



2025 Annual Seagrass Monitoring Report

Sebastian Inlet District

January 9, 2026

114 Sixth Avenue, Indialantic, FL 32903

SEBASTIAN INLET SEAGRASS MONITORING PROGRAM



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1. Introduction

In August 2007 the Sebastian Inlet District (SID) completed the construction of a navigation channel connecting Sebastian Inlet from Channel Markers No.18 and 19 westward to the Intracoastal Waterway (ICW). The purpose of this 3,120-ft long, 10.7-acre (5:1 side slope; -9 ft NGVD) channel extension was to provide the growing maritime community with a safe, clearly designated passage to/from the Atlantic Ocean as a matter of public safety and for the future protection of associated aquatic resources. To offset impacts to 3.08 acres of seagrass habitat and 7.62 acres of non-vegetated soft bottom, and pursuant with the U.S. Army Corps of Engineers (USACE) and the Florida Department of Environmental Protection (FDEP) permits SAJ-2002-7868 (IP-TSD) and 05-264486-001, issued March of 2007, the permittee, the SID, provided the following over the course of a five-year (2008-2012) seagrass mitigation and monitoring program (PBS&J 2011, Atkins 2012, Atkins 2013):

- 1) The recovery of 459 seagrass planting units (179 *Halodule wrightii*; 279 *Syringodium filiforme*; 1 *Halophila johnsonii*; see **Figure 1-1** for reference photos) from the proposed channel alignment and subsequent planting of 41 propeller scars (hereafter, “prop scars”), filling an estimated 366.95 m of linear damage.
- 2) The balance of financial support needed to install the Indian River County Main Relief Canal Pollution Control Structure, estimated at \$750,000.00. The structure came online in July 2008.
- 3) The establishment and/or monitoring of the St. Johns River Water Management District (SJRWMD) fixed seagrass transect No. 51, plus 9 additional transects in the vicinity of the Main Relief Canal Outfall (Vero Beach, Florida). The monitoring protocol and periodicity followed those previously established and utilized by the SJRWMD. Three baseline monitoring events and eight post-activation monitoring events occurred from May 2007- August 2012.
- 4) The placement of “Caution, Shallow Water, Seagrass Area” signs clearly delineating 145 acres of the flood tidal shoal as seagrass habitat, protecting an initially estimated 110.26 acres (2007) of mixed meadow seagrasses. The most recent (2024) estimates place this area of live seagrass habitat at approximately 115 acres.
- 5) The quantification of seagrass coverage within the six designated protected areas (“A” thru “F”) using low-level, high resolution, digital orthophotography.
- 6) A complete inventory and tracking of annual changes to anthropogenic damage within the protected areas.
- 7) The successful deployment of 2,031 Sediment Tubes® into 32 previously identified propeller-related scars, including 22 significant “blow-out” features. Work was conducted in partnership with Seagrass Recovery, Inc.

The five-year monitoring program associated with the Sebastian Inlet navigation channel was completed in 2012 (Atkins 2013). However, the SID completed the Sebastian Inlet channel realignment project (FDEP Permit No. 05-264486-005-EM) from May 2012 to July 2012, which corrected the severe angle of the channel west of the shoal by widening the turn. The widening resulted in additional seagrass impacts which were included in the available mitigation from the original channel construction project. The widening project

resulted in the continuation of an abbreviated version of the seagrass monitoring program (Atkins 2014). As part of this abbreviated monitoring program, the SID continued to quantify seagrass coverage (#5 above) and inventory and tracked anthropogenic damage (#6 above) within the protected areas on the flood tidal shoal over a period of three years (terminating in 2015) (Atkins 2014, 2015, 2016). The SID contracted Atkins (AtkinsRéalisis after 2023) to continue the abbreviated seagrass monitoring program in 2016, 2017, 2018, 2019, 2020, and 2021 with a focus on the quantification of seagrass coverage within the protected areas of the flood tidal shoal (Atkins 2017, Atkins 2018, Atkins 2019a, Atkins 2019b, Atkins 2021, Atkins 2022). During the lead-up to the 2022 seagrass monitoring event, Atkins and SID discussed improvements to the monitoring plan. Shortly before the 2012 realignment, the Indian River Lagoon (IRL) experienced a severe harmful algal bloom and subsequent seagrass die-off which drastically reduced coverage within the monitored protected areas. While the abbreviated monitoring plan has tracked the quantitative area of seagrass regrowth and provided some qualitative data on species composition, little data has been collected on seagrass density. This has become an acute issue since 2021, when the Florida Fish and Wildlife Conservation Commission (FFWCC) declared a statewide Unusual Mortality Event (UME) for the Florida manatee (*Trichechus manatus latirostris*), which has been most severe in the IRL (FFWCC 2026). As such, it was agreed that beginning with the 2022 seagrass monitoring event, work would focus effort on obtaining species composition and density data across the six protected shoals. Conversely, changes were made to the collection of data on anthropogenic damage within the protected areas as since 2012 field verification of scars has been limited due to the changes in seagrass density and composition.

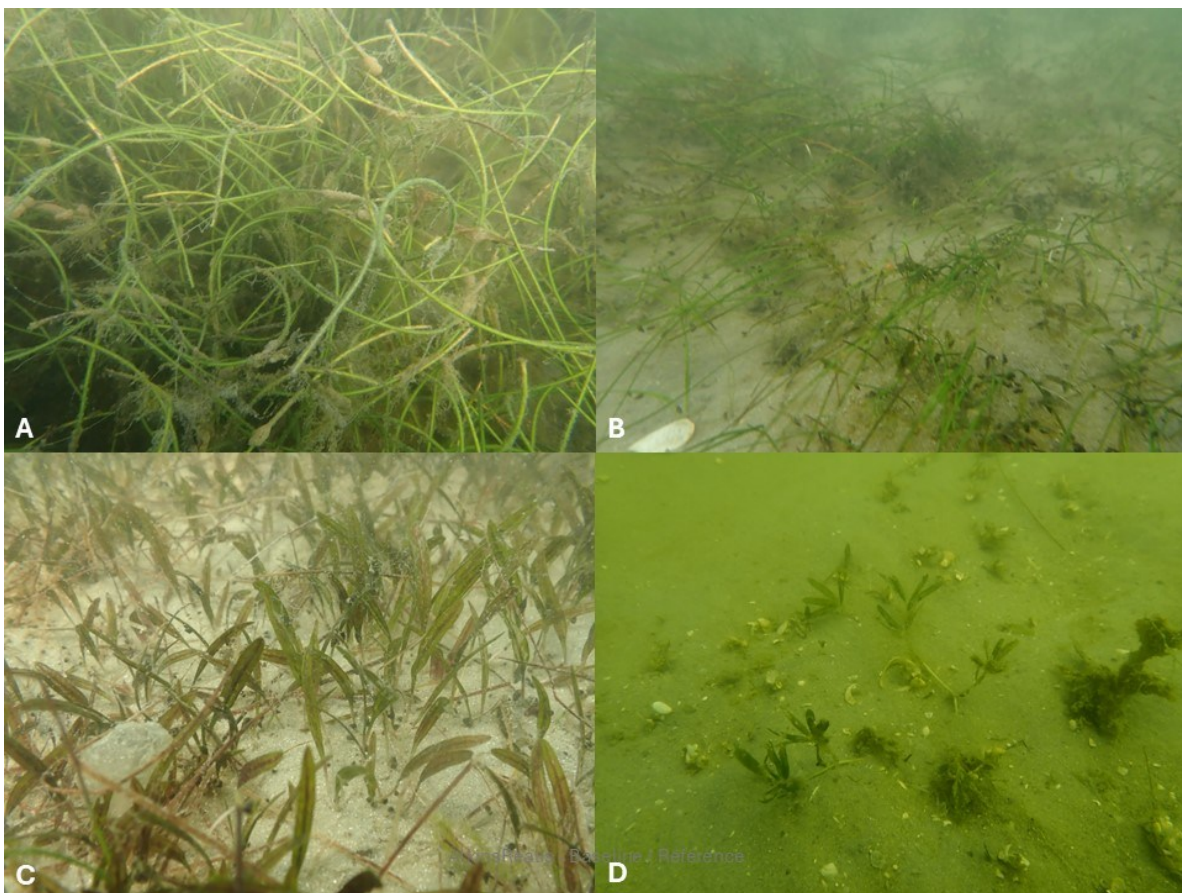


Figure 1-1 – Sebastian Inlet seagrass species: A) *Syringodium filiforme*, B) *Halodule wrightii*, C) *Halophila johnsonii*, and D) *Halophila engelmannii*.

2. Aerial Image Analysis

2.1 Objectives

To assess changes in the submerged aquatic resources within the protected areas or mitigation zone, a Geographic Information System (GIS)-based approach using low-level, digital aerial photography was implemented in June 2007 and has continued annually thereafter. Since 2022, aerial image analysis has had four primary objectives:

- 1) To quantify the aerial extent of existing seagrasses within the mitigation zone,
- 2) To assess changes to the spatial distribution and aerial extent of seagrass,
- 3) To identify visible anthropogenic impacts (i.e., prop scarring) within the mitigation zone, and
- 4) To field verify (hereafter referred to as “groundtruthing”) the validity of observations made remotely (see Section 3.2).

