

# Endangered populations in NSW: *Posidonia australis* in Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie

Fisheries Ecosystems Unit, Port Stephens Fisheries Institute

## Introduction

*Posidonia australis*, also commonly referred to as strapweed, is a type of seagrass that is endemic (native) to the temperate marine and estuarine waters of the southern half of Australia. In NSW, *Posidonia australis* is found within the protected waters of coastal bays and estuaries and coastal lakes that are subject to frequent tidal flushing.

This seagrass species has been impacted by a range of human activities, particularly in six estuaries within the Sydney and Central Coast region. Populations of *Posidonia australis* in Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie have suffered such a large reduction in abundance and geographic distribution that they have been listed as **endangered populations** under the threatened species schedules of the NSW *Fisheries Management Act 1994*.

This loss is likely to have had significant historical and ongoing impacts on marine and estuarine biodiversity and productivity as *Posidonia australis* plays an important role in providing nursery areas, feeding grounds and shelter for many aquatic animals.



Figure 1: *Posidonia australis* generally has green or brown leaves, often with algae growing on them. Photo: Justin Gilligan.

## Description

Seagrasses are flowering plants that live and reproduce entirely within seawater. Seagrasses are not related to seaweeds.

*Posidonia australis* is the largest of the eight species of seagrass that occur in NSW waters and has strap-like leaves that can reach up to 60 cm in length. New leaves are bright green, and mature leaves are often more brown in colour and commonly covered in epiphytes (which are smaller algae species that attach themselves to the leaf surface, see figure 1). Leaves are typically between 10–20 mm wide, but can be as little as 6 mm in very young plants.

Each shoot along the rhizome (the horizontal stem that runs between plants and helps to anchor the plant) carries 2–4 leaves. The rhizomes are usually buried and are 1–2 cm thick.

The leaves of this species are produced constantly throughout the year, but growth is slower during the winter months. Old leaves are shed regularly and accumulate in the shallows and on shore (known as “wrack”).

## Habitat and ecology

The Posidoniaceae family contains nine species, but *Posidonia australis* is the only member of the family that occurs in NSW. Seven other species occur elsewhere in Australia, and the remaining member of the family is found in the Mediterranean Sea.

Within NSW, *Posidonia australis* occurs from Wallis Lake in the north to Twofold Bay in the south, with a few isolated populations found along the coastline and at offshore islands. Maps showing the current known distribution of the endangered populations of *Posidonia australis* can be seen in the maps below.

