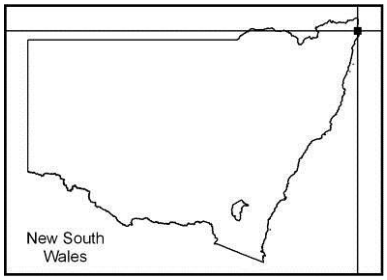
Office of Environment & Heritage
NSW National Parks & Wildlife Service

Plan of Management

Hayters Hill Nature Reserve



Hayters Hill Nature Reserve
Plan of Management

NSW National Parks and Wildlife Service

October 2013

This plan of management was adopted by the Minister for the Environment on 29 October 2013

Acknowledgments

The NPWS acknowledges that this reserve is in the traditional country of the Bundjalung of Byron Bay (Arakwal) people.

This plan of management is based on a draft plan prepared by staff of the Byron Coast Area, Northern Rivers Region of the NSW National Parks and Wildlife Service (NPWS), part of the Office of Environment and Heritage.

Valuable information and comments were provided by the Arakwal, ecologist David Milledge and botanist Annette McKinley. Southern Cross University student Megan Vynne prepared an early preliminary draft of the plan.

Cover photograph of lowland rainforest in Hayters Hill Nature Reserve by Dianne Mackey, NPWS.

For additional information or any inquiries about this reserve or this plan of management, contact the NPWS, Byron Coast Area Office, PO Box 127, Byron Bay 2481 or by telephone on (02) 6620 9300.

Published by:
Office of Environment and Heritage
59-61 Goulburn Street
PO Box A290
Sydney South 1232

ISBN 978 1 74359 343 1

OEH 2013/0822

Printed on recycled paper

Foreword

Hayters Hill Nature Reserve is located 5 kilometres south-west of Byron Bay on the far north coast of New South Wales. It is one of a few small nature reserves that conserve rainforests typical of the once extensive Big Scrub and is part of the country of the Bundjalung of Byron Bay (Arakwal) people.

Hayters Hill Nature Reserve conserves an important remnant of lowland rainforest, an ecological community nationally recognised as critically endangered. This is important habitat for fruit-eating and rainforest dependent birds, and the reserve is part of a network of rainforest remnants which are critical to maintaining migratory pathways for fruit-doves and cuckoo-shrikes. It also provides habitat for a wide range of plants and animals used traditionally by Bundjalung Aboriginal people.

The NSW *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each nature reserve. Hayters Hill Nature Reserve was previously covered by the Plan of Management for the Big Scrub Nature Reserves, adopted in 1997. A draft plan of management for Hayters Hill Nature Reserve was placed on public exhibition between 1 February 2012 and 30 April 2012. The submissions received were carefully considered before adopting this plan.

The plan contains a number of actions to achieve the NSW 2021 goal to protect our natural environment. These include strategies to assist the recovery of threatened species and ecological communities, preparing and implementing a Pest Management Strategy and cooperating with neighbours to implement pest control programs. The plan also provides for a continuation of low impact nature-based activities such as bird-watching and bushwalking. The plan contributes to the NSW 2021 goal of fostering partnerships with Aboriginal people. The Bundjalung of Byron Bay (Arakwal) people will be consulted and involved in the management of the reserve, including development and delivery of off-site information on the reserve's Aboriginal cultural and biodiversity values. A Management Committee has been established for the NPWS Byron Coast Area to enable joint management of the parks in the Area, including Hayters Hill Nature Reserve.

This plan of management establishes the scheme of operations for Hayters Hill Nature Reserve. In accordance with section 73B of the *National Parks and Wildlife Act 1974*, I cancel the provisions of the Big Scrub Plan of Management relating to Hayters Hill Nature Reserve and hereby adopt this plan of management.

Robyn Parker MP
Minister for the Environment

Jingi wahlu widtha.... Welcome to Country

This plan talks about a special part of the Country of the Bundjalung of Byron Bay (Arakwal) people (referred to as the Arakwal in this plan) known as Hayters Hill Nature Reserve which is situated 5 kilometres south-west of the township of Byron Bay.

The reserve is an important part of Country to the Arakwal for a range of reasons including its role as a lookout where ancestors could observe people travelling along the coast and as a rare remnant of the once extensive Big Scrub rainforests which sustained generations of Bundjalung people.

As an outcome of the second Indigenous Land Use Agreement (ILUA 2) between the Arakwal and the State government a Management Committee has been established for the NPWS Byron Coast Area, including Hayters Hill Nature Reserve. The committee enables joint management of the Hayters Hill Nature Reserve by NPWS and the Arakwal.