GPI Geospatial, Inc. (previously Aerial Cartographics of America, Inc.) was selected to supply low-altitude, high-resolution, color imagery for the 500-acre region of the shoal in order to update the groundtruthed 2024 seagrass extent (**Figure 2-1**). Unfortunately, during the 2025 assessment period suitable aerals were not obtained due to a combination of technical issues and unsuitable weather conditions. As such, the contingency monitoring plan adopted after September 1, 2025 and executed September 8-12, 2025 had two primary objectives:

- 1) Investigate areas of frequent year-to-year change to for expansion or recession of seagrass,
- 2) Collect representative seagrass coverage and species data across all six monitoring zones.

From previous years, Zone A, the central portion of Zone C, the eastern and central portions of Zone D, and the north portion of Zone E were identified as areas with high year-to-year variability in seagrass coverage (**Figure 2-2**). In order to provide species and coverage data, 180 sampling points were placed within seagrass polygons finalized after the 2024 monitoring event, with an additional seven points added to Zone D from the channel edge seagrass transects (see Section 5), for a total of 187. A total of 23 out of the 187 sampling points were distributed outside of the mapped 2024 seagrass extent to cover potential areas of expansion where seagrass has existed previously. The purpose of the sampling points was to eliminate a potential issue with using the uncertainty point and polyline features to record species presence as in previous monitoring events; typically, seagrass density was not recorded at these locations and their primary function (resolution of indistinct aerial signatures) skewed the distribution towards sparser areas within the shoals.

Efforts to delineate scars in recent years have been hampered by the typically sparse seagrass density; additionally, the dominant species present (*Halodule wrightii* and *Halophila johnsonii*) regrow relatively rapidly after a disturbance. As such, this element has been de-emphasized in recent years; in any case the lack of high-resolution aerals in 2025 prevented any delineation and verification of prop scars.

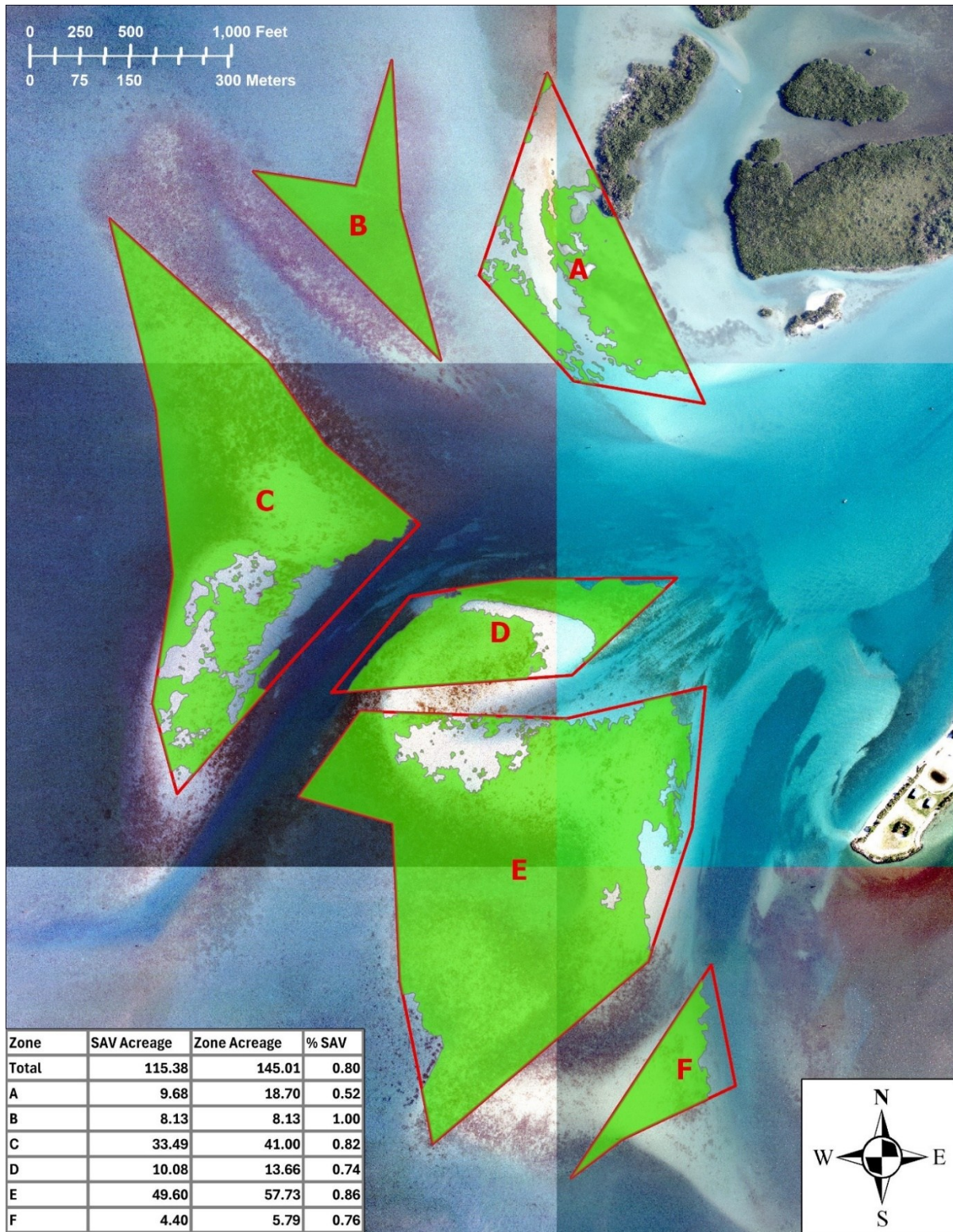


Figure 2-1 – ESRI feature class depicting the groundtruthed extent of seagrass within the mitigation zone in 2024. The associated table summarizes area and percent coverage of seagrass by zone.

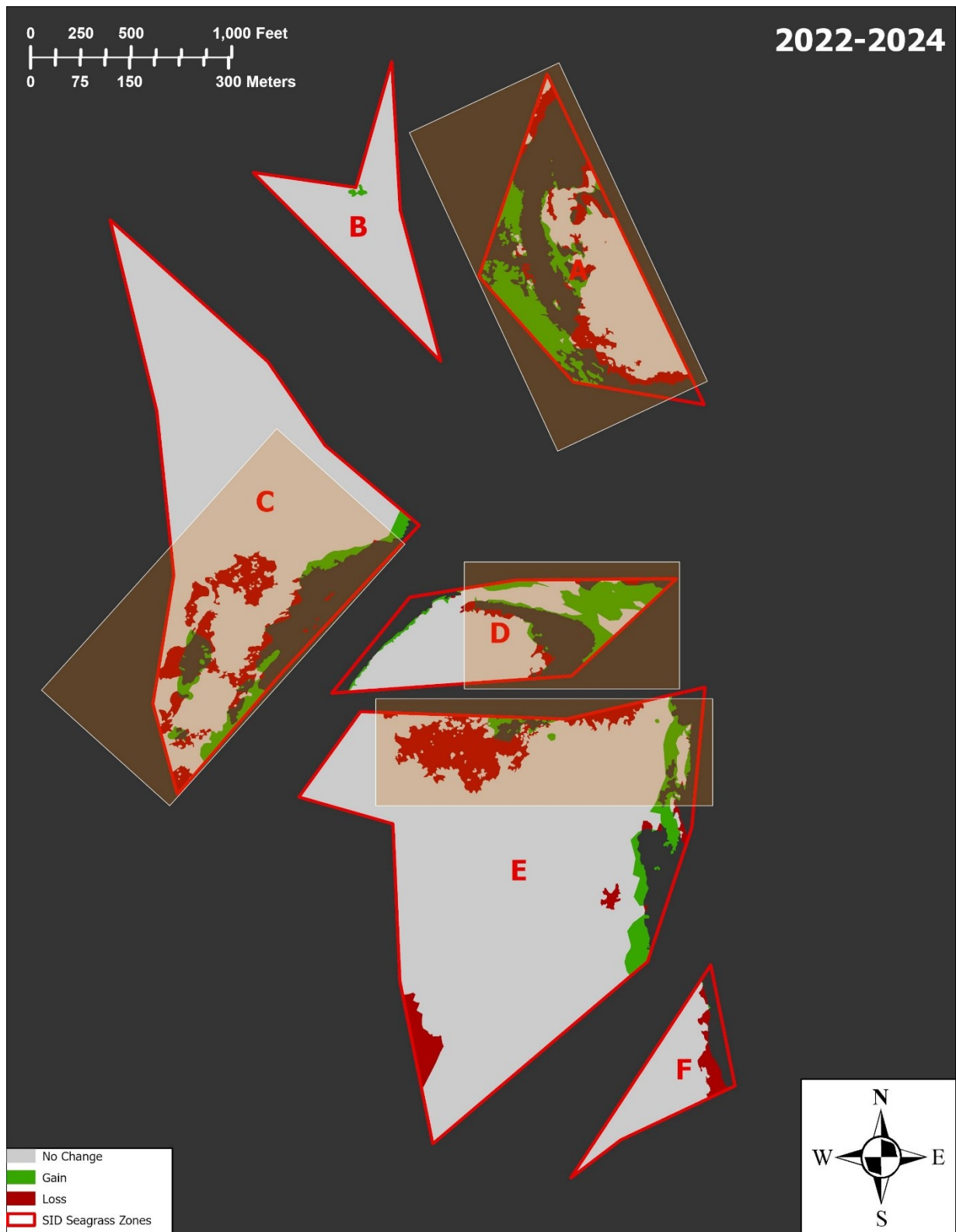


Figure 2-2 – Spatial distribution of inter-year change in seagrass coverage within the mitigation boundaries, 2022 to 2024. Areas of frequent year-to-year change highlighted.

