

# **FISHERMANS BEND NATURE RESERVE**

## **PLAN OF MANAGEMENT**

**NSW National Parks and Wildlife Service**

**Part of the Department of Environment and Conservation (NSW)**

**October 2005**

**This plan of management was adopted by the Minister for the Environment on 28 October 2005.**

**Acknowledgments**

This plan of management is based on a draft plan prepared by NPWS Macleay Area staff, NPWS Mid-North Coast Regional staff and the NPWS Northern Directorate Planning section.

**Further information**

For additional information or enquiries on any aspect of the plan, contact the NPWS Mid North Coast Regional Office at 152 Horton Street, Port Macquarie or by phone on (02) 6586-8300.

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## **FOREWORD**

Fishermans Bend Nature Reserve is located 1.5km south-west of the town of Stuarts Point and 30km north-east of Kempsey. It covers an area of 160 hectares, and is in two separate sections.

The vegetation of the reserve is in a relatively undisturbed condition, despite several trails, works associated with the bore field which extracts water from the Stuarts Point aquifer, and a narrow strip of land that was formerly mined for mineral sands. The reserve also forms part of the regional Stuarts Point fauna corridor and provides habitat for a number of threatened animal species.

There are no known Aboriginal sites within the reserve, however, there is an Aboriginal burial site to the south of the reserve as well as numerous midden sites in the local area associated with the Macleay Arm shellfish resource.

The *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each nature reserve. A plan of management is a legal document that outlines how the area will be managed in the years ahead.

A draft plan of management for Fishermans Bend Nature Reserve was placed on public exhibition from 19 December 2003 until 19 April 2004. The exhibition of the plan of management attracted 7 submissions that raised 4 issues. All submissions received were carefully considered before adopting this plan of management.

This plan of management establishes the scheme of operations for Fishermans Bend Nature Reserve. In accordance with Section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.

**Bob Debus**

**Minister for the Environment**

## 1. NATURE RESERVES IN NEW SOUTH WALES

### 1.1 LEGISLATIVE AND POLICY FRAMEWORK

The management of national parks and nature reserves in New South Wales (NSW) is in the context of a legislative and policy framework, primarily the *National Parks and Wildlife Act 1974 (NPW Act)*, the *Threatened Species Conservation Act 1995 (TSC Act)* and the policies of the National Parks and Wildlife Service (NPWS). Section 72AA of the NPW Act lists the matters to be considered in preparation of a plan of management. The policies are compiled from the legislative background, the NPW Regulations and internationally accepted principles of park and reserve management. They relate to nature conservation, Aboriginal and historic heritage conservation, recreation, commercial use, research and communication.

Other legislation, international agreements and charters may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979 (EP&A Act)* requires the assessment and mitigation of environmental impacts of any works proposed in this plan.

The 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 planning area except in accordance with the plan. The plan will also apply to any future additions to the planning area. Where management strategies or works are proposed for the planning area or any additions that are not consistent with the plan, an amendment to the plan will be required.

