Tropical seagrass:
small in size but big in nature

Seagrasses play an important role in diverse and productive marine communities, and Western Australia has some of the largest seagrass meadows in the world. In order to continue benefiting from the range of ecosystem services they provide, it is necessary to carry out robust monitoring, especially in areas like the Pilbara, where seagrasses experience unique pressures.

by Molly Moustaka and Simone Strydom

Although they are not always immediately recognised as an important foundation species, seagrasses often form the basis of ecologically- and economically-valuable ecosystems. Seagrasses are flowering plants (known as marine angiosperms), which are structurally and functionally similar to terrestrial plants. The only difference is that they go through their entire life cycle – from germination to maturity, and subsequent reproduction including pollination, fruiting, and seeding – underwater.

Seagrass meadows underpin diverse and productive marine communities, and provide food, habitat and nursery areas for a variety of marine animals. Seagrass meadows also facilitate a range of important environmental processes, including sediment stabilisation, water quality maintenance and carbon sequestration, and they help protect our coastline from erosion. Several industries in Western Australia, such as tourism and fisheries, benefit from the ecological services provided by seagrasses. For example, seagrass meadows support commercially, recreationally and culturally important fauna, including dugongs, sea turtles, blue swimmer crabs, western rock lobsters, tiger prawns and several finfish and cephalopod species. To ensure seagrass meadows continue to provide valuable ecosystem services, robust monitoring and active management of their health is essential.

TEMPERATE VERSUS TROPICAL

WA is a biodiversity hotspot for seagrass, and is home to some of the largest and most diverse temperate and tropical seagrass meadows in the world. Temperate seagrasses generally form persistent meadows that remain relatively stable through time, and are more resistant to disturbance than their tropical counterparts. Meanwhile, tropical seagrass meadows are often dominated by ephemeral species that can form either transient or persistent meadows. As such, the extent and composition of tropical meadows can alter dramatically in response to episodic weather events and changes in environmental conditions. But they are often quick to recover post-disturbance. It is generally more straightforward to monitor temperate seagrass meadows due to their naturally lower variation in size and diversity, while the fluctuating nature of tropical seagrass meadows often makes it difficult to disentangle natural background variation from changes caused by human activity or natural disturbances (e.g. cyclones and marine heatwaves).

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Opposite page
Main top Seagrass meadows support dugongs and other finfish species.
Photo – Geoff Taylor/Lochman Transparencies
Main bottom WA is home to some of the largest and most diverse seagrass meadows in the world.

Above left DBCA researcher Simone Strydom counting seagrass shoots in the Dampier Archipelago.

Above Ripe seagrass fruit.
Photos – Molly Moustaka/DBCA

Under the auspices of its Marine Science Program, DBCA has a well-established seagrass monitoring program in WA's temperate oceanic marine reserves, comprising Shark Bay, Jurien Bay, Shoalwater Islands, Marmion and Ngari Capes marine parks. Monitoring seagrasses in these reserves is important, as some are close to populated areas, and are therefore potentially exposed to impacts associated with human activities, such as nutrient run-off, anchor damage from boats, and sedimentation associated with marine infrastructure.

Managing tropical seagrass meadows requires monitoring programs that are built on long-term datasets that reveal the higher levels of natural temporal and spatial changes. These programs rely on site-specific data that are collected from sites exposed to a range of environmental conditions and potential pressures.

THE DYNAMIC PILBARA

WA's Pilbara region experiences significant variations in its environmental conditions, such as the water temperature, turbidity, sedimentation, wind and wave energy, salinity and the effects of periodic tropical storms. While extensive seagrass meadows occur throughout the region, the natural dynamics of these assemblages, including annual fluctuations in abundance and their reproductive effort, remain unknown. The Dampier Archipelago is made up of

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42 offshore islands, with rich intertidal and subtidal reefs, coral gardens, seagrass meadows, macroalgal beds and extensive mangrove communities. The region has been the focus of significant commercial development, including the construction of the world's second largest bulk export port to facilitate the export of iron ore, salt, liquified natural gas and cargo. It also has high levels of visitor use, including recreational fishing. Some human activities have the potential to detrimentally impact seagrasses that occur in the area by reducing the amount of light they receive and increasing the risk of seagrasses being buried by sediment. Both these factors can limit the seagrass's ability to photosynthesise and grow. Seagrasses may also be subjected to physical damage from anchors and mooring scarring.

FILLING IN THE BLANKS

With the aim of developing our understanding of the natural dynamics of seagrasses and contributing to a growing long-term dataset for the region, a team of DBCA researchers travelled to the Dampier Archipelago. The researchers monitored the species composition, abundance and biomass of seagrass meadows to determine which species are present, and their relative abundance. They also recorded any reproductive elements including flowers, fruits, and seeds.

The team found both male and female flowers and fruits burgeoning with seeds at several sites. But they did not locate seeds in any of the sediment samples they collected. Recent work in the inshore Pilbara region suggests that tropical seagrasses rely on recovery from vegetative re-growth, rather than on recovery from seeds. Thus, either the seeds here are buried deeply in the sediment, exported along currents into other areas, or are not required for these plants to propagate. This is one of the questions that DBCA researchers will investigate in the future.

The continued collection of these data will provide a baseline for tropical seagrass meadow dynamics in the Pilbara, and ultimately help managers identify the reasons behind any future changes in seagrass meadow health. This study will help DBCA to assure locals, visitors, and industry bodies that we understand the dynamics of these important marine habitats and species that live there well enough to ensure that they are conserved and protected in this area of focused development.

Above (clockwise from top left) Seagrass meadows support important marine life such as turtles, finfish and coral gardens, and nudibranchs.
Photos – Eva Boogaard/Lochman Transparencies (left), Molly Moustaka/DBCA)

Below Paddle weed.
Photo – Molly Moustaka/DBCA

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