

Threatened Species Assessments (5 Part Tests)
Biodiversity Conservation Act 2016

Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats

- (1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:
 - (a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
 - (b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity--
 - i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
 - ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
 - (c) in relation to the habitat of a threatened species or ecological community:
 - i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
 - ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
 - iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality
 - (d) whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Threatened Ecological Communities

Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions

Habitat and distribution

The Lowland Rainforest EEC comprises subtropical rainforest and some related, structurally complex forms of dry rainforest. The EEC may be associated with a range of high-nutrient geological substrates, notably basalts and fine-grained sedimentary rocks, on coastal plains and plateaux, footslopes and foothills. In the north of its range, it is found up to 600m above sea level, but in the Sydney Basin bioregion it is limited to elevations below 350m.

Although accurate figures and mapping for this EEC are not available, the Scientific Committee found that it has undergone a large reduction in geographic distribution due to clearing. Locally, Floyd estimated the Big Scrub lowland rainforest near

Lismore, originally estimated to cover 75 000 ha, had been reduced to only 300 ha (0.07%).

The Commonwealth Threatened Species Scientific Committee advises that, in NSW, the EEC has been reduced from 187 280 ha to 11 170 ha (94% reduction). The current extent within protected areas is 1988 ha. This is across 41 different national parks and reserves, however the majority is within Nightcap National Park (525 ha), Border Ranges National Park (283 ha), Mooball National Park (203 ha), Mt Jerusalem National Park (143 ha) and Inner Pocket Nature Reserve (104 ha).

Threats

- Clearing from rural, agricultural and urban development leading to edge effects, degradation and further fragmentation.
- Invasion and establishment of transformer weed species changing community structure and floristic composition.
- Inappropriate fire regimes associated with burning off and hazard reduction pose a threat to the margins of rainforest stands and the entirety of small stands in fragmented landscapes.
- Myrtle rust infection of characteristic species resulting in changes to community structure and floristic composition.
- Grazing and trampling by livestock causing loss of or damage to plants, compaction of soil, erosion, influx of nutrients and dispersal of weeds.
- Climate change.
- Reduced pollination and lack of seed.
- Bell Miner associated dieback affecting the eucalypts in some remnants
- Damage caused by human disturbance including trampling, rubbish dumping, arson, motorbikes, bicycles.
- Biogeographic homogenisation of lowland rainforest with native (non-endemic) garden plants.

Assessment

The vegetation and flora report (Appendix 3) states that rainforest vegetation around the DUA and in the vicinity possibly fits this EEC. It recommends that it be treated as an EEC as a precautionary approach.

Up to 500m² of the possible EEC will be impacted by the activity at, and in the vicinity of, the day use area (DUA). Direct impacts include clearing of understorey, shrubs, small trees, three large trees (two Coachwood and one laurel sp.) and accidental damage to vegetation during construction, or as a result of changes to flow paths of stormwater etc. Indirect impacts will occur as a result of visitors using the area and this is evident at the site, for example, damage to vegetation and removal. Any weed subsequent weed invasion will be addressed by ongoing maintenance by NPWS of the site.

To avoid additional impacts, it is recommended that NPWS apply the current Australian Standard: Protection of Trees on Development Sites (Standards Australia 2009) in construction of walking tracks and other infrastructure. It is recommended that NPWS use a qualified arborist experienced in its application, or a suitably qualified/experienced NPWS officer.

Appendix 4 Threatened Species Assessments – BC Act & EPBC Act

The Aboricultural Report (Appendix 9) includes additional recommendations to avoid and minimise impacts on this EEC, for example, building steps and paths up instead of excavating for the walking track and minimising soil disturbance close to trees. The report's focus is on the risk vegetation poses to public safety but includes some comments on the potential impact on vegetation from the proposal. It

Impacts on the lowland rainforest at the DUA are small in scale (500m²) compared to the predicted extent of this EEC in Mt Jerusalem NP (143ha). Walking tracks will not result in fragmentation or isolation because they are relatively short and most impacts will be on the understorey while the canopy and surrounding vegetation will remain intact. The clearing at the DUA already exists.

All habitat of this EEC is important, however, the small-scale habitat impacts predicted are unlikely to affect the EECs long-term survival in the locality.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA and at nearby sites (see Appendix 3). Additionally, damage caused by motorbikes accessing the creek at the DUA will be addressed and the affected area rehabilitated. If additional impacts are avoided and compensation measures are implemented it is unlikely the local occurrence the EEC will be placed at risk of extinction or that there will be a significant effect on this species.

References:

Commonwealth Threatened Species Scientific Committee 2011, *Commonwealth Listing Advice on Lowland Rainforest of Subtropical Australia*, Department of Sustainability, Environment, Water, Population and Communities. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities, viewed 13 February 2020, <<http://www.environment.gov.au/biodiversity/threatened/communities/pubs/101-listing-advice.pdf>>

NSW Department of Planning, Industry & Environment 2019, *Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions - Profile*, DPIE, viewed 13 February 2020, <<https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20073#threats>>

NSW Threatened Species Scientific Committee 2019, *Final Determination – Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions*, DPIE, viewed 13 February 2020, <<https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2004-2007/lowland-rainforest-nsw-north-coast-sydney-basin-bioregion-endangered-ecological-community-listing>>

Standards Australia 2009, *Australian Standard: Protection of Trees on Development Sites: AS 4970 - 2009*, Standards Australia.

Threatened Flora

Scrub Turpentine (*Rhodamnia rubescens*) - Critically Endangered

Habitat and Distribution

Scrub Turpentine occurs in coastal districts north from Batemans Bay in New South Wales to areas inland of Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm.

The species is found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest, usually on volcanic and sedimentary soils.

There are 14 records for this species within Mount Jerusalem NP (Bionet search 28/1/20). Six additional specimens of this species were recorded in the course of field work near the Manns Road study site. The closest record is within 150m, adjacent to the track running east from the campground.

Threats

Key threats to viability are loss, fragmentation and degradation of habitat, and widespread pervasive factors such as impacts of climate change and disease. Threats in more detail:

- Decline in health/loss of mature plants and a lack of seed-based recruitment due to infection by *Austropuccinia psidii* (Myrtle Rust).
- Degradation of habitat and competition from transformer weed species.
- Clearing from rural, agricultural and urban development leading to edge effects, degradation and further fragmentation.
- Habitat degradation and clearing due to forestry operations.
- Too frequent/intense fire destroying habitat and individual plants.
- Damage caused by inappropriate use of four-wheel drive vehicles.
- Road and track development and maintenance.

The species is projected to undergo a 96–99% reduction in population size across its range within three generations.

Assessment

Two stems of this species (16cm and 40cm) are present adjacent to the Manns Road campground. The proposal includes mitigation of potential impacts on the species by erecting an 8 x 8m enclosure which is weeded as part of ongoing management of the campground. The species will also be monitored twice annually and signage erected with information about the species and how visitors can assist by staying out of the enclosure.

Myrtle Rust is present on both specimens and, regardless of the campground development, may kill both specimens. The viability of local populations of this species at any location is greatly diminished because of the threat posed by Myrtle Rust.

Approximately 1000m² of adjoining habitat will be removed or modified by the proposal. The plants will be protected by an enclosure (see above). The impact of this small-scale fragmentation of habitat on dispersal is reduced because the species

is dispersed by birds. Additionally, considerable areas of intact habitat remain locally within Mount Jerusalem NP with several records recently located nearby. Given the retention of considerable habitat and potential habitat and that the species is known from several locations, locally, within Mount Jerusalem NP, the loss of adjacent habitat at the campground is unlikely to result in the species being unable to survive long-term. However, Myrtle Rust does pose this threat. If safeguards are implemented, the activity is unlikely to have a significant effect on this species.

References:

Department of Planning, Industry & Environment (DPIE) 2019, *Scrub Turpentine – profile*, OEH, viewed 12 February 2020,

<<https://www.environment.nsw.gov.au/threatenedSpeciesApp/>>

NSW Threatened Species Scientific Committee 2019, *Notice of and Reasons for Final Determination – Rhodamnia rubescens*, DPIE, viewed 13 February 2020, <https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2019/rhodamnia-rubescens-a-tree-critically-endangered-species-listing>

Threatened Fauna

NON-FLYING MAMMALS

Common Planigale (*Planigale maculata*) – Vulnerable

Distribution, Habitat and Habitat Use

In NSW, Planigales occur in the coastal north-east. The confirmed southern distribution limit is on the lower north coast with some records on the central coast.