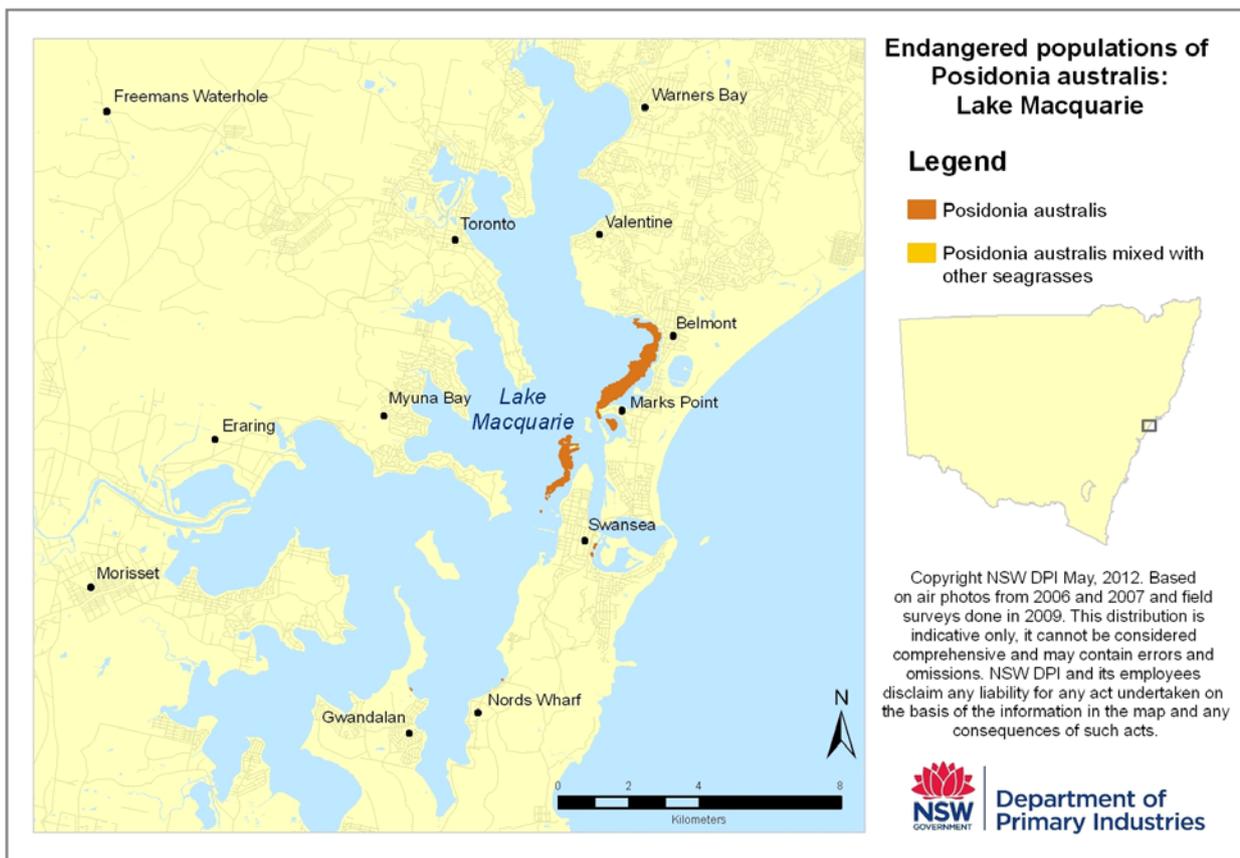


Figure 2: Map showing the known extent of the endangered population of *Posidonia australis* in Lake Macquarie.

The species can grow in coarse sandy to fine silty sediments between the low tide line and approximately 10 m depth. It may also occur in deeper water if water clarity is good.

It can form large, dense stands (called meadows), and is also often found mixed with other species of seagrass such as *Zostera* (eelgrass) and *Halophila* (paddleweed).

The expansion of meadows of *Posidonia australis* occurs primarily by the lateral (sideways) growth of the rhizomes.

Sexual reproduction is via the production of monoecious flowers (male and female reproductive organs on the same plant) that are pollinated underwater. *Posidonia australis* fruits in November and the floating fruits are distributed by currents before splitting open to expose the seed.

Successful recruitment of *Posidonia australis* from seed has rarely been observed by researchers. Many fruits tend to be blown onto shore where most of the seeds are thought to perish due to desiccation.

Seedlings take 2–3 years before producing rhizomes (which help anchor plants) and are thought to be vulnerable to physical disturbance from wave action, storms, currents and smothering during this time.

Intact stands of *Posidonia australis* have the ability to grow quite rapidly, however if the growing tips of

the rhizomes are damaged, the plants cease to establish lateral rhizome runners and are very slow to recover. For example, it can take up to 50 years to close a gap of 1 m following damage to these tips.

As a result of the factors listed above, the endangered populations of *Posidonia australis* are unlikely to re-establish naturally to pre-development levels in the short to medium term.

### Why is *Posidonia australis* important?

*Posidonia australis*, along with other seagrasses, is an important driver of fisheries productivity in coastal waters and is crucial to the maintenance of estuarine biodiversity. It provides important feeding and refuge areas for many species of fish, molluscs and crustaceans, many of which are targeted commercially and recreationally (see Figure 3).

All seagrasses contribute organic matter to estuarine food chains. They also stabilise the sea floor and baffle water currents, causing a reduction in sedimentation and assisting to maintain water quality.

Additionally, they help to prevent erosion by stabilising sediments and assist in removing nutrients from the water.

*Posidonia australis* wrack (shedded leaves) that is washed ashore also provides an important habitat and food source for small invertebrates and can provide nutrients to other marine vegetation.

## Why are populations of *Posidonia australis* endangered?

The endangered populations of *Posidonia australis* within the estuaries of Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie are under particular threat due to historical and current intensity of urbanisation and associated disturbance, including:

- direct physical disturbance from dredging and reclamation activities, as well as damage from anchors, boat propellers and boat moorings (which can harm seagrass by scouring as the mooring chain is dragged across the sea bed by the moored vessel, see Figure 5);
- increased sediment entering waterways which can smother seagrass and block the light available for photosynthesis;
- eutrophication (nutrient increase, especially of nitrogen and phosphorus) resulting in an increase in epiphytes which grow on the leaves, reducing the photosynthetic capacity of *Posidonia australis*;
- indirect disturbance from altered tidal and wave regimes (associated with major dredging and foreshore reclamation) and stormwater discharges changing water quality and salinity levels;
- the construction of foreshore structures such as pontoons, jetties and berthing areas which cause direct loss and shading that inhibits the growth of seagrass; and
- potential impacts from invasive species which may have consequences for *Posidonia australis* that is already stressed due to other disturbances.



