



Australian Government

Department of the Environment and Energy

Posidonia australis Seagrass Meadows of the Manning- Hawkesbury Ecoregion: A Nationally Significant Ecological Community



This guide is designed to assist coastal developers and land managers, water users, as well as environmental assessment officers and consultants, to identify, protect and manage the *Posidonia australis* Seagrass Meadows of the Manning-Hawkesbury Ecoregion; a threatened ecological community, listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Australia's national environment law.

This guide is a companion document to the approved Conservation Advice, which can be found on the Australian Government's species profile and threats (SPRAT) database at: <http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=127>. On this webpage, click on the details link—alongside the ecological community name—to download the documents and the map for the listed ecological community.

© Commonwealth of Australia, 2018.



Posidonia australis Seagrass Meadows of the Manning-Hawkesbury Ecoregion: A Nationally Significant Ecological Community is licensed by the Commonwealth of Australia for use under a Creative Commons Attribution 4.0 International licence with the exception of the Coat of Arms of the Commonwealth of Australia, the logo of the agency responsible for publishing the report, content supplied by third parties, and any images depicting people. For licence conditions see: <http://creativecommons.org/licenses/by/4.0/au/>

This guide should be attributed as '*Posidonia australis* Seagrass Meadows of the Manning-Hawkesbury Ecoregion: A Nationally Significant Ecological Community, Commonwealth of Australia 2018'.

The Commonwealth of Australia has made all reasonable efforts to identify content supplied by third parties using the following format '© Copyright, [name of third party]'.

Disclaimer

The views and opinions expressed in this publication are those of the authors and do not necessarily reflect those of the Australian Government.

While reasonable efforts have been made to ensure that the contents of this publication are factually correct, the Commonwealth does not accept responsibility for the accuracy or completeness of the contents, and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this publication.

Images

Front cover — Dense *Posidonia australis* seagrass meadow © Justin Gilligan

Back cover — *Posidonia australis* seagrass meadows play a key role in providing habitat and food for various fish and marine animals © Justin Gilligan

Contents

Summary.....	4
National ecological communities.....	6
What is the <i>Posidonia australis</i> seagrass meadows ecological community?.....	6
Vegetation.....	7
Fauna.....	9
Where does the <i>Posidonia australis</i> seagrass meadows ecological community occur?.....	11
How is the ecological community identified?.....	12
Are all patches protected under the national listing?.....	13
Why is the <i>Posidonia australis</i> seagrass meadows ecological community important?	14
Threats to the ecological community.....	15
Why does the ecological community need national protection?.....	16
What are the benefits of listing the ecological community as nationally threatened?.....	17
What can I do to look after the ecological community?.....	18
Environmentally friendly moorings.....	19
What does the listing mean for water users?.....	20
Referral required for actions likely to have a significant impact.....	21
Are there other nationally protected ecological communities within this area?.....	22
Do state or local environment laws also apply?.....	22
Where can I get further information?.....	22

This guide is intended to assist people to understand the national listing of *Posidonia australis* Seagrass Meadows of the Manning-Hawkesbury Ecoregion as a Matter of National Environmental Significance; to explain what it is, why it is threatened and what national protection means.

Summary

- The *Posidonia australis* Seagrass Meadows of the Manning-Hawkesbury Ecoregion ecological community was listed in May 2015 as endangered under Australian national environment law, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- The distribution of the *Posidonia australis* seagrass meadows ecological community occurs within estuaries along a coastline hosting the highest density of human population in Australia and the greatest degree of coastline utilisation in terms of cities, harbours and industry.
- The national Threatened Species Scientific Committee found that this ecological community has undergone severe decline. It is estimated to have an area of occupancy of only approximately 14km² and a generally small and fragmented distribution of patches. These small areas are susceptible to many ongoing pressures such as coastal development, dredging, boat mooring and other boating related activities, catchment disturbance and pollution and climate change.
- The nationally listed seagrass meadows:
 - are an important driver of fisheries productivity and estuarine biodiversity
 - protect water quality by filtering the water, removing and recycling nutrients; stabilise sediment on the seabed; and are an important blue carbon store
 - support a diverse range of fauna—providing habitat, shelter and food resources. Included in this fauna are the protected Weedy Seadragon (*Phyllopteryx taeniolatus*), Manly's population of endangered Little Penguin (*Eudyptula minor*) and various migratory shorebirds. They also provide nursery habitat and feeding grounds for commercially and recreationally important fish species such as various bream, sea mullet and leatherjacket fish species
 - are limited to the Hawkesbury and Manning Shelf bioregions and are known to occur in Wallis Lake, Port Stephens, Lake Macquarie, Brisbane Water, Hawkesbury River, Pittwater, Port Jackson (Sydney Harbour), Botany Bay, Port Hacking and around Broughton Island
 - may correspond to country and have cultural significance to a number of Indigenous groups, including the Worimi, Awabakal, Darkinjung, Guringai (Kuring-gai) Eora, and Dharawal (Tharawal/Dariwal)
 - include six populations of *Posidonia australis* listed as endangered under NSW fisheries management legislation
 - contribute to the health and wellbeing of local residents. For example, by supporting snorkelling, diving, fishing and other recreational activities, including seeing local wildlife.

- National listing aims to secure the future of the species and ecosystem functions within Australia's most threatened ecological communities by:
 - raising awareness
 - taking them into account during approval processes for major new developments
 - stimulating research into seagrass meadows and best practice management
 - encouraging priority support for conservation and recovery efforts.
- The national **Conservation Advice** outlines a range of priority research and management actions that provide guidance on how to protect, manage and restore the ecological community. The listing promotes a co-ordinated, ecosystem-scale approach to coastal threat abatement and recovery. Activities likely to have significant adverse impacts on the ecological community need to be considered under national environment law to avoid or mitigate those impacts—activities such as large new developments, works or infrastructure that involve permanently removing or impacting on large areas of an ecological community. These activities will need to be referred for an environmental impact assessment and approval.
- Activities which were routine or began before the listing of an ecological community can typically continue without referral/approval. Such exemptions apply to activities that were either already legally approved (termed 'prior authorisation'), or are ongoing (termed 'continuing use').
- Overall, national listing reduces the risk of this unique and important ecological community being lost for future generations and supports efforts to restore coastal biodiversity and ecosystem health.



