PORT STEPHENS – GREAT LAKES MARINE PARK OPERATIONAL PLAN

November 2010

NSW GOVERNMENT | Marine Parks Authority

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Cover photo: MPA vessel *Argo* undertaking marine park research offshore Port Stephens (Port Stephens – Great Lakes Marine Park photo library).

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EXECUTIVE SUMMARY

The Port Stephens – Great Lakes Marine Park (PSGLMP) was declared on 1 December 2005 under the *Marine Parks Act 1997*. The PSGLMP covers approximately 98,200 hectares of marine, estuarine and coastal lake habitats, extending south from the Cape Hawke Surf Life Saving Club near Forster (31°11'47 S), to Birubi Beach Surf Life Saving Club at the northern end of Stockton Beach (152°04'25 E). The PSGLMP extends from the mean high water mark offshore to the three nautical mile limit of NSW waters and includes all of Port Stephens, the Karuah River, the Myall River, Myall and Smiths lakes and all of their creeks and tributaries to the limit of tidal influence.

The PSGLMP contains a diverse range of habitats including intertidal and subtidal reefs, soft sediments, beaches, seagrass beds, mangroves, saltmarsh, coastal lakes, intermittently open and closed lakes and open waters, which all support distinct groups of plants and animals. As the park extends from the high tide mark to at least 100 m deep and more than 10 km offshore in some areas, there is considerable diversity in flora and fauna. Such diversity is due to the variations in depth, sessile assemblages (communities of species attached by their base to the seabed), oceanographic influences and the presence of offshore islands. These factors have resulted in a unique environment where tropical, subtropical and temperate marine fauna and flora co-exist. The PSGLMP lies within the country of the Worimi people, who maintain a strong connection to the ocean.

The PSGLMP Operational Plan details management actions being undertaken by the Marine Parks Authority (MPA). These actions focus on meeting key objectives related to the conservation of marine biodiversity, maintenance of ecological processes and the provision of opportunities for ecologically sustainable use, public appreciation, enjoyment and understanding of the marine park.

The PSGLMP Operational Plan explains the roles and priorities of the MPA and other organisations in the management of the PSGLMP, including threats to its natural, cultural and economic values. PSGLMP objectives and management actions have been organised under the following strategies:

1. Identification and adaptive management of threats to marine biodiversity and habitats
2. Protection of high conservation areas and threatened species
3. Assessing developments in and affecting the marine park to minimise impacts
4. Maximising voluntary compliance with the marine park zoning plan
5. Ecologically sustainable management of commercial activities
6. Delivering an ecological, social and economic research and monitoring program
7. Promotion of sustainable tourism and recreational uses, as well as facilitation of a greater appreciation of marine biodiversity, and
8. Ensuring management is consistent with the cultural aspirations of Aboriginal people.

The PSGLMP Operational Plan is consistent with and supports the PSGLMP Zoning Plan, which is a regulation that sets out the range of activities that can be undertaken within different areas of the PSGLMP. It has been developed in consultation with the PSGLMP Advisory Committee as required by the Marine Parks Act.

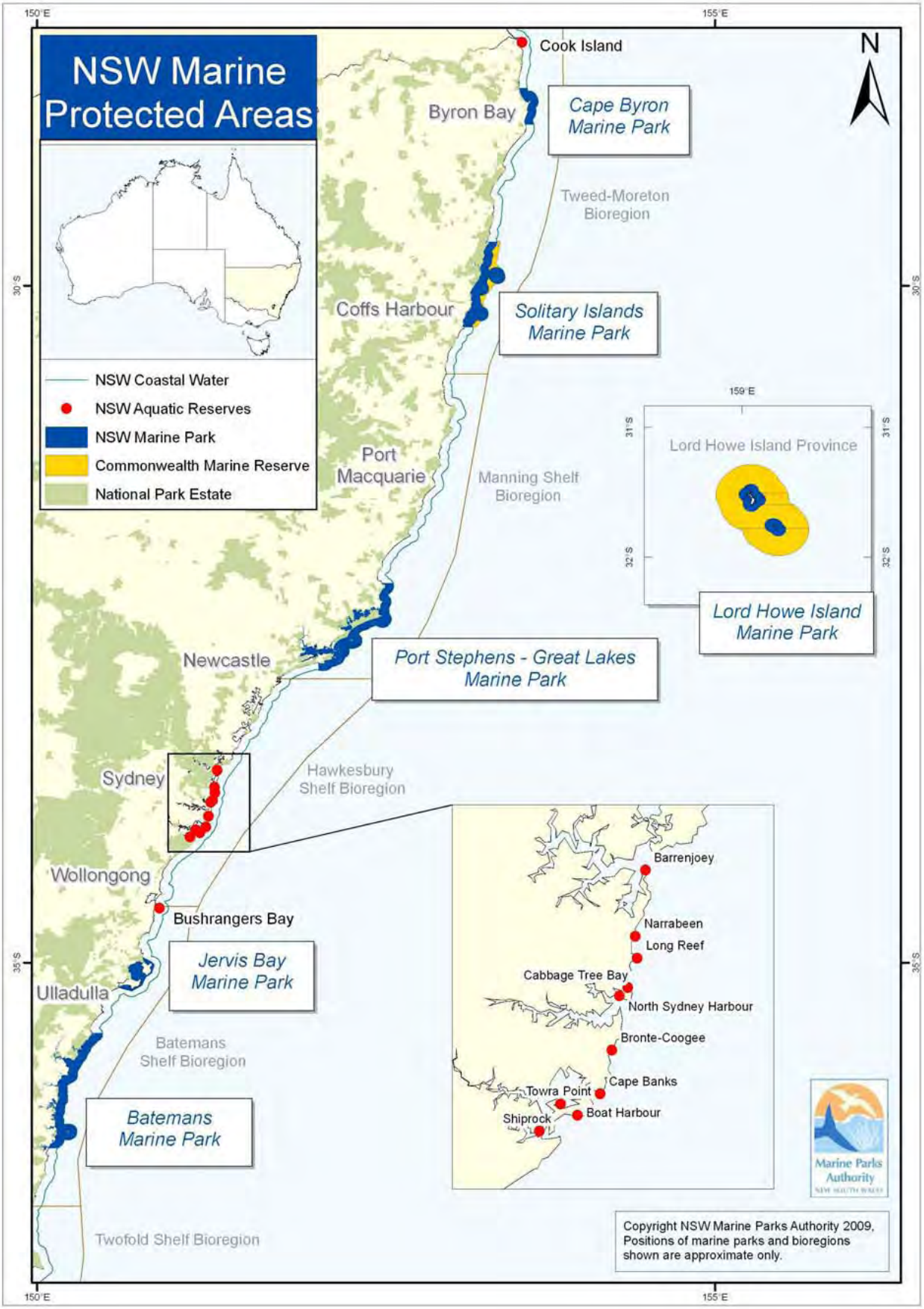

Figure 1: Map of NSW Marine Protected Areas

1 INTRODUCTION

Marine biodiversity, the variety of marine life including species, habitats and ecosystems, contributes to Australian industries worth more than $25 billion annually, with more $18 billion attributable to marine tourism and recreational activities (Australian Institute of Marine Science 2009). Despite its importance, marine biodiversity is impacted by human activities, such as coastal development, pollution, marine pests, diseases and resource use. These key threats to marine biodiversity can cause declines in the health of marine and estuarine habitats, changes to ecological processes, alterations to ecosystem functioning and loss of species (Natural Resource Policies and Programs Committee Biodiversity Decline Working Group 2005).

The marine and estuarine waters of New South Wales support rich biodiversity. The state's waters cover a breadth of latitudes from subtropical, warm temperate to cool temperate and include many different habitats (e.g. mangroves, seagrass, soft-sediment, beaches, rocky reefs, kelp forests and sponge gardens). These and other key habitats support the thousands of marine plants and animals that underpin populations of fish, birds, marine mammals and reptiles.

The establishment and management of a representative system of marine protected areas is widely regarded as one of the most effective mechanisms for conserving biodiversity and helping to support ecologically sustainable uses, including tourism and fishing (IUCN-WCPA 2008).The United Nations Convention on Biological Diversity aims to establish and maintain an ecologically representative system of marine protected areas by 2012. Australian states and territories committed in 1998 to contributing to this global system through the development of a *National Representative System of Marine Protected Areas* (ANZECC Task Force on Marine Protected Areas 1999). Subsequent to this, the NSW Government has made a significant contribution to Australia's *National Representative System of Marine Protected Areas* through the declaration and management of marine protected areas within NSW waters, which now includes 6 large-scale marine parks, 12 aquatic reserves and over 60 coastal national parks and nature reserves (Marine Protected Areas Working Group 2007).

The primary goal for the NSW marine protected areas program is to establish and manage a comprehensive, adequate and representative system of marine protected areas that contributes to the long-term viability of marine and estuarine systems, to maintain ecological processes and ecosystem functions and to protect the marine biological diversity of New South Wales at all levels. The NSW Government's approach to developing a system of marine protected areas is based on nationally agreed guidelines and selection criteria, as well as the Integrated Marine and Coastal Regionalisation of Australia (Marine Parks Authority 2001).

The long-term aim of the NSW Government's representative system of marine protected areas is to establish and protect marine biodiversity in the full range of ecosystems within the state's marine bioregions. Currently, marine protected areas are located in all five marine bioregions and the one marine province at Lord Howe Island (Figure 1). In New South Wales, large-scale marine parks have been established in all bioregions, except for the Twofold Shelf Bioregion (south of Bermagui), which includes national park coastal frontage, and the Hawkesbury Shelf Bioregion, which includes 10 significant aquatic reserves and 17 national parks. All marine parks declared under the NSW *Marine Parks Act 1997* provide for multiple use of the marine environment including recreational and commercial fishing.

The Port Stephens – Great Lakes Marine Park (PSGLMP) was declared on 5 December 2005 and the zoning plan came into effect on 21 April 2007. This relatively large marine park plays a key role in representing the ecosystems, habitats and marine life found in the Manning Shelf Bioregion and contributes to the national and global system of marine protected areas.

The PSGLMP Operational Plan is a legislative document that outlines the management context applying to the marine park, including the legislative framework, the role of zoning plans and the responsibility of different organisations in contributing to the overall marine park management. The operational plan describes natural, cultural and use values of PSGLMP, as well as the threats to those values. It also identifies a suite of strategies and actions aimed at addressing them.

2 MANAGEMENT CONTEXT

NSW marine parks are declared and managed under the *Marine Parks Act 1997*. The objects of this Act are to:

- *conserve marine biological diversity and marine habitats by declaring and providing for the management of a comprehensive system of marine parks;*
- *maintain ecological processes; and*
- *where consistent with the preceding objects, to provide:*
  - *for ecologically sustainable use of fish (including commercial and recreational fishing) and marine vegetation in marine parks, and*
  - *opportunities for public appreciation, understanding and enjoyment of marine parks.*

The Marine Parks Act establishes the Marine Parks Authority (MPA), that is responsible for the administration of the Act, a statewide Marine Parks Advisory Council, that provides advice to the Ministers responsible for marine parks, and local advisory committees that advise the Ministers on local marine park matters (Appendix 1). The Act also provides for the general regulation of activities in marine parks, including the preparation of zoning plans, establishment of closures, assessment of development activities within and affecting marine parks and the preparation of operational plans.

2.1 Purpose of the operational plan

An operational plan is required for each marine park under section 23 of the Marine Parks Act. The Act defines the purpose of the operational plan as 'to identify and define a scheme of the strategies, actions or activities that are proposed to be undertaken by the Authority (including arrangements with other agencies) to operate a marine park, consistent with the zoning plan for the marine park and the objects of the Act'. Consequently, an operational plan is the guiding document by which marine park policy, advice, concurrence, consent, communication and education, research and monitoring, and compliance activities are strategically planned, prioritised and delivered to meet the marine park's objectives.

The MPA is required under the Act to prepare a draft operational plan having regard to the zoning plan for the park and the objects of the Act. The draft operational plan is to be referred to the relevant marine park advisory committee for consideration and advice for a minimum of 28 days. The MPA is required to consider and take account of any comments received from this committee before finalising and adopting an operational plan.

Once an operational plan is adopted, any functions of the MPA in relation to a marine park are required to be exercised with consideration of the operational plan. Implementation of the operational plan will occur through an annual work planning and review cycle designed to allocate available staff and financial resources to priority actions detailed in the operational plan. The MPA is to review the plan for a marine park as soon as practicable after a marine park zoning plan is amended or replaced, but is not required to do so if it considers the amendment is minor in nature. In this way the period of time in which an operational plan applies is closely connected to the marine park zoning plan.

2.2 Port Stephens – Great Lakes Marine Park Zoning Plan

NSW marine parks provide for multiple use of the marine environment including recreational and commercial activities such as fishing, spearfishing, tourism, snorkelling and scuba diving, boating, yachting, swimming, surfing, kayaking, parasailing, beach walking, marinas and other safe vessel anchorages. Zoning plans are regulations that establish the types of activities that can be undertaken in different areas of a marine park, having regard to the degree of potential impact they may have on differing species of plants, animals, and habitats, and potential conflicts with other uses. Similar to the identification and selection of marine parks, zoning is based on the application of nationally agreed guidelines, as well as ecological, social and economic criteria.

The PSGLMP Zoning Plan was implemented on 21 April 2007 and forms part of the Marine Parks (Zoning Plans) Regulation 1999. Extensive community consultation was undertaken prior the establishment of the zoning plan, which included over 130 formal meetings with individuals and stakeholder groups. These meetings included presentations, focus group workshops and community information sessions. Consultation also included a three month public exhibition of the draft zoning plan between 23 June and 23 September 2006. Consideration of over 4500 submissions on this draft plan informed the preparation of the final zoning plan. The final zoning plan is composed of the following zoning scheme (see Figures 2 and 2.1–2.5):

- *Sanctuary zones* (approx. 17,283 ha, 17.6%) provide the highest level of protection for habitats, animals and plants, as well as areas of cultural significance. Only activities that do not harm plants or animals and do not damage or interfere with habitat are permitted in these areas.
- *Habitat protection zones* (approx. 33,781 ha, 34.4%) provide for the protection of habitat and areas of cultural significance. These zones allow for a range of recreational and commercial fishing activities, but prohibit purse seining, estuarine hauling, mesh netting, set-lining, drift-lining, trawling, dredging and long-lining, as well as the collection of some species. They also include some seasonal closures. This zoning also influences developments within the marine park (e.g. wharf and boat ramps) to ensure they concur with the objects of the zone and minimise impacts to key habitats.
- *General use zones* (approx. 46,890 ha, 47.75%) provide for ecologically sustainable management of habitat, animals and plants, through a wide range of ecologically sustainable uses. These zones allow for many forms of fishing but prohibit trawling, dredging and long-lining.
- *Special purpose zones* (736 ha, 0.75%) accommodate areas that require specialised management. In PSGLMP, special purpose zones have been established to provide for marina management, coastal infrastructure development and aquaculture activity.

2.3 Activities and development

Consent may be granted by permit to carry out certain activities that are otherwise prohibited in a marine park or a specific zone, including commercial activities. The circumstances in which consent may be granted are set out in the Marine Parks (Zoning Plans) Regulation 1999 and the process for applying for consent is included in the Marine Parks Regulation 2009. An MPA permit policy detailing administrative arrangements, processes and consent parameters for the issuing of permits is available on the MPA web site (www.mpa.nsw.gov.au/pdf/MPA-Permit-Policy.pdf). Consistent with this policy, specific conditions are applied to permitted activities to ensure they are ecologically sustainable and do not unduly impact on the enjoyment of other park users.

With respect to development proposals, the Marine Parks Act (sections 19 and 20) requires that authorities must take into consideration the objects of the Act, permissible uses and the advice from the MPA when determining development proposals within (s.19) and in the locality (s.20) of a marine park. These provisions not only give the MPA powers to influence developments that occur within the boundaries of a marine park, but also provide for the provision of MPA comment on developments in the locality of a marine park which must be taken into account before any such development application is determined.

Mining development and exploration are specifically prohibited in NSW marine parks.