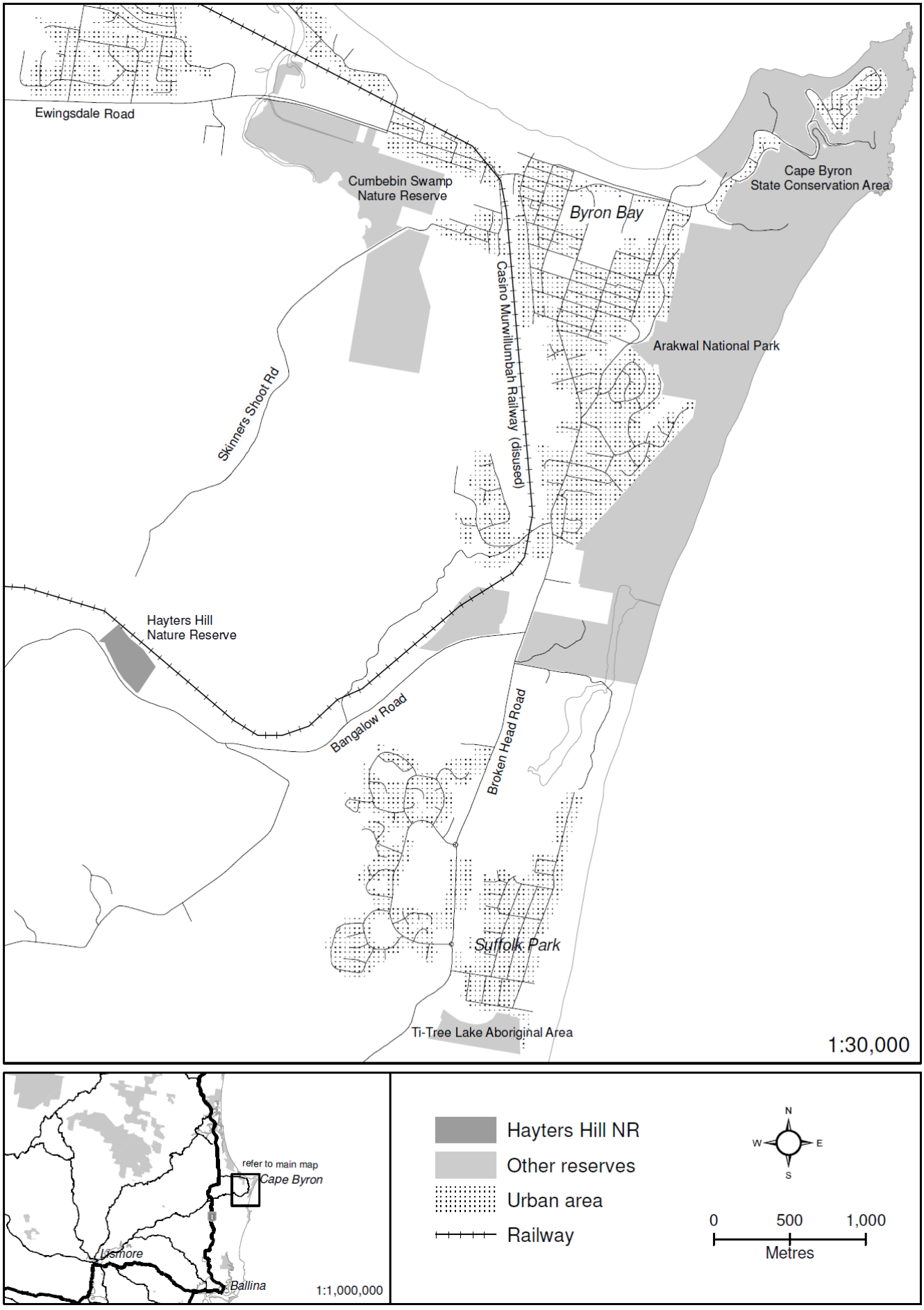
D. Nicholls

Dulcie Nicholls
Arakwal Elder

CONTENTS

LIST OF APPENDICES

Map 1 Hayters Hill Nature Reserve



1. HAYTERS HILL NATURE RESERVE

1.1 Location, Gazettal and Regional Context

Features	Description
	Hayters Hill Nature Reserve
Location	Hayters Hill Nature Reserve (referred to as the reserve in this plan) is located 5 kilometres south-west of Byron Bay on the far north coast of New South Wales (NSW).
Area	The reserve totals 8 hectares and is bordered by Bangalow Road and the disused Lismore-Murwillumbah railway line. As well as the reserve, the area subject to this plan includes lands that are vested in the Minister under Part 11 of the NPW Act. These lands have been acquired by NPWS but were not gazetted as part of reserve due to road widening plans by Byron Shire Council at the time of gazettal.
Reservation Date	1989
Previous Tenure	Prior to reservation under the *National Parks & Wildlife Act 1974* (NPW Act) the reserve was privately owned. The reserve is named after the locality of Hayters Hill. The name derives from the early European settlers of the area.
	Regional Context
Biogeographic Region	The reserve is situated on a moderately steep escarpment on the edge of a large volcanic plateau associated with the Mount Warning shield volcano within the South Eastern Queensland biogeographic region. The reserve is one of a few small nature reserves including Andrew Johnston Big Scrub, Victoria Park, Davis Scrub, Boatharbour and Wilson Nature Reserves that conserve rainforests typical of the once extensive Big Scrub. The Big Scrub comprised 75,000 hectares of lowland subtropical rainforest which was largely cleared for agriculture in the late 19th century.
Surrounding Land Use	Adjacent and nearby rural properties support grazing, residential uses and rural tourism. Although land around the reserve is largely cleared, a Big Scrub remnant, known as Hayters Hill West, is located on private land 200m west of the reserve.
Other Authorities	The reserve is located within the areas of the Bundjalung of Byron Bay (Arakwal) people (referred to as the Arakwal in this plan), Jali Local Aboriginal Land Council, Northern Rivers Catchment Management Authority and Byron Shire Council.

1.2 Relationship to Country – Cultural landscape context of the Reserve

"Many Bundjalung people journeyed through Country from the hills to the coast and beyond to use seasonal food resources and for social and ceremonial purposes. On these journeys they used the rich and abundant materials, foods and other resources of the Big Scrub's rainforests to sustain them."

Yvonne Stewart, Arakwal Member

The idea of 'Country' to Aboriginal people

To Aboriginal people, the 'landscape' is made up of many features that are inter-related. These include the lands and waters, plants and animals, special places and stories, historical and current uses, and people and their interactions with each other and place. These features are seen as inseparable and make up what is known as 'Country' to Aboriginal people. While these inter-relationships are recognised, this plan addresses many of these topics individually for clarity and ease of use.

"People talk about Country, speak and sing to Country, visit and worry about Country, feel sorry for Country, long for Country. People say Country knows best, hears, smells, takes notice, takes care, is sorry or happy. It is consciousness and a will towards life. Because of this richness, Country is love and peace, nourishment for body, mind and spirit."

Source: Interpretation Australia (2003)

The Country of the Arakwal

The Arakwal and other Bundjalung people have a long and ongoing cultural association with the landscape around Byron Bay, including the reserve. Research into the Bundjalung lands of south-east Queensland date their occupation to at least 22,000 years ago (Neal & Stock 1986).

The Arakwal lodged a Native Title Application in 1994 (NC95/1 - Byron Bay Bundjalung People) over the land and adjoining waters extending from the Brunswick River to the north, past Julian Rocks to the east, Broken Head to the south and around the hinterland areas of Mullumbimby, Coorabell and Bangalow to the west, including the reserve.

A series of Indigenous Land Use Agreements (ILUAs) registered under the *Commonwealth Native Title Act 1993* has been made between the State government and the native title claimants within the claim area. These ILUAs acknowledge that the Bundjalung People of Byron Bay are descendants of indigenous people who lived and/or held native title in the Byron Bay area at the time of first contact with European settlers in the 1820s and 1830s and that they have a strong cultural association with the area.

The reserve is an important part of Country to the Arakwal for a range of reasons including its role as a lookout where ancestors could observe people travelling along the coast and as a rare remnant of the once extensive Big Scrub rainforests which sustained generations of Bundjalung people. The Arakwal recognise the importance of conserving this special place so that current and future generations may learn about the importance of the rainforest, its history and its future.

2. LEGAL RULES

2.1 Government laws and National Parks and Wildlife policies

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

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

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan, the plan must be carried out and no operations may be undertaken within the reserve except in accordance with this plan.

Management of the reserve is currently subject to the 'Big Scrub Nature Reserves (incorporating Andrew Johnson Big Scrub, Victoria Park, Davis Scrub, Hayters Hill, Boatharbour and Wilson Nature Reserves) Plan of Management' (NPWS 1997), as amended. When adopted, this plan will replace the provisions of the 1997 plan relevant to the reserve. This plan will also apply to any future additions to the reserve. 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 principles for Nature Reserves in NSW

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 (section 30J), nature reserves are 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.

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.

3. THE IMPORTANCE AND MANAGEMENT OF HAYTERS HILL NATURE RESERVE

3.1 Respecting Country- Key values associated with the Reserve

The reserve has many values that are important to the Arakwal and the wider community, including:

Values associated with 'looking after Country'- reserve conservation and management

- The reserve provides an opportunity for recognition of the long and ongoing traditional association of the Arakwal with the landscape and recognises their rights and responsibilities to Country.

- The reserve protects part of Country and allows the Arakwal and other Bundjalung people to continue their connection to Country, including through employment with NPWS to look after Country.

- The reserve protects cultural and historic heritage values**,** including special places and cultural stories of the Arakwal and other Bundjalung people.

- The reserve is one of a few remnants of the Big Scrub which was formerly an extensive subtropical rainforest supporting a high diversity of rainforest plants and animals. The reserve's lowland rainforest is listed as an Endangered Ecological Community under the TSC Act and as a Critically Endangered Ecological Community under the EPBC Act.

- The reserve supports a range of native plants and animals listed as threatened under the TSC Act.

- The reserve forms part of a network of rainforest remnants, linking the coast to the Nightcap Range and beyond, and is a significant pathway for the distribution of seed by birds and bats. The rainforest remnants also provide important food and habitat resources for migratory and nomadic birds and bats.

Values associated with 'using and knowing about Country' – cultural use of the reserve and information, research and monitoring

- The reserve provides opportunities for the Arakwal to undertake cultural activities and cultural renewal associated with the sustainable use of wild resources, the transfer of cultural knowledge, customs and stories, and ceremonial and other cultural practices.

- Opportunities for visitors and the wider Byron Shire community to understand and respect the culture and heritage of the Bundjalung people, and the importance of this special place, will be provided off-site.

- Environmental education opportunities relating to Aboriginal cultural values, the Big Scrub, lowland rainforest, rainforest rehabilitation, endangered ecological communities and threatened species will be provided off-site.

- The reserve provides visitors with opportunities for low-key nature-based recreation including nature study, however, visitor facilities such as walking tracks will not be provided.

- The reserve provides for appropriate research and monitoring and is a significant scientific reference area as a remnant of a once extensive but now greatly depleted ecosystem (the Big Scrub).

4. LOOKING AFTER COUNTRY

4.1 Joint Management by the Arakwal and the NPWS

"Joint management ensures that our people have a say in the management of the land. Everyone at a meeting sits here at the same level. It's a two way process."