Habitat comprises rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas with surface cover, usually close to water. Planigales prey on insects and small vertebrates and are agile climbers active at night. They make nests in hollow logs, beneath bark or under rocks (OEH 2018).

Within the park, they have been recorded 6.5 km southwest near Mount Jerusalem (CSIRO and State Forests 1995).

Threats

- Predation by foxes.
- Predation by cats.
- Predation and poisoning by cane toads.
- Loss of habitat from a variety of land uses resulting in species fragmentation and habitat degradation. Includes changes to riparian areas and hydrology from residential and associated infrastructure development, and loss of ground cover vegetation and woody debris from too frequent fire and clearing.
- Frequent burning that reduces ground cover such as hollow logs and bark.
- Over grazing that reduces ground cover.
- Disturbance of vegetation surrounding water bodies.
- Predation by domestic cats.

Assessment

Suitable habitat exists for this species at both sites - Manns Road campground and Unicorn Falls DUA. Unicorn Falls may be more suitable because of its proximity to water and it has some ecotonal variation, whereas Manns Road is situated on a ridgeline and has a more uniform vegetation community. Both sites have dense ground cover and adequate canopy cover. Both sites incorporate existing clearings and Unicorn Falls has a pre-existing pattern of low-level visitation.

Impacts on habitat at Manns Road will be greater (1076m²) and involve removal of vegetation around a previously cleared dump site and understorey removal for walk-in tent camping on platforms.

Less habitat will be removed at Unicorn Falls (300m²). This will occur in two areas: adjacent to South Chowan Road, where the carpark and toilets will be constructed, and between the (previously cleared) DUA and the waterfall, to construct the walking track. Impacts associated with construction (e.g. noise, emissions) will be short term in nature.

Indirect impacts include those associated with increased visitation, including camping at Manns Road, and changes to surface hydrology caused by constructing infrastructure.

The impacts are unlikely to fragment or isolate habitat as they expand on existing clearings (Manns Road), or are roadside (Unicorn Falls), or in the case of the Falls walking track, can be crossed. Ground cover will be retained both sides of the walking track and the canopy retained above.

Although loss of habitat is undesirable, the impacts comprise relatively small losses within a much larger area of suitable habitat and are focussed on areas with existing disturbance. To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites (see Appendix 3).

It is unlikely that the impacts of the activity, including some loss of habitat, will lead to a local extinction, although it would result in a change in habitat use because of habitat loss and indirect impacts.

Reference

DPIE 2018, *Common Planigale* – Profile, DPIE, viewed 13 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10635>>

Eastern Pygmy-possum (*Cercartetus nanus*) – Vulnerable

Distribution, Habitat and Habitat Use

Eastern Pygmy-possum is found in a broad range of habitats from rainforest through sclerophyll forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. They are agile climbers and are generally nocturnal.

They feed largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; are an important pollinators of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. They also feed on insects throughout

the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests.

Eastern Pygmy-possum shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation, (e.g. grass-tree skirts). Nest-building appears to be restricted to breeding females. Tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks.

They appear to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares.

They frequently spend time in torpor especially in winter, with body curled, ears folded and internal temperature close to the surroundings.

Within the park, Eastern Pygmy-possum was recorded 6.5 km southwest, around Blackbutt Plateau (AM Gilmore 1984).

Threats

- Loss and fragmentation habitat through land-clearing for agriculture, forestry and urban development.
- Changed fire regimes that affect the abundance of flowering proteaceous and myrtaceous shrubs, particularly banksias.
- Declining shrub diversity in forests and woodlands due to overgrazing by stock and rabbits.
- Predation from cats, dogs and foxes.
- Loss of nest sites due to removal of firewood.
- Mortality on roads through habitat and movement areas.

Assessment

Suitable feed sources are available at both sites. At Manns Road, 55 eucalypts (potential nectar feed trees) will be removed; three eucalypts will be removed from Unicorn Falls and 600m² of potential rainforest habitat (including regrowth) will be impacted and some removed. At Unicorn Falls, these impacts will mainly occur in two areas: adjacent to South Chowan Road, where the carpark and toilets will be constructed, and between the (previously cleared) DUA and the waterfall, to construct the walking track. Impacts associated with construction (e.g. noise, emissions) will be short term in nature.

Direct impacts at Unicorn Falls include clearing of understorey, shrubs, small trees, three large trees (two Coachwood and one laurel sp.) and accidental damage to vegetation during construction, or as a result of changes to flow paths of stormwater etc. Indirect impacts will occur as a result of visitors using the area and this is already evident at the site, for example, damage to vegetation and removal.

Indirect impacts at Manns Road include those associated with increased visitation, including camping, and changes to surface hydrology caused by infrastructure constructed.

The impacts are unlikely to fragment or isolate habitat as they expand on existing clearings (Manns Road), are roadside (Unicorn Falls), or in the case of the Falls

walking track, can be crossed. Ground cover will be retained both sides of the walking track and the canopy retained above.

Visitor use of both areas has the potential to affect winter torpor being undertaken by individuals in surrounding vegetation. At both sites it is reasonable to expect the winter months to result in lower visitation which will lessen this impact. There is also an established low-level pattern of visitor use already at Unicorn Falls.

Although loss of habitat is undesirable, the impacts represent relatively small habitat losses within a much larger area of suitable potential habitat comprising eucalypt forest and rainforest. Impacts are focussed on areas with existing disturbance. To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites (see Appendix 3).

It is unlikely that the impacts of the activity, including some loss of habitat, will lead to a local extinction, although affected animals would change their use of habitat in response to habitat loss and indirect impacts.

Reference

DPIE 2018, *Eastern Pygmy-possum - Profile*, DPIE, viewed 14 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10155>>

Koala (*Phascolarctos cinereus*) - Vulnerable

Note: The Koala population in Mount Jerusalem NP does not form part of the endangered population listing in Tweed and Byron local government areas because it occurs west of the Pacific Highway.

At the national level, the combined Koala populations of Queensland, NSW and the ACT are listed as Vulnerable under the *Environment Protection & Biodiversity Conservation Act 1999*.

Distribution, Habitat and Habitat Use

In New South Wales, Koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range.

They inhabit eucalypt woodlands and forests where they feed on the foliage of eucalypt species and some non-eucalypt species, but in any one area will select preferred browse species. Within the North Coast Koala Management Area, as defined under the (new) Koala Habitat Protection State Environmental Planning Policy, 43 forage species have been identified for the Koala. Within NSW, 123 forage species have been identified.

Koalas are inactive for most of the day, feeding and moving mostly at night. They spend most of their time in trees, but will descend and traverse open ground to move between trees.

Home range size varies with habitat quality, ranging from less than 2ha to several hundred hectares in size.

Koalas are generally solitary, but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery. Females breed at two years of age and produce one young per year.

There are numerous Koala records in Mt Jerusalem NP and in surrounding forests. Table 1 (p.10) of the REF provides details of Koala records within 4km of the proposed campground.

Threats

- Loss, modification and fragmentation of habitat.
- Vehicle strike.
- Predation by roaming or domestic dogs.
- Intense prescribed burns or wildfires that scorch or burn the tree canopy.
- Koala disease.
- Heat stress through drought and heatwaves.
- Human-induced climate change.
- Inadequate support for fauna rehabilitation.
- Poor understanding of sources of trauma and mortality, distribution and trend, movements and use of habitat.

Assessment

Fifty-five Koala feed trees identified under the new SEPP will be removed at Manns Road comprising: 7 Grey Gum (*Eucalyptus propinqua*), 27 Ironbark (*E. siderophloia*), 16 Tallowwood (*E. microcorys*) and 5 White Mahogany (*E. acmenoides*) (see Appendix 1). At Unicorn Falls DUA, 3 Flooded Gum (*E. grandis*) which are also identified as Koala feed trees will be removed from the proposed carpark.

Tallowwood and Grey Gum also occur in the form of emergents over rainforest at Unicorn Falls. There are no direct impacts on these Koala feed trees from the activity. Searches for koala scats under 75 trees at the Manns Road site resulted in only one faecal pellet being located, indicating low use of the site by Koalas.

