Headwaters Conservation Proposal

A nature reserve for the Upper Kalang, Middle Bellinger and Nambucca Rivers

prepared by Friends of Kalang Headwaters & affiliated groups

Origin and Intent of this Reserve Proposal

The reserve proposed encompassing the forests of the Upper Kalang, Middle Bellinger and Nambucca Rivers is public land. The Friends of the Kalang Headwaters (FoKH) have commissioned this proposal to ensure permanent protection of these forests within a formal conservation reserve, particularly for ensuring water security and biodiversity conservation at a time of unprecedented climate change. FoKH is an affiliation of the Bellingen Environment Centre, Kalang River Forest Alliance, National Parks Association of NSW and business organisations, and has joined with concerned members of the local community to form a coordinated effort to protect, promote and preserve the natural and cultural values of the forests in this reserve proposal, and to seek their immediate, permanent protection.

Intensive expert ecologist-led and community biodiversity assessment work has been focused within Scotchman State Forest and Roses Creek State Forest. This has resulted in a significant number of new records of key threatened flora and fauna species, major range extensions and a great improvement in the understanding of the distribution and abundance of many species within this part of the public forest estate. These results are likely to be replicated, or potentially improved upon, with equivalent survey effort in other compartments and State Forests across the proposed reserve. Findings to date highlight the national conservation values within these forests; reservation is compatible with the maintenance of these values.

From discussions with traditional custodians and representatives of the Gumbaynggirr Nation it is apparent that there are many cultural values across the proposed reserve, these values will be best maintained with the cooperative and protective management strategies of a conservation reserve.

The reserve proposal encompasses all of Buckrabendinni, Roses Creek and Oakes State Forests and part of Diehappy, Irishman and Scotchman State Forests.

The photograph of the Koala on the front cover was taken on the 23rd February 2020 in the middle of the proposed Reserve whilst surveying bushfire damage.

Statement of Values and Significance

The proposal covers 13,233 ha of public land that provides connectivity between the New England and Dorrigo National Parks Gondwana World Heritage properties as well as connecting these reserves with both Baalijin and Juugawaarri Nature Reserve and Gumbaynggirr National Park and State Conservation Area. This proposed reserve contains extensive areas of nationally significant intact and inter-connected tall wet sclerophyll forests at low to mid elevation. These forests are interspersed with subtropical rainforest communities and contain extensive areas of old growth forest. These ecosystems are in excellent condition, mostly lacking environmental weeds and feral animals, and support intact and functional populations of threatened apex predators such as the Spotted-tailed Quoll (*Dasyurus maculatus*) and Powerful Owl (*Ninox strenua*) and other threatened species, such as the Long-nosed Potoroo (*Potorous tridactylus*), that are responsible for keystone ecosystem health functions.

There is strong and emerging evidence of the antiquity and stability of aquatic ecosystems in the Bellinger Valley, with many specific elements of these ecosystems representing amongst the oldest and most stable freshwater ecosystems on the planet. These aquatic ecosystems supply residents of Urunga and Bellingen with their drinking water supply and for future water security every effort must be expended to ensure the continued availability of adequate flows of clean water from the headwaters.

Aquatic ecosystems in drainage lines within and adjoining this reserve proposal in the Upper Bellinger Valley are known to support remnant populations of the Critically Endangered Bellinger River Snapping Turtle, *Myuchelys georgesii*; this species in considered amongst the most ancient of known chelid turtles. Genetic dating work for this species has indicated an evolutionary age of approximately 80 million years, a lineage considerably pre-dating the extinction of the dinosaurs.

The forests of the proposed reserve represent core habitat for a great diversity of threatened and declining forest fauna species, notably supporting a nationally significant interconnected breeding population of Koalas, many hollow-dependent and ancient threatened species and large complexes of the Lowland Subtropical Rainforest threatened ecological community, protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Car Reserve System and JANIS Criteria. Collectively these forests comprise a key component of a core Gondwanan refuge that is of critical significance for the survival of ancient ecosystems and species such as the Rufous Scrub-bird (*Atrichornis rufescens*), Sphagnum Frog (*Philoria sphagnicolus*), Stuttering Frog (*Mixophyes balbus*) and the many species of passerine birds inhabiting these forests (such as the Superb Lyrebird (*Menura novaehollandiae*) and the Southern Logrunner (*Orthonyx temminckii*) that are known to represent the most primitive and basal lineages of all passerines.

The reserve proposal covers a significant and unique section of both the Great Escarpment and the adjoining Great Eastern Ranges forests. The Great Escarpment in the hinterland of Bellingen and Bowraville broadly follows the Horseshoe Road and is a key element of this continental-scale wildlife corridor. Beyond the proposed reserve, elevation extends to in excess of 1500m above sea level, meaning that the reserve is a key component of the shortest (and in many parts the steepest) intact gradient of native vegetation connecting habitats from sea level to the subalpine ecosystems on the continent. Management of this entire landscape has important implications for the globally significant assemblage of biodiversity known to be dependent upon it. Industrial logging of these forests is simply not compatible with maintenance and the future viability of this astonishing natural heritage legacy.