Yvonne Stewart, Arakwal Member

An important part of Aboriginal culture is looking after and caring for Country. This is an obligation of past, present and future generations. The Arakwal are recognised as descendants of indigenous people who lived and/or held Native Title over Country, including the reserve, at the time of first contact by European settlers, and have a strong cultural association with Country.

The right of the Arakwal to be involved in the management and protection of their Country and heritage is acknowledged. The Arakwal wish to exercise their custodial responsibilities for Country in partnership with the NPWS under joint management arrangements for the reserve.

The Byron Coast Area Management Committee (the committee) has been established to enable joint management of this and other reserves within the Byron Coast Area. The committee includes representatives of the Arakwal, the community and a representative of Byron Shire Council and NPWS. The committee is responsible for the care, control and management of the reserve within the framework of the NPW Act and this plan of management. The committee may make management recommendations to the Director General of National Parks and Wildlife. ILUA 2 requires procedures and protocols to be developed for the operation of the management committee.

Joint management provides a continuing role for the Arakwal in looking after Country and allows NPWS to better integrate Aboriginal cultural values into conservation and management programs.

Desired Outcome

- Joint management of the reserve will be undertaken through the Byron Coast Area Management Committee.

Management Response

4.1.1 Issues and proposals relating to the care, control and management of the reserve will be referred to the Management Committee for their consideration and recommendations.

4.2 The Story of Country that is now the Reserve

A living ancestry and culture

The Arakwal are part of the Bundjalung Nation and their history in the area predates the arrival of non-Aboriginal people. Their ancestors, Bobby and Alice, Harry and Clara Bray, and Linda and Jimmy Kay lived and raised families in and around the Byron Bay area. The landscape that includes the reserve is an important part of this history.

Despite the changing natural, socio-economic and political environment brought about since European settlement of the area, the Arakwal have maintained their links with Country that includes the reserve. It is important to the Arakwal that their cultural traditions and associations are maintained. Maintenance of cultural traditions and associations contributes to identity and well-being and shows respect to their ancestors.

Rainforests were important to the livelihood of the Arakwal and other Bundjalung people. The reserve's rainforest contains a wide range of plants used traditionally by Bundjalung people including fruits, nuts, yams, medicines, fibre, fish poisons and useful timbers. Appendix 1 lists plants known to be of cultural value.

Common animals in the reserve such as brush turkeys, flying foxes, pigeons, possums, snakes and frogs were also important food sources for the Elders, their families and their ancestors. All these animals are important to the Arakwal for their conservation, totemic, wild resource and other cultural values.

Areas of Aboriginal occupation and use have not been located within the reserve, however, evidence of use may be identified through archaeological investigation.

Story of land use

The reserve is a remnant of the Big Scrub which was formerly the largest continuous tract of subtropical rainforest in Australia, exceeding 75,000 hectares. The Big Scrub was situated on a low, basaltic plateau between l00 and 150 metres above sea level which formed part of the residual southern slope of the Mount Warning shield volcano. Six small nature reserves managed by NPWS, totalling about 100 hectares, protect some remnants of the Big Scrub (NPWS 1997). A number of Big Scrub remnants, totalling approximately 500 hectares, are in private ownership or occur on Crown, Council or Rous County Council land.

Remnants of the Big Scrub, such as the reserve, provide a dramatic contrast between the lowland rainforest which once dominated the region and the extensively cleared surrounding rural lands. Clearing and European habitation of the Big Scrub began around the 1840s with the arrival of cedar-getters. Shortly thereafter, the government made land available to settlers on the condition that it was cleared and farmed. This resulted in most of the Big Scrub being cleared by 1900 (NPWS 1997).

The reserve is named after the locality of Hayters Hill which takes its name from an early settler family, the Hayters. Eli Hayter selected 259 hectares south-west of the

reserve in 1881 (Stubbs 2006). Descendents of the Hayter family have maintained the family's long association with this area and still farm and live locally. The reserve is located on land originally selected by William Graham in 1883 (Ryan & Smith 2001).

A 1947 aerial photograph shows the site which is now the reserve to be well vegetated, despite the surrounding area being largely cleared and grazed. It is likely that the reserve was at least selectively logged for valuable species such as hoop pine (*Araucaria cunninghamii*) and red cedar (*Toona ciliata*), given the widespread extent of rainforest logging and clearing in the 19th and early 20th centuries. Floyd (1990) noted that heavy logging for hoop pine had left numerous gaps filled with lantana (*Lantana camara*) and native climbers.

Early timber-getters around Byron Bay pushed timber over the edge of the less steep parts of the escarpments to the coastal plain below from where the timber was dragged by bullocks to the beach and floated out to waiting ships (Stubbs 2006). These locations were known as 'shoots', possibly a variation of the word 'chute', or a reference to 'shooting' the timber over the escarpment. The reserve is located adjacent to the historic Skinners Shoot which is identified on parish maps from the late 19th century. Skinners Shoot, a rural locality on the foothills below the reserve, and Skinners Shoot Road, which runs north from the base of the escarpment below the reserve to the coastal plain west of Byron Bay, also incorporate reference to the 'shoot'.

The footings of a small building and old rubbish dumps occur in the central western part of the reserve adjacent to Bangalow Road. Joseph (1995) and Goodenough (1987) refer to the building as a 'shack' used for holidays or on weekends.

The land which forms the reserve was privately owned prior to its purchase and gazettal as Hayters Hill Nature Reserve. The previous owner, Mr Brouwer, organised for the property to be declared a wildlife refuge under the NPW Act in October 1984. In 1995, the reserve and a nearby privately-owned rainforest remnant known as Hayters Hill (West) were placed on the Interim List of the Register of the National Estate in recognition of their significant natural heritage value.

A small parcel of land (0.36 hectares) located between the reserve and Bangalow Road is held in the name of the Minister for the Environment. This parcel was not included when the reserve was gazetted due to road widening plans by Byron Shire Council at that time. The parcel supports a significant stand of rainforest which buffers the reserve. It is understood that Council subsequently undertook the requisite road widening but did not require the parcel of land for these works. Another small parcel of land (0.12 hectares) adjacent to the reserve's north-west corner which forms part of the road reserve also supports a significant stand of rainforest. Incorporation of these two parcels of land into the reserve would increase the integrity of the reserve's natural and cultural values.

Desired Outcomes

- Manage the reserve to protect its biodiversity and Aboriginal and European cultural values.

- Incorporate Aboriginal knowledge, insights and values and involve the Aboriginal community in efforts to conserve and protect the reserve's cultural and biodiversity values.

Management Response

4.2.1 Record Aboriginal and European stories about the reserve and its significance.

4.2.2 Record the location of any Aboriginal or European heritage sites in the reserve.

4.2.3 Investigate adding to the reserve the land adjoining the reserve held in the Minister's name.

4.2.4 Write to Byron Shire Council about adding the vegetated road reserve adjacent to the reserve's north-west corner to the reserve.

4.2.5 Record and remove old rubbish dumps and allow these areas to regenerate naturally, or undertake habitat restoration if required.

4.3 Native Plants and Animals

Native Plants

The reserve's native vegetation is highly diverse with 180 species recorded including threatened and rare species and others approaching their southern distributional limit in NSW (Floyd 1977 & 1990; Kooyman & Rossetto 2006). The reserve's vegetation is classified as dry rainforest in the *Drypetes-Araucaria* alliance and the *Araucaria* suballiance, acknowledging the significant role of hoop pine as a canopy emergent (Floyd 1990). This rainforest alliance is included in the EPBC Act listing of the critically endangered ecological community 'Lowland Rainforest of Subtropical Australia' and the TSC Act listing of the endangered ecological community 'Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions'. The reserve is also described structurally as Araucarian notophyll - microphyll vine forest and complex notophyll vine forest (Kooyman & Rossetto 2006).

