NSW NATIONAL PARKS & WILDLIFE SERVICE

Wallis Lake Reserves Plan of Management

Incorporating Wallis Island, Regatta Island, Coolongolook, Mills Island, Yahoo Island, Bandicoot Island, Flat Island and Durands Island Nature Reserves

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This plan of management was adopted by the Minister for Energy and Environment on 6 August 2019.

The Department acknowledges that the Wallis Lake reserves are in the traditional Country of the Worimi People.

This plan of management was prepared by staff of the Central Coast Hunter Region of the NSW National Parks and Wildlife Service (NPWS).

For additional information or any inquiries about these reserves or this plan of management, contact the NPWS Great Lakes Area Office at Booti Booti National Park, The Ruins Campground, The Lakes Way, Pacific Palms NSW 2428; or by telephone on (02) 6591 0300.

Cover photo: Wallis Lake. Photo credit: NPWS.

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Contents

TABLES

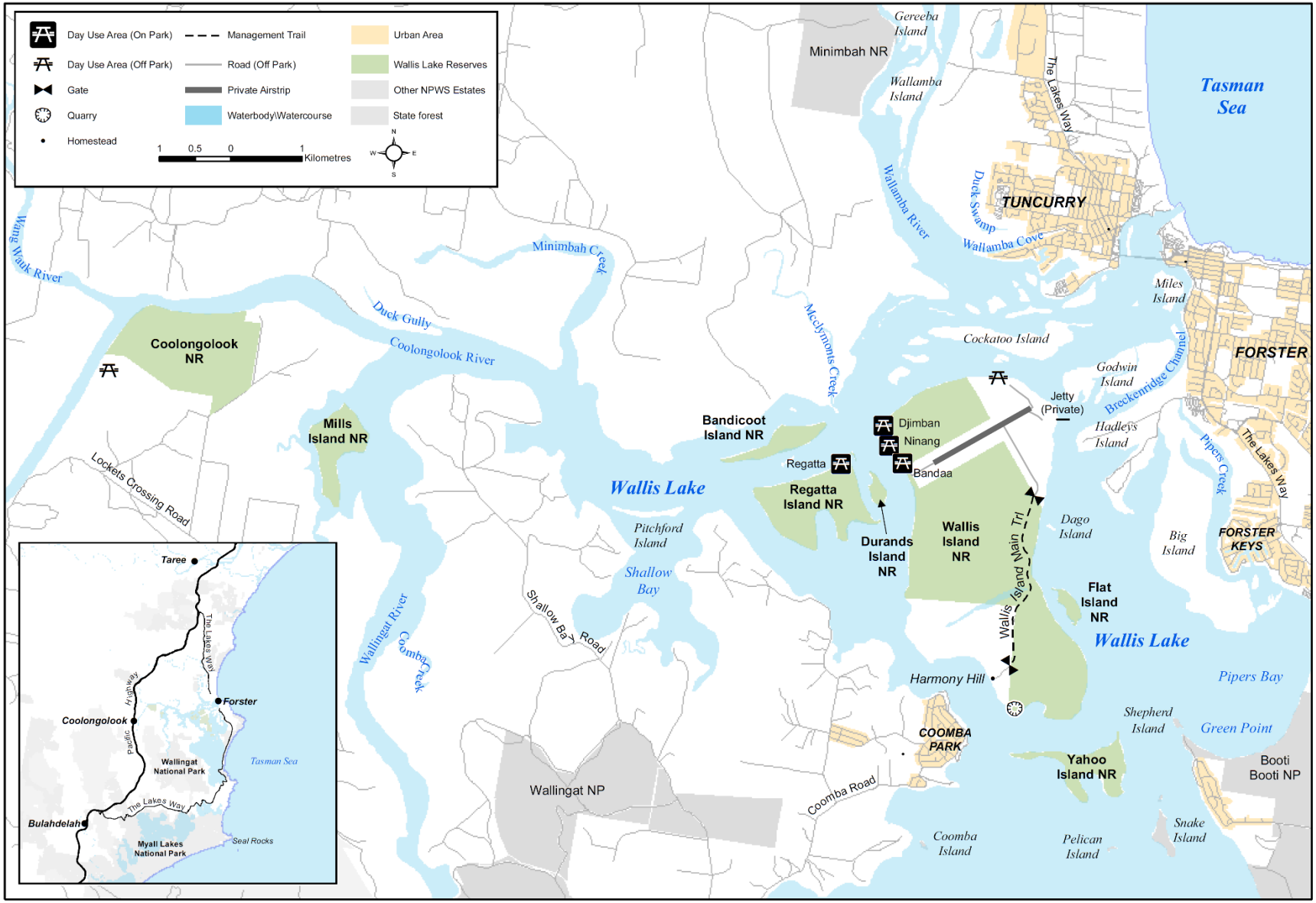

Figure 1: Wallis Lake reserves

1. Introduction

1.1 Location, reservation and regional setting

<table>
<tr><th>Features</th><th>Description</th></tr>
<tr><td>Location</td><td>The Wallis Lake reserves (‘the reserves’) are located on or adjoining the Wallis Lake estuary on the Mid North Coast of New South Wales. The urban centres of Forster and Tuncurry are located approximately one kilometre north-east of Wallis Island Nature Reserve. See Map 1.</td></tr>
<tr><td>Area and reservation date</td><td>The Wallis Lake reserves incorporate the following eight nature reserves, listed in descending size:
<table>
<tr><th>Reserve</th><th>Reservation date</th><th>Area (ha)</th></tr>
<tr><td>Wallis Island Nature Reserve</td><td>28 January 1983</td><td>584</td></tr>
<tr><td>Coolongolook Nature Reserve</td><td>14 October 1977</td><td>198</td></tr>
<tr><td>Regatta Island Nature Reserve</td><td>19 November 1976</td><td>102</td></tr>
<tr><td>Mills Island Nature Reserve</td><td>14 October 1977</td><td>61</td></tr>
<tr><td>Yahoo Island Nature Reserve</td><td>14 October 1983</td><td>47</td></tr>
<tr><td>Bandicoot Island Nature Reserve</td><td>19 November 1976</td><td>30</td></tr>
<tr><td>Flat Island Nature Reserve</td><td>23 December 2005</td><td>9</td></tr>
<tr><td>Durands Island Nature Reserve</td><td>23 December 2005</td><td>7</td></tr>
</table>
Wallis Island Nature Reserve was originally reserved in 1983 covering 133 hectares. There have since been two additions to the reserve, one in December 1997 of 340 hectares and the other in December 2005 of 111 hectares. A large proportion of Wallis Island is reserved, although there are sections of privately owned land in the north-east and south. The private land in the island’s north includes an airstrip which is occasionally used by small aircraft. There are also some parcels of Crown land remaining in the north-east of Wallis Island, which are interspersed between private lands.

The whole of Regatta, Mills, Yahoo, Bandicoot, Flat and Durands islands are reserved as nature reserves. Coolongolook Nature Reserve is the only reserve within this group that is not an island. It borders the southern side of the Coolongolook River at its junction with the Wang Wauk River. It also borders privately owned land to the south and east and is close to Bachelor State Forest.

All of the nature reserves are reserved to mean high watermark.</td></tr>
<tr><td>Previous tenure</td><td>The reserves form part of a much larger area between Port Stephens and the Manning River that was granted to the Australian Agricultural Company in 1824, but which was subsequently relinquished to the Crown in the early 1830s in exchange for land in the Liverpool Plains district.</td></tr>
<tr><td>Biogeographic region</td><td>The reserves are located in the NSW North Coast Bioregion. Other surrounding parks include Booti Booti National Park to the east and south-east, Wallingat National Park to the south-west, Wallamba Nature Reserve to the north-west and Minimbah Nature Reserve to the north.</td></tr>
</table>

Surrounding land use	Most of the islands in Wallis Lake estuary are undeveloped, with some good stands of mature native vegetation present. There are some limited areas that have been developed on some of the islands, primarily Wallis Island, Cockatoo Island, Godwin Island and Hadleys Island. The urban townships of Forster and Tuncurry adjoin Wallis Lake to the north and east, and these include some canal development and marinas. The local area supports limited rural enterprises primarily associated with cattle grazing. Oyster farming is a major enterprise within the Wallis Lake system producing more than 30% of oysters for the Sydney rock oyster market. The village of Coomba Park and surrounding areas to the west of Wallis Lake include semi-cleared rural residential and grazing land. Coolongolook Nature Reserve is surrounded by some grazing land with state forest and private bushland nearby. Tourism and retirement interests are the primary economies driving growth in the Wallis Lake area.
Other authorities	The reserves are located in the administrative areas of the Forster Local Aboriginal Land Council, Hunter Local Land Services and MidCoast Council.

1.2 Statement of significance

The Wallis Lake reserves are significant because of the following values.

Landscape and catchment values

The reserves protect important coastal wetlands and forests that are crucial to maintaining water quality and natural habitat in the Wallis Lake wetlands area.

Biological values

The reserves protect important estuarine vegetation including coastal saltmarsh, mangroves and rainforest communities. A number of bird species protected under the China–Australia Migratory Bird Agreement (CAMBA), Japan–Australia Migratory Bird Agreement (JAMBA), and Republic of Korea – Australia Migratory Bird Agreement (ROKAMBA) are known to use the reserves on their migrations.

Aboriginal heritage

There are a number of recorded Aboriginal sites on Wallis and Yahoo islands. The Wallis Lake estuary, tributaries and feeder creeks provide a range of food resources for Aboriginal people, including waterfowl, crustaceans, fish and shellfish.

Historic heritage values

The north of Regatta Island Nature Reserve has been used continuously for water-based recreation for over 100 years.

