

Gladstone Healthy Harbour Partnership 2021 Report Card Summary, ISP011: Seagrass

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Gladstone Harbour seagrass meadows were in good overall condition in 2021 for the second consecutive year. This is the first time that seagrass has maintained good condition over consecutive years since 2009, prior to large flooding events that led to significant seagrass declines in 2010-2011. Gradual improvements in seagrass condition have occurred since 2017 and most meadows recovered by 2020, when biomass and area peaked in many meadows. Small biomass declines occurred in some meadows between 2020 and 2021, but the majority of meadows remained in good or very good condition for the three seagrass sub-indicators.

Eight of the 14 seagrass monitoring meadows overall grades were good or very good condition in 2021 (Table 1). There was a decline in meadow condition at four meadows from good or very good to satisfactory condition (Figure 1), largely due to decreases in meadow biomass from 2020 when seagrass was in the best condition for a decade. The South Trees Inlet Zone was in very good condition for the fourth consecutive year. Meadows in The Narrows and Western Basin remained in good condition (Figure 1). Declines in meadow health associated with lower biomass relative to 2020 occurred at Rodds Bay and the Inner Harbour, however these zones were still in good and satisfactory condition respectively because biomass was at a decade-long peak in 2020 (Figure 1). Seagrass in the Mid Harbour Zone continues to be in poor condition due to low biomass in Meadow 43 at Pelican Banks. This meadow has shown minimal recovery since major declines were recorded in 2015.

Table 1. Grades and scores for seagrass sub-indicators (biomass, area and species composition), overall meadow, zone, and Gladstone Harbour scores for the GHHP 2021 reporting year. Scores are on 0 – 1 scale; cells are coloured according to grade, where dark green = very good, light green = good, yellow = satisfactory, orange = poor, red = very poor. Note, 2021 scores may differ slightly to those reported by Smith et al. (2021) due to bootstrapping used to calculate GHHP report card and scores.

ZONE	MEADOW ID	BIOMASS	AREA	SPECIES COMPOSITION	OVERALL MEADOW SCORE	OVERALL ZONE SCORE
1. The Narrows	21	0.84	0.99	0.93	0.84	0.84
3. Western Basin	4	1.00	0.97	0.91	0.94	0.75
	5	0.86	0.82	0.82	0.82	
	6	0.88	0.94	0.62	0.75	
	7	0.63	0.74	1.00	0.63	
	8	0.86	0.69	0.57	0.63	
	52-57*	0.71	0.95	1.00	0.71	
5. Inner Harbour	58	0.59	0.91	0.60	0.59	0.59
8. Mid Harbour	43	0.33	0.87	0.50	0.33	0.48
	48	0.64	0.72	0.97	0.64	
9. South Trees Inlet	60	0.97	1.00	1.00	0.97	0.97
13. Rodds Bay	94	0.84	0.87	0.99	0.84	0.70
	96	0.75	1.00	0.97	0.75	
	104	0.51	0.86	0.83	0.51	
Gladstone Harbour						0.72

*Meadow 52-57 consists of a number of small meadows surrounding the Passage Islands in the Western Basin Zone (see Figure 1). These meadows are grouped for reporting purposes.

