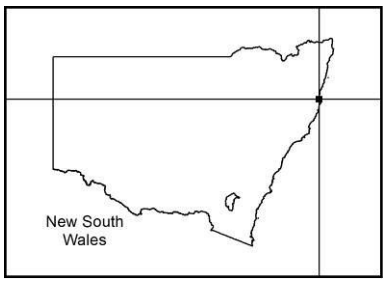
Office of Environment & Heritage
NSW National Parks & Wildlife Service

Plan of Management

Yarrahapinni Wetlands National Park



Yarrahapinni Wetlands National Park

Plan of Management

NSW National Parks and Wildlife Service

March 2013

This plan of management was adopted by the Minister for the Environment on 25 March 2013.

Acknowledgments

This plan of management is based on a draft plan prepared by staff of the Macleay Area of the NSW National Parks and Wildlife Service (NPWS), part of the Office of Environment and Heritage, Department of Premier and Cabinet.

Valuable information and comments were provided by the Yarrahapinni Wetlands Working Group and the local Aboriginal Community.

Cover photograph of a typical wetland scene characteristic of Yarrahapinni Wetlands National Park by Penny Kendall, NPWS.

NPWS acknowledges that this park is in the traditional country of the Dhanggati and Gumbaynggir Aboriginal people.

For additional information or any inquiries about this park or this plan of management, contact the NPWS Macleay Area Office, Cardwell Street, Arakoon or by telephone on 02 6566 6621.

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FOREWORD

Yarrahapinni Wetlands National Park is located on the floodplain of the Macleay River approximately 25 kilometres north-east of Kempsey on the Mid North Coast of NSW.

Yarrahapinni Wetlands National Park contains important estuarine habitats and a number of endangered ecological communities, including saltmarsh, littoral rainforest, swamp sclerophyll forest, swamp oak forest and freshwater wetlands. It also contains part of the highly significant Clybucca-Stuarts Point midden complex and some of the connecting traditional pathways used by the Aboriginal community to access this complex.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each national park. A draft plan of management for Yarrahapinni Wetlands National Park was placed on public exhibition from 13 May to 29 August 2011. The submissions received were carefully considered before adopting this plan.

The plan contains a number of actions to achieve the NSW 2021 goal to protect our natural environment, including staged restoration of the natural hydrology of the wetlands, revegetation of previously cleared areas, rehabilitation of the saltmarsh community, and management of weeds, pest animals and fire.

This plan of management establishes the scheme of operations for Yarrahapinni Wetlands National Park. In accordance with section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.

Robyn Parker MP
Minister for the Environment

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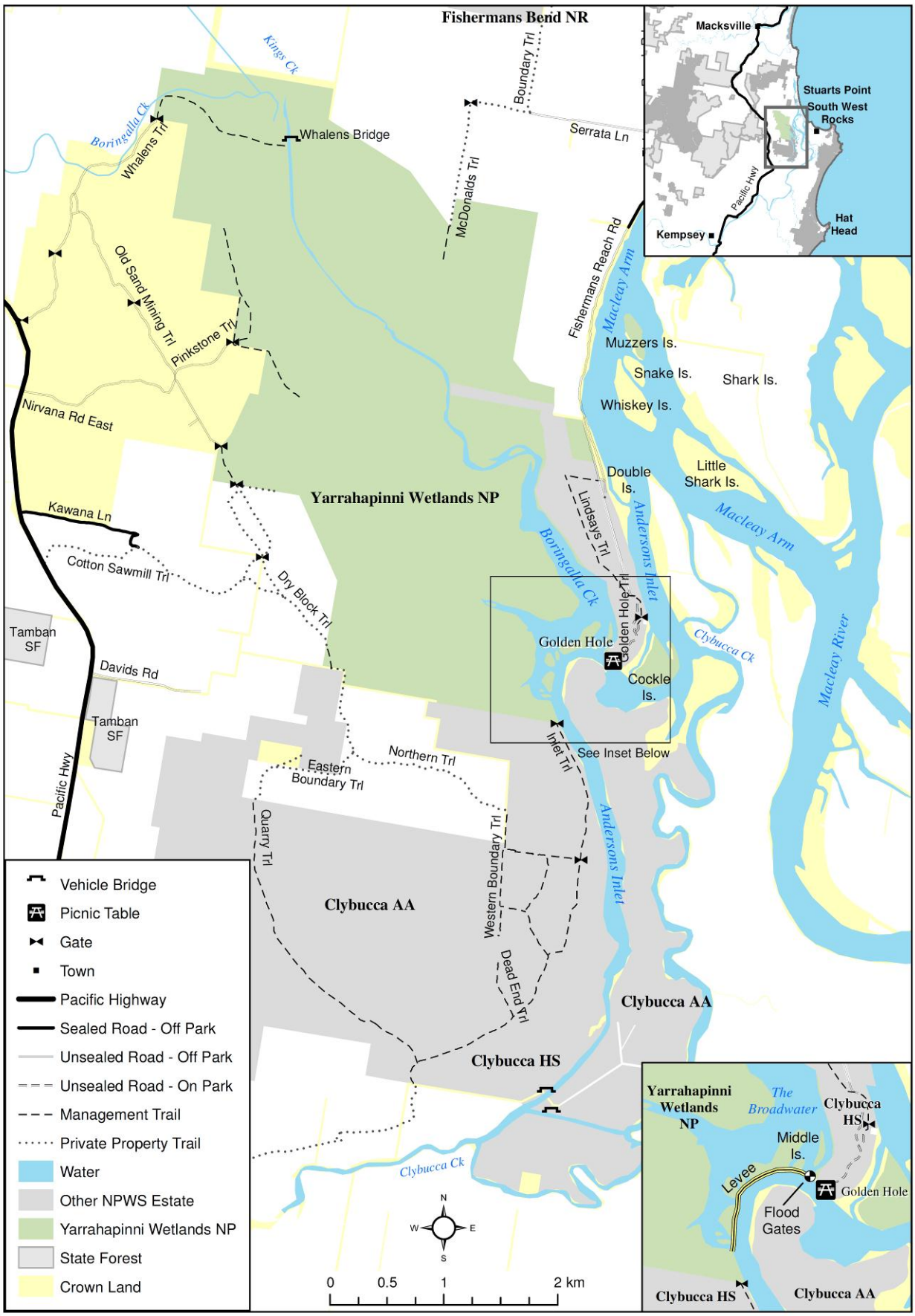
MAP OF YARRAHAPINNI WETLANDS NATIONAL PARK



1. LOCATION, GAZETTAL AND REGIONAL CONTEXT

Yarrahapinni Wetlands National Park is located approximately 25 kilometres north-east of Kempsey (31.07ºS, 152.83ºE) and 18 kilometres south of Macksville (31.73ºS, 152.90ºE) on the Mid North Coast of NSW. Road access to the park is via the township of Stuarts Point.

The area of the park is 1373 hectares (as at 13 January 2012). The beds of all streams within the boundaries of the park, including The Broadwater and Boringalla Creek (also spelt “Borirgalla Creek”) are included within the gazetted area of the park. The boundary of the park along Andersons Inlet and the Macleay Arm (including Cockle Island and Muzzers Island) is to the mean high water mark.

The park was gazetted in 2007, originally under the name Yarrahapinni National Park. The name of the park was changed by gazette notice in March 2008, and additions to the park were gazetted in 2009 and 2010.