Grey Gum is also identified as a preferred feed tree in the Tweed Coast Koala Habitat Study (Biolink 2011) and the Byron Coast Koala Habitat Study (Biolink 2012). The Byron Flora and Fauna Study (Landmark & Ecograph 1999) states that moist forests with Tallowwood and Flooded Gum dominant or sub-dominant in the canopy are the most important hinterland habitats for the Koala in Byron Shire. Drier forests with a high proportion of Grey Gum are also rated highly for foraging. Flooded Gums are also recorded as having significant use by Koalas in the coastal Byron Shire (OEH 2018).

Apart from the direct impacts of removal of habitat, including feed trees, short-term impacts will be associated with short term disturbance caused by construction. Indirect impacts include those associated with increased visitation at both sites, including introduction of camping at Manns Road. Unicorn Falls has a pre-existing pattern of low-level visitation. Koala usage of the area will change due to loss of habitat and, potentially, human disturbance (short and long term).

Although any loss of koala habitat is undesirable, the impacts represent relatively small habitat losses within a much larger area of suitable habitat, as evidenced by

numerous koala records. Scat searching also indicates that there is currently low usage of the Manns Road site and there is a low proportion of Koala feed trees at the DUA, where they occur as occasional emergents above rainforest.

To avoid unintended impacts on koala feed trees and trees used for shelter and social activities, it is recommended that NPWS apply the current *Australian Standard: Protection of Trees on Development Sites* (Standards Australia 2009) in construction. It is recommended that NPWS use a qualified arborist experienced in its application, or a suitably qualified/experienced NPWS officer. The Aborigicultural Report (Appendix 9) also recommends minimising soil disturbance close to trees.

The overall impacts of the activity have been minimised by focusing on sites with existing disturbance at Manns Road and Unicorn Falls. The activity footprint at Manns Road has also been reduced as much as possible to retain habitat. However, to mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites (see Appendix 3). The bush regeneration works proposed will target dense infestations of lantana which can impede koalas when they are moving on the ground, degrade habitat and suppress koala feed tree recruitment.

References

Biolink Ecological Consultants 2011, *Tweed Coast Koala Habitat Study - Report to Tweed Shire Council*, Biolink, Uki NSW.

Biolink Ecological Consultants 2012, *Byron Coast Koala Habitat Study - Report to Byron Shire Council*, Biolink, Uki NSW.

DPIE 2019, *Koala - Profile*, DPIE, viewed 14 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10616>>

Landmark, Ecograph & Terrafocus 1999, *Byron Flora and Fauna Study*, Byron Shire Council, Mullumbimby NSW.

State of NSW and OEH 2018, *A Review of Koala Tree Use Across NSW*, OEH, Sydney.

Long-nosed Potoroo (*Potorous tridactylus*) – Vulnerable

Distribution, Habitat and Habitat Use

The Long-nosed Potoroo occurs on the south-eastern coast of Australia. In NSW, it is generally restricted to coastal heaths and wet and dry sclerophyll forests east of the Great Dividing Range, with an annual rainfall >760 mm. The stronghold of its northern distribution is along the foothills and eastern ranges of the Great Divide in northern NSW and southern Queensland.

Dense understorey with occasional open areas is essential, and may consist of grass-trees, sedges, ferns or heath, or low shrubs of tea-trees or melaleucas. A sandy loam soil is also common. A 2007/2008 study found that the habitat preferences of Long-nosed Potoroo includes a dense canopy and shrub cover with a ground layer possessing low floristic diversity.

The fruit-bodies of hypogeous (underground-fruited) fungi are a large component of the diet. Additionally, they eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil.

Their presence is often noticed because of the small holes dug in the ground, similar to bandicoot diggings.

They are mainly nocturnal, sheltering by day in dense vegetation but during winter they may forage during daylight hours. Individuals are mainly solitary and non-territorial with males occupying ranges between 2-4 hectares and females between 1-3 hectares.

Breeding usually peaks in late winter to early summer when one young is born. Adults can reproduce twice annually.

Potoroos have been recorded in the park most recently though camera trapping associated with Wildcount in 2012, 2013, 2014, 2015, 2017 & 2018. Most records are from Koonyum Range, 9km southwest, with one Wildcount record from 2012 located 4.4km west. There is also a 1995 State Forest record for 1.5km west.

Threats

- Habitat loss and fragmentation from land clearing for residential and agricultural development.
- Predation from foxes, wild dogs and cats.
- Inappropriate fire regimes reduce the density and floristic diversity of understorey vegetation.
- Logging or other disturbances that reduce the availability and abundance of food resources, particularly hypogeous fungi, and ground cover.
- Unplanned clearing in areas where the species occurs on private property is likely to degrade the species' habitat.
- Removal of wild dogs and dingoes potentially exposes potoroos to other threats (competition from other macropods/fox predation) due to removal of top order predator.

Assessment

The habitat at Manns Road more closely aligns with Long-nosed Potoroo preferred habitat than the rainforest at Unicorn Falls. No diggings were evident, however, fungi were observed above ground and emerging from the ground near tree trunks and roots. The forested areas around the existing clearing at the campground have a dense understorey and with the requisite occasional open area. There are few sclerophyllous shrubs but the ground cover includes requisite sedges and ferns but also an emerging mesic layer which extends into the midstorey.

Direct (potential) habitat clearing at the Manns Road campground amounts to 1076m². Clearing will extend out from an existing disturbed and cleared area to minimise impacts. The campground footprint has also been reduced as much as practical to minimise impacts. Impacts associated with construction (e.g. noise, emissions) will be short term in nature. Indirect impacts include those associated with increased visitation, including camping at Manns Road.

Although habitat loss is undesirable, the impacts represent relatively small habitat losses within extensive area of suitable habitat, comprising dry and wet sclerophyll

forest with the park, and represents a small proportion of an individual animal's range.

It is reasonable to conclude that Long-nosed Potoroo usage of the campground area would alter due to direct loss of habitat and, potentially, human disturbance (short and long term).

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites (see Appendix 3). The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

References

DPIE 2017 *Long-nosed Potoroo – Profile*, DPIE, viewed 14 February 2020, <https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10662>

Threatened Species Scientific Committee 2019, *Conservation Advice Potorous tridactylus tridactylus Long-nosed Potoroo (SE Mainland)*, Department of the Environment and Energy, <<http://www.environment.gov.au/biodiversity/threatened/species/pubs/66645-conservation-advice-31102019.pdf>>

Red-legged Pademelon *Thylogale stigmatica*- Vulnerable

Distribution, Habitat and Habitat Use

Red-legged Pademelon is patchily distributed along coastal and subcoastal eastern Australia from Cape York to the Hunter Valley in NSW. Southern range records are from the Watagan Mountains and the Wyong district. There are unconfirmed records from the western New England Tablelands (e.g. west of Emmaville).

They inhabit forest with a dense understorey and ground cover, including rainforest, moist eucalypt forest and vine scrub. Wet gullies with dense, shrubby ground cover provide shelter from predators.

They disperse from dense shelter areas to feed from late afternoon to early morning, favouring native grasses and herbs on the edge of the forest.

Pademelons are also known to feed on fruits, young seedling leaves and stems, fungi and ferns.

There are Wildcount records of this species on park: 1.6 km west (Middle Ridge Trail) and 4.4km north east (Mount Chowan Road), both from 2016.

Threats

- Loss or fragmentation of habitat due to land clearing and under scrubbing.
- Predation by domestic and wild dogs/dingos.
- Predation by foxes.
- Inappropriate fire regime reducing or degrading habitat, especially as a result of overly frequent or intense fires and regular burning of forest margins.
- Habitat degradation and grazing competition by feral horses, cattle, pigs, and rabbits.

- Predation by feral cats.
- Habitat degradation and grazing competition by domestic stock.
- Climate change altering habitat and increasing risks associated with fire.
- Intensive forestry practices resulting in, or exacerbating, habitat loss and fragmentation.
- Broad scale lantana removal resulting in habitat loss.
- Lack of information about disease prevalence and susceptibility

Assessment

The marginal habitat available for this species at both sites is unlikely to be directly impacted although indirect impacts associated with human activities at both sites may result in any pademelons present avoiding the vicinity of the campground and day use area when visitation levels are high. There are few native grasses and herbs occurring on the edges of forest at both sites, however, other forage habitat in the form of fruits (at Unicorns Falls), young seedling leaves and stems, fungi and ferns occur, and shelter is available nearby. Shelter habitats are unlikely to be directly impacted by the activity. The activity is focussed on areas of existing disturbance to minimise impacts of vegetation removal and minimise fragmentation or isolation impacts.