Because of the high level of ecosystem intactness and the very broad connectivity of the forests of the proposed reserve, many of the threatened fauna species known to occupy these forests are able to migrate broadly. This enables long-distance genetic exchange and interbreeding, thereby supporting genetically diverse large and viable populations of species that have become extinct across much of their historic range (e.g. Koala, Rufous Scrub-bird, Greater Glider and Long-nosed Potoroo). If allowed to continue to structurally develop, following extractive forest management 30-50 years previously, these forests will have improved capacity to support many sensitive and threatened species; this is particularly the case for hollow-dependent threatened fauna species.

Water Resource Values and Water Security

With widespread extreme and record drought conditions now afflicting much of the eastern seaboard of Australia, many rivers that have never ceased flowing in recorded history have now stopped flowing. Because of the extensive forest cover in their headwaters the Bellinger and Kalang Rivers are still flowing cool and clean, despite historically low rainfall in recent years. The retention of all forest cover in these catchments must be a priority to ensure water security for the residents of the Bellingen and Nambucca Shires and for the viability of agricultural, fishing and tourism industries.

There is a substantial body of evidence globally that forests create rainfall as well as moderating climatic extremes. Maintenance and enhancement of forest cover across the Bellinger, Kalang and Nambucca River Headwaters will be important for the maintenance of rainfall in the region and for the moderation and reduction of climatic extremes happening as a consequence of global climatic heating. There are good prospects for retention of water and maintenance of stream flows in the Bellinger, Kalang and Nambucca Rivers into the future if all the headwater forests are protected.

Carbon Storage Values

The forests within the proposed Headwaters reserve are a diverse mixture of tall rainforest and eucalypt dominated forest communities with a high biomass, occurring within a high rainfall landscape with a stable and moist microclimate. Although the soils and parent rocks underlying most of the proposed reserve are relatively infertile, the primary productivity of these forests is high, resulting in large existing volumes of stored carbon and a very high potential for significant additional carbon storage as these forests regenerate and structurally mature after selective logging 30-50 years previously. If protected these forests will continue to structurally develop over the decades and centuries to come and will draw down and store atmospheric carbon.

There is an excellent opportunity to allow these forests to continue to structurally develop and to build biomass. The processes of structural development occurring in these forests following historic logging (30-50 years previously) create additional habitat resources for hollow-dependent species and for primitive Gondwanan species that are dependent upon a stable cool moist microclimate. As these forests structurally develop they increase in biomass, this enables the storage of greater volumes of water and provides a growing buffer against future droughts and heatwaves because of the known "air-conditioning" and cloud-seeding properties of these forests.

Koala Habitat Values

Native forests of the Upper Mid North Coast (Nambucca to Clarence Valley) are known to support a significant proportion of the population of the state population, there are some indications that 20% of the NSW Koala population resides in these forests. The headwaters of the Bellinger, Kalang and Nambucca Rivers are completely connected by forest cover, enabling the movement and interbreeding (and hence survival) of Koalas across the entire proposed reserve. Sections of the proposed Reserve are well-known Koala breeding hotspots and there are reliable indications of the occupation of healthy breeding Koalas across all sectors of the reserve proposal.

Preliminary professional ecological and community-led Koala surveys have focused on Compartments 125&126 Scotchman State Forest and Compartments 127&128 Roses Creek State Forest. Substantial evidence of Koalas has been gathered from across these four compartments including many direct observations of animals, substantial acoustic evidence, camera-trap evidence and the identification of feed trees spread across all four compartments from scat searches.

Koala feed tree species and those occupied by Koalas that were documented during the surveys of compartments 125-128 include Tallowwood, *Eucalyptus microcorys*, New England Blackbutt, *E. campanulata*, Coastal Blackbutt, *E. pilularis*, White Mahogany, *E. acmenoides*, Forest Oak, *Allocasuarina torulosa*, Brush Box, *Lophostemon confertus* and Turpentine, *Syncarpia glomulifera*. A distinct feature of the forests across Compartments 125-128 is the near-complete absence of environmental weeds. Few weeds are present in low numbers. Weeds are mostly Lantana, Crofton Weed and Mistflower along roads and trails with very few apparent in core forest areas of these compartments. The general lack of weeds is a consequence of the lack of extractive forest management activities for 30-50 years and there has been negligible disturbances that have facilitated or enabled weed invasion. With a nationally significant Koala population there is a management priority to ensure that areas of habitat that are currently well utilised with a relatively open understorey remain free from Lantana, and that other weed-generating ground disturbances are avoided.

A diversity and abundance of Koala feed trees are present in the complexes of wet and dry sclerophyll forest communities across the proposed reserve. Patches of rainforest vegetation within this forest matrix are cool moist refuges that Koalas move into during heatwave conditions, enabling their survival in such adverse climatic conditions.