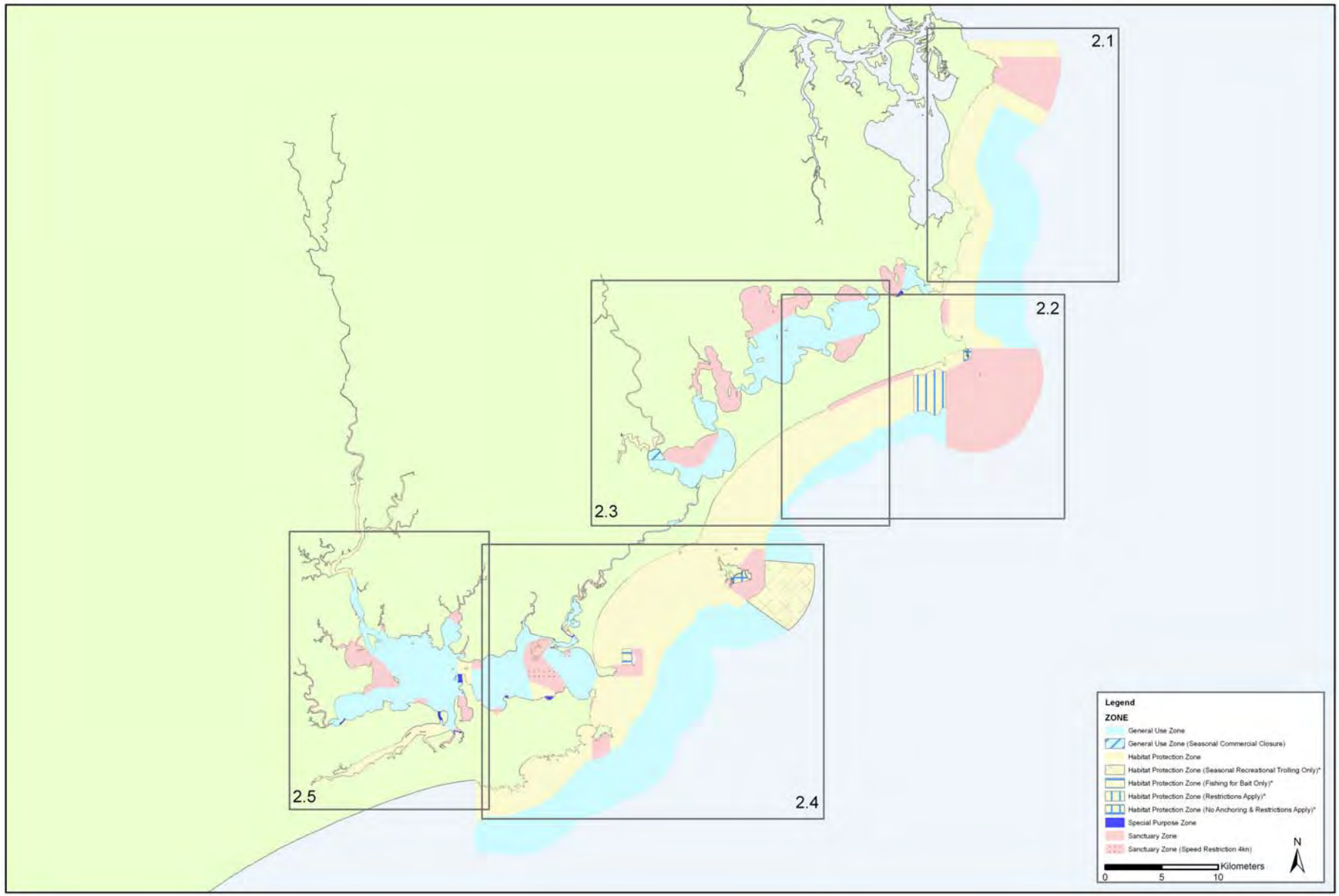

Figure 2: Key map of Port Stephens – Great Lakes Marine Park

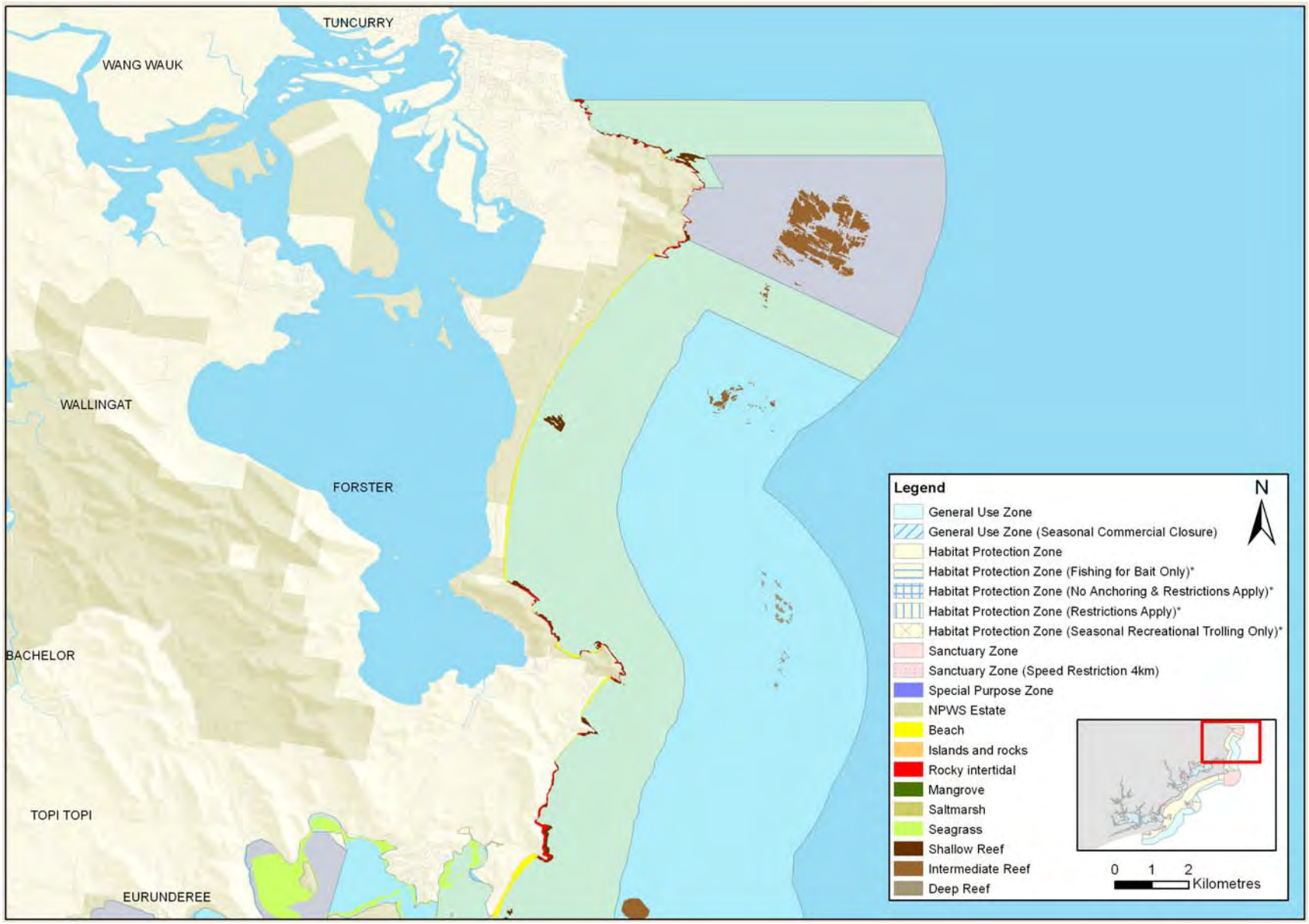

Figure 2.1: PSGLMP – Offshore Forster

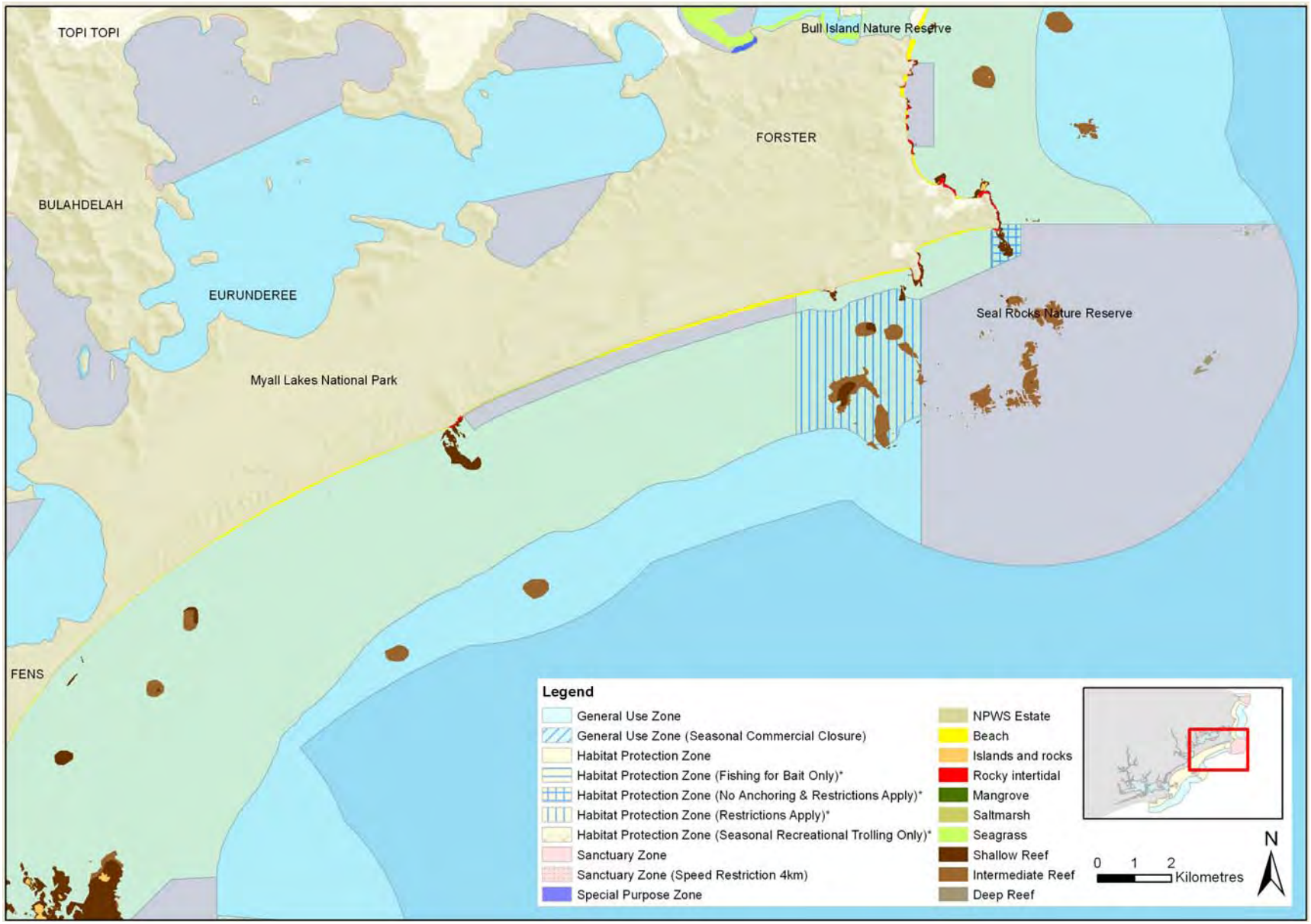

Figure 2.2: PSGLMP – Seal Rocks

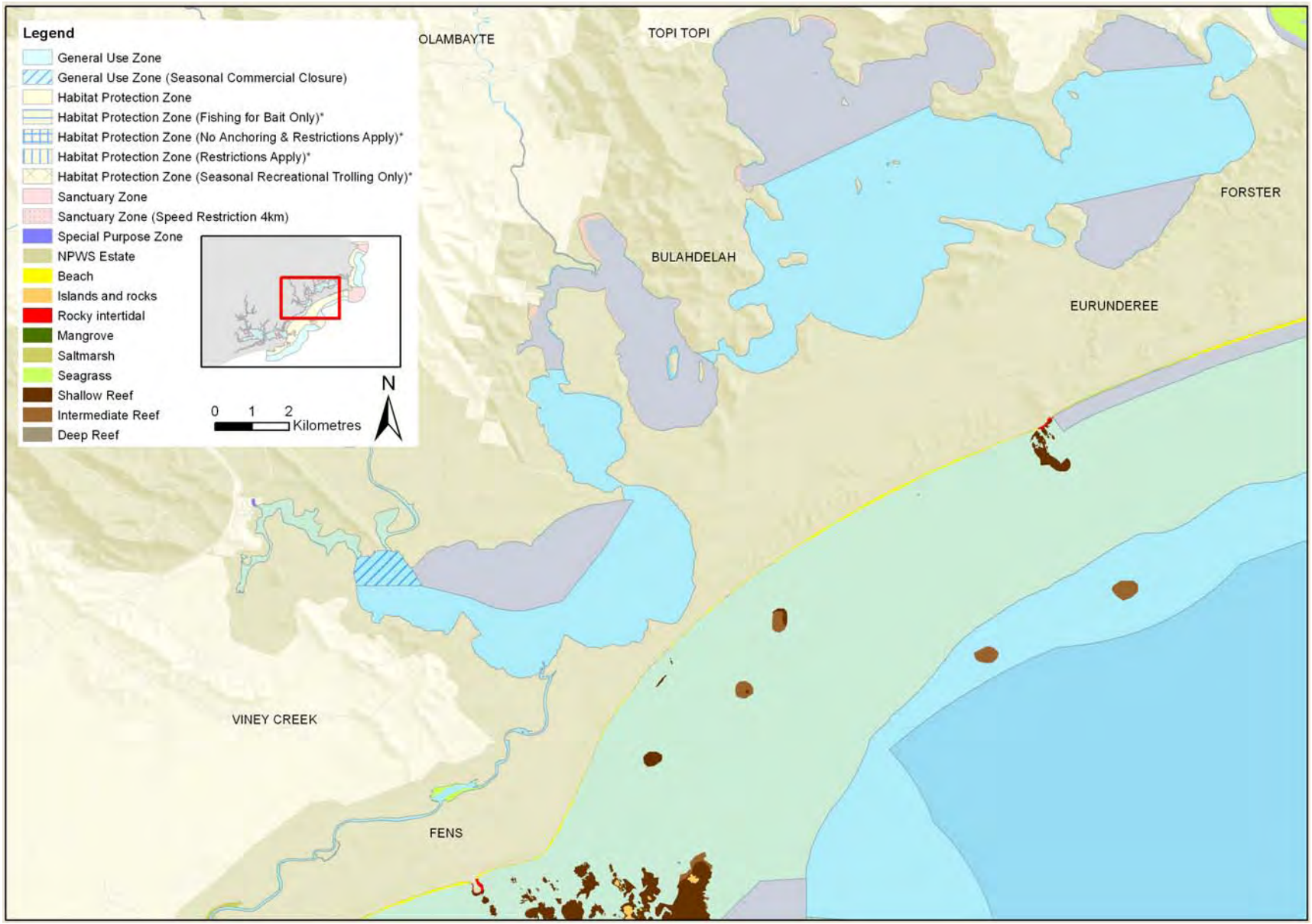

Figure 2.3: PSGLMP – Myall Lakes

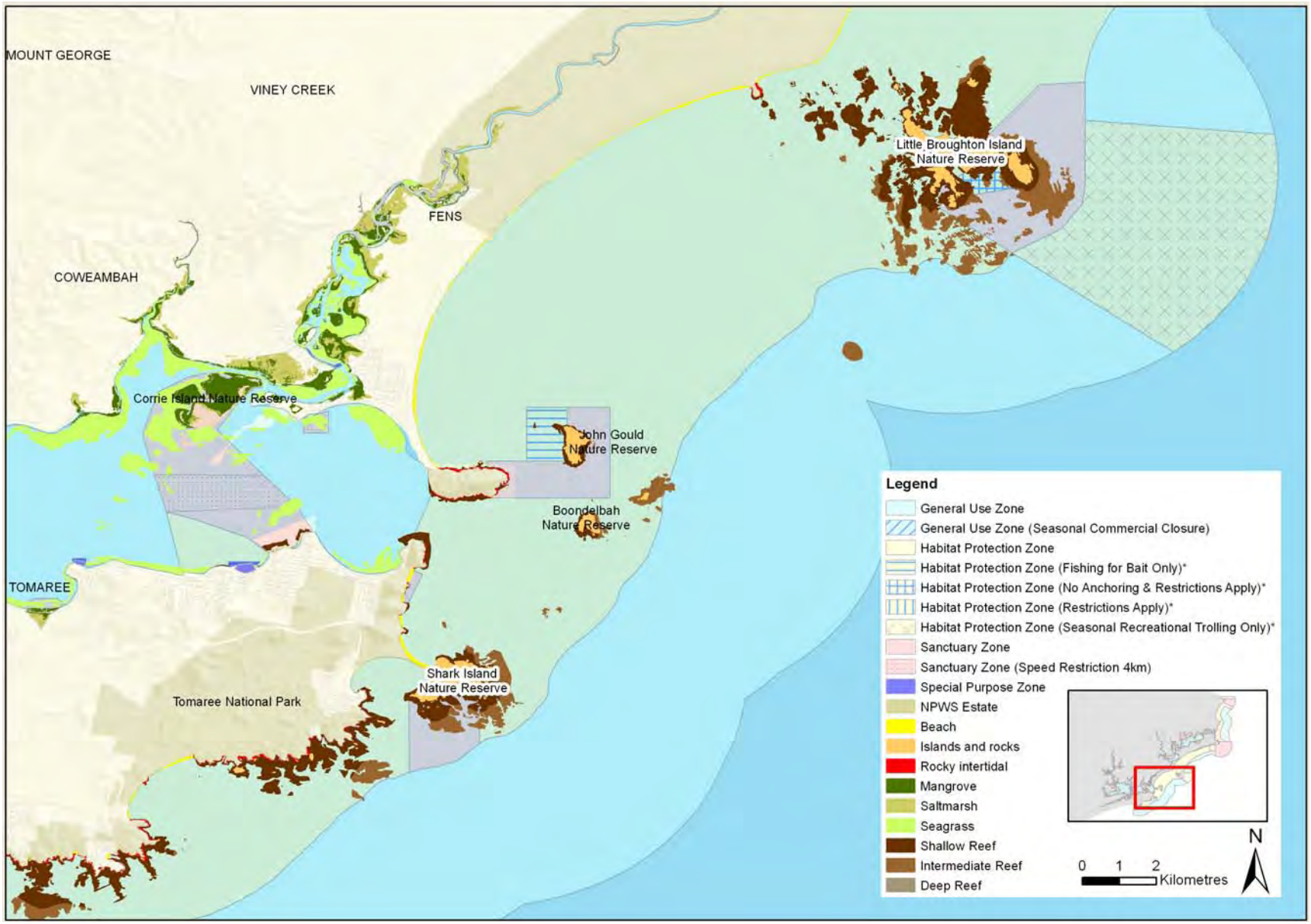

Figure 2.4: PSGLMP – Offshore Port Stephens

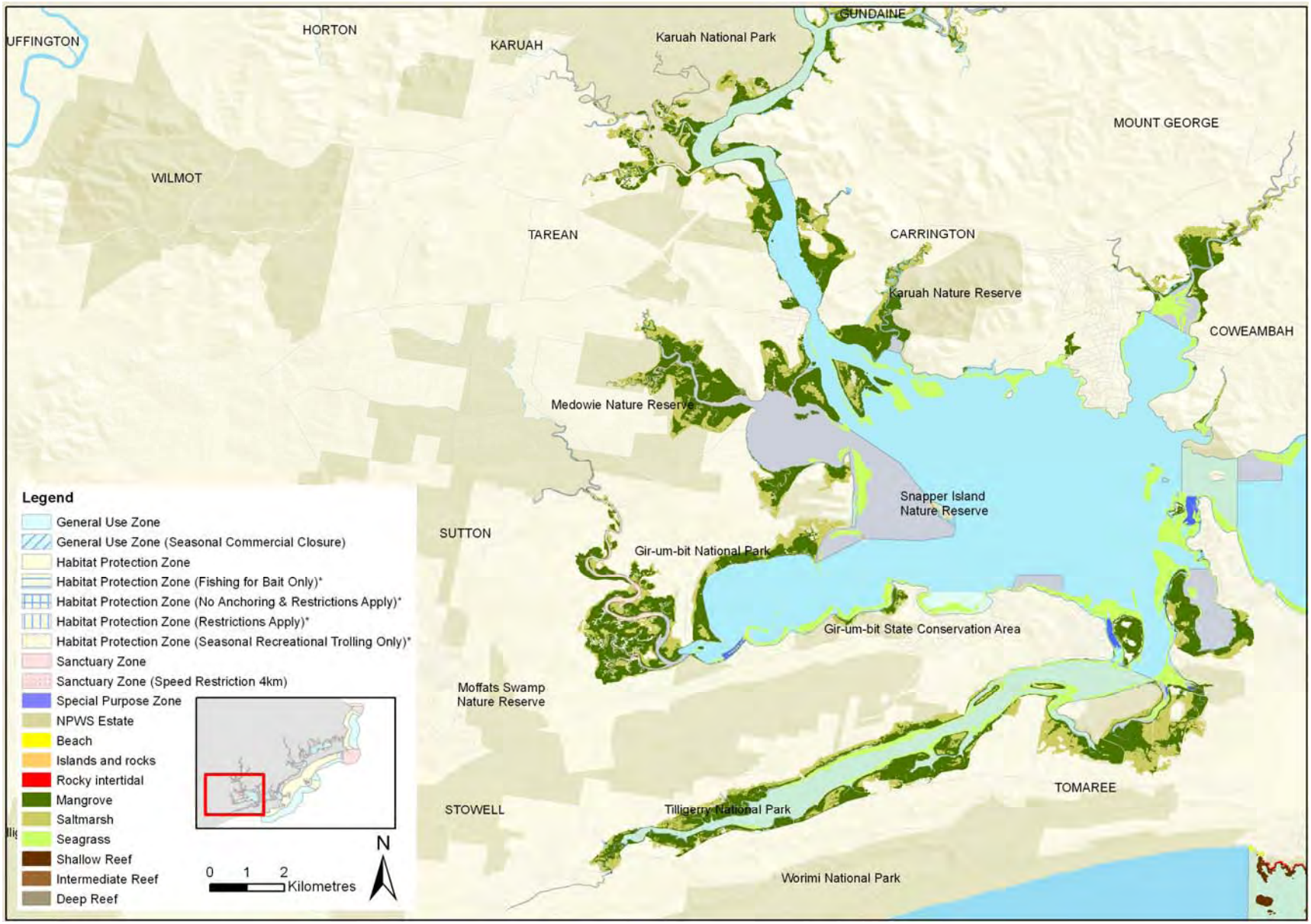

Figure 2.5: PSGLMP – Inshore Port Stephens

2.4 Strategies, policies and other relevant plans

The MPA develops strategies, policies and plans at the statewide level to manage priority issues that apply across the network of NSW marine parks and aquatic reserves. These strategies, policies and plans are typically developed in consultation with the Marine Parks Advisory Council and in some cases local marine park advisory committees. Current strategies, policies and plans are accessible on the Marine Parks Authority website (www.mpa.nsw.gov.au) and include the following:

System-wide strategies and plans

- Marine parks education and communications strategy 2009–12
- Strategic framework for evaluation and monitoring of marine parks 2004
- Marine parks strategic research plan 2005–10
- Marine parks statewide compliance plan 2009–2012

System-wide policies

- Marine parks permits policy
- Marine parks artificial reef policy
- Marine Parks Authority mooring and anchoring policy
- Policy and guidelines for Aboriginal engagement and cultural resource use in NSW marine parks.

New strategies, policies and plans may be developed during the period in which a NSW marine park zoning plan or operational plan is in effect. Existing strategies, plans and policies may also be periodically reviewed, amended or replaced. The PSGLMP Operational Plan is required to deliver actions consistent with NSW marine park strategies and plans, as well as give effect to any marine park policies.

2.5 Linkage with relevant legislation and conservation programs

Management of PSGLMP does not occur in isolation from other conservation and natural resource management legislation, or other agency administered programs and initiatives. For example, many marine species migrate across marine park boundaries, ocean currents transport nutrients and larvae over large areas and numerous activities occurring in waters outside park boundaries or on adjacent land can influence marine biodiversity within a marine park. The health of the near-shore marine environment is linked to the health of the region's catchments, rivers, and estuarine and coastal ecosystems, which all drain to the ocean.

The PSGLMP benefits from a wide range of NSW and local government programs, including those operating within and adjacent to the park (e.g. fisheries management, pollution reduction, estuary and coastal management). The MPA can and does influence such programs to ensure they have regard to marine park objectives. Wherever possible, the MPA works closely with other government agencies including DECCW and I&I NSW, Catchment Management Authorities, NSW Maritime, the Department of Planning, local government and with the Commonwealth's Department of the Environment, Water, Heritage and the Arts to help achieve shared goals to conserve marine biodiversity and to ensure sustainable use of resources. Key legislation and agencies that function within NSW marine parks and complement the Marine Parks Act in management of the marine environment are described in Appendix 2**.**

National parks and reserves lying adjacent to marine parks provide a degree of naturalness that is a key criterion for the initial selection and ongoing effectiveness of marine parks. National parks and reserves located adjacent to the PSGLMP include Worimi Conservation Lands, Tomaree National Park, John Gould Nature Reserve, Boondelbah Nature Reserve, Stormpetrel Nature Reserve, Little Broughton Island Nature Reserve, Myall Lakes National Park, Tilligerry Nature Reserve, Tilligerry State Conservation areas, Medowie State Conservation Area, Gir um bit National Park, Corrie Island Nature Reserve, Karuah National Park, Seal Rocks Nature Reserve, Booti Booti National Park (see Figure 3).

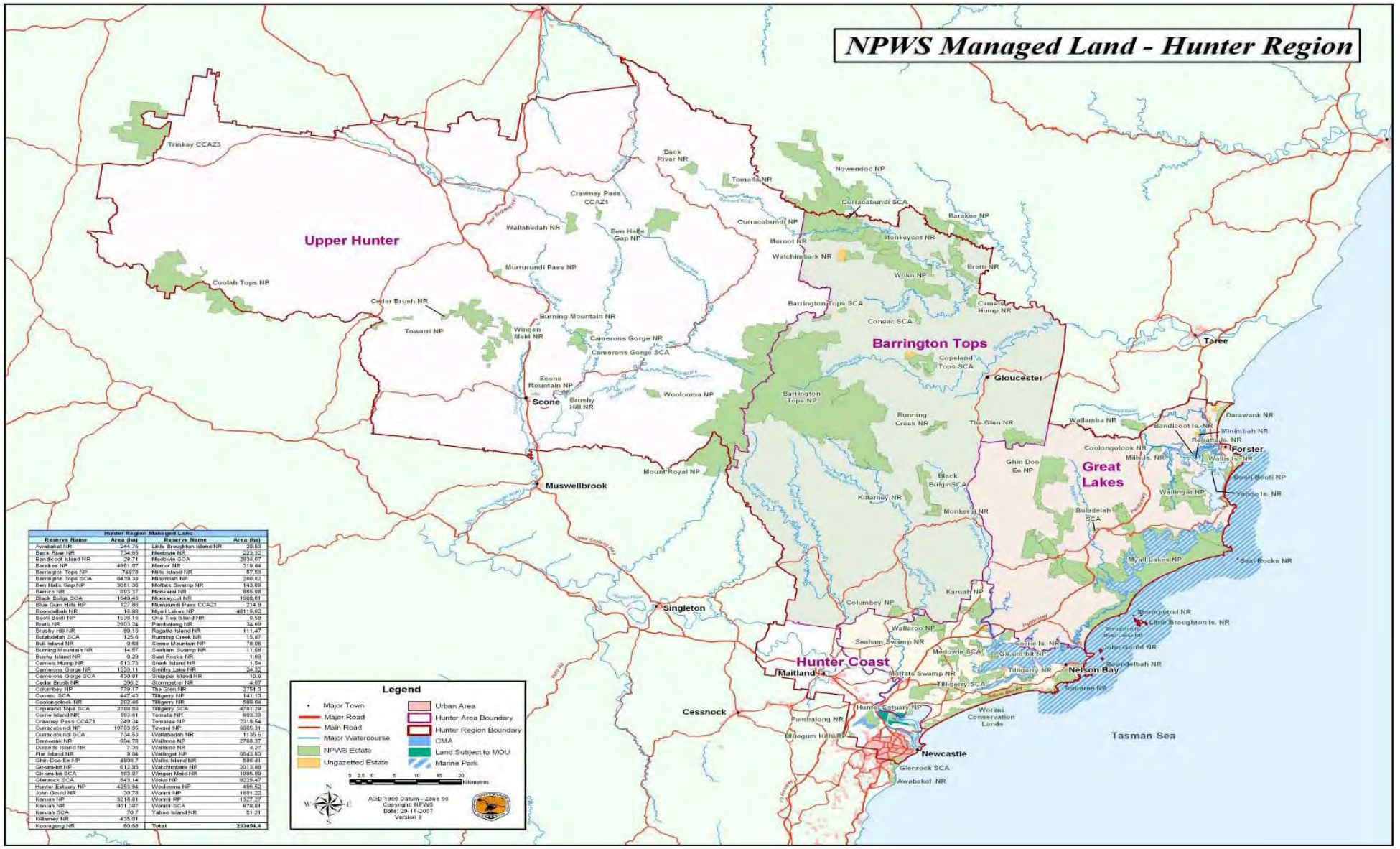

Figure 3: Terrestrial protected areas adjacent to PSGLMP

The Hunter Catchment Management Authority (HCMA) has prepared a Catchment Action Plan, which includes a coast and marine program. This program extends the scope of their responsibility to include a 'whole of catchment' perspective on impacts from the catchment on the coastal waters it flows into. This key program focuses on increasing knowledge about the marine environment and improving management practices to reduce impacts on it. The HCMA also has a water program that aims to maintain estuarine ecosystem health to protect biodiversity and support sustainable use of these resources. The goals of these two key programs overlap substantially with objects of the Marine Parks Act. Similarly, local government has a lead role in delivery of estuary and coastal management plans with financial and technical assistance from the NSW Government.

3 VALUES

PSGLMP provides a range of natural, cultural and economic values to the community. These values or benefits have important short- and long-term positive outcomes for community well-being. The inherent natural (physical and biological) values of the park are the primary focus of marine park management, which aims to conserve marine biodiversity. Cultural values relate to the importance of areas to Aboriginal and non-Aboriginal communities, from both historical and current use perspectives. Economic values are linked to benefits derived from commercial use and visitation to the area, in terms of employment and revenue to the community.

3.1 Natural values

Ecosystems and habitats

Oceanography

The oceanography of the region's shelf waters is determined by a combination of the large scale oceanographic circulation and local wind stress. It is dominated by the warm, stratified, nutrient-poor East Australian Current (EAC) water, and cooler, well-mixed water of southerly origin. The EAC regularly separates from the coast in the Sugarloaf Point (Seal Rocks) area, particularly during the summer, although headlands to the north can also be important separation points for the current. At other times, the EAC lies further offshore near the edge of the shelf break (approximately 200 m depth).

