



A New Approach to Seagrass Restoration in Florida: Exploring the Potential for Seed-based Restoration



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Possibility for Successful Restoration

Seagrass restoration has a long history of both active and passive approaches, with varying degrees of success but limited achievement at ecologically meaningful spatial scales. This underscores the need for innovative restoration techniques that can be applied effectively at large scales and yield higher success rates. Historically, restoration efforts have aimed to reestablish the climax community; however, increasing evidence highlights the importance of considering species’ life history traits and successional dynamics in meadow recovery. This perspective suggests that restoration efforts may benefit from aligning with the natural successional trajectory of seagrass communities. In tropical systems, these principles position *Syringodium filiforme* as a promising candidate for large-scale restoration initiatives

			
Life History Characteristic	<i>Halodule</i>	<i>Syringodium</i>	<i>Thalassia</i>
Relative Light Requirement	Low	Low	High
Tolerance to disturbance	High	High	Low
Relative Growth Rates	High	High	Low
Seed production	High	High	Low
Seed dormancy	?	?	None
Seed size	Poppy seed	Sunflower seed	Chickpea
Clonal growth rate	High	High	Low
Branching frequency (ability to fill space)	High	High	Low
Role in succession	Early	Early	Late
Habitat value	High	High	High

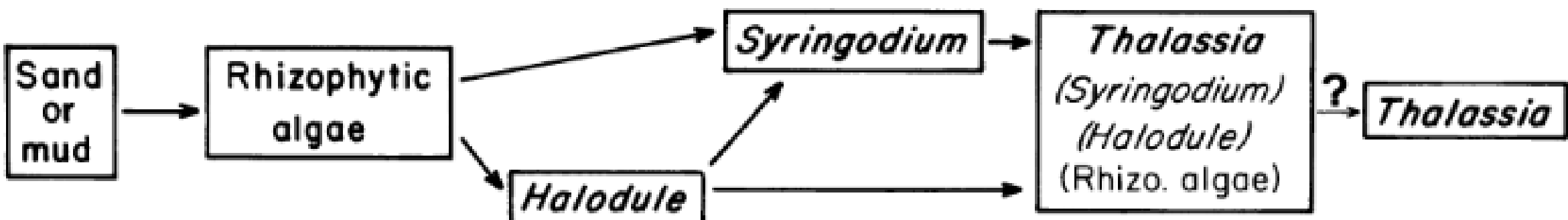
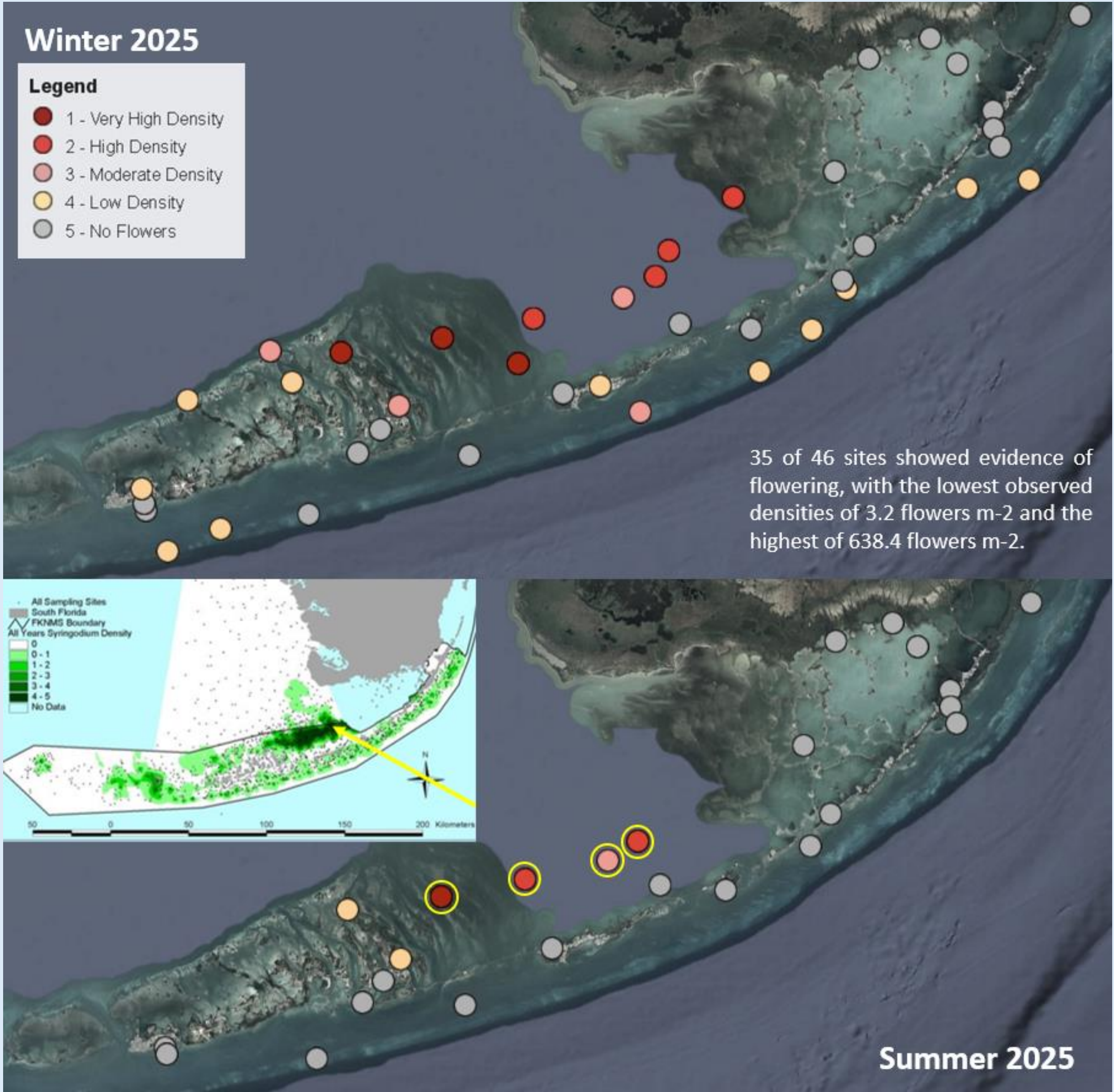
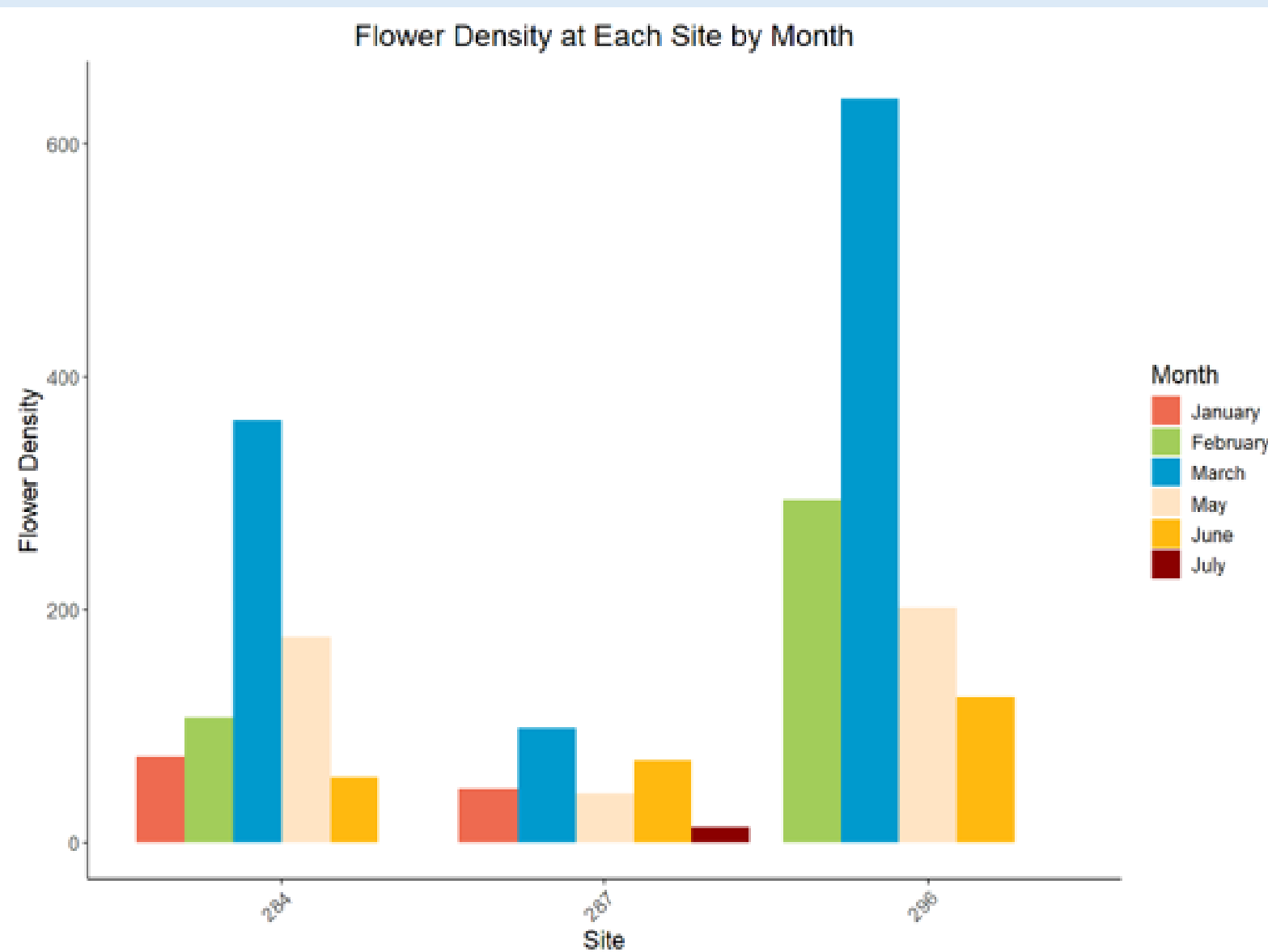