Populations of Great Glider and Long-nosed Potoroo Across Compartments 125-128

Expert ecologist and community spotlighting and camera-trap surveys in compartments 125&126 Scotchman State Forest and compartments 127&128 of Roses Creek State Forest have confirmed the presence of breeding populations of both the Greater Glider, *Petauroides volans* and the Long-nosed Potoroo, *Potorous tridactylus* within the boundaries of these localities.

Climate

The climate is humid-subtropical with a peak in rainfall during late summer and autumn. Cyclonic and ex-cyclonic weather events and East Coast lows can deliver extremely high rainfall intensities and rainfall totals occasionally exceeding 1000mm per event. Temperatures rarely exceed 35C and winter frosts are common in low lying and exposed landscapes. Average annual rainfall across the proposed reserve varies from approx. 1300mm – over 2000mm per annum (Bureau of Meteorology data).

Drainage, Water Use and Water Users

Three major river systems drain eastwards from the proposed reserve, from north to south, the Bellinger, Kalang and Nambucca Rivers. The Bellinger River is the largest catchment with the most extensive and diverse aquatic ecosystems within the proposed Reserve. With a much larger catchment area the Bellinger River also has a substantially greater volume of flow than either the Kalang or Nambucca Rivers. Part or all of the following sub-catchments are within the Bellinger River catchment section of the proposed Reserve: Angys, Clear, Cleavers, Diehappy and Fishers Creek.

Sub-catchments of the Kalang River section of the proposed reserve include Middle Camp and Roses Creek on the northern boundary of the Kalang River catchment and Graces Creek flowing southwards into the Nambucca River. Sub-catchments within the Nambucca/Buckrabendinni section of the proposed Reserve include Argents, Gravelly, Stinging Tree and Sullivans Creeks and Bottle Gully.

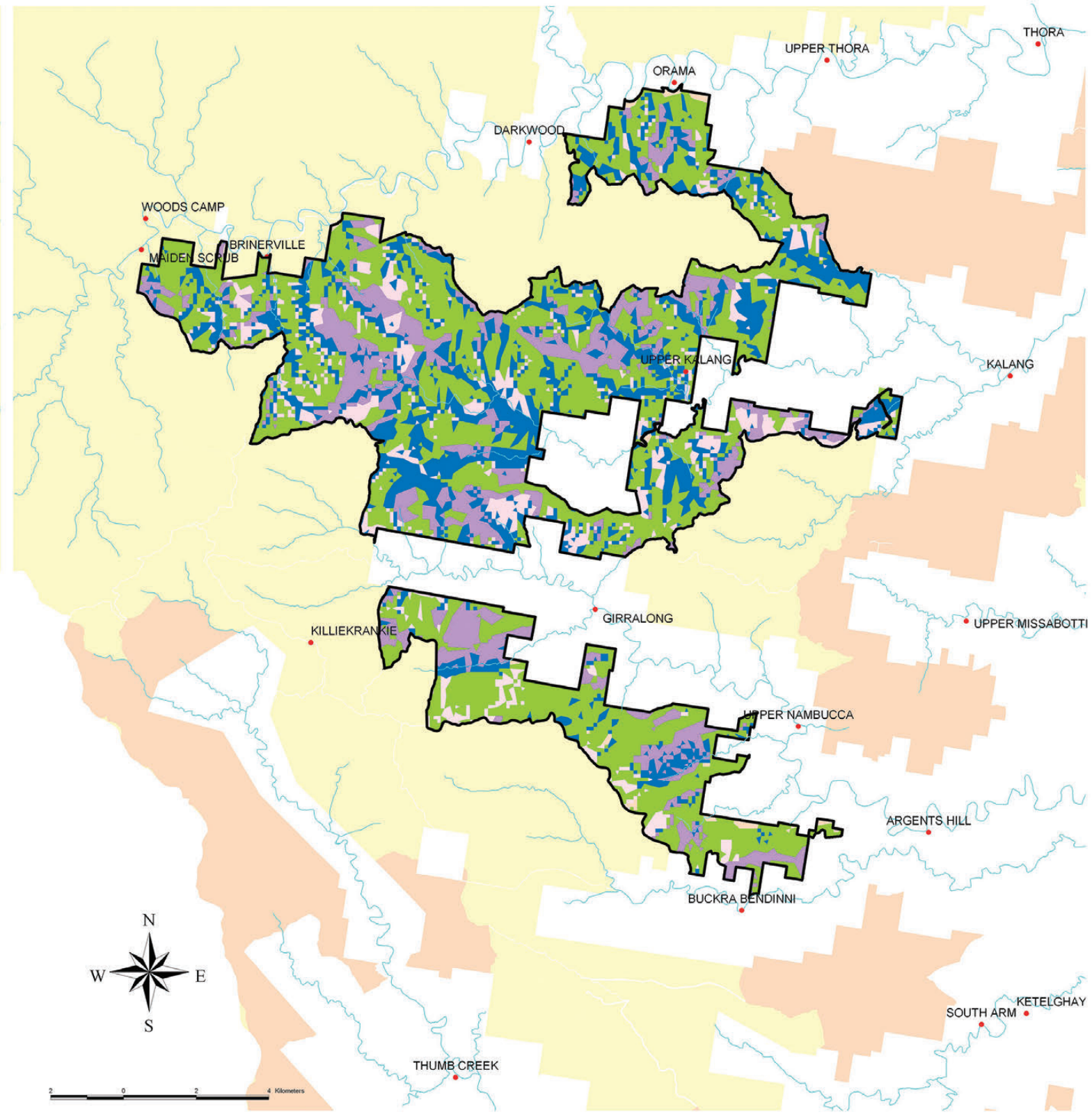
In the Bellinger River catchment all municipal water supply, limited agricultural irrigation and substantial stock and domestic supply is derived from the main channel of the river; residents of Urunga and Bellingen are therefore critically reliant upon the maintenance of water quality and of water security (water quantity). In both the Kalang and Nambucca River catchments there are a range of water users including stock and domestic uses and agricultural irrigation.