The EAC is generally stronger during the summer months and eases in intensity during winter, and is characterised by warm temperatures and a clear blue appearance. Sea surface temperatures range from around 17°C to 25°C, with a trend for cooler waters in the south of the marine park. Occasionally, deeper currents bring cold, nutrient-rich water up the continental slope onto the shelf. This coastal upwelling occurs at irregular intervals, but mostly between the months of August and December. Coastal upwelling is associated with strong clockwise flowing EAC eddies out past the shelf and northerly winds which tend to push the surface waters offshore. This promotes upwelling of the nutrient-rich colder waters from the ocean depths.

Habitats

The marine park contains a diverse range of habitats including intertidal and subtidal reefs, soft sediments, beaches, seagrass beds, mangroves, saltmarsh and open waters, which all support distinct groups of plants and animals. As the park extends from the high tide mark to at least 100 m deep and 13 km offshore in some areas, there is considerable diversity in flora and fauna. Such diversity is due to the variations in depth, various dominant sessile assemblages (communities of species attached by their base to the seabed), oceanographic influences and the presence of offshore islands. These factors have resulted in a unique environment where tropical, subtropical and temperate marine fauna and flora co-exist. Variation in salinity levels also provides a range of habitats, e.g. estuarine lake areas. Some of these habitats and ecosystems may be unique and are poorly represented in conservation areas.

These ecosystems and associated habitats, communities and species are therefore a major focus in achieving comprehensive, adequate and representative protection of the marine environment in the PSGLMP and larger Manning Bioregion. Consequently, these habitat types in the marine park have been identified and mapped and representative examples of each habitat type are included in sanctuary zones.

Animals and plants

Flora and fauna diversity

Ecological processes throughout the region are interconnected, with both resident and migratory marine species relying on specific habitats for breeding, feeding and protection. As a result the region supports a particularly high and biologically diverse range of marine species. It is estimated that the PSGLMP supports more than 400 species of fish, with a mixture of temperate and tropical species. Some of these species are threatened or protected, some have high conservation value due to their endemism or their ecological role, and some are valued by fishers. Mammals, reptiles and birds are also a distinct part of the fauna, being permanent residents, seasonal visitors, or individuals just passing through.

Reef habitats in particular, exhibit a very diverse range of flora and fauna. Shallow reefs (those less than 20 m depth) are characterised by abundant macroalgae, dominated by the kelp *Ecklonia radiata*, and various species of *Sargassum* and *Caulerpa,* with an understorey of coralline algae (algae with a coral-like, calcareous outer covering) and foliose algae (leafy algae with fronds and a holdfast which attaches itself to the seabed or a rock). Sponges and other sessile invertebrates can also occur on shallow reefs, but are generally not dominant.

Rocky reefs also contain a diverse assemblage of fish species that range from small cryptic residents through to transient species that move between reef systems. A large diversity of less conspicuous marine animals is also present including nudibranchs (Figure 4), many types of molluscs (e.g. cowries; Figure 5), bryzoans, feather-duster worms, basket-stars, seawhips and seastars, hydroids, corals, anemones, crabs, shrimps, and octopus (see Edgar 1997).

Figure 4: Nudibranch (*Chromodoris collingwoodi*)

Figure 5: Cowry shell (*Diminovula bimaculata*)

Seagrass beds are widely distributed within the Port Stephens estuary and occur adjacent to most shorelines up to Karuah. Seagrass beds are critically important to estuarine and lake systems because they greatly enhance local primary production and biodiversity, stabilize sediment, and provide a nursery habitat for many economically-important crustaceans and fish (Butler & Jernakoff 1999).

Seagrasses are important contributors to coastal productivity and are particularly important in maintaining sediment stability because the seagrass roots act to stabilise the underlying sediment. They are also important in maintaining water quality by using nutrients and stabilising sediments in shallow water.

Seagrass beds are important areas for algal production that adds to their overall productivity. There is also evidence that much of the seagrass and algae produced are not used within the area of the bed but are exported as detritus, forming an important component of the food chain for fish and invertebrates in adjacent coastal waters. However, much of the relationship between seagrass and coastal productivity is still to be fully understood.

Four species of seagrass are commonly found within the Port Stephens estuary:

- eelgrasses (*Zostera capricorni* and *Zostera muelleri*) (Figure 6)
- paddleweed (*Halophila* spp.) (Figure 7)
- strapweed (*Posidonia australis*) (Figure 8)

Figure 6: *Zostera* spp.

Figure 7: *Halophila* spp.

Figure 8: *Posidonia australis*

The seagrass beds contain a significantly higher diversity and abundance of fish compared to unvegetated areas and they are an important habitat for juvenile stages of commercial and recreational species such as snapper, yellow-fin bream, tarwhine and luderick (Hannan & Williams 1998). The fish communities in beds of different seagrass species are also often distinct, with many species or life-history stages only found in that particular habitat (Middleton et al. 1984; Rotherham & West 2002).

Threatened and protected species

The PSGLMP includes both resident and migratory species which are considered to be threatened under the *Threatened Species Conservation Act 1995* or the *Fisheries Management Act 1994*. Whilst it is the intention of management to conserve all marine species occurring naturally within the marine park, particular emphasis is placed on conserving marine species and ecological communities that are more susceptible to human impacts, including grey nurse sharks, black cod, sea turtles, whales, shorebirds, and saltmarsh.