Recreation and tourism values

The day-use areas on Wallis Island and Regatta Island nature reserves are important recreational sites for people undertaking water-based activities in the Wallis Lake estuary, such as fishing and boating.

2. Management context

2.1 Legislative and policy framework

The management of nature reserves in New South Wales is in the context of the legislative and policy framework of the NSW National Parks and Wildlife Service (NPWS), primarily the *National Parks and Wildlife Act 1974* (NPW Act) and Regulation, the *Biodiversity Conservation Act 2016* (BC Act) and NPWS policies.

Other legislation, strategies and international agreements may also apply to management of the area. In particular, the NSW *Environmental Planning and Assessment Act 1979* (EPA Act) may require the assessment of environmental impact of works proposed in this plan. The NSW *Heritage Act 1977* may apply to the excavation of known archaeological sites or sites with potential to contain historical archaeological relics. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) may apply in relation to actions that impact matters of national environmental significance, such as migratory and threatened species listed under that Act.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan, the plan must be carried out and no operations may be undertaken in relation to the lands to which the plan relates unless the operations are in accordance with the plan. This plan will also apply to any future additions to these reserves. Should management strategies or works be proposed in future that are not consistent with this plan, an amendment to the plan will be required.

2.2 Management purposes and principles

Nature reserves are reserved under the NPW Act to protect and conserve areas containing outstanding, unique or representative ecosystems, species, communities or natural phenomena. Under Section 30J of the Act, nature reserves are managed to:

- conserve biodiversity, maintain ecosystem functions, and protect geological and geomorphologic features and natural phenomena
- conserve places, objects, features and landscapes of cultural value
- promote public appreciation, enjoyment and understanding of the reserve's natural and cultural values
- provide for appropriate research and monitoring.

The primary purpose of nature reserves is to conserve nature. Nature reserves differ from national parks in that they do not have the provision of visitor use as a management purpose or principle.

2.3 Specific management directions

In addition to the general principles for the management of nature reserves, the following specific management directions apply to the management of the reserves:

- Continue to support relevant management groups to improve water quality and habitat values in the Wallis Lake catchment.
- Encourage further ecological research to improve knowledge and management of plants, animals, threatened species and ecosystem processes within the reserves.
- Identify, manage and monitor weed and feral animal impacts.
- Maintain day-use sites on Wallis Island and Regatta Island nature reserves for low-impact recreation.

- Educate the community on the location and boundaries, appropriate uses, and natural and cultural heritage values of the reserves.

3. Values

This plan aims to conserve both the natural and cultural values of the reserves. The location, landforms and plant and animal communities of an area have determined how it has been used and valued by both Aboriginal and non-Aboriginal people. 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. To make this plan clear and easy to use, various aspects of natural heritage, cultural heritage, threats and ongoing use are dealt with individually, although these features are interrelated.

3.1 Hydrology, geology and landscape

Wallis Lake is a large subtropical estuary open to the sea between Forster and Tuncurry. There are four main rivers that discharge into the lake; the Wallamba, Wang Wauk, Coolongolook and Wallingat. The Wallamba River has the largest subcatchment and is the most modified with 69% of the catchment cleared for agriculture (WLEMC 2005). The Wang Wauk and Coolongolook rivers have the next two largest subcatchments, with the Wang Wauk subcatchment considerably more cleared than Coolongolook (57% compared to 28%). The Wallingat subcatchment is least cleared (18%), and is largely national park and state forest (WLEMC 2005).

Wallis Lake supports a large commercial fishing industry, and is one of the largest oyster farming areas in New South Wales. The majority of the lake is less than three metres deep, with the average depth just under two metres.

There is a permanent lagoon on Wallis Island Nature Reserve (see Figure 1). Little is known about the water quality in the lagoon. Wallis Island Main Trail (also known as Cable Trail) is a gravelled, elevated trail that crosses what was once part of the lagoon at the eastern end. Water flow to and from the lagoon has been restricted by the trail and there is a single culvert that serves as the only discharge/recharge point for the lagoon at its eastern end (see Section 5.1).

The reserves' geology dates from the Quaternary period. The lower estuarine reserves (Wallis, Regatta, Yahoo, Bandicoot, Flat and Durands islands) and Coolongolook Nature Reserve are comprised of marine sediments from mud and sand. Mills Island Nature Reserve is comprised of alluvial deposits of sand, silt, clay and gravel (DMR 2001). Yahoo Island Nature Reserve is comprised of a rock outcrop identified as toscanite (Floyd 1990).

A draft soil landscape map for the Wallis Lake catchment has mapped soil types in the catchment as transferral, alluvial, aeolian/barrier, estuarine and swamp soils (Murphy 2005, cited in Griffith & Wilson 2008).

Acid sulfate soils are known to occur throughout the Wallis Lake catchment. These soils occur naturally, particularly on coastal floodplains, and can become a threat to the environment when the soils are disturbed and exposed to air. Acid sulfate soils risk maps have been prepared for the Wallis Lake area. Mills Island, Bandicoot Island, Durands Island and Flat Island nature reserves have all been mapped as having a high risk of acid sulfate soils, while the other reserves are mainly mapped as having a low risk.

The topography of the reserves is generally flat, with some undulating sections of less than 10 metres. Coolongolook Nature Reserve has a small knoll which is 33 metres high. There is also a small bedrock knoll (less than 10 metres) on Yahoo Island Nature Reserve.

Historically, some limited sections of Wallis Lake were dredged for sand to expand oyster production areas. This involved sand being dredged from the lakebed and placed on sections of the islands. The impact on the reserves is thought to be fairly small, though it would have resulted in loss of native vegetation and changes to the landscape and hydrology of the islands.

There are two sites in Wallis Island Nature Reserve that have weed issues as a result of this past land practice (see Section 4.1).

There are two key strategic planning documents that guide the management of the Wallis Lake catchment; the *Wallis Lake Wetlands Strategy* (Great Lakes Council 2010) and the *Wallis Lake Estuary and Catchment Management Plan* (Great Lakes Council 2014). The estuary and catchment management plan is implemented by two management groups; the Wallis and Smiths Lake Coast and Estuary Committee, and the Great Lakes Catchment Management Group. NPWS will endeavour to support the work of these catchment and estuary groups and the actions outlined in these strategic documents.

Issues

- Clearing of considerable areas of land in some of the upper catchment has resulted in poor water quality and decline of habitat in the Wallis Lake estuary. Land use practices and altered hydrology in the Wallamba, Wang Wauk and Coolongolook rivers have resulted in issues with eutrophication, acid water caused from acid sulfate soils, and fish kills in some areas.
- Water in the lagoon on Wallis Island Nature Reserve is being restricted by the presence of Wallis Island Main Trail and only one culvert. There is a need to investigate the dynamics of the hydrology in this location.

Desired outcomes

- Water quality and hydrological regimes within the reserves are maintained and improved where necessary.
- Potential acid sulfate soils in the reserves remain undisturbed.
- NPWS supports the maintenance and improvement of water quality and hydrological regimes in the Wallis Lake catchment.

Management response

3.1.1 Continue to support and work with the catchment and estuary groups in implementing strategic plans for the Wallis Lake catchment.

3.1.2 To address impacts on potential acid sulfate soils, ensure soils in the reserves are not disturbed, or any disturbance is subject to environmental assessment.

3.1.3 Investigate and implement the preferred option to reinstate a natural hydrology in the lagoon on Wallis Island Nature Reserve.

3.2 Native plants

The vegetation communities of the reserves have significant social and environmental values. Coastal wetlands in New South Wales are known to provide important habitat values for terrestrial and aquatic species and are important sites for recreation and fishing opportunities. In the past, there has been significant clearing and modification of wetland areas in New South Wales. The conservation of these nature reserves is vital in providing protection for a portion of wetland communities and associated forests poorly represented in existing reserves.

Early reports provide accounts of vegetation in Coolongolook Nature Reserve (Dodkin & Winter 1973) and Yahoo Island Nature Reserve (Dodkin 1978). The vegetation of Yahoo Island Nature Reserve has also been documented by Griffith et al. (2000). In 2008, Griffith and Wilson undertook a detailed study for the Great Lakes Council on the wetland vegetation in the Wallis Lake catchment (Griffith & Wilson 2008). However, there is limited specific information regarding the composition and extent of vegetation communities occurring in the nature reserves. Table 1

shows the vegetation communities identified by Griffith and Wilson (2008) and Griffith et al. (2000) that are known or expected to occur within the reserves.