Elevation and Topography

Elevation in the Bellinger River section of the proposed reserve ranges from approximately 80m above sea level (asl) along the main river channel at Orama, to 820m asl at the top of both Angys and Clear Creek sub-catchments. In the Kalang River catchment, elevation ranges from 80m asl along the Kalang River at Upper Kalang to 850m asl between Bellbucca and Owl Road and adjoining Hawk Road in the far west and southwest of the catchment. In the Nambucca River catchment elevation ranges from 90m asl along Gravelly Creek to 850m asl along Hawk Road in the far north of the catchment.

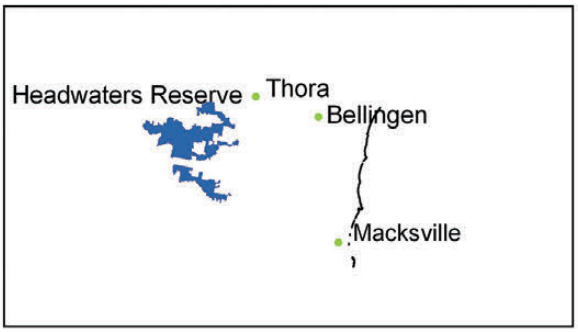
The forests of the Bellinger, Kalang and Nambucca Valleys are unique in their steepness and vulnerability to erosion, structural failure and mass-movement, particularly during the frequent intense rainfall events that occur. The structural failings of the landscape are because of the dominance and weaknesses of the underlying Nambucca shale beds. In upper catchment areas there are few if any areas of gentle relief and many slopes across the proposed reserve are precipitously steep.