Figure 3: *Posidonia australis* plays a critical role in providing habitat and feeding grounds for a range of fish and other marine animals. Photo: Justin Gilligan

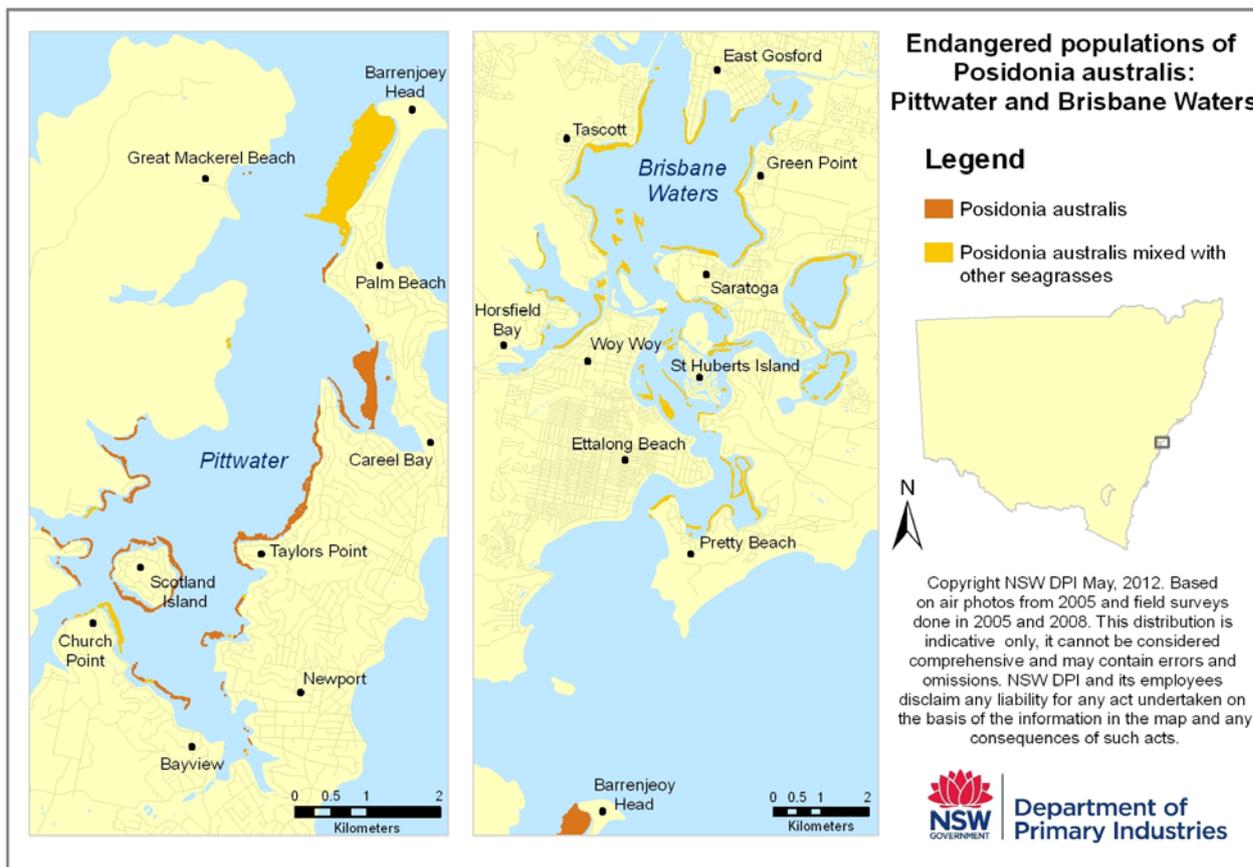


Figure 4: Map showing the known extent of the endangered population of *Posidonia australis* in Pittwater and Brisbane Waters.



Figure 5: Holes have been formed in a large *Posidonia australis* meadow at Marks Point, Lake Macquarie by boat mooring chains scouring across the sea bed. Photo: Tim Glasby.