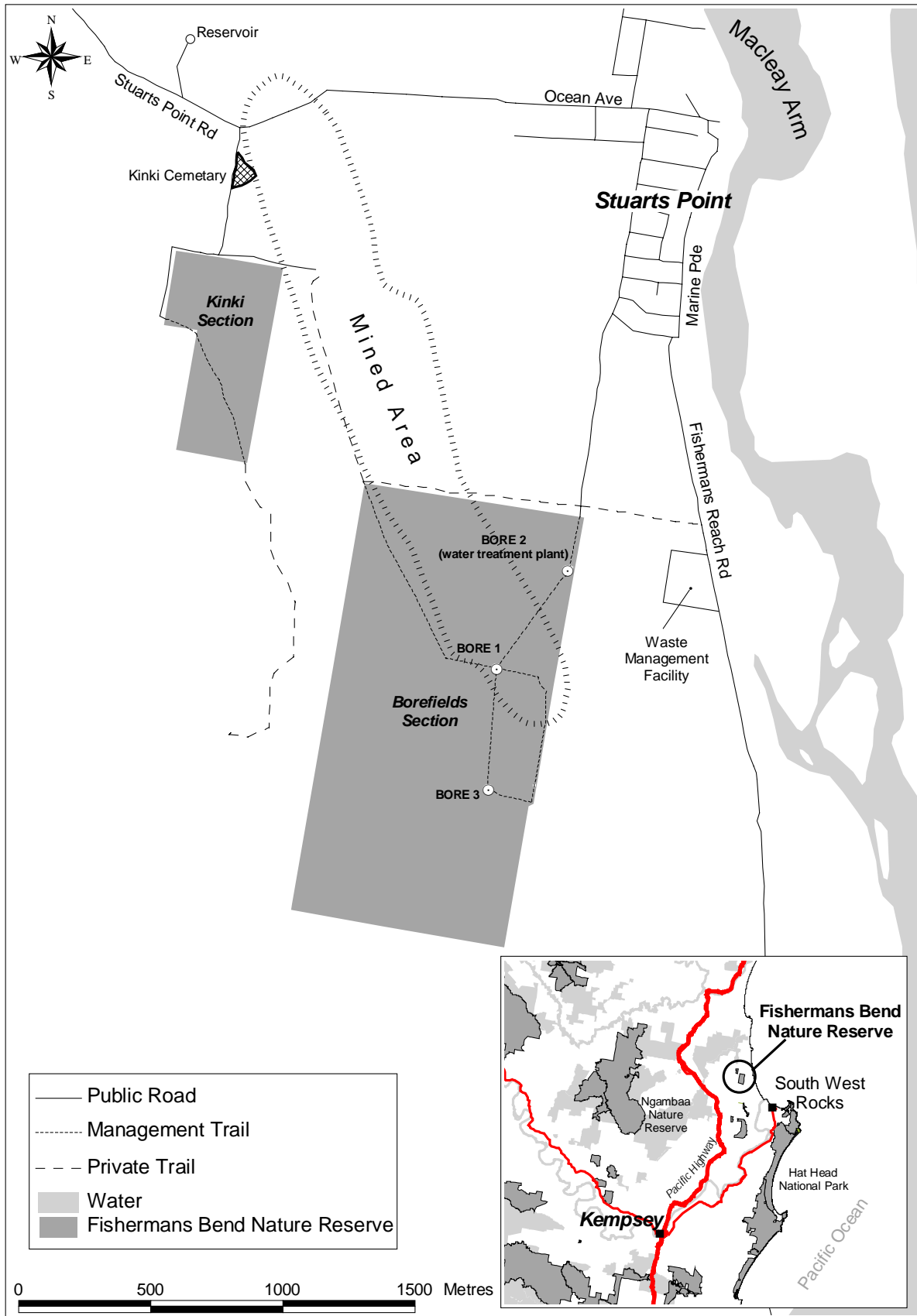
### 1.2 MANAGEMENT PRINCIPLES

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 the Act, nature reserves are to be managed to:

- conserve biodiversity, maintain ecosystem functions, and protect geological and geomorphological 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; and
- provide for appropriate research and monitoring.

## 2. FISHERMANS BEND NATURE RESERVE AND LOCALITY MAP



### **3. FISHERMANS BEND NATURE RESERVE—BASIS FOR MANAGEMENT**

#### **3.1 LOCATION, GAZETTAL AND REGIONAL SETTING**

Fishermans Bend Nature Reserve (hereafter called “the reserve”) is located 1.5km south-west of the town of Stuarts Point and 30km north-east of Kempsey. The reserve was previously vacant crown land and was gazetted on 5 March 1999 to cover an area of 160 ha, in two separate sections. The larger section of the reserve is called the “Borefield section” in this plan and covers an area of approximately 136 ha. The smaller section is called the “Kinki section” for the nearby cemetery and covers an area of approximately 24 ha.

The reserve is named for a nearby bend in an arm of the Macleay River, to the north of Fishermans Reach. In 1893 a major flood saw the Macleay River break through the sandhills to form an entrance at South West Rocks which is still in place today. Prior to this event the Macleay River entered the ocean at Grassy Head, though occasionally the river had taken temporary short cuts through to the sea near Trial Bay (Carey, 1993). Lands to the east of the reserve are intensively farmed for avocados and vegetables. Other adjoining lands are relatively undisturbed heath or dry sclerophyll forest with a heathy understorey.

The reserve is within the State electorate of Oxley, the Kempsey Local Government Area, the Kempsey Local Aboriginal Land Council area, the Mid North Coast Catchment Management Board area and the Kempsey Rural Lands Protection Board area.

#### **3.2 LANDSCAPE CONTEXT**

Natural and cultural heritage and on-going use are strongly inter-related and together form the landscape of an area. Much of the Australian environment has been influenced by past Aboriginal and non-Aboriginal land use practices and the activities of modern day Australians continue to influence bushland through recreational use, cultural practices, the presence of introduced plants and animals and in some cases air and water pollution.

The geology, landform, climate and plant and animal communities of the area, plus its location, have determined how it has been used by humans. The natural features and location of the area encouraged the use of the area by Aboriginal people, while the geology in the area of the reserve has resulted in both sand mining and an aquifer that is now utilised for irrigation and domestic water supply. These uses have modified the landscape.

Both Aboriginal and non-Aboriginal people place cultural values on natural areas, including aesthetic, social, spiritual, recreational and other values. Cultural 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 natural and cultural heritage, non-human threats and on-going use are dealt with individually, but their inter-relationships are recognised.