Headwaters Reserve Proposal



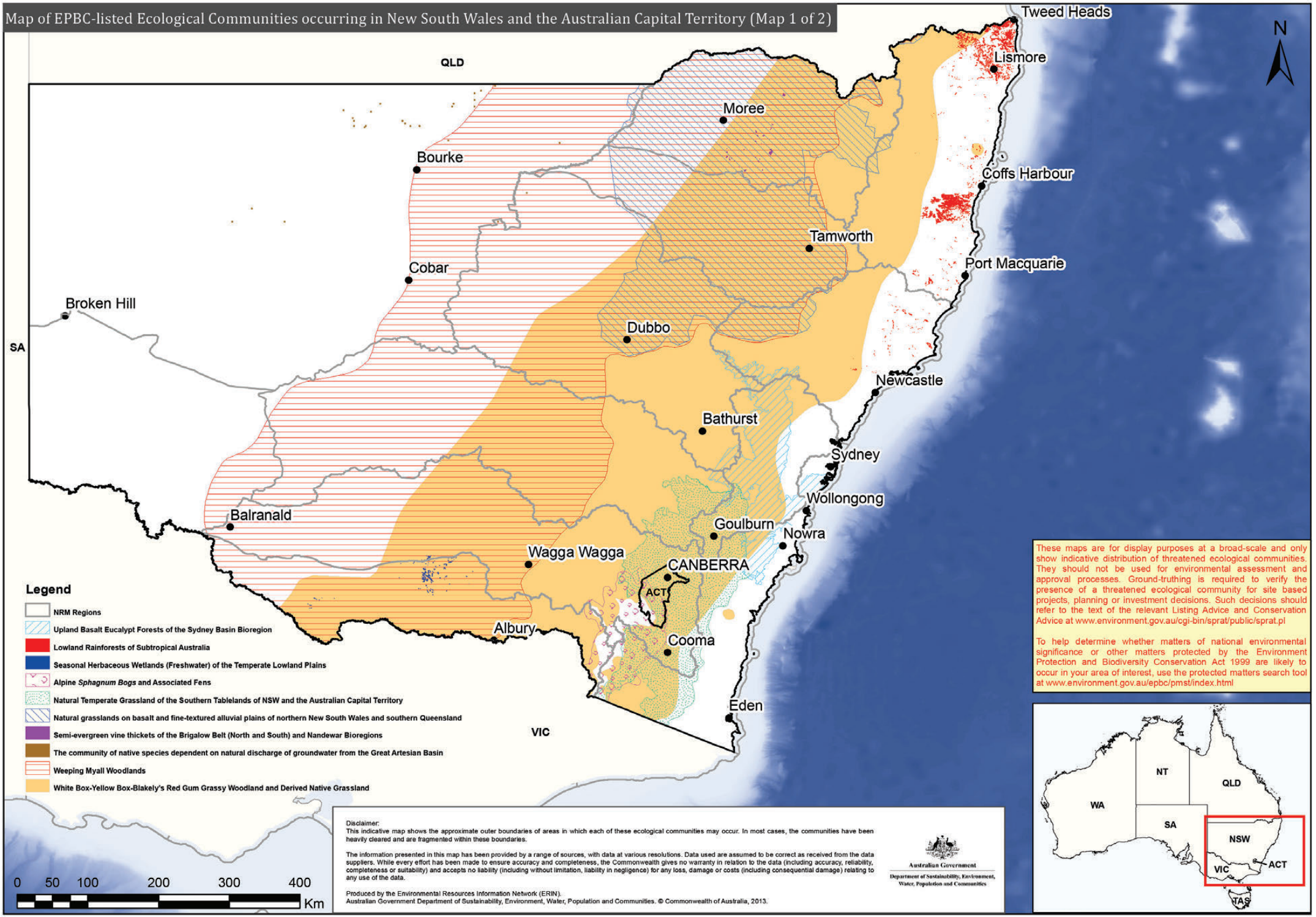
Legend

- Headwaters Reserve
- Secondary Forests
- Rainforest
- Old-growth
- Disturbed Old-growth
- Perennial Streams
- NPWS Reserves
- Stateforests



LOCATION

Map of EPBC-listed Ecological Communities occurring in New South Wales and the Australian Capital Territory (Map 1 of 2)



These maps are for display purposes at a broad-scale and only show indicative distribution of threatened ecological communities. They should not be used for environmental assessment and approval processes. Ground-truthing is required to verify the presence of a threatened ecological community for site based projects, planning or investment decisions. Such decisions should refer to the text of the relevant Listing Advice and Conservation Advice at www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

To help determine whether matters of national environmental significance or other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 are likely to occur in your area of interest, use the protected matters search tool at www.environment.gov.au/epbc/pmst/index.html

Disclaimer:
This indicative map shows the approximate outer boundaries of areas in which each of these ecological communities may occur. In most cases, the communities have been heavily cleared and are fragmented within these boundaries.

The information presented in this map has been provided by a range of sources, with data at various resolutions. Data used are assumed to be correct as received from the data suppliers. While every effort has been made to ensure accuracy and completeness, the Commonwealth gives no warranty in relation to the data (including accuracy, reliability, completeness or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data.

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Landform and Landscape

A significant proportion of the proposed reserve is the broadly arcing ridge upon which the Horseshoe Road is positioned. This arc of ridges separates the Bellinger Valley from the Kalang Valley and the Nambucca Valley as well as separating parts of the Kalang Valley from the Nambucca Valley. Across a large proportion of its length there are precipitous slopes either side of the Horseshoe Road, and headwater tributaries are all steep in the upper reaches and quickly reach their confluence with the major stream channels on the valley floor.

Vegetation Communities

The vegetation of the area varies from dry open forest on the exposed ridges to moist tall open forest on sheltered slopes to well-developed rainforest on sheltered creek flats and gullies. Forest Types are described in Research Note No. 17 (Forestry Commission of NSW 1989), as the descriptors of vegetation. Forest Types are a relatively simple classification of vegetation mainly based on commercial timber species. The Forest Type mapping maps just over half the area as Dry Blackbutt (FT 37), with Brush Box (FT 53) and Myrtle (FT 23) the only other types mapped on more than 10% of the area. A number of other Forest Types occupy smaller areas. There are other more ecologically based classifications of vegetation communities notably forest ecosystems, that are available.

In the proposal area much of the area mapped as Dry Blackbutt (FT 37) would be better assigned to Moist Blackbutt (FT 36), and much of the area mapped as Myrtle (FT 23) is not a dry rainforest type and should be assigned to either Corkwood – Sassafras – Crabapple – Silver Sycamore (FT 3) or one of the warm temperate Forest Types.

The following descriptions of the more extensive Forest Types are based on available site data from earlier surveys and unpublished field notes.