## Conservation and recovery actions

NSW DPI works with a range of stakeholders, including other State authorities, local councils and community groups, to conserve *Posidonia australis*. Recovery actions for this species include:

- conducting research into the biology and ecology of *Posidonia australis* including cultivation and rehabilitation techniques;
- promoting the replacement of existing moorings within seagrass beds to environmentally friendly moorings;
- avoiding the establishment of new mooring blocks in proximity to *Posidonia australis* plants;
- educating boat owners to avoid anchoring in or mooring boats over fragile *Posidonia* beds;
- improving protection for *Posidonia australis* through land use and coastal zone management planning processes;
- ensuring that structures such as jetties, pontoons, berthing areas, boat ramps and slip rails and their associated use avoid shading or physical damage to *Posidonia australis* beds;
- ensuring that dredging and reclamation activities do not directly or indirectly damage *Posidonia australis* beds;
- preventing sedimentation and poor water quality by improving land management practices, conserving and restoring riparian (river bank) vegetation and using effective erosion control measures;
- educating coastal communities about the ecological importance of *Posidonia australis* and ways to assist with its protection and recovery;
- monitoring and assessing the impact of threatening processes affecting the survival of endangered populations of *Posidonia australis*;
- undertaking compliance action where activities cause unauthorised harm to *Posidonia australis* seagrass.

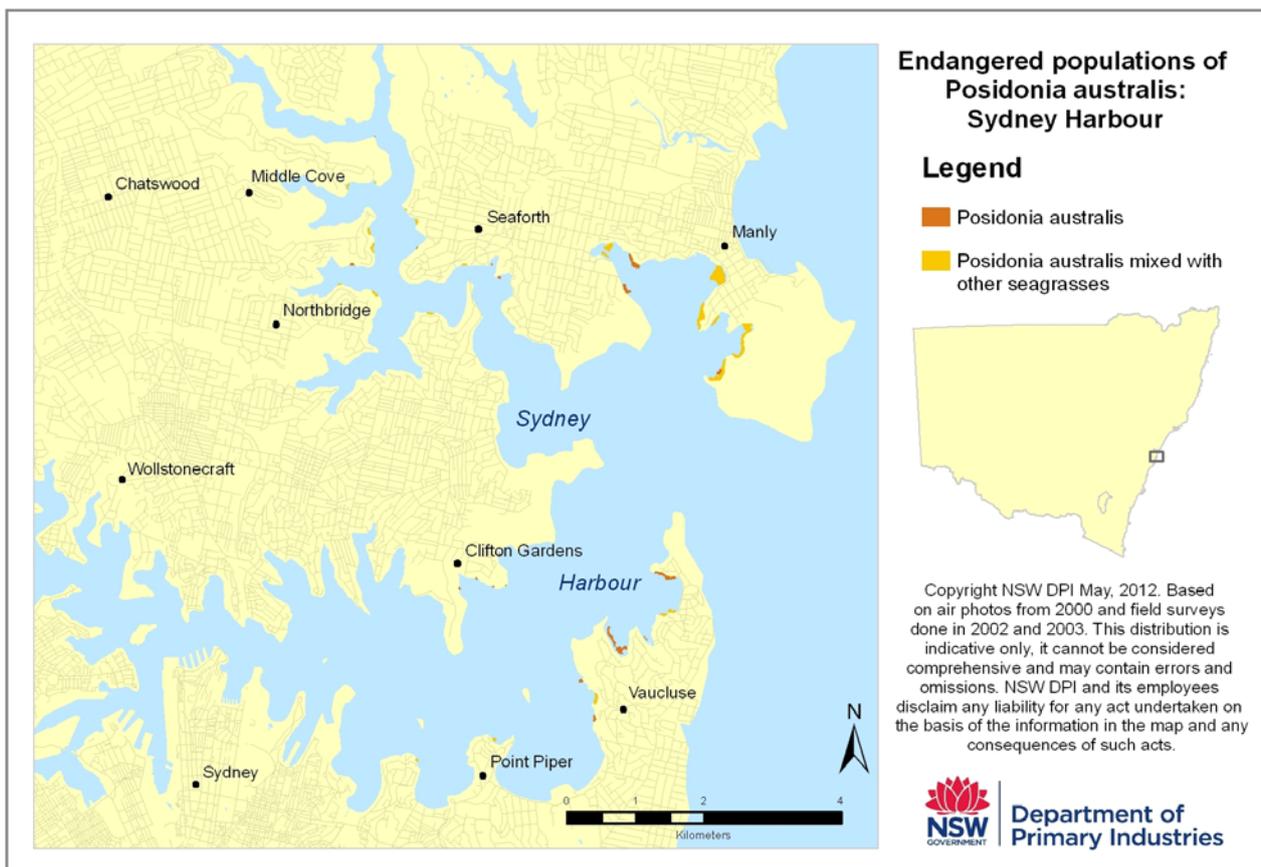


Figure 6: Map showing the known extent of the endangered population of *Posidonia australis* in Sydney Harbour.