Mixed species seagrass meadow: *Posidonia australis*, *Halophila* sp., *Zostera* sp. © Aaron Wright

National ecological communities

Australian national environment law provides a legal framework to list, protect and manage Matters of National Environmental Significance, which include nationally threatened species and ecological communities.

National environment law defines an ecological community as an assemblage of native species which inhabits a particular area in nature. In other words, ecological communities are groups of native plants, animals and other organisms that naturally occur together and interact in a unique habitat.

The native plants and animals in an ecological community have different roles and relationships that, together, contribute to a healthy functioning natural environment.

Listed ecological communities may become extinct, through loss of extent, loss of characteristic species, and/or loss of natural function throughout their range, unless threats are removed or better managed. Even though ecological communities listed as threatened are compromised, remnants retain important natural values and have the potential to provide more habitat and ecosystem services, if threats are eliminated or managed to reduce their impacts, and the natural composition and function of the ecological communities are restored.

National protection complements other conservation measures and is particularly vital for ecological communities such as the *Posidonia australis* seagrass meadows, as only a low proportion of remnants are protected in conservation reserves.

What is the *Posidonia australis* seagrass meadows ecological community?

Posidonia australis is a sub-tidal meadow-forming seagrass species. The nationally-listed ecological community is the assemblage of plants, animals and micro-organisms associated with seagrass meadows dominated by *Posidonia australis* occurring in the warm temperate Manning Shelf and Hawkesbury Shelf bioregions, on the east coast of Australia. The ecological community typically occurs in subtidal waters at depths ranging from less than 1m to 10 m, on sand and silty mud substrate.

The *Posidonia australis* Seagrass Meadows of the Manning-Hawkesbury Ecoregion ecological community occurs mostly within the sheltered environments of permanently open estuaries, from Wallis Lake to Port Hacking. *Posidonia australis* dominated seagrass meadows occurring around islands within the geographical range are also included within the nationally-listed ecological community.

Seagrasses play a role in supporting biodiversity, providing habitat, stabilising sediments, protecting water quality and sequestering carbon. Of the three dominant species of seagrass in south eastern Australia (*Halophila ovalis*, *Zostera muelleri* subsp. *capricorni* and *Posidonia australis*), *Posidonia australis* is considered to provide the most structural complexity to seagrass habitat and play the most vital role in ecosystem processes.

In order to aid in the identification of the nationally-listed ecological community, there are some features that can be utilised including: key diagnostic characteristics, condition thresholds and a patch definition (see 'How is the ecological community identified?' section on page 12 of this guide).



Vegetation

Posidonia australis is the foundation species for this ecological community. It is long lived, with persistent rhizomes, and is meadow forming. *Posidonia australis* fronds can grow to over 80 cm long and as much as 90 per cent of the mass of the plant may be in the roots and rhizomes. As one of the slower growing species of seagrass, it can be particularly slow to recover from damage.

Meadows of the ecological community occur as almost pure stands of *Posidonia australis* | (monospecific meadows) or multispecies meadows dominated by *Posidonia australis* (for example, with *Zostera muelleri* subsp. *capricorni* and *Halophila ovalis* also occurring within the meadow). The spatial structure of the meadows is highly variable, ranging from nearly continuous to fragmented and arranged in mosaic discrete patches.

Areas of bare sand or other seagrass species that occupy edges, blowouts (i.e. areas in the seagrass meadow stripped of seagrass through natural or human disturbance) and small areas of meadows are common in both continuous and patchy meadows of the ecological community. In some cases, sparse meadows of the ecological community may have an understorey of other small seagrass species e.g. *Halophila ovalis*. The aquatic plant *Ruppia* sp. may also be found growing within the community.

Above: *Posidonia australis* meadow © Fisheries NSW

Below: The wide strap-like leaves of *Posidonia australis*
© Aaron Wright



The wide, strap-like leaves of *Posidonia australis* provide a surface for the establishment of a diverse collection of other aquatic plants (epiphytes) and a complex mixture of microbes, cyanobacteria and algae (periphyton). The epiphytes and some components of the periphyton can photosynthesise and contribute significantly to the overall primary production of the ecological community. The amount of cover of epiphytes on the seagrass depends largely on the nutrients available in the water – generally, more nutrients means more epiphytes.



Fauna

The seagrass meadows provide habitat, shelter and food resources for a large diversity and abundance of fauna. The fauna that are part of the ecological community may be classified into four major groups:

- Infauna – animals living in the sediment amongst the rhizomes (stems) of the seagrass.
- Motile epifauna – smaller, mobile animals associated with the surface of the sediment, often amongst seagrass debris, or on seagrass stems or leaves.
- Sessile epifauna – permanently attached animals living on seagrass stems or leaves.
- Epibenthic fauna – larger, mobile animals which are broadly associated with seagrass meadows rather than with individual seagrass plants.

Polychaete worms, crustaceans (e.g. Striped Shrimp (*Palaemon intermedius*)) and molluscs (e.g. Sydney Cockle (*Anadara trapezia*)) dominate the infauna and motile epifauna of the ecological community. These faunal groups process a significant portion of the primary production of the ecological community (energy from the seagrass) and provide an important food source for larger animals.