Dry Blackbutt (FT 37)

On dry ridges and exposed slopes an open to tall open forest dominated by Blackbutt *Eucalyptus pilularis* occurs. Other canopy species include New England Blackbutt *E. campanulata*, Tallowwood *E. microcorys*, Turpentine *Syncarpia glomulifera*, Diehard Stringybark *E. cameronii* and Broad-leaved White Mahogany *E. carnea*. There is often a small tree layer of Forest Oak *Allocasuarina torulosa*, Black Oak *A. littoralis* and *Daviesia arborea*. The ground layer includes small shrubs (such as Prickly Shaggy Pea *Podolobium ulicifolium*, Crinkle Bush *Lomatia silaifolia* and Beard Heath *Leucopogon lanceolatus*), as well as Bracken Fern *Pteridium esculentum*, Spiny-headed Matt-rush *Lomandra longifolia* and Wiry Panic *Entolasia stricta*.

Moist Blackbutt (FT 36)

This type is much more extensive than mapped by existing Forest Type mapping, particularly on steep sheltered slopes south of the Horseshoe Road. On more sheltered sites a moister tall open forest dominated by Blackbutt *Eucalyptus pilularis* occurs. Other canopy species include Tallowwood *E. microcorys*, Turpentine *Syncarpia glomulifera*, Brush Box *Lophostemon confertus*, White Mahogany *E. acmenoides* and Sydney Blue Gum *E. saligna*. The small tree and shrub layer includes Forest Oak *Allocasuarina torulosa*, Blackwood *Acacia melanoxylon*, Soft Corkwood *Akama paniculosa*, Rough Treefern *Cyathea australis*, *Daviesia arborea* and Rose Myrtle *Archirhodomyrtus beckleri*. Ground layer species include Gristle Fern *Blechnum cartilaginium*, *Coopernookia chisolmii*, Bracken Fern *Pteridium esculentum*, Soft Bracken *Calochleana dubia* and Spiny-headed Matt-rush *Lomandra longifolia*.

Brush Box (FT 53)

On sheltered lower slopes often adjacent to rainforest vegetation a moist tall open forest dominated by Brush Box *Lophostemon confertus* occurs. Other common canopy species include Sydney Blue Gum *Eucalyptus saligna*, Tallowwood *E. microcorys* and Blackbutt *E. pilularis*. There is usually a well-developed small tree layer of species such as Blackwood *Acacia melanoxylon*, Soft Corkwood *Akama paniculata*, Mur rogun *Cryptocarya microneura* and Forest Oak *Allocasuarina torulosa*. Shrubs such as Rose Myrtle *Archirhodomyrtus beckleri*, Forest Maple *Cryptocary rigida* and Bolwarra *Eupomatia laurina*, and the vines Five-leaved Water Vine *Cissus hypoglauca*, Giant Water Vine *Cissus antarctica* and Austral Sarsaparilla *Smilax australis* are often present. The ground layer is generally sparse with Soft Bracken *Caloclaena dubia* and Native Ginger *Alpinia caerulea* the most frequent species.

Rainforest Communities (mapped as Myrtle (FT 23) and Corkwood – Sassafras – Crabapple – Silver Sycamore (FT 3))

On sheltered creek flats, particularly along the upper Kalang River, a well-developed sub-tropical rainforest occurs. This is dominated by large Yellow Carabeen *Sloanea woollsii*, Brush Box *Lophostemon confertus* and Strangling Fig *Ficus watkinsiana* with occasional emergent large mature Flooded Gum *Eucalyptus grandis*. Other tree species present include Coachwood *Ceratopetalum*

apetalum, Red Carabeen *Geissois benthamiana*, White Beech *Gmelina leichhardtii* and Northern Acradenia *Acradenia euodiiformis*. Common mid-storey species and shrub include Bangalow Palm *Archontophoenix cunninghamiana*, Prickly Tree Fern *Cyathea leichardtiana* and Featherwood *Polyosma cunninghamii*. The ground layer is generally sparse with *Adiantum sylvaticum*, *Cyperus filipes* and Strap Water Fern *Blechnum patersonii* present.

At higher elevations, such as on the southern slope of Boot Hill are areas of warm temperate rainforest. Canopy species include a number of tree species such as Sassafras *Doryphora sassafras*, Black Booyong *Heritiera actinophylla*, Soft Corkwood *Akama paniculata*, Black Wattle *Callicoma serratifolia*, Prickly Ash *Orites excelsa*, Pencil Cedar *Polyscias murrayi*, Coachwood *Ceratopetalum apetalum* and Northern Acradenia *Acradenia euodiiformis*. Common mid-storey and shrub species include Rough Tree Fern *Cyathea australis*, Grey Possumwood *Quintinia verdonii*, Five-leaved Water Vine *Cissus hypoglauca* and Walking Stick Palm *Linospadix monostachyos*. Ground layer includes the ferns *Lastreopsis microsora* and Strap Water Fern *Blechnum patersonii*.

The narrower gullies and creeks contain less well developed examples and gradations between these two rainforest communities.