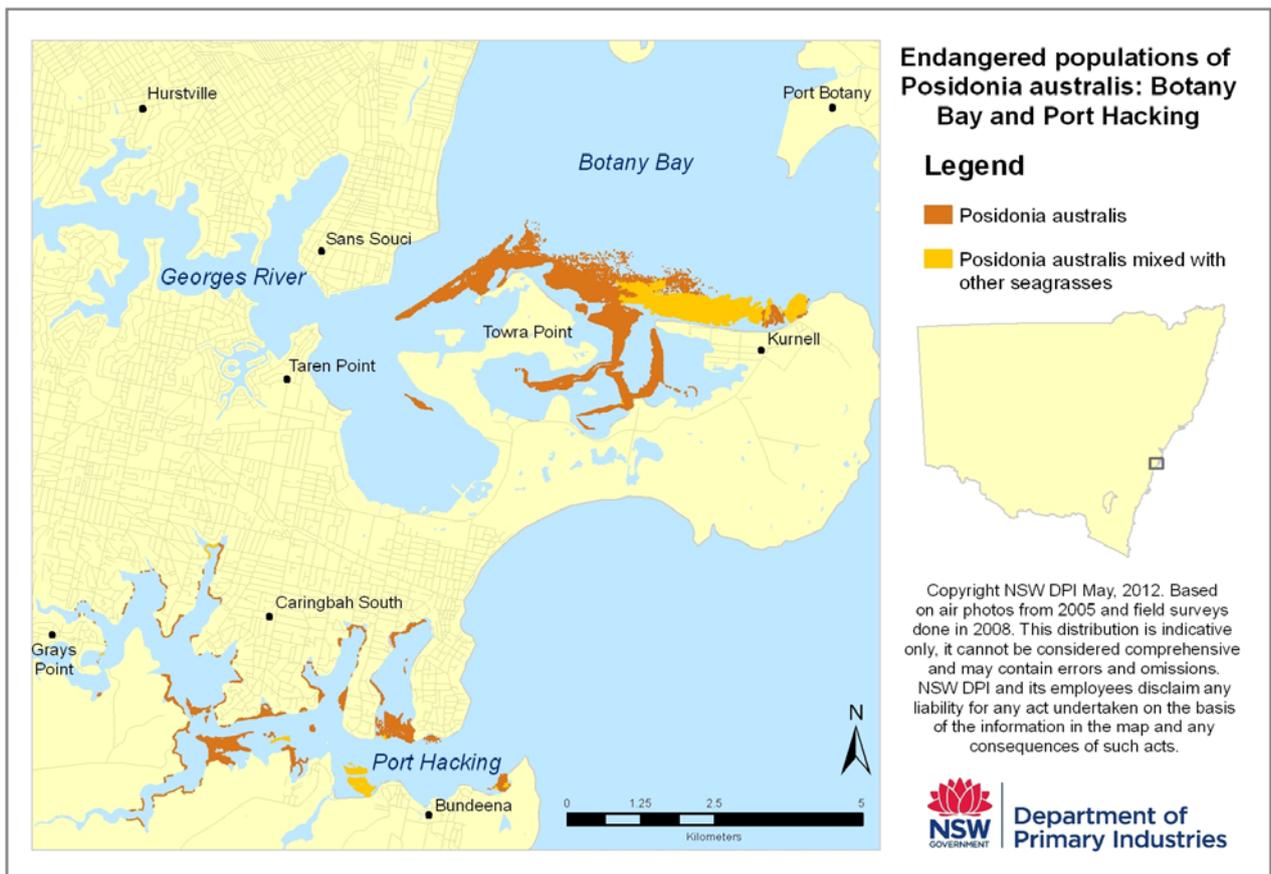


Figure 7: Map showing the known extent of the endangered population of *Posidonia australis* in Botany Bay and Port Hacking.