Small areas of potential forage habitat will be affected at both sites, however suitable forage habitat is limited by the paucity of native grasses and herbs occurring on edges. To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites (see Appendix 3). The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

The viability of a local population is unlikely to be affected by these impacts and any habitat directly or indirectly impacted is unlikely to be sufficiently important that the likely impacts would threaten the long-term survival of the local population.

Reference

DPIE 2017 *Red-legged Pademelon – Profile*, DPIE, viewed 14 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10805>>

Spotted-tailed Quoll (*Dasyurus maculatus*) - Vulnerable

Distribution, Habitat and Habitat Use

Spotted-tailed Quoll utilise a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.

Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites.

They are mostly nocturnal, although will hunt during the day and spend most of their time on the ground, although they are excellent climbers and will hunt possums and gliders in tree hollows and prey on roosting birds.

They create communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. Such sites may be visited by multiple individuals.

Quolls are generalist predators preferring medium-sized (500g-5kg) mammals and consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits, reptiles and insects.

Females home ranges are around 200-500 hectares, while males occupy very large home ranges from 500 to over 4000 hectares. Densely vegetated creeklines are important for travel within their home range. Average litter size is five; both sexes mature at about one year of age. Life expectancy in the wild is about 3-4 years.

All records of this species are State Forests records from 1995. Three records are from 7-11km south around Blackbutt Plateau and Koonyum Range and one record from 3.5km west.

Threats

- Loss, fragmentation and degradation of habitat.
- Competition with introduced predators such as cats and foxes.
- Deliberate poisoning, shooting and trapping, primarily in response to chicken predation.
- Roadkill.
- Poisoning from eating cane toads in the wild.

Assessment

Suitable habitat for this species occurs at both sites and extensively within the park. Densely vegetated creeklines occur nearby. Habitat for den sites is limited at and around both sites (Unicorn Falls DUA) and Manns Road (campground).

The small-scale loss of habitat at both sites within the extensive area of habitat within the park is unlikely to be significant for the local population. Similarly, indirect impacts, are unlikely to affect the viability of the local population, although quolls may avoid the DUA and campground and their surrounds or, conversely, may be attracted by the availability of food. Specialist habitat for den sites is limited at and around both sites and will not be directly affected. The impacts of the activity are unlikely to fragment or isolate any habitat at a scale significant for quolls which have large home ranges. Habitat directly or indirectly impacted by the activity is unlikely to be sufficiently important that these impacts would threaten the long-term survival of the local population.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites (see Appendix 3). The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

Reference

DPIE 2017 *Spotted-tailed Quoll – Profile*, DPIE, viewed 16 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10207>>

Yellow-bellied Glider (*Petaurus australis*) – Vulnerable

Distribution, Habitat and Habitat Use

Yellow-bellied Gliders occur in tall, mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.

They feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein. Gliders extract sap by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar.

They live in small family groups of two - six individuals and are nocturnal. Gliders make dens, often in family groups, in hollows of large trees.

Highly mobile, they occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.

The sole record for the park is from near Hells Holes, 3km southwest (State Forests 1995).

Threats

- Loss and fragmentation of habitat.
- Loss of hollow-bearing trees.
- Loss of feed trees

Assessment

A variety of favoured feed trees occur at both sites. Of these, seven Grey Gums and three Brush Box will be removed at the campground and three Flooded Gums will be removed at the DUA. No trees were observed to have characteristic incision-scarring in the area of direct impact. No hollow-bearing trees suitable for denning will be removed.

Extensive areas of forage habitat occur within the park, however denning sites would be restricted because of the park's commercial logging history. Nevertheless, old, hollow-bearing trees have been observed around roads and trails in the park. The rainforest at the DUA is not preferred glider habitat although emergent eucalypts may be used and will not be impacted.

Increased visitation to the two sites may result in gliders changing their use of habitat at the campground or in eucalypt forest surrounding the day use area, however, they are known to be highly mobile within their extensive ranges in response to seasonal food availability.

The relatively small direct and indirect impacts of the activity are unlikely to affect the species such that a local population would be placed at risk of extinction. Habitat fragmentation from the activity is minor and unlikely to affect this highly mobile species. The small areas of habitat being impacted are unlikely to be important to the survival of the local population.

References

Department of Environment & Climate Change 2007, *Yellow-bellied Glider Feed Trees: Private Native Forestry Advisory Note 3*, Environment Protection Authority, <<https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/pnf/07355ybglider.pdf?la=en&hash=F924E2EC877BF512DFCEAF54A82D96B73692A22F>>

DPIE 2017 *Spotted-tailed Quoll – Profile*, DPIE, viewed 16 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10601>>

FLYING MAMMALS

Common Blossom-bat (*Syconycteris australis*) – Vulnerable

Distribution, Habitat and Habitat Use

Common Blossom-bats often roost in littoral rainforest and feed on nectar and pollen from flowers in adjacent heathland and paperbark swamps. They have also been recorded in a range of other vegetation communities, such as subtropical rainforest, wet sclerophyll forest and other coastal forests.

They generally roost individually in dense foliage and vine thickets of the sub-canopy, staying in the same general area for a season. They change roost sites daily, but each roost site is generally only 50m or so away from other recent roosts.

Favoured feeding sites are repeatedly visited on consecutive nights within a flowering season and revisited over several years.

They require a year-round supply of nectar and pollen which is gathered from a mosaic of coastal complex vegetation types. When these vegetation types are in short supply of nectar and pollen (Nov/Dec in northern NSW) Common Blossom-bats have been known to use riverine areas containing Black Bean, Silky Oak and Weeping Bottlebrush.

There are a few, isolated records of the blossom-bat away from the coast in Tweed Shire and none in Byron Shire. There is one record from the park 3.5km west (P. Baverstock 1992).

Threats

- Clearing of coastal habitat for development resulting in habitat degradation, fragmentation, and edge effects
- Weeds, such as Bitou Bush, that suppress the regeneration of key food trees, such as Coastal Banksia.
- Predation by foxes and feral cats may occur whilst the bat is feeding on low hanging flowers and fruit.
- Inappropriate fire regimes applied in heathland habitats leading to reduced flowering of *Banksia*, *Callistemon* and *Melaleuca* species.
- Loss of habitat from climate change including inundation of lowland (wallum) habitat, coastal erosion, influx of saline water, as well as drying of littoral forests from temperature rise and increased drought.
- Limited viable habitat for the species reducing NSW population viability.

- Lack of knowledge of threats.
- Impacts from light associated with coastal development affecting behaviour (e.g. reduced foraging), particularly in small reserves where there are edge effects

Assessment

It is likely that Common Blossom-bats are using hinterland forests to supplement their diet in times of short supply on the coastal lowlands. Some favoured food plants would occur in the park generally and particularly within riparian rainforest. Favoured food plants at Unicorn Falls will not be removed and direct impacts are small-scale comprising: loss of two Coachwoods, a laurel, rainforest regrowth adjacent to South Chowan Road and understorey along the walking track to the waterfall. Favoured food plants will not be impacted at the Manns Road campground.

Light has been noted as possibly influencing feeding behaviour. Lighting at the campground, provided by campers, may have some impact on blossom-bats using the surrounding area, however, there are few favoured food plants such as Melaleucas, Banksias and Forest Red Gum (*Eucalyptus tereticornis*) located nearby and impacts would be expected to be minimal.

Use of the day use area at Unicorn Falls at night may affect blossom-bats utilising favoured food plants in the adjoining riparian rainforest however visitor numbers are expected to be low and in keeping with the quiet, remote nature of the site. Any illegal use of the area by visitors, for example for dance parties, will be targeted by NPWS compliance activities.

It is unlikely that a local population of Common Blossom-bat occurs in the park due to an absence of a year-round food supply and the bats may only use the resources available when there are supply shortages elsewhere. No favoured food plants will be impacted and indirect impacts are on the very low end of the scale of possible impacts on the species. It is unlikely that the habitat impacted is important to the long-term survival of the species.

References

DPIE 2017 *Common Blossom-bat – Profile*, DPIE, viewed 16 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10785>>

Office of Environment & Heritage 2016, *Planting to Conserve Threatened Nomadic Pollinators in NSW*, OEH, Sydney.