These areas of rainforest would probably include the following Floyd suballiances:

Suballiance 12 *Sloanea woollsii-Dysoxylum fraserianum-Argyrodendron actinophyllum-Caldcluvia*

Suballiance 33 *Ceratopetalum / Schizomeria-Argyrodendron / Sloanea*

Suballiance 35 *Ceratopetalum / Schizomeria-Doryphora*

New England Blackbutt (FT 163)

On higher altitude exposed ridges Blackbutt *Eucalyptus pilularis* tends to be replaced by New England Blackbutt *E. campanulata*. Mid and under-storey species are similar to those found in the Dry Blackbutt community.

There are also small areas of the following Forest Types:

Grey Gum – Grey Ironbark – White Mahogany (FT 62a)
Tallowwood – Sydney Blue Gum (FT 47)
Fig – Giant Stinger / Myrtle (FT 23)
Narrow-leaved White Mahogany – Red Mahogany – Grey Ironbark – Grey Gum (FT 60)
Sydney Blue Gum (FT 46)
River Oak (FT 211)
Rock (FT 234)
Improved Pasture and Cropland (FT 216)

Significant vegetation communities and plant species

Endangered Ecological Communities

Some parts of the mapped rainforest could be included in the following listed communities:

Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion; listed in NSW as an Endangered Ecological Community

Lowland Rainforest of Subtropical Australia: listed Federally as Critically Endangered

Listed Threatened Species

Milky Silkpod *Parsonsia dorrigoensis*:

Conservation status in NSW: Vulnerable

Commonwealth status: Endangered

Milky Silkpod is locally common, particularly at intermediate altitude, in moist and dry Blackbutt communities.

Scrub Turpentine *Rhodamnia rubescens*:

Conservation status in NSW: Critically Endangered.

Scrub Turpentine was a common under and mid storey species but it has been severely affected by Myrtle Rust *Austropuccinia psidii* in recent years.

Rusty Plum *Niemeyera whitei*:

Conservation status in NSW: Vulnerable

Rusty Plum is rare in low altitude rainforest patches.

Other species and features of significance

Speculantha amabilis:

This recently described orchid (Jones and Copeland 2014) was observed in dry Blackbutt forest near Sirius Road. The known habitat of this species is generally tall moist forest or Snow Gum woodland at high elevations, mainly above about 1300m, in the vicinity of Point Lookout in New England National Park. So, this occurrence at about 550m in dry open forest is of significance (L. Copeland pers. comm. 2107).

Old Growth Forest

Significant areas of high conservation value old growth forest occur within the proposal area. Such old growth forest provides important nest and roost resources for a number of threatened fauna species, such as large forest owls and gliders.

Eucalypt Diversity

The Coffs Harbour region is recognised as having exceptionally high diversity of tall eucalypt species. In the small area of this proposal 16 species of tall forest trees have been recorded (11 *Eucalyptus*, 3 *Corymbia*, *Lophostemon confertus* and *Syncarpia glomulifera*).

Glossy Black-Cockatoo feed trees

The small trees Forest Oak *Allocasuarina torulosa* and Black Oak *Allocasuarina littoralis* are common in much of the non-rainforest area. These trees provide food for the Vulnerable Glossy Black-Cockatoo.

Floristic Diversity

Over 300 plant species have been recorded in the proposal area.

References

Forestry Commission of New South Wales 1989: Research Note No. 17 Forest Types in New South Wales

Floyd AG (1990a). Australian Rainforests in New South Wales. Surrey Beatty and Sons Pty Limited, Chipping Norton, NSW.

Jones D.L. and Copeland L.M 2014 *Speculantha amabilis* (Orchidaceae: Pterostylinidae), a new species of Tiny Greenhood from the Northern Tablelands of New South Wales. *The Australian Orchid Review October-November 2014*.

Critically Endangered Lowland Rainforest – EPBC Act 1999

The reserve proposal also contains significant areas of lowland rainforest. Since European settlement Lowland Rainforest has undergone a large reduction in geographic distribution (particularly its area of occupancy) due to clearing (Floyd 1990a, b). For example, Floyd (1990a) estimated the Big Scrub lowland rainforest near Lismore, originally estimated to cover 75 000 ha, had been reduced to only 300 ha (0.07%) since European settlement. Other districts as far south as Ourimbah have suffered similar losses of Lowland Rainforest. Relative to the longevity of rainforest trees, many of which live for several hundred years, these represent large reductions in the geographic distribution of the community. 'Clearing of native vegetation' is listed as a Key Threatening Process under the then NSW *Threatened Species Conservation Act*.

Extensive clearing of Lowland Rainforest has resulted in fragmentation and loss of ecological connectivity. The integrity and survival of small, isolated stands is impaired by the small population size of many species, enhanced risks from environmental stochasticity, disruption to pollination and dispersal of fruits or seeds, and likely reductions in the genetic diversity of isolated populations (Lott 1990, Rossetto et al. 2004a, b). Disruption of these ecological processes may result in a large reduction in the ecological function of the community.