Posidonia australis dominated seagrass meadow © Aaron Wright

Opposite Page (Top row, from left):

Eastern King Prawn (*Melicertus plebejus*) in Camp Cove Sydney Harbour © E. Schlogl,

White's seahorse (*Hippocampus whitei*) among *Posidonia australis* seagrass © David Harasti,

Six-spine Leatherjacket (*Meuschenia freycineti*), © A. Newton, Department of the Environment and Energy,

Rough Leatherjacket (*Scobinichthys granulatus*) © John Turnbull,

Wide-bodied Pipefish (*Stigmatopora nigra*) © David Harasti,

Eastern Blue Groper (*Achoerodus viridis*) © David Harasti

The majority of epibenthic fauna associated with the ecological community only use it for a small part of their life history, as a temporary foraging area or refuge from predation. The ecological community provides nursery habitat to the commercially important Yellowfin Bream (*Acanthopagrus australis*), Black Bream (*A. butcheri*), Sea Mullet (*Mugil cephalus*), Luderick (*Girella tricuspidata*), Fanbelly Leatherjacket (*Monacanthus chinensis*), Six-spine Leatherjacket (*Meuschenia freycineti*) and Yellowfin Leatherjacket (*Meuschenia trachylepis*).

The most commonly found fish within the ecological community are from the families Syngnathidae (including the Weedy Seadragon), Clupeidae (herrings and ilishas), Latridae (trumpeters), Monacanthidae (leatherjackets), Gobiidae (gobies), Kyphosidae (drummers and sweeps), Hemiramphidae (garfishes) and Mugilidae (mullets).

The following species are typically associated with *Posidonia australis* meadows in the warm temperate Manning Shelf and Hawkesbury Shelf bioregions, not the adjacent cool temperate Batemans or Two Fold Shelf bioregions: Stars-and-Stripes Puffer (*Arothron hispidus*), Eastern Frogfish (*Batrachomoeus dubius*), Longtail Catfish (*Euristhmus lepturus*), Ghost Shrimp (*Lucifer hansenii*), Moses' Snapper (*Lutjanus russellii*), Dusky Leatherjacket (*Paramonacanthus otisensis*), Asian Blue Swimming Crab (*Portunus pelagicus*), Yellowtail Barracuda (*Sphyrna obtusata*) and Southern Cardinalfish (*Vincentia conspersa*).



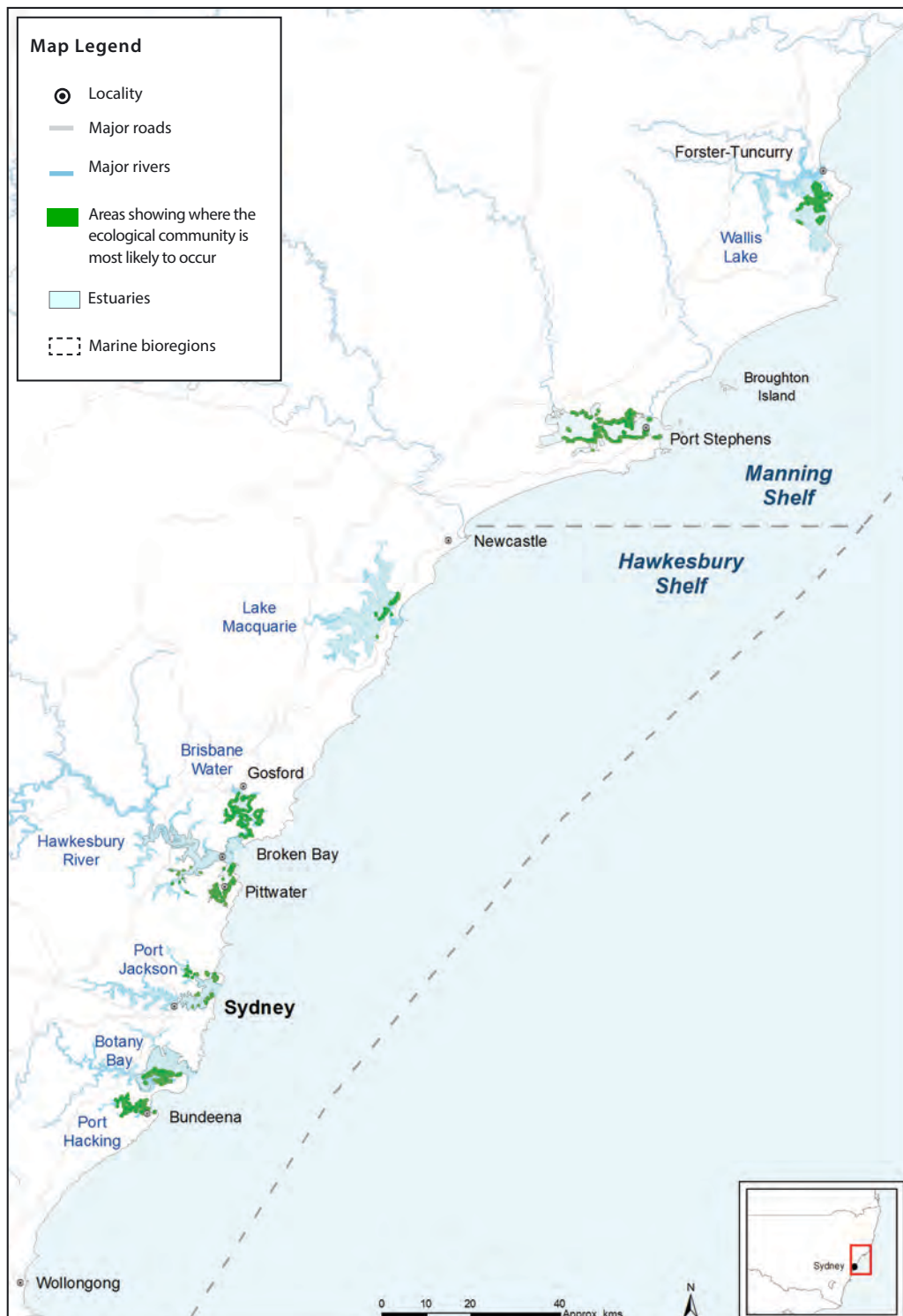
Spotted Pipefish (*Stigmatopora argus*) © David Harasti



From top: *Posidonia australis* fruit © Hugh Kirkman, Orate Wobbegong (*Orectolobus ornatus*) in a meadow of *Posidonia australis*
© David Harasti

Where does the *Posidonia australis* seagrass meadows ecological community occur?