Fig. 11. A revision of den Hartog’s successional scheme leading to a *Thalassia testudinum* association in Caribbean subtidal seagrass beds. Bold lettering indicates relative dominance. Question mark indicates that the assumed terminal *Thalassia* monoculture has not been verified.



Phenology Surveys

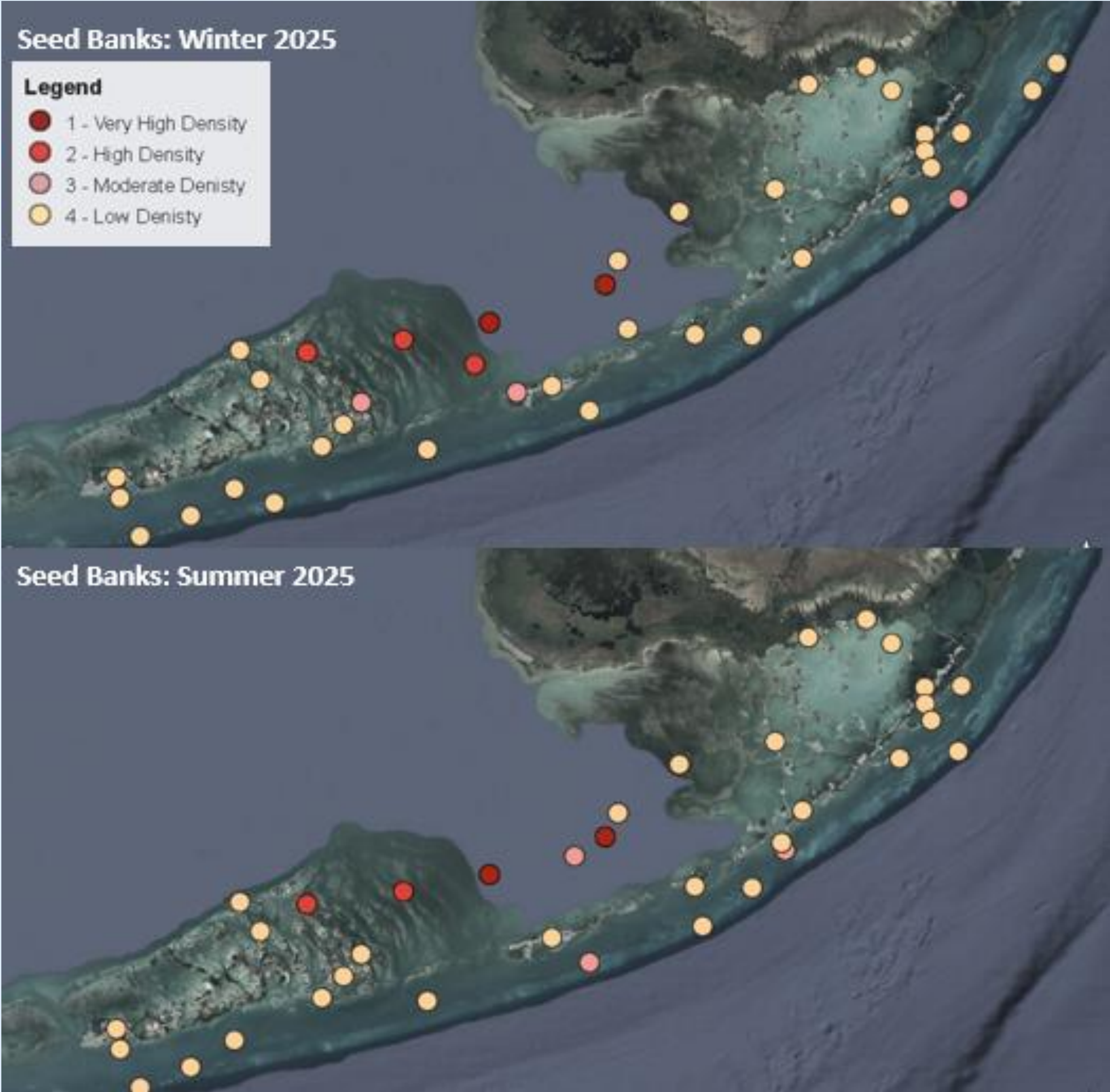
- Here are all sites *S. filiforme* abundance and flowering intensity of the seagrass was reporting period.
- Sites 284, 287 and 296 (highlighted yellow) are our monthly monitoring sites. All others were sampled only once in the monitoring period.
- Flowering was recorded throughout the Florida Keys and was **most intense in the Bay** and was positively correlated with *S. filiforme* shoot density (as indicated by heat map).



- All flowering sites were female-biased with one having a balanced proportion of male and female shoots. This is a direct comparison to the observations during the winter sampling period, where most of the location presented has being male-biased

Seed Bank Surveys

- Core samples were successfully taken from 38 sites, 17 showed evidence of a *S. filiforme* seed bank.
- The lowest and highest observed **densities were 14.1m-2 seeds and 1938.2 m-2**, respectively.
- Sites on the bay side of the Florida Keys were found to have the highest observed densities .
- Assessment of individual core samples shows that while the total amount of seeds found per site may be high, the proportion **of potentially viable seeds is markedly lower** across all sites.
- There does appear to be a strong, positive correlation between higher overall seed densities and potentially viable seed densities. Additionally, the densities of both intact and potentially viable seeds in notably higher during the winter than the summer.

