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Myall Lakes Ramsar site

Ecological character description

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Summary

In 1999, the Myall lakes were designated as a Wetland of International Importance under the Ramsar Convention. The Convention requires that the site is managed to maintain or improve its ecological character. The Ramsar site is located on the mid-north coast of New South Wales and is protected by conservation reserves managed by the NSW Government, consisting of Myall Lakes National Park, Little Broughton Island Nature Reserve, Corrie Island Nature Reserve, and part of Gir-um-bit National Park. The estuarine and brackish waters and the beaches and intertidal areas in the site are within Port Stephens – Great Lakes Marine Park.

This ecological character description provides baseline information about the wetlands' values and the components, processes and services that characterise Myall Lakes Ramsar site. It also identifies limits of acceptable change, threats to the Ramsar site's ecological character, knowledge gaps in the site's components and processes, and recommendations for future monitoring.

Myall Lakes Ramsar site was originally listed under the Ramsar Convention's pre-1999 criteria 1a, 1c, 2a and 3b. The Ramsar site is now listed under the following three updated criteria:

- Criterion 1: A representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.
- Criterion 2: Wetland supports vulnerable, endangered, or critically endangered species or threatened ecological communities.
- Criterion 3: Wetland supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

The Ramsar site is now not considered to meet the updated Criterion 5 (wetland regularly supports 20,000 or more waterbirds), equivalent to the pre-1999 criterion 3b, as there is no evidence to show that the wetlands regularly support such large numbers of waterbirds.

The Myall lakes consist of a mosaic of near-natural wetlands ranging from fresh to brackish and estuarine waters within a relatively unmodified coastal lake system unique in NSW. The site's wetlands include brackish waters, fringing swamps, freshwater swamps, mangroves, saltmarshes, riverine ecosystems and rocky marine shores and beaches, and are surrounded by a near-natural terrestrial ecosystem. As a consequence of the habitats provided by this range of wetlands and by the surrounding terrestrial vegetation, the site supports a rich biodiversity. The site plays an important role in linking key fauna habitats to the north and west and in providing connectivity between estuarine wetland ecosystems to the north and the south, and is a drought refuge for waterbirds. The site's estuarine and brackish waters provide a food source, spawning ground and nursery for many common fish species.

The Ramsar site's large area of 44,612 ha supports a rich biodiversity, containing a range of undisturbed terrestrial and wetland vegetation communities with a large number of plant and animal species. The site's vegetation is particularly diverse, with 968 species of terrestrial and aquatic plants recorded, and vegetation communities ranging from littoral rainforest to forest, heath, grassland, swamp, mangrove, seagrass, submerged aquatic vegetation and emergent freshwater vegetation. The terrestrial species occur in a wide range of vegetation communities, from rainforest and wet sclerophyll forest to heathland and sand dune vegetation. There is also a high diversity of animal species, with 298 bird, 58 mammal, 44 fish, 37 reptile and 29 amphibian species recorded in the Ramsar site. The number of amphibian species is exceptionally high as the Ramsar site provides a large permanent body of fresh to brackish water and associated swamps, creeks and rivers in a near-natural condition.

There are 22 species of shorebirds listed under migratory bird agreements (JAMBA, CAMBA and ROKAMBA) which use the site as roosting, feeding, nesting and breeding habitat. The lakes in the Ramsar site are part of the coastal lake system in NSW which provides drought refuge for waterbirds.

Myall Lakes Ramsar site provides habitat for 12 nationally or internationally threatened species, including several wetland-dependent species. There are five wetland-dependent threatened species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), or listed in the IUCN Red List of Threatened Species: Australasian bittern (*Botaurus poiciloptilus*), Freycinet's frog (*Litoria freycineti*), green and golden bell frog (*Litoria aurea*), green-thighed frog (*Litoria brevipalmata*) and stuttering frog (*Mixophyes balbus*). The site also supports one threatened ecological community listed under the EPBC Act – littoral rainforest and coastal vine thickets of eastern Australia. The site supports seven other species which are listed as nationally threatened or internationally threatened – Gould's petrel (*Pterodroma leucoptera leucoptera*), grey-headed flying-fox (*Pteropus poliocephalus*), spotted-tailed quoll (*Dasyurus maculatus*), swift parrot (*Lathamus discolor*), Guthrie's grevillea (*Grevillea guthrieana*), magenta lilly pilly (*Syzygium paniculatum*) and black-eyed Susan (*Tetratheca juncea*).

