



Unravelling complexity in seagrass systems for management: Australia as a microcosm



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HIGHLIGHTS

- Management requires understanding of seagrass life history, habitat and meadow form.
- These three attributes assist our understanding of seagrass response to disturbance.
- A new classification of transitory or enduring meadows informs monitoring and policy.
- Past management has historically focused on enduring seagrass meadows.
- This transdisciplinary synthesis supports monitoring, management and policy.

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ABSTRACT

Environmental decision-making applies transdisciplinary knowledge to deliver optimal outcomes. Here we synthesise various aspects of seagrass ecology to aid environmental decision-making, management and policy. Managers often mediate conflicting values and opinions held by different stakeholders. Critical to this role is understanding the drivers for change, effects of management actions and societal benefits. We use the diversity of seagrass habitats in Australia to demonstrate that knowledge from numerous fields is required to understand seagrass condition and resilience. Managers are often time poor and need access to synthesised assessments, commonly referred to as narratives. However, there is no single narrative for management of seagrass habitats in Australia, due to the diversity of seagrass meadows and dominant pressures. To assist the manager, we developed a classification structure based on attributes of seagrass life history, habitat and meadow form. Seagrass communities are formed from species whose life history strategies can be described as colonising, opportunistic or persistent. They occupy habitats defined by the range and variability of their abiotic environment. This results in seagrass meadows that are either transitory or enduring. Transitory meadows may come and go and able to re-establish from complete loss through sexual reproduction. Enduring meadows may fluctuate in biomass but maintain a presence by resisting pressures across multiple scales. This contrast reflects the interaction between the spatial and temporal aspects of species life history and habitat variability. Most management and monitoring strategies in place today favour enduring seagrasses. We adopt a functional classification of seagrass habitats based on modes of resilience to inform management for all seagrass communities. These concepts have world-wide relevance as the Australian case-studies have many analogues throughout the world. Additionally, the approach used to classify primary scientific knowledge into synthesised categories to aid management has value for many other disciplines interfacing with environmental decision-making.

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