Large Bent-winged Bat (*Miniopterus oriana oceanensis*) - Vulnerable

Distribution, Habitat and Habitat Use

In NSW, the Large Bent-winged Bat has an extensive distribution along the coast and inland from the coast.

Caves are the primary roosting habitat, but they also use derelict mines, storm-water tunnels, buildings and other man-made structures.

Large Bent-winged Bats form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity

caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves.

Cold caves are used for hibernation in southern Australia.

Breeding or roosting colonies can number from 100 to 150,000 individuals.

Large Bent-winged Bats hunt in forested areas, catching moths and other flying insects above the tree tops.

There are no records of this species for the park but there is a recent record at Clarrie Hall Dam, directly west of the park (D Hannah 2017).

Threats

- Disturbance by recreational cavers and general public accessing caves and adjacent areas particularly during winter or breeding.
- Loss of high productivity foraging habitat.
- Introduction of exotic pathogens, particularly white-nose fungus.
- Cave entrances being blocked for human health and safety reasons, or vegetation (particularly blackberries) encroaching on and blocking cave entrances.
- Hazard reduction and wildfire fires during the breeding season.
- Predation by feral cats.

Assessment

Suitable forage habitat for this species occurs throughout the park mainly in the form of wet dry sclerophyll forest and rainforest. Wet sclerophyll forest and rainforest will be impacted by the activity. Loss of a small area of rainforest habitat at Unicorn Falls is unlikely to impact on the availability of insect prey considering the extent of riparian rainforest in the park. Although the loss of seventy trees at Manns Road, including canopy trees, will reduce the upper tree layer available for foraging, the disturbance is small-scale, amounting to a maximum of 1076m². In the context of the extensive remaining habitat in the park, this is expected to have minimal impact on forage resources.

No breeding/roosting habitat will be impacted therefore no impact on this aspect of the lifecycle of the species is likely.

The loss of small areas of suitable forage habitat for the species is unlikely to impact on the long-term survival of the species.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

Reference

DPIE 2017 *Large Bent-winged Bat – Profile*, DPIE, viewed 16 February 2020, < <https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10534> >

Eastern Long-eared Bat (*Nyctophilus bifax*) – Vulnerable

Distribution, Habitat and Habitat Use

In NSW they appear to be confined to north east coastal plain and nearby coastal ranges, extending south to the Clarence River area, with a few records further south around Coffs Harbour.

Eastern Long-eared Bats are insectivorous, and their preferred habitat is lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured.

They have been recorded eating ants, moths and click beetles and forage on the edge of the canopy rather than within foliage. They can use a slower, fluttering hover to capture prey. Foraging methods include gleaning, taking insects from foliage or bark of plants, perching, and they have also been observed taking prey from the ground.

The Eastern Long-eared Bat roosts in tree hollows, the hanging foliage of palms, in dense clumps of foliage of rainforest trees, under bark and in shallow depressions on trunks and branches, among epiphytes, in the roots of strangler figs, among dead fronds of tree ferns and less often in buildings

The species can be locally common within its restricted range.

On park, the species has been mist-netted on the western edge of the park, 4km south west (P Baverstock 1992). There are also mist-netting records for this species from Upper Main Arm, close to the park (D Milledge 2010).

Threats

- Development pressures in or near swamp, wet sclerophyll and rainforests resulting in habitat degradation, alterations to moisture regimes, and edge effects, and loss of connectivity
- Loss of hollow-bearing trees and stands of palms and rainforest trees used for roosting and maternity sites.
- Invasion of habitat by weeds, particularly by Bitou Bush on the coast.
- High frequency fire.
- Climate change resulting in degradation of habitat from forest drying and increasing likelihood of fire.
- Limited known sites for the species reducing NSW population viability.
- Predation from cats.
- Vehicle strike.
- Light pollution in and near habitat areas impacting species behaviour.

Assessment

There is suitable forage and roosting habitat for this species in rainforest and wet sclerophyll forest at Unicorn Falls. There is more marginal forage habitat at Manns Road which is drier, with fewer mesic species in the understorey and a simpler structure. Hollow-bearing trees will not be impacted. At Unicorn Falls, young, dense rainforest regrowth may fit the requirements for roosting habitat for the species. Understorey, two large Coachwoods and a laurel will be removed on the walking

track, however, these habitat features do not exhibit the dense foliage preferred for roosting.

Light may influence the species' behaviour. There will be no lighting at the DUA at Unicorn Falls. Lighting at the campground, provided by campers, may have a minor impact on Eastern Long-eared Bats using the surrounding area to forage.

Extensive rainforest occurs throughout the network of riparian areas in the park. Wet sclerophyll/moist eucalypt forests are also common. To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

Loss of up to 700m² of potential forage habitat and a up to 200m² of potential roosting habitat (young, dense rainforest regrowth) at Unicorn Falls, and loss of 1076m² of marginal forage habitat at Manns Road is unlikely to affect the viability of this species locally. The activity will result in minor impacts on habitat fragmentation because it is focussed on existing disturbed areas at both sites and the species is highly mobile. It is unlikely that the habitat to be removed is important to the species long-term survival locally.

References

Andrew D. 2015, *Complete Guide to Finding the Mammals of Australia*. CSIRO Publishing, Canberra.

Churchill S. 1998, *Australian Bats*, Clare Coney, Frenchs Forest, NSW.

DPIE 2018, *Eastern Long-eared Bat – Profile*, DPIE, viewed 17 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10567>>

Greater Broad-nosed Bat (*Scoteanax rueppellii*) – Vulnerable

Distribution, Habitat and Habitat Use

The Greater Broad-nosed Bat utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest. It is most commonly found in tall, wet forest. The species usually roosts in tree hollows and hollow branches but can use buildings.

They forage after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 – 6 m.

They have also been trapped in gullies associated with open woodland habitat and dry open forest and wet sclerophyll forest where they prey on large moths and beetles, including ground beetles, chafers and leaf beetles. These are taken within 20m of the ground from rows of trees lining creeks and edges of woodland patches in fragmented landscapes. Greater Broad-nosed Bats have been known to eat other bat species.

Little is known of their reproductive cycle. Prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of young. One young is born in January.

The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m.

There is one record on park 11km south east, on the Koonyum Range (1995 State Forests).

Threats

- Disturbance to roosting and summer breeding sites.
- Foraging habitats are being cleared for residential and agricultural developments, including clearing by residents within rural subdivisions.
- Loss of hollow-bearing trees.
- Pesticides and herbicides may reduce the availability of insects or result in the accumulation of toxic residues in individuals' fat stores.
- Changes to water regimes are likely to impact food resources, as is the use of pesticides and herbicides near waterways.

Assessment

Moist gullies and mature forests suitable as forage habitat occur in and around both sites. Hollow-bearing trees used for roosting and as maternity sites occur at Manns Road and in surrounding forests. Extensive areas of suitable forage habitat occur in the park. However, hollow-bearing trees are a restricted resource because of the park's commercial logging history. No hollow-bearing trees will be impacted at either site.

Although moist gullies occur downslope and adjacent to the Manns Road campground site its location on a ridgeline makes it marginal habitat. The forest edges created by Manns Road and the cleared area/soil dump on site may be used for foraging if suitable prey species are available, and if Greater Broad-nosed Bats are utilising nearby moist gullies. The development of the campground will expand this more marginal forest edge habitat.

At Unicorn Falls, the only impact on forest along the creekline, preferred forage habitat, is the removal of understorey for the walking track (100m²) and removal of three trees (two Coachwood and a laurel sp.). The regrowth rainforest on the edge of South Chowan Road which will be impacted is unlikely to be preferred habitat due to its density and relatively low height.

Locally, these impacts are unlikely to affect the viability of this species and the small amount of habitat to be impacted is unlikely to be important for the long-term survival of the species.

Herbicides will be used in the habitat compensation project to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. All chemicals will be used according to label requirements (and the *Pesticides Act*) by professional, experienced bush regenerators. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

References

Churchill S. 1998, *Australian Bats*, Clare Coney, Frenchs Forest, NSW.

DPIE 2018, *Greater Broad-nosed Bat – Profile*, DPIE, viewed 17 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10748>>

Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable

Distribution, Habitat and Habitat Use

Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations.

They occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps, as well as urban gardens and cultivated fruit crops.

Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.

Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Site fidelity to camps is high; some camps have been used for over a century.

Annual mating commences in January and conception occurs in April or May. One young is born in October or November.

Flying-foxes can travel up to 50 km from their camp to feed on the nectar and pollen of native trees, in particular, *Eucalyptus*, *Melaleuca* and *Banksia*, and fruits of rainforest trees and vines. Commuting distances are more often less than 20 km.

Most camps occur below 200 m along the coastal lowlands and ranges. A high proportion of camps are occupied continuously. Seasonally occupied camps are widely distributed in the coastal lowlands and ranges reflecting the significance of habitats in the region throughout the year.

In terms of food resources, extensive, widely distributed areas are productive from late spring to early autumn. From late autumn to early spring the extent of habitat is reduced and restricted in distribution, largely occurring in areas east of the escarpment. Winter is the greatest food resource bottleneck with productive areas concentrated in coastal floodplains, coastal dunes and inland slopes in SEQ and northern NSW. Most winter habitats are heavily cleared, poorly conserved and recognised as endangered vegetation communities.

The species has not been recorded on park, however, there is a record at Upper Main Arm, adjacent to the park (Wildthing Consulting 2004) and it is likely to occur.

Threats

- Loss of roosting and foraging sites.
- Electrocution on powerlines, entanglement in netting and on barbed-wire.
- Heat stress.
- Conflict with humans.
- Incomplete knowledge of abundance and distribution across the species' range

Assessment

Rainforest occurs throughout the network of riparian areas in the park. Tall sclerophyll forests are also common. Wet sclerophyll forest occurs at Manns Road campground and at Unicorn Falls, where rainforest also occurs.

Ironbark (*Eucalyptus siderophloia*) is the only nectar tree with a high productivity/reliability score impacted by the activity. Twenty-five Ironbark trees will be removed at Manns Road campground. Brush Box (*Lophostemon confertus*), White Mahogany (*E. acmenoides*) and Grey Gum (*E. propinqua*) are also recognised nectar trees but with much lower productivity/reliability score. In total, fifteen trees of these species will be removed at Manns Road. Three Flooded Gums (*E. grandis*) will be removed at Unicorn Falls, however, this species also has a much lower productivity/reliability score. Despite the loss of these resources, there are extensive areas of forest within the park containing flying-fox nectar trees.

Impacts on rainforest at Unicorn Falls involve the removal of understorey for the walking track (100m²), removal of three trees (two Coachwood and a laurel sp.) and removal of regrowth rainforest (200m²) beside South Chowan Road. The regrowth rainforest possibly contains some food plants, however, the impact of their removal is small-scale in terms of the availability of alternate fruit sources in the network of riparian rainforest on park.

The campground has been designed to minimise and avoid impacts as far as possible and both sites include existing disturbed areas. To mitigate the unavoidable impacts of the activity, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

It is unlikely that loss of the forty-three nectar trees and a small area of young, fruiting rainforest trees and vines will result in a viable local population being placed at risk of extinction. The concept of a local population of the flying-fox has been the subject of some debate because the species travels considerable distances seasonally to take advantage of seasonal food resources and to utilise maternity camps. The impacted habitat is unlikely to be important to the species long-term survival.

References

Churchill S. 1998, *Australian Bats*, Clare Coney, Frenchs Forest, NSW.

DPIE 2017, *Grey-headed Flying-fox – Profile*, DPIE, viewed 17 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10697>>

Eby P. & Law B. 2008, *Ranking the Feeding Habitats of Grey-headed Flying-Fox for Conservation Management*, a report for the Department of Environment & Climate Change (NSW) & The Department of Environment, Water, Heritage & Arts, <<https://www.environment.nsw.gov.au/resources/threatenedspecies/GHFFmainreport.pdf>>

Large-eared Pied Bat (*Chalinolobus dwyeri*) – Vulnerable

Distribution, Habitat and Habitat Use

Pied bats are found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. They are generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes.

Pied Bats roost in caves (near their entrances), crevices in cliffs, old mine workings and have been recorded in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*). Almost all records are within several kilometres of cliff lines or rocky terrain. It is likely that critical foraging resources are also located in these areas.

Over most of its range, the large-eared pied bat appears to roost predominantly in caves and overhangs in sandstone cliffs and forage in nearby high-fertility forest or woodland near watercourses. The presence of suitable caves or overhangs may be more important than the geology, as bats have also been captured near rhyolite cliffs in south-east Queensland.

They forage in low to mid-elevation dry open forest and woodland close to these roosts. Well-timbered areas containing gullies are favoured. They are also known from the edges of rainforest and wet sclerophyll forest.

Their relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. The species probably forages for small, flying insects below the forest canopy.

Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years and are likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring.

On park, the species has been recorded 3.5km west (P. Baverstock 1992) and 11km southeast on Koonyum Range (1995 W Braithwaite - SFNSW).

Threats

- Clearing and isolation of forest and woodland habitats near cliffs, caves and old mine workings for agriculture or development.
- Loss of foraging habitat close to cliffs, caves and old mine workings from forestry activities and too-frequent burning, usually associated with grazing.
- Damage to roosting and maternity sites from mining operations, and recreational caving activities.
- Use of pesticides.
- Disturbance to roosting areas by goats.

Assessment

The presence of rhyolite outcrops and clifflines provide possible roost habitat on park. The exact location of all of these features on park and their favourability as roost sites is unknown. As foraging records usually occur within a few kilometres of

roosts and there are two known records from the park. On this basis, the species has been included for assessment.

In terms of impacts on potential forage habitat, the activity will impact on wet sclerophyll forest at the campground and rainforest edges at Unicorn Falls. No known roosting habitat will be impacted.

The rainforest edge impacted at Unicorn Falls is beside South Chowan Road where rainforest regrowth will be removed. This edge will be replaced by a new rainforest edge further inland from the road edge. An area of 1076m² of wet sclerophyll forest will be removed at Manns Road campground. Forage resources associated with this habitat will be lost. The habitat is contiguous with other similar habitat and extensive wet sclerophyll habitat occurs in the park, as well as other favoured vegetation communities. Therefore, this loss represents a small-scale impact on forage resources available locally.

Use of the campground by visitors may result in Pied Bats avoiding a broader area around the campground, however their susceptibility to low levels of human disturbance, primarily noise and light, is unknown.

Herbicides will be used in the habitat compensation project to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. All chemicals will be used according to label requirements (and the *Pesticides Act*) by professional, experienced bush regenerators. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

Impacts on habitat are very low compared to the remaining forage habitat locally and no roosting habitat will be impacted. It is unlikely that these impacts will result in a viable local population being placed at risk of extinction. Any (minor) fragmentation impacts are unlikely to be significant because of the mobility of this species. The impacted habitat is unlikely to be important to the species long-term survival.

References

Churchill S. 1998, *Australian Bats*, Clare Coney, Frenchs Forest, NSW.

DPIE 2017, *Large-eared Pied Bat - Profile*, DPIE, viewed 17 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10157>>

Department of Environment and Resource Management 2011, *National Recovery Plan for the Large-eared Pied Bat* *Chalinolobus dwyeri*, report to the Department of Sustainability, Environment, Water, Population and Communities, Canberra. <<http://www.environment.gov.au/system/files/resources/9e59696a-f72f-4332-8eda-25eeb4460349/files/large-eared-pied-bat.pdf>>

Little Bentwing-bat (*Miniopterus australis*) – Vulnerable

Distribution, Habitat and Habitat Use

Little Bentwing-bats are recorded along the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW.

Preferred habitats are moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and Banksia scrub, where they are usually found in well-timbered areas.

During the day, they roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings. At night, they forage for small insects beneath the canopy of densely vegetated habitats.

Only five nursery sites /maternity colonies are known in Australia. Little Bentwing-bats often share roosting sites with Common Bentwing-bats (*Miniopterus schreibersii*) and, in winter, the two species may form mixed clusters. In NSW, the largest maternity colony is closely associated with a large maternity colony of Eastern Bentwing-bats (*Miniopterus schreibersii oceanensis*) and appears to depend on this colony to provide the high temperatures required to successfully rear its young.

Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer.

On park, the species is recorded 4.8km south, 7km south around Blackbutt Plateau and 11km southeast on Kooynum Range (all records W Braithwaite 1995).