3. Groundtruthing/Field Verification

3.1 Objectives

Any attempt to characterize benthic composition from high-resolution aerial imagery presents a suite of technical challenges, including changing optical properties of water with depth and water density, variations in water constituents across the spatial extent of an image (e.g., tannins), reflections caused by an imperfect water surface, discolored sediment, and shadows from taller features. These issues are exacerbated at the Inlet by the confluence of two distinctly different water bodies (i.e., sometimes lower salinity, tannin-rich lagoon water and more saline, comparatively clearer, but at times sand/silt containing, nearshore Atlantic Ocean water), creating a heterogeneous mixture of optical properties over a range of depths. Since 2012, aerial interpretation has also been complicated by the large-scale changes in seagrass composition and density on the shoals; sparse distributions of smaller seagrasses such as *Halodule wrightii* and *Halophila johnsonii* are extremely difficult to distinguish from bare sand and the visual signature of these areas may be from other associated material (e.g. drift algae, cyanobacteria, snail eggs) caught in the blades.

After multiple aerial imaging windows failed to produce usable conditions, the 2025 monitoring event was mostly conducted from September 8-12, 2025 (some preliminary work on Zones A and D was conducted on July 11 and August 4). The sampling of the shoal was guided by a Trimble R1 or EOS Arrow 100 handheld DGPS unit, interfacing with an iPad Mini Generation 6 handheld tablet running ESRI Field Maps.

The objectives of the 2025 groundtruthing event were to:

- 1) Collect species and overall percent cover data at designated sampling points,
- 2) Collect seagrass data in areas of frequent year-to-year change, and
- 3) Obtain adjacent seagrass species data for each position visited.

3.2 Methods

A particular challenge during the post-bloom recovery has been gathering qualitative and quantitative data on seagrass composition on the shoals. In previous years, seagrass species composition (but not density) has been recorded at all GPS point, line, and polygon features collected in the field. The problem is that as part of the groundtruthing process, these locations tend to be concentrated in areas where the visual signature of seagrass is not evident or unclear in aerial images, creating an uneven sampling distribution. Even the addition of random sampling points across the shoals, which were used in the 2020 and 2021 monitoring events, tended to be “washed out” by the number of points recorded when verifying uncertain visual signatures or delineating seagrass beds in the field. As a result, while the previous dataset does provide some useful qualitative data on seagrass species distribution across the shoals, there is little to no quantitative data on seagrass density and the quantitative species abundance data in some years is skewed. Zone A in particular can be difficult to delineate from aerial images and large numbers of groundtruth points tend to be clustered on this shoal. In 2022 a total of 126 points were spaced out across the shoals (Atkins 2023); in 2023 (a year in which aials were not flown and field validation was delayed until October) this count was increased to 302 to compensate for the inability to assess gains and losses in seagrass acreage (AtkinsRéalais 2024a). In 2024, this count was increased to 346, 35 of which were associated with pre-construction monitoring transects along the channel (AtkinsRéalais 2024b).

As seagrass acreage has been relatively stable over the past five years, better field conditions as compared to the October 2023 effort allowed for some in-field mapping of seagrass beds, and the end of seagrass growing season was approaching, the contingency monitoring plan adopted after September 1, 2025 included fewer sampling points than the 2023 and 2024 groundtruthing events. Seagrass percent cover data (both overall and by species) was collected at 187 sampling points on the shoals, with 157 of these being distributed to capture representative data across the previously established 2024 seagrass limits (**Figure 3-1**), 23 being placed in areas where seagrass was historically present outside the 2024 seagrass limits, and seven associated with channel seagrass transects 15 and 17 (see Section 5). Within the sampling points, seagrass coverage would be quantified as a whole and by species within a 1 meter by 1 meter area using Braun-Blanquet scoring (**Table 3-1**). This allowed for a rapid assessment of total and species-specific seagrass coverage at each point.

Table 3-1 – Braun-Blanquet Scoring Definitions

Braun-Blanquet Score	Coverage
0	No seagrass present
0.1	Single shoot present
0.5	2-5 shoots present, < 1% cover
1	> 5 shoots present, < 1% cover
2	5-25% cover
3	25-50% cover
4	50-75% cover
5	75-100% cover

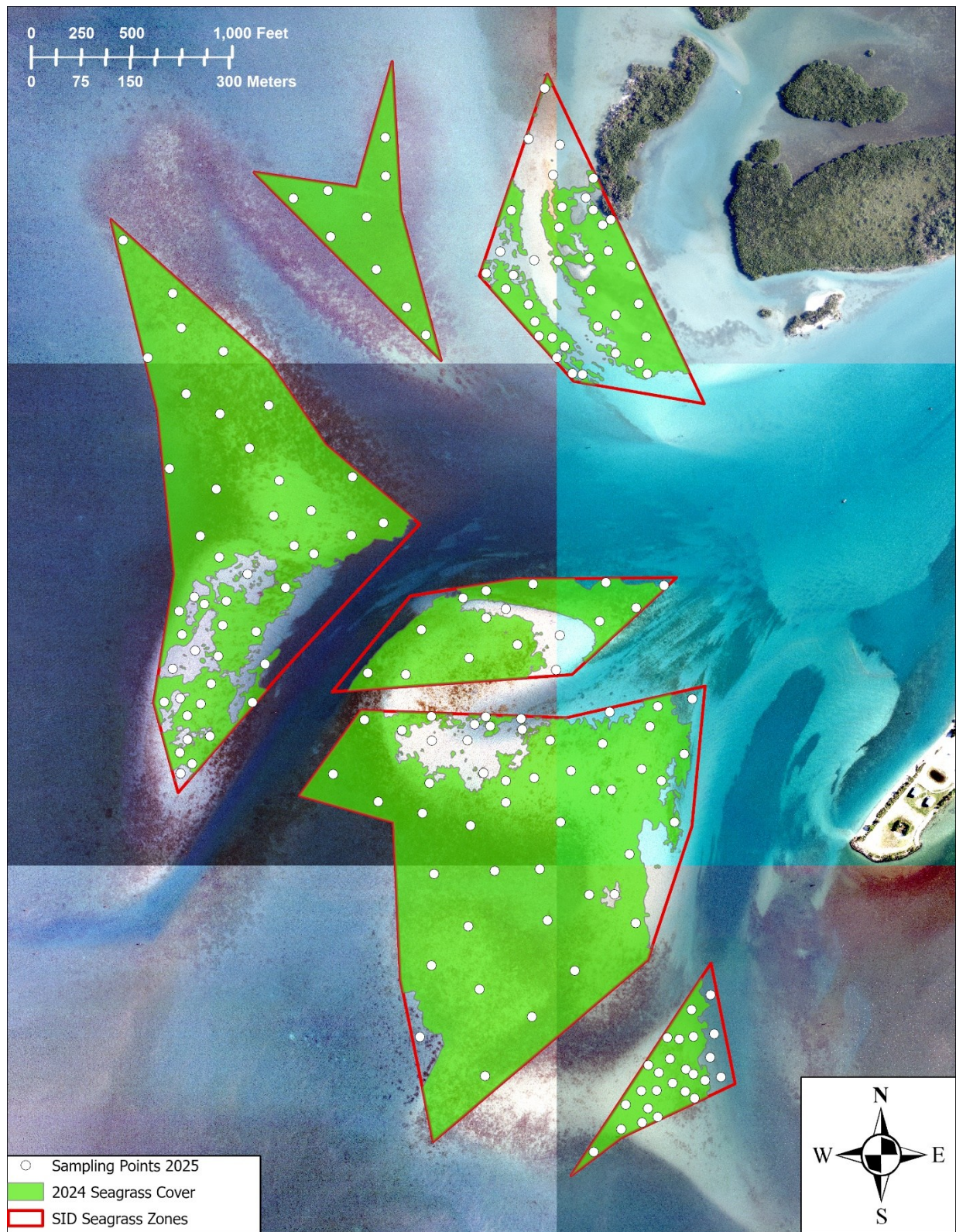


Figure 3-1 – 2024 groundtruthed seagrass cover and 2025 quadrat points.

3.3 Results

All positions identified during the image analysis and verified in the field to contain seagrass (159 out of 187 sampling points) were sampled for benthic composition. While in previous years seagrass species composition would be analyzed using the total number of visited features, this approach can skew the dataset. Groundtruthing question points (including points collected as part of the field mapping effort) and transects are more likely to be placed at the edges of seagrass beds, in areas where seagrass cover is sparse, and/or in areas dominated by diminutive species, causing disproportionate oversampling of these areas.