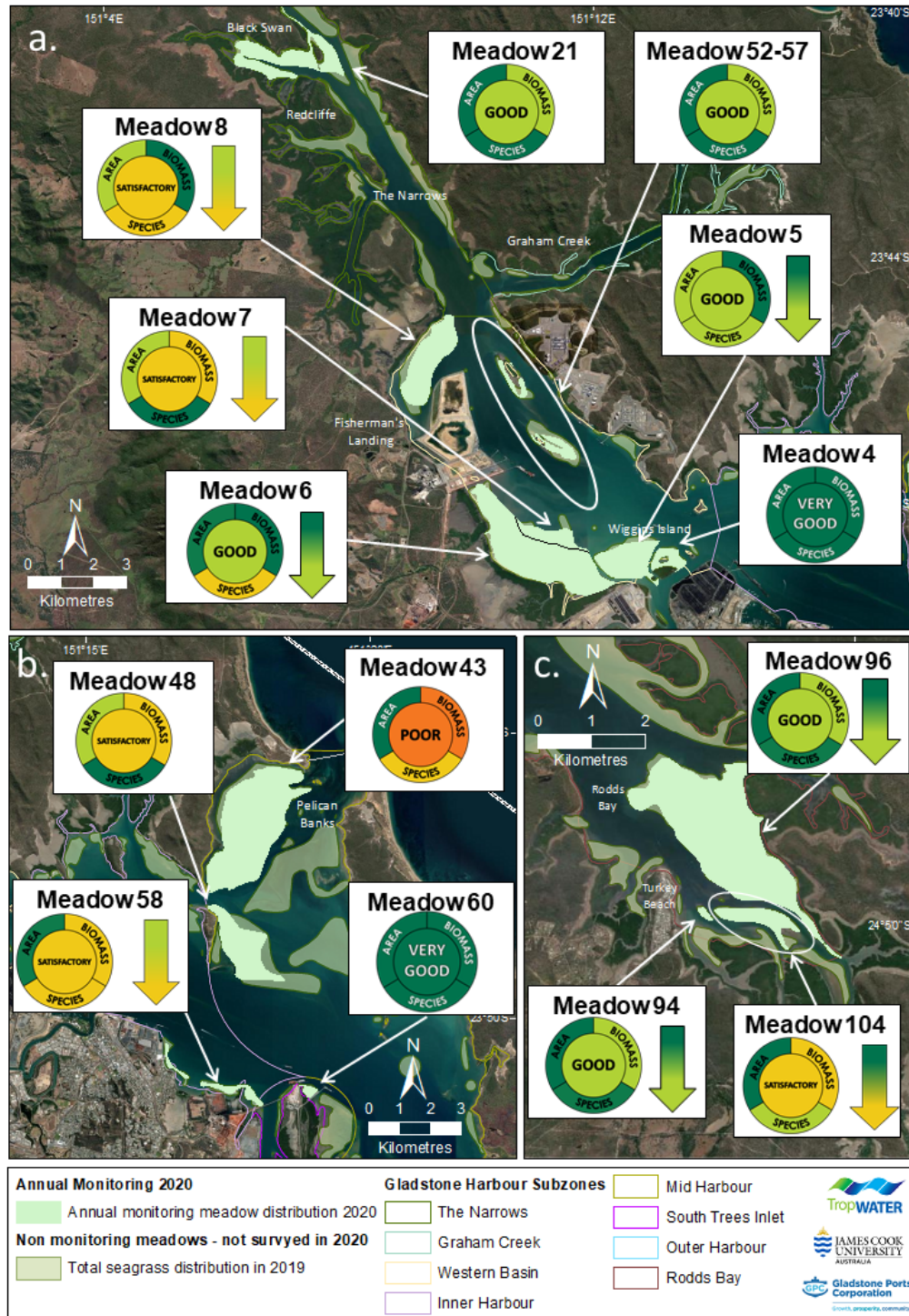


Figure 1. Seagrass distribution and meadow condition in the The Narrows and Western Basin Zones (a), Inner Harbour, Mid Harbour, and South Trees Inlet Zones (b) in Gladstone Harbour, and in Rodds Bay (c) in November 2020 (this report card). Arrows indicate an overall grade change from the previous year.

Improvement in seagrass condition and meadow recovery over the past year was facilitated by environmental conditions that promote seagrass growth. Available light plays a major role in seagrass condition and turbidity from flood and dredge plumes can result in large-scale seagrass losses (Erftemeijer 2006, McCormack et al. 2013, York et al. 2015, Chartrand et al. 2016). Analysis of the long-term patterns of seagrass condition from annual monitoring reveal a strong relationship with rainfall and Calliope River flow including major losses in 2010-2011 (McCormack et al. 2013, Office of Public Affairs 2013). Flow from the Calliope River over the past three years has been below average, and outflow was very low during the 2020 wet season. Rainfall also has been below average since 2017. Increased benthic light as a result of reduced rainfall and river flow over the last three years has created ideal conditions for seagrass growth. Favourable growth conditions have also seen a change in species composition in many meadows, with the most persistent species *Zostera muelleri* returning as the dominant species.

The Mid Harbour is the only zone in the Gladstone Harbour and Rodds Bay region where seagrass is in poor overall condition in 2021. This is due to Meadow 43 at Pelican Banks, where large declines in seagrass biomass and reduction in the proportion of the foundation species *Z. muelleri* have occurred over the past six years, despite meadow area remaining relatively stable. The Mid Harbour meadows typically experience the best water quality/ benthic light conditions for seagrass growth in the area (Chartrand et al. 2016), and there are no obvious differences in environmental conditions or human activities in the area that would hinder recovery. Seagrass at Meadow 43 is subject to high levels of herbivory from green turtles and dugongs, with recent studies indicating these animals have a major influence on seagrass condition in the Gladstone region (Scott et al. 2020, 2021). High herbivory rates may be restricting seagrass recovery at Meadow 43, altering the seagrass community and preventing improvements in biomass. Given this meadow's importance as a key seagrass resource in Gladstone Harbour, recovery remains key to overall marine environmental health in the region.

Good overall seagrass condition across Gladstone Harbour and Rodds Bay in the 2021 reporting year indicates seagrasses are resilient to future pressures. Continuing high levels of resilience mean seagrasses should be well placed to cope with forecast La Niña weather patterns and anthropogenic pressures in 2021-22.

References

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