Threats

- Disturbance of colonies, especially in nursery or hibernating caves, may be catastrophic.
- Destruction of caves that provide seasonal or potential roosting sites.
- Changes to habitat, especially surrounding maternity/nursery caves and winter roosts.
- Pesticides on insects and in water consumed by bats bio accumulates, resulting in poisoning of individuals.
- Predation from foxes, particularly around maternity caves, winter roosts and roosts within culverts, tunnels and under bridges.
- Predation from feral cats, particularly around maternity caves, winter roosts and roosts within culverts, tunnels and under bridges
- Introduction of exotic pathogens such as the White-nosed fungus.
- Hazard reduction and wildfire fires during the breeding season.
- Large scale wildfire or hazard reduction can impact on foraging resources.
- Poor knowledge of reproductive success and population dynamics

Assessment

Suitable habitat in the form of wet sclerophyll forest occurs at both sites and rainforest occurs at Unicorn Falls. No roost sites are known locally and none will be impacted by the activity. Forage habitat will be impacted at both sites. The main impacts will be at Manns Road campground where the forest structure will change and the niche where the bats forage will be removed over an area of up to 800m². Impacts on forage in rainforest/wet sclerophyll forest at Unicorn Falls are minor in scale with removal of small areas of understorey and three trees for walking tracks (100m²), and removal of roadside rainforest regrowth (200m²). The rainforest regrowth is relatively low and dense and is unlikely to be suitable habitat as it does not provide the more open, layers of forest structure preferred for foraging.

Use of the campground by visitors may result in bats also avoiding the area around the campground, however their disturbance response to low levels of human activity, resulting primarily in noise and light, is unknown.

Herbicides will be used in the habitat compensation project to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. All chemicals will be used according to label requirements (and the *Pesticides Act*) by professional, experienced bush regenerators. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

Impacts on habitat are very low compared to the remaining forage habitat locally and no roosting habitat will be impacted. It is unlikely that these impacts will result in a viable local population being placed at risk of extinction. Any (minor) fragmentation impacts are unlikely to be significant because of the mobility of this species. The relatively small areas of impacted habitat are unlikely to be important to the long-term survival of the species.

References

Churchill S. 1998, *Australian Bats*, Clare Coney, Frenchs Forest, NSW.

DPIE 2019, *Little Bentwing-bat - Profile*, DPIE, viewed 17 February 2020,
< <https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10533>
>

Southern Myotis (*Myotis macropus*) – Vulnerable

Distribution, Habitat and Habitat Use

Southern Myotis are recorded the length of the NSW coast and for some distance inland in southern NSW, associated with major rivers. They generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Roost trees have been reported up to 400m from water.

Southern Myotis forage over streams and pools catching insects and small fish by raking their feet across the water surface. They also forage aerially. In NSW, they have one young each year usually in November or December. In southern Queensland they have one young in October and January.

There are records on park: 1.6km west on a tributary of Rowlands Creek and on Kooynum Range 11km southeast (both records W Braithwaite 1995).

Threats

- Loss or disturbance of roosting sites.
- Clearing adjacent to foraging areas.
- Application of pesticides in or adjacent to foraging areas.
- Reduction in stream water quality affecting food resources

Assessment

No roosting or forage habitat for this species will be impacted at the Manns Road campground due to the absence of streams and its location on a ridgeline. Suitable

forage habitat occurs at Unicorn Falls DUA along South Chowan Creek. No hollow-bearing trees or other roost habitat will be impacted at Unicorn Falls. Vegetation impacts adjacent to the creek involve removal of 100m² of understorey and three trees for the walking track to the falls. Although loss of habitat is undesirable, the impacts comprise relatively small losses within a much larger area of suitable habitat along South Chowan Creek.

There may also be impacts associated with visitors using Unicorn Falls when foraging usually occurs (from dusk). It is expected that this use will involve low numbers of visitors and occur predominantly in the warmer months. There is also an existing pattern of visitor use of the site. Any illegal use of the area by visitors, for example for dance parties, will be targeted by NPWS compliance activities.

Herbicides will be used in the habitat compensation project to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. All chemicals will be used according to label requirements (and the *Pesticides Act*) by professional, experienced bush regenerators. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

The main impact is on vegetation adjacent to South Chowan Creek. This impact is very low when compared to the extensive local riparian habitat. No roosting habitat will be impacted. It is unlikely that these impacts will result in a viable local population being placed at risk of extinction. Any (minor) fragmentation impacts are not significant because the species is highly mobile. The relatively small areas of impacted habitat are unlikely to be important to the long-term survival of the species.

References

Churchill S. 1998, *Australian Bats*, Clare Coney, Frenchs Forest, NSW.

DPIE 2017, *Southern Myotis - Profile*, DPIE, viewed 18 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10549>>

Tanton M. 1996, *Proposed Forestry Operations in the Murwillumbah Management Area – Environmental and Fauna Impact Statement – Fauna Appendix (Volume 3)*, Prepared on behalf of State Forests of NSW, State Forests of NSW, Pennant Hills, Sydney.

Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) - Vulnerable

Distribution, Habitat and Habitat Use

The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes.

They roost singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.

Sheathtail-bats forage in most habitats across their extensive range in areas with and without trees. They have been observed to defend aerial territories.

When foraging for insects, they fly high and fast over the forest canopy, but fly lower in more open country. They consume a high proportion of beetles but their diet also includes grasshoppers, shield bugs and flying ants.

Breeding has been recorded from December to mid-March, when one young is born.

Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.

There are no records of this species in the park, but there are records adjacent at Clarrie Hall Dam (D Hannah 2017) and to the south in Goonengerry NP (W Braithwaite 1995).

Threats

- Disturbance to roosting and summer breeding sites.
- Clearing foraging habitats for residential and agricultural developments, including clearing by residents within rural subdivisions.
- Loss of hollow-bearing trees; clearing and fragmentation of forest and woodland habitat.
- Pesticides and herbicides may reduce the availability of insects or result in the accumulation of toxic residues in the bat's fat stores.

Assessment

No potential roost habitat, hollow-bearing trees, will be impacted. As an insectivore feeding about the canopy across a wide range of vegetation communities, the main impact on this species from the activity is the removal of vegetation. Up to 940m² of forested habitat and 136m² of understorey will be cleared at the Manns Road campground. At Unicorn Falls DUA, 210m² of vegetation and three trees will be cleared for the carpark and 100m² of understorey and three trees for the walking track to the falls.

Although loss of forage habitat is undesirable, the impacts are minor considering the availability of forage habitat across a wide range of vegetation communities locally and regionally. No roosting habitat will be impacted.

It is unlikely that these impacts will result in a viable local population being placed at risk of extinction. Any (minor) fragmentation impacts are not significant because the species is highly mobile. The relatively small areas of impacted habitat are unlikely to be important to the long-term survival of the species.

References

Churchill S. 1998, *Australian Bats*, Clare Coney, Frenchs Forest, NSW.

DPIE 2017, *Yellow-bellied Sheath-tail-bat - Profile*, DPIE, viewed 18 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10549>>

BIRDS

Albert's Lyrebird (*Menura alberti*) – Vulnerable

Distribution, Habitat and Habitat Use

Albert's Lyrebird is restricted to a small area of far south-eastern Queensland and north-eastern NSW. In NSW, it is mainly found in the McPherson and Tweed Ranges but occurs west to the Acacia Plateau in the Border Ranges and south to the Koonyum and Nightcap Ranges, with an isolated population at the species' eastern and southern limit in the Blackwall Range, between Alstonville and Bagotville.

They mainly occur in the wettest rainforests or wet sclerophyll forests with a wet understorey, often of rainforest plants. Higher densities of Albert's Lyrebirds occur in association with a canopy of eucalypts compared with rainforest lacking eucalypts (for equivalent climate), and in wet sclerophyll forest with greater weights of litter and logs and slower rates of litter decomposition.

In optimum habitat, they forage up to major ridges whereas in mid-quality habitat tend to forage only on lower slopes and in gullies, and do not forage in dry sclerophyll forest.

Lyrebirds feed on the ground, usually where there is a deep, moist layer of leaf-litter, and fallen logs. In NSW, Lyrebirds usually forage in rather open areas without a dense layer but with a well-developed taller strata.

Lyrebirds eat invertebrates that live in soil and leaf-litter, particularly insects and their larvae, but have not been observed to eat earthworms.