The park is situated on the floodplain of the Macleay River. The majority of the park was at one stage freehold farmland and was subjected to flood mitigation works in the 1970s to improve its agricultural productivity. These works severely limited the interaction between the wetlands and the Macleay River, and have resulted in the degradation of a previously diverse wetland ecosystem, the drying out and leaching of acid sulphate soils, and the decline of fish stocks.

Following their purchase by the NSW Government in 1994, the private lands covering a large part of the wetlands were designated as Crown land in early 1996, and then notified as a reserve for environmental protection (R.210109) in September 1996. This Crown reserve was managed by the Yarrahapinni Wetlands Reserve Trust which commenced restoration of the wetlands. Following the area’s gazettal as a national park, members of the former trust have continued to advise on the ongoing restoration of the wetlands as part of the Yarrahapinni Wetlands Working Group.

Oyster farming and fishing are the main activities that occur to the south of the park on Andersons Inlet and the Macleay River. Lands surrounding the park are used for forestry and grazing, with some horticulture (mainly growing avocados) located to the north east. Yarrahapinni Wetlands National Park borders Clybucca Historic Site to the east and south (see map), and it is spatially, ecologically and culturally connected to Clybucca Historic Site and Clybucca Aboriginal Area through many landscape features, including the Clybucca-Stuarts Point midden complex. An Aboriginal Custodian Group was established in 2003 to advise on and participate in the management of Clybucca Historic Site. This group is also involved in the management of Yarrahapinni Wetlands National Park.

The park lies within the local government area of Kempsey Shire, and within the boundaries of Kempsey and Nambucca local Aboriginal land councils, and the Northern Rivers Catchment Management Authority.

Prior to gazettal as national park, the Yarrahapinni Wetlands Reserve Trust prepared a plan of management for the Yarrahapinni Wetlands (Sustainable Futures 2001), which has guided the development of this plan of management. A more recently prepared restoration plan for the wetlands (WRL 2009) forms the basis of the Yarrahapinni Wetlands Rehabilitation Project.

2. MANAGEMENT CONTEXT

2.1 Legislative and policy framework

The management of national parks in NSW is in the context of the legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act), the NPW Regulation, the *Threatened Species Conservation Act 1995* (TSC Act) and the policies of the National Parks and Wildlife Service (NPWS).

Other legislation, international agreements and charters may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* (EPA Act) may require the assessment and mitigation of the environmental impacts of works proposed in this plan. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) also applies in relation to actions that may impact on matters of National Environmental Significance, such as migratory species listed under that Act.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan, no operations may be undertaken within the park except in accordance with this plan. This plan will also apply to any future additions to Yarrahapinni Wetlands National Park. Should management strategies or works be proposed for the park or any additions that are not consistent with this plan, an amendment to this plan or a new plan will be prepared and exhibited for public comment.

2.2 Management purposes and principles

National parks are reserved under the NPW Act to protect and conserve areas containing outstanding or representative ecosystems, natural or cultural features or landscapes or phenomena that provide opportunities for public appreciation and inspiration and sustainable visitor or tourist use.

Under the Act (section 30E), national parks are managed to:

- conserve biodiversity, maintain ecosystem functions, protect geological and geomorphological features and natural phenomena and maintain natural landscapes;
- conserve places, objects, features and landscapes of cultural value;
- protect the ecological integrity of one or more ecosystems for present and future generations;
- promote public appreciation and understanding of the park's natural and cultural values;
- provide for sustainable visitor or tourist use and enjoyment that is compatible with conservation of natural and cultural values;
- provide for sustainable use (including adaptive reuse) of any buildings or structures or modified natural areas having regard to conservation of natural and cultural values; and
- provide for appropriate research and monitoring.

2.3 Statement of significance

Yarrahapinni Wetlands National Park is considered to be of significance for its following values:

- Biological Values: The park contains important but degraded estuarine habitats of potential importance to fish, migratory waders and other waterbirds, and a number of terrestrial ecosystems that are listed as endangered ecological communities under the TSC Act, including saltmarsh, littoral rainforest, swamp sclerophyll forest, swamp oak forest and freshwater wetlands.
- Aboriginal Heritage Values: The park contains part of the highly significant Clybucca-Stuarts Point midden complex and some of the connecting traditional pathways used by the Aboriginal community to access this complex.
- Scientific Values: The rehabilitation of the wetlands is a major experiment in restoration ecology and the park will have increasing significance as a demonstration site for this work.
- Catchment Values: The park drains into the Macleay River and forms part of its floodplain. Successful rehabilitation of the wetlands will contribute to overall improvement in water quality in the Macleay River.

2.4 Specific management directions

In addition to the general principles for the management of the park (refer section 2.2), the following specific management directions apply to the management of Yarrahapinni Wetlands National Park:

- ongoing involvement of the Yarrahapinni Wetlands Working Group and the Aboriginal Custodian Group in the management of the park;
- a staged restoration of the natural hydrological conditions in the wetland, including tidal exchange function, without extensive on-ground works and with measures taken to minimise potential impacts on neighbouring properties;
- rehabilitation of the wetland's degraded ecosystems, especially its saltmarsh community, to enhance the long-term protection and viability of wildlife, fish and habitat values, and to neutralise areas affected by acid sulphate soils;
- revegetation of previously cleared areas to ensure there is no net loss of other endangered ecological communities;
- development of opportunities for the wetlands to provide an important educational and scientific resource for schools and the wider community at some point in the future;
- provision of opportunities for low impact access to and recreational use of the wetland while limiting impacts on park neighbours; and
- integration of protection and interpretation activities for the natural and cultural values of Yarrahapinni Wetlands National Park with those of the nearby Clybucca Historic Site and Clybucca Aboriginal Area.

3. VALUES

The location, landforms and plant and animal communities of an area have determined how it has been used and valued. Both Aboriginal and non-Aboriginal people place values on natural areas, including aesthetic, social, spiritual and recreational values. These values may be attached to the landscape as a whole or to individual components, for example to plant and animal species used by Aboriginal people. This plan of management aims to conserve both natural and cultural values. For reasons of clarity and document usefulness, various aspects of natural heritage, cultural heritage, threats and on-going use are dealt with individually, but their inter-relationships are recognised.

3.1 Geology, landscape and hydrology

The park is situated on the lower floodplain of the Macleay River, off Andersons Inlet and the Macleay Arm part of the Macleay River (see map). Before the construction of an artificial entrance to the ocean at South West Rocks in the late nineteenth century, the Macleay Arm was the main channel of the Macleay River which then entered the ocean north of Stuarts Point.

The Macleay River floodplain is an estuary which has been in-filled from the seaward side by quartz-based marine sands and from the landward side by fluvial (or riverine) sediments, such as gravels, sands and muds, often containing materials produced by biological processes (Roy 1984).

The park is predominately a wetland landscape which rarely exceeds 2 metres Australian Height Datum (AHD). The Aboriginal midden complex bordering the eastern side of the wetland forms an artificial but longstanding levee approximately 1 metre high. A deep sand substrate, which is evidence of the wetland's estuarine history, occurs throughout the park.