Of the 187 sampling points, 159 (85.03%) contained seagrass (Figure 3-2). Species-specific data revealed that ~64.15% of the sites that contained seagrass were monospecific patches of seagrass, including *Halodule wrightii* (51.57%), *Syringodium filiforme* (3.14%), *Halophila johnsonii* (7.55%), and *Halophila engelmannii* (1.89%). The remaining ~35.85% consisted of species combinations, including *Halodule wrightii*/*Halophila johnsonii* (the predominant species combination at 20.13%), *Syringodium filiforme*/*Halodule wrightii* (10.06%), *Syringodium filiforme*/*Halodule wrightii*/*Halophila johnsonii* (2.52%), and other combinations found in one or two quadrats each. Overall, *Halodule wrightii* was present in 84.91% of locations containing seagrass, while *Syringodium filiforme* was present in 17.61% and *Halophila johnsonii* in 31.45%. *Halophila engelmannii* and *Halophila decipiens*, were only found in 2.52% and 1.26% of quadrats, respectively.

Figure 3-2 depicts the total Braun-Blanquet scores and distributions for all seagrass species across the shoals along with areas of seagrass expansion identified by groundtruth transects. **Figures 3-3, 3-4, and 3-5** depict the Braun-Blanquet scores and distributions for *Syringodium filiforme*, *Halodule wrightii*, and *Halophila johnsonii*. The total average Braun-Blanquet score for all seagrass species across all quadrats was between 3 and 4; scores in Zones B and E averaged around 4 and scores in Zones C and D averaged between 2 and 3. Removing the zero-value quadrats (which are likely outside of seagrass beds), average scores for all zones except B (which had no zero-value quadrats) and E rose to between 3 and 4, with Zone E averaging between 4 and 5.

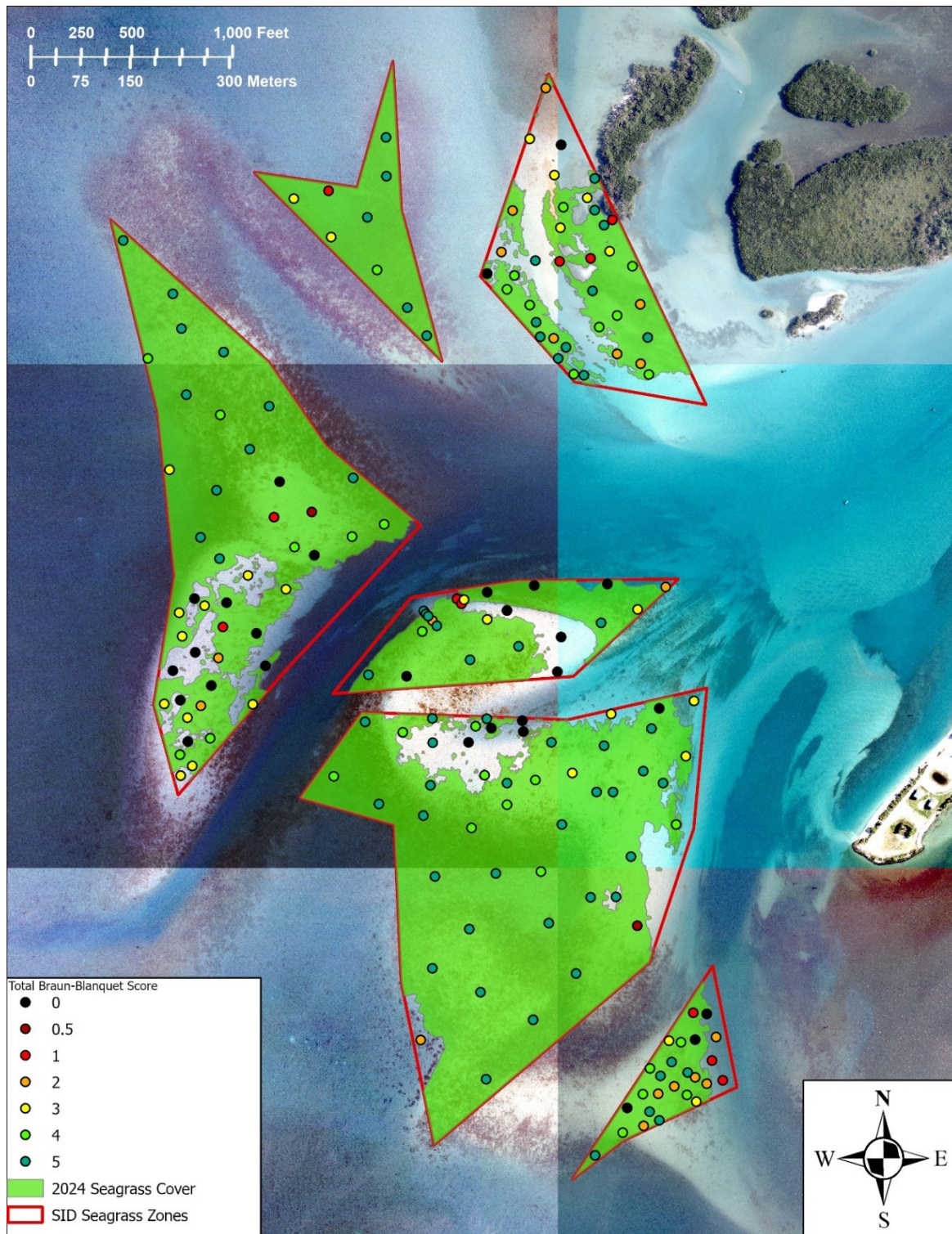


Figure 3-2 – Total 2025 Braun-Blanquet scores for all seagrass species, overlaid on 2024 seagrass cover. Black points within the 2024 seagrass cover should be considered as areas of loss, while points with seagrass outside the 2024 seagrass cover should be considered as gains.



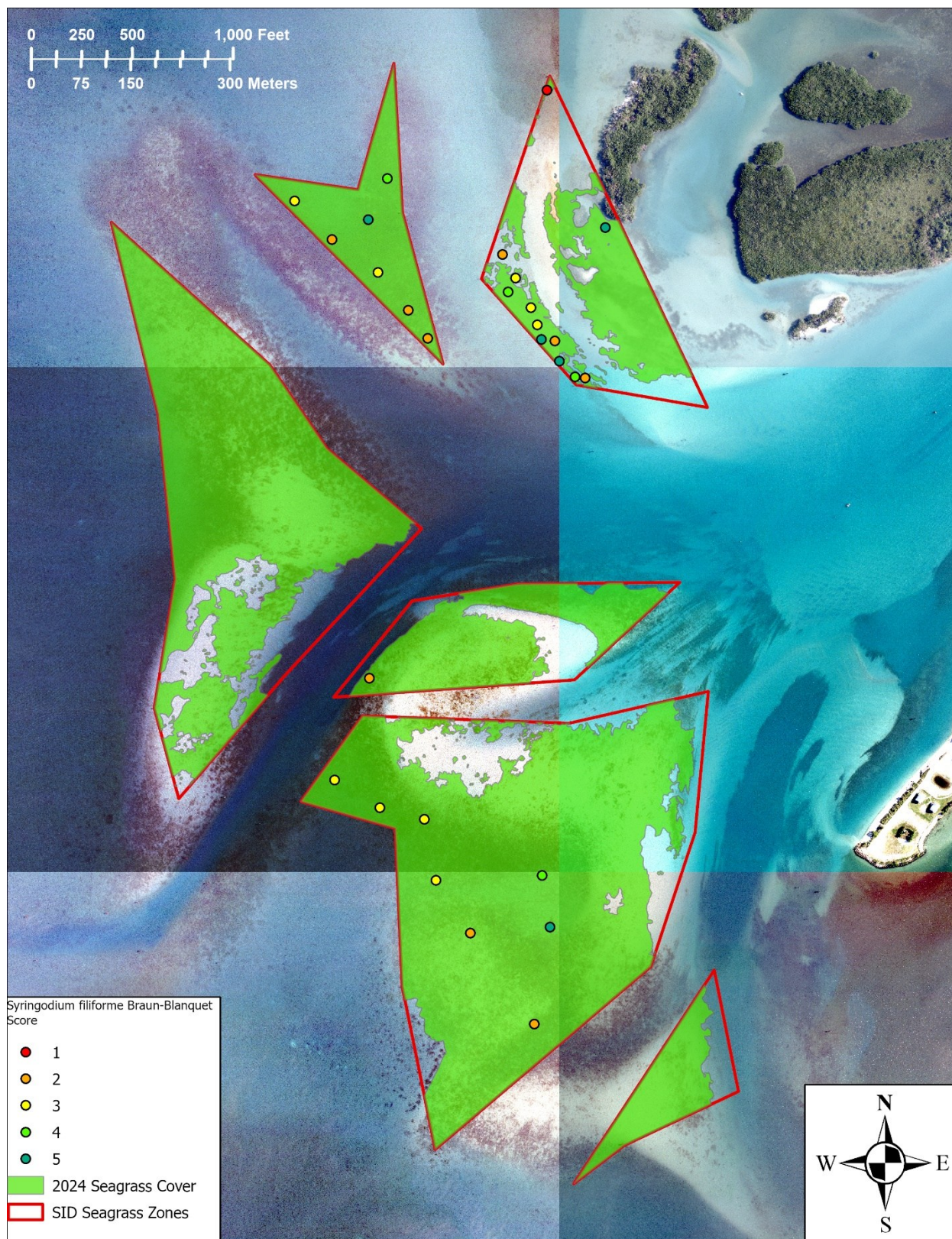


Figure 3-3 – 2025 Braun-Blanquet scores for *Syringodium filiforme*.