### 3.3 NATURAL AND CULTURAL HERITAGE VALUES

#### Landform, Geology and Soils

The reserve has almost no vertical relief, being part of the Macleay flood plain it is only 1.0 to 2.0 metres above sea level. The soils are aeolian sediments, being Pleistocene sand dunes. Acid sulphate soils (ASS) occur along much of the lower coastal floodplain area, in poorly drained grey sandy clays. However, the soil type within the reserve, ASS maps developed by the Department of Land and Water Conservation, bore hole investigations and the experience of local landholders indicate that the area of the reserve is within a low risk region for ASS (DLWC 1995, DPWS 1998).

The main geological formations to the west and south west of Stuarts Point consist of Permian slate, phyllite, schistose sandstone, schistose conglomerate and basic volcanics. Borehole investigations have indicated a shallow bedrock platform of these rock types south west of Stuarts Point which deepens towards the coast (DPWS, 1998).

Water erosion is negligible due to the flat terrain and low elevation, although denudation of large areas may lead to wind erosion.

#### Catchment values

The reserve itself has no surface catchment other than its own area, however the water table beneath the reserve is perched upon a layer of "coffee rock". This layer causes a perched water table close to the surface, which enables the sands to support sedges and other moisture loving plants.

The Stuarts Point aquifer is shared between several large commercial fruit and vegetable growers, the township and environmental allocation. Water sharing arrangements are currently being reviewed.

#### Native Plants

A comprehensive flora survey was conducted on the northern portion of the Kinki section, as well as around the bores and pipelines within the Borefield section, for the Stuarts Point water supply development (Environmental Consultants Pty Ltd 1997). Although this study did not systematically survey all of the current reserve area, it did sample all representative vegetation associations found in the reserve and found no threatened plant species. In addition, no threatened plants were predicted under the comprehensive regional assessment (CRA).

##### *Borefield section vegetation*

This section of the reserve is densely vegetated with old-man banksia (*Banksia serrata*), swamp oak (*Casuarina glauca*), coastal tea-tree (*Leptospermum polygalifolium*) and other tea-trees as a closed low understorey, with occasional emergent sand blackbutt (*Eucalyptus pilularis* – sand ecotype), swamp mahogany (*E. robusta*) and red bloodwood (*Corymbia gummifera*). There are many sedges and minor heath species in the more open or poorly drained areas.

The vegetation of this section is in a relatively undisturbed condition, despite several through trails, works associated with the bore field and a narrow strip of land that was formerly mined for mineral sands (see the map and refer to Non-Aboriginal heritage).

#### *Kinki section vegetation*

The vegetation of this section is largely unmodified, apart from one through trail. Vegetation varies from tall dry heathy understorey forest in the southern section to tall moist sclerophyll with a littoral rainforest influence in the north. The southern area is chiefly blackbutt and red bloodwood with a dense understorey of tea-tree. The northern area is blackbutt, swamp mahogany, flooded gum (*E. grandis*) and red bloodwood with occasional turpentine (*Syncarpia glomulifera*) and hard corkwood (*Endiandra sieberi*). Broad-leaved tea-tree (*Melaleuca quinquenervia*) is a component of both areas but only reaches large tree status in the northern area.

#### **Native Animals**

As part of the environmental assessment for Stuarts Point water supply, a fauna survey was undertaken on land neighbouring the reserve (Environmental Consultants Pty Ltd, 1997). The threatened species findings from the survey and other threatened species recorded near the reserve are listed in Table 1. The reserve was modelled during the CRA process as providing suitable habitat for other significant species (Table 2). The reserve also forms part of the regional Stuarts Point fauna corridor.

**Table 1 Threatened animal species recorded within 2km of the reserve**

Common name	Scientific name	Status under TSC Act
<b>Mammals</b>		
Eastern bent-wing bat <sup>1</sup>	<i>Miniopterus schreibersii oceanensis</i>	Vulnerable
Eastern freetail bat <sup>1</sup>	<i>Mormopterus norfolkensis</i>	Vulnerable
Greater broad-nosed bat <sup>2</sup>	<i>Scoteanax rueppellii</i>	Vulnerable
Koala <sup>1</sup>	<i>Phascolarctos cinereus</i>	Vulnerable <sup>r</sup>
Little bent-wing bat <sup>2</sup>	<i>Miniopterus australis</i>	Vulnerable <sup>r</sup>
Queensland blossom bat <sup>2</sup>	<i>Syconycteris australis</i>	Vulnerable <sup>r</sup>
Yellow-bellied sheath-tail bat <sup>2</sup>	<i>Saccolaimus flaviventris</i>	Vulnerable
<b>Birds</b>		
osprey	<i>Pandion haliaetus</i>	Vulnerable <sup>r</sup>
glossy black-cockatoo	<i>Calyptorhynchus lathami</i>	Vulnerable <sup>r</sup>

Source: <sup>1</sup> = NSW Wildlife Atlas <sup>2</sup> = Environmental Consultants (1997) <sup>r</sup> = recovery plan in preparation