There are several sites within the park that have been identified by I&I NSW as critical habitat for the grey nurse shark (*Carcharias taurus*). These are the Forster Pinnacle, Big and Little Seal Rocks and Little Broughton Island. Critical Habitat Regulations came into effect in December 2002. Other species protected under fisheries management legislation, including the eastern

blue devilfish (*Paraplesiops bleekeri*), the estuary cod (*Epinephelus coioides*), the black cod (*E. daemelii*), the elegant wrasse (*Anampses elegans*), the Queensland groper (*E. lanceolatus*) and several species of syngnathids (seahorses, seadragons and pipefish) are also found within the park.

Around 30 species of marine mammals have been recorded within the marine park region from records of live animals and strandings, with 24 being whales and dolphins, six species of seals and one dugong. Dolphins are the most common marine mammals sighted in the marine park, with the bottlenose dolphins (genus *Tursiops*) being the most abundant. Other marine mammal species of national significance that have been recorded within the region include the humpback whale (*Megaptera novaeangliae*), southern right whale (*Eubalaena australis*), sei whale (*Balaenoptera borealis*), fin whale (*Balaenoptera physalus*) and the dusky dolphin (*Lagenorhynchus obscurus*).

In addition, PSGLMP is home to green, loggerhead and hawksbill turtles, with juvenile green turtles appearing to be the most abundant within Port Stephens estuary. Occasional sightings of the leatherback turtle have also been recorded in the offshore waters.

Birds that depend on marine and estuarine habitats include 'true' seabirds, shorebirds, waders, waterfowl and birds of prey. There are over 120 species of coastal and marine birds known to occur within the region, and of these, around 100 species commonly occur on the coasts and inshore waters and may also occur below the high water mark. Many occur in the region on a seasonal basis. The vulnerable Gould's petrel (Australia's rarest endemic seabird) breeds only on Cabbage Tree and Boondelbah Islands off the coast of Port Stephens. The species feeds in oceanic waters over a wide area targeting surface fish, small squid and krill.

Port Stephens and Myall Lakes have large areas of important bird habitat for threatened species, species protected under international treaties, and for other native species. The ocean coast between Smiths Lake, Myall Lake, Port Stephens and the Hunter River supports the largest area of important bird habitat for threatened and other species. Shorebirds also breed within the area, above high water on coastal shores. Although this location lies outside the high tide boundary of the park it is mentioned here as it lies close to the vicinity of this boundary and these birds utilise the intertidal zone for feeding. *Note: JAMBA, CAMBA and ROKAMBA species also utilise the marine park (various shorebirds and seabirds).*

The protection of threatened species and endangered ecological communities is guided by specific recovery plan actions, which were taken into consideration when preparing the PSGLMP Zoning Plan. Management actions to conserve threatened species and endangered ecological communities are listed in Section 4 of this operational plan.

Ramsar site

In June 1999, the Myall Lakes National Park was listed as a Ramsar Wetland of International Importance. The Ramsar Convention on Wetlands of International Importance is a multi-lateral convention, which provides for the wise use and conservation of all wetlands, to which Australia is a signatory. The principal expectation is that listed sites will be managed to protect the ecological character for which they were recognised. Any action that results in deterioration of these values is considered to be in violation of the convention. Australia addresses its obligations through the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and national, state and local government wetland policies, programs and legislation.

The Ramsar site covers all of the Myall Lakes National Park (this included Fame Cove at the time of listing in 1999), as well as Corrie Island and Little Broughton Island nature reserves (see Figure 9 overleaf). The Ramsar site is gazetted to high tide and includes the beds of the Bombah Broadwater, Boolambayte and Myall lakes, which form part of the PSGLMP. The Myall Lakes are wetlands of international importance because they contain relatively unmodified large coastal brackish lake systems, which are unique in New South Wales. The Ramsar site is also unique because it encompasses a series of ecologically linked wetland types, ranging from a marine coast to estuarine, brackish open water, fringing swamps, freshwater swamps and riverine ecosystems. The wetlands are surrounded and supported by a near-natural terrestrial ecosystem. As a consequence of this range of wetlands and the complex variety of habitats, the

site supports a rich biodiversity. The site plays an important role in linking fauna habitats to the north and west and is a drought refuge for waterbirds. It is also an important food source, spawning ground and nursery for many fish species.

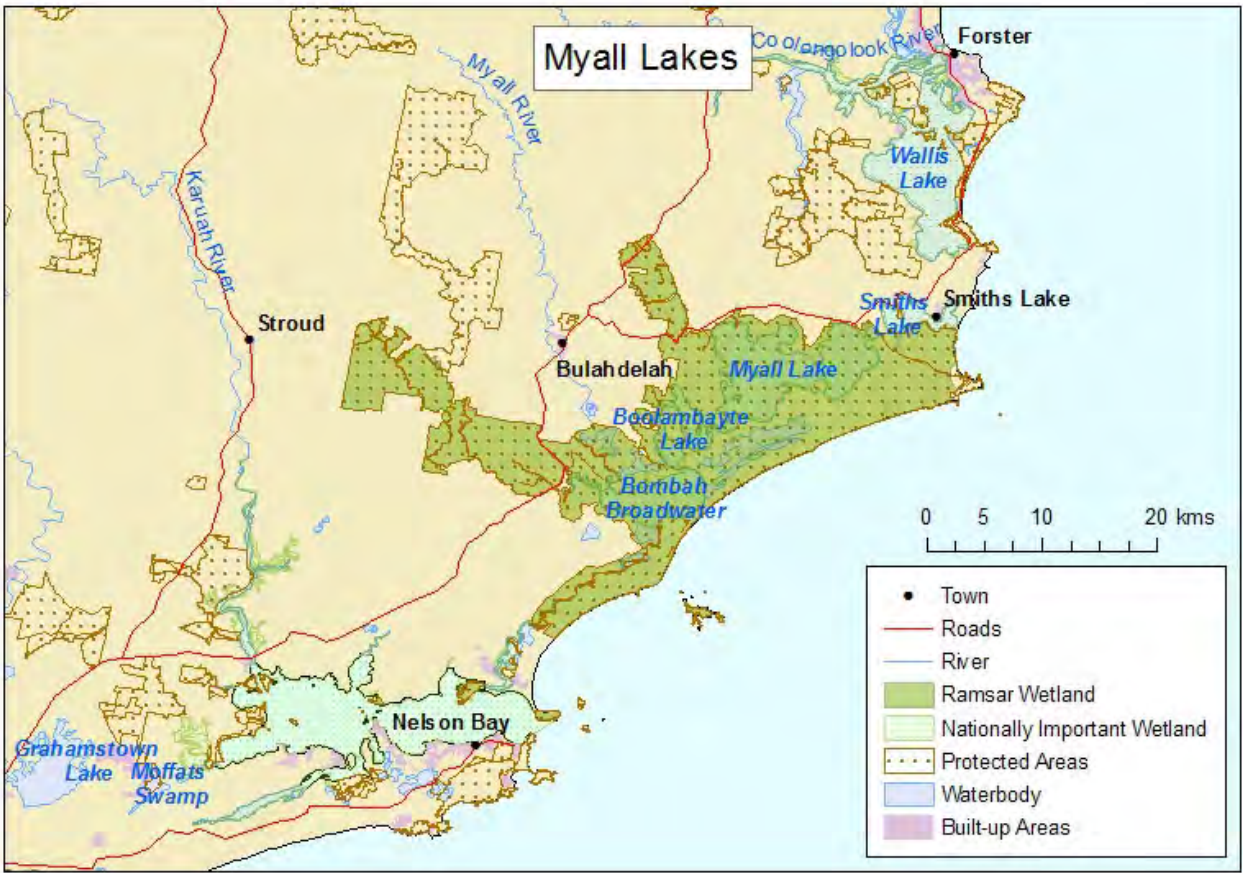

Figure 9: Map of Myall Lakes RAMSAR area

There are a number of threats to the ecological character of the Ramsar site. Periodic excessive phytoplankton growth, including toxic blue green algal blooms, suggests that the system is very sensitive to increases in nutrient levels. Nutrient loadings resulting from catchment land-use practices contribute to the nutrient level in the lakes and pose a growing threat to the integrity of the system. Other major threats are climate change, fire, introduced species and overuse or inappropriate recreational activities.

There are a number of knowledge gaps and monitoring requirements regarding the important components and critical processes of the site, which limit the current capacity to establish benchmarks, detect changes and set limits of acceptable change for its ecological character. There are two primary documents that inform the management and protection of the Ramsar site: *Ecological Character Description: Myall Lakes Ramsar Site (draft)* (ECD) and *Myall Lakes National Park Little Broughton Island and Stormpetrel Nature Reserves Plan of Management* (PoM; NSW National Parks and Wildlife Service 2002). The ECD identifies and describes the values for which the Ramsar site was listed and identifies threats to those values; the PoM is a statutory document that prescribes how the MLNP will be managed to protect the ecological character of the Ramsar Site. The PSGLMP Zoning Plan is aligned with this PoM, and this operational plan will also be aligned with the PoM and ECD.

In addition to the above documents, management of water quality in the Ramsar site is informed by the *Great Lakes Water Quality Improvement Plan* (WQIP; Great Lakes Council 2009), which was developed by Great Lakes Council through the Coastal Catchments Initiative (CCI) with funding from the Commonwealth Government. The focus of the CCI was to identify strategies to reduce the impact of catchment sediments, nutrients and faecal 'coliform' bacteria on the Wallis, Smiths and Myall lakes. The WQIP identifies threats and recommends actions to protect and

improve water quality in the Myall Lakes Ramsar Site and Smith's Lake (both part of the PSGLMP). The project involved extensive community, stakeholder and agency consultation and contributions, with DECCW undertaking the scientific investigations and the NPWS and MPA sitting on the advisory committee. This operational plan will be aligned with the Great Lakes WQIP.

Guidelines, recommendations and actions contained in the Myall Lakes PoM, ECD and WQIP, that are relevant to the operational management of the PSGLMP are listed in Appendix 5.

Ramsar monitoring

Ramsar monitoring is comprehensive and includes the following surveys:

- bird surveys (annual)
- fish surveys (five yearly)
- invertebrate surveys (five yearly)
- mammal surveys (five yearly)
- amphibian and reptile surveys (five yearly)
- surveys of extent of macrophyte beds in summer and winter (every third year)
- surveys of extent of gyttja (every third year)
- hydrodynamic modelling
- monitoring of chlorophyll a and water clarity in summer
- algal blooms database/log.

Identified Ramsar knowledge gaps

A standardised and consistent map of vegetation showing the distribution of vegetation communities and endangered ecological communities is lacking. Data about inter-annual variation in seagrass and macrophyte coverage, mangroves and saltmarshes, are sporadic. Remote sensing or aerial photos of vegetation types and distributions over time, together with ground truthing have been recommended.

Annual waterbird surveys, including distributions, abundance and identification of nesting, roosting and feeding sites and food resources, are needed. This is especially important in areas that have had changed management strategies or are impacted by threatening processes. For example, it would be valuable to know how effective excluding four-wheel driving activities on certain beaches have been on shorebird numbers. Additionally, bird surveys are required around high boating areas such as Mungo Brush as well as non-boating areas to discern if there are differences in the bird communities.

Fauna surveys are also required, especially for reptiles, frogs, fish, bats and small marsupials. The Myall Lakes Ramsar site potentially has a considerable faunal biodiversity on a national scale, but adequate fauna surveys are required to know the distribution and abundance of these species. These surveys are important to provide baseline information for the site and to assess any future change.

It is expected that the Myall Lakes Ramsar site has abundant aquatic invertebrates, such as crustaceans, molluscs and macroinvertebrates, providing an important food source for waterbirds. However, there is limited quantitative information about their distribution, diversity, and abundance. The aquatic invertebrates could be sampled at the same time as the annual waterbird survey.

There is very limited physical, chemical and biological information about the lower Myall River, limiting the ability to assess the marine exchange and the impacts of the lakes system on the ecosystems in Port Stephens. Monitoring water levels and sampling water quality in the lower Myall River are recommended.

Groundwater inflow and its contributions to the nutrient condition in the Myall Lakes are unknown. It is known that the groundwater in the region has high nutrient concentration, and may be responsible (at least partially) for the recent algal blooms in the lakes. However, there is no detailed study to quantify the contribution. Monitoring bores are needed to estimate the rate of flux in or out of the lakes system, and the seasonal and annual dynamics.

There needs to be greater monitoring of recreational use and visitation profiles. This includes identifying the popular recreational activities and areas of conflicting use.

3.2 Cultural values

People place cultural values on the marine environment, including aesthetic, social, spiritual, recreational, commercial, and other values. These cultural values may be attached to the seascape as a whole or to individual components, for example, to plant and animal species used by Aboriginal people.

Aboriginal culture and heritage

The MPA recognises the importance of working with local Aboriginal communities to incorporate Aboriginal cultural and landscape values in the management of the PSGLMP.

The understanding and appreciation of Aboriginal culture and heritage has changed in recent times from the limited scientific definition of archaeological sites to a much broader understanding that Aboriginal people have a commitment to care for Country and therefore should be responsible for the co-management of natural resources. The Worimi people view their environment as a holistic landscape rather than individual ecologies. Landscapes represent collections of natural resource issues with many values (vegetation, habitat, water resources, places, knowledge, stories, landscapes, objects, flora, fauna, water) that together provide a single coherent value, with particular meaning for the Worimi people.

The MPA acknowledges that traditional and recent Aboriginal culture and heritage will exist together with other natural resource assets. For example, improvement in the condition and health of the Marine Park will be beneficial to the preservation and conservation of Aboriginal culture and heritage. In turn, works that seek to conserve or preserve Aboriginal culture and heritage will have a beneficial impact on the condition and health of the natural resources in the PSGLMP area.

The MPA's association with Aboriginal heritage should be maintained and practised so that all people visiting the marine park can respect and understand Worimi cultural heritage values. Knowledge of the past, and connecting values with Aboriginal people in the region, can also teach us about what we can provide for our future. It is therefore essential to maintain and improve Aboriginal culturally significant landscapes so that they are maintained for use by present and future generations.

Guiding principles

- To manage Aboriginal culture and heritage it is important to acknowledge that Aboriginal people are a major source of knowledge relating to natural resource management. Therefore, Worimi people should be primarily responsible for decision making about their culture and heritage.
- All relevant parties should be consulted about Aboriginal culture and heritage matters. These include the Worimi people and other Aboriginal organisations/agencies with rights and interests in the PSGLMP. Care should be taken to consult with Aboriginal people with the appropriate right to speak for Country, and to identify Aboriginal people with traditional and/or contemporary cultural associations/knowledge of the marine park area.
- Aboriginal people must control the use of intellectual property and information sharing relating to Aboriginal cultural values and landscapes, to ensure that culturally sensitive information is protected. Formal agreements to use information about Aboriginal cultural values and landscapes should guarantee how information is obtained, stored and used. If information is to be used in future projects or up-loaded into government databases, written consent is required.

- Aboriginal people will be formally consulted during the planning stages of any activity or development to identify if the proposal will impact negatively on Aboriginal culture and heritage. Some places have gender specific meanings and it may be more appropriate, for example, to consult Aboriginal women rather than men in some circumstances.
- Consideration should also be given to family hierarchies or responsibilities that prevent some individuals from speaking about certain Aboriginal culture and heritage.
- Any Aboriginal culture and heritage that is identified in an area (by Aboriginal or non-Aboriginal recognition techniques) will be managed through a process of consultation and close collaboration with the relevant traditional owners (where this is not available, the use of respective 'caretakers/guardians' should be adopted).
- There will be commitment by all parties that the consultation process will be an equal partnership whereby Aboriginal advice and recommendations with respect to management of their culture within the PSGLMP will be incorporated into natural resource management.
- The precautionary principle should be used for protecting culture and heritage. Where there is uncertainty about the value of culture and heritage, the management of that place should be limited by any negative impact on the locality.
- Aboriginal people should be given adequate resources to sustain the cultural interconnectivity/relationship between their culture and the PSGLMP.
- It is important to understand that culture and heritage includes both traditional and contemporary connections to landscape features. Aboriginal awareness-training (cross-cultural awareness) of natural resource management staff from all organisations should occur to improve the understanding of how Aboriginal culture and heritage relates to the natural resources of the Hunter–Central Rivers region.
- Land managers, other stakeholders and the community should be supported to actively participate with the Worimi people to increase their knowledge and understanding of Aboriginal cultural values and their capacity to protect culture and heritage.
- There should be continual improvement and innovation in the way Aboriginal culture and heritage is protected.

Maritime heritage

The Register of the National Estate is a list of natural, indigenous and historic heritage places throughout Australia. It was originally established under the *Australian Heritage Commission Act 1975*. Under that Act, the Australian Heritage Commission entered more than 13,000 places in the register. In 2004, responsibility for maintaining the register shifted to the Australian Heritage Council, under the *Australian Heritage Council Act 2003* (AHC Act).

On 1 January 2004, a new national heritage system was established under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This led to the introduction of the National Heritage List, which was designed to recognise and protect places of outstanding heritage to the nation, and the Commonwealth Heritage List, which includes Commonwealth owned or leased places of significant heritage value.