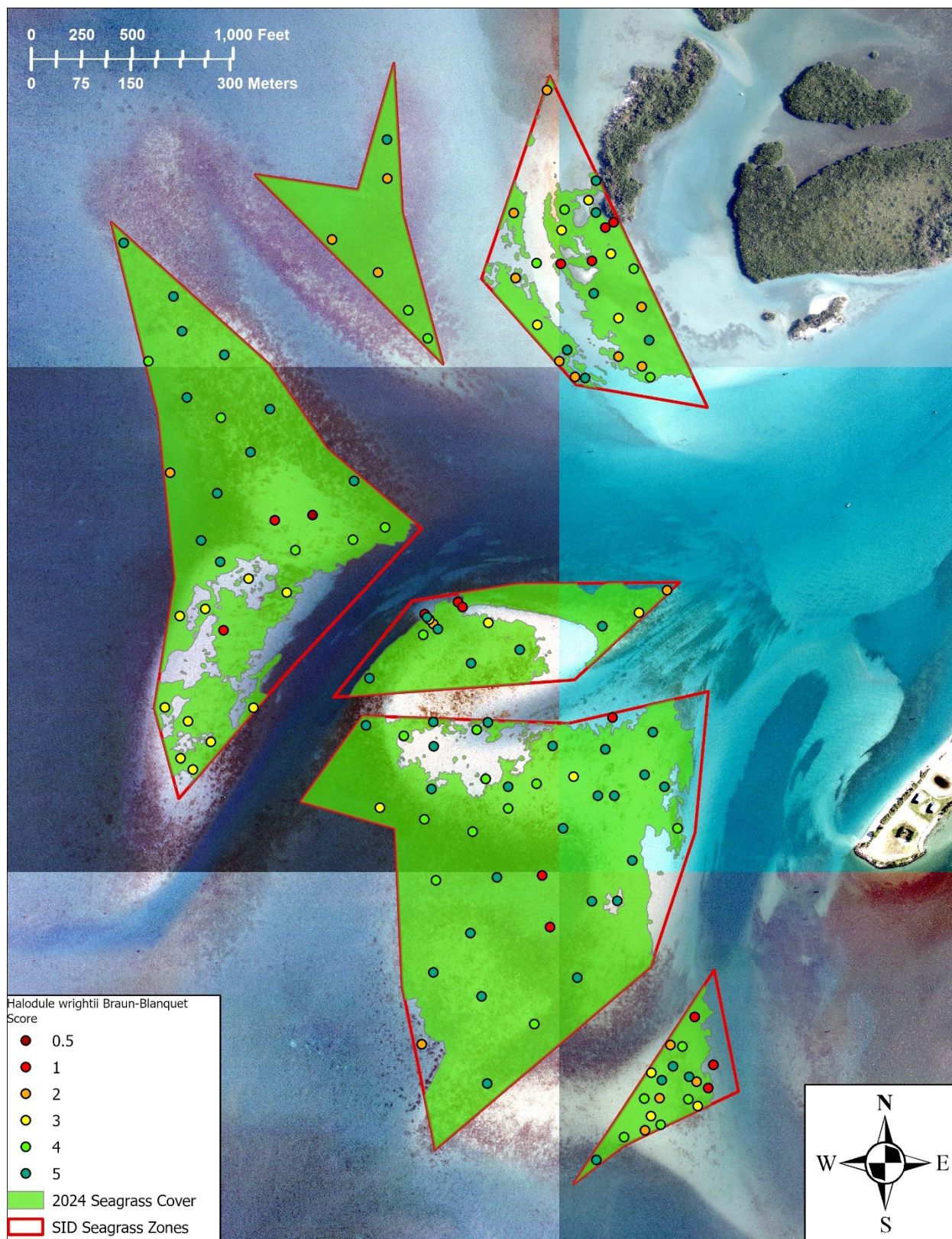


Figure 3-4 – 2025 Braun-Blanquet scores for *Halodule wrightii*.

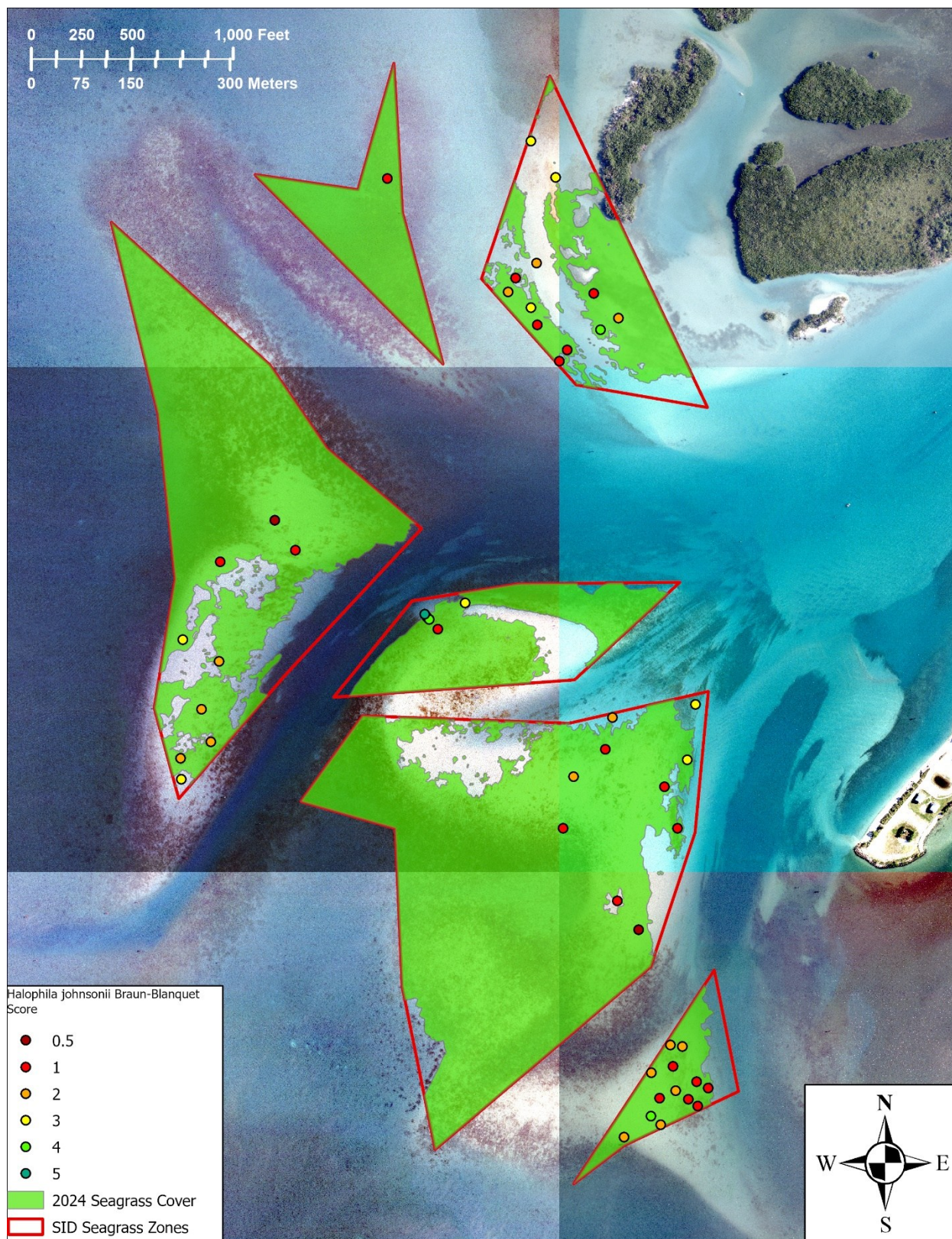


Figure 3-5 – 2025 Braun-Blanquet scores for *Halophila johnsonii*.

4. Discussion

4.1 2025 Seagrass Data

From 2022 to 2024, Atkins documented a net decrease in seagrass coverage of 1.64 acres across the six marked flood tide shoals (Zones A-F). While approximately 1.59 acres of seagrass was lost from Zone C and 2.62 acres from Zone E, these were partially offset by net gains of 1.12 acres in Zone A and 1.93 acres in Zone D (AtkinsRéalais 2024b). As updated aerials were not available for 2025, estimation of seagrass acreage changes from 2024 was not possible to a degree of reasonable confidence. However, the collected quadrat data can be used to infer where advancement and recession of the seagrass bed boundaries has occurred. Furthermore, extensive edge mapping was conducted within Zone A with spot checks in Zones C, D, and E. Zone A showed further expansion and consolidation of the seagrass beds on the western edge of the zone as well a small area near the mangroves on the northeast side of the zone, while previously mapped seagrass in the center of the zone has receded around a set of oyster shell mounds that are exposed at low tide. Overall, Zone A appears to have added approximately 1.47 acres of seagrass and lost approximately 0.94 acres, for a net gain of approximately half an acre over the 2024 results; see **Figure 4-1**.