**Table 2 Significant animals predicted to occur in the reserve**

Common name	Scientific name	Status under the TSC Act or other significance
<b>Mammals</b>		
New Holland mouse	<i>Pseudomys novaehollandiae</i>	Limited distribution
<b>Birds</b>		
black-necked stork	<i>Ephippiorhynchus asiaticus</i>	Endangered
powerful owl	<i>Ninox strenua</i>	Vulnerable <sup>r</sup>

Source: CRA Fauna Model

<sup>r</sup> = recovery plan in preparation



## **Aboriginal heritage**

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

There are no known Aboriginal sites within the reserve, however there is an Aboriginal burial site to the south of the Borefield section of the reserve, as well as numerous midden sites in the local area associated with the Macleay Arm shellfish resource. An archaeological survey (Willoughby 1998) for a proposed pipeline from the bore field to a reservoir on a hillside to the north of Stuarts Point Road found no Aboriginal sites associated with the proposed pipeline route, however no systematic studies have been undertaken within the reserve.

There is some confusion as to the actual cultural group that occupied the Stuarts Point area. Four tribes (or clans) of the Dunghutti nation have been recorded on the Macleay floodplain area and Stuarts Point would be central to at least two of these, the Yarra-Happinni and Clybucca tribes. Each tribe was thought to consist of 80 to 100 adults. It has also been suggested that the Gumbaingeri nation were the original inhabitants of the area. It is likely that the area was a boundary between nations and used as a meeting or ceremonial place, or as a travel route, as the Dunghutti and Gumbaingeri were openly friendly to each other (DPWS 1998).

## **Non-Aboriginal heritage**

There are no registered historic places within the nature reserve and no known European historic sites on or near the reserve. The only evidence of past use is an area that was mined for mineral sand in the 1970s, common on the mid-north coast of NSW. The site was subsequently revegetated with native species (see the map).

## **3.4 VISITOR USE**

Public access to the Borefield section of the reserve is via a gravelled unnamed road from Fishermans Reach Road, or along a sandy track on a reserved road alignment from the south-western corner of Stuarts Point. The public can also access the Kinki section of the reserve via an unnamed gravelled road passing Kinki Cemetery off Stuarts Point Road. No unauthorised public vehicles are permitted on management trails within the reserve, or on the sand trails between the two sections of the reserve, which are on freehold land.

There are no visitor facilities in the reserve and no formal record of recreational use of the reserve, although observation of tracks in the soft sand of both sections of the reserve indicates that horse riders use the area frequently. Visitor facilities are available at Stuarts Point, as well as at Arakoon State Conservation Area and at Hat Head National Park, near South West Rocks.

Recreational activities not consistent with the study of nature and natural environments are generally considered inappropriate uses of a nature reserve. Horse riding is inconsistent with the purposes of a nature reserve under the NPW Act and is not permitted in a nature reserve under NPWS policy. Opportunities for horse riding and cycling exist in Way Way State Forest, approximately 10 km north of the reserve. Cycling can also be undertaken at Arakoon State Conservation Area.

Reserve identification signs are located at the north-eastern corner of the Borefield section of the reserve and at Bore 1 (see the map).

### **3.5 NON-NPWS USE**

The reserve is zoned Rural 1(a3) – Agriculture Protection in the Kempsey LEP. This is an inappropriate zoning for NPWS estate which is currently being amended to 8(a) – National Parks and Nature Reserves by amendment to the Kempsey LEP.

Power is brought to the water treatment plant (refer to Modification of surrounding lands) by an overhead power line from Fishermans Reach Road. The power line is directed underground at Bore 2 and runs beneath a gravel trail together with a water delivery pipe to bores 1 and 3. At Bore 3 the 11kV line is directed to a transformer on a pole. Water leaves the filtration facility at Bore 2 to be delivered to Stuarts Point via a pipeline beneath a gravelled road easement which existed prior to gazettal of the reserve within the northern part of the eastern edge of the reserve. The reserve was gazetted over the easement and no formal agreement has been negotiated to grant the easement under the NPW Act.

Rubbish dumping within the eastern boundary of the Borefield section of the reserve is common, due to its proximity to the Stuarts Point waste management area. This has increased due to the accessibility provided by the road and trail works associated with the water filtration works.

### **3.6 MANAGEMENT OPERATIONS**

Gravel surfaced management trails for authorised vehicles only lead from the eastern boundary of the Borefield section of the reserve to Bores 1 and 3 (see map).

The gravelled trail which runs from the north-eastern corner of the reserve to the water treatment plant and bores 1 and 3 (see map and 3.5 Non-NPWS use) was gazetted in 1987 as a 15 m easement to allow authorised access to these bore sites, the underground power line and the water delivery pipeline. This access is available to Kempsey Shire Council, Country Energy and NPWS. The reserve was gazetted over this easement (refer to 3.5 Non-NPWS use).

