

Updated seagrass density and distribution map for the Swan Canning Estuary

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Background

Seagrass communities play a vital role in estuarine systems as ecosystem engineers by stabilising sediment, reducing excess nutrients from the water column, sequestering carbon, releasing oxygen and providing a food source, habitat and nursery for various faunal species. The dominant species of seagrass in the Swan-Canning Estuary is *Halophila ovalis* (Figure 1), with *Zostera muelleri*, *Ruppia megacarpa* and *Posidonia australis* found in small populations throughout the estuary.

The level of ecosystem services provided by seagrass in the Swan-Canning Estuary depends on both its spatial distribution and coverage. Seagrass is vulnerable to anthropogenic pressures associated with eutrophication, climate change, physical disturbance and natural perturbations. Therefore, it is essential to routinely map the region, report on and manage any observed changes in distribution and coverage.

Findings

In 2023, during the peak of interannual seagrass productivity (February), DBCA undertook mapping surveys combining satellite imagery and ground truth data with computer modelling to assign seagrass distribution and density. Seagrass density was categorised as either sparse (1-24 per cent), medium (25-74 per cent) or dense (75-100 per cent; Figure 1). The resulting map (Figure 2) represents the expected community composition of shallow seagrass communities defined by depths that produced visual results.

Here we found approximately 590 hectares of seagrass communities in the shallow areas of the Swan-Canning Estuary. This comprises approximately 213 hectares of sparse, 168 hectares of medium and 208 hectares of dense seagrass. Results and methods from previous seagrass surveys illustrate the progression of mapping in the SCE (Table 1).

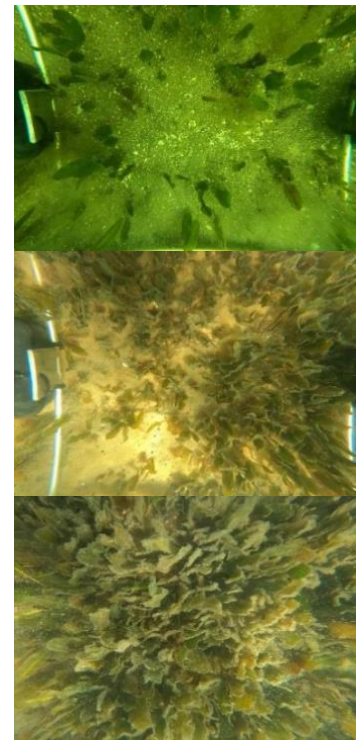


Figure 1: Images of *Halophila ovalis* coverage, depicting sparse (top), medium (middle) and dense (bottom) densities.

Table 1: Historical seagrass surveys conducted in the SCE with estimated extent and brief methods

Source	Year	Survey timing	Cover (ha)	General methods
Hillman et al., 1995	1976 1982	March March	568 598	Drawn from aerial photography (1:5000 and 1:10,000 in 1976 and 1982, respectively). The area of cover was measured using a digitiser.
Phillips & Wilshaw, unpublished data	1995	December	460.9	Drawn from aerial photography (1:10,000) taken in December 1995. Ground-truthed by boat, photographs taken through a glass bottom bucket and additional observations by snorkel and scuba diving. The Environmental Resource Mapping system was used for calculations of area and coverage.
Forbes & Kilminster, 2014	2011	February	403	Ground truthing using underwater video collecting point data along estuary-wide transects. RapidEye imagery (remote sensing) captured in December 2010. Image and ground truthing were visually interpreted to identify vegetation on satellite image and polygons were manually drawn (ArcMap) based on visual observations.
Department of Biodiversity, Conservation and Attractions (unpublished)	2019	January	600	Ground truthing was performed using GoPro images in shallow waters (< -1.2m). Image and ground truthing visually interpreted to identify vegetation on satellite image (WorldView 2 captured in Jan 2019) and polygons were manually drawn based on bathymetry and visual observations.