While the other zones were not delineated in the field, some notes were collected. Zone B appears to have maintained near-100% coverage. Zone C appears to have experienced further thinning of seagrass along the shallow portion of the shoal running parallel to the channel, with new barren patches opening up, but seagrass has also filled in at the south tip of the shoal. Zone D has lost a small amount of seagrass area along the north boundary as well as a bare patch along the southwest side of the zone. Zones E and F appear to have undergone minimal changes, with likely equivalent gains and losses within each zone.

Seagrass presence by species within sampling quadrats from 2022-2025 is shown in **Figure 4-2**. Notably, quadrat data indicates a distinct decrease in *Halophila johnsonii* on the shoals in 2025 (from being present in 59.69% of quadrats containing seagrass in 2024 to 31.45% in 2025); Sebastian Inlet is towards the north end of its range and the growing season for the species is considered to end on September 30. Per personal communication with Don Deis of Brevard Zoo's Restore Our Shores program on June 25, 2025, *Halophila johnsonii* on the shoals was already observed browning and losing blades. A smaller year-to-year drop was observed between the 2022 groundtruthing event (conducted in late July) and the 2023 groundtruthing event (conducted in early October) (AtkinsRéalais 2024a). With that said, there was not the precipitous drop in monospecific quadrats containing *Halophila johnsonii* that was seen from 2022 to 2023.

While it seems likely that total seagrass area has remained stable or marginally decreased from 2024 to 2025, seagrass density has increased since 2024 (**Figure 4-3**). In 2024, 58.53% of quadrats with seagrass had B-B scores of 4 or 5 (>50% cover); in 2025 those two categories accounted for 63.53% of quadrats with seagrass. This was largely driven by *Halodule wrightii*; in 2024 36.44% of quadrats with seagrass had >50% cover of *Halodule wrightii* while in 2025 that figure was 49.06%. However, 2025 is also the first year where quadrats were observed with *Syringodium filiforme* scores of 5 (>75% cover).

Noted during the 2025 monitoring effort was the widespread presence of *Enteromorpha* sp. drift algae across the shoals, accumulating in thick layers in some areas (**Figure 4-4**). While detrimental effects from this were not observed, *Enteromorpha* can be a sign of high nutrient levels. Cyanobacteria was also observed growing on seagrass blades in some areas.

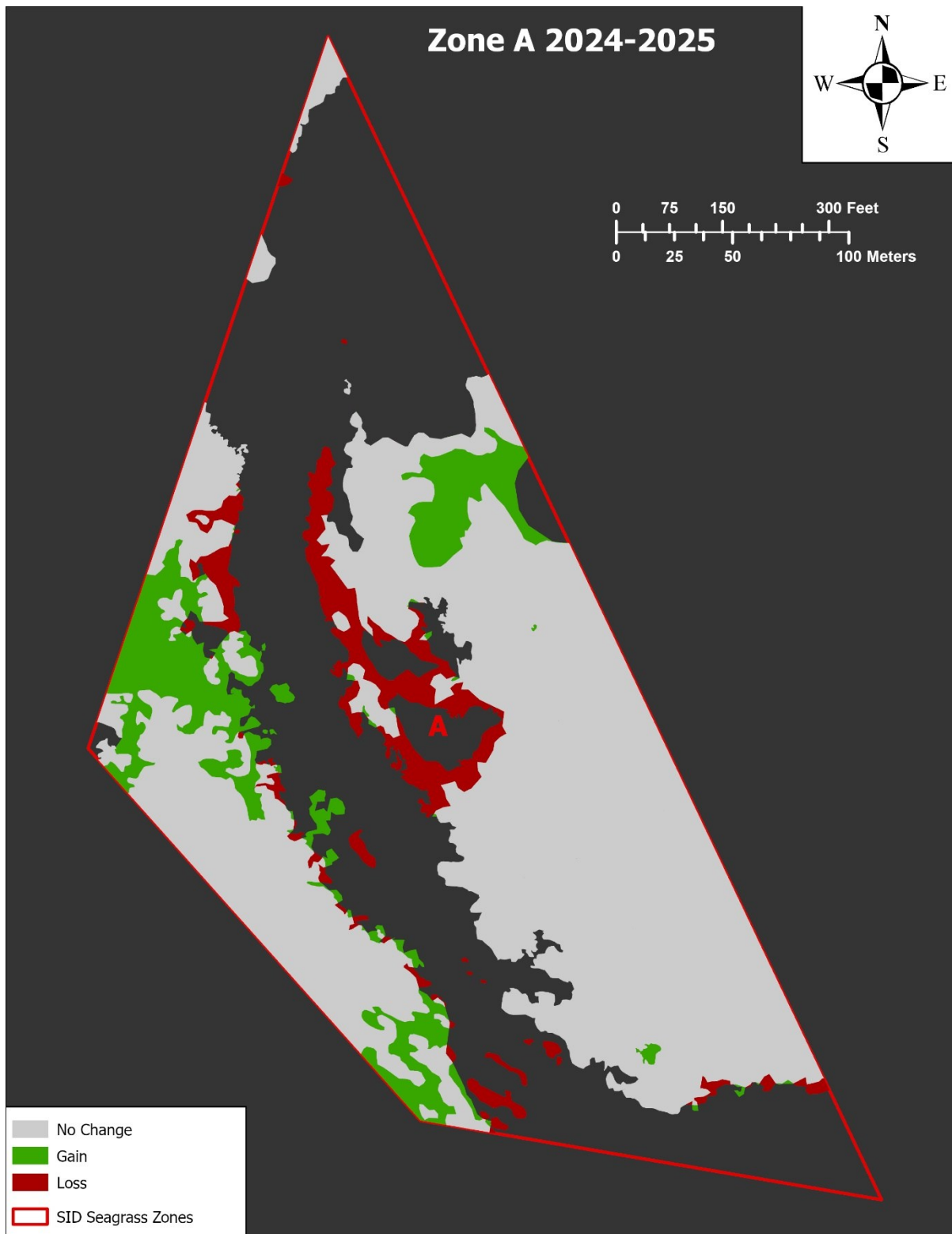


Figure 4-1 – Gain-loss analysis for Zone A, 2024 to 2025.

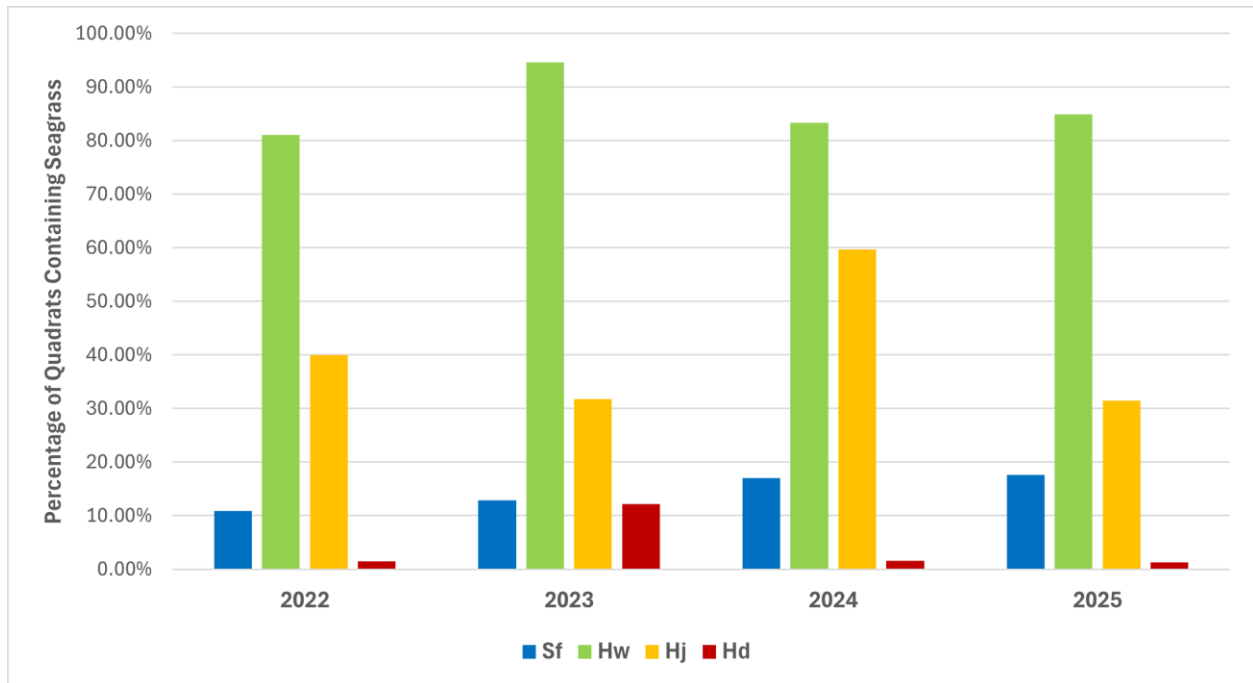


Figure 4-2 – 2022 (n=111), 2023 (n=266), 2024 (n=258), and 2025 (n=159) seagrass abundance within sampling quadrats by species. Sf = *Syringodium filiforme*, Hw = *Halodule wrightii*, Hj = *Halophila johnsonii*, and Hd = *Halophila decipiens*.