Table 1: Vegetation communities in the reserves

Community	Diagnostic species	Habitat
Subtropical Rainforest	Cabbage palm (*Livistona australis*) dominates with swamp oak (*Casuarina glauca*) and broad-leaved paperbark (*Melaleuca quinquenervia*). Swamp mahogany (*Eucalyptus robusta*) and brush box (*Lophostemon confertus*) may be minor associates.	Primarily on sand Quaternary sediments along broad open depressions, also extends to gullies on sedimentary bedrock. Found in Yahoo Island Nature Reserve.
Dry Rainforest	Red olive plum (*Cassine australis* var. *australe*), shiny-leaved stinging tree (*Dendrocnide photinophylla*), Port Jackson fig (*Ficus rubiginosa*) and whalebone tree (*Streblus brunonianus*) are some of the characteristic dominants.	Occurs on boulder outcrops of islands in Wallis Lake. Known to occur in Yahoo Island Nature Reserve.
Mangrove Forest and Woodland (grading into Shrubland)	Grey mangrove (*Avicennia marina* subsp. *australasica*).	Found on the intertidal flats in all reserves.
Swamp Sclerophyll Forest and Woodland	Swamp oak, swamp mahogany, broad-leaved paperbark, flooded gum (*E. grandis*), red mahogany (*E. resinifera*), forest red gum (*E. tereticornis*) and cabbage palm.	Occupies open depressions and poorly drained flats or plains. Also borders closed swamps where standing water accumulates. Known to occur in all reserves. Wet or dry sclerophyll forest often replaces the swamp subformations as drainage improves as is the case for Wallis Island and Coolongolook nature reserves. Significant stands of cabbage palm occur in Wallis Island Nature Reserve.
Swamp Sclerophyll Shrubland	Heath-leaved banksia (*Banksia ericifolia* subsp. *macrantha*), swamp paperbark (*Melaleuca ericifolia*), broad-leaved paperbark and *M. sieberi*.	Generally on poorly drained, open depressions and flats where shallow watertable may rise. Also extends into swamps with standing water. Expected to occur in Coolongolook, Wallis Island, Yahoo Island and Regatta Island nature reserves.
Wet Heathland	Floristically variable (see Griffith & Wilson 2008).	Characteristic of poorly drained sand barrier swales and open swamps and associated flats with a shallow watertable. Known to occur in Wallis Island Nature Reserve together with dry heathland, and expected to occur in Coolongolook and Regatta Island nature reserves.

Community	Diagnostic species	Habitat
Chenopod Shrubland/ Tussock Grassland	Chenopod shrubland dominated by samphire (*Sarcocornia quinqueflora* subsp. *quinqueflora*). Seablite (*Suaeda australis*) is a less-frequent dominant. Tussock grassland dominated by sand couch (*Sporobolus virginicus*).	Characteristic saltmarsh vegetation on tidal flats. Generally occurs upslope of mangroves and seaward of rushland dominated by *Juncus kraussii*. Expected to occur in all reserves.
Sedgeland	Jointed twig-rush (*Baumea articulata*), *Baumea juncea, Bolboschoenus caldwellii, Eleocharis equisetina,* tall spike rush (*Eleocharis sphacelata*), grey rush (*Lepironia articulata*), and *Schoenoplectus subulatus*.	*Baumea juncea* occupies supratidal flats. *Bulboschoenus caldwellii or Schoenoplectus subulatus* occur on upper reaches of saltmarsh. The remaining species more common in closed swamps containing fresh water. Expected to occur in all reserves.
Rushland	Sea rush (*Juncus kraussii* subsp. *australiensis*), common reed (*Phragmites australis*) and narrow-leaved cumbungi (*Typha domingensis*).	Generally occupies upper tidal to supratidal flats or depressions where conditions are likely to be brackish. Narrow-leaved cumbungi observed close to an estuary where drainage had been modified. Expected to occur in all reserves.
Sod Grassland	Water couch (*Paspalum distichum*).	Fringes freshwater swamps supporting *Eleocharis equisetina* sedgeland. Expected to occur on Coolongolook, Wallis Island and Regatta Island nature reserves.

Source: Griffith & Wilson (2008) and Griffith et al. (2000).

Coolongolook Nature Reserve also contains Shrubby Dry Sclerophyll Forest characterised by grey gum (*E. propinqua*), blackbutt (*E. pilularis*) white mahogany (*E. acmenoides*), bloodwood (*E. gummifera*), narrow-leaved ironbark (*E. crebra*), northern grey ironbark (*E. siderophloia*), spotted gum (*Corymbia maculata*), flooded gum, together with forest oak (*Allocasuarina torulosa*) and grass tree (*Xanthorrhoea* sp.) (Dodkin & Winter 1973). Wallis Island Nature Reserve has also been observed to contain similar dry sclerophyll forest eucalypt species.

All of the vegetation communities of the Wallis Lake catchment identified and described by Griffith and Wilson are considered to be of regional conservation significance (Griffith & Wilson 2008). Wallis Lake and adjacent estuarine islands are listed on the *Directory of Important Wetlands in Australia* (DoE 1993). The Wallis Lake wetlands also contain the following five threatened ecological communities listed under the BC Act (Great Lakes Council 2010):

- Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions
- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions
- Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion
- Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions
- Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions.

The *Wallis Lake Wetlands Strategy* (Great Lakes Council 2010) has recommended a range of management actions to assist with managing the wetlands that are applicable to the reserves. The strategy has highlighted that there is limited spatial vegetation mapping of the communities in the wetlands. MidCoast Council is currently undertaking vegetation mapping for large sections of the catchment, although this mapping does not specifically include the nature reserves. Spatial information on wetland or forest type, habitat, extent and condition in the catchment would enable management to focus on priority areas for protection in the reserves (Griffith & Wilson 2008).

There have been limited surveys for threatened species in the reserves and therefore there are few records on BioNet (OEH 2015). The only vulnerable species recorded in the reserves is the perennial herb, trailing woodruff (*Asperula asthenes*), recorded in Wallis Island Nature Reserve.

The *Wallis Lake Wetlands Strategy* lists a number of threatened plant species and communities known to occur in the Wallis Lake wetlands area. It is likely that most of these species and communities would also be found in the nature reserves. Table 2 shows the threatened plants recorded in the Wallis Lake wetlands.

Table 2: Threatened and significant plant species recorded in the Wallis Lake wetlands

Common name	Scientific name	Status	
		BC Act	EPBC Act
Biconvex paperbark	*Melaleuca biconvexa*	Vulnerable	Vulnerable
Dwarf heath casuarina	*Allocasuarina defungens*	Endangered	Endangered
Nabiac casuarina	*Allocasuarina simulans*	Vulnerable	Vulnerable
Noah's false chickweed	*Lindernia alsinoides*	Endangered	
Trailing woodruff	*Asperula asthenes*	Vulnerable	Vulnerable
	Maundia triglochinoides	Vulnerable	

BC Act = *Biodiversity Conservation Act 2016*
EPBC Act = Federal *Environment Protection and Biodiversity Conservation Act 1999*.
Source: Great Lakes Council (2010)

Strategies for the recovery of threatened species, populations and ecological communities have been set out in the Biodiversity Conservation Program (formerly known as the Threatened Species Priorities Action Statement [DECC 2007]). These actions are currently prioritised and implemented through the Saving our Species program that aims to maximise the number of threatened species that can be secured in the wild in New South Wales for 100 years (OEH 2013b). Biodiversity Conservation Program strategies have been prepared for trailing woodruff, Noah's false chickweed*, Maundia triglochinoide*s and biconvex paperbark*.* Current actions include undertaking surveys to confirm the continued existence of the species and implementing appropriate weed and fire control to protect the species.

Tuncurry midge orchid (*Genoplesium littorale*) is known to occur in heath, scrub and woodland on sands at North Tuncurry, Minimbah Sandplain and Booti Booti National Park. This species is listed as critically endangered under the BC Act and it is likely that habitat for this species occurs in the heaths and scrubs of Wallis Island Nature Reserve and possibly some of the other reserves.

Cynanchum carnosum (a vine) is a regionally significant species on the islands, where it is widespread in Swamp Sclerophyll Forest and Woodland. This species reaches its southern limit of distribution in the vicinity of Wallis Lake.

The majority of vegetation within the reserves is in good condition. A number of small areas on the western and northern sides of Wallis Island Nature Reserve have been used as previous dredge spoil disposal sites from oyster production that has resulted in loss of native vegetation and weed invasion (see Section 4.1). No active rehabilitation of these sites has been undertaken. Stray cattle are grazing and trampling native vegetation in Coolongolook Nature Reserve (see Section 5.1).

Issues

- There is limited spatial vegetation mapping of the communities in the reserves.
- Few surveys for threatened plant species have been undertaken.
- Previous dredge spoil disposal has degraded the native vegetation at two sites in Wallis Island Nature Reserve.

Desired outcomes

- Populations of significant plants and ecological communities are conserved.
- Knowledge of threatened and significant plants is improved and vegetation communities in the reserves are mapped.
- Negative impacts on threatened species are minimised.
- The habitat and populations of all threatened plant species are protected and maintained.
- Structural diversity and habitat values are restored in degraded areas.

Management response

3.2.1 Implement relevant strategies in the *Biodiversity Conservation Program* for threatened species and communities present in the reserves. Undertake surveys to confirm continued existence of species and communities and implement appropriate weed and fire management programs.

3.2.2 Undertake an assessment of the extent and representation of vegetation communities in the reserves and produce a spatial map in consultation with MidCoast.

3.2.3 Assist the catchment and estuary groups by implementing actions identified in the *Wallis Lake Estuary and Catchment Management Plan* and *Wallis Lake Wetlands Strategy* (where relevant).

3.2.4 Investigate the potential to actively revegetate the former dredge spoil disposal sites on Wallis Island Nature Reserve and undertake necessary works.

3.3 Native animals

There have been no formal native animal studies undertaken in any of the reserves. BioNet (OEH 2015) has records for some animals occurring in the reserves that have been obtained from casual observations and community surveys. A more comprehensive list of native animals from the Wallis Lake wetlands was prepared for the *Wallis Lake Wetlands Strategy* (Great Lakes Council 2010). This list forms the basis of the threatened animal species with the potential to occur where there is suitable habitat in the reserves (See Table 3).