The ecological community occurs between Wallis Lake in the north and Port Hacking in the south, within the Manning Shelf and Hawkesbury Shelf IMCRA v4.0 (Integrated Marine and Coastal Bioregionalisation of Australia Version 4.0) bioregions. These two bioregions have similar biota and are at times described as a single ecoregion. Seagrass meadows are known to occur at the following locations: Wallis Lake, Port Stephens, Lake Macquarie, Brisbane Water, Hawkesbury River; Pittwater; Port Jackson (Sydney Harbour); Botany Bay; Port Hacking; and in the lee of Broughton Island.



How is the ecological community identified?

This section summarises the patch, key diagnostic characteristics, and condition threshold concepts for the nationally-listed ecological community. Full details can be found in the **Conservation Advice**.

What is a patch?

A patch of the ecological community is defined as a *Posidonia australis* dominated seagrass meadow. The edge of the seagrass meadow is defined as the edge of the contiguous seagrass cover. A patch may include small scale bare areas or substrate (e.g. sand) or small scale disturbances or low condition areas such as boat mooring and propeller scours or blowouts that do not fully alter the functionality of the meadow (i.e. ecological processes such as refuge or nursery function).



Posidonia australis dominated seagrass meadow © Aaron Wright

Key diagnostic characteristics

Key diagnostic characteristics are intended to aid the identification of a patch of the ecological community. For the *Posidonia australis* seagrass meadows ecological community, the key diagnostic characteristics are:

- Occurs within the Manning Shelf and Hawkesbury Shelf bioregions (IMCRA v4.0) from Wallis Lakes to Port Hacking.
- Occurs in shallow sub-tidal coastal waters (<10 m) in locations with protection from high wave energy, typically, permanently open estuaries.
- Consists of seagrass meadows $\geq 0.01 \text{ km}^2$ (1 ha) and dominated (i.e. > 50 per cent of total seagrass cover) by *Posidonia australis*.
- Occurs on sand or silty mud substrate.

Condition thresholds

Condition and size thresholds provide guidance for when a patch of a threatened ecological community retains sufficient conservation values to be considered as a Matter of National Environmental Significance, as defined under national environment law. This means that the referral, environmental assessment, approval and compliance provisions of the national environment law are focused on the most valuable areas of the ecological community. In addition, management actions should, where feasible, aim to restore patches to at least meet the minimum good condition thresholds outlined below.

	Meadow Size		
	Small ($\geq 0.01 - 0.1 \text{ km}^2$) ($\geq 1 - 10 \text{ ha}$)	Moderate ($\geq 0.1 - 1 \text{ km}^2$) ($\geq 10 - 100 \text{ ha}$)	Large ($\geq 1 \text{ km}^2$) ($\geq 100 \text{ ha}$)
Percentage seagrass cover of total meadow area	> 50%	> 30%	> 20%
	and	and	and
Minimum shoot density of <i>Posidonia australis</i>	100 shoots/m ²	25 shoots/m ²	10 shoots/m ²

Figure 1. Table showing the good condition thresholds to help identify good quality patches of seagrass

Are all patches protected under the national listing?

No. National listings of ecological communities specify low or minimum condition thresholds that help to identify patches that are too degraded for the purposes of protection under national environment law. This allows national protection to focus on the best and most intact patches that remain of a listed ecological community.

Protected patches (meadows)

A meadow or patch should first be identified as being the ecological community, using the descriptive information above, and the key diagnostic characteristics. Then, condition thresholds are applied—the ecological community is only protected under national environment law when it remains in relatively good condition.

Unprotected patches (meadows)

Although not part of the protected ecological community listed under national environment law, it is recognised that any meadows or patches which do not meet the minimum good condition thresholds may still retain important natural values; particularly if they are near patches which do meet the minimum good condition thresholds. As such, these patches

should not be excluded from recovery and other management actions. Such actions may improve these patches to the point that they may be regarded as part of the ecological community fully protected under national environment law. They may also be protected under state and/or local laws or schemes.

Further details

For further details of how to determine whether a patch of *Posidonia australis* seagrass meadow meets the definition and condition thresholds for the national ecological community see the **Conservation Advice** at: www.environment.gov.au/biodiversity/threatened/communities/pubs/127-conservation-advice.pdf

The condition of the ecological community is best assessed when:

- most plants are exhibiting maximum leaf growth, which usually occurs during the spring and summer
- a reasonable interval – e.g. four months – is allowed after a significant disturbance to allow for regeneration of *Posidonia australis* canopy to become evident and be identified. A significant disturbance may be natural, such as a storm, or human induced, such as dredging or boat damage.