The invasion and establishment of exotic species in Lowland Rainforest results in a large reduction in the ecological function of the community. 'Invasion and establishment of exotic vines and scramblers' is listed as a Key Threatening Process under the then NSW *Threatened Species Conservation Act*.

Some stands of Lowland Rainforest are included within the conservation estate (including components of the Central Eastern Rainforest Reserves of Australia World Heritage listing). However, not all Lowland Rainforest suballiances occur in conservation reserves and many small stands, important for connectivity and maintenance of landscape-scale ecological processes, remain outside conservation reserves.

Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions is eligible to be listed as an endangered ecological community as, in the opinion of the Scientific Committee, it is facing a very high risk of extinction in New South Wales in the near future, as determined in accordance with the criteria as prescribed by the *Threatened Species Conservation Regulation 2002*.

Threatened species values and threatened ecological communities

Because they are connected to major latitudinal corridors along the Great Escarpment and the Great Dividing Range, the forests of the proposed reserve provide key habitat for part of what are likely to be amongst the largest populations of numerous wet forest dependent threatened species. Examples of such species include Stephens Banded Snake, *Hoplocephalus stephensii*, Sphagnum Frog, *Philoria sphagnicolus*, Golden-tipped Bat, *Phoniscus papuensis*, Red-legged Pademelon, *Thylogale stigmatica* and the Spotted-tailed Quoll, *Dasyurus maculatus*. The forests of the Upper Bellinger, Kalang and Nambucca Valleys are also a key stronghold for many other specialist wet fauna species including the Pale-yellow Robin, Southern Angle-headed Dragon and Spiny Crayfish, *Euastacus sp.(spinifer)* (McCormack unpub 2017). Other crayfish species known to occur in the Kalang River include *Cherax cuspidatus* (Riek, 1969) and *E. dangadi* (ACP Specimens 5902 – 5906) (McCormack unpub. 2017)

Threatened species known from within the proposed reserve		Conservation Status
FLORA		
Milky Silkpod	*Parsonsia dorrigoensis*	**EPBC** End. **BCA** Vuln.
Slender Marsdenia	*Marsdenia longiloba*	**EPBC & BCA** End.
Scrub Turpentine	*Rhodamnia rubescens*	**BCA** Crit. End.
Rusty Plum	*Neimeyera whitei*	**BCA** Vuln.
FAUNA		
Reptiles		
Bellinger River Snapping Turtle	*Myuchelys georgesii*	**EPBC** Crit. End. **BCA** Crit. End.
Stephens Banded Snake	*Hoplocephalus stephensii*	**BCA** Vuln.
Amphibians		
Sphagnum Frog	*Philoria sphagnicolus*	**BCA** Vuln.
Stuttering Frog	*Mixophyes balbus*	**EPBC** End. **BCA** End.
Giant Barred Frog	*Mixophyes iteratus*	**EPBC** End. **BCA** End.
Birds		
Rufous Scrub-bird	*Atrichornis rufescens*	**EPBC** End. **BCA** Vuln.
Wompoo Fruit-dove	*Ptilinopus magnificus*	**BCA** Vuln.
Rose-crowned Fruit-dove	*Ptilinopus regina*	**BCA** Vuln.
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	**BCA** Vuln.
Powerful Owl	*Ninox strenua*	**BCA** Vuln.
Sooty Owl	*Tyto tenebricosa*	**BCA** Vuln.
Varied Sittella	*Daphoenositta chrysoptera*	BCA Vuln.
Little Lorikeet	*Glossopsitta pusilla*	BCA Vuln.
Osprey	*Pandion cristatus (haliaetus)*	BCA Vuln.
White-bellied Sea Eagle	*Haliaeetus leucogaster*	BCA Vuln.
Square-tailed Kite	*Lophoictinia isura*	BCA Vuln.
Mammals		
Koala	*Phascolarctos cinereus*	BCA Vuln.
Long-nosed Potoroo	*Potorous tridactylus*	BCA Vuln.
Spotted-tailed Quoll	*Dasyurus maculatus*	BCA Vuln.
Common Planigale	*Planigale maculata*	BCA Vuln.
Red-legged Pademelon	*Thylogale stigmatica*	BCA Vuln.
Parma Wallaby	*Macropus parma*	BCA Vuln.
Greater Glider	*Petauroides volans*	**EPBC** Vuln.
Eastern Pygmy Possum	*Cercartetus nanus*	BCA Vuln.
Brush-tailed Phascogale	*Phascogale tapoatafa*	BCA Vuln.
Golden-tipped Bat	*Phoniscus papuensis*	BCA Vuln.
Little Bent-wing Bat	*Miniopterus australis*	BCA Vuln.
Greater Broad-nosed Bat	*Scoteanax rueppellii*	BCA Vuln.
Grey-headed Flying-fox	*Pteropus poliocephalus*	BCA Vuln.
Hastings River Mouse (suitable habitat present)	*Pseudomys oralis*	BCA End.

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