Threatened and significant plants recorded, or with potential habitat, in the reserve are listed in Appendix 2. Seven threatened plants (TSC Act) have been recorded, six of which are also listed as vulnerable under the EPBC Act. Two rare plants have been recorded and another five recorded species approach their southern limit of distribution in NSW (Briggs & Leigh 1996; Floyd 1990; Sheringham & Westaway 1995). Four rare and threatened plants occurring in the reserve are endemic to the Mount Warning caldera: veiny lace flower (*Archidendron muellerianum*), rough-shelled bush nut *(Macadamia tetraphylla*), onion cedar (*Owenia cepiodora*), and Byron Bay acronychia (*Acronychia baeuerlenii*) (Lott & Duggin 1993). McKinley et al. (1995) notes that onion cedar is no longer regenerating at Hayters Hill.

The reserve's vegetation gives us some idea of what the Big Scrub may have looked like. As a remnant of this once extensive but now greatly depleted ecosystem, the reserve's gene/seed bank is of very high scientific importance (NPWS 1997).

Severe storms impact on the reserve's vegetation from time to time due its north-east aspect and prominent location on the edge of the escarpment. In 1978, a severe storm greatly reduced the canopy (Goodenough 1987). This pattern of storm disturbance coupled with the effects of salt winds may contribute to the reserve's species richness as canopy disturbance leads to an increase in understorey species. Species richness is also related to the mixed geological origins of the reserve's soils and moisture availability in the form of seepage from kraznozem (red) soils and gully and slope run-off (Planners North 1988). The reserve's soils derive from plateau basalts, and sandstone and metasediments of the ancient cliffline (Floyd 1990).

Native Animals

The reserve supports a range of native animals including threatened species. A sub-regional corridor links the reserve to a regional coastal corridor to the north and east and links a network of fragmented but significant habitats west of the reserve to the Nightcap Range and beyond. Sub-regional corridors serve as routes for dispersal and movement. Lot and Duggin (1993) list the reserve among the most important Big Scrub remnants for conservation and active management, despite its small size, due to its role as a link in the network of remnants linking the coast to the Nightcap Range.

Four animals listed as threatened under the TSC Act have been recorded in the reserve: rose-crowned fruit-dove (*Ptilinopus regin*a)*,* white-eared monarch (*Monarcha leucotis),* common blossom-bat (*Syconycteris australis)* and grey-headed flying-fox (*Pteropus poliocephalus).* The grey-headed flying-fox is also listed as vulnerable under the EPBC Act. A further 14 threatened animals are likely to occur, or have potential habitat, in the reserve (refer to Appendix 3).

The longer growing, flowering and fruiting season on the NSW north coast during autumn-winter provides a reliable and plentiful food supply for migratory and nomadic birds, flying-foxes and micro-bats at a time of year when food is often in short supply elsewhere (Scotts 2003).

The reserve is important habitat for birds, particularly for fruit-eating and rainforest dependent birds. Appendix 4 and 5 lists fruit-eating and rainforest dependent birds that are known from the reserve. These birds are important dispersal agents for rainforest plants facilitating natural rainforest regrowth in the region and helping to maintain the ecological functioning of Big Scrub rainforest remnants (NPWS 1997). Fruit-eating bats, such as the grey-headed flying-fox (*P. poliocephalus)*, also play a key role in seed dispersal.

Rainforest remnants, such as the reserve, are critical to maintaining migratory pathways for fruit doves and cuckoo-shrikes (Brodie, Green & Graham et al. 2002). Birds arriving from higher elevations in winter, for example from the New England Tablelands and nearby areas of the Great Dividing Range, use the food and habitat resources available in the network of Big Scrub remnants. However, most birds found within the reserve are highly mobile and are unlikely to reside there permanently. Holmes (1987) notes that an interesting feature of Big Scrub remnants is their use by many birds usually associated with more open habitats.

The Richmond birdwing butterfly (*Ornithoptera richmondia*) which has a restricted occurrence within southern Queensland and north-east NSW occurs in the reserve (Williams 2002). The reserve is also potential habitat for a range of threatened and significant invertebrates including the atlas rainforest ground beetle (*Nurus atlas*), the Mitchell's rainforest snail (*Thersites mitchellae*), the rainforest dependent pink underwing moth (*Phyllodes imperialis* southern subspecies) and the regent skipper (*Euschemon rafflesia rafflesia*). The food plants on which the larva of the butterflies and moth depend are known to occur in the reserve.

The red-necked pademelon (*Thylogale thetis*), long-nosed bandicoot (*Parameles nasuta*) and brown antechinus (*Antechinus stuartii*) have previously been recorded in a survey of the reserve and the Hayters Hill West private remnant (NPWS 1979), however, it is unknown if they still occur.

Threats to Native Plants and Animals

Major threats to the reserve's native animals and plants are habitat degradation (refer to Section 4.4), climate change (refer to Section 4.6) and isolation and fragmentation (refer to Section 4.7). Other threats to native species in the reserve are pathogens, such as the fungus myrtle rust (*Uredo rangelii*) (refer to Section 4.4) and inappropriate fire regimes (refer to Section 4.5). Introduced plants and animals in the reserve compete for habitat and resources and/or prey on native species (refer to Section 4.4).

Strategies for the recovery of threatened species, populations and ecological communities have been set out in a state-wide Threatened Species Priorities Action Statement (PAS). Individual recovery plans may also be prepared for threatened species to consider management needs in more detail. A national recovery plan, under the EPBC Act, has been prepared for the rough-shelled bush nut. A draft national recovery plan has been prepared for the grey-headed flying fox.

The Border Ranges Rainforest Biodiversity Management Plan (BRBMP) has been adopted as a regional recovery plan for threatened species and communities of the Border Ranges North and South (Queensland and New South Wales) Biodiversity Hotspot, which includes the reserve. The Plan constitutes the formal national recovery plan for those rainforest species which are endemic to the Hotspot region, including the following threatened plants recorded in the reserve: arrow-head vine *(Tinospora tinosporoides*), durobby (*Syzgium moorei*), onion cedar and rough-shelled bush nut.

Priority Actions for the endangered ecological community 'Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions' and for the seven threatened plants recorded in the reserve are included in the PAS.

Desired Outcome

- Conserve native plants and animals and minimise impacts from introduced species, including pathogens, inappropriate fire regimes, climate change, and isolation and fragmentation (refer to Sections 4.4 and 4.5).

Management Response

4.3.1 Implement relevant actions in the PAS and Recovery Plans, including the Border Ranges Rainforest Biodiversity Management Plan, for threatened species and ecological communities in the reserve.

4.3.2 Encourage flora and fauna surveys of the reserve to expand information available on the reserve's flora and fauna, including threatened and migratory species and ecological communities (refer to Section 5.3).

4.4 Pest Plants and Animals

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

The Northern Rivers Region Pest Management Strategy (NRRPMS) (OEH 2012) identifies priority pest animal and weed control programs across the region's parks and reserves (including actions listed in the PAS and Threat Abatement Plans prepared under the TSC Act). The NRRPMS also identifies where other site or pest specific plans or strategies need to be developed to provide a more detailed approach. The overriding objective of the NRRPMS is to minimise adverse impacts of introduced species on biodiversity and other reserve and community values whilst complying with legislative responsibilities.

The NRRPMS identifies four significant pest animals as occurring in areas adjoining the reserve although they have not been recorded on the reserve: wild dog (*Canis familiaris*), fox (*Vulpes vulpes*), cat (*Felis catus*) and cane toad (*Bufo marinus*). The reserve is not identified as a priority for pest animal control. Sixteen significant weed species are identified as occurring in the reserve which is ranked as a critical priority for rainforest weed control. Appendix 6 lists weeds recorded in the reserve and their threat status.

In addition to the NRRPMS, a noxious weed survey of the reserve has been undertaken (Ecological Assessment & Restoration Services 2006) which includes recommendations for weed control and builds on an earlier restoration strategy (Joseph 1995). To date, control activities have mainly focussed on noxious weeds and weeds posing the greatest threat to the reserve's vegetation, such as madiera vine (*Anredera cordifolia*) and cat's claw creeper (*Macfadyena unguis-cati*) which can rapidly smother vegetation and destroy the structure of the forest.

Weeds in nearby areas and the railway corridor bordering the reserve can invade and degrade the reserve. The boundary of the reserve is unclear in relation to the railway corridor and adjoining properties. To support the development of co-operative weed control strategies the reserve boundary needs to be clearly defined on the ground.