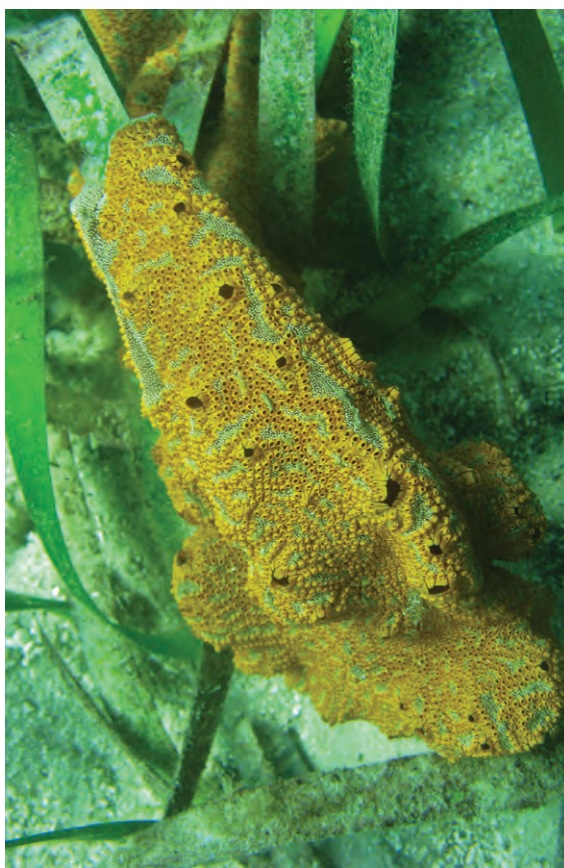
From Left: Stars and Stripes Puffer (*Arothron hispidus*) © David Harasti, Sparse *Posidonia australis* seagrass meadow © Aaron Wright

Why is the *Posidonia australis* seagrass meadows ecological community important?

The ecological community provides habitat for a diverse number and variety of plants and animals including nursery habitat for many important fish and invertebrate species (including commercially harvested species). It also supports estuarine food webs by providing a surface for other plants (as epiphytes) and animals (as epifauna) to grow on, and which become a source of food for larger foraging animals, including invertebrates and fish. In addition, the *Posidonia australis* meadows stabilise sediments and prevent erosion of nearshore areas by mitigating currents and reducing wave energy, protect water quality and sequester carbon. All of these processes rely on *Posidonia australis* meadows having an intact, well developed leaf canopy.

The presence of *Posidonia australis* is critical to the survival of the ecological community. *Posidonia australis* plays a significant role in ecological and biogeochemical processes. No other species can provide the habitat structure required to support the other component species and ecosystem services. *Posidonia australis* is the functionally important foundation species in the ecological community. It is a long lived, slow growing perennial, that is very good at stabilising estuarine sediment. *Posidonia australis* meadows can often be very dense and persist for decades. It has been calculated that intact meadows of *Posidonia australis* may have taken centuries to establish. They are considered to provide the greatest habitat structure of any of the seagrass species found in New South Wales.

Some of the ecological community also occurs within the boundaries of Towra Point Nature Reserve Ramsar site and Myall Lakes Ramsar site. These sites are protected under the Ramsar Convention that aims to halt the worldwide loss of wetlands and conserve those that remain. The ecological community provides critical ecosystem services, forming part of the ecological character of the Ramsar sites.



From Top: The ascidian species, *Botrylloides leachii* in *Posidonia australis* meadow © Marie-Claire Demers, Blue Dragon Nudibranch (*Pteraeolidia ianthina*) © David Harasti

Threats to the ecological community

The ecological community is subject to a number of demonstrable and ongoing threats causing loss or decline of *Posidonia australis* thereby disrupting community integrity and ecological and biogeochemical processes. In some areas (e.g. Sydney Metropolitan region), these threats, coupled with the reduced ability of the *Posidonia australis* to recover after disturbance, could cause the ecological community to be lost in the next 15 years or three generations of *Posidonia australis*.

These threats include:

- **Coastal development** includes the construction of ports, buildings, infrastructure and also foreshore structures, such as moorings, jetties, and boat ramps. This can impact the ecological community directly through removal of seagrass, and indirectly through shading which limits the photosynthetic capacity of the seagrass. Localised dieback of seagrasses is also possible due to: increased runoff, sedimentation and pollution that decrease water and sediment quality; and changed wave or current patterns and sediment stability that lead to erosion or burial of the seagrass.
- **Invasive species** such as the pest alga *Caulerpa taxifolia* can impact the ecological community by potentially colonising areas previously occupied by *Posidonia australis* and preventing the complete recovery of the ecological community. Parts of the ecological community that are already under stress from other human disturbances might become more susceptible to impacts from *Caulerpa taxifolia*.
- **Climate change** can impact the ecological community in a number of ways. These include sea level rise, increased turbidity due to erosion of coastlines, changes in sea temperatures, UV radiation and increased frequency of natural disturbance regimes such as storms and cyclones.
- **Boat mooring** can produce circular scours in the meadows as a result of the slack chain from the mooring moving through the seagrass with each wind direction change. The ecological community favours sheltered conditions which are also preferred sites for boat moorings. In shallow water, boat propellers can also remove seagrass leaves and rhizomes, leaving scars in the meadows.
- **Catchment disturbance and pollution** impacts the ecological community by increased inputs from a range of pollutants associated with catchment disturbance including sediment, nutrients, metals, hydrocarbons, industrial compounds and litter to the associated estuary. Elevated levels of nutrients, including nitrogen and phosphorus, can trigger phytoplankton blooms or excessive epiphyte growth, reducing the amount of light received for photosynthesis by the seagrass leaves and potentially smothering the ecological community.
- **Fishing** by recreational and commercial fishers can result in damage to seagrass meadows from boats, fishing gear and people e.g. wading through meadows and bait digging.
- **Dredging** is carried out to maintain existing ports and navigation channels, for expansion to allow larger ships to have access and for the construction of new ports, as well as other activities such as land reclamation, beach nourishment, laying of pipes and cables and sand mining. The ecological community can be impacted by dredging directly through physical removal of *Posidonia australis* at the dredge site, or smothering by sediments at the dredge disposal site. Indirect impacts also occur through the generation of turbid plumes by sediment particles which are suspended in the water column and reduce light reaching the meadows, and changes to the hydrology of the area, wave or current patterns, or sediment stability with consequent impacts on meadow integrity and water quality.