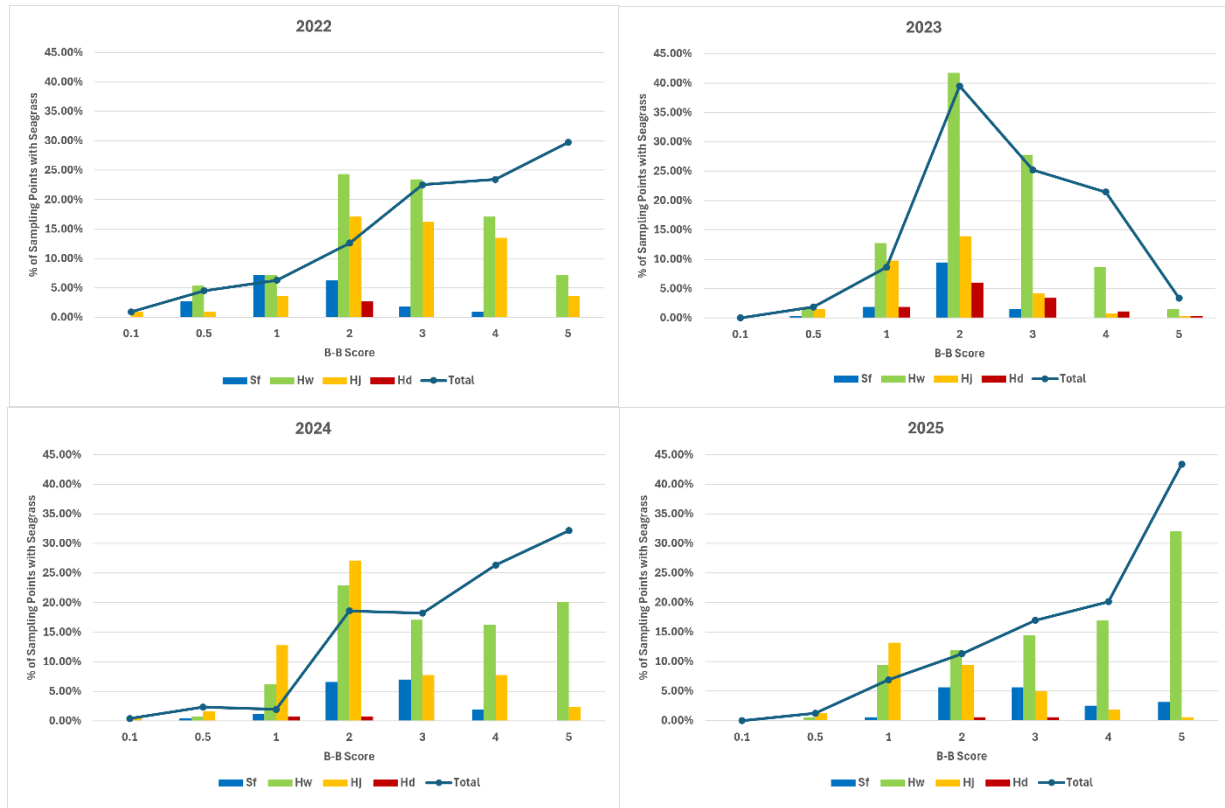


Figure 4-3 – 2022 (n=111), 2023 (n=266), 2024 (n=258), and 2025 (n=159) seagrass density within sampling quadrats by Braun-Blanquet score and species. Sf = *Syringodium filiforme*, Hw = *Halodule wrightii*, Hj = *Halophila johnsonii*, and Hd = *Halophila decipiens*.



Figure 4-4 – *Enteromorpha* sp. caught on seagrass along the north side of Zone D (top), and cyanobacterial growth on seagrass (bottom).



4.2 Long-Term (2010-2025) Changes

The Sebastian Inlet flood tide shoals have undergone a drastic change in seagrass cover over the past decade (**Figure 4-5**). Prior to 2011, the dominant seagrass species on the shoals were *Syringodium filiforme* (present in approximately 67% of locations visited in 2010) and *Halodule wrightii* (present in approximately 53% of locations visited in 2010). *Halophila johnsonii* was only present in 2% of the seagrass locations sampled in 2010 (PBS&J 2011). Seagrass coverage was estimated at nearly 112 acres; seagrass density was not recorded at the time but both aerial and in situ field photographs show dense, thick grass beds. The following year coverage dropped to approximately 81 acres, with seagrass losses most evident on the west side of Zone C (Atkins 2012). *Syringodium filiforme* continued to be the dominant species, being identified in 89% of locations visited, while *Halodule wrightii* was only present in approximately 18% of locations visited. In 2012 seagrass coverage fell to approximately nine acres, with Zones B and F essentially defoliated, Zones C and D reduced to small patches, and continuous grass pockets in the shallows of Zone A and the northeast tip of Zone E (Atkins 2013). This widespread loss of seagrass is believed to have been the result of a large-scale phytoplankton bloom lasting from early spring to late fall 2011; while the Sebastian Inlet area was less affected than other parts of the IRL, cyanobacteria rafts were observed throughout the shoals during the 2011 field event (Atkins 2012).

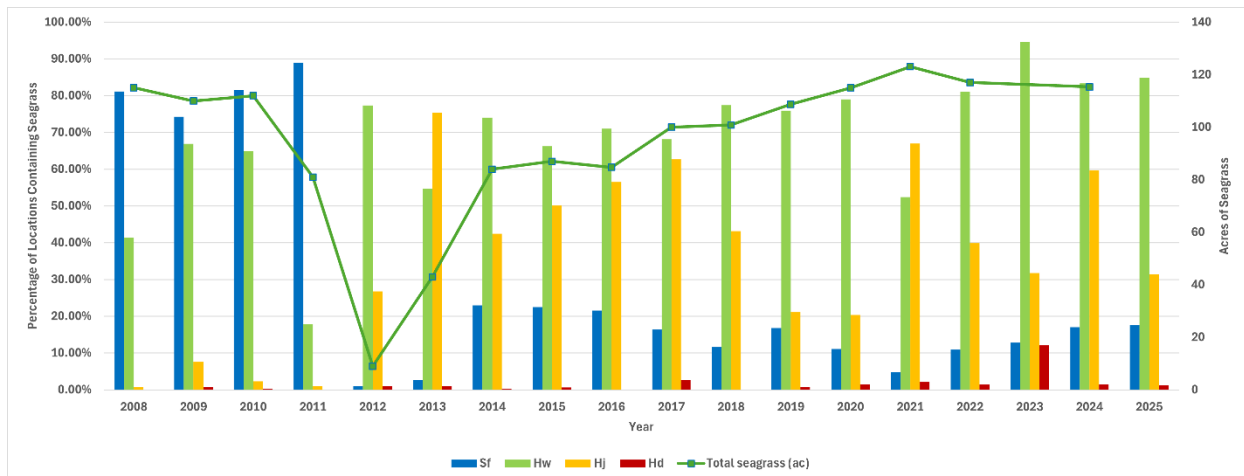


Figure 4-5 – Seagrass abundance by species and acreage, 2008-2024. Sf = *Syringodium filiforme*, Hw = *Halodule wrightii*, Hj = *Halophila johnsonii*, and Hd = *Halophila decipiens*. Total seagrass acreage provided for 2008-2022 and 2024; 2023 and 2025 acreage data not obtained.

Despite the widespread loss of seagrass acreage in 2011-2012, in 2013 and 2014 a rapid recovery of seagrass acreage on the shoals occurred, plateauing in 2014-2016 and then continuing a general upward trend from 2016 onwards. The 2021 aerial delineation and groundtruthing survey results indicated that total seagrass coverage across Zones A-F had exceeded the acreage present in 2010 prior to the die-off, with 123 acres of seagrass mapped (Atkins 2022). Since 2021 there has been a slight decline in mapped acreage, although this appears to be a flux around a stable acreage. Additionally, the loss of seagrasses on the shoals in 2011-2012 led to spreading of the shoals beyond the established boundaries; while examining the spread of seagrass beyond the shoal boundaries is beyond the scope of the shoal monitoring program, aerial imagery and comparison of the channel monitoring transect data from 2018, 2019, and 2024 suggest seagrass expansion beyond the shoal boundaries (AtkinsRéalais 2024b).

Since 2012, *Syringodium filiforme* has typically featured in an extremely small percentage of seagrass locations sampled (23% or less, with some years as low as 1-5%). As previously noted, seagrass species data collection since 2008 has typically been compiled from groundtruth points and transects, which have the potential to skew sampling towards the edges of seagrass beds and sparsely vegetated areas. While analyzing all points is necessary to compare data for all years, going forward from 2022 the quadrat data series will allow for a more consistent year-to-year comparison. This is critical particularly for monitoring changes in the presence of *Syringodium filiforme*, which prior to 2012 was the primary seagrass component on the shoals. In 2025 *Syringodium filiforme* was found in 28 of 159 (17.61%) sampling quadrats containing seagrass, compared to 17.05% in 2024 (note that 2024 had a larger sample size with 258 quadrats containing seagrass).