The reserve is particularly susceptible to weed infestation due to its shape and small size, which results in a high perimeter to area ratio, adjacent land uses and its

location within a heavily modified landscape. Also, major storms, such as occurred in 1978, can cause significant canopy damage and open up areas within the core of the reserve to weed infestation.

Pest species with the potential to threaten the survival or evolutionary development of species, populations or ecological communities listed under the TSC Act may be declared Key Threatening Processes (KTP) under the TSC Act and/or the EPBC Act. Table 1 lists the declared KTPs for priority pest species identified for the reserve.

The TSC Act provides for Threat Abatement Plans to be prepared for KTPs. A Threat Abatement Plan has been prepared for predation by the red fox and a plan is also being developed for predation by feral cats.

A draft national Plan to Protect Environmental Assets from Lantana has been developed which establishes national conservation priorities for the control of lantana. The Northern Branch Cane Toad Management Strategy has been prepared to guide the management and control of cane toads.

Introduced pathogens

Myrtle rust, a plant disease caused by the exotic fungus *Uredo rangelli,* is known to affect plants in the Myrtaceae family and was first detected on the NSW central coast in 2010. Myrtle rust is now widespread and has been recorded in bushland and gardens in and around Byron Bay. Myrtle rust infects young actively-growing shoots, leaves, flower buds and fruits. The spores of myrtle rust are spread by wind, water, animal dispersal and human activity.

While evidence of myrtle rust has not been identified in the reserve it is considered to pose a significant threat to its biological values and in particular to plants in the following genera of the Myrtaceae family which occur in the reserve: *Acmena, Austromyrtus, Pilidiostigma, Rhodamnia* and *Syzygium*. Myrtle rust and other exotic rusts have been listed as a KTP under the TSC Act.

A plan outlining how myrtle rust will be managed on national parks estate has been developed and incorporates strategies to limit its spread and to minimise impacts to threatened species and ecological communities (OEH 2011).

Table 1: Pest species declared as key threatening processes

Key Threatening Process	TSC Act	EPBC Act
Invasion and establishment of the cane toad	X	X
Predation by feral cats	X	X
Predation by the European red fox	X	X
Predation and hybridisation by feral dogs	X	
Invasion and establishment of exotic vines and scramblers	X	
Invasion, establishment and spread of *Lantana camara.*	X	
Introduction and establishment of exotic rust fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	X	

Desired Outcome

- Manage pest plants, including introduced pathogens, and animals to minimise impacts on native plants and animals in accordance with the Northern Rivers Region Pest Management Strategy and other relevant strategies and plans, such as the Northern Branch Cane Toad Management Strategy.

Management Response

4.4.1 Implement weed control programs in accordance with the Northern Rivers Region Pest Management Strategy.

4.4.2 Prepare and implement a Pest Management Strategy for the reserve, incorporating monitoring.

4.4.3 Monitor the reserve for myrtle rust infestation and implement strategies contained in the Myrtle Rust Management Plan.

4.4.4 Survey and mark the boundary of the reserve.

4.4.5 Seek the cooperation of neighbours, where appropriate, in implementing weed and pest control programs.

4.5 Fire

The primary fire management objectives of NPWS are to protect life and property and community assets from the adverse impacts of fire, while managing fire regimes to maintain and protect cultural heritage and biodiversity.

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 TSC Act.

Fire history for the reserve is limited, however, available records, anecdotal information and observations suggest a very low fire frequency in the recent past. The reserve's rainforest has a low bushfire risk potential and in most conditions is unable to support bushfire. It is bordered by rainforest and rainforest regrowth, cleared pasture, a dwelling and gardens, Bangalow Road and the disused Lismore-Murwillumbah railway line. There is little opportunity for fire to spread into or from the reserve, except from the railway line.

A combined Fire Management Strategy (DECC 2005) for the reserve and five other Big Scrub nature reserves has been prepared. The strategy outlines the reserve's fire history, key assets within and adjoining the reserve, (including cultural heritage assets), fire management zones, and fire control advantages such as water supply points. The strategy designates the reserve as a Land Management Zone which has a primary fire management objective of conserving biodiversity and protecting cultural heritage. It also contains fire regime guidelines for conservation of the reserve's rainforest, which are to exclude fire from the reserve.

Although there has been little if any recorded history of fire in the reserve, rainforest margins are susceptible to fire damage, particularly to the cumulative effects of

frequent fires. Fires may change the composition of rainforests and favour species which are resilient to fire, such as eucalypts. Managing the impact of fire in the reserve is also important for maintaining populations of threatened species and the endangered ecological community.

NPWS maintains cooperative arrangements with the Rural Fire Service and is actively involved with the Far North Coast Bush Fire Management Committee. Cooperative arrangements include fire planning, fuel management and information sharing.

Desired Outcome

- Ensure fire regimes are appropriate to protect biodiversity and cultural heritage values.

Management Response

4.5.1 Implement the reserve Fire Management Strategy.

4.6 Climate Change

Climate change has been listed as a key threatening process under the TSC Act. Projections of future climate changes in NSW include higher temperatures, increasing sea levels and water temperatures, elevated carbon dioxide, more intense but possibly reduced annual average rainfall, increased temperature extremes and higher evaporation. These changes are likely to lead to greater intensity and frequency of fires, more severe droughts, regional flooding and increased erosion.

Climate change may significantly affect biodiversity by changing population size and distribution of species, modifying species composition, and altering the geographical extent of habitats and ecosystems. Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates. The potential impact of climate change is difficult to assess since it depends on the compounding effects of other pressures, particularly barriers to migration and pressure from weeds and feral animals. Programs to reduce pressures arising from such threats will help reduce the severity of the effects of climate change.

On the NSW north coast the climate is likely to be hotter with temperatures to rise by 1-3 degrees. Summer and autumn rainfall will increase slightly by 5-20 per cent and winter rainfall will decrease slightly by 5-10 per cent. Soil moisture is expected to decrease due to increased evaporation year round and short term droughts are likely to become more severe. Terrestrial biodiversity will experience major impacts from sea level rise, increased temperatures, and changes to water availability and fire regimes. These impacts are likely to change the structure of vegetation communities, and the number and types of plant and animals. Communities affected by fragmentation or isolation, such as the reserve, are among the most vulnerable to the adverse effects of climate change (DECCW 2010).

DECCW has recently mapped climate change corridors along climatic gradients for native animals occupying coastal, dry and moist habitats on the NSW north coast (DECC 2007). These corridors are predicted to be important for wildlife adapting to

the threatening processes of climate change. The reserve forms part of a corridor for fauna occupying coastal habitats and links significant habitats around Byron Bay to Tyagarah, to the north.

Desired Outcome

- Improve the ability of native plants and animals to cope with the effects of climate change by controlling pest plants and animals (refer to Section 4.4), managing fire (refer to Section 4.5) and reducing the impacts of isolation and fragmentation (refer to section 4.7).

4.7 Isolation and Fragmentation

The elevated land surrounding the reserve has been largely cleared, which has resulted in a high loss of biodiversity and fragmentation of habitat (BSC 1999). The extent of clearing means that the remaining vegetated areas near the reserve contribute significantly to its habitat values. These areas include:

- 2.5 hectares of contiguous lowland rainforest on private land to the south-east;
- 4.5 hectares of lowland rainforest on private land 200m to the west, known as Hayters Hill West, which is separated from the reserve by cleared pasture;
- rainforest regrowth and eucalypt and paperbark forest north-east of the reserve on private land below the escarpment. This vegetation provides a habitat link between the reserve and Cumbebin Swamp Nature Reserve and surrounding floodplain habitats.

The above key habitats occur within a sub-regional corridor which links the reserve to a regional coastal corridor to the north and east. It also links a network of fragmented but significant habitats west of the reserve to the Nightcap Range and beyond (Scotts 2003). Long term conservation of biodiversity depends upon the protection, enhancement and connection of remaining habitat across the landscape, incorporating vegetation remnants on both public and private lands.