They are solitary birds; the males are territorial, and it is likely that the females are also. Occasionally, two or three birds may be seen close together.

Lyrebirds breed over winter, with clutches found between late May and mid-August. The nest is built on a rocky ledge, in fissures in rocks, between rocks, or occasionally in caves on steep rock faces or cliffs. Females lay a single egg and do all the parental care.

There are numerous records in the park -west, south west and south - at about 50 locations. The closest record is 1.5km northwest on Manns Road (S Debus 1990). There are no records in the northeast part of the park.

Threats

- Clearing of rainforest and wet eucalypt forest habitat for forestry and agriculture, and subsequent, fragmentation and isolation of remnant patches is thought to be the main reason for the decline of the species. Continued clearing for forestry activities or for agricultural and residential development remains a threat.
- Intensive management of forests, especially conversion of optimal wet sclerophyll forest habitat to plantations. Damage to the canopy, understorey and ground layers of rainforest and wet sclerophyll forest habitats through forestry activity. Plantations contain much lower densities and sometimes no Albert's Lyrebirds compared to habitat recovering from selective logging, or optimal habitat.
- Invasion of habitat by weeds, especially Lantana (*Lantana camara*), which reduces suitability of the habitat.
- Damage to habitat by grazing stock.

Appendix 4 Threatened Species Assessments – BC Act & EPBC Act

- Encroachment of urban or rural development close to habitat of Albert's Lyrebirds, as densities of Lyrebirds are lower close to such developments than would be expected.
- The isolated population in the Blackwall Range is under threat because it is so small, with possibly as few as 10 or fewer birds, and isolated from other populations.
- Fire may be a threat in exceptionally dry years, particularly isolated outlying populations.
- Predation by Red Foxes (*Vulpes vulpes*) and feral dogs or, close to settlements, domestic dogs and cats may pose a threat, though this is thought to be of minor significance.
- Anthropogenic climate change, and potential changes to habitat and further restrictions of range linked to such change.

Assessment

The activity will impact on forage habitats in wet sclerophyll forest and rainforest at Manns Road and Unicorn Falls. Most, if not all, of the habitat features important to this species are present at both sites or, in the case of suitable nesting habitat are likely to occur nearby. No known nesting habitat will be impacted.

Additionally, operation of the campground may result in lyrebirds avoiding this area. There is a pre-existing pattern of generally low-level use at Unicorn Falls, however, if use increases markedly this may impact on lyrebirds using the locality. Presumably, visitor such use will decrease in winter when use of the falls decreases.

Up to 940m² of forage habitat and 136m² of wet sclerophyll understorey will be cleared at the Manns Road campground. At Unicorn Falls DUA, 210m² of vegetation and three trees will be cleared for the carpark and 100m² of rainforest/wet sclerophyll understorey and three trees for the walking track to the falls.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

Although loss of forage habitat is undesirable, the impacts are minor considering the availability of forage habitat in large areas of wet sclerophyll forest within the park and contiguous with the two development sites, and in the network of riparian rainforest in the park. No known nesting habitat will be impacted.

It is unlikely that these impacts on forage habitat will result in a viable local population being placed at risk of extinction. Any (minor) fragmentation impacts are not significant because the species is highly mobile. The relatively small areas of impacted habitat are unlikely to be important to the long-term survival of the species.

References

DPIE 2018, *Albert's Lyrebird - Profile*, DPIE, viewed 18 February 2020,

<<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10525>>

Barred Cuckoo-shrike (*Coracina lineata*) – Vulnerable

Distribution, Habitat and Habitat Use

Barred Cuckoo-shrikes are widely distributed along coastal eastern Australia from Cape York to the Manning River in NSW. They are generally uncommon in their range and rare in NSW.

They are fruit-eating, particularly favouring figs, but also take insects. They utilise rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses. They are usually seen in pairs or small flocks foraging among foliage of trees for insects and fruit. Barred Cuckoo-shrikes are active birds and move frequently from tree to tree.

Nesting occurs between October and January when a nest is built high in a tree.

There are no records on park, however, there are records close by at Mt Nullum (G Holmes 1987) and Wilsons Creek (D Gosper 1987).

Threats

Reduction of habitat, particularly rainforest, due to clearing for agriculture, development and timber harvesting.

Assessment

The activity will impact on rainforest and eucalypt forest habitat for this species. Rainforest is particularly important because of its role in providing fruits in the bird's diet. Impacts on trees are of concern because they are primary forage habitat (and roosting habitat). Up to 940m² of eucalypt forest habitat will be cleared at the Manns Road campground. At Unicorn Falls DUA, 210m² of vegetation, including young rainforest regrowth, and three eucalypt trees will be cleared for the carpark and three rainforest trees will be removed for the walking track to the falls. No figs will be removed.

Visitor use of the camping and day use areas may impact on Barred Cuckoo-shrikes using these areas, however, Unicorn Falls has an existing pattern of mainly low-level use and it would be expected that usage of both sites would reduce in winter.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

Although loss of habitat is undesirable, the impacts comprise relatively small losses compared to alternative habitat locally and the activity is focussed on areas with existing disturbance to minimise additional impacts.

It is unlikely that the impacts on forage habitat will result in a viable local population being placed at risk of extinction. Any (minor) fragmentation impacts are not significant because the species is highly mobile. The relatively small areas of impacted habitat are unlikely to be important to the long-term survival of the species. Habitat compensation will be provided.

References

DPIE 2018, *Barred Cuckoo-shrike - Profile*, DPIE, viewed 18 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10176>>

Tanton M. 1996, *Proposed Forestry Operations in the Murwillumbah Management Area – Environmental and Fauna Impact Statement – Fauna Appendix (Volume 3)*, Prepared on behalf of State Forests of NSW, State Forests of NSW, Pennant Hills, Sydney.

Glossy Black-Cockatoo (*Calyptorhynchus lathami*) - Vulnerable

Distribution, Habitat and Habitat Use

Glossy Black-Cockatoos inhabit open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important local food sources. They are dependent on large hollow-bearing eucalypts for nest sites.

Assessment

No feed trees or hollow-bearing trees will be removed. Forest Sheoak (*A. torulosa*) is recorded in the walk-in tent camp area at Manns Road. To ensure preservation of potential feed trees, it is recommended that all Forest Sheoaks (*A. torulosa*) within the walk-in tent camp and any directly adjoining the campground footprint are clearly identified in the field for retention.

Assuming that this occurs, there will be no impact on current forage or nesting resources for this species. The impact of removing general habitat without forage or nesting resources is unlikely to result in a viable local population being placed at risk of extinction. Similarly, this habitat is unlikely to be important to the long-term survival of the species.

References

DPIE 2017, *Glossy Black-Cockatoo - Profile*, DPIE, viewed 18 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10140>>

Tanton M. 1996, *Proposed Forestry Operations in the Murwillumbah Management Area – Environmental and Fauna Impact Statement – Fauna Appendix (Volume 3)*, Prepared on behalf of State Forests of NSW, State Forests of NSW, Pennant Hills, Sydney.

Little Lorikeet (*Glossopsitta pusilla*) – Vulnerable

Distribution, Habitat and Habitat Use

The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs.

Little Lorikeets forage primarily in the canopy of open *Eucalyptus* forest and woodland, yet also finds food in *Angophora*, *Melaleuca* and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species.

They feed mostly on nectar and pollen and occasionally on native fruits, such as mistletoe, and rarely in orchards.

They form small, gregarious, travelling and feeding flocks (<10) often with other lorikeets. Flocks numbering in the hundreds are still occasionally observed and may have been the norm in past centuries.

Little Lorikeets roost in treetops, often distant from feeding areas. Nests are located in proximity to feeding areas, if possible. Most typically hollows are selected in the limb or trunk of smooth-barked Eucalypts. The entrance is small (3 cm) and usually high above the ground (2–15 m). Nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like *Allocasuarina*.

Nesting season extends from May to September. In years when flowering is prolific, Little Lorikeet pairs can breed twice, producing 3-4 young per attempt. The survival rate of fledglings is unknown.

There are two records in the park: at Koonyum Range (State Forests 1995) and in the west of the park, near Rockface Road (A Smith 1992).

Threats

- Given that large old *Eucalyptus* trees on fertile soils produce more nectar, the extensive clearing of woodlands for agriculture has significantly decreased food for the lorikeet, thus reducing survival and reproