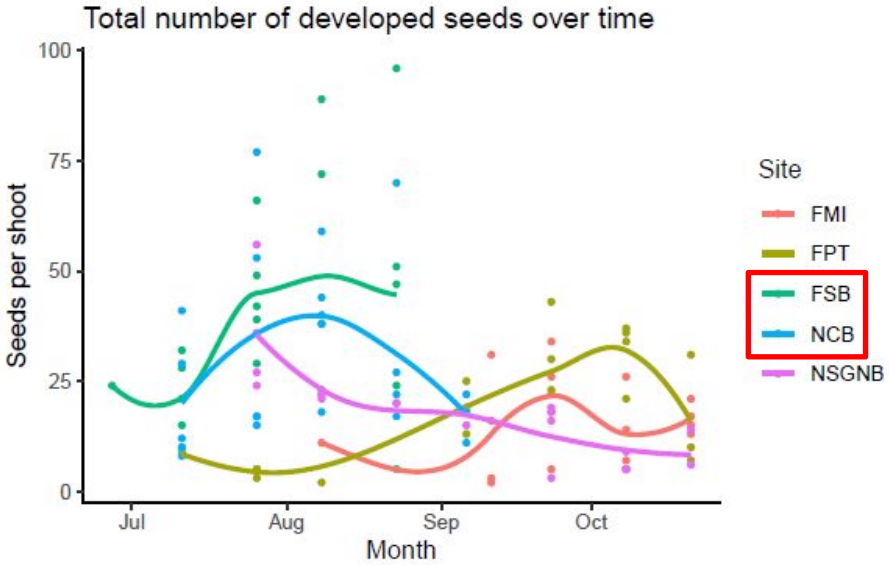
von Staats et al. 2020

- Spathe stages
- Seed counts
- Vegetative & reproductive shoot densities
- Light
- Temperature

Figuring out seeds







In a nutshell...

	Tier-1	Tier-2	Tier-3	Phenology
# of sites	Full estuary	25 sites of 4 quadrats each	2 sites of 3 transects with 12 quadrats each	5 sites
Data starting from	1986	2021	2007	2024
Sampling window	June-October	June-August *(April & October)*	July-August	May-October
Sampling frequency	1 flyover/area, more as needed	1 event/site	1 event/site	Biweekly
Parameters	Eelgrass presence/absence; widgeon grass presence/absence; acreage	Percent cover; canopy height; density; biomass; epiphytes; wasting disease; reproductive density; C:N; NPI; sediment organic matter; grain size; light attenuation; seaweed cover, canopy, & biomass	Percent cover; canopy height; density; biomass; reproductive density; light; temperature; salinity; sediment organic matter; grain size; seaweed cover	Spathe stages; seed counts; vegetative & reproductive density; light; temperature

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