Species loss due to habitat fragmentation is common but may occur over long time frames (BSC 1999). The lack of regeneration of the threatened onion cedar in the reserve, as documented by McKinley et al. (1995), may be evidence of this process of species loss.

The reserve is relatively small and isolated and subject to edge effects making it more vulnerable to disturbances. Adjacent land uses place pressures on the reserve through the incursion of non-native plants and animals, such as small-leaved privet (*Ligustrum sinense*), madiera vine and lantana. Cooperative arrangements with neighbours are important for the management of weeds. NPWS will continue to liaise with neighbours about weed management (refer to Section 4.4).

Desired Outcomes

- Investigate opportunities to expand existing corridors adjacent to the reserve, to buffer the reserve and to establish corridors between the reserve and other nearby vegetation remnants.
- Liaise with neighbours, Byron Shire Council, Northern Rivers Catchment Management Authority and the Country Rail Infrastructure Authority to encourage the retention and appropriate management of habitat and corridors near the reserve.

Management Response

4.7.1 Support initiatives to develop a long-term program for restoration and connectivity works for the reserve and surrounding lands involving interested landholders, Landcare groups, Byron Shire Council, Northern Rivers Catchment Management Authority and other interested agencies and land managers.

5. USING AND KNOWING ABOUT COUNTRY

5.1 Keeping Connected with Country- Cultural renewal

Aboriginal people have adapted and sustained their cultural identity despite the impacts bought about by European settlement. The links Aboriginal people maintain with Country continue to be expressed through stories, lineage, occupation and use. Aboriginal people maintain their cultural identity and links with Country through cultural learning passed on by the Elders to the following generations.

The reserve's dense understorey which features the barbed wait-a-while vine (*Calamus muelleri*) combined with the steep rocky terrain and the absence of tracks, makes access difficult. This may limit opportunities for cultural activities compared to nearby Country, such as Arakwal National Park and Cape Byron State Conservation Area. However, the NPWS recognises that the Arakwal and other Bundjalung people may want to undertake cultural activities in the reserve and that these activities are important to transfer knowledge and to maintain, renew or repair cultural associations with Country. Cultural activities may include the use of wild resources.

Desired Outcome

- Permit cultural activities to allow the Aboriginal community to connect with Country while ensuring the reserve's natural values are not threatened.

Management Response

5.1.1 Permit cultural activities in accordance with a NPWS consent (and relevant conditions).

5.2 Managing Visitor Use of the Reserve and Talking About Country

Visitor use of the reserve is minimal and there are no formal visitor facilities, such as walking tracks or picnic areas. Additionally, visitor access is not promoted due to the reserve's small size and difficult access. Providing for visitor use is generally not considered compatible with protecting the reserve's significant natural values.

Other nearby areas managed by NPWS provide a diverse range of recreation opportunities, information and visitor facilities including Cape Byron State Conservation Area, Arakwal National Park and Broken Head Nature Reserve. NPWS also encourages public access to the Victoria Park Nature Reserve Big Scrub remnant near Alstonville where information, a boardwalk and picnic facilities are provided.

Desired Outcomes

- Protect the reserve's natural and cultural heritage values from impacts of inappropriate visitor use.

- Develop community understanding of the reserve's Aboriginal cultural and biodiversity values through off-site information programs.

Management Response

5.2.1 No visitor facilities will be developed in the reserve and only low impact nature-based activities, such as bird watching and bushwalking, will be allowed. Activities such as camping, fires, cycling and horse riding will be prohibited.

5.2.2 Upgrade signage to incorporate regulatory information about visitor use.

5.2.3 Consult and involve the Arakwal in the development and delivery of off-site information on the reserve's Aboriginal cultural and biodiversity values.

5.3 Understanding Country – Research and Monitoring

The Arakwal have a broad knowledge of Country as told by the Elders through oral history. The NPWS respects this intellectual property and wishes to add to this body of knowledge. Research is an important part of 'Looking After Country' (refer to Section 4) as it ensures reserve values are clearly identified and managed as well as possible.

Research and monitoring assists in assessing the success of reserve management programs and/or may trigger specific management actions (refer to Section 4.4). In particular, monitoring plant and animal communities, species and habitats is important so that changes in their distribution and abundance due to human impacts and the impacts of introduced species, management activities, climate change and responses to natural phenomenon can be identified (refer to Sections 4.3, 4.4, 4.6 and 4.7).

As a Big Scrub remnant, the reserve is a significant scientific reference area. The plant and animal communities of the reserve provide valuable insights into what the Big Scrub rainforests may have been like. As a remnant of a once extensive but now greatly depleted ecosystem, the reserve's gene/seed bank is of very high scientific importance (NPWS 1997).

Desired Outcome

- Encourage research and monitoring which assists management of the reserve, including research into Aboriginal cultural heritage values (refer to Sections 4.2, 4.3, 4.4, 4.6 & 4.7).

Management Response

5.3.1 Permit research and monitoring, subject to NPWS licensing/consent requirements, that enhances management and has minimal impact on the reserve's natural and cultural values.

6. PLAN IMPLEMENTATION

This plan of management establishes a scheme of operations for Hayters Hill Nature Reserve. Implementation of this plan will be undertaken within the annual program of the NPWS Northern Rivers Region.

Identified activities for implementation are listed in Table 2. Relative priorities are allocated against each activity as follows:

High priority activities are those imperative to achievement of the objectives and desired outcomes. They must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources.

Medium priority activities are those that are necessary to achieve the objectives and desired outcomes but are not urgent.

Low priority activities are desirable to achieve management objectives and desired outcomes but can wait until resources become available.

Ongoing activities are undertaken on an annual basis or are statements of management intent that will direct the management response if an issue arises.

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.

Table 2: List of Management Responses

Section Number	Management Response	Priority
4.1	**Joint Management by the Arakwal and the NPWS**	
4.1.1	Issues and proposals relating to the care, control and management of the reserve will be referred to the Management Committee for their consideration and recommendations.	High
4.2	**The Story of Country that is now the Reserve**	
4.2.1	Record Aboriginal and European stories about the reserve and its significance.	Medium
4.2.2	Record the location of any Aboriginal or European heritage sites in the reserve.	Medium
4.2.3	Investigate adding to the reserve the land adjoining the reserve held in the Minister's name.	High
4.2.4	Write to Byron Shire Council about adding the vegetated road reserve adjacent to the reserve's north-west corner to the reserve.	High
4.2.5	Record and remove old rubbish dumps and allow these areas to regenerate naturally, or undertake habitat restoration if required.	High
4.3	**Native Plants and Animals**	
4.3.1	Implement relevant actions in the PAS and Recovery Plans for threatened species and ecological communities in the reserve.	Medium
4.3.2	Encourage flora and fauna surveys of the reserve to expand information available on the reserve's flora and fauna, including threatened and migratory species and ecological communities.	Medium

Section Number	Management Response	Priority
4.4	**Pest Plants and Animals**	
4.4.1	Implement weed control programs in accordance with the Northern Rivers Region Pest Management Strategy.	High
4.4.2	Prepare and implement a Pest Management Strategy for the reserve, incorporating monitoring.	Medium
4.4.3	Monitor the reserve for myrtle rust infestation and implement strategies contained in the Myrtle Rust Management Plan.	Ongoing
4.4.4	Survey and mark the boundary of the reserve.	Medium
4.4.5	Seek the cooperation of neighbours, where appropriate, in implementing weed and pest control programs.	Medium
4.5	**Fire**	
4.5.1	Implement the reserve Fire Management Strategy.	High
4.7	**Isolation and Fragmentation**	
4.7.1	Support initiatives to develop a long-term program for restoration and connectivity works for the reserve and surrounding lands involving interested landholders, Landcare groups, Byron Shire Council, Northern Rivers Catchment Management Authority and other interested agencies and land managers.	Medium
5.1	**Keeping Connected with Country – Cultural renewal**	
5.1.1	Permit cultural activities in accordance with a NPWS consent (and relevant conditions).	High
5.2	**Managing Visitor Use of the Reserve and Talking About Country**	
5.2.1	No visitor facilities will be developed in the reserve and only low impact nature-based activities, such as bird watching and bushwalking, will be allowed. Activities such as camping, campfires, cycling and horse riding will be prohibited.	Ongoing
5.2.2	Upgrade signage to incorporate regulatory information about visitor use.	Medium
5.2.3	Consult and involve the Arakwal in the development and delivery of off-site information on the reserve's Aboriginal cultural and biodiversity values.	Medium
5.3	**Understanding Country – Research and Monitoring**	
5.3.1	Permit research and monitoring, subject to NPWS licensing/consent requirements, that enhances management and has minimal impact on the reserve's natural and cultural values.	Ongoing

7. REFERENCES

Briggs, JD and Leigh, JH (1996) *Rare or Threatened Australian Plants*, CSIRO Australia, Canberra.