A large area of the wetland is mapped as an acid sulphate soil hotspot (Tulau & Naylor 1999). Two of the four soil landscapes identified in the park have been identified as high risk acid sulphate soils. Acid sulphate soils are found underlying many coastal floodplains, and as bottom sediments in coastal wetlands and estuaries. The drying of acid sulphate soils allows the iron sulphides or other sulphidic minerals they contain to oxidise, producing acidic runoff which in turn mobilises toxic chemicals in soils and into streams and groundwater. The soil landscapes in the park are:

1) The Boringalla soil landscape was developed under conditions of prolonged water logging, is poorly drained and has a water table close to the ground surface. The store of acidity is close to the soil surface and is readily available for transport from the groundwater to the estuary. In many areas of this landscape, the soils have high salinity. The soils comprise dark peaty loam over pale sand and grey estuarine sandy clay.
2) Siliceous soils occur in the inter-tidal zone and in areas immediately above the high tide mark. The soils comprising this soil landscape also contain high levels of sulphur compounds and have been identified as high risk acid sulphate soils.
3) The Shark Island soil landscape occurs in the south of the park, near Andersons Inlet. The soils which make up this soil landscape are deep, very poorly drained colonchaks (soils containing a high amount of salt) and calcareous sands.

4) The Stuarts Point complex occurs in the western and eastern parts of the park and comprises former sand plains made up of coastal beach deposits.

Surface drainage within the wetlands generally flows in a south easterly direction towards the floodgates at Andersons Inlet. Stream channels are poorly defined and impeded to the north by built-up banks. Groundwater is generally at or near the surface. The wetlands act as a backwater storage during flooding and lie within minor flood levels (SWC 1999).

Flood mitigation works constructed in the 1970s at the southern end of the park severely limited the interaction between the wetlands and the Macleay River, and have degraded a previously diverse wetland ecosystem (see section 4.1). At the same time, to enhance drainage in the upper reaches of the wetlands, Boringalla Creek was dredged to deepen and widen its channel resulting in oxidisation of acid sulphate soils. The Yarrahapinni Wetlands Rehabilitation Project is aiming to restore the landscape and hydrological values of the park (see section 6.1).

3.2 Native plants

In the late 1990s and early 2000s, Shortland Wetlands Centre and the University of New England were commissioned by the Yarrahapinni Wetlands Reserve Trust to undertake a range of projects in the wetland sections of what is now the park. These projects included current and historical vegetation mapping (SWC 1997, 1999).

Table 1 lists the significant vegetation communities recorded in the park. Other vegetation present in the park includes riparian rainforest along the eastern boundary of the wetland bordering Clybucca Historic Site, and some eucalypt and heath communities in the northern and western sections of the park.

The comparison of current and historical vegetation mapping of the wetlands has highlighted the change of vegetation in the wetlands since the installation of flood mitigation structures in the 1970s, with an influx of freshwater wetland vegetation species such as swamp oak (*Casuarina glauca*) and broad-leaved paperbark (*Melaleuca quinquenervia*). This growth of freshwater species has accompanied a dramatic decline in important estuarine vegetation in the wetlands. It has been estimated that mangrove communities have declined from 84 hectares (being approximately 20 per cent of the mangroves in the lower Macleay) to less than 1 hectare, and saltmarsh from 340 hectares to less than 4 hectares (SWC 1999). This change in vegetation has led to a loss of important food and nursery habitat for many estuarine dependent fauna in the surrounding estuary.

Monitoring of vegetation following a trial opening of the floodgates in 2001 revealed that freshwater vegetation will die off and be eventually replaced with salt-tolerant species (Graham & Duggin 2002, 2004).

Some sections of the park that could support swamp sclerophyll, swamp oak and floodplain forest are currently open pasture, having been cleared for grazing while under private ownership. Swamp oak, broad-leaved paperbark and swamp mahogany (*Eucalyptus robusta*) are beginning to regenerate in this area.

The only threatened plant species recorded in the park is the white-flowered wax plant (*Cynanchum elegans*), although there are a number of records of other threatened plant species in similar habitats in the vicinity of the park. Table 2 lists those threatened plant species expected to occur in the park.

A Priorities Action Statement (PAS) has been prepared which identifies strategies and actions to promote the recovery of threatened species, populations and ecological communities, and the management of key threatening processes (DEC 2006). The PAS currently contains strategies for the rusty plum and scented acronychia, and also for the endangered ecological communities present in the park.

Table 1. Significant vegetation communities recorded in the park

Community	Characteristic species	Status*	Occurrence in the park
Swamp oak floodplain forest	*Casuarina glauca* *Melaleuca quinquenervia*	EEC	More prevalent in the northern part of the wetland. *Casuarina glauca* has expanded locally in the area since flood mitigation works.
Swamp sclerophyll forest	*Melaleuca quinquenervia* *Eucalyptus robusta*	EEC	More prevalent in the northern parts of the park.
Coastal freshwater wetland	*Eleocharis sphacelate* *Baumea articulata* *Juncus* spp.	EEC	More prevalent in the northern parts of the park. Currently degraded but recovering.
Coastal saltmarsh	*Baumea juncea* *Juncus krausii* *Sarcocornia quinqueflora* *Sporobolus virginicus*	EEC	Very limited extent (~ 4ha) restricted to the southern half of the wetland. It was a significant feature of the wetland before flood mitigation works.
Littoral rainforest	*Ficus coronata* *Ficus macrophylla* *Ficus obliqua* *Toona ciliata* *Acmena smithii* *Flindersia schottiana*	EEC^	Limited to eastern boundary of the wetland where it grows on areas of raised elevation in the Clybucca-Stuarts Point midden complex.
Mangroves	*Avicennia marina* *Aegiceras corniculatum*	P	Isolated remnant trees or clumps of trees less than 2km upstream from floodgates. A dominant feature of the wetlands before flood mitigation works, but now covering less than 1ha. Both grey mangrove and river mangrove present

* EEC = Endangered Ecological Community, listed under the TSC Act
P = protected under the *Fisheries Management Act 1994*
^ also listed as a threatened ecological community under the EPBC Act

Table 2. Threatened plant species known or likely to occur in the park

Common name	Scientific name	Status	
		EPBC Act	TSC Act
Rusty plum	*Niemeyera whitei*		Vulnerable
Scented acronychia	*Acronychia littoralis*	Endangered	Endangered
White-flowered wax plant[R]	*Cynanchum elegans*	Endangered	Endangered
	Maundia triglochinoides		Vulnerable
Lesser swamp orchid	*Phaius australis*	Endangered	Endangered
Austral toadflax	*Thesium australe*	Vulnerable	Vulnerable

R = species is recorded from the park. Other species known from areas in the park's vicinity

3.3 Native animals

There is not a lot of information on the native animals present in the area before the installation of the flood mitigation structures. However, it is thought likely that there has been a marked decline in fauna species as a result of vegetation changes associated with the flood mitigation works. For example, the Yarrahapinni Wetlands currently provide very little habitat suitable for wading birds to feed and roost whereas such habitats were previously dominant features in the wetlands. The wetlands are also recognised as an important (although degraded) fish breeding area. The waters in the park upstream of the levee and floodgates are closed to recreational fishing under Schedule 4 of the *Fisheries Management (General) Regulation 2010* and closed to commercial fishing under the *Fisheries Management (Estuary General Share Management Plan) Regulation 2006*. The installation of fish gates on two of the floodgates permits some fish passage between the Macleay River and the wetlands.

Since 2007, NSW Fisheries (part of the Department of Primary Industries) and authorised volunteers have been monitoring the fish species in the Broadwater. This has revealed changes in the assemblages of species following the installation of the fish gates, with an increased number of estuarine indicator fish species being recorded in the lower reaches of the wetlands.

The park lies in the Hastings-Macleay Important Bird Area, as identified by Birds Australia (2009). Surveys conducted since the 1990s however reveal that no large populations of waterbirds currently visit the wetlands, although some common waterbirds including chestnut teal (*Anas castanea*), grey teal (*A. gracilis*), Pacific black duck (*A. superciliosa*), great egret (*Ardea alba*) and black swan (*Cygnus atratus*) are often observed.

Table 3 lists the threatened and significant animal species recorded in the park – these are all currently bird and mammal species. Only a few reptile species have been recorded from the park, including the eastern snake-necked turtle (*Chelodina longicollis*), eastern water dragon (*Physignathus lesueurii*), dark flecked garden sun-skink (*Lampropholis delicata*), three-toed skink (*Saiphos equalis*) and red-bellied black snake (*Pseudechis porphyriacus*). Three species of frogs are known to occur in the park: the brown-striped frog (*Limnodynastes peronii*), common eastern toadlet (*Crinia signifera*) and green tree frog (*Litoria caerulea*) (ERM 1995 & Atlas of NSW Wildlife).

Mammal species recorded in the park include common macropods such as eastern grey kangaroo (*Macropus giganteus*), swamp wallaby (*Wallabia bicolor*) and the red-necked wallaby (*M. rufogriseus*), plus a number of threatened species listed in Table 3. The park has also been modelled as a regional corridor for the eastern chestnut mouse (*Pseudomys gracilicaudatus*) and the common blossom bat (*Syconycteris australis*).

The PAS contains strategies for most of the threatened species recorded in the park. It is anticipated that the Yarrahapinni Wetlands Rehabilitation Project (see section 6.1) will result in major and positive benefits to fish and waterbird populations, which should return to the wetlands for breeding and foraging purposes.

Table 3: Significant fauna species recorded in Yarrahapinni Wetlands NP

Common name	Scientific name	Status	
		EPBC Act	TSC Act
BIRDS			
Great egret	*Ardea alba*	Migratory	
Varied sittella	*Daphoenositta chrysoptera*		Vulnerable
Black-necked stork	*Ephippiorhynchus asiaticus*		Endangered
Little lorikeet	*Glossopsitta pusilla*		Vulnerable
Pied oystercatcher	*Haematopus longirostris*		Endangered
Bar-tailed godwit	*Limosa lapponica*	Migratory	
Black-tailed godwit	*Limosa limosa*	Migratory	Vulnerable
Eastern curlew	*Numenius madagascariensis*	Migratory	
Whimbrel	*Numenius phaeopus*	Migratory	
Eastern osprey	*Pandion cristatus*		Vulnerable
Grey-tailed tattler	*Tringa brevipes*	Migratory	
Common greenshank	*Tringa nebularia*	Migratory	
Terek sandpiper	*Xenus cinereus*	Migratory	Vulnerable
MAMMALS			
Little bentwing-bat	*Miniopterus australis*		Vulnerable
Squirrel glider	*Petaurus norfolcensis*		Vulnerable
Common planigale	*Planigale maculata*		Vulnerable
Grey-headed flying-fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable

Source: Atlas of NSW Wildlife & SWC (1997)

3.4 Aboriginal heritage

Aboriginal communities have an association and connection to the land. The land and water within a landscape are central to Aboriginal spirituality and contribute to Aboriginal identity. Aboriginal communities associate natural resources with the use and enjoyment of foods and medicines, caring for the land, passing on cultural knowledge, kinship systems and strengthening social bonds. Aboriginal heritage and connection to nature are inseparable from each other and need to be managed in an integrated manner across the landscape.

Yarrahapinni Wetlands National Park is situated in the country of the Dhanggati and Gumbaynggir nations, and it is acknowledged as a sharing place for the two Aboriginal groups. A number of other tribal groups are likely to have visited the area for a range of cultural practices, including people from the Ngamba tribe. There are a range of Aboriginal sites recorded in the park including earth mounds, shells and other artefacts.

The eastern side of the park contains part of the Clybucca-Stuarts Point midden complex which is the key value of the neighbouring Clybucca Historic Site. Almost continuous for a distance of 14 kilometres, this complex is the largest estuarine midden in temperate Australia and contains a rich and variable assemblage of well-preserved shell and bone remains dating from between 2500 and 6000 years ago (Hughes & Sullivan 2002). The diversity of the assemblage, its size and intact nature

contributed to it being listed on the former Register of the National Estate. The midden country would have traditionally been accessed by water through the Yarrahapinni Wetlands and its size reflects the productivity of the surrounding Macleay estuary over millennia.

An Aboriginal Custodian Group was established in 2003 to provide guidance to NPWS in the management of Clybucca Historic Site. This group is now also involved in the management of Yarrahapinni Wetlands National Park. It comprises representatives from the Dhanggati and Gumbaynggir nations, and other local Aboriginal community members. The local Aboriginal community at Stuarts Point have a particularly active involvement in the management of the park and Clybucca Historic Site.

NPWS is currently funding an Aboriginal guiding project that is providing training and employment opportunities for local Aboriginal people. This project aims to enable local people to gain skills in the interpretation of the site and Aboriginal heritage values, so they can pass on this knowledge to their community, to school children and to the wider public. NPWS also regularly applies for funding to enable other employment and training opportunities such as training in bush regeneration and weed control in the park.

The former Land and Property Management Authority (LPMA – now Land and Property Information in the Department of Finance and Services) has undertaken detailed LiDAR (Light Detection and Ranging) aerial mapping of the park and surrounding floodplain. This mapping can be processed to prepare high-resolution elevation and terrain models. Once developed and ground-truthed, these models will improve understanding of the full extent of the midden, including along the eastern side of the park, and can be used by the community and NPWS to target protection works.

3.5 Historic heritage

Settlement within the boundaries of what is now the park was highly constrained by the presence of the wetland and regular flooding events on the Macleay floodplain. Following the major flood events in the Macleay Valley of the 1950s, flood mitigation schemes began throughout the floodplain. These were justified at the time on the basis of their potential to improve pasture for beef cattle production (Tulau & Naylor 1999) as well as for flood hazard reduction (Smith 1986). One of the last of these schemes to be carried out by the former Macleay River County Council (now incorporated into Kempsey Shire Council) was the project to construct a 900 metre rock levee and a cluster of five floodgates in the lower southern reaches of the Yarrahapinni Wetland.

The material evidence of the agricultural use of what is now the park is limited to some cleared areas and a few structures, including an old dam that is fed by groundwater, several troughs, shallow wells, a shelter, a cattle ramp and a network of internal fences in various states of disrepair. There was also some timber getting in the area, and this is evidenced by cut stumps. Consistent with the assessment conducted in neighbouring Clybucca Historic Site (NPWS 2007), these items are thought to have no particular historic heritage value and most are gradually disappearing through natural processes.

The structures associated with the flood mitigation works from the early 1970s have some local historic value, as has the long campaign to have them removed. As early as 1977, calls by oyster growers for the opening of the floodgates were reported in the local paper, the *Macleay Argus* (cited in Tulau & Naylor 1999). In the 1990s, the NSW State Government began the purchase of some of the marginal agricultural lands to allow for this to occur.

3.6 Visitor use, education and research

Vehicle access to the park is limited. The only option available to the public is via Fishermans Reach Road from Stuarts Point. From the end of Fishermans Reach Road, this becomes an unconsolidated sand trail suitable only for 4WD or All Wheel Drive vehicles. This passes alongside part of the park and part of Clybucca Historic Site, before traversing Clybucca Aboriginal Area and terminating at the Golden Hole Picnic Area in Clybucca Historic Site. From this point, the southernmost part of the park's wetlands, the levee and floodgates can be accessed by foot or by boat (see inset to map). The wetlands, which are the most significant feature of the park, are mainly accessible by boat but the water is fairly shallow. Walking access is currently available along the floodgates and levee wall.