All other trails are natural sand surface. Permission of the private land owners is required for management vehicles to utilise the private sand trail between the two sections of the reserve.

### 3.7 THREATS TO THE RESERVE'S VALUES

#### Introduced plants

There has been no comprehensive study of weeds undertaken in the reserve, however casual observation indicates that whisky grass (*Andropogon virginicus*) occurs in low densities on tracks within both sections of the reserve. Lantana (*Lantana camara* - pink flowering) occurs in a small disturbed area on the northern boundary of the Kinki section of the reserve.

#### Introduced animals

Wild dogs and feral cats were reported in a 1998 Kempsey RLPB/NPWS survey of landholders in the vicinity of the reserve and observation of tracks in both sections of the reserve indicate that dogs do enter the reserve.

There is no record of other pest animals within the reserve, although the house mouse (*Mus musculus*) and black rat (*Rattus rattus*) are likely to be present.

Apart from the southern side of the Kinki section, the reserve is unfenced. However, due to the lack of water and grass, domestic stock do not enter the reserve.

#### Fire

While there is some information on the fire history of the reserve, an inspection in mid-2002 showed that the reserve had not been burnt for many years. To the east of the Borefield section is cleared land, farmed intensively for fruit and vegetables with low fire risk to the reserve. A trail has been constructed along the northern boundary of the reserve and provides some firebreak protection for properties to the north.

The Kinki section of the reserve is remote from habitation and has a wet sclerophyll forest in the northern part, which would reduce the intensity of fire leaving the reserve, and inhibit fire entering the reserve from the north-west.

NPWS regards cooperative fire management as essential for the protection of life and surrounding property, as well as protection of the natural and cultural heritage of the reserve. An important aspect of fire management for the NPWS is participation as a member of local bushfire management committees and the preparation of district bushfire management plans for the area covered by this committee. The NPWS has a legislative responsibility to protect life and property on NPWS estate and to prevent fire from entering or leaving the reserve. Under the *Rural Fires Act 1997*, the NPWS is a recognised fire fighting authority that is required to implement the provisions of district fire management plans. Specific fire management strategies have not been prepared for the planning area.

The fire management strategies to be prepared will include a base map, wildfire history, fire season information, operational guidelines, assessment of the risk to life, property and conservation values, as well as communications information. They will provide for a strategic pattern of burning, incorporating ecological burning principles. Management

will aim to maintain biodiversity by restricting fires to only part of the distribution of a vegetation community at any one time, ensuring that the fire thresholds are not exceeded.

### **Modification of surrounding lands**

Kempsey Shire Council operate a bore (Bore 2) and water treatment plant on a 0.09ha inholding, as well as bores 1 and 3 on two very small inholdings of about 40sqm (see map) within the Borefield section of the reserve. These are part of the infrastructure that supplies domestic water to the township of Stuarts Point (refer to 3.5 Non-NPWS use and 3.6 Management Operations). There are also numerous water quality monitoring points within the bore inholdings, which are monitored by the University of New England and Kempsey Shire Council.

The groundwater is drawn from an unconfined aquifer which is recharged directly from infiltration of rainwater (DPWS, 1998). Previous water quality results have indicated unusually high levels of arsenic in the groundwater, with some of the levels higher than permissible under water quality guidelines (DPWS, 1998). There are a number of possible reasons for the high arsenic levels including the possibility of it being attributed to sand mining in the area, where excavation of clay layers may have allowed arsenic to oxidise and enter the groundwater system (DPWS, 1998).

As the sandy soils allows free drainage to the water table, it is essential that any chemicals such as surfactants or poison baits, as well as any water soluble matter or other water pollutants are not introduced into the reserve without undertaking a review of environmental factors. A review of environmental factors would need to address the possible effects that the introduced material may have on potable water drawn from the reserve's groundwater. It would be desirable to also monitor the impact of water extraction on the reserve as well as monitoring water quality.

Lands to the north of the reserve, and lands east of the Borefield section and west of the Kinki section are zoned Rural 1(a3)—Agriculture Protection in the Kempsey Local Environment Plan (LEP) to protect the bore field catchment from residential development. The Kinki cemetery is located approximately 300m to the north of the Kinki section. The land to the west of the reserve is mainly cleared for grazing, while the land to the east of the reserve has only limited native vegetation cover and is intensively farmed for market gardening using bore water for irrigation. Land to the south of the Kinki section and between both sections of the reserve is zoned Rural 1(a1)—Agriculture and is privately owned uncleared or partially cleared land with a few access trails (see map).

A dry waste transfer site is situated 400m east of the reserve Borefield section and is managed by Kempsey Shire Council (see map). Prior to this area becoming a transfer site, the land was managed as a waste management facility for a number of years. Kempsey Shire Council has ground water monitoring sites set at the facility and has been monitoring ground water quality for approximately two years. To date, no known threat has been identified. It is separated from the reserve by orchard and vegetable growing areas.