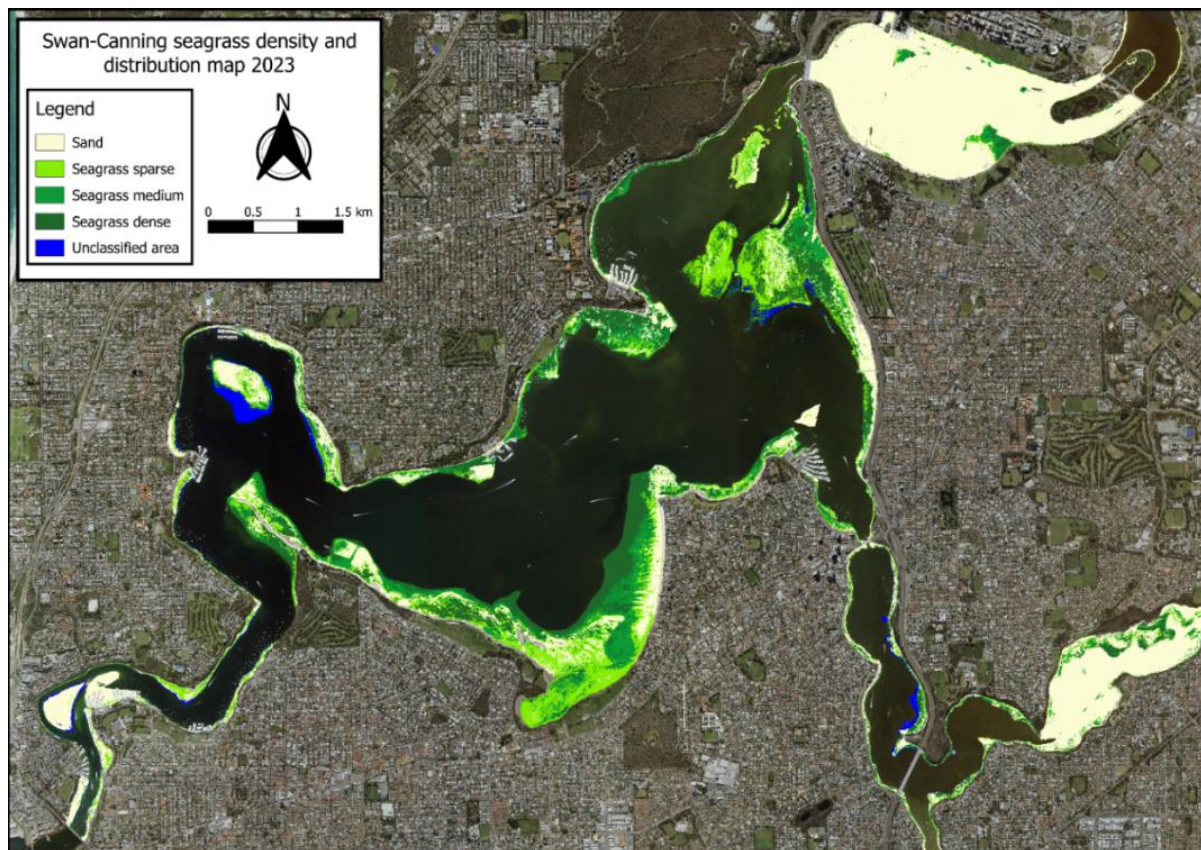


Figure 2: Swan-Canning seagrass density and distribution map 2023

Management implications

This updated seagrass map is intended to inform on the location and distribution of seagrass communities and provides estimates of coverage during the seagrass peak productivity period in 2023. Seagrass cover estimates from past studies in this region are shown in Table 1, however comparison between historic surveys should be undertaken with a measure of caution. Seagrass extent and cover are affected by differing methodologies over time, including differing scope in the focus area/size and depth limits, targeted species, timing relative to productivity, technology application, density parameters and classification criteria. Future mapping endeavours by DBCA will aim to standardise the methodological approach to seagrass mapping in the Swan-Canning Estuary, enabling the collection of robust and comparable time series results of seagrass distribution.

A key caveat in this map is that it focused on the shallow areas, with 'shallow' defined by depths that produced clear and expected results when interpreted by the computer model. Depths varied depending on location and light attenuation in the Swan-Canning Estuary. For example, in Perth Waters, seagrass was classified to a depth of -2.6m, whereas at Fremantle, seagrass was classified to depths of -5.2m. We cannot assume that there is no seagrass present within the deeper areas that are not classified. In addition, it should be noted that the 'unclassified areas' (shown as dark blue on the map) are instances where the depth was shallow, but the computer model could not confidently define what was present in the area. Within the 'unclassified areas', it cannot be assumed that there is no seagrass or other benthic habitat values. Rather, these are areas where interference from the water column disguises the ability to make confident classification of the benthic habitat.

Further information

Department Biodiversity, Conservation and Attractions (unpublished). Swan-Canning waterway condition report (2016-2020). Department of Biodiversity, Conservation and Attractions, Perth.

Forbes, V., & Kilminster, K. (2014). Monitoring seagrass extent and distribution in the Swan Canning Estuary. Water Science Technical Series, No. 70

Hillman, K., McComb, A. J., & Walker, D. I. (1995). The distribution, biomass and primary production of the seagrass *Halophila ovalis* in the Swan/Canning Estuary, Western Australia. *Aquatic Botany*, 51(1-2), 1-54. [https://doi.org/10.1016/0304-3770\(95\)00466-D](https://doi.org/10.1016/0304-3770(95)00466-D)

Phillips, J., Wilshaw, J. (unpublished). The distribution and biomass of seagrasses and macroalgae in the Swan-Canning Estuary, Western Australia. Environmental Management, Edith Cowan University and Department of Botany, The University of Western Australia.