The establishment of this national system was in line with a 1997 agreement by the Council of Australian Governments that each level of government should be responsible for protecting heritage at the appropriate level. The Australian Government's role in relation to heritage is to focus on protecting places of world and national heritage significance and on ensuring Commonwealth compliance with state heritage and planning laws. Each state and territory government, and local government, has a similar responsibility for its own heritage. As a result, there was a significant level of overlap between the Register of the National Estate, and heritage lists at the national, state and territory, and local government levels. Following amendments to the AHC Act, the Register of the National Estate (RNE) was frozen on 19 February 2007, which means that no new places can be added, or existing places removed.

The register will continue as a statutory register until February 2012. During this period the Minister for the Environment, Heritage and the Arts is required to continue considering the register when making some decisions under the EPBC Act. This transition period also allows state, territory and local governments, and the Australian Government, to complete the task of transferring places to appropriate heritage registers where necessary and to amend legislation that refers to the RNE as a statutory list.

From February 2012 all references to the register will be removed from the EPBC Act and the AHC Act. The RNE will be maintained after this time on a non-statutory basis as a publicly available archive. Many places in the register are already included in other statutory lists, such as the state heritage lists, or local government heritage registers. As a result, those places receive protection under the relevant federal, state or territory legislation, or under council bylaws. In the case of places of national or Commonwealth significance that are in the register, some of these places are already included in the National Heritage List or the Commonwealth Heritage List, and therefore receive protection under the EPBC Act. The Australian Government will, over the next five years, assess whether there are further places in the register that should be included in the Commonwealth Heritage List.

At this stage it is uncertain as to the quantum of NSW listings under the National Heritage Register which will be transferred to NSW legislated protection. The existing Commonwealth inventory includes 18 Heritage Places (in or adjacent to the PSGLMP) and 187 shipwrecks within the PSGLMP. Any shipwreck in excess of 75 years of age (from the time of being wrecked) is automatically a declared shipwreck under the *Historic Shipwrecks Act 1976*. Two 'Places' are already protected under the NSW Heritage Act (Point Stephens Lighthouse and Tahlee Bible College) and 25 shipwrecks are recognised by the Heritage Office of NSW.

Listings under the National Estate Register within or adjacent to the PSGLMP are detailed in Appendix 4.

3.3 Economic values

Many forms of commercial fishing are permitted in specified zones of the PSGLMP and are regulated by I&I NSW (Fisheries) including, fish and prawn trawling, beach hauling, purse seining, line fishing, trapping (fish, crab, lobster, eel), hand gathering, long-line and drop-lining, estuary prawn netting, and estuary mesh and haul netting. Approximately 150 fishermen operate in the marine park in some capacity during the year.

The PSGLMP Zoning Plan also places additional conditions on commercial fishing, such as, no trawling within the PSGLMP habitat protection zone and no set-lining anywhere in the marine park. At the commencement of the zoning plan, local commercial fishing operations were adjusted through a $10 million voluntary buy-back program. Adjustment of commercial fishing effort at the time of zoning was a critical component of the marine park's establishment and aimed to ensure that sufficient commercial fishing effort was removed to offset reduced access to the PSGLMP as a consequence of zoning. As well as commercial fishing, there is a thriving oyster aquaculture industry within the PSGLMP. Oyster farming has a long history within the port, dating back to the early 20th century. There are currently 58 oyster businesses in the marine park with approximately 400 leases that extend into the upper port from Salamander Bay in the south and Corrie Island in the north.

With the exception of commercial fishing, a permit is required to undertake any other commercial activity in the PSGLMP. As well as mooring contractors and other consultancy businesses, permits have been issued to more than 60 tourism businesses, including whale and dolphin watching, a dolphin swim-with program, charter fishing, kayak tours, scuba diving charters, surf schools, small boat hire, sightseeing cruises, parasailing, houseboat hire and adventure craft. Tourism, both recreational and commercial, is a major focus of the mid-north coast of New South Wales. Most activities undertaken in the PSGLMP are recreational in nature and include swimming, walking, running, wildlife observing, surfing, fishing, diving, snorkelling, sailing, kayaking and beach going.

Table 1 shows a breakdown of the commercial operators in the PSGLMP, as at the commencement of this operational plan. The list includes several operators with more than one permit, those that are based outside the area, and those that operate infrequently over the year or years.

Table 1: Commercial operators in Port Stephens – Great Lakes Marine Park

Commercial operation	**# of permits**
Beach hire	1
Boat hire	6
Charter fishing	12
Charter general	6
Dive	4
Dolphin/cetacean watch	11
Ferry services	4
Filming/photography	1
Fisherman's cooperatives	1
Houseboats	4
Jetski	2
Kayaking	4
Mooring and marine infrastructure	3
Parasailing	1
Surf schools	4
Thrill rides	1
Total	**65**

Tourism is a major industry in the region, with visitation estimates of around two million people per year. Surrounded by national park, the sheltered and open waters of the PSGLMP boast large areas of pristine shoreline, clean beaches, several offshore islands, and unique fauna. Its close proximity to major centres like Newcastle and Sydney make it a convenient destination for day trips or overnight stays for large numbers of visitors from these areas. Along with the ever-expanding suburban growth of the Tomaree Peninsular, these features place considerable pressure on marine park usage.

Within the PSGLMP, dolphin and whale watching receive the highest level of commercial tourism activity. Indeed, Port Stephens is regarded as the 'dolphin watch' capital of Australia, and arguably carries the highest number of clients on dedicated dolphin watching trips anywhere in the world. Gross revenue is estimated at $5 million from 250,000 passengers. A fleet of dolphin watch vessels operate daily within the port, increasing the number of trips as per demand. Several dolphin watch operators also provide whale-watching trips during the migration period, and/or evening cruises and dinners. Smaller vessels are also available for private charters that may take in sightseeing, wildlife observation, and wining and dining.

Given the seasonal nature of business on the NSW mid-north coast, many businesses conduct a range of activities, e.g. a combination of charter fishing, whale watching and scuba and snorkelling charters at different times throughout the year.

The extensive coastline of the marine park offers a number of beaches easily accessible to everyday beachgoers, whilst several more secluded beaches are available for four-wheel drive enthusiasts. To the north the beaches of Seven Mile, Bluey's and Boomerang are within easy reach of Forster and surrounding suburbs, whilst in the south popular open beaches are Fingal Bay, Zenith, Box, One Mile, and Samurai. Best beaches inside the port are Jimmies, Shoal Bay, Little Beach, Nelson Bay Beach, Dutchies, Bagnalls, Salamander Bay and Wanda. Local surf schools operate over the warmer months at Bluey's Beach, One Mile/Samurai, and Fingal Bay. Kayaks, catamarans, paddle boats, aqua-boats and windsurfers can be hired at certain times of the year from selected beaches within the port.

Fishing, sailing, kayaking, canoeing, waterskiing, cetacean watching and general sightseeing are the most prevalent boating activities. Several courtesy moorings installed by the MPA are available for public use at Shoal Bay and Nelson Bay Beach. Overnight anchoring is popular in the secluded waters of Fame Cove, which is also a sanctuary zone. Myall River and Lakes are ideal for house boating, camping, and picnicking, whilst its protected waters, along with those of Smith Lake, make it suitable for waterskiing.

Restrictions apply to motorised water sports within the marine park. Jetskis are common in the main port, whilst high speed towing (tyre-tubes, surfboards) are often seen during summer in the bays and lakes. Adventure style craft and parasailing cater for particular clientele.

Recreational fishing occurs mostly over autumn and summer, peaking during the Christmas and New Year period and again over Easter. Hire boats are available to fishers for use inside and outside the port. Several operators with I&I NSW endorsements provide for non-licensed recreational fishers. Fingal Island, Little Island, and Broughton Island are favoured destinations for recreational fishers. Bait fishing is popular in the habitat protection zone on the western side of Cabbage Tree Island. Two fish attracting devices have been installed on the northern side of Fingal Island in order to draw bait collectors away from Cabbage Tree Island and the endangered Gould's petrels that nest there.

The port includes the internationally recognised dive site of Fly Point and Halifax Park, reputedly one of the best shore dives in Australia. The surrounding sponge gardens are a rich habitat for temperate and tropical water species such as wrasse, butterfly fish, moray eels, snapper, cod and groper. Other popular dive locations in the marine park include Broughton and Cabbage Tree islands, the Pinnacle, and Seal Rocks.

Fishing competitions, triathlons, sailing races, kayaking events, and swimming events are amongst the many organised sporting and recreational activities that occur throughout the year.

4 THREATS

Threats to marine and estuarine biodiversity include all human activities (e.g. fishing, pollution, invasive species) that impact significantly on the diversity and abundance of animals, plants and microorganisms and their genetic makeup, as well as the habitats and ecosystems they live in. Effective conservation of marine biodiversity aims to minimise risks and prioritise the management of human activities that impact on animals, plants, habitats and ecosystems, while allowing natural processes to occur. Marine communities, ecological processes and ecosystem functions are naturally dynamic, varying from place to place and year to year. In particular, natural disturbances such as destructive storms or outbreaks of grazing sea urchins can cause profound changes in the structure and function of marine and estuarine communities and have moulded marine environments over millennia. Although natural disturbances can cause significant environmental devastation, marine and estuarine communities can recover from these, given time.

Responses to human threats to marine and estuarine biodiversity are often based on the risk of biodiversity change. Risk is determined by assessment of the potential consequences of a particular activity occurring and the likelihood of its occurrence (Hayes 1997). For example, a large oil spill has the potential to cause a substantial and long-lasting impact to marine biodiversity, but the likelihood or frequency of such an event occurring within the PSGLMP is very low. While such risk assessments are a useful tool for resource allocation and prioritisation, they are prone to failure in capturing the full picture of marine biodiversity decline because they

assess threats in isolation. Although individual activities can and do cause impacts, declines in marine biodiversity are generally a function of multiple human stressors interacting on multiple spatial and temporal scales. Consequently, effective conservation of marine biodiversity requires that multiple threats are simultaneously addressed in a coordinated and holistic way.

Key threats to marine and estuarine biodiversity can be divided into at least five broad categories including resource use, land-based impacts, marine biosecurity, marine pollution and climate change.

4.1 Resource use

Australia's *National strategy for ecologically sustainable development 1992* defines ecologically sustainable development as using, conserving and enhancing the community's resources so that ecological processes (on which life depends) are maintained, and the total quality of life, now and in the future, can be increased (Commonwealth of Australia 1992). The establishment of the NSW marine parks system was consistent with this policy, and NSW marine parks were modelled on the approach adopted by the Great Barrier Reef Marine Park Authority, which allows for sustainable resource use within the boundaries of the marine park providing that the objective of biodiversity conservation is achieved as the highest order priority.

While it is important to ensure that all extractive uses in NSW marine parks are sustainable, potential conflict exists between management for sustainability and conservation of marine biodiversity (Hilborn 2005). Sustainable extraction from marine environments, such as managed fisheries, can still: (i) result in changes to marine communities and ecological processes due to the selective removal of predators, prey and competitors; (ii) act as a selection pressure that influences population genetics; (iii) create physical disturbance to habitats; or (iv) unintentionally take non-target species. Sanctuary zones are included in all NSW marine parks to ensure that biodiversity conservation objectives are met in the first instance by providing places where marine ecological communities can continue to exist in the absence of human extraction.

The most significant threats from extractive uses in NSW marine parks relate to illegal fishing within parks in general, but especially in sanctuary zones. Of particular concern to the PSGLMP is illegal trawling. Trawling not only removes large numbers of target species, such as tiger flathead (*Neoplatycephalus richardsoni*) and silver trevally (*Pseudocaranx dentex*), but is also associated with substantial bycatch (i.e. species that have no commercial value) and discarding of injured undersize economically-important species (NSW Department of Primary Industries 2004). Trawling also causes substantial damage to marine habitats (NSW Department of Primary Industries 2004). Sanctuary zones in the PSGLMP are also subject to illegal commercial mesh netting, and illegal recreational fishing activities. Given the substantial variation in frequency of occurrence and risk to biodiversity of the illegal fishing activities that occur in the PSGLMP, it is critical that risk assessment be adopted to ensure compliance resources are utilised optimally.

Non-extractive uses of marine and estuarine ecosystems, such as commercial tourism, shipping and recreational activities have many economic and educational benefits for New South Wales. However, the intensity and frequency of such activities has the potential to impact marine species and habitats. For example, too many visitors to a rocky intertidal shore can impact plants and animals through trampling (Keough & Quinn 1998). Although some non-extractive activities, such as anchoring, are provided for in the PSGLMP Zoning Plan, most commercial activities, research, and organised events are managed via a permit system.

The most significant threats from non-extractive resource use in the PSGLMP include concentrated marine mammal observation, intensively used scuba diving sites, careless boating practices around seagrass beds and illegal waste disposal. Whale and dolphin watching are two popular commercial activities in the PSGLMP, with the internal waters of Port Stephens arguably hosting the world’s largest dolphin watching fleet. Each activity has the potential to alter the behaviour of the animals under observation if appropriate consideration is not given (e.g. Stamation et al. 2010). To address this, the *Australian national guidelines for whale and dolphin watching* (Department of Environment and Heritage 2005) are applied through regulations within the National Parks and Wildlife Act.

4.2 Foreshore development

Access to the PSGLMP, and protection of private property from storm events, has resulted in a large number of foreshore structures, particularly within the internal waters of Port Stephens. Jetties, retaining walls, groins, marinas and slipways are common. The marine park objective of *maintaining ecological processes* is threatened by these structures which serve to alter current flow, sediment transportation, erosion and accretion, fish passage and habitat structure. Such facilities also impact on the wider community's access to the foreshore of the PSGLMP.

Local government (Port Stephens and Great Lakes councils), the Land and Property Management Authority, NSW Maritime and the MPA all have vested and inter-related management responsibilities for the foreshore of the PSGLMP. In an attempt to provide coordination to these responsibilities a foreshore management plan has been prepared and adopted by both councils (www.portstephens.nsw.gov.au/environment/1273/38936.html).

4.3 Land-based pollution and habitat impacts

Human activities in coastal catchments can directly and indirectly impact on adjacent marine environments (Natural Resource Management Ministerial Council 2006). Industrial, agricultural and urban diffuse and point source discharges can include a variety of pollutants, such as nutrient loading, pesticides, metals, sediments (including acid sulfate soils) and litter. Besides having adverse impacts on marine biodiversity, land-based pollution can have serious implications for marine industries, in particular fisheries, aquaculture and tourism.

Pollution can be introduced into the marine environment by point source discharges, diffuse discharges or solid wastes. While point source discharges (such as sewage outfalls) and solid waste are easier to manage to ensure water quality guidelines are met, diffuse discharge is more problematic. The potential for land-based pollution to impact on marine biodiversity is dependent on a range of different factors including types of pollutant, size of catchment, modification of catchment, and the type and amount of industrial, urban and agricultural development. Estuarine waters adjacent to large urban populations or within highly modified agricultural catchments are particularly susceptible to diffuse pollution (Scanes et al. 2007). These types of impacts can be exacerbated in intermittently closed and open lakes and lagoons such as Smiths Lake when they are closed to the ocean, due to limited tidal exchange or flushing of pollutants.

The ecological significance of the Myall and Smiths lakes and their catchments have long been recognised at local, state, national and international levels, as documented in the relevant estuary and catchment management plans. Formal recognition of ecological values varies across the area and includes national park estate (including the Port Stephens – Great Lakes Marine Park), international migratory bird agreements such as the Japan–Australia Migratory Bird Agreement (JAMBA) and the China–Australia Migratory Bird Agreement (CAMBA), and recognition of wetlands of national and international importance, including Ramsar listing for the Myall Lakes.

Great Lakes Water Quality Improvement Plan

The Great Lakes Water Quality Improvement Plan (WQIP; Great Lakes Council 2009) further recognises the significance of these lake systems, drawing on new research, modelling and community engagement to identify a range of actions to protect and support (and where required, restore) their ecological health. In 2005, the Australian Government provided funding to Great Lakes Council through the Coastal Catchments Initiative (CCI) to undertake research and to develop this WQIP. The aims of the project were to:

- identify the specific levels of nutrients and sediments that are required to provide conditions for a healthy lake ecology and environmental values desired by the community
- identify the best way to manage activities to reduce key pollutant loads entering the lakes
- review pollution control and faecal coliform management systems as they pertain to the management and protection of the lakes.

Implementation of the WQIP will occur through engagement and partnerships with the community and between government agencies, including DECCW. Recommended actions for practitioners having direct relevance to the operations of the PSGLMP include those outlined in:

- approach to engagement for improving water quality
- lake-use strategies
- institutional arrangements for water quality improvement, and
- pollution control systems.

Both the MPA and DECCW worked closely with Great Lakes Council in development of this plan, which is available at www.greatlakes.nsw.gov.au/files/36bfeee6-2708-477f-8bc7-9d1300daf7f4/GLC_WQIP_Exhibition_V2_Exec_Summary_and_TOC.pdf

Acid sulfate soils

Acid sulfate soils (ASS) can pollute marine environments where land-based developments expose these soils to oxidation processes during dry times and subsequent wet seasons discharge low pH waters into the PSGLMP. In recent years there has been increasing awareness of the impacts of acid sulfate soils in the Anna Bay sub-catchment, which discharges into the PSGLMP. The Anna Bay sub-catchment is comprised of a 450 ha coastal back-swamp, historically known as Murrumburrimbah Swamp. Since initial drainage works in 1897 were carried out to improve agricultural prospects, the drainage network has been considerably extended and discharges into Tilligerry Creek. While this has benefited its intended purposes, in recent years there has been increasing recognition of the potential for negative impacts due to exposure of the underlying acid sulfate soils. Greater movement of acidic groundwater has resulted in fish kills, poor water quality affecting oyster cultivation, reduced stock production and a deterioration in downstream environmental values.