#### 4. FISHERMANS BEND NATURE RESERVE—MANAGEMENT ISSUES AND STRATEGIES

Current Situation	Desired Outcomes	Strategies	Priority
<p><b>Soil and water conservation</b></p> <p>Although there are currently minimal problems with soil erosion or water quality within the reserve, the area that was previously mined for mineral sands may be contributing heavy metals to the aquifer below.</p> <p>The reserve forms part of the catchment for the Stuarts Point domestic water supply.</p>	<ul style="list-style-type: none"> <li>• There is no evidence of increased soil erosion in the reserve.</li> <li>• There is no reduction in the quality of the reserve's groundwater.</li> </ul>	<ul style="list-style-type: none"> <li>• Undertake all works, such as trail maintenance and hazard reduction, in a manner that minimises exposure of large areas of sand to wind erosion.</li> <li>• Conduct a review of environmental factors prior to the introduction of any chemicals or possible water pollutants (apart from normal motor fuels) into the reserve.</li> <li>• Immediately report on and take remedial action for any oil or fuel spills.</li> </ul>	<p>High</p> <p>High</p> <p>High</p>
<p><b>Native plant and animal conservation</b></p> <p>The section of the reserve previously mined for mineral sands is revegetating with native species.</p> <p>Formal survey and incidental observation indicate that threatened animal species have been observed near the reserve.</p>	<ul style="list-style-type: none"> <li>• There is no loss of native plant and animal species found in the reserve, or reduction in habitat diversity.</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor the revegetation of the area previously mined for sand and, if necessary, undertake works to encourage successful revegetation.</li> </ul>	<p>High</p>

<p>Modelling has identified that the reserve contains potential habitat for additional threatened animal species.</p> <p>A fauna survey has been undertaken on land adjacent to the reserve, though no survey has been undertaken on the reserve.</p> <p>Ecological viability of the reserve would be improved by the maintenance of vegetation corridors on neighbouring lands. This would assist in the movement of wildlife between the reserve and other forested areas.</p>	<ul style="list-style-type: none"> <li>• There is an increased knowledge of plants and animals in the reserve and their ecological requirements.</li> <li>• The ecological viability of the reserve is enhanced by retention of native vegetation in surrounding areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Undertake or encourage appropriate native plant and animal surveys of the reserve, in particular to determine the occurrence of significant species (refer to Research).</li> <li>• Liaise with neighbours, Landcare, vegetation management committees and other land use authorities to encourage retention, and if possible expansion, of areas of native vegetation close to the reserve.</li> </ul>	<p>Medium</p> <p>Medium</p>
<p><b>Introduced species</b></p> <p>No comprehensive pest plant and animal survey has been undertaken in the reserve, however small patches of lantana and whisky grass are known to occur in the reserve.</p> <p>A Pest Management Strategy has been developed for the region as a whole. This strategy identifies pest populations, priorities for control and suggested control methods.</p>	<ul style="list-style-type: none"> <li>• The impact of introduced species on native biodiversity and neighbouring lands is minimised.</li> <li>• Lantana distribution does not expand beyond the current extent.</li> </ul>	<ul style="list-style-type: none"> <li>• Undertake weed and pest animal control in cooperation with neighbours, the Kempsey Rural Lands Protection Board, the Mid North Coast Weeds Advisory Council, and other stakeholders.</li> <li>• Control, and where possible eradicate, introduced pest plant and animal species found in the reserve, in accordance with the Regional Pest Management Strategy. Control of lantana will be a priority in the reserve.</li> </ul>	<p>Medium</p> <p>High</p>