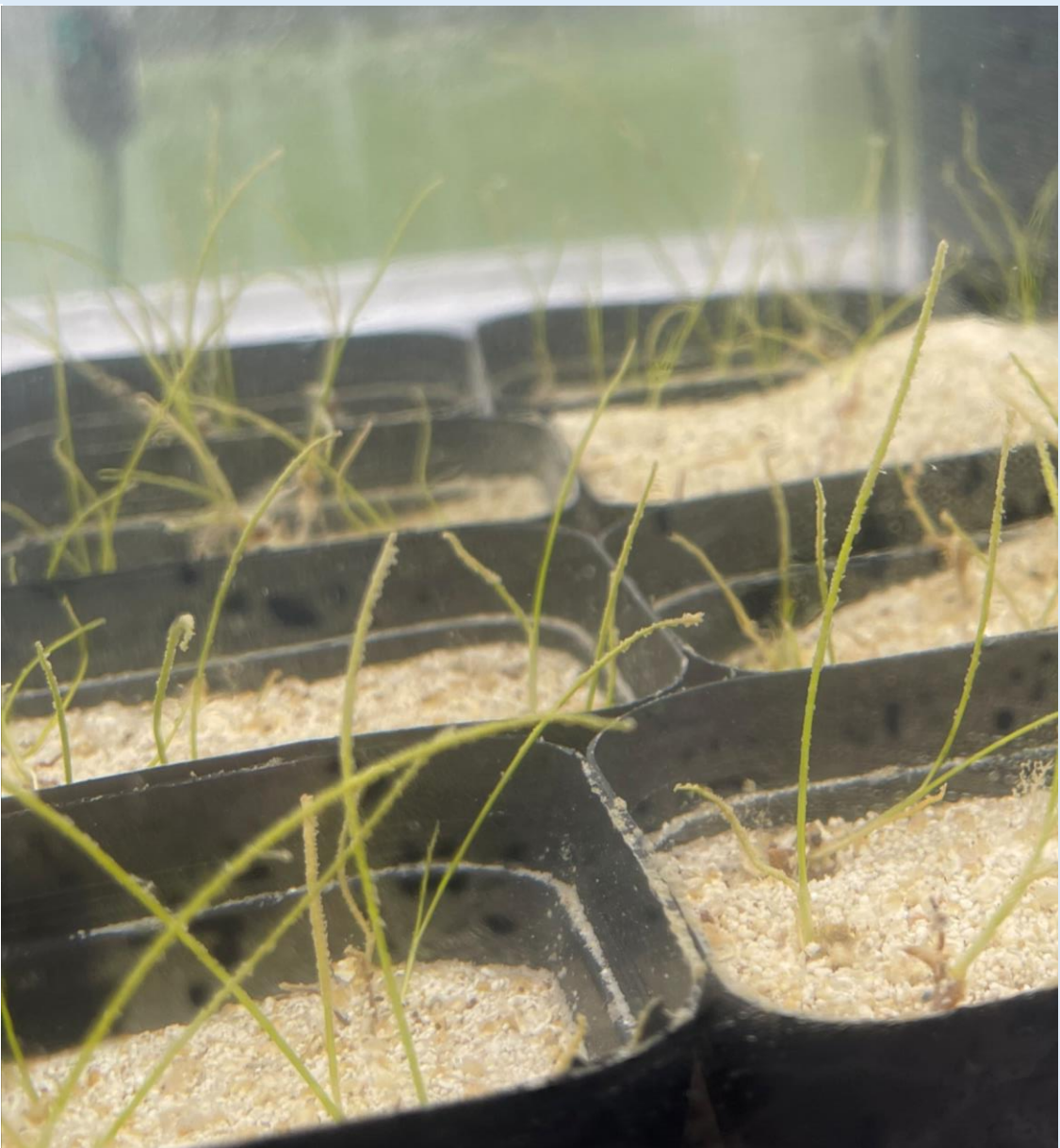
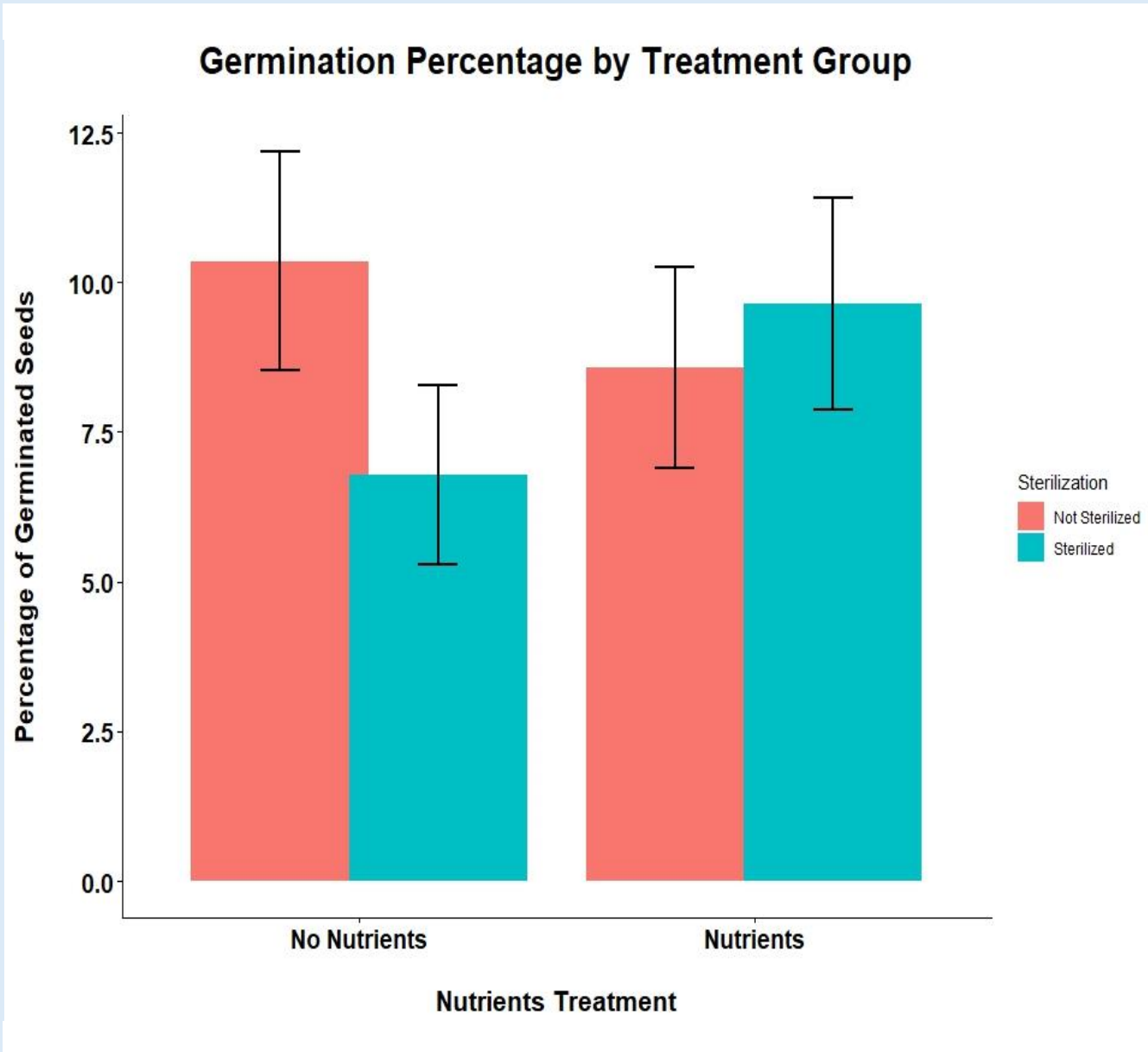


Experimental Works

This experiment will incorporate a preliminary and secondary growth experiment that will observe the effects of the following variables on rates of seed germination:

- Light, salinity and Temperature
- Sediment grain size and burial depth
- Adult plant presence and density of seeds planted.

Over the summer of 2025, we have carried out a pilot study of this germination experiment that looked at nutrient addition and sterilization after further research into the potential for these two factors to also be influential on rates of germination. A fully factorial design included 168 pots with 5 seeds per pot. The results of **this showed a 10% germination rate** but no significance between the two treatments.



Next steps:

- Test for viability of the seeds found in the soil in south Florida seagrass meadows
- Further quantify phenology and seed production in south Florida
- Controlled experiments on seed storage techniques, measure the impact of storage on viability
- Controlled experiments of single-factor and interactive effects on potential cues for germination
- Working with Ulysses on field tests of experimental seed planting using robots.

Acknowledgements

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