**You can help too by reporting any illegal activities affecting *Posidonia australis* to your nearest Fisheries Office or to the Fishers Watch Phonenumber on 1800 043 536.**

## Legal implications

It is illegal to harm, buy, sell or possess any *Posidonia australis* from Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie without a specific permit, licence or other appropriate approval. This means you cannot gather, cut, pull up, destroy, poison, dig up, remove, injure, shade or cause any kind of damage to *Posidonia australis* within these waters without an appropriate approval.

Significant penalties apply for harming endangered populations including fines of up to \$220,000 and up to 2 years in prison.

There can also be significant penalties for causing damage to the habitat of an endangered population through actions such as dredging and reclamation or construction, without relevant approvals.

Different types of approvals may be granted, including for:

### i) Research and rehabilitation

NSW DPI may issue permits for collecting live or dead *Posidonia australis* for the purpose of scientific research or for other activities that are for the benefit of the species such as habitat rehabilitation. Permit application forms and more information on research and rehabilitation permits can be found on the NSW DPI website ([www.dpi.nsw.gov.au](http://www.dpi.nsw.gov.au)).

### ii) Development, dredging and reclamation and other activity approvals

Developments or activities that require consent or approval (in accordance with the *Environmental Planning and Assessment Act 1979*) that may impact on an endangered population of *Posidonia australis* or their habitat must be assessed to determine the significance of any impacts. Where significant impacts are identified, a detailed Species Impact Statement must be prepared, and special consultation and concurrence requirements are established.

These types of activities may be authorised, but this is dependant on the particular development or activity and the level of impact. In certain situations

a threatened species licence to harm may be required.

Contact your [regional Fisheries Conservation Manager](#) to discuss requirements for undertaking activities that may cause harm to an endangered population of *Posidonia australis*.

Other legal implications include:

### i) Land Use Planning

State and local government must consult with NSW DPI prior to making environmental planning instruments such as Local Environmental Plans and State Environmental Planning Policies that may adversely affect endangered populations of *Posidonia australis*.

### ii) Recovery Planning

NSW DPI may prepare a recovery plan in accordance with the provisions of the *Fisheries Management Act 1994* to promote the recovery of the endangered populations of *Posidonia australis* to a position of viability in nature.

Strategies to be adopted for promoting the recovery of the endangered populations of *Posidonia australis* must be set out by NSW DPI in the Priorities Action Statement which can be viewed on the NSW DPI website at [www.dpi.nsw.gov.au](http://www.dpi.nsw.gov.au).

## Bibliography and further reading

Bastyan, G.R. and Cambridge, M.L., 2008. Transplantation as a method for restoring the seagrass *Posidonia australis*. *Estuarine, Coastal and Shelf Science*, 79, 289–299.

Fisheries Scientific Committee, 2010. The seagrass *Posidonia australis* as Endangered Populations in Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie (NSW). Final Determination.

Fitzpatrick, J. and Kirkman, H., 1995. Effects of prolonged shading stress on growth and survival of seagrass *Posidonia australis* in Jervis Bay, New South Wales, Australia. *Marine Ecology Progress Series*, 127, 279–289.

Fyfe, S.K. and Davis, A.R., 2007. Spatial scale and the detection of impacts on the seagrass *Posidonia australis* following pier construction in an embayment in southeastern Australia. *Estuarine, Coastal and Shelf Science*, 74, 297–305.

Kirkman, H., 1997. *Seagrasses of Australia*, Australia: State of the Environment Technical Paper Series (Estuaries and the Sea), Department of the Environment, Canberra.

Meehan, A.J. and West, R.J., 2000. Recovery times for a damaged *Posidonia australis* bed in south eastern Australia. *Aquatic Botany*, 31, 361–366.

Meehan, A.J. and West, R.J., 2002. Experimental transplanting of *Posidonia australis* seagrass in Port Hacking, Australia, to assess the feasibility of restoration. *Marine Pollution Bulletin*, 44, 25–31.



Figure 8: Dense and healthy meadow of *Posidonia australis*. Photo: Justin Giligan.

---

© State of New South Wales through Department of Trade and Investment, Regional Infrastructure and Services (NSW Trade & Investment) 2012. You may copy, distribute and otherwise freely deal with this publication for any purpose, provided that you attribute the Department of Trade and Investment, Regional Infrastructure and Services as the owner.

ISSN 1832-6668

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (July 2012). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the Department of Primary Industries or the user's independent adviser.

Published by the Department of Primary Industries, a part of the Department of Trade and Investment, Regional Infrastructure and Services.

Authors: Renata Pronk and Gabrielle Holder.

Trim Reference: PUB12/107