I&I NSW has prepared a report into the Anna Bay ASS issue which is available at www.dpi.nsw.gov.au/fisheries/habitat/publications/threats/anna-bay. This report provides the results of detailed on-ground assessments of the distribution and impacts of acid sulfate soils in the Anna Bay area. These assessments included: a review of all previous studies; water quality monitoring and chemical analyses; collection and analysis of soil cores; cross-sectional drain profiling; digital elevation data; and land surveys. The assessments identified the presence of acid sulfate soils across the catchment with two key ‘hotspot’ areas of soil acidity. The report also identifies on-ground works that would be most effective at retaining high groundwater levels to manage acid export, while ensuring better drainage of surface waters following floods and severe rain events.

Sanctuary zones

A key strategy to minimise land-based threats to marine communities is to establish marine protected areas, in particular sanctuary zones (SZs), adjacent to terrestrial lands with high conservation status (ANZECC Task Force on Marine Protected Areas 1998). Marine stressors from terrestrial conservation areas are generally low. Therefore, the deliberate linking of marine sanctuaries to terrestrial reserves will help conserve marine biodiversity. Opportunities to complement adjacent land-use management were considered when selecting the location of a marine park within the Manning Bioregion, and in preparing the PSGLMP Zoning Plan. Where practical, sanctuary zones were located directly adjacent to national parks or nature reserves. For example, Cape Hawke/Pinnacle SZ, Fiona Beach SZ, Broughton Island SZ, Cabbage Tree Island SZ, Fingal Island SZ, Corrie Island SZ, Celito South SZ, Myall Lake No. 1 SZ, Myall Lake No. 2 SZ, Myall Lake No. 3 SZ, Boolambayte Lake SZ, Bombah Broadwater SZ, Zenith Beach SZ, Wallis and Fenninghams Islands SZ, Twelve Mile Creek SZ, Karuah River SZ, Pindimar SZ, Myall River SZ, all adjoin protected terrestrial lands.

4.4 Marine-based pollution

Marine pollution is associated with a variety of human activities, including shipping, boating, oil and gas exploration, fishing and aquaculture. Pollution from such sources encompasses, but is not limited to, oil and chemical spills and discharges, boat sewage and wastewater discharge, marine industrial and domestic waste jetsam, aquaculture discharge, and antifoulants.

Marine pollution impacts on marine biodiversity by degrading habitats and water quality or by directly smothering or killing marine species. Marine pollution can impact on the structure and function of marine communities and alter key ecosystem processes, such as primary production. Pollution agents can also accumulate in marine organisms, resulting in physiological and morphological effects in higher predators. Pollutants often persist in the environment, continuing to impact marine organisms and habitats for many years after their discharge.

Marine debris, in particular garbage wastes, discarded lost fishing gear and lost traps, threaten biodiversity in the PSGLMP. For example, marine animals can be harmed through entanglement in and ingestion of plastic litter (Derraik 2002). Lost fishing gear, such as traps and nets, can continue ghost fishing for weeks, even months, and is a notable threat to fish, marine animals and birds. Large scale discharges from vessels (e.g. oil, waste water, ballast water or fuel) has the potential to negatively influence marine life in the PSGLMP, as well as impact the productive oyster aquaculture industry.

4.5 Marine biosecurity

Marine pest species represent a very significant threat to marine biodiversity. For example, marine pest species can compete with native species for resources, consume native species, disrupt food chains, alter the structure of habitat, modify ecosystem productivity, and facilitate the spread of aquatic disease, pathogens and parasites. Marine pest species threaten the viability of commercial and recreational sectors including fisheries, aquaculture, tourism, shipping and ports.

The exact number of introduced species to Australian waters is unknown, however, over 129 exotic marine species and 209 species of unknown origin have been identified. Pests can attach themselves to boats' hulls, fishing gear and other marine equipment, and can also be transported in bilges, pipes and ballast water. Pests can also be translocated within the aquaculture and aquarium industry. Once established, marine pests are extremely difficult to eradicate and costly to manage, requiring coordinated planning. In this regard, Australia has in place a national system for the prevention and management of marine pests to prevent new marine pests arriving, and to respond when a new pest establishes to minimise its spread and impacts. Assessment of risks and initial response activities are led by I&I NSW.

There are currently no nationally listed aquatic pests of concern in PSGLMP. Pacific oysters are listed as noxious in all NSW waters except for Port Stephens where they are farmed. A Section 8 Fisheries Management Closure for Pacific oyster is in place to regulate the movements of oysters within New South Wales to minimise the spread of Pacific oysters.

I&I NSW Aquatic Biosecurity is a member of the National Introduced Marine Pests Coordination Group (NIMPCG) and contributes to the development of national plans and implementation strategies on issues such as ballast water legislation, biofouling, monitoring, control plans and research. I&I NSW has recently released an updated *Caulerpa taxifolia* control plan (I&I NSW 2009) which outlines goals to prevent the further spread of *C. taxifolia* within and between NSW estuaries. In collaboration with the MPA, I&I NSW ensures developments and activities that have the potential to introduce pest species (e.g. stocking and aquaculture) in the PSGLMP and its catchment have been subject to appropriate levels of assessment. Any proposed fish translocation or live fish import activities are assessed under a risk analysis framework by I&I NSW. Based on outcomes of the risk analysis, strategies may be developed to mitigate identified risks before permitting the activity to occur.

Currently there is no finfish stocking within PSGLMP. Finfish stocking activities undertaken by I&I NSW are underpinned by environmental impact assessment (EIA) and a Fisheries Management Strategy (currently only freshwater fish stocking is undertaken in New South Wales and an EIA has commenced for marine stocking).

In the event that a significant new pest or disease issue is identified in New South Wales, I&I NSW would be the lead agency and, in cooperation with other stakeholders including PSGLMP, can mobilise emergency response arrangements to investigate and if appropriate, respond to the incident. I&I NSW participates in the national Coordinating Committee for Introduced Marine Pest Emergencies (CCIMPE) and the Consultative Committee on Emergency Aquatic Animal Disease (Aquatic CCEAD), which can have a role where the pest or disease is of national

concern. Although I&I NSW is the lead agency for aquatic pest management, it would look to MPA for collaboration and contribution on any pest and disease response actions within PSGLMP as required.

I&I NSW Aquatic Biosecurity Unit has a pest sighting program that is widely advertised, for the public to report suspected sightings of aquatic pests by email or 24 hour recorded phone line.

4.6 Climate change

Climate change driven by human activities has and will continue to threaten marine biodiversity. On average, ocean temperatures and sea levels have increased over the last century. Concurrently, the pH of the oceans has decreased and the southward flow of the East Australian Current has intensified pushing warm and saltier water further south (Poloczanska et al. 2009). As our climate continues to change, it has been predicted with high confidence that directional changes in the temperature and pH of the oceans, as well as sea level rises, will continue over the next century (Poloczanska et al. 2009).

Climate change could have myriad impacts on marine and estuarine biodiversity in NSW waters. For example, a strengthening of the East Australian Current will cause further southern shifts in the distribution of fish, invertebrates, algae and microorganisms, which will continue to impact the structure and function of marine ecosystems (Poloczanska et al. 2009). Within estuaries, mangroves will likely encroach into areas currently occupied by saltmarshes, and seagrass may decline due to sea level rise, increased storminess and warmer temperatures (Lovelock et al. 2009). Ocean acidification combined with increasing water temperatures may decrease the growth and survival of tropical and temperate corals and other invertebrates found in NSW waters. Furthermore, warmer temperatures and an El Niño-like future climate may reduce food availability for breeding seabirds leading to a reduction in breeding success.

NSW marine parks may reduce predicted impacts of climate change on marine biodiversity in a number of ways. Firstly, NSW marine parks contribute to a network of marine protected areas down the east coast of Australia that facilitate connectivity and provide refuges for marine species undergoing southern range expansions. Second, marine parks may reduce negative interactions between climate change and other types of impacts (e.g. fishing and marina construction) by directly reducing other threats to marine communities. Finally, NSW marine park legislation can play a key role in ensuring that developments aimed at protecting privately and publicly owned coastal assets (e.g. seawalls, groins), are installed appropriately and with minimum impact to marine biodiversity. This will be especially important in PSGLMP because predicted sea level rises will exacerbate erosion along coastlines and within Port Stephens.

5 MANAGEMENT STRATEGIES AND ACTIONS

Management actions have been organised under broad strategies to deliver on marine park legislative objectives, as follows:

Objective 1 – To conserve marine biodiversity, marine habitats and maintain ecological processes in the marine park, includes:

1. identification and adaptive management of threats to marine biodiversity and habitats
2. protection of high conservation areas and threatened species.

Objective 2 – To provide for ecologically sustainable uses (including commercial and recreational fishing), includes:

3. assessing developments in and affecting the marine park to minimise impacts
4. maximising voluntary compliance with the marine park zoning plan
5. ecologically sustainable management of commercial activities.

Objective 3 – To provide opportunities for public appreciation, understanding and enjoyment, includes:

6. delivering an ecological, social, cultural and economic research and monitoring program
7. promotion of sustainable tourism and recreational uses, as well as facilitating a greater appreciation of marine biodiversity
8. ensuring management is consistent with the cultural aspirations of Aboriginal people.

Management actions have been systematically identified to give support to these strategies and are outlined in Table 2. These actions include the range of responses involved in each step of management, including: 1) policy development at the state and local level; 2) strategic and local planning; 3) day-to-day management; and 4) research and monitoring. Following identification and consideration of respective outputs and outcomes in meeting strategy objectives, actions were prioritised with the assistance of the local PSGLMP Advisory Committee.

Table 2: Management actions and performance indicators

MARINE PARK OBJECTIVE: To conserve marine biodiversity, marine habitats and maintain ecological processes in the marine park.

Strategy	Action	Performance indicators		Priority
		Output (deliverables)	**Outcome (extent to which management objectives are being achieved)**	
1. Identification and adaptive management of threats to biodiversity and habitats in the marine park	Report on natural values and key threats to PSGLMP to provide up-to-date information for public use, adaptive management and for zoning plan review.	• Report prepared prior to review of zoning plan.	Public are better informed to comment about marine park values and management needs during the review process.	High
	Support and engage in the development and implementation of management plans and programs initiated by local councils and other government agencies.	• Local management plans (e.g. Local Environmental Plan, estuarine or coastal management plans) address PSGLMP priorities. • Assist with the development and implementation of the Great Lakes Water Quality Improvement Plan. • Assist with the development and implementation of the Port Stephens Foreshore Management Plan. • Assist with development of Port Stephens Council's Water Sensitive Urban Design policy	Coordinated planning and resourcing amongst agencies provides a more holistic approach to reducing threats to biodiversity in PSGLMP.	High
	Work with relevant agencies (e.g. DECCW Environment Protection and Regulation Group and NSW Maritime) to ensure effective government response to pollution incidents.	• Pollution incident management strategies are developed for PSGLMP that identify responsibilities of various agencies and their contacts' details. • Local incident plans consider objects of the Marine Parks Act. • PSGLMP staff are trained to assist in pollution incidents where necessary.	Effective incident response reduces impacts on marine biodiversity in PSGLMP.	High

MARINE PARK OBJECTIVE: To conserve marine biodiversity, marine habitats and maintain ecological processes in the marine park.

Strategy	Action	Performance indicators		Priority
		Output (deliverables)	**Outcome (extent to which management objectives are being achieved)**	
1. Identification and adaptive management of threats to biodiversity and habitats in the marine park	Contribute to preparation of policies and management plans that are developed by agencies to address impacts and management of marine pests of concern to PSGLMP.	• Support agencies (CMA and I&I NSW) in the preparation and implementation of local and statewide invasive species plans. • Local initiatives to control marine pests in PSGLMP are supported. • Research grants obtained and papers published that direct management action on invasive species in PSGLMP. • AQUIS National Ballast Water and Biofouling plan is implemented.	Pest species in PSGLMP are identified and threats minimised or mitigated.	High
	Review the PSGLMP Zoning Plan	• Zoning plan review report prepared for Ministers' consideration.	Updated PSGLMP Zoning Plan provides for effective delivery of marine park objectives, representing and protecting key habitat types and providing for sustainable use.	High

MARINE PARK OBJECTIVE: To conserve marine biodiversity, marine habitats and maintain ecological processes in the marine park.

Strategy	Action	Performance indicators		Priority
		Output (deliverables)	**Outcome (extent to which management objectives are being achieved)**	
2. Protection of high conservation areas and threatened species	Enforce the PSGLMP Zoning Plan effectively by prioritising resources to high conservation areas (e.g. key sanctuary zones), damaging activities and repeated offenders using a risk-based approach.	• Develop and review annual PSGLMP compliance plans. • Enforcement activities are implemented optimally. • Enforcement data maintained on the Nautilus compliance database.	Marine biodiversity effectively conserved though marine park users complying with the zoning plan.	High
	Support DECCW, I&I NSW and the DEWHA in the implementation of recovery actions for threatened species and endangered ecological communities and contribute to threat abatement actions.	• Appropriate training for PSGLMP staff is undertaken for the identification and protection of marine threatened species. • DECCW policies for marine mammal disentanglement and their conservation and management are implemented.	Populations of threatened species in PSGLMP are not impacted by use. Improved information is available to make informed decisions concerning the protection of threatened species and endangered ecological communities.	High
	Support and assist NPWS with the protection and management of the Myall Lakes RAMSAR site.	• Assist in the delivery of relevant actions detailed in the *Myall Lakes National Park Little Broughton Island* and *Stormpetrel Nature Reserves Plan of Management*.	Ongoing protection of the Myall Lakes RAMSAR site and its values for important migratory waterbird species.	Medium
	Encourage marine park users, including commercial operators and community groups, to record sightings of threatened and vulnerable species.	• Information sheets are developed and distributed to facilitate reporting of sightings of threatened species.	Better informed decisions are made concerning the effectiveness of protection strategies for threatened species and endangered ecological communities in PSGLMP.	Medium

MARINE PARK OBJECTIVE: To provide for ecologically sustainable uses (including commercial and recreational fishing).

Strategy	Action	Performance indicators		Priority
		Output (deliverables)	**Outcome (extent to which management objectives are being achieved)**	
3. Assessing developments in and affecting the marine park to minimise impacts	Establish processes with relevant authorities to ensure that the provisions of the Marine Parks Act are met when assessing applications for developments in and adjacent to BMP.	• Applications for developments in PSGLMP are assessed in accordance with the provisions of the Marine Parks Act. • Marine park conditions are incorporated into development approvals.	Impacts from construction and operation of developments in the marine park are managed or mitigated.	High
	Enforce and audit relevant conditions included within development approvals.	• Compliance of development conditions is included in the marine park compliance plan.	Successful enforcement or restorative action is taken in respect of developments in PSGLMP that do not comply with development conditions.	High
	Contribute to the preparation and review of legislation, policies or strategies relating to the assessment of applications for developments in NSW marine parks.	• Legislation, policies and strategies associated with development consent include PSGLMP's needs.	Decision making for developments is improved ensuring impacts on values of PSGLMP are mitigated.	Medium
4. Maximising voluntary compliance with the marine park zoning plan	Prepare risk-based annual compliance plan for the PSGLMP and include activities (e.g. advisory days, fishing competition briefings) aimed at maximising voluntary compliance.	• PSGLMP compliance plan is prepared and implemented annually. • Prepare and implement a communications plan for the PSGMP.	Marine park users comply with marine park legislation and compliance resources are used effectively.	High

MARINE PARK OBJECTIVE: To provide for ecologically sustainable uses (including commercial and recreational fishing).

Strategy	Action	Performance indicators		Priority
		Output (deliverables)	**Outcome (extent to which management objectives are being achieved)**	
4. Maximising voluntary compliance with the marine park zoning plan	Enforce provisions of relevant legislation with priority given to areas identified in state and local marine park compliance plans.	• Staff trained to enforce provisions of marine parks, fisheries and national parks legislation. • Enforcement activities are implemented optimally.	Trends in voluntary compliance with marine parks legislation improve, and in particular, there is a reduction in infringements/patrol effort observed by the local community (within a buffer of 40 km of PSGLMP).	High
	Adaptively manage signage, buoys and advisory material to improve understanding of the zoning plan.	• Signage and buoys are recorded in an asset maintenance system and regular maintenance completed. • Comments from marine park users about advisory material collated and appropriate changes made to advisory materials.	Trends in voluntary compliance with marine parks legislation improve.	High
	Assess applications for organised recreational activities in PSGLMP.	• Permits issued with appropriate conditions.	Organised recreational activities in PSGLMP are managed in accordance with statutory and policy requirements.	High
	Enforce and audit conditions of permits for recreational activities in BMP.	• Permit conditions are enforced. • At least 25% of commercial permits issued are audited per year.	Continual improvement over time in the development of permit conditions and compliance, as well as a decrease in offences relating to permit breaches.	Medium

MARINE PARK OBJECTIVE: To provide for ecologically sustainable uses (including commercial and recreational fishing).

Strategy	Action	Performance indicators		Priority
		Output (deliverables)	**Outcome (extent to which management objectives are being achieved)**	
5. Ecologically sustainable management of commercial activities	Work with commercial tour operators to develop ways to promote and market sustainable practices and enjoyment of the marine park.	• Commercial tour operators support and promote sustainable practices. • Commercial tour operators adopt sustainable practices that are listed on MPA web site.	The number of operators who are actively promoting sustainable use increases over time.	Medium
	Assess applications for commercial activities in PSGLMP.	• Permits issued with appropriate conditions.	Commercial activities in PSGLMP are managed in accordance with statutory and policy requirements.	High
	Enforce and audit conditions of permits for commercial activities in PSGLMP.	• Permit conditions are enforced. • At least 25% of permits issued are audited per year.	Continual improvement over time in the development of permit conditions and compliance, as well as a decrease in offences relating to permit breaches.	Medium
	Contribute to improvement of the MPA permit policies for managing commercial and organised recreational activities in PSGLMP.	• Permit policy and procedures reviewed.	Recreational and commercial activities within PSGLMP comply with marine park legislation.	High

MARINE PARK OBJECTIVE: To provide opportunities for public appreciation, understanding and enjoyment.