Table 3: Threatened animal species with the potential to occur in the reserves

Common name	Scientific name	BC Act	EPBC Act	Migratory bird agreements
Frogs and reptiles				
Green and golden bell frog	*Litoria aurea*	E	V	
Wallum froglet	*Crinia tinnula*	V		
Stephens' banded snake	*Hoplocephalus stephensii*	V		
Birds				
Australasian bittern	*Botaurus poiciloptilus*	E	E	
Barking owl	*Ninox connivens*	V		
Beach stone-curlew	*Esacus neglectus*	CE		
Black bittern	*Ixobrychus flavicollis*	V		
Black-necked stork	*Ephippiorhynchus asiaticus*	E		
Black-tailed godwit	*Limosa limosa*	V		CAMBA, JAMBA, ROKAMBA
Blue-billed duck	*Oxyura australis*	V		
Bush stone-curlew	*Burhinus grallarius*	E		
Comb-crested jacana	*Irediparra gallinacea*	V		
Eastern grass owl	*Tyto longimembris*	V		
Eastern ground parrot	*Pezoporus wallicus wallicus*	V		
Eastern osprey	*Pandion cristatus*	V		
Glossy black-cockatoo	*Calyptorhynchus lathami*	V		
Greater sand-plover	*Charadrius leschenaultii*	V		CAMBA, JAMBA, ROKAMBA
Grey-crowned babbler	*Pomatostomus temporalis temporalis*	V		
Lesser sand-plover	*Charadrius mongolus*	V	E	CAMBA, JAMBA, ROKAMBA
Little tern	*Sternula albifrons*	E		CAMBA, JAMBA, ROKAMBA
Magpie goose	*Anseranas semipalmata*	V		
Masked owl	*Tyto novaehollandiae*	V		
Pied oystercatcher	*Haematopus longirostris*	E		
Powerful owl	*Ninox strenua*	V		
Regent honeyeater	*Anthochaera phrygia*	CE	CE	Endangered on JAMBA
Rose-crowned fruit-dove	*Ptilinopus regina*	V		
Sanderling	*Calidris alba*	V		CAMBA, JAMBA

Common name	Scientific name	BC Act	EPBC Act	Migratory bird agreements
Sooty oystercatcher	*Haematopus fuliginosus*	V		
Superb fruit-dove	*Ptilinopus superbus*	V		
Swift parrot	*Lathamus discolor*	E	CE	
Terek sandpiper	*Xenus cinereus*	V		CAMBA, JAMBA, ROKAMBA
Wompoo fruit-dove	*Ptilinopus magnificus*	V		
Mammals – non-flying				
Eastern chestnut mouse	*Pseudomys gracilicaudatus*	V		
Eastern pygmy-possum	*Cercartetus nanus*	V		
Koala	*Phascolarctos cinereus*	V	V	
Long-nosed potoroo	*Potorous tridactylus*	V	V	
Rufous bettong	*Aepyprymnus rufescens*	V		
Spotted-tailed quoll	*Dasyurus maculatus*	V	E	
Squirrel glider	*Petaurus norfolcensis*	V		
Brush-tailed phascogale	*Phascogale tapoatafa*	V		
Mammals – flying				
Common blossom-bat	*Syconycteris australis*	V		
Eastern bentwing-bat	*Miniopterus schreibersii oceanensis*	V		
Eastern false pipistrelle	*Falsistrellus tasmaniensis*	V		
Eastern freetail-bat	*Mormopterus norfolkensis*	V		
Golden-tipped bat	*Kerivoula papuensis*	V		
Greater broad-nosed bat	*Scoteanax rueppellii*	V		
Grey-headed flying-fox	*Pteropus poliocephalus*	V	V	
Little bentwing-bat	*Miniopterus australis*	V		
Southern myotis	*Myotis macropus*	V		
Yellow-bellied sheathtail-bat	*Saccolaimus flaviventris*	V		

BC Act = *Biodiversity Conservation Act 2016*
EPBC Act = Federal *Environment Protection and Biodiversity Conservation Act 1999*
V = vulnerable, E = endangered, CE = critically endangered

Source: This list is from *Wallis Lake Wetlands Strategy* (Great Lakes Council 2010) and is a list of the native animal species known from the Wallis Lake wetlands. These records have been obtained from the *Atlas of NSW Wildlife*, reference documents on Wallis Lake estuary and data from local bird observers.

As for plants, strategies for the recovery of threatened species, populations and ecological communities have been set out in a statewide Biodiversity Conservation Program. These actions are currently prioritised and implemented through the Saving our Species program that aims to maximise the number of threatened species that can be secured in the wild in New South Wales for 100 years (OEH 2013b). Recovery plans have been prepared for the barking owl, bush stone-curlew, little tern and koala. Biodiversity Conservation Program strategies have

also been prepared for a range of species outlined in Table 3. Some of the main strategies include conducting surveys, controlling weeds and feral animals, rehabilitating wetlands, protecting breeding sites and undertaking targeted fox control.

Issues

- Few surveys for native animals have been undertaken in the reserves.

Desired outcomes

- Populations of significant animal species are conserved.
- Knowledge of native animals in the reserves is improved.
- Negative impacts on threatened species are minimised.
- The habitat and populations of all threatened animal species are protected and maintained.
- Structural diversity and habitat values in degraded areas is restored.

Management response

3.3.1 Implement relevant strategies in the Biodiversity Conservation Program and recovery plans for threatened species known or likely to occur in the reserves. Strategies include conducting surveys, controlling weeds and feral animals, rehabilitating wetlands, protecting breeding sites and undertaking targeted fox control.

3.3.2 Undertake and support native plant and animal surveys in the reserves as opportunities arise.

3.4 Aboriginal heritage

The land, water, plants and animals 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 and need to be managed in an integrated manner across the landscape.

The reserves lie within the traditional Country of the Worimi People. The traditional language in the area and currently being revived is Gathang. Contemporary involvement of the local Worimi People is through the Forster Local Aboriginal Land Council and the Minimbah Elders Group. Local Aboriginal people still associate with the reserves, in particular for activities relating to fishing. The reserves contain an abundance of bush tucker, both plant and animal.

Wallis Island is considered to be an important place of ‘men’s business’ by the local Aboriginal community. Wallis Island contains remnant middens and tool sites, particularly around the shoreline. These middens were considered to be extensive, which indicates the large quantity of shellfish once available in the area. The lagoon on Wallis Island Nature Reserve is reported to have been very rich in fish and was used to hone fishing skills.

Yahoo Island Nature Reserve is considered to be an important place of ‘women’s business’ by the local Aboriginal community. Remnants of a large shell midden on the reserve also indicate regular and frequent use of the island in the past.

Early European settlers gathered shells from middens on both Yahoo and Wallis islands for the production of lime, which significantly destroyed these sites. There is limited information on these sites and any others that may exist on Yahoo Island and Wallis Island nature reserves.

There is also limited information on Aboriginal heritage for the other reserves, though it is likely they would have been used for similar purposes.

The NSW Government has legal responsibility for the protection of Aboriginal sites and places under the NPW Act, and acknowledges the right of Aboriginal people to make decisions about their own heritage. Aboriginal communities will be consulted and involved in managing Aboriginal sites, places and related issues and in promoting and presenting Aboriginal culture and history.

Issues

- There is limited information regarding Aboriginal cultural sites in the reserves.

Desired outcomes

- Significant Aboriginal places and values are identified and protected.
- Aboriginal people are involved in managing the Aboriginal cultural values of the reserves.
- Impacts on Aboriginal heritage values are minimised.
- Understanding of the cultural values of the reserves is improved.

Management response

3.4.1 Continue to consult and involve the Forster Local Aboriginal Land Council, the Minimbah Elders Group, other relevant Aboriginal community organisations and custodial families in the management of their Country, including the identification and management of Aboriginal sites and places and cultural and natural values.

3.4.2 Undertake an archaeological survey and cultural impact assessment prior to all works with the potential to impact Aboriginal sites or values.

3.4.3 Undertake or encourage further site surveys into the Aboriginal heritage values of the reserves.

3.4.4 Provide opportunities for Aboriginal people to access Country, to maintain, renew or develop cultural practices and associations.

3.4.5 Permit cultural resource use where it is in accordance with NPWS policy and legislation.

3.5 Historic heritage

Little is known about the historic heritage of the reserves. The information below has been provided by the Great Lakes Historical Society and information gathered by NPWS during reserve establishment.

Wallis, Regatta, Bandicoot, Yahoo and Mills islands were all dedicated as Crown reserves in 1862. Wallis Island was named by the explorer John Oxley in 1818 after Captain Wallis, the Commandant of the military station at Fort Scratchley in Newcastle. The majority of the island was originally managed by a trust as a Crown reserve.

A portion of Crown land in the centre of Wallis Island around the lagoon was leased to The University of NSW as a research station until it was dedicated as a nature reserve.

Regatta Island was originally known as Kangaroo Island. The name Kangaroo was dropped after the Geographical Names Board reviewed the names of the islands in Wallis Lake in 1971. The name Regatta came from the boating events that were held there from about 1887 to 1939. The regattas were held on New Year's Eve and New Year's Day. Originally the races were for sailing boats, but speedboats were later included. The reason for the demise of the regattas is thought to be the start of World War II. A survey map of the area (dated 28 February 1941) showed four jetties, a grandstand and seats along the river frontage in the north of the island.

None of the buildings or structures exist today, however, there is a picnic area in this location that is used as a base for waterskiing activities.

A special grazing lease was held over Regatta Island until 1967. In 1971, the island was reserved for public recreation and preservation of flora and fauna. A survey of Regatta Island in 1972 (Winter 1972), reported that in the north, approximately 1 acre of land had been cleared and there were remnants of a dwelling that was thought to have been destroyed by fire.

Historical records suggest that Yahoo Island was mined for gold and lime (from oyster shells) in the late 18th century, although there is limited evidence known of these activities.

Bandicoot Island may also have been used for gold mining as it was proclaimed as part of the Gloucester Gold Field in 1879.