The lakes maintain high water quality (oligotrophic clear waters) by effectively retaining, recycling and removing suspended solids, organic and inorganic nutrients, and other pollutants from water that flows through the lakes via several mechanisms. The lakes act as a sink for nutrients, organic matter and sediments, due to very long flushing times. The long water retention times allow sediments to settle out and allow primary producers (algae and macrophytes) to convert nutrients to plant biomass. The lakes can remove up to 90% of phosphorus deposited from catchment runoff, and the removal rate for nitrogen is considered to be high given the long water residence time in the lakes. The majority of nutrients are stored as plant biomass, detritus or sediment, with a small amount remaining in the lakes' waters.

The lakes, which cover an area of 100–150 km² (depending on water levels) and drain a catchment of 780 km², hold a large volume of the catchment's runoff and groundwater, and slowly release this water into Port Stephens via the constricted entrance channel in the lower Myall River. The water quality in the lakes is dependent on retention of the large area of native vegetation in the site's catchment (about 78% of total area of catchment), as increased sediment and nutrient loads can result in increased turbidity, decreased abundance of submerged aquatic vegetation, and occurrences of blue-green algae (cyanobacteria) blooms.

The Myall lakes support the only known occurrence in Australia of gyttja – a green-brown organic-rich sediment derived from the decomposition of charophytes, macrophytes and cyanobacterial algae. The gyttja found in the Myall lakes is believed to be important in structuring and maintaining the characteristic submerged aquatic vegetation of the lakes.

Myall Lakes Ramsar site also provides a broad range of opportunities for recreational, educational and scientific activities, and has a high social and cultural value. Its recreational and aesthetic amenity is particularly important, as the lakes' high quality waters, their naturalness and their attraction for recreation were the primary reasons for the protection of the area as Myall Lakes National Park in 1972. It is a major tourist site for NSW and receives approximately 100,000 visitors per year. The site has been a major focus for research activities since the 1930s, and numerous scientific studies and investigations have been undertaken in the site, particularly relating to biodiversity and to the geomorphology and hydrology of the lakes and the other wetlands.

The Myall lakes are within the traditional lands of the Worimi people. The varied wetlands, environments and abundant resources of the Myall lakes provided an ideal living environment for the Worimi people, and evidence of this traditional occupation exists across the landscape in the form of shell and stone middens, campsites and burials. Evidence of European occupation of the lands around the lakes and use of the lakes themselves remains in the form of historic sites and items such as graves associated with villages and with subsistence farming, former timber mills, Tamboy fishing village, and the roads, camps and waste associated with sandmining.

The site has not been greatly modified by human activity, and is relatively healthy compared to other coastal lakes in NSW. However, periodic excessive phytoplankton growth, including toxic blue-green algae (cyanobacteria) blooms, shows that the system is very sensitive to increases in nutrient levels. Nutrient loads associated with runoff from high rainfall events in the lakes' catchment can contribute significantly to the nutrient levels in the lakes, and pose a threat to the integrity of the system. While the nutrients in existing sediments are recycled through the water column and are absorbed by aquatic plants in the lakes, all new nutrients driving increased water column production and algal blooms come from the catchment. The expansion of urban areas and intensive agriculture within the catchment pose the greatest threat to the lakes' water quality. Other main threats include climate change, fire, introduced species, and overuse or inappropriate recreational activities.

Limits of acceptable change have been set for the site's critical components, processes and services, including for measures of water quality in the lakes: chlorophyll-a, external nutrient loads, turbidity, Secchi depth and salinity. Whilst the LAC for chlorophyll-a and turbidity in Bombah Broadwater have been exceeded, none of the other LACs for water quality measures or for other critical components and processes has been exceeded, and it is considered that there has not been a change in the site's ecological character since time of listing. The site's ecological character continues to be maintained as a result of the largely natural catchment of the lakes and the effective management of the site's wetlands and terrestrial ecosystems.

The site is now under greater protection than it was in 1999 due to the adoption in 2002 of the plan of management for Myall Lakes National Park and Little Broughton Island Nature Reserve, and the gazettal in 2005 of Port Stephens – Great Lakes Marine Park.

There is a need to collect more data on many of the site's components and processes, and to continue to monitor the wetlands' water quality and biodiversity, especially nationally and internationally listed threatened species. High priorities for further investigation are water quality in the lakes, extent of aquatic vegetation communities, number and abundance of waterbird species, and groundwater levels.

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