Because access points are restricted, visitation to the park is very limited and most visitor use occurs in the neighbouring Clybucca Historic Site. Facilities at Golden Hole Picnic Area are being improved in accordance with the historic site's plan of management (NPWS 2007) and will include picnic tables, shelters and interpretation displays, including information on the Yarrahapinni Wetlands National Park and the rehabilitation project. There is a launch area suitable for canoes next to the picnic area.

As discussed in section 3.3, fishing is prohibited within the waters of the park.

Given the significance of the Aboriginal cultural values in Clybucca Historic Site and Yarrahapinni Wetlands National Park, and in recognition of the desire of the local Aboriginal community to interpret their own culture to the wider community, NPWS has recently engaged the local Aboriginal community in a project which is currently training a number of local Aboriginal people as guides.

The park has also been used as an education and research site. Under its previous management by the Yarrahapinni Wetlands Reserve Trust, a number of schools visited the park, and a number of research and monitoring projects were initiated. The Trust also produced a video about the wetlands rehabilitation project and options to restore the site, which continues to be a valuable education resource. NPWS continues to educate the local community about the wetland restoration project at the annual Yarrahapinni Day at Stuarts Point.

It is likely that the park will continue to provide significant opportunities in the future as an educational and research site as the wetland restoration project proceeds. It has linkages to other sites where the long-term restoration of floodplain wetlands is being undertaken, including Everlasting Swamp State Conservation Area in the Clarence Valley and the Tomago section of Hunter Wetlands National Park in the Hunter Valley.

4. ISSUES

4.1 Changes to hydrology and water quality

As discussed earlier, a 900 metre long rock levee was constructed in the lower southern reaches of the wetland in the 1970s to prevent saltwater entering the wetlands. At the eastern end of the levee a concrete structure with five floodgates was inserted to allow floodwaters to drain away. These works severely limited the interaction between the wetlands and the Macleay River, and have degraded a previously diverse wetland ecosystem. There has been a significant decline in important estuarine vegetation, particularly mangrove and saltmarsh communities.

At the same time, to enhance drainage in the upper reaches of the wetlands, Boringalla Creek was dredged to deepen and widen its channel. This has resulted in the drying and oxidation of acid sulphate soils, creating large areas of scalds in the wetlands that are now devoid of vegetation. Following heavy rains, leaching of exposed acid sulphate soils mobilises toxic metals which enter waterways and can often lead to the death of many aquatic species.

Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands is listed as a key threatening process (KTP) under the TSC Act, and the installation and operation of in-stream structures and other mechanisms that alter natural flow regimes of rivers and streams is listed as a KTP under the *Fisheries Management Act 1994*.

The combined impact of loss of estuarine vegetation and leaching of acid sulphate soils has resulted in declining fish stocks and has had a major impact on the oyster farms in the Macleay River. Birds Australia (2009) identified the risk of wetland degradation from drying of acid sulphate soils as a threat affecting the Hastings-Macleay Important Bird Area.

The Yarrahapinni Wetlands Rehabilitation Project has the goal of restoring the natural hydrological conditions within the park without extensive on-ground works, and to restore the acid sulphate scalds (see section 6.1). This activity will address one of the high priority actions contained within the PAS to mitigate this KTP.

The channel constructed in the mid reaches of Boringalla Creek as part of the flood mitigation works will probably allow salt water to penetrate further north than the pre-mitigation natural flow regime. There is also a minor risk of salt water moving overland north of the predicted inundation area due to the changes that have occurred in the surrounding landscape, such as the construction of minor drainage channels and subsidence resulting from the drying of peat or peat fires. To mitigate against the risk of salt water intrusion further upstream than desired, an in-stream structure to limit tidal inundation beyond the park may be constructed. The extent of salt water intrusion will be monitored during the staged re-inundation to evaluate the need for additional protection works (such as a levee) in the north of the wetland.

While it is anticipated that the system will be self maintaining once the rehabilitation project is completed and the floodgates and most of the levee are removed, some initial poor water quality is expected. The reintroduction of estuarine conditions will kill any wetland vegetation not tolerant of salty or brackish water; the decomposition of this organic matter will result in oxygen depletion in the wetlands. There may also be an initial ‘flush’ of high acid water as oxidised acid soils are inundated (SWC 1997). The project will be managed to limit the scale of these impacts and changes

in water quality and vegetation will be monitored closely. With regular tidal flushing, poor water quality will be diluted and, over the long term, increased tidal inundation will prevent exposure and oxidation of acid sulphate soils and improve water quality in the wetlands and the Macleay River.

Before the formal decommissioning of the floodgates, their operation will continue to be managed by Kempsey Shire Council under an Interim Memorandum of Understanding (KSC 2007). Any change to the operation of the Yarrahapinni floodgates will be undertaken by Kempsey Shire Council, acting in consultation with the Yarrahapinni Headworks Management Advisory Body (YHMAB). The YHMAB consists of representatives from NPWS, Kempsey Shire Council and the Fisheries Ecosystems Branch of the Department of Primary Industries (formerly NSW Fisheries). These bodies are also represented on the Yarrahapinni Wetlands Working Group that provides advice on the implementation of the Yarrahapinni Wetlands Rehabilitation Project.

4.2 Pest species

Pest species are animals (including invertebrates) and plants that have negative environmental, economic and social impacts and are most commonly introduced species. Pests may have impacts across the range of park values, including impacts on biodiversity, cultural heritage, catchment and scenic values.

Pest management is guided by a Regional Pest Management Strategy (OEH 2012). This identifies a number of pest species for Yarrahapinni Wetlands National Park (refer Table 4). Weed species of particular concern in the park include groundsel bush (*Baccharis halimifolia*) and lantana (*Lantana camara*).

Table 4: Priority weed and pest animal species present in Yarrahapinni Wetlands NP

Common name (*Scientific name*)	**Status ***
WEEDS	
Groundsel bush (*Baccharis halimifolia*)	Noxious
Lantana (*Lantana camara*)	WONS, Noxious Invasion, establishment and spread of lantana is a KTP
Madeira vine (*Anredera cordifolia*)	Invasion and establishment of exotic vines and scramblers is a KTP
ANIMALS	
Wild dog (*Canis lupus familiaris*)	Pest. Predation/ hybridisation by feral dogs is a KTP
European red fox (*Vulpes vulpes*)	Predation by European Fox is a KTP^
Feral cat (*Felis catus*)	Predation by Feral Cats is a KTP^
Feral deer (*Cervus sp.*)	Herbivory/ environmental degradation by feral deer is a KTP

* Status is as follows:
Noxious = declared noxious weed under the *Noxious Weeds Act 2003*
Pest = Declared pest under *Rural Lands Protection Act 1989*
KTP = Key threatening process under TSC Act
^ = also key threatening process under EPBC Act
WONS = Weed of national significance

Groundsel bush is scattered throughout the park and is a major weed affecting the integrity of the park. This species is not tolerant of salty or brackish water and the implementation of the Yarrahapinni Wetlands Rehabilitation Project will likely kill the species in areas inundated with salt water. Priority areas for control of this species are therefore those parts of the park in the north-east and north-west that will not be inundated with salt water. Control programs for groundsel bush have been occurring in these parts of the park since 2008.

Lantana mainly grows in the slightly elevated areas in the eastern section of the park bordering the midden. Madeira vine also occurs in isolated patches along the midden. Control programs for these species have been occurring in this area since 2008. Giant Parramatta grass (*Sporobolus fertilis*) occurs in scattered areas throughout the park, primarily along trails where it was spread by vehicle traffic.