Mills Island was originally reserved as Baldy Island Nature Reserve in 1977 and its name changed back to Mills Island in 1982. The origin of the names Mills and Baldy is unclear, however historical records suggest that Mills Island may have been named after Abraham Mills, one of the pioneer families of the area. A special grazing lease was held over the island until 1976.

The area now including Coolongolook Nature Reserve was historically thought to be important koala habitat. A special grazing lease was held over the area until 1988.

Issues

- Knowledge about historic heritage values of the reserves is limited.

Desired outcomes

- Negative impacts on historic heritage values are minimised.
- Understanding of the historic values of the reserves is improved.
- Significant historic features are appropriately conserved and managed.

Management response

3.5.1 Encourage further research into the historic values of the reserves.

3.5.2 Record any historic evidence and leave it in situ.

3.5.3 Incorporate historic heritage information in interpretative displays at the day-use areas in Regatta Island and Wallis Island nature reserves.

3.6 Visitor use

NPWS parks and reserves provide a range of visitor opportunities. NPWS aims to ensure that visitors enjoy, experience and appreciate parks at the same time as protecting and conserving park values. Appropriate activities for the reserves include low-impact, self-reliant, nature-based recreation such as picnicking and bushwalking.

The reserves generally experience low levels of visitation. There are day-use facilities on Wallis Island and Regatta Island nature reserves. Bandicoot, Yahoo, Mills, Durands and Flat islands nature reserves along with Coolongolook Nature Reserve have no facilities and limited recreational use. There is no public vehicular access in any of the reserves.

Visitation to the reserves is via boat, and visitors generally use the facilities while undertaking activities such as waterskiing, wakeboarding and fishing. Wallis Island Nature Reserve has three day-use areas along the western edge of the reserve. Regatta Island Nature Reserve has one day-use area in the north of the reserve (Figure 1). These day-use areas typically consist of

a small cleared grass area with a picnic table and shelter. Three of the day-use areas have sealed vault toilets. A number of dilapidated small wood-fired barbecues and rubbish bins also exist at the day-use sites.

The removal of wood debris and trees has been identified as having a significant negative impact on habitat availability and ecosystem functioning and is listed as a key threatening process under the BC Act. It is proposed to remove the fireplaces and the rubbish bins from the reserves to encourage more sustainable recreational use.

The Wallis Lake estuary receives high visitation levels during peak periods such as Easter and summer school holidays. The level of visitation to the reserves is unknown, though it is likely that Wallis Island and Regatta Island nature reserves receive majority of visitors, with very limited use of the other reserves.

Waterskiing and wakeboarding are very popular activities undertaken in Wallis Lake. The main impact on the reserves associated with this activity is the erosion at day-use sites from boat wash and access.

Previously, wakeboarding was popular on the neighbouring Wallamba River. As the Wallamba River is quite narrow, there have been a number of erosion issues from this activity and in February 2011 it was banned on the Wallamba River. An alternative site promoted by MidLakes Council is the Wallis Lake area, primarily on the western side of Wallis Island and the eastern side of Regatta Island. The impact of wash from this activity is a potential issue that needs to be monitored along with the increased pressure on existing picnic area facilities on both islands.

Outside the reserves, recreational facilities including toilets and picnic tables are provided on sections of Crown land adjacent to Coolongolook and Wallis Island nature reserves (see Figure 1), on the edges of Wallis Lake at Booti Booti National Park and at Forster, Tuncurry and Coomba Park.

Issues

- Visitors to the area have difficulty in identifying the nature reserves islands from amongst the large number of islands in the lake system. The *Wallis Lake Estuary and Catchment Management Plan* also identified this as an issue.
- Existing day-use infrastructure in the reserves is in a poor state and not designed to NPWS standards.
- Recreation issues in Wallis Island and Regatta Island nature reserves include littering, illegal camping, the collection of timber for fires and the threat of wildfire from day-use areas.
- Informal visitation in the form of picnicking and camping is known to occur in an undesignated day-use area south of Harmony Hill in Wallis Island Nature Reserve.
- Erosion to the banks occurs at some of the day-use areas where boats are converging to use the facilities.
- Wakeboarding has recently been banned in the Wallamba River. The alternative site being promoted is an area between Wallis Island and Regatta Island nature reserves which will increase boat traffic adjacent to the reserves and demand for reserve day-use areas.

Desired outcomes

- Visitor use of the reserves is appropriate and ecologically sustainable.
- Negative impacts of visitors on reserve values are minimised.
- Visitor opportunities encourage appreciation and awareness of reserve values and their conservation.

Management response

3.6.1 Provide for and maintain low-key day-use in existing designated areas within the reserves as shown on Figure 1. No new day-use sites are to be established on any of the reserves and camping is not permitted.

3.6.2 Reduce or remove day-use areas if use of these areas is shown to cause significant negative impacts on natural or cultural values.

3.6.3 Erect identification and appropriate-use signage in the reserves.

3.6.4 Where recreational infrastructure is considered appropriate and the current infrastructure needs replacing, replace it with NPWS standard infrastructure.

3.6.5 Remove all wood fireplaces and garbage bins from the reserves. Wood fires and solid fuel barbecues will not be permitted in any of the reserves, and visitors will be educated about sustainable use of the reserves.

3.6.6 Promote natural, cultural and historic heritage values of the reserves through appropriate interpretation, including investigating options for combining interpretative information with MidCoast Council in Forster–Tuncurry.

3.6.7 Minimise bank erosion on Regatta Island due to boat access and wash through stabilisation measures.

3.6.8 Monitor the impacts of aquatic recreational activities on the reserves' natural and cultural values. Consult with relevant catchment and estuary groups to address impacts as necessary.

4. Threats

4.1 Pests

Pest species include plants, animals and pathogens that have negative environmental, economic and social impacts. Commonly they are introduced species. Pests can have impacts across the range of park values, including impacts on biodiversity, cultural heritage, catchment and scenic values.

NPWS prepares regional pest management strategies that identify pest species across that region's parks and priorities for control, including actions listed in the Priorities Action Statement (see Sections 3.2 and 3.3), threat abatement plans, and other strategies such as the NSW Biodiversity Priorities for Widespread Weeds (NSW DPI & OEH 2011) and the NSW Biosecurity Strategy 2013–2021 (DPI 2013).

The NPWS regional pest management strategy (OEH 2012) identifies pest species and priority programs for the reserves. The overriding objective of the pest management strategy is to minimise adverse impacts of introduced species on biodiversity and other reserves and community values while complying with legislative responsibilities. The strategy also identifies where other site- or pest-specific plans or strategies need to be developed to provide a more detailed approach.

The pest management strategy identifies a number of pest species as occurring in the reserves (see Table 4).

Table 4: Weed and pest animals recorded in the reserves

Common name	Scientific name	Comment
Weeds		
Asparagus * + (climbing and ground types)	*Asparagus* spp.	Isolated infestation restricted to a small geographic area. Bridal creeper is known to occur in Regatta Island, Yahoo Island and Bandicoot Island nature reserves.
Bitou bush *#	*Chrysanthemoides monilifera* subsp. *rotundata*	Scattered infestations likely to occur throughout the reserves. Known to occur on Wallis Island and Yahoo Island nature reserves.
Coastal morning glory	*Ipomoea cairica*	Isolated infestation restricted to a small geographic area. Known to occur on Wallis Island and Yahoo Island nature reserves. Has the potential to degrade Swamp Sclerophyll Forest and Woodland.
Crofton weed>	*Ageratina adenophora*	Scattered infestations throughout Wallis Island Nature Reserve. Known to occur along Wallis Island Main Trail and around former dredge spoil sites.
Lantana *#	*Lantana camara*	Scattered infestations likely to occur in most of the reserves. Known to occur on Wallis Island and Yahoo Island nature reserves with significant infestations throughout Coolongolook Nature Reserve.

Common name	Scientific name	Comment
Madeira vine #	*Anredera cordifolia*	Isolated infestation restricted to a small geographic area. Known to occur in some areas of dry rainforest on Yahoo Island Nature Reserve.
Pampas grass+	*Cortaderia selloana*	Isolated infestation restricted to a small geographic area. Known to occur in a small section on Wallis Island Nature Reserve where past dredge spoil dumping has occurred.
Trad	*Tradescantia pallida*	Isolated infestation restricted to a small geographic area. Known to occur on Yahoo Island Nature Reserve.
White passionflower	*Passiflora subpeltata*	Isolated infestation restricted to a small geographic area. Known to occur on Wallis Island and Yahoo Island nature reserves.
Pest animals		
Cat	*Felis catus*	It is likely that feral cats would be present in Wallis Island and Coolongolook nature reserves.
European red fox ~	*Vulpes vulpes*	It is likely that foxes would be present in Wallis Island and Coolongolook nature reserves.
Rusa deer	*Cervus timorensis*	There have been reports of feral deer on Wallis Island.
Wild dog ~	*Canis lupus* subsp.	There have been some reports of wild dogs in Coolongolook Nature Reserve.

* Declared Weed of National Significance
\# State-level priority weed
\+ Regional level priority weed
\> Additional species of concern
~ Declared 'pest' under the *Local Land Services Act 2013*

The *Biosecurity Act 2015* (Bio Act) and regulations provide specific legal requirements for the prevention, eradication or containment of state-level priority weeds. These requirements apply equally to both public and privately owned land. A regional strategic weed management plan prepared under the Bio Act identifies those pest plants that are being prioritised for management action, investment and compliance effort within the Hunter Local Land Services region (Hunter LLS 2017). These priorities will be implemented via the relevant NPWS pest management strategy.