<p><b>Fire management</b></p> <p>Fire is a natural feature of the environment of the reserve and is essential to the survival of some plant communities.</p> <p>Frequent or regular fire, however, can cause loss of particular plant and animal species and communities. Fire could also damage fences, some cultural features that may be found in the reserve, as well as threaten neighbouring land.</p> <p>The current network of boundary and internal trails may be insufficient for effective fire management (refer to Management operations).</p>	<ul style="list-style-type: none"> <li>• The potential for spread of wildfire on, from, or into the reserve is minimised.</li> <li>• Fire regimes are appropriate for long-term maintenance of the reserve's plant and animal communities.</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare and implement fire management strategies for the reserve. Ensure that the Rural Fire Service, Bush Fire Management Committee, and other relevant stakeholders are consulted in the preparation of the fire strategies.</li> <li>• The use of heavy machinery within the reserve during fire incidents will be restricted to existing roads and trails, former trails which may be re-opened in an emergency, or any trails which may be identified for construction in development of approved fire management strategies, subject to a review of environmental factors (refer below and to Management operations)</li> <li>• Negotiate with relevant neighbours between the two sections of the reserve, Kempsey Shire Council and the Rural Fire Service to seek an overall fire trail design based on existing trails and the possible construction of new trails on adjacent lands.</li> <li>• Encourage research into the ecological effects of fire in the reserve, particularly the fire response of significant plant species and the fire requirements of the various plant communities (refer to Research).</li> <li>• Continue to actively participate in the Kempsey Bush Fire Management Committee. Maintain close contact and cooperation with neighbours, Rural Fire Service officers, Council fire officers and volunteer bush fire brigades concerning fire management on and adjacent to the reserve.</li> <li>• The reserve may be closed to public use during periods of extreme fire danger.</li> </ul>	<p>High</p> <p>High</p> <p>High</p> <p>High</p> <p>High</p> <p>High</p>
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<p><b>Cultural heritage</b></p> <p>There are no known Aboriginal or European cultural sites within the reserve.</p> <p>No formal cultural heritage surveys have been undertaken in the reserve.</p>	<ul style="list-style-type: none"> <li>• Cultural heritage studies are undertaken and any objects or sites are appropriately recorded and protected.</li> </ul>	<ul style="list-style-type: none"> <li>• Precede all new ground disturbance work with the potential to impact on Aboriginal and non-Aboriginal sites and values of the reserve by a check for cultural features. Maintenance of existing works is exempted to the extent of land previously disturbed.</li> <li>• Consult with the Kempsey Local Aboriginal Land Council on all aspects of management of any identified Aboriginal sites, objects, places and values and provide copies of any research findings on Aboriginal cultural heritage to the Land Council.</li> <li>• Encourage appropriate research into the cultural heritage of the reserve (refer to Research).</li> </ul>	<p>High</p> <p>High</p> <p>Medium</p>
<p><b>Visitor use</b></p> <p>Use of the reserve must be carefully managed since it is a relatively small area of remnant vegetation.</p> <p>Promotion of community understanding and appreciation of the conservation values of the reserve can minimise inappropriate visitor activities.</p> <p>The reserve currently appears to receive a low level of visitor use including horse riding.</p>	<ul style="list-style-type: none"> <li>• There is widespread community understanding and appreciation of the reserve's natural and cultural values and management programs.</li> <li>• Visitor use is ecologically sustainable and consistent with its management as a nature reserve.</li> <li>• The Kinki section of the reserve is the primary focus of any interpretative or educational activities in the reserve.</li> </ul>	<ul style="list-style-type: none"> <li>• Liaise with neighbours and community organisations to promote community understanding of the reserve's values and management strategies.</li> <li>• Permit nature based visitor use such as bushwalking, bird watching and nature observation in the reserve.</li> <li>• Encourage recreational or educational visitors to use the Kinki section of the reserve, in preference to the Borefield section.</li> <li>• No public vehicle access will be permitted in the reserve, as all routes are management trails (refer to 3.5 Non-NPWS uses &amp; 3.6 Management Operations).</li> <li>• Wood fires, camping, bicycling and horse riding will not be permitted in the reserve.</li> </ul>	<p>Medium</p> <p>High</p> <p>High</p> <p>High</p>



<p>The Kinki section is most suitable for recreation or educational use, as it is remote from the bore field, <i>has</i> easier access, better parking, less potential to impact groundwater, greater biodiversity with a less fragile groundcover and exhibits a pronounced ecotone change over a short distance.</p> <p>There are reserve identification signs at the north-eastern corner of the Borefield section and at Bore 1. There is no signage at the Kinki section of the reserve.</p>	<ul style="list-style-type: none"> <li>• Signage appropriately identifies reserve boundaries and prohibited activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Improve and maintain existing reserve identification signage at the north-eastern boundary of the Borefield section of the reserve. Relocate the sign at Bore 1 to the reserve boundary east of Bore 3 and erect reserve identification signage on the northern boundary of the Kinki section, ensuring all signage indicates prohibited activities. No other visitor facilities will be provided.</li> </ul>	High
<p><b>Research</b></p> <p>Scientific study is needed to improve understanding of the reserve's natural and cultural values, the processes that affect it and the requirements for management of particular species.</p>	<ul style="list-style-type: none"> <li>• Research that enhances the information base and assists management of the reserve is encouraged or undertaken.</li> </ul>	<ul style="list-style-type: none"> <li>• Undertake or encourage appropriate research to improve knowledge and management of the reserve's natural and cultural values (refer to Native plant and animal conservation, Cultural heritage and Fire management).</li> <li>• If alternative opportunities are not available elsewhere, low impact research may be permitted. The results of the research must offer significant benefits for management programs or knowledge of the natural and cultural heritage of the reserve.</li> </ul>	Low  Low