No major water weeds have been reported in the wetlands to date. Although not currently recorded in the park, spiny rush (*Juncus acutus*) is prevalent in the lower Macleay where it poses a serious threat to coastal saltmarsh communities. If introduced to the park, it has the potential to out-compete native saltmarsh species and to threaten the restoration of the park's former saltmarsh areas.

Pest animal species of concern in the park include the wild dog, European red fox, and feral cat. Introduced fish (such as the plague minnow *Gambusia holbrooki*) and introduced rodents such as the black rat (*Rattus rattus*) have also been recorded. Apart from the wild dog, it is suspected that these are likely to be scattered throughout the area and have not yet been subject of control programs.

Wild dogs (including dingos) have been declared as pest animals under the *Rural Lands Protection Act 1998* (RLP Act) throughout NSW and their control in the park is subject to a wild dog plan prepared for the area of the former Kempsey Rural Lands Protection Board (DPI 2008). The park is not thought to provide habitat for dingos. Cooperative wild dog control programs have been undertaken in the western section of the park since 2008 in response to neighbour complaints. There have been occasional reports of wild dogs in the eastern section of the park.

4.3 Inappropriate fire

Fire is a natural feature of many environments. However, inappropriate fire regimes can lead to the loss of particular plant and animal species and communities, and the ecological impact of high frequency fires has been listed as a key threatening process under the TSC Act.

The main vegetation communities in the park that naturally have a risk of fire are coastal heath vegetation, dry sclerophyll forest and swamp sclerophyll forest. In contrast, riparian and rainforest vegetation, mangroves and saltmarsh present a much lower risk of fire.

Historically, fires have entered the park from the west and north-west, with large fires occurring in 1990 and 2000. The wetland currently acts as a barrier to stop some fires moving from the west to east and the effectiveness of the wetlands as a barrier to fire will improve significantly when they are fully inundated. However, riparian vegetation, rainforest, saltmarsh and mangroves are significantly impacted by fire and it should be avoided in these areas where possible. Trails to the west of the park

and clearings along fence lines provide control lines that can be used to limit the spread of fire into the park.

There are few assets in the park that are at risk from fire, and these are limited to some fencing, boundary signs and gates. The main assets outside the park which are at risk from fire are nearby properties along Fishermans Reach Road, future facilities at Golden Hole and the Clybucca-Stuart Point midden complex.

Fire management strategies for the park are contained within a separate map-based fire management strategy that has been prepared for the park and nearby Clybucca Historic Site and Aboriginal Area (DECC 2009). The fire management strategy outlines the recent fire history of the park, key assets within and adjoining the park (including sites of natural and cultural heritage value), and fire control advantages such as management trails and water supply points. Hazard reduction programs, ecological burning proposals and fire trail works are submitted annually to the Lower North Coast Bush Fire Management Committee.

4.4 Climate change

Human-induced climate change has been listed as a key threatening process under the TSC Act and the associated loss of terrestrial habitat has been listed as a key threatening process under the EPBC Act.

Projections of future changes in climate for the NSW north coast include higher temperatures and evaporative demand, increased rainfall during summer and autumn, reduced rainfall in winter and more extreme influence of the El Niño–Southern Oscillation on rainfall patterns. These changes are likely to lead to greater intensity and frequency of fires, more severe short-term droughts, changes in flooding behaviour and increased erosion (DECCW 2010).

Sea-level rise is one of the projected outcomes of climate change. A sea-level rise of 90 centimetres by the end of this century is predicted, and rises will continue to occur beyond this in the following centuries (DECCW 2010). When combined with the expected increased frequency of extreme storm events, such rises in sea level will increase the risk of severe coastal inundation and shore erosion, the loss of important coastal wetlands and mangroves, the loss of or damage to middens and other Aboriginal sites, and substantial impacts on human settlements and agriculture. These impacts may be exacerbated by the infiltration of saline water into coastal aquifers (CSIRO 2007).

The most direct impact on the park's natural values would be a loss of floodplain wetlands and low-lying vegetation, affecting the whole vegetation complex of the park. A landward migration of estuarine wetland communities is expected to occur. In part, the wetlands rehabilitation project is pre-empting the impacts of sea level rise by facilitating this migration through a staged and managed process. There will also be major impacts on the midden complex in the east of the park, with much of the midden likely to be submerged by 2100 and subject to increasing levels of erosion in the decades beforehand.

Climate change may also significantly affect biodiversity by changing the population size and distribution of species, and altering the geographical extent of habitats and ecosystems. The potential impact of climate change on the park's biodiversity is difficult to assess since it depends on the compounding effects of other pressures, particularly barriers to migration and pressure from feral animals. Species most at

risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates.

Programs to reduce the pressures arising from other threats, such as habitat fragmentation, invasive species and bushfires, will improve the resilience of the park's animal populations and ecosystems, and reduce the severity of the effects of climate change.

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6. IMPLEMENTATION

In the following table, **High** priority activities are those imperative to achievement of the objectives and desired outcomes. They must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources. **Medium** priority activities are those that are necessary to achieve the objectives and desired outcomes but are not urgent. **Low** priority activities are desirable to achieve management objectives and desired outcomes but can wait until resources become available. **Ongoing** is for activities that are undertaken on an annual basis or statements of management intent that will direct the management response if an issue arises.

Current situation	Desired outcomes	Management response	Priority
6.1 On-park ecological conservation			
The park includes the Yarrahapinni Wetlands – a formerly diverse wetland area which was an important breeding area for fish and birdlife, but which has been significantly degraded since the construction of flood mitigation structures in the 1970s which prevented tidal exchange in the wetlands and drained areas of acid sulphate soils. The Yarrahapinni Wetlands Reserve Trust initiated a rehabilitation project for the wetlands and this is guided by a separate plan (WRL 2009), which focuses on restoring natural hydrological conditions with minimal water diversion and control structures. Partial tidal exchange and some saltwater flushing in the lower reaches of the wetlands have occurred since late 2007 following the installation of fish gates on two of the five floodgates. Advice on implementation of the wetlands restoration project is provided by the Yarrahapinni Wetlands Working Group. A precautionary, staged and adaptive management approach has been adopted for the project so that it may be refined using feedback from monitoring. A constraint on the restoration project is the need to ensure salt water does not intrude onto surrounding agricultural lands. The project therefore may involve structures (such as weirs) in Boringalla Creek and a levee in the northern part of the wetlands to minimise the flow of salt water. Sea level rise associated with climate change in the next 50 years is predicted to be 40 centimetres (DECCW 2010), which would cause extensive inundation well beyond the park's current	Habitat values in areas subject to past disturbance are restored. Water quality is improved through a staged restoration of natural hydrological processes in the park's wetlands. Native biodiversity, including the extent of endangered ecological communities, is conserved and improved. Negative impacts from the restoration project are monitored and minimised. Landscape and catchment values are enhanced.	6.1.1 Implement the rehabilitation project for the Yarrahapinni Wetlands in accordance with the current restoration plan (WRL 2009) and Review of Environmental Factors (NPWS 2011) and in consultation with the Yarrahapinni Wetlands Working Group. This may include construction of an in-stream structure and/ or levee to limit tidal inundation beyond the park but not to ameliorate the impacts of sea level rise. 6.1.2 Undertake monitoring during the re-inundation of the wetlands to assess water levels and water quality in the wetlands and aquifer. 6.1.3 Undertake regular flora and fauna surveys in the park to monitor the changes in species assemblages in response to the rehabilitation project. 6.1.4 Implement relevant strategies in the PAS and recovery plans for threatened species. 6.1.5 Encourage natural regeneration of previously cleared areas. Monitor vegetation recovery and assist natural regeneration and establishment of wetland EECs by collecting and propagating seeds and planting seedlings	High High Medium Medium Medium