Bitou bush is listed as a Weed of National Significance and a key threatening process under the BC Act as it readily invades a wide variety of disturbed and undisturbed coastal plant communities, outcompeting native vegetation. A threat abatement plan has been prepared (DEC 2006) that lists actions to abate, ameliorate or reduce the threat posed by bitou bush to threatened species, populations and ecological communities.

A national Plan to Protect Environmental Assets from Lantana (Biosecurity Queensland 2010) has been developed that establishes national conservation priorities for the control of lantana. It

identifies the research, management and other actions needed to ensure the long-term survival of native species and ecological communities affected by the invasion of lantana.

The Wallis Lake Wetlands Strategy (Great Lakes Council 2010) highlights other weeds of national significance known to occur in the Wallis Lake catchment that might threaten the reserves, including African boxthorn (*Lycium ferocissimum*) and mother of millions (*Bryophyllum delagoense*). Groundsel bush (*Baccharis halimifolia*) has not been recorded in the reserves to date but is considered to be a threat to the estuarine vegetation of the Wallis Lake wetlands. Canary palm (*Phoenix canariensis*) is another high priority weed species likely to occur in the Wallis Lake wetlands.

The reserves in the Wallis Lake wetlands are generally considered to be in fairly good condition due to their relative isolation as islands and the resulting limited human activities. However, there are weeds in the reserves identified as high priority in the regional pest management strategy and these species need to be controlled and monitored. There has been very limited weed control work undertaken in any of the reserves.

A number of former dredge spoil disposal sites on Wallis Island Nature Reserve contain weeds including pampas grass, crofton weed and white passionflower. Lantana infestations also exist on Wallis Island along the southernmost boundary with private property.

There has been no comprehensive assessment of pest animals in any of the reserves. Pest animal control programs in the reserves would have significant benefits as the islands are relatively isolated and reinvasion is less likely.

European red foxes suppress native animal populations, particularly medium-sized mammals, ground-nesting birds and freshwater turtles. They have also been implicated in the spread of a number of weed species such as bitou bush and blackberry. As they are known to prey on domestic stock, including lambs and poultry, the European red fox is a declared pest throughout New South Wales under the *Local Land Services Act 2013*.

Predation by the European red fox is a key threatening process under the BC Act and EPBC Act. The NSW fox threat abatement plan was initiated in 2001 (and revised in 2010 – see OEH 2011) with the primary objective of establishing long-term control programs to protect priority threatened animal species and populations. Foxes are being controlled at priority sites across New South Wales to protect biodiversity. Foxes are likely to occur in the larger reserves.

Historically there were records of goats in a few of the island reserves including on Regatta and Yahoo islands. There is currently no evidence of this and it is unlikely that they are present today.

Feral deer have been reported to occur on Wallis Island in the past. A population of rusa deer occurs around Coomba Park and it is understood that deer swim across to the island from the mainland. Feral deer are known to have a detrimental impact on native plants and have been listed as a key threatening process under the BC Act (NSW SC 2004) due to environmental degradation caused through grazing.

Stray cattle graze and traverse Coolongolook Nature Reserve and introduce and spread weeds throughout the reserve (see Section 5.1).

Desired outcomes

- Pest plants and animals are controlled and where possible eliminated.
- Negative impacts of introduced species on reserve values are minimised.

Management response

4.1.1 Manage pest species in accordance with pest management strategies relevant to the reserves. Priority will be given to the control of madeira vine, asparagus species, bitou bush, crofton weed, pampas grass, coastal morning glory and lantana.

4.1.2 Survey the reserves to determine the presence and extent of pest species.

4.1.3 Seek the cooperation of neighbours in implementing weed and pest control programs. Undertake control in cooperation with MidCoast Council and Hunter Local Land Services.

4.2 Fire

The primary objectives of NPWS fire management are to protect life, property, community assets and cultural heritage from the adverse impacts of fire, while also managing fire regimes in parks to maintain and enhance biodiversity. NPWS also assists in developing fire management practices that contribute to conserving biodiversity and cultural heritage across the landscape, and implements cooperative and coordinated fire management arrangements with other fire authorities, neighbours and the community (OEH 2013a).

Fire is a natural feature of many environments and is essential for the survival of some plant communities. However, inappropriate fire regimes can lead to loss of particular plant and animal species and communities, and high frequency fires have been listed as a key threatening process under the BC Act (NSW SC 2000b).

There is limited recorded fire history for a number of the island reserves. Mills Island has no record of fire for over 20 years.

Most of the reserves are considered to have a low fire risk, except Wallis Island and Coolongolook. The vegetation in the reserves with low fire risk is generally dominated by wetland vegetation communities, such as mangroves and saltmarsh. The threat of fire on Wallis Island and Coolongolook nature reserves is greater due to forest and heathland vegetation. Fires in these reserves have historically originated from human activities, particularly from day-use areas.

The last fire to occur in the reserve on Wallis Island was in 2003 when most of the reserve was burnt. Wildfires occurred in the reserve before it was managed by NPWS. Typically these fires would have burnt large areas of the reserve but their details have not been documented.

Options to establish a short management trail on Wallis Island from the western boundary of the airstrip west to the lake will be investigated. This would improve the east–west advantage for wildfire suppression activities (see Figure 1).

The last fire to occur on Regatta Island Nature Reserve was in 1993 when 23 hectares of eucalypt forest were burnt. On Yahoo Island Nature Reserve, the most recent fire occurred in 1994 when 37 hectares were burnt. In 2003, 25 hectares were burnt in Coolongolook Nature Reserve. Only one other fire has been recorded for the reserve when 5 hectares were burnt in 1994. There is no early fire history for any of these reserves.

The only built assets in any of the reserves are the day-use areas on Wallis Island and Regatta Island nature reserves. There are a number of houses on the north-east part of Wallis Island which are separated from the reserve by Crown land and the private airstrip. There are also two houses in the south-west of the island.

There are fences, farm buildings, a permanent residence and temporary residences along the southern and eastern boundaries of Coolongolook Nature Reserve. To the south-west of the

reserve there is a Crown reserve with a picnic area managed by MidCoast Council consisting of a picnic table, shelter and toilet.

NPWS has prepared fire management strategies, which define the fire management approach for the reserves. The fire management strategies outline the recent fire history of the reserves, key assets within and adjoining the reserves including sites of natural and cultural heritage value, fire management zones and fire control advantages such as management trails and water supply points. They also contain fire regime guidelines for conservation of the reserves' vegetation communities, and aims to keep fires out of rainforest, wetland and saltmarsh areas.

NPWS maintains cooperative arrangements with surrounding landowners and the Rural Fire Service and is actively involved with the Great Lakes Bush Fire Management Committee. Cooperative arrangements include fire planning, fuel management and information sharing. Hazard reduction programs, ecological burning proposals and fire trail works are submitted annually to the bush fire management committee.

Issues

- With the exception of Coolongolook Nature Reserve, the reserves are islands and access for firefighting vehicles is not feasible.

Desired outcomes

- Fire management strategies for Coolongolook and Wallis Island nature reserves provide a greater level of detail.
- Negative impacts of fire on life, property and the environment are minimised.
- The potential for spread of bushfires on, from or into the reserves is minimised.
- Fire regimes are appropriate for conservation of native plant and animal communities.
- Existing fire advantages on Wallis Island Nature Reserve are enhanced.

Management response

4.2.1 Implement the fire management strategies for the reserves and update them as required.

4.2.2 Upgrade fire management strategies for Coolongolook and Wallis Island nature reserves to provide greater detail, including maps.

4.2.3 Continue to be actively involved in the Great Lakes Bush Fire Management Committee and maintain cooperative arrangements with local Rural Fire Service brigades, other fire authorities and surrounding landowners in regard to fuel management and fire suppression.

4.2.4 Suppress unplanned fires in the reserves in accordance with the fire management strategies.

4.2.5 Manage the reserves to protect biodiversity in accordance with the identified fire regimes in the fire management strategies.

4.2.6 Monitor the ability of native plants to recover between fires and review regimes where relevant.

4.2.7 Investigate the options and if acceptable create and maintain a short management trail extending from the western boundary of the airstrip to the lake on Wallis Island Nature Reserve.

4.3 Climate change

Human-induced climate change is listed as a key threat under the BC Act (NSW SC 2000a) and the associated loss of habitat is listed under the EPBC Act (TSSC 2001).

The latest information on projected changes to climate are from the NSW and ACT Regional Climate Modelling (NARClim) project (OEH 2014). The climate projections for 2020–39 are described as 'near future', and projections for 2060–79 are described as 'far future'. The snapshot shown in Table 5 is for the NARClim Hunter Region, which includes the Wallis Lake reserves (OEH 2014).

There are projections of higher temperatures, increased autumn rainfall and increased frequency of weather conditions that will promote wildfires. As well as these impacts, sea level is virtually certain to rise, causing recession of the erodible coastline, typically of 20–40 metres by 2050 and 45–90 metres by 2100 (DECCW 2010). The combination of rising sea levels and catchment-driven flooding is likely to increase flood frequency, height and extent in lower portions of coastal floodplains. Increased sheet, rill and gully erosion due to higher rainfall is likely to induce sediment inundation in coastal floodplains. Problems of acid sulfate soils are likely to increase in the short term but decrease in the longer term (DECCW 2010).