Brodie, RS, Green, R and Graham, M (2002) 'Mapping groundwater-dependent ecosystems: a case study in the fractured basalt aquifers of the Alstonville Plateau, New South Wales', *Proceedings of the International Groundwater Conference*, Darwin.

Byron Shire Council (1999) *Byron Flora and Fauna Study*, a report prepared for Byron Shire Council by Landmark Ecological Services Pty. Ltd., Ecograph and Terrafocus Pty Ltd.

DECC (2005) *Big Scrub Nature Reserves (incorporating Andrew Johnson Big Scrub, Victoria Park, Davis Scrub, Hayters Hill, Boatharbour and Wilson Nature Reserves) Type 1 Reserve Fire Management Strategy*, DECC, Alstonville.

DECC (2007) *Key Altitudinal, Latitudinal and Coastal Corridors for response to Climate Change,* DECC, Sydney.

DECCW (2010) *NSW Climate Impact Profile – the Impacts of Climate Change on the Biophysical Environment of NSW*, DECCW, Sydney.

Department of Industry and Investment 2010, *Preventing Spread of Myrtle Rust in Bushland,* handout, Department of Industry and Investment, Gosford.

Ecological Assessment & Restoration Services (2006) *Byron Coast Area Noxious and Environmental Weed Survey*, a report to the Department of Environment & Conservation.

Floyd, AG (1977) *Vegetation Resource Inventory - Big Scrub Remnants*, a report to NSW National Parks and Wildlife Service, Grafton.

Floyd, A.G. (1990) *Australian Rainforests in New South Wales Vols. 1 and 2,* Surrey, Beatty and Sons, Sydney.

Holmes, G (1987) *Avifauna of the Big Scrub Region,* a report to the Australian National Parks and Wildlife Service and the NSW National Parks and Wildlife Service, NSW National Parks and Wildlife Service, Sydney.

Interpretation Australia Association (2003) *'The IAA Charter of Best Practice for Interpreting Aboriginal Culture and Country',* IAA Guidelines, 22 September 2003.

Joseph, R (1995) *Rainforest Remnants Restoration and Rehabilitation Project - Hayter's Hill Nature Reserve*, National Parks and Wildlife Service, Alstonville.

Kooyman, R & Rossetto, M (2006) 'Factors influencing species selection for littoral rainforest restoration: Do environmental gradients matter?', *Ecological Management & Restoration*, vol. 3, no.2, pp.113-122.

Lot, RH and Duggin, JA (1993) *Conservation Significance and Long Term Viability of Subtropical Rainforest Remnants of the Big Scrub, North-Eastern New South Wales*, a report prepared for the Australian Heritage Commission and NSW Department of Planning, University of New England, Armidale.

Low, T with Kelly, L, Vidler, L and Nicholls, D (2003a) *Place of Plenty: Culturally Useful Plants around Byron Bay*, NSW National Parks and Wildlife Service, Northern Rivers Region.

Low, T with Kelly, L, Vidler, L and Nicholls, D (2003b) *Culturally Significant Plants in Byron Bay Arakwal Country- a Resource Document,* NSW National Parks and Wildlife Service, Northern Rivers Region.

McKinley, A L, Nicholson, H R W, Nicholson, N J and Stewart, B C (1995). Recovery Plan for *Owenia cepiodora*, unpublished report to NPWS, Landmark Ecological Services Pty. Ltd., Terania Creek.

Neal, R and Stock, E (1986) 'Pleistocene occupation in the southeast Queensland coastal region', *Nature*, no. 323, pp. 618-621.

NPWS (1979) 'Birds, mammals, reptiles of two remnants of rainforest and environs Hayters Hill', NPWS file notes, Lismore District.

NPWS (1997) *Big Scrub Nature Reserves (incorporating Andrew Johnson Big Scrub, Victoria Park, Davis Scrub, Hayters Hill, Boatharbour and Wilson Nature Reserves) Plan of Management,* National Parks and Wildlife Service, Lismore District.

Oakwood, M (2008) *Northern Rivers Invasive Plants Action Strategy 2008 -2013*, a report to the Northern Rivers Weeds Advisory Committee, viewed 7 May 2009, http://www.northcoastweeds.org.au/nr-weed-action-strategy.htm

OEH (2011) *Management Plan for Myrtle Rust on the National Parks Estate*, OEH, Sydney.

OEH (2012) *NPWS Northern Rivers Region Pest Management Strategy, Part B 2012-2015*, OEH, Sydney.

Planners North Pty Ltd (1988) *Big Scrub Conservation Strategy,* Vols. 1 & 2, unpublished report for the NSW National Parks and Wildlife Service.

Ryan, M & Smith, R (2001) *Time and Tide Again: A History of Byron Bay,* Northern Rivers Press, Lismore.

Scotts, D (2003) *Key Habitats and Corridors for Forest Fauna: a Landscape Framework for Conservation in North-east New South Wales*, NPWS Occasional Paper 32, NPWS, Sydney.

Sheringham, P & Westaway, J (1995) *Significant Vascular Plants of Upper North East NSW*, NPWS, Hurstville.

Stubbs, B J (2006) *Byron Shire Thematic History*, a report to Byron Shire Council, Byron Shire Council, Mullumbimby.

Williams, G (2002) *A Taxonomic and Biogeographic Review of the Invertebrates of the Central Eastern Rainforest Reserves of Australia (CERRA) World Heritage Area, and Adjacent Regions*, Technical Reports of the Australian Museum, No.16, Sydney.

Appendix 1 Plants important to the Arakwal for wild resource use

Plants of high cultural significance	Uses
lawyer cane *(Calamus muelleri)*	Canes for weaving
water vine (*Cissus* spp.*)*	Edible fruit, water in stems
long yam (*Dioscorea transversa*)	Edible tuber
strangler fig *(Ficus watkinsiana)*	Edible fruit
supplejack *(Flagellaria indica)*	Canes for weaving
Plants of lower cultural significance	
mushrooms *(Agaricus sp.)*	Edible
cunjevoi *(Alocasia brisbanensis)*	Medicine
bangalow palm (*Archontophoenix cunninghamiana*)	Sled, etc.
white booyong (*Argyrodendron trifoliolatum)*	Communication
sandpaper fig *(Ficus coronata)*	Leaves for sandpaper
Other culturally significant plants	
black apple *(Pouteria australis)*	Edible fruit, dye
brown kurrajong *(Commersonia bartramia)*	Fibre for weaving nets and bags
finger lime *(Citrus australasica)*	Edible fruit
giant stinging tree *(Dendrocnide excelsa)*	Fibre for weaving, wood carved into utensils
hoop pine *(Araucaria cunninghamiana)*	Ritual, resin used as cement and dye
lacebark tree *(Brachychiton discolor)*	Shields
native grapes *(Cayratia* spp*., Tetrastigma nitens)*	Edible fruit
native tamarind *(Diploglottis australis)*	Edible fruit
native wisteria *(Callerya megasperma)*	Vines used as hoops for climbing trees
rough-shelled bush-nut *(Macadamia tetraphylla)*	Edible nuts

Source: Low 2003a; Low 2003b.