Strategy	Action	Performance indicators		Priority
		Output (deliverables)	**Outcome (extent to which management objectives are being achieved)**	
6. Delivering an ecological, social, cultural and economic research and monitoring program	Consistent with the MPA Strategic Research Plan, prepare an annual research work plan and undertake core research programs.	• Annual marine park research work plans are approved. • Research publications and reports are produced in accordance with project milestones.	Research provides feedback to improve management of PSGLMP.	High
	Develop and maintain partnerships with internal and external research providers to undertake targeted research projects in the marine park.	• Maintain partnerships with universities and other research providers (e.g. DECCW, I&I). • Reports from research programs are prepared and published.		High
	Apply for or support external grant funding to value-add research efforts in the PSGLMP.	• Significant research grants are obtained.		High
	Contribute to the development and review of policies and strategies relating to research activities by the MPA.	• The development and review of policies and strategies relating to research activities by the MPA include PSGLMP priorities.		Medium

MARINE PARK OBJECTIVE: To provide opportunities for public appreciation, understanding and enjoyment.

Strategy	Action	Performance indicators		Priority
		Output (deliverables)	**Outcome (extent to which management objectives are being achieved)**	
6. Delivering an ecological, social, cultural and economic research and monitoring program	Research activities are managed in accordance with statutory, policy and strategic requirements.	• Applications for research permits are assessed with reference to statutory, policy and strategic requirements.	Results from permitted research activities are incorporated into future management action and natural values reports.	High
7. Promotion of sustainable tourism and use, as well as facilitating a greater appreciation of marine biodiversity	Work with recreational groups, local council and chamber of commerce to support/ coordinate events, and promote local marketing opportunities through the development of promotional material and MPA sponsorship.	• Marketing products published and promotional events supported. • Prepare and implement a Communications Plan for the PSGLMP.	Appreciation of BMP increases over time, as does the prominence of organised events held in the marine park.	Medium
	Opportunities are provided for volunteer and community groups to engage in marine park education, environmental restoration and research projects.	• Volunteer projects are developed and implemented with community support and funding.	Community support and appreciation of PSGLMP improves over time.	Medium
	Educate local school and community groups about the values of PSGLMP.	• MPA primary school education kit developed and implemented. • Local schools are visited by MPA staff. • Support DECCW Discovery Ranger Program (marine park component).	Number of local primary schools using the MPA schools kit increases over time. Increased number and satisfaction of discovery participants with discovery programs offered.	High

MARINE PARK OBJECTIVE: To provide opportunities for public appreciation, understanding and enjoyment.

Strategy	Action	Performance indicators		Priority
		Output (deliverables)	**Outcome (extent to which management objectives are being achieved)**	
7. Promotion of sustainable tourism and recreational uses	Contribute to the implementation of MPA Communications and Engagement Plan 2009–2012.	• Local actions under the MPA Communications and Engagement Plan 2009–2012 are implemented via the PSGLMP Communication Plan.	Public engagement, appreciation and enjoyment of BMP is improved and the community is better informed about marine park values and benefits.	High
	Develop interpretive and regulatory information for marine park users.	• Signage, publications, advertisements, and information shelters are prepared, website upgraded to include local information.		High
8. Ensuring management is consistent with the cultural aspirations of Aboriginal people	Ensure there is an appropriate forum for traditional owners to input into the management of PSGLMP.	• Worimi knowledge holders Aboriginal Corporation is supported.	Greater engagement of Worimi people over marine park management.	High
	Identify and administer Cultural Resource Use Agreements (CRUA) for Aboriginal access in the marine park.	• MoU negotiated and signed by parties and marine park and fisheries permits issued. • All parties comply with CRUAs.	CRUAs provide for the sustainable cultural use of marine park resources.	High
	Contribute to the development of policies and strategies relating to research on Aboriginal cultural heritage issues.	• Research strategies developed for PSGLMP to better direct cultural heritage research. • Cultural mapping project completed.	Cultural research programs provide information to better inform management decisions.	High

6 RESEARCH, MONITORING AND PERFORMANCE REPORTING

Evaluating the delivery of outputs and performance in achieving outcomes is a critical step for adaptive management, as part of improving future planning and management practices. In this regard, the management actions described in Section 5 will be evaluated and reported against on an annual basis as part of annual planning.

Approved annual work programs will describe the scheduled actions to be implemented by marine park staff over the financial year. Identified action outcomes, monitoring and resource assessment will be instigated to provide data (both quantitative and qualitative) that will be analysed to view changes over time. Indicators and measurements that will be used in this evaluation are listed in Appendix 3.

The Marine Parks Authority will consider undertaking a review of this operational plan following the review of the zoning plan in 2012.

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Appendix 1 – Marine Parks Authority and Marine Parks Committee Functions

Marine Parks Authority

The Marine Parks Authority (the Authority) is a three member statutory body established to administer the declaration and management of marine parks to meet the objectives of the *Marine Parks Act 1997*. The Authority reports to the Minister for Industries and Investment and the Minister for Climate Change and the Environment, who are jointly responsible for the administration of the Marine Parks Act.

The Authority is chaired by the Director-General of the Department of Premier and Cabinet (DPC) and includes as members the Directors-General of the Department of Environment, Climate Change, and Water (DECCW) and NSW Industry and Investment (I&I NSW). The specific functions of the Authority are:

- making recommendations on the zoning of marine parks
- preparing operational plans for marine parks
- managing and controlling activities that may affect marine biodiversity in marine parks
- providing for and regulating the ecologically sustainable use (including commercial and recreational fishing) of marine parks
- disseminating information about marine parks
- encouraging public appreciation, understanding and enjoyment of marine parks and, public recreation in marine parks
- encouraging appropriate scientific research into the ecology of marine systems.

Officers undertaking day-to-day functions of the Authority are employees of DECCW; however, I&I NSW officers assist in the joint enforcement of marine park regulations.

Marine Parks Advisory Council

The Marine Parks Advisory Council is established to advise the responsible Ministers and the Authority on marine park matters from a ‘statewide’ perspective. Members on the council include representatives from commercial and recreational fishing, conservation, science, the Aboriginal community, scuba diving and tourism. The council generally provides direct advice to the Authority on matters affecting the whole marine park system, such as legislation, regulatory reform, and marine park policies and the development of scientific research and monitoring plans.

Port Stephens – Great Lakes Marine Park Advisory Committee

A local advisory committee is established for each marine park to provide specific advice on its management, including zoning and operational plans. The PSGLMP Advisory Committee includes members representing:

- Port Stephens and Great Lakes councils
- marine science
- marine conservation
- recreational fishers
- recreational fishers (spearfishers)
- commercial fishers
- tourism industry
- charter operations
- aquaculture (oyster) industry
- recreational boat owners
- other (at the discretion of the Ministers).

Appendix 2 – Key legislation applying to NSW marine parks

The *Marine Parks Act 1997* operates alongside the following legislation, which is administered by various NSW and Commonwealth agencies.

Legislation (administering organisation)	Application in NSW marine parks
Fisheries Management Act 1994 (Industry and Investment NSW)	• The Act aims to conserve, develop and share the fishery resource for the benefit of present and future generations. • Industry and Investment NSW is represented in the Marine Parks Authority, meaning that interactions between marine park and fisheries management programs are well understood and reflected in decision making. • Recreational and commercial fishing legislation applies equally in marine parks as in other NSW waters. For example, species bag and size limits apply in marine parks and licences are required for recreational, charter and commercial fishing in marine parks. • I&I NSW is also the determining authority for dredging and reclamation in state waters including marine parks meaning that opening and closing of coastal lakes in marine parks requires consent under fisheries legislation. • I&I NSW administers the listing and protection of threatened fish and marine vegetation species, population and communities, and processes for identifying critical habitat. Recovery plans and threat abatement plans are implemented in marine parks. For example, the grey nurse recovery plan is being implemented through marine zoning plans. • Section 36 of the Marine Parks Act applies certain provisions of the Fisheries Management Act to enforcement in marine parks. Consistency in enforcement policies and guidelines applies across state waters including in marine parks. Fisheries and marine park officers are authorised under the Fisheries Management Act and Marine Parks Act and joint patrols are common practice.
Catchment Management Authorities Act 2003 (CMA Act) (Department of Environment, Climate Change and Water – Catchment Management Authorities)	• The CMA Act establishes local Catchment Management Authorities for the purpose of ensuring operational, investment and decision making natural resource functions at the catchment level and ensuring that decisions about natural resources take into account appropriate catchment issues. • CMAs have an important role to ensure the management of natural resources in catchments is in the interests of the state. They also provide a framework for financial assistance and incentives to landholders, including marine parks, in connection with natural resource management. • The Department of Environment, Climate Change and Water supports the administration of CMAs and works closely with them both at the state and local levels to support catchment and marine conservation initiatives. • Specifically, CMAs are tasked with developing catchment action plans that give effect to approved plans through annual implementation programs, and provide loans, grants, subsidies or other financial assistance for the purposes of the catchment activities. The Marine Parks Authority has a strong interest in catchment management planning and has been active in their preparation and subsequent reviews.

Legislation (administering organisation)	Application in NSW marine parks
National Parks and Wildlife Act 1974 (Department of Environment, Climate Change and Water – National Parks and Wildlife Service)	• National parks and wildlife legislation provides for the conservation and management of animals and plants and habitats within declared reserves, and for the protection of listed species outside reserves. • All marine reptiles, mammals and birds are protected and managed by DECCW. For example, in marine parks, approach distances for whale and dolphin tour charters are managed under this Act. Other management controls, including accreditation and code of practice compliance are also overseen by DECCW Parks and Wildlife Officers. • Nature reserves and national parks adjacent to marine parks are managed consistently where possible. For example, domesticated animals rules applying to adjacent national parks equally apply within the marine park.
Protection of the Environment Operations Act 1997 (Department of Environment, Climate Change and Water – Environment Protection Authority)	• The Protection of Environment Operations Act provides a single licensing system to regulate air, water and noise pollution, as well as waste management throughout the whole state, including marine parks. • Marine park staff have powers under this legislation for 'non-scheduled' activities within marine parks. NSW Maritime also has full powers in respect to vessel related matters in marine parks, including noise pollution. • The joint roles of NSW Maritime and the Marine Parks Authority are set out in an operational agreement about responding to pollution incidents in and outside marine park boundaries.
Environmental Planning and Assessment Act 1979 (Department of Planning)	• Planning legislation provides for the environmental assessment and mitigation of environmental impacts of any works proposed in and adjacent to marine parks. • Planning approvals in marine parks may be subject to local councils or state government determining authorities or both. Most often, development approvals within marine parks require determination by the NSW Land and Property Management Authority (Crown lands) in consultation with the Marine Parks Authority.
Maritime Safety Act 1998 *Maritime Services Act 1935* (No. 47) *Navigation Act 1901* (No. 60) (NSW Maritime)	• The NSW Maritime agency administers maritime safety legislation that provides for the safe and orderly navigation of vessels operating in state waters including all marine parks. The Navigation Act also ensures that navigable waters are not unduly interfered with, in order to ensure safe and uninterrupted passage. • In marine parks, NSW Maritime administers the licensing of moorings including moorings owned and operated by the MPA for public use. • Organised aquatic activities that require aquatic licences under maritime legislation in marine parks are managed by NSW Maritime. NSW Maritime and MPA have arrangements in place to manage joint consent. • Vessel speed restrictions are also managed and enforced by NSW Maritime officers in marine parks. Where speed restrictions are required for the protection of biodiversity, such as important areas for turtles or dolphins, the Marine Parks Authority may regulate vessel speed, by agreement with NSW Maritime.

Legislation (administering organisation)	Application in NSW marine parks
Marine Pollution Act 1987 (NSW Maritime)	• The Marine Pollution Act relates to matters affecting the protection of the sea and certain waters from pollution by oil and other noxious substances discharged from ships. All discharges of noxious substances and oil are prohibited under this Act. The Act also concerns other pollution types and is cross linked with pollution of environment operations legislation in this regard. • As pollution from shipping is a major threat to marine parks, NSW Maritime plays a key role in ensuring that risks are minimised in marine park localities.
NSW Heritage Act 1977 (NSW Planning, Heritage Branch)	• This Act protects archaeological relics from being disturbed. The Heritage Branch of the NSW Department of Planning has prime responsibility for this and other maritime heritage. The work of the Heritage Branch includes the identification of important places and objects; providing guidance on management; supporting community heritage projects through funding and advice; and maintaining the NSW Heritage Database.
Threatened Species Conservation Act 1995 (TSC Act) (Department of Environment, Climate Change and Water)	• The TSC Act provides for the assessment and listing of threatened species, populations and communities of animals and plants. • The process for identifying critical habitat for threatened species (other than fish), populations and ecological communities is managed by DECCW. Similar to fisheries arrangements and application, TSC recovery plans and threat abatement plans are implemented in full in marine parks. As an example, MPA has adopted appropriate actions detailed in the recovery plan for the little tern in marine park zoning plans.
Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth.) (Cth. Department of the Environment, Water, Heritage and the Arts)	• The Australian Government's environment protection and biodiversity legislation provides for the assessment and approval processes for actions that are likely to have a significant impact on matters of national environmental significance, such as: World Heritage properties, listed threatened species and communities, listed migratory species, and the Commonwealth marine environment. • The Australian Government has a primary role is to protect areas of national environmental significance. Interactions with marine parks occur through the implementation of national marine mammal guidelines and threatened species conservation and through the East Marine Bioregional Planning process and management of existing Commonwealth marine reserves.
Environment Protection (Sea dumping) Act 1981 (Commonwealth) (Cth. Department of the Environment, Water, Heritage and the Arts)	• The Australian Government also manages the loading and dumping of waste at sea, as well as, international obligations under the London Protocol to prevent marine pollution by controlling dumping of wastes and other matter. • Ocean disposal of waste and the sinking of vessels, aircraft and platforms in all Australian waters, including most areas of NSW marine parks are determined by the Commonwealth. • Consequently, Commonwealth permits are required for all sea dumping operations in marine park areas. Examples include artificial reefs and dredging operations. Permits have also been issued for dumping of vessels, platforms or other man-made structures and for burials at sea. • Commonwealth legislation also protects underwater cultural heritage in Australia. Management is also guided by the Code of Ethics of the Australasian Institute for Maritime Archaeology.

Appendix 3 – Indicators used to evaluate outcome performance

Marine park objectives	Performance indicators and measurements
To conserve marine biodiversity, marine habitats and maintain ecological processes in the marine park.	• Quantify changes in rocky reef fish abundance and composition • Percentage of marine park habitat mapped and classified at the fine-scale
To provide for ecologically sustainable uses (including commercial and recreational fishing)	• Trends in patterns of use • Trends in voluntary compliance
To provide opportunities for public appreciation, understanding and enjoyment	• Adequacy of signage, information materials and research dissemination

Appendix 4 – Places and shipwrecks listed on the National Heritage Register in or adjacent to PSGLMP

Place	Values
Fly Point, Halifax Park Aquatic Reserve	High diversity of sedentary marine animals, particularly sponges.
Point Stephens Lighthouse	One of the few examples of the work of colonial architect Alexander Dawson.
Port Stephens Estuary	The largest area of mangroves (2700 ha) and the second most extensive area of seagrass (1000 ha) in New South Wales.
Snapper Island Nature Reserve	The reserve's rainforest is of considerable scientific interest in the regional context of plant associations and distributions and provides a significant habitat isolate for rainforest passerines and frugivorous pigeons.
Tomaree National Park	One of the most scenically significant national parks within the NSW reserve system. It includes fine examples of distinctive coastal landforms such as tombolos, rocky prominences, heavily indented cliffs, together with attractive sandy beaches and dune systems.
Boondelbah Nature Reserve	A significant breeding site for: little penguin, Gould's petrel, wedge tailed shearwater, short tailed shearwater, sooty shearwater and the white faced storm petrel.
Cape Hawke Coastal Area	Significant for its scenic coastal cliffs, and endangered littoral rainforest communities.
Indigenous Place – Hawks Nest	
Indigenous Place – Seal Rocks	

Place	Values
John Gould Island Nature Reserve	Immensely important as the breeding site for Gould's petrel which has rarely been recorded elsewhere.
Karuah River Road Bridge	Believed to be the oldest existing timber truss bridge in Australia.
Little Broughton Island Nature Reserve	An important breeding place for sooty, wedge tailed and short tailed shearwaters.
Myall Lakes National Park	Lakes, swamps, diverse vegetation and complex dune formations make this a natural area of outstanding beauty.
Seal Rocks Littoral Rainforest	A high diversity and association of species not found anywhere else in the mid north coast region of New South Wales.
Seal Rocks Nature Reserve	The northern most colony of Australian fur seals.
Stormpetrel Nature Reserve	An important breeding place for sooty, wedge tailed and short tailed shearwaters.
Sugarloaf Point Lighthouse	Opened in 1875, and significant for its association with the development of New South Wales maritime navigational aids during an important period of expansion of the lighthouse network.
Tahlee Bible College	Tahlee Estate is of very high local, regional, state and national significance, contributing to our understanding of the history and development of Australia in every aspect of cultural significance.