<p><b>Management operations and Non-NPWS use</b></p> <p>Additional fire trails would improve effective fire management of the reserve.</p> <p>Dumping of rubbish is a problem within the eastern side of the Borefield section of the reserve.</p> <p>The reserve is currently zoned Rural 1(a3) in the Kempsey Shire LEP. This is in the process of being amended to 8(a) - National Parks and Nature Reserves, and gazetted as Amendment No 67 to the Kempsey Shire LEP.</p> <p>The bores and water treatment plant located on inholdings are used for supply and treatment of water for the town of Stuarts Point.</p>	<ul style="list-style-type: none"> <li>• Management facilities adequately serve the needs of management and other authorities with acceptable impact.</li> <li>• The Kempsey LEP reflects the gazetted use as 8(a).</li> <li>• The supply and treatment of water to the town of Stuarts Point continues, to the benefit of the community with minimal impact on reserve values.</li> </ul>	<ul style="list-style-type: none"> <li>• Liaise with Kempsey Shire Council, the Rural Fire Service, Country Energy and relevant neighbours in regard to gating of trails and the construction and maintenance of additional trails as identified by the fire management strategies (refer to Fire Management).</li> <li>• Gate management trails as required, with priority being given to the eastern boundary of the Borefield section of the reserve to reduce rubbish dumping.</li> <li>• Maintain liaison with Kempsey Shire Council, and Country Energy regarding any future development proposals on the inholdings, easements or adjoining the reserve that may impact on the reserve.</li> <li>• Remove rubbish dumped on the reserve.</li> <li>• Support Amendment No 67 to the Kempsey LEP.</li> </ul>	<p>High</p> <p>High</p> <p>Medium</p> <p>High</p> <p>Medium</p>
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<p>The reserve has been gazetted over pre-existing easements for power, water delivery lines and roads within the Borefield section of the reserve and the easement has not been formally granted under the NPW Act.</p>	<ul style="list-style-type: none"> <li>• The pre-existing easements within the reserve are formally granted under the NPW Act 1974 and proper commercial returns are received for alien use within the reserve.</li> </ul>	<ul style="list-style-type: none"> <li>• Undertake appropriate negotiations with Kempsey Shire Council and Country Energy to formally grant an easement with appropriate conditions for access to and maintenance of the bores, underground water pipelines power lines and management trails under the provisions of the NPW Act 1974, and seek a proper commercial return for this alien use on the reserve.</li> </ul>	<p>High</p>
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**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.

## 5. REFERENCES

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## GLOSSARY

### ACRONYMS USED

NPW Act	NSW <i>National Parks and Wildlife Act</i> (1974)
NPWS	NSW National Parks and Wildlife Service
LEP	Local Environment Plan
RLPB	Rural Lands Protection Board (Kempsey)
SFNSW	State Forests of New South Wales
TSC Act	NSW <i>Threatened Species Conservation Act</i> (1995)

### SELECTED DEFINITIONS

Aeolian (soils)	Soils built upon deposits laid down by wind e.g. sand dunes.
Biodiversity	Biological diversity, namely the variety of life forms: the different plants, animals and microorganisms, the genes they contain, and the ecosystems they form. It is usually considered at three levels: genetic diversity, species diversity and ecosystem
Coffee Rock	Sand and or silt concreted into an impervious layer due to the addition of organic matter.
Cultural heritage	Encompasses past and present cultural associations of all people in Australia, including tradition, knowledge and customs. It can be tangible (i.e. have physical manifestations in the form of art, buildings etc.) or intangible (i.e. spiritual or social associations, songs, stories and cultural practices). Cultural significance includes values that are social, spiritual, aesthetic, historic and scientific. When natural resources acquire meaning for a particular group, they become cultural resources as well.
Fauna	Any mammal, bird, reptile or amphibian. NPWS has responsibility for the conservation of fauna. Note this definition excludes fish or invertebrates.
Feral species	A domesticated species that has become wild
Fire authorities	Organisations (including land management authorities such as NPWS) vested by the <i>RF Act</i> with the responsibility to suppress fires. Under the <i>RF Act</i> , Fire management activities on NPWS reserves are the responsibility of NPWS
Fire Management	Includes all activity associated with the use and control of fire in bushland designed to achieve stated objectives for the protection of life and property, and the maintenance of wildlife communities.

Fire management plan	A plan of operations to prevent, detect and suppress unplanned fires and to reduce bushfire hazard, prepared by a Bushfire Management Committee, constituted under the RF Act for coordinated fire management and operations within a rural fire district.
Historic places	Landscapes, sites buildings or other works together with pertinent contents and surroundings and include structures, ruins, archaeological sites and areas
Introduced species	A species occurring in an area outside its historically known natural range as a result of intentional or accidental dispersal by human activities. Also known as exotic or alien species.
Policy	A statement of attitude and courses of action, directed toward the attainment of NPWS corporate goals and/or objectives.
Recovery plan	A document, prepared under the <i>TSC Act</i> , that identifies the actions to be taken to promote the recovery of a threatened species, or endangered population or ecological community.
Regeneration	The recovery of natural integrity following disturbance or degradation. This can be achieved through totally natural processes or an assisted process, where human intervention (through removing weeds or planting seedlings) accelerates recovery.