The changes to seagrass density and species composition since 2011-2012 likely affected the overall seagrass biomass available on the shoals. *Syringodium filiforme* has cylindrical blades which can grow to approximately 18 inches in length; *Halodule wrightii* and *Halophila johnsonii* both have flat blades that are significantly shorter (~1 inch maximum in the case of *Halophila johnsonii*). As such, while the overall seagrass acreage may have returned to or exceeded pre-2011 totals, the average density (50-75% per the 2025 quadrat sampling data) and reduced coverage of *Syringodium filiforme* likely represents an exponential reduction in seagrass biomass from prior to 2011. This is of particular note since the 2021 declaration of an Unusual Mortality Event (UME) for the Florida manatee population, with 637 manatee deaths recorded statewide in 2020, 1,101 in 2021, and 800 in 2022 (FFWCC 2025). From 2020 to 2022, the largest shares for each year (173 in 2020, 358 in 2021, and 346 in 2022) were recorded in Brevard County waters (Indian River County recording 19, 25, and 21 mortalities for those respective years). Starvation is currently believed to have been the key driver of this mortality event. Since then, annual manatee mortality numbers have declined, with 555 recorded deaths statewide in 2023 (55 of those in Indian River and Brevard Counties) and 565 in 2024 (109 of those in Indian River and Brevard Counties) (FFWCC 2026). The United States Fish and Wildlife Service (USFWS) and FFWCC have since declared the manatee UME closed as of March 14, 2025, with the duration per after-the-fact data review given as December 1, 2020 to April 30, 2022. As of December 31, 2025, the statewide manatee mortality count for 2025 was 632 individuals, with 119 of those in Brevard County and seven in Indian River County.

The presence of cyanobacteria on seagrass, which has been noted within Zone A in previous years, is a potential sign of elevated nutrient loads. On Zone A, this was assessed to likely be a result of birds utilizing the shallow areas of the shoal. In 2025 dense amounts of *Enteromorpha* sp. drift algae were observed at multiple locations on the shoal. This is cause for vigilance going into the winter months; while in early September the accretion of *Enteromorpha* did not appear to be smothering or having other negative impacts on seagrasses, another algal bloom similar to the 2011-2012 event would be a major setback to what is currently a promising 13-year recovery.

5. 2025 Post-Dredging Seagrass Survey

Maintenance dredging of Sebastian Inlet's channel and sand trap was conducted between March 24, 2025 and May 8, 2025. The overall objectives of the Seagrass Monitoring Plan (ATM 2014) are:



- 1) Assess potential project-induced unmitigated impacts to SAV adjacent to the sand trap and the navigation channel easement.
- 2) To ensure that there is no submerged aquatic vegetation (SAV) in the submerged pipeline route or in-water staging areas prior to construction.

The methods are outlined in detail in the approved Seagrass Monitoring Plan (ATM 2014, Appendix A). Briefly, 46 30-meter long transects were established at predetermined locations, perpendicular to the sides of the sand trap and navigational channel through the flood tidal shoals (**Figure 5-1**). Transects 1-5 surround the sand trap and transects 6-46 occur along the north and south sides of the channel from the sand trap through the flood shoal area. During the pre-dredging assessment, all transects within 50 meters of the proposed dredge template (which in 2024 was the full extent of the sand trap and channel) are assessed for the presence of seagrass. Along each of the transects containing seagrass, five 1 m² quadrats are to be sampled at 0, 5, 10, 20 and 30 meters from the beginning of the transect (sand trap or channel edge) (see **Figure 5-1**). The quadrat is divided into a 100-cell grid composed of 10 cm x 10 cm cells. Ground cover is reported as the number of cells in the quadrat occupied by seagrass. Additionally, information on the diversity (seagrass species), abundance and density of seagrass within each quadrat is visually surveyed. One alteration was made to the transect quadrat sampling methodology; while the monitoring plan states that B-B scoring is to be used for total seagrass density and abundance by species, the post-construction reporting also requires statistical comparison of the pre- and post-dredging seagrass coverage data. As such, and in line with more recent FDEP monitoring protocols, seagrass density data was recorded on a scale of 0-100%. The water depth at the start and stop of the transect, canopy height (max blade length), and total number of seagrass shoots rooted within one 10 cm x 10 cm cell of the quadrat is also recorded.

Of the 46 channel transects assessed in the 2024 pre-dredging assessment, 30 had seagrass present at some point along them; three of these had no coverage at quadrat locations but did have isolated shoots of *Halophila decipiens* along the transect (AtkinsRéalès 2024b). Transect 29 had a small amount of *Halophila decipiens* before the 0-meter mark (i.e. in the permitted channel template), with the main grass bed starting at 10 meters. Twelve transects had seagrass coverage in all five quadrats (with one additional transect, 45, having seagrass at 0, 20, and 30 meters). Average seagrass density for all transects with seagrass (including those with seagrass recorded on the transects but no quadrat coverage) was approximately 30%. *Halodule wrightii* was the most common species at 18%, followed by *Syringodium filiforme* at 5%, *Halophila johnsonii* at 4%, and *Halophila decipiens* at 3% (AtkinsRéalès 2024b).

Upon completion of dredging, the post-dredging assessment protocol is to re-survey the transects with seagrass identified in the pre-dredging, using the same methodology. However, shortly after starting the post-dredging assessment (completing Transects 15 and 17) it was realized that dredging was stopped while still in the sand trap and before getting within 50 meters of any transects. As such, the post-construction assessment will be postponed until after the completion of dredging work (which was restarted on December 5, 2025). The seven quadrats on Transects 15 and 17 which contained seagrass were incorporated into the shoal monitoring dataset for Zone D.

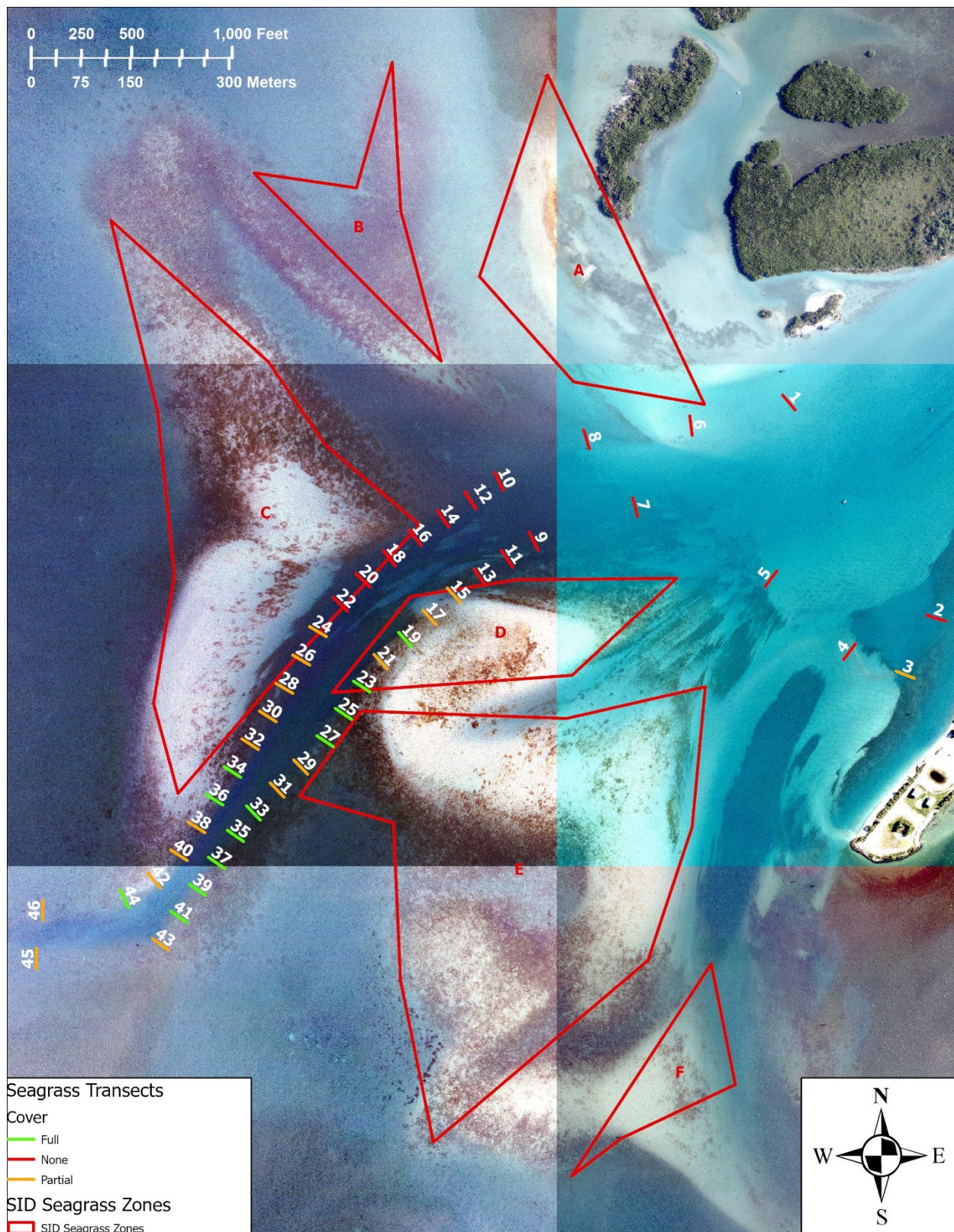


Figure 5-1 – Channel monitoring transects.

APPENDICES

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