Table 5. Hunter region climate change snapshot

Projected temperature changes	
Maximum temperatures are projected to **increase** in the near future by 0.4–1.0°C	Maximum temperatures are projected to **increase** in the far future by 1.6–2.6°C
Minimum temperatures are projected to **increase** in the near future by 0.5–0.9°C	Minimum temperatures are projected to **increase** in the far future by 1.5–2.5°C
The number of hot days (i.e. > 35°C) will **increase**	The number of cold nights (i.e. < 2°C) will **decrease**
Projected rainfall changes	
Rainfall is projected to **decrease** in spring and winter	Rainfall is projected to **increase** in autumn
Projected Forest Fire Danger Index changes	
Average fire weather is projected to **increase** in summer, spring and winter	Severe fire weather days are projected to **increase** in summer and spring

Source: OEH 2014

Climate change may significantly affect biodiversity by changing the size of populations and the distribution of species and altering the geographical extent and species composition of habitats and ecosystems. Sea level rise is virtually certain to alter estuarine and coastal lowland ecosystems (DECCW 2010). Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or slow growth rates.

Specific impacts are difficult to assess since they depend on the compounding effects of other pressures, particularly barriers to migration and pressure from feral animals. Programs to reduce the pressures arising from habitat fragmentation, invasive species, bushfires and pollution, will help reduce the severity of the effects of climate change.

Desired outcomes

- The effects of climate change on natural systems are minimised.

Management response

4.3.1 Continue existing fire, pest and weed management programs to increase the reserves' ability to cope with future disturbances, including climate change and encourage research into appropriate indicators to monitor the effects of climate change.

5. Management operations and other uses

5.1 Management facilities and operations

A gravelled vehicle trail (known as Wallis Island Main Trail or Cable Trail) on the eastern side of Wallis Island Nature Reserve (see Figure 1) existed before the establishment of the reserve (see Section 5.2). The trail has limited value for NPWS fire management purposes but has the potential for use by staff to implement weed and pest animal control programs.

A constructed trail along the Crown road reserve provides vehicle access to the south-east and eastern perimeters of Coolongolook Nature Reserve (see Figure 1). Previous fire suppression activities created vehicle access into the reserve, however, these trails are now overgrown and impassable.

Around Harmony Hill, in the southern part of Wallis Island, there are a number of former quarry sites both on private land and within Wallis Island Nature Reserve. Before the establishment of the reserve, gravel from this area was used to construct Wallis Island Main Trail and the private airstrip. There may be a need to maintain Wallis Island Main Trail using gravel from the quarry sites within the reserve. The reserve boundary around Harmony Hill is not adequately defined to ensure delineation of the reserve and its quarry sites from those on private property.

Coolongolook Nature Reserve is subject to cattle grazing due to inadequate boundary fencing. The Crown land directly adjoining the reserve in the south-west is unfenced and carries a current grazing lease.

Issues

- Cattle are grazing in Coolongolook Nature Reserve.
- There is inadequate boundary identification on Wallis Island Nature Reserve around the former quarry sites near Harmony Hill.

Desired outcomes

- Former quarry sites on Wallis Island Nature Reserve are retained for future NPWS use if required.
- Boundary fences are adequate to keep cattle excluded from the reserves.
- There is adequate identification of the boundary of Wallis Island Nature Reserve around the former quarry sites near Harmony Hill.

Management response

5.1.1 Ensure that any quarrying activity from the former quarry sites in Wallis Island Nature Reserve is in accordance with an approved quarry management and rehabilitation plan.

5.1.2 Work with neighbours to prevent cattle entering the park and erect stock-proof boundary fencing in accordance with the NPWS *Boundary Fencing Policy*.

5.1.3 Survey the reserve boundary in the vicinity of quarry sites near Harmony Hill on Wallis Island Nature Reserve and clearly identify the reserve boundary.

5.2 Non-NPWS uses and operations

A telecommunications cable is located on Wallis Island Nature Reserve and runs along the edge of Wallis Island Main Trail servicing the private properties in the south of the island. This cable pre-dates reservation. While maintenance of these facilities, as defined under the Commonwealth *Telecommunications Act 1997*, can be undertaken without NPWS approval, any works other than maintenance require NPWS approval and licensing under the NPW Act.

A slashed trail west of the airstrip on Wallis Island Nature Reserve extends from private property through the reserve to Bandaa Day-use Area. This trail to the day-use area does not serve any NPWS management purpose and is periodically being slashed by island residents.

All fishing activities in NSW waters, including Wallis Lake, are regulated under the *Fisheries Management Act 1994* (FM Act). Both commercial and recreational fishing must be in accordance with licence conditions specified by the NSW Department of Primary Industries.

Issues

- Wallis Island Main Trail on Wallis Island Nature Reserve is required for the ongoing maintenance requirements of the telecommunications cable.
- Inappropriate slashing of vegetation is occurring on Wallis Island Nature Reserve.

Desired outcomes

- There is no public vehicle access in any of the reserves.
- The existing telecommunications cable is managed appropriately to minimise impacts on natural and cultural values and reserve infrastructure.
- Fishing activities do not impact the values of the reserves.

Management response

5.2.1 Liaise with the relevant telecommunications authority to ensure any maintenance, disruption or replacement works comply with the NPW Act and Regulation and the utility service requirements.

5.2.2 Work cooperatively with the Department of Primary Industries to ensure that activities licensed under the FM Act have minimal impact on reserve values.

5.2.3 Ensure reserve neighbours on Wallis Island are aware that slashing of vegetation in Wallis Island Nature Reserve is not permitted.

6. Implementation

This plan of management establishes a scheme of operations for the Wallis Lake reserves. Implementation of this plan will be undertaken within the annual program of the NPWS Lower North Coast Region.

This plan of management does not have a specific term and will stay in force until amended or replaced in accordance with the NPW Act.

Identified activities for implementation are listed in Table 6. Relative priorities are allocated against each activity as follows:

- **High** priority activities are imperative to achieve the plan's objectives and desired outcomes and must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources.
- **Medium priority** activities are necessary to achieve the objectives and desired outcomes but are not urgent.
- **Low priority** activities are desirable to achieve the objectives and desired outcomes but can wait until resources become available.
- **Ongoing** activities are undertaken on an annual basis or in response to an issue that arises.

Table 6. List of management responses

Management response	Priority
3.1 Geology, landforms and hydrology	
3.1.1 Continue to support and work with the catchment and estuary groups in implementing strategic plans for the Wallis Lake catchment.	Ongoing
3.1.2 To address impacts on potential acid sulfate soils, ensure soils in the reserves are not disturbed, or any disturbance is subject to environmental assessment.	Ongoing
3.1.3 Investigate and implement the preferred option to reinstate a natural hydrology in the lagoon on Wallis Island Nature Reserve.	Low
3.2 Native plants	
3.2.1 Implement relevant strategies in the Biodiversity Conservation Program for threatened species and communities present in the reserves. Undertake surveys to confirm continued existence of species and communities, and implement appropriate weed and fire management programs.	High
3.2.2 Undertake an assessment of the extent and representation of vegetation communities in the reserves and produce a spatial map in consultation with MidCoast Council.	Medium
3.2.3 Assist the catchment and estuary groups by implementing actions identified in the Wallis Lake Estuary and Catchment Management Plan and Wallis Lake Wetlands Strategy (where relevant).	Medium
3.2.4 Investigate the potential to actively revegetate the former dredge spoil disposal sites on Wallis Island Nature Reserve and undertake necessary works.	Medium

Management response	Priority
3.3 Native animals	
3.3.1 Implement relevant strategies in the *Biodiversity Conservation Program* and recovery plans for threatened species known or likely to occur in the reserves. Strategies include conducting surveys, controlling weeds and feral animals, rehabilitating wetlands, protecting breeding sites and undertaking targeted fox control.	High
3.3.2 Undertake and support native plant and animal surveys in the reserves as opportunities arise.	Low
3.4 Aboriginal heritage	
3.4.1 Continue to consult and involve the Forster Local Aboriginal Land Council, the Minimbah Elders Group, other relevant Aboriginal community organisations and custodial families in the management of their Country, including the identification and management of Aboriginal sites and places, and cultural and natural values.	Ongoing
3.4.2 Undertake an archaeological survey and cultural impact assessment prior to all works with the potential to impact Aboriginal sites or values.	Ongoing
3.4.3 Undertake or encourage further site surveys into the Aboriginal heritage values of the reserves.	Medium
3.4.4 Provide opportunities for Aboriginal people to access Country, to maintain, renew or develop cultural practices and associations.	Ongoing
3.4.5 Permit cultural resource use where it is in accordance with NPWS policy and legislation.	Ongoing
3.5 Historic heritage	
3.5.1 Encourage further research into the historic values of the reserves.	Low
3.5.2 Record any historic evidence and leave in situ.	Ongoing
3.5.3 Incorporate historic heritage information in interpretative displays at the day-use areas in Regatta Island and Wallis Island nature reserves.	Medium
3.6 Visitor use	
3.6.1 Provide for and maintain low-key day-use in existing designated areas within the reserves as shown on Figure 1. No new day-use sites are to be established on any of the reserves and camping is not permitted.	Ongoing
3.6.2 Reduce or remove day-use areas if use of these areas is shown to cause significant negative impacts on natural or cultural values.	Ongoing
3.6.3 Erect identification and appropriate-use signage in the reserves.	High
3.6.4 Where recreational infrastructure is considered appropriate and the current infrastructure needs replacing, replace it with NPWS standard infrastructure.	Low
3.6.5 Remove all wood fireplaces and garbage bins from the reserves. Wood fires and solid fuel barbecues will not be permitted in any of the reserves, and visitors will be educated about sustainable use of the reserves.	High
3.6.6 Promote natural, cultural and historic heritage values of the reserves through appropriate interpretation, including investigating options for combining interpretative information with MidCoast Council in Forster–Tuncurry.	Medium