Appendix 2 Threatened and significant flora

Common Name	Scientific Name	TSC Act Status	Records
Threatened flora			
arrow-head vine*	*Tinospora tinosporoides*	Vulnerable	**Known**
ball nut*	*Floydia praealta* *	Vulnerable	**Known**
durobby*	*Syzygium moorei*	Vulnerable	**Known**
onion cedar*	*Owenia cepiodora*	Vulnerable	**Known**
red lilly pilly*	*Syzygium hodgkinsoniae*	Vulnerable	**Known**
rough-shelled bush nut*	*Macadamia tetraphylla*	Vulnerable	**Known**
white lace flower	*Archidendron hendersonii*	Vulnerable	**Known**
basket fern	*Drynaria rigidula*	Endangered	Potential
brown fairy-chain orchid	*Peristeranthus hillii*	Vulnerable	Potential
corokia*	*Corokia whiteana*	Vulnerable	Potential
green-leaved rose walnut	*Endiandra muelleri* subsp. *bracteata*	Endangered	Potential
needle-leaf fern	*Belvisia mucronata*	Endangered	Potential
northern clematis*	*Clematis fawcettii*	Vulnerable	Potential
rusty plum	*Niemeyera whitei*	Vulnerable	Potential
rusty rose walnut*	*Endiandra hayesii*	Vulnerable	Potential
small-leaved tamarind[#]	*Diploglottis campbellii*	Endangered	Potential
spiny gardenia[#]	*Randia moorei*	Endangered	Potential
sweet myrtle[#]	*Gossia fragrantissima*	Endangered	Potential
yellow satinheart*	*Bosistoa transversa*	Vulnerable	Potential
	Isoglossa eranthemoides [#]	Endangered	Potential
	Melicope vitiflora	Endangered	Potential
	Niemeyera chartacea	Endangered	Potential
	Xylosma terrae-reginae	Endangered	Potential
Rare flora^			
Byron Bay acronychia	*Acronychia baeuerlenii*		**Known**
veiny lace flower	*Archidendron muellerianum*		**Known**
Approaching southern distributional limit			
finger lime	*Citrus australasica*		**Known**
rose marara	*Pseudoweinmannia lachnocarpa*		**Known**
veiny pear-fruit	*Mischocarpus anodontus*		**Known**

Common Name	Scientific Name	TSC Act Status	Records
southern tapeinosperma	*Tapeinosperma pseudojambosa*		**Known**
large-leaved wilkiea	*Wilkiea macrophylla*		**Known**

Source: Atlas of NSW Wildlife; Floyd (1990); Kooyman & Rossetto (2006).

McKinley, A. 2011, pers. comm.; Sheringham & Westaway (1995).

Key: # Species listed as Endangered under the EPBC Act.
* Species listed as Vulnerable under the EPBC Act.
^ Denotes species listed as a Rare or Threatened Australian Plant (ROTAP) according to Briggs and Leigh (1996)

Appendix 3 Threatened fauna

Common Name	Scientific Name	TSC Act Status	Known/Likely to Occur or with Potential Habitat
Invertebrates			
Atlas rainforest ground-beetle	*Nurus atlas*	Endangered	Potential
Mitchell's rainforest snail #	*Thersites mitchellae*	Endangered	Potential
pink underwing moth #	*Phyllodes imperialis southern subspecies*	Endangered	Potential
Birds			
rose-crowned fruit-dove	*Ptilinopus regina*	Vulnerable	**Known**
white-eared monarch	*Monarcha leucotis*	Vulnerable	**Known**
barred cuckoo-shrike	*Coracina lineata*	Vulnerable	Likely
wompoo fruit-dove	*Ptilinopus magnificus*	Vulnerable	Likely
bush hen	*Amaurornis olivaceus*	Vulnerable	Potential
Coxen's fig-parrot #	*Cyclopsitta diophthalma coxeni*	Critically Endangered	Potential
marbled frogmouth	*Podargus ocellatus*	Vulnerable	Potential
square-tailed kite	*Lophoictinia isura*	Vulnerable	Potential
superb fruit-dove	*Ptilinopus superbus*	Vulnerable	Potential
Mammals			
common blossom-bat	*Syconycteris australis*	Vulnerable	**Known**
grey-headed flying-fox*	*Pteropus poliocephalus*	Vulnerable	**Known**
eastern bent-wing bat	*Miniopterus schreibersii oceanensis*	Vulnerable	Likely
eastern long-eared bat	*Nyctophilus bifax*	Vulnerable	Likely
little bent-wing bat	*Miniopterus australis*	Vulnerable	Likely
common planigale	*Planigale maculata*	Vulnerable	Potential

Source: Atlas of NSW Wildlife; Milledge, D. 2011, pers. comm.

Key: # Species listed as endangered under the EPBC Act.
* Species listed as vulnerable under the EPBC Act.

Appendix 4 Fruit-eating birds

Common Name	Scientific Name
black-faced cuckoo-shrike	*Coracina novaehollandiae*
brown cuckoo-dove	*Macropygia amboinensis*
cicadabird	*Coracina tenuirostris*
eastern koel	*Eudynamys orientalis*
eastern rosella	*Platycercus eximius*
figbird	*Sphecotheres viridis*
green catbird	*Ailuroedus crassirostris*
Lewin's honeyeater	*Meliphaga lewinii*
mistletoebird	*Dicaeum hirundinaceum*
olive-backed oriole	*Oriolus sagittatus*
rose-crowned fruit-dove	*Ptilinopus regina*
satin bowerbird	*Ptilonorhynchus violaceus*
scaly-breasted lorikeet	*Trichoglossus chlorolepidotus*
silvereye	*Zosterops lateralis*
varied triller	*Lalage leucomela*
white-headed pigeon	*Columba leucomela*

Source: Atlas of NSW Wildlife; Holmes (1987).

Appendix 5 Rainforest dependent birds

Common Name	Scientific Name
Australian brush-turkey	*Alectura lathami*
brown gerygone	*Gerygone mouki*
green catbird	*Ailuroedus crassirostris*
large-billed scrubwren	*Sericornis magnirostra*
Lewin's honeyeater	*Meliphaga lewinii*
noisy pitta	*Pitta versicolor*
pale-yellow robin	*Tregellasia capito*
rose-crowned fruit-dove	*Ptilinopus regina*
rufous fantail	*Rhipidura rufifrons*
white-eared monarch	*Monarcha leucotis*
white-headed pigeon	*Columba leucomela*

Source: Atlas of NSW Wildlife; Lot & Duggin (1993).

Appendix 6 Weeds

Common Name	Scientific Name
asparagus fern*	*Asparagus aethiopicus*
busy lizzie	*Impatiens walleriana*
camphor laurel[N4]	*Cinnamomum camphora*
cat's claw creeper[#]	*Macfadyena unguis-cati*
climbing asparagus	*Asparagus africanus*
climbing nightshade[#]	*Solanum seaforthianum*
cocos palm[#]	*Syagrus romanzoffianum*
common morning glory[*]	*Ipomoea purpurea*
common passionfruit	*Passiflora edulis*
crofton weed[N4]	*Ageratina adenophora*
fishbone fern	*Nephrolepis cordifolia*
lantana[WONS N4]	*Lantana camara*
large-leaved privet[# N4]	*Ligustrum lucidum*
madeira vine[#]	*Anredera cordifolia*
morning glory	*Ipomoea indica*
ochna[*]	*Ochna serrulata*
palm setaria	*Setaria palmifolia*
red salvia	*Salvia coccinea*
siratro[*]	*Macroptilium atropurpureum*
small-leaved privet[# N4]	*Ligustrum sinense*
smooth cassia	*Senna x floribunda*
umbrella tree[*]	*Schefflera actinophylla*
white passionflower	*Passiflora subpeltata*
winter senna	*Senna pendula var. glabrata*

Source: Ecological Assessment & Restoration Services (2006); Joseph (1995).

Key: [*] Priority Weeds for Coastal Landscapes (Oakwood 2008).

[#] Serious ranking - Ecological Assessment & Restoration Services (2006).

[WONS] Weeds of National Significance

Weeds declared under the *Noxious Weeds Act 1993:*

[N4] Class 4: Plants that pose a potentially serious threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area.