Why does the ecological community need national protection?

Historical aerial photography and field observations indicate that the most significant losses of the ecological community occurred prior to the mid-1980s, but many pressures remain. The distribution of the ecological community occurs within estuaries along a coastline hosting the highest density of human population in Australia and the greatest degree of coastline utilisation in terms of cities, harbours and industry. This makes the ecological community susceptible to many environmental stresses such as increased nutrients and sediment, dredging, land reclamation and damage from fishing and boating.

In May 2015, the Australian Government Minister for the Environment listed the *Posidonia australis* seagrass meadows ecological community, after considering the advice of the independent Threatened Species Scientific Committee (the Committee). A rigorous assessment of the scientific evidence found that it met the eligibility criteria for listing as endangered under Australian national environment law.



The Committee found that the ecological community:

- has a restricted distribution with both a small area of occupancy (approx. 14 km² remaining) and generally small and fragmented distribution of patches that are subject to multiple threats
- experienced a severe reduction in community integrity due to a range of threats causing loss or decline of *Posidonia australis*, thereby disrupting its critical role in maintaining community health.

Two key drivers of integrity reduction are increased fragmentation and reduced water quality. The ability of *Posidonia australis* to naturally recover from habitat fragmentation is considered extremely low given its slow rate of growth. Once a meadow is fragmented, the seafloor sediment becomes vulnerable to erosion, potentially resulting in further seagrass decline. Often, loss of the ecological community leads to irreversible changes in the nature of the environment and habitat, rendering the site unsuitable for restoration.

By listing the ecological community, additional protection is given to national, state and regionally threatened native animals and plants, and to migratory species. These include state-listed animal species such as: Weedy Seadragon, a protected species under the NSW *Fisheries Management Act 1994*; and Manly's population of Little Penguins, listed as endangered under the NSW *Biodiversity Conservation Act 2016*. The seagrass meadows are an important foraging habitat for Little Penguins.



From left: *Posidonia australis* seagrass meadows provide refuge and feeding grounds for Manly's endangered population of Little Penguin © Brian Furby Collection, The protected (NSW *Fisheries Management Act 1994*) Weedy Seadragon © David Harasti



Posidonia australis dominated seagrass meadow © Aaron Wright

What are the benefits of listing the ecological community as nationally threatened?

There are a number of benefits of listing and protecting ecological communities under Australian national environment law:

- It can protect and recover habitat resources critical for refuge and recruitment of the native species of the region, including threatened species, other species under local pressure and species important for ecosystem function. In turn, this helps foster the ecosystem services associated with the ecological community.
- It helps protect ecological communities from future significant human impacts causing further decline. The aim of the national environment law is to ensure the Matters of National Environmental Significance are given due consideration, along with broader economic, social and other issues in the planning of any large projects. Where possible, significant adverse impacts to the environment should be avoided. If the impacts are unavoidable, they must be mitigated, reduced or, as a last resort, offset.
- It encourages agencies and community groups to apply for funding opportunities for conservation and recovery works that will address threats to the ecological community. The Australian Government has research programs available to help conserve biodiversity and ecosystem services.
- A **Conservation Advice**, published at the time of listing, provides guidance for environmental decision-making, including priority research, conservation management and restoration actions.
- In the case of the *Posidonia australis* seagrass meadows ecological community, the listing aims to:
 - raise awareness about the ecological community, the threats it faces and priority actions to combat these threats
 - provide seascape-scale protection that complements existing national and state protection for threatened species and populations that are found within the ecological community
 - protect and restore the environmental values, including the ecosystem functions and services associated with the ecological community, contributing to the long-term productivity of the seascape.

What can I do to look after the ecological community?

To protect and promote the recovery of seagrass meadows in your area you can:

- join or set up a community-based seagrass monitoring program to monitor the condition of the ecological community and water quality
- practice environmentally responsible boating by not anchoring in, or mooring boats over, the seagrass meadows; replacing swing moorings with environmentally friendly moorings; avoiding boating (particularly propeller use) over shallow areas of the ecological community
- ensure that foreshore structures such as jetties, boat ramps, pontoons etc (and their use) do not damage or shade the seagrass meadows. Replace decking of jetties with mesh decking to allow sunlight penetration to underlying seagrass beds
- avoid single-use plastics (e.g. straws), recycle and dispose of waste wisely to reduce the impact of storm water pollution on the seagrass meadows
- ensure dredging and reclamation projects are sensitive to adjacent seagrass beds
- avoid walking through seagrass areas at low tide and digging for bait in seagrass beds
- support local efforts to conserve native vegetation and wildlife in your area by joining a local organisation, such as a Landcare/Coastcare or catchment group, natural history or a 'friends of' group, or by volunteering for Conservation Volunteers Australia. Protect river bank vegetation by controlling stock access to creeks and drainage lines and replant native vegetation to prevent bank erosion and downstream movement of sediment
- promptly report sewer overflows. Maintain septic tanks and pumps so that they do not leak
- be careful when applying fertilisers and pesticides to your lawn if you live near the coast or along a river. Use only the amount of fertiliser required and consider using a slow-release fertiliser. Gutters and storm drains transport excess lawn chemicals to the water
- try and use natural cleaning products in your home (e.g. bi-carb soda and vinegar) to reduce nutrients and chemicals going into the bay
- appropriately dispose of unwanted fishing tackle, including waste fishing line, hooks and bait bags.

The **Conservation Advice** gives further details of priority conservation actions for the ecological community.