Management response	Priority
3.6.7 Minimise bank erosion on Regatta Island due to boat access and wash through stabilisation measures.	Medium
3.6.8 Monitor the impacts of aquatic recreational activities on the reserves' natural and cultural values. Consult with relevant catchment and estuary groups to address impacts as necessary.	Ongoing
4.1 Pests	
4.1.1 Manage pest species in accordance with pest management strategies relevant to the reserves. Priority will be given to the control of madeira vine, asparagus species, bitou bush, crofton weed, pampas grass, coastal morning glory and lantana.	High
4.1.2 Survey the reserves to determine the presence and extent of pest species.	Medium
4.1.3 Seek the cooperation of neighbours in implementing weed and pest control programs. Undertake control in cooperation with MidCoast Council and Hunter Local Land Services.	Ongoing
4.2 Fire	
4.2.1 Implement the fire management strategies for the reserves and update them as required.	High
4.2.2 Upgrade fire management strategies for Coolongolook and Wallis Island nature reserves to provide greater detail, including maps.	High
4.2.3 Continue to be actively involved in the Great Lakes Bush Fire Management Committee and maintain cooperative arrangements with local Rural Fire Service brigades, other fire authorities and surrounding landowners in regard to fuel management and fire suppression.	Ongoing
4.2.4 Suppress unplanned fires in the reserves in accordance with the fire management strategies.	Ongoing
4.2.5 Manage the reserves to protect biodiversity in accordance with the identified fire regimes in the fire management strategies.	Ongoing
4.2.6 Monitor the ability of native plants to recover between fires and review regimes where relevant.	Ongoing
4.2.7 Investigate the options and if acceptable create and maintain a short management trail extending from the western boundary of the airstrip to the lake on Wallis Island Nature Reserve.	Medium
4.3 Climate change	
4.3.1 Continue existing fire, pest and weed management programs to increase the reserves' ability to cope with future disturbances, including climate change, and encourage research into appropriate indicators to monitor the effects of climate change.	High
5.1 Management facilities and operations	
5.1.1 Ensure that any quarrying activity from the former quarry sites on Wallis Island Nature Reserve is in accordance with an approved quarry management and rehabilitation plan.	Ongoing

Management response	Priority
5.1.2 Work with neighbours to prevent cattle entering the park and erect stock-proof boundary fencing in accordance with the NPWS *Boundary Fencing Policy*.	Ongoing
5.1.3 Survey the reserve boundary in the vicinity of quarry sites near Harmony Hill on Wallis Island Nature Reserve and clearly identify the reserve boundary.	Medium
5.2 Non-NPWS uses and operations	
5.2.1 Liaise with the relevant telecommunications authority to ensure any maintenance, disruption or replacement works comply with the NPW Act and Regulation and the utility service requirements.	Ongoing
5.2.2 Work cooperatively with the Department of Primary Industries to ensure that activities licensed under the FM Act have minimal impact on reserve values.	Ongoing
5.2.3 Ensure reserve neighbours on Wallis Island are aware that slashing of vegetation in Wallis Island Nature Reserve is not permitted.	Medium

References

Biosecurity Queensland 2010, *Plan to Protect Environmental Assets from Lantana*, Department of Employment, Economic Development and Innovation, Yeerongpilly, Queensland.

DEC 2006, NSW *Threat Abatement Plan – Invasion of native plant communities by* Chrysanthemoides monilifera *(bitou bush and boneseed*), Department of Environment and Conservation (NSW), Hurstville, www.environment.nsw.gov.au/threatenedspecies/ThreatAbatementPlans.htm.

DECC 2007, *Introducing the NSW Threatened Species Priorities Action Statement (PAS),* Department of Environment and Climate Change, Sydney, NSW, www.environment.nsw.gov.au/resources/threatenedspecies/threatspecpas07168.pdf.

DECCW 2010*, NSW Climate Impact Profile: The impacts of climate change on the biophysical environment of New South Wales*, Department of Environment, Climate Change and Water NSW, Sydney, http://climatechange.environment.nsw.gov.au/Impacts-of-climate-change/2010-NSW-climate-impact-reporting.

DMR 2001, 1:250,000 Combined Geological Map Sheets, Department of Mineral Resources, NSW.

Dodkin MJ 1978, New Area Proposal – Yahoo Island, Wallis Lake, unpublished report to NPWS, Taree District.

Dodkin MJ & Winter J 1973, Proposed Coolongolook Nature Reserve, internal report for NPWS.

DoE 1993, *Directory of Important Wetlands in Australia*, Commonwealth Department of the Environment, www.environment.gov.au/node/25064.

DoE 2009, *Listed Key Threatening Processes*, Department of the Environment, www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl.

DPI 2013, *NSW Biosecurity Strategy 2013–2021*, Department of Primary Industries, a division of NSW Department of Trade and Investment, Regional Infrastructure and Services, Orange, www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/467699/NSW-biosecurity-strategy-2013-2021.pdf.

Floyd AG 1990, *Australian Rainforests in New South Wales,* vol. 1 & 2, Surrey Beatty & Sons – NSW National Parks and Wildlife Service.

Great Lakes Council 2010, *Wallis Lake Wetlands Strategy: Vision, guiding principles and actions,* prepared by Natural Systems, Great Lakes Council, NSW.

Great Lakes Council 2014, *Wallis Lake Estuary and Catchment Management Plan*, Great Lakes Council, NSW.

Griffith SJ & Wilson B 2008, Wetland Biodiversity in Coastal New South Wales: the Wallis Lake Catchment as a case study, *Cunninghamia*, vol. 10, no. 4, p. 2008.

Griffith SJ, Wilson R & Maryott-Brown K 2000, Vegetation and flora of Booti Booti National Park and Yahoo Nature Reserve, Lower North Coast of New South Wales, *Cunninghamia*, vol. 6, no. 3, p. 2000.

Hunter LLS 2017, *Hunter Regional Strategic Weed Management Plan 2017-2022*, prepared in partnership with the Hunter Regional Weed Committee and published by Hunter Local Land Services,

http://hunter.lls.nsw.gov.au/__data/assets/pdf_file/0004/722875/Hunter_Regional_Strategic_weed_management_plan_web-1.pdf

NSW DPI & OEH 2011, *Biodiversity Priorities for Widespread Weeds*, report prepared for the 13 Catchment Management Authorities (CMAs) by NSW Department of Primary Industries and Office of Environment & Heritage, Orange.

NSW SC 1998, *Final Determination to List Predation by the European Red Fox* Vulpes vulpes *(Linnaeus 1758) as a Key Threatening Process on Schedule 3 of the Threatened Species Conservation Act 1995*, New South Wales Scientific Committee, www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20015.

NSW SC 1999, *Final Determination to List Invasion of Native Plant Communities by Bitou Bush and Boneseed as a Key Threatening Process on Schedule 3 of the Threatened Species Conservation Act 1995*, New South Wales Scientific Committee, www.environment.nsw.gov.au/determinations/BitouBushBoneseedKTPListing.htm.

NSW SC 2000a, *Final Determination to List Anthropogenic Climate Change as a Key Threatening Process on Schedule 3 of the Threatened Species Conservation Act 1995*, New South Wales Scientific Committee, www.environment.nsw.gov.au/threatenedspecies/HumanClimateChangeKTPListing.htm.

NSW SC 2000b, *Final Determination to List High Frequency Fire Resulting in the Disruption of Life Cycle Processes in Plants and Animals and Loss of Vegetation Structure and Composition as a Key Threatening Process on Schedule 3 of the Threatened Species Conservation Act 1995*, New South Wales Scientific Committee, www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20014.

NSW SC 2003, *Final Determination to List Removal of Dead Wood and Dead Trees as a Key Threatening Process on Schedule 3 of the Threatened Species Conservation Act 1995*, New South Wales Scientific Committee, www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20011.

NSW SC 2004, *Final Determination to List Herbivory and Environmental Degradation Caused by Feral Deer as a Key Threatening Process on Schedule 3 of the Threatened Species Conservation Act 1995*, New South Wales Scientific Committee, www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20012.

OEH 2011, *NSW Threat Abatement Plan for Predation by the Red Fox (*Vulpes vulpes*)*, Office of Environment and Heritage, Sydney, www.environment.nsw.gov.au/threatenedspecies/ThreatAbatementPlans.htm.

OEH 2012, *Regional Pest Management Strategy 2012–17, Hunter Region: A new approach for reducing impacts on native species and park neighbours*, Office of Environment and Heritage, Sydney, www.environment.nsw.gov.au/pestsweeds/RegionPestManagement.htm.

OEH 2013a, *Living with Fire in NSW National Parks: A strategy for managing bushfires in national parks and reserves 2012–2021*, revised edition, Office of Environment and Heritage, Sydney, www.environment.nsw.gov.au/fire/120690livfire.htm.

OEH 2013b, *Saving our Species*, Office of Environment and Heritage, Sydney, www.environment.nsw.gov.au/savingourspecies/about.htm.

OEH 2014, *Hunter: Climate change snapshot*, Office of Environment and Heritage, Sydney, www.climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region/Hunter-Climate-Change-Downloads.

OEH 2015, *NSW BioNet, Atlas of NSW Wildlife*, Office of Environment and Heritage, Sydney, www.bionet.nsw.gov.au/.

TSSC 2001, *Commonwealth Listing Advice on Loss of Terrestrial Climatic Habitat Caused by Anthropogenic Emissions of Greenhouse Gases*, Threatened Species Scientific Committee, www.environment.gov.au/cgi-bin/sprat/public/publicshowkeythreat.pl?id=7.

WLEMC 2005, *Wallis Lake Estuary Management Plan,* Wallis Lake Estuary Management Committee Foster, NSW.

Winter J 1972, Baldy Island, Parish Bachelor, County Gloucester, unpublished report to National Parks and Wildlife Service.