Current situation	Desired outcomes	Management response	Priority
boundaries. The in-stream structure or levee is not intended to ameliorate the impacts of sea level rise resulting from climate change. Another constraint is the presence of freshwater wetland endangered ecological communities (EECs) in the re-inundation zone, including swamp sclerophyll forest and swamp oak floodplain forest. The rehabilitation project will lead to significant mortality of the characteristic species in these EECs in the lower reaches of the wetland where high levels of salinity will result. An area of cleared land in the western part of the park is suitable for regeneration by the species that characterise these communities and can provide compensatory habitat for expected losses. A key benefit of the project is the re-establishment of estuarine vegetation communities formerly common in the area, such as saltmarsh and mangroves in the wetlands. There are also likely to be positive impacts on the fauna of the park from the rehabilitation project, with a return of estuarine fish and bird species. Fishing is currently prohibited in the park to protect remaining fish populations to ensure the best chances for these populations to grow. Significant species recorded from the park include a range of migratory and threatened bird species, and some threatened mammals. One threatened plant species has been recorded in the park and others are predicted to occur. Climate change is likely to lead to significant additional changes to the park's natural values, primarily through sea level rise. Other existing threats to the flora and fauna values of the planning area are from weed, pest species and fire (refer to section Pest Species 6.3 and Fire 6.4).		if required. 6.1.6 Assist the Department of Primary Industries in the enforcement of the fishing exclusion zone in the wetlands to enable the area to return as a nursery ground for fish and crustaceans. 6.1.7 Continue existing fire, pest and weed management programs to increase the park's resilience to cope with future disturbances, including climate change.	Low Ongoing

Current situation	Desired outcomes	Management response	Priority
6.2 Cultural heritage			
The park includes part of the Clybucca-Stuarts Point midden complex. This is the largest estuarine midden complex in temperate Australia and is highly significant to the local Aboriginal community. The midden complex extends into neighbouring Clybucca Historic Site and Aboriginal Area, and therefore an integrated approach for its protection and interpretation is needed between these three reserves. An Aboriginal Custodian Group has been established to advise and assist in their management. Access to the midden is currently restricted to a few locations (some through private property). The wetlands rehabilitation project will improve boat access through the wetlands. It is not anticipated that there will be any other impacts on the midden complex from the Yarrahapinni Wetlands Rehabilitation Project, however major long-term impacts are anticipated due to rising sea levels associated with climate change. The full extent of the midden complex is yet to be determined. Although recent LiDAR mapping will greatly assist in this process, ground truthing is required. Other evidence of past use is limited to structures associated with the flood mitigation works and with former farming enterprises, including internal fences in various states of disrepair. Most of these fences will be difficult to remove due to their location in the wetlands, often in heavily vegetated and swampy areas. A former dam has value for fire-fighting purposes and, in the short term, for providing water for seedlings planted as part of revegetation efforts in former cleared areas. The cattle ramp has value in the removal of stock that stray into the park (see section 6.5). Once the floodgates are decommissioned, the surrounding concrete structure and some sections of levee may be left in situ. This will aid in the interpretation of the wetland restoration project (see section 6.4).	Aboriginal places and values are identified and protected, particularly those values associated with the midden complex. The Dhanggati and Gumbaynggir people continue to be actively involved in the management of the park. Access to the midden site is improved for the Aboriginal community. Historic heritage values are documented and managed in accordance with their significance.	6.2.1 Consult and involve the Nambucca and Kempsey local Aboriginal land councils, and other relevant members of the Dhanggati and Gumbaynggir Aboriginal communities in the management of the park, principally via the Aboriginal Custodian Group. 6.2.2 Encourage the Aboriginal community to visit the park for meetings and events such as World Wetlands Day. 6.2.3 Ensure that guiding programs, interpretative materials and research on the midden are prepared and carried out in consultation with the Aboriginal Custodian Group. 6.2.4 Encourage the involvement of the local Aboriginal community in the management of the park, including employment opportunities such as weed control and revegetation programs, and a project to ground truth the location of the midden. 6.2.5 Encourage a comprehensive archaeological and cultural heritage study of the midden. 6.2.6 Record and assess the heritage value of historic sites and retain *in situ* where possible. This may include sections of the levee wall and the concrete structure surrounding the floodgates. Remove wire from internal fencing that does not serve any management purpose.	Ongoing Ongoing Ongoing Medium Medium Low

Current situation	Desired outcomes	Management response	Priority
6.3 Visitor use and services			
Existing visitor opportunities within the park are currently constrained by access limitations. Most visitation to the park occurs via the Golden Hole Picnic Area in the neighbouring Clybucca Historic Site.	Visitor use is appropriate and ecologically sustainable.	6.3.1 Encourage visitors to access the park from Fishermans Reach Road through Clybucca Historic Site, or by watercraft from Clybucca, South West Rocks or Stuarts Point.	Ongoing
During the wetland restoration project, there are likely to be hazards associated with poor water quality and high water velocity due to manipulation of the floodgates. Consequently, until the project is completed, recreational boating and other use of the wetlands will not be encouraged due to safety concerns.	Recreational visitor use is not promoted until the rehabilitation project is completed.	6.3.2 Liaise with the Maritime Authority regarding restrictions on the use of motorised watercraft in the wetlands. Erect signage at Golden Hole Picnic Area and elsewhere as required advising that the recreational use of motorised vessels is prohibited.	High
Recreational and commercial fishing are prohibited within the waters of the park upstream of the existing levee and floodgates (see section 6.1).		6.3.3 Restrict pedestrian access along the old levee wall as sections of the levee are removed to allow water to inundate the wetlands.	High
The park will eventually provide ecotourism opportunities when the wetlands are rehabilitated. It is likely that most access to the interior of the park will be by boat. As the wetlands are fairly shallow, motorised watercraft will be discouraged to limit disturbance to the bed and banks of water bodies. In particular, the recreational use of motorised watercraft is prohibited.		6.3.4 Investigate the feasibility of constructing a series of low level bridges to re-establish pedestrian and management access to the south-west of the park from Golden Hole Picnic Area once sections of the levee are removed. Construct if feasible.	Low
Due to the park's wetland nature and the limited extent of trails and roads, cycling and recreational horse riding are prohibited in the park. The rehabilitation project will eventually remove the current pedestrian access from Golden Hole to the south-western part of the park as sections of the levee wall are removed. It may be appropriate to maintain some pedestrian and management access through construction of a series of low bridges that are wide enough for a quad bike.		6.3.5 Allow bushwalking throughout the park and bush camping more than 500 metres from roads. Walking routes may be marked or hardened to enhance navigation and reduce impacts on popular routes. No public vehicle access, cycling or recreational horse riding will be permitted.	Ongoing
		6.3.6 Permit organised group visits, including licensed commercial tours, subject to limits on numbers and other conditions if necessary to minimise impacts and safety concerns.	Ongoing