The decline in extent of seagrass due to boat mooring can be shown by the clear rings amongst the seagrass meadow © Map data: Google, AEROMETREX & JACOBS

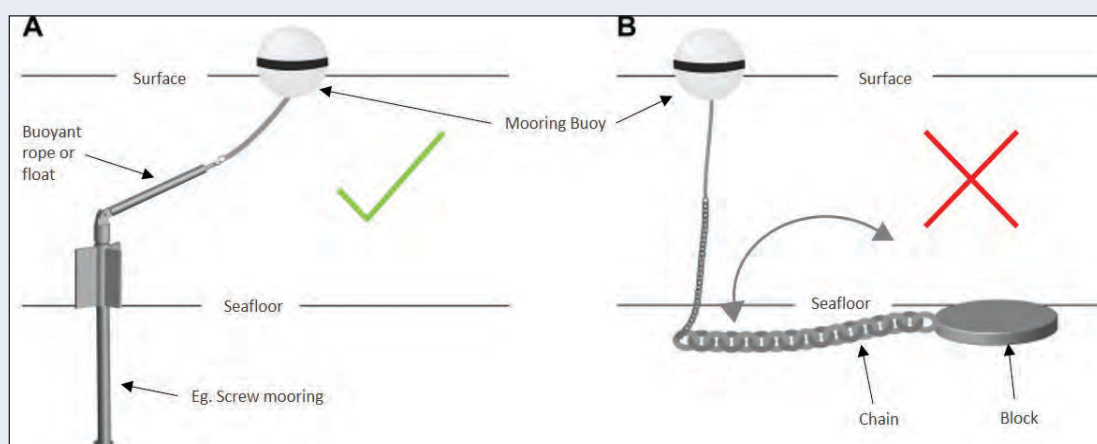
Environmentally friendly moorings

Traditional boat swing moorings, consisting of a block and chain (Figure B), are known to cause significant damage to seagrass meadows. The apparatus is made up of a heavy block that rests on the seafloor, attached to a heavy chain and a mooring buoy. The boat is attached by rope to the buoy and as the wind direction or tide changes, the boat swings around the mooring block, dragging the slack chain along the seafloor. This produces bare circular scour patch in the seagrass bed which can range in extent depending on the size of the boat. As a result these scours destabilise the seafloor sediment and seagrass meadows can be fragmented into isolated patches.

The negative impact from swing moorings has driven the development of alternative environmentally friendly mooring (EFM) designs. EFMs cause less damage to the seagrass meadows by ensuring there is minimal contact between the mooring and the seagrass bed, while still allowing boats to be properly secured. They avoid a heavy chain dragging along the seafloor and therefore reduce the environmental impact and damage that can occur with conventional block and chain moorings. Typical methods include replacing the

chain component of a conventional swing mooring with a buoyant elasticized rope or 'bunty', or with a mechanical shock absorber housed in a float. Both of these can be attached to either the existing or a new mooring block. A screw-in mooring structure (Figure A) is an example of an EFM that is drilled into the seabed and fixed in one location. While there are many alternative styles of EFMs on offer, research into this field is currently evolving; therefore other improved options may become available in the future.

Various trials have taken place within the range of the ecological community, including Manly Cove, Shoal Bay and Pittwater, using different types of EFMs, with generally positive results. However, due to the slow growing nature of *Posidonia australis*, following the removal of traditional block and chain moorings, replanting may be needed to assist with the restoration of this ecological community. Shading impacts from boat moorings and spread of invasive species are other concerns from boat moorings, so reducing the number, time spent and/or size of boats in areas with seagrass meadows would also be ideal, whenever that is possible.



Schematic representation of a typical (A) 'screw' mooring system and (B) 'swing' mooring system, adapted from © Demers et al. 2013¹

¹ Demers, M. A., Davis, A. R. & Knott, N. A. (2013). A comparison of the impact of 'seagrass-friendly' boat mooring systems on *Posidonia australis*. *Marine Environmental Research*, 83 (N/A), 54-62.

What does the listing mean for water users?

Business as usual for most routine activities.

The overall aim of nationally listing the ecological community is to prevent its decline and support efforts to ensure its long-term survival. It is important to note that national environment law is only triggered if a particular activity has, or will have, a significant impact on a Matter of National Environmental Significance—in this instance, a listed nationally threatened ecological community.

Activities carried out in line with state laws and guidelines covering aquatic vegetation, fish habitat and fishing often do not require referral under national environment law. Additionally, an ecological community listing will only apply to species that are native and natural to the ecological community. For example, fishing for introduced species is not regulated by national environment law.

Routine activities not requiring national environment law referral include the following:

- recreational fishing within legal zones and limits
- commercial fishing within approved sustainable catch limits
- lawful recreational boating
- collection of seagrass washed up on beaches.

In all these cases, water users are encouraged to avoid any impacts on patches of the ecological community where possible and to help restore remnants.

The likelihood that an action will have a significant impact on the ecological community depends on local conditions, the quality of the patch, and upon the intensity, duration, magnitude and geographic extent of the impacts.

Activities with national environment law approval prior to the listing of this ecological community, do not need to seek further approval.

How does listing impact recreational fishing?

Recreational fishing is regulated in all states and territories. These regulations guide the activities of anglers through measures such as fishing gear restrictions; size and bag limits; and closed fishing seasons. The legal catch of a recreational angler is unlikely to constitute a significant impact on native fish species and thus the ecological community, and as such, recreational fishers can continue to enjoy their fishing within the existing rules. Fishers should try to avoid direct damage to the seagrass beds, as described in the ‘Threats to the ecological community’ section on page 15 of this guide.

How does the listing impact commercial fishing?

Commercial fishing in Australia is managed by Commonwealth, state and territory governments. Approved commercial fishing activities can continue within existing rules.