Ship name	Year wrecked	Location
Ability	1897	Cape Hawk
Acme	1876	Seal Rocks
Ada and Ethel	1887	Seal Rocks
Addreley	1897	Morna Point
Alice	1861	Morna Point
Amphitrite	1862	South Head, Port Stephens
Ann	1876	Port Stephens entrance
Ballina	1934	Offshore Port Stephens
Ben Bolt	1895	Seal Rocks
Ben Nevis	1875	Yacaaba Head
Bessy	1844	Morna Point
Black Diamond	1863	Seal Rocks
Bound to Win	1893	1 nm offshore Port Stephens
Bowra	1894	8 nm south Seal Rocks

Ship name	Year wrecked	Location
Brighton	1916	Duckhole, Port Stephens
Britannia	1869	4nm south Morna Point
Caribean	1830	Offshore Port Stephens
Carnation	1866	Seal Rocks
Caroline	1877	Charlotte Head
Carrington	1842	Port Stephens
Catterthun	1895	Seal Rocks
Centennick	1898	Long Island, Broughton
Clarissa	1857	Fingal Bay
Cleone	1871	Seal Rocks
Concord	1867	Morna Point
Condong	1896	Morna point
Contest	1807	Jimmys Beach
Coolongolook	1927	4 nm NE Port Stephens
Coral	1898	Port Stephens
Corra Lyn	1914	Port Stephens entrance
Croki	1903	Seal Rocks
Currency	1856	Bungaree Norah, Port Stephens
Cyclone	1867	Yacaaba Head
Cynthia	1900	Yacaaba Head
Daisy	1885	Hannah Beach, Port Stephens
Damaruis	1858	False Bay, Port Stephens
Daring	1858	Port Stephens entrance
Dart	1876	Yacaaba Head
Dauntless	1921	Anna Bay
Diamond	1864	Little gibber
Dolly Walmsley	1894	Stoney point, Port Stephens
Don Juan	1869	Hannah Bay, Port Stephens
Dove	1828	Yacaaba Head
Dove	1857	Long Island , Broughton
Duroby	1923	Duckhole, Port Stephens
Echo	1894	Yacaaba Head
Edith	1874	Seal Rocks
Edward	1839	Port Stephens

Ship name	Year wrecked	Location
Edwin	1816	Cape Hawke
Eldriss	1932	Narrow Gut, Port Stephens
Eliza	1811	Port Stephens
Eliza	1855	Hannah Bay, Port Stephens
Ellen	1891	Seal Rocks
Emily	1919	Little Gibber
Emperor	1886	Yacaaba Head
Empress of India	1900	Cape Hawke
Endeavour	1852	Port Stephens
Ethel	1884	Yacaaba Head
Ethel	1898	Yacaaba Head
Fanny	1850	Hannah Bay
Favourite	1897	Cape Hawke
Fiona	1882	Fiona Beach
Fire Queen	1896	Port Stephens
Fitzroy	1897	Morna Point
Fitzroy	1921	Cape Hawke
Flirt	1876	Seal Rocks
Florence Irving	1877	Port Stephens outer light
Flying Fish	1870	Port Stephens
Forest Queen	1894	Charlotte Head
Forest Queen	1902	Port Stephens inner light
Francis Freeling	1839	Port Stephens
Freak	1864	Port Stephens
General Weel	1868	Charlotte Head
Governor Musgrave	1925	Duckhole, Port Stephens
Ham 3	1926	Sugarloaf Point
Hawke	1876	Yacaaba Head
Heather Bell	1880	4 nm south Cape Hawke
Hoolet	1876	Seal Rocks Bay
Hope	1817	Port Stephens
Huntley Castle	1883	Port Stephens entrance
Ida	1911	Port Stephens
Iluka	1911	Port Stephens

Ship name	Year wrecked	Location
Ingeborg	1907	Port Stephens
Iris	1860	Hannah Bay
Isabella	1876	Jimmys Beach
Isle of Thanet	1870	Port Stephens
Jane	1816	Cape Hawke
Jane	1900	Shoal Bay
Jessie Kelly	1886	Yacaaba Head
John T Berry	1888	Offshore Port Stephens
Joker	1887	Jimmys Beach
Josephine	1943	Morna Point
K-9	1949	Fiona Beach (now Submarine Beach)
Karoola	1896	Morna Point
Kate	1876	Cape Hawke
Kate Thompson	1972	Tea Gardens
Kiltie	1921	Cape Hawke
Kingsley	1902	Crayfish Bay, Morna Point (Kingsley Beach)
Lavinia	1869	Port Stephens
Leah	1865	Port Stephens
Lightning	1868	6 nm south Seal Rocks
Lillian	1876	Nelson Bay
Lilly	1885	Morna Point
Lord	1874	Nelson Bay
Lurline	1869	Port Stephens
Macleay	1911	Boondelbah Island
Maggie	1894	Broughton Island
Marian Mayfair	1913	Cape Hawke
Mary and Rose	1866	Port Stephens outer light
Mary Ann	1872	Long Island (Seal Rocks)
Mary Campbell	1889	Cape Hawke
Matilda	1873	Offshore Port Stephens
Merlin	1898	Morna Point
Mermaid	1899	8 nm south Seal Rocks
Morning Star	1877	Cabbage Tree Island
New Moon	1864	Hannah Bay

Ship name	Year wrecked	Location
Numbah	1878	Morna Point
Oakland	1903	Cabbage Tree Island
Oimara	1903	Morna Point
Our Jack	1921	Offshore Cape Hawke
Pandora	1836	Yacaaba Head
Pappinbarra	1929	Port Stephens outer light
Perseverance	1877	Yacaaba Head
Phil Forbes	1922	3 nm north Broughton Island
Polly Hopkins	1857	Port Stephens
Prince Victor	1881	Seal Rocks
Priscilla	1837	Port Stephens
Priscilla	1849	Hannah Bay
Psyche	1940	Salamander Bay
Queen	1876	1 nm south Hannah Bay
Rainbow	1864	Sugarloaf Point
Raymond	1879	2.5 nm north Cape Hawke
Recovery	1816	Near Port Stephens
Reliance	1928	Tea Gardens
Ripple	1889	Seal Rocks
Rose	1916	Tea Gardens
S.A. Hayward	1913	Yacaaba Head
Sally	1843	Long Island 10 nm south Seal Rocks
Sally	1925	Port Stephens
Sarah dent	1863	Between Yacaaba and Cabbage Tree Island
Satara	1910	2 km south Treachery Head
School Boy	1881	One Mile Beach
Sea Foam	1894	Shoal Bay
Sea Ripple	1875	Yacaaba Head
Secret	1869	Providence bay
St George	1903	Seal Rocks
Stag	1885	Yacaaba Heads
Surprise	1884	Seal Rocks
Susie	1891	10 nm south Port Stephens
Swallow	1839	Seal Rocks

Ship name	Year wrecked	Location
Talbot	1899	Fingal Bay
Tallong	1913	Fishermans Bay
Taufauhau	1879	Seal Rocks
Teetpookana	1937	Seal Rocks
Terara	1930	Witt Island, Port Stephens
Terrara	1868	12 nm offshore Port Stephens
Terrigal Jack	1873	Seal Rocks
Thordis	1906	Yacaaba Head
Traveller	1874	Nelson Bay
Trio	1870	Seal Rocks Bay, 50 yards from Rainbow
Trio	1894	Offshore Port Stephens
Triton	1862	Port Stephens
Tybee	1864	8–9 nm north Port Stephens ashore
Unidentified 1801	1801	North of Port Stephens
Unidentified 1851	1851	Near Port Stephens
Unidentified		Naranie Bay, Myall Lake
Unidentified		Tea Gardens (1)
Unidentified		Tea Gardens (2)
Venture	1934	Morna Point
Venus	1862	Offshore Port Stephens
Vine	1869	Sugarloaf Point
Wallamba	1923	Birubi Point
Wauchope	1942	Offshore Box Beach
Willinga	1908	Port Stephens entrance
Woodlark	1868	Seal Rocks

Appendix 5 – Extract of relevant sections from the Myall Lakes National Park, Little Broughton Island and Stormpetrel Nature Reserves Plan of Management

Note: Cross-references to sections and maps within this extract refer to sections and maps in the plan of management, not this operational plan.

Aquatic Plants and Animals

Desired outcome: Management programs to secure the survival of all aquatic plant and animal species native to the planning area in collaboration with other agencies.

Guideline 1.3.1: Support and encourage any initiatives by NSW Fisheries to manage aquatic fauna and habitat within the waters of Myall Lakes National Park.

Guideline 1.3.2: Encourage further research and monitoring of the aquatic flora and fauna communities by external institutions and agencies to facilitate an understanding of their role in the healthy functioning of the aquatic environment, so as to assess threats and methods of reducing threats.

Action 1.3.3: Monitor catchment characteristics in conjunction with relevant agencies. Implement catchment management policies and programs to control water quality (see section 1.4: catchment management and water quality).

Catchment Management and Water Quality

Desired outcome: Implementation of policies, programs and procedures to ensure that the quality of waters entering, and within, the park are within the limits necessary to maintain natural processes, biodiversity, ecological integrity and visitor safety.

Guideline 1.4.2: Ensure best-practice nutrient management within the park and work with the community to reduce nutrient inputs across the catchment.

Guideline 1.4.7: Support the principles of catchment and estuary management, and liaise with local government, other authorities and the community to maintain and improve the water quality of the Myall Lakes system and associated catchment.

Guideline 1.4.8: Actively contribute to the implementation of the *Port Stephens–Myall Lakes Estuary Management Plan* (Umwelt Australia 2000) and the *Smith Lakes Estuary Management Plan* (Webb, McKeown & Associates 2001) as they relate to the land and waterways within Myall Lakes National Park.

Guideline 1.4.10: Actively contribute to the development and implementation of the relevant water management plan for the catchment (which will be developed under the *Water Management Act 2000*).

Guideline 1.4.11: Support proposals by the Waterways Authority of NSW to designate the Myall Lakes system a ‘no discharge zone’ for treated and untreated sewage from all vessels.

Action 1.4.5: Maintain programs for the ongoing monitoring of ground and lake water quality in collaboration with relevant government agencies and the community.

Action 1.4.6: Monitor blue-green algae populations within the lake system, in collaboration with relevant agencies, to provide information that may assist in developing appropriate responses. Informing park visitors when a health risk exists in regards to blue green algae blooms through the erection of relevant signage.

Action 1.4.1: Undertake research into the nutrient dynamics and ecological processes of the lake system, in collaboration with relevant agencies and research institutions, to increase understanding of nutrient issues

Action 1.4.4: Develop guidelines and information strategies to reduce disposal of grey water from onshore into the lake system and to reduce the introduction of products such as chemicals and soaps into the water from both land and water-based activities.

Wetlands

Desired outcome: Part fulfilment of Australia's international obligations under the Ramsar Convention by providing an integrated management framework for the 'wise use' and conservation of the Myall Lakes wetlands.

Guideline 1.5.1: Adopt an integrated catchment management approach.

Action 1.5.2: Monitor the ecological character of the wetlands to determine extent of restoration or required rehabilitation works.

Action 1.5.3: Pursue external avenues of funding (for example, through government and private grants) to assist with works identified in accordance with action 1.5.2.

Historic Heritage

Guideline 2.2.5: Incorporate the interpretation of maritime heritage of the Myall Lakes system into the proposed 'boating management plan' to be developed jointly by the NPWS and Waterways Authority of NSW (see action 4.9.4).

Introduced Plants

Desired outcome: Control, and eradication where possible, of introduced plants, and if rehabilitation is required, planting of locally indigenous species.

Guideline 3.2.2: Treat noxious weed infestations in accordance with the *Noxious Weeds Act 1993*.

Action 3.2.8: Monitor the occurrence of aquatic weeds in the upper catchment in coordination with Great Lakes Council and NSW Agriculture.

Recreation Management

Desired outcome: Provision of an appropriate range of high-quality recreational opportunities within Myall Lakes National Park, consistent with the protection of the area's natural and cultural conservation values and that also satisfy a range of visitor expectations

Guideline 4.1.3: Manage visitor numbers and behaviour where natural or cultural values of an area are threatened in order to retain the predetermined range and quality of recreation opportunities and to protect the natural and cultural conservation values.

Guideline 4.1.7: Prohibit private electric generators, hovercraft and fan-powered boats within the Park. Implement the boating management plan to reduce the noise impacts of boating to onshore recreation visitors (see section 4.9).

Boating

Guideline 4.9.3: Adopt an adaptive management approach to waterways within Myall Lakes in collaboration with the Waterways Authority of NSW. That is, if ongoing monitoring demonstrates that there is a risk to the environmental qualities of the lakes or to visitor safety, appropriate controls will be developed and implemented in consultation with the community.

Guideline 4.9.5: Encourage and where appropriate undertake maintenance of established boating facilities in cooperation with other agencies.

Guideline 4.9.7: Only permit new wharves, boat ramps and jetties near identified camping and picnic areas, and subject to assessment of the impacts on other users, amenity and natural and cultural values.

Guideline 4.9.9: Support the continued service of the mobile sewage collection barge and the Bombah Point pump-out facility by the Waterways Authority of NSW.

Guideline 4.9.10: Prohibit private moorings in the park. Permit a total of five moorings for commercial use by the lessee at Myall Shores and seventeen public moorings, for casual short-term use, in those locations shown in map 4 (subject to 4.9.11, 4.9.12 and 4.9.13). Commercial moorings are those moorings operated by a licensed commercial operator for casual/short-term use by the general public.

Guideline 4.9.11: Monitor the use of moorings and, if warranted, quantify a maximum length of stay in terms of days and nights for commercial and recreational moorings. This maximum may vary seasonally.

Guideline 4.9.15: Require commercial operators to fund installation and maintenance of any new commercial Moorings

Guideline 4.9.16: Locate moorings in sheltered areas with preference to locations that are in proximity of designated camping and/or picnic areas.

Action 4.9.1: Implement proposed waterway plan shown in map 4. This plan includes:

- an 'idle speed only' limit in most of the identified sensitive areas;
- personal watercraft (jet skis) must not be driven in an irregular manner (that is, they should travel in a direct line) as defined by section 15AA of the Water Traffic Regulations in areas indicated on the map; and
- identification of safe swimming areas near Mungo Brush, Northern Broadwater, Neranie, Shelly Beach and Tickerabil where motorised vessels will not be permitted.

Action 4.9.2: Establish a monitoring program to ascertain the impacts of boating on aquatic vegetation and fauna in collaboration with relevant research institutions and community interest groups.

Action 4.9.4: Develop a 'boating code of conduct' which promotes minimal impact boating. Promote the natural and cultural values of the waterways and appropriate visitor behaviour by providing appropriate signage and interpretation material. This may include brochures and information boards at strategic visitor nodes, including Violet Hill and Mungo Brush.

Action 4.9.8: Investigate, in conjunction with Waterways Authority of NSW, the potential application of 'no discharge guidelines' of greywater from commercial and recreational vessels.

Action 4.9.13: If the number of proposed additional recreational moorings exceeds four (not including up to five additional recreational moorings at Tickerabit) or if additional commercial moorings are proposed, prepare a mooring plan jointly with Waterways Authority of NSW. This plan must consider the cumulative environmental impacts of additional moorings, visual impacts and desired boating numbers. This plan will be exhibited for public comment. If the total number of moorings (commercial and recreational) identified in the mooring plan exceeds 35, an amendment to this Plan of Management will be required.

Action 4.9.17: Develop and implement a fuel-spillage response plan in collaboration with relevant agencies.

Commercial Activities

Desired outcome: Provision of opportunities for commercial recreational activities within Myall Lakes National Park that contribute to a positive, nature-based recreation experience with minimal impact on natural and cultural values.

Action 4.10.1: Continue to implement a commercial licensing system for all commercial activities within the park, including on the park's waterways (but excluding commercial fishing activities licensed under the Fisheries Management Act, unless utilising management trails or facilities within the park (see also action 5.2.4)).

Action 4.10.4: Develop and implement through licensing procedures detailed commercial activity guidelines for:

- Broughton Island;
- vessel-based activities on the Myall Lake system;
- land-based activities in Myall Lakes National Park; and
- Sugarloaf Lighthouse precinct.

Research

Desired outcome: Completion of appropriate research activities and a continuing commitment to increase understanding and knowledge about the cultural and natural values of the park and the park visitor, thereby contributing to improved park management.

Guideline 4.13.1: Require all researchers to be licensed in accordance with legislative requirements under the Threatened Species Conservation Act, National Parks and Wildlife Act, and NPWS policy and procedures. As part of the licence, require researchers to provide results of research to the NPWS

Guideline 4.13.2: Direct NPWS research efforts towards establishing baseline data and monitoring the impact of recreational activities on biophysical indicators. This research will provide information critical to effective and adaptive management.

Guideline 4.13.4: Work collaboratively with, and encourage, researchers from other organisations to share information and to design research programs that provide information that is directly useful for park management purposes.

Guideline 4.13.4: Work collaboratively with, and encourage, researchers from other organisations to share information and to design research programs that provide information that is directly useful for park management purposes.

Guideline 4.13.3: Prepare a prospectus to encourage the involvement of other organisations in identified priority research areas. Priority research areas are outlined in the issues section above.

Guideline 4.13.5: Monitor for any changes to the ecological character of the Ramsar site and report these findings to Environment Australia.

Commercial Fishing

Guideline 5.2.1: Support and encourage any initiatives by NSW Fisheries to collect data on commercial fish catches and to manage fish populations and habitat in the lake system (see action 1.3.1).