Current situation	Desired outcomes	Management response	Priority
6.4 Community programs and education			
It is important that the local community is kept informed about the changes to the wetlands and progress of the restoration project. The park has value as an education site both for its wetland and Aboriginal heritage values. NPWS is engaging the local Aboriginal community in a project to train a number of local Aboriginal people as guides. It is envisaged that the trained guides will lead tours for interested groups in the park at some point in the future. The park will also provide unique opportunities in the future as an educational site on wetland rehabilitation. Previously, the area has been used for this purpose with a number of schools visiting the park for educational purposes when the area was managed by the Yarrahapinni Wetlands Reserve Trust.	The local community is aware of the significance of the park and the rehabilitation project. The potential for future ecotourism opportunities in the wetlands is developed in collaboration with the Aboriginal community.	6.4.1 Liaise with local stakeholders regarding the wetland restoration project, including oyster farmers, commercial fishers and neighbouring landholders. 6.4.2 Organise media releases, educational material, contact with neighbours and community organisations, and displays at community events during the course of the wetland restoration project. 6.4.3 Encourage the use of Aboriginal guides in the interpretation of the park's values to the wider community. 6.4.4 Ensure any interpretation signs erected in Clybucca Historic Site incorporate information on Yarrahapinni Wetlands National Park and the wetland restoration project.	High Medium High High

Current situation	Desired outcomes	Management response	Priority
6.5 Weeds and pest animals			
The management of weeds and pest animals is guided by the regional pest management strategy (OEH 2012). The overriding objective of this management is to minimise adverse impacts of weeds and pest animals on biodiversity and other park values. Weed species in particular can have a major impact on areas of regenerating native vegetation, and also on the stability of the midden. Thus control programs in these areas are a priority. Weed species of key concern in the park include groundsel bush (particularly in areas that will not be inundated with salt water in the north east and north west of the park), and lantana and madeira vine along the midden in the east of the park. Although not currently recorded in the park, spiny rush (*Juncus acutus*) may seriously impact upon regenerating saltmarsh areas should it be introduced to the park. Feral animals of most concern in the park include wild dogs, foxes and feral cats. Cooperative wild dog trapping programs have occurred in the park, consistent with the Kempsey Wild Dog Plan (DPI 2008). Opportunist baiting for foxes could occur at the same time as wild dog control programs. Parts of the park were used for grazing prior to the park's gazettal, and livestock still occasionally stray into the park. Grazing and trampling by domestic stock is a threat to both estuarine and freshwater wetlands as it has the potential to change vegetation composition and modify drainage patterns. The local Aboriginal community has been involved in weed control work in the neighbouring Clybucca Historic Site for a number of years and this is now expanding into areas in Yarrahapinni Wetlands National Park (see section 6.2).	Negative impacts of weeds and pest animals on park values and neighbours are controlled and diminish over time. The local Aboriginal community is involved in weed and pest animal management in the park. Pest control programs are undertaken with the cooperation and in consultation with neighbours. Livestock are excluded from the park.	6.5.1 Monitor the park for noxious and significant environmental weeds and manage pest species in accordance with the Regional Pest Management Strategy (OEH 2012). Priority will be given to groundsel bush, lantana, madeira vine, spiny rush and wild dogs. 6.5.2 Undertake cooperative wild dog control as required, in liaison with neighbours and the Mid Coast Livestock Health and Pest Authority. 6.5.3 If opportunities are available, undertake control for other pest animal species, particularly the European red fox. 6.5.4 Encourage neighbours to construct and maintain boundary fences to exclude stock from the park. Fencing assistance may be provided in accordance with NPWS policy. 6.5.5 Ensure that any stray livestock are removed promptly from the park. Temporary yards may be installed around the existing cattle ramp to facilitate stock removal.	High Medium High Medium Ongoing

Current situation	Desired outcomes	Management response	Priority
6.6 Fire management The management of fire within the park is guided by a separate fire management strategy which has been prepared for an area that includes the park and the nearby Clybucca Historic Site and Clybucca Aboriginal Area (DECC 2009). This strategy directs hazard reduction programs, ecological burns and fire trail works, proposals for which are submitted annually to the Lower North Coast Bush Fire Management Committee. Fire is a natural feature of many environments but inappropriate fire regimes can lead to loss of particular plant and animal communities. Within the park, fire should be excluded from littoral rainforest, saltmarsh and mangrove communities and also from the midden complex. Some fire suppression activities, such as the use of earth-moving equipment and aerial water bombing, pose a serious threat to the midden, while the use of retardants should be excluded from all wetland areas.	Life, property and natural and cultural values are protected from fire. Fire regimes are appropriate for conservation of native plant and animal communities. A cooperative approach to fire management is developed with neighbours and other fire management authorities.	6.6.1 Implement the Reserve Fire Management Strategy for Yarrahapinni Wetlands National Park, Clybucca Historic Site and Clybucca Aboriginal Area and update as necessary. 6.6.2 Participate in the Lower North Coast Bush Fire Management Committee. Maintain cooperative arrangements with Rural Fire Service brigades and fire control officers, other fire authorities and surrounding landowners in regard to fuel management and fire suppression. 6.6.3 Suppress all unplanned fires in the park as quickly as possible. 6.6.4 Manage the park to protect biodiversity in accordance with the fire management strategy. In particular, avoid fire in rainforest, saltmarsh and mangroves. 6.6.5 Avoid the use of retardants, heavy machinery off tracks and water bombing near the midden during fire suppression activities.	High Ongoing High Ongoing Ongoing

Current situation	Desired outcomes	Management response	Priority
6.7 Infrastructure and maintenance			
There is limited vehicle access to the park for management purposes. The two main management trails in the park are Whalens and McDonalds Trails. Some informal trails that traverse old paddocks within the park are becoming revegetated, and require upgrade works to ensure ongoing access. Dry Block and Old Sand Mining Trails, which provide access to parts of the park's western boundary, cross freehold and leased lands before reaching the park. Inlet Trail in Clybucca Historic Site is currently used to access the southern boundary of the park. It may be possible to improve management access from Golden Hole in future through construction of a series of low bridges suitable for quad bikes (see 6.3.5). The main infrastructure in the park is the floodgates on the lower reaches of the wetland. Their operation is managed by Kempsey Shire Council in consultation with the Yarrahapinni Headworks Management Advisory Body under an Interim Memorandum of Understanding (KSC 2007). The final stages of the Yarrahapinni Wetlands Rehabilitation Project will result in the decommissioning of the floodgates and their removal from the surrounding concrete structure. There are also several water gauges that have been installed in the park to monitor water level changes. Most of these are accessed by boat. Within the wetlands, motorised boat access will be permitted for management purposes. As discussed in section 6.1, it is likely that more monitoring equipment will be installed throughout the wetlands as the rehabilitation project progresses. This equipment is at risk from vandalism. A powerline along Fishermans Reach Road traverses the eastern edge of the park and requires the ongoing maintenance of a cleared corridor in this area.	Management facilities adequately serve management needs and have minimal impact. Infrastructure and assets are routinely maintained. Existing non-park infrastructure is managed to minimise impacts on natural and cultural values, and is removed when no longer required.	6.7.1 Maintain all management trails as shown on the map. Sections of trails may be gravelled to improve management access. 6.7.2 Gate or signpost management trails to restrict unauthorised access. 6.7.3 Negotiate arrangements for management access to the park through neighbouring properties. 6.7.4 Ensure that any change to floodgate management is done in accordance with the interim MOU, is consistent with advice from the Yarrahapinni Wetlands Working Group and is supported by relevant research. 6.7.5 Ensure that the location of monitoring equipment is not promoted and that any equipment is designed to be low key and inconspicuous to minimise the chances of vandalism. Remove monitoring equipment from the park when no longer required. 6.7.6 Allow the continued management of regrowth vegetation under the powerline along Fishermans Reach Road.	Ongoing Medium High High/ Ongoing Ongoing Ongoing