Posidonia australis with epiphytes © Aaron Wright

Referral required for actions likely to have a significant impact

Consideration under national environment law is only triggered if an action is likely to have a significant impact on the *Posidonia australis* seagrass meadows ecological community. If a proposed action (e.g. development project) could have such an impact it would require a referral to the Australian Government. If the proposed action is not likely to be significant, approval is not required if the action is taken in accordance with the referral. Consequently, the action can proceed (subject to any state or local government requirements). If it is determined that the action is likely to have a significant impact on the ecological community (and/or other Matters of National Environmental Significance), then it is typically declared a controlled action and it would require:

- an assessment (the scope and approach of the assessment will depend upon matters such as the details put forward in the referral, other relevant reports or documentation, whether an accredited assessment process or some other agreed arrangement is in place, and the complexity of the proposed action and impacts)
- a decision by the Minister (or delegate) on approval and any conditions of that approval. When making an approval decision, the Minister must have regard to the approved conservation advice and consider social and economic matters relevant to the action.

Strict timeframes apply to assessments to ensure decisions are made as quickly as possible. For further information on referral, assessment and approval processes, refer to the following website:

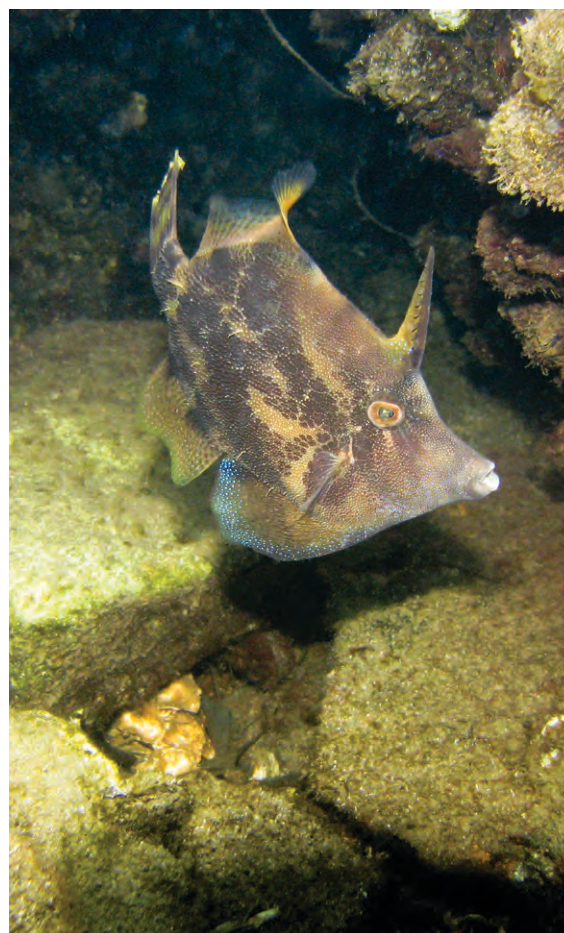
www.environment.gov.au/protection/environment-assessments/assessment-and-approval-process

The key diagnostics and condition thresholds for the ecological community exclude many patches that are considered too degraded for protection. In addition, national environment law provides exemptions for continuing (routine) use or where legal permission has previously been given.

Activities likely to require national referral and assessment include:

- permanently clearing or destroying large areas of the ecological community or native vegetation fringing the estuary
- dumping waste or contaminated water within or adjacent to the ecological community or otherwise changing the water quality around the ecological community
- construction of large buildings or other developments adjacent to or near the ecological community
- expansion of an existing port, or construction of a new port, channel harbour, marina, wharf, or sea wall within or near the ecological community.

To help reduce the significance of actions and referral under national environment law, avoidance and mitigation to reduce clearing and associated impacts is needed in the early planning stage.



Fanbelly Leatherjacket (*Monacanthus chinensis*) in Port Hacking
© Marie-Claire Demers

Are there other nationally protected ecological communities within this area?

Along the coast line and surrounding regions there are a number of other nationally-listed ecological communities including:

- Littoral Rainforest and Coastal Vine Thickets of Eastern Australia
- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland
- Subtropical and Temperate Coastal Saltmarsh

For more information regarding these ecological communities, click on the links above, or visit: www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl

Do state or local environment laws also apply?

Yes. State and local laws may also apply. Information about state-listed ecological communities and vegetation and fisheries management laws are available from the following agencies:

- NSW Office of Environment and Heritage
www.environment.nsw.gov.au/threatenedspecies/
www.environment.nsw.gov.au/vegetation/
- NSW Department of Primary Industries
www.dpi.nsw.gov.au/fishing/marine-protected-areas/aquatic-reserves
- NSW Local Land Services
www.lls.nsw.gov.au

Where can I get further information?

The **Conservation Advice** for the *Posidonia australis* Seagrass Meadows Ecological Community is the definitive source of information on the listing of this ecological community.

For information about the development referral, assessment and approval process, please consult our environmental protection webpages. These can be found on the Department's website—along with additional information about the national environment law and Australian Government programs—as listed below:

- A statutory approved Conservation Advice for the ecological community is on the Department's species profile and threats (SPRAT) database, at: www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=127
- National listing process: www.environment.gov.au/topics/threatened-species-ecological-communities
- National referral, assessment and approval process: www.environment.gov.au/protection/environment-assessments
- National environmental offsets policy: www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy
- Australian Government Natural Resource Management initiatives: www.nrm.gov.au

If you need help to identify if Matters of National Environmental Significance may be present in your area of interest:

- Check the protected matters search tool at: www.environment.gov.au/epbc/pmst/
- Check the species profile and threats (SPRAT) database at: www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
- Consult with relevant experts, such as an ecological consultant, NSW Department of Primary Industries or local NRM agency (e.g. Local Land Services). They may be able to help identify the ecological community and its condition, or
- Enquiries can also be made through the Department's Community Information Unit, by phone on 1800 803 772 (freecall), or email to: ciu@environment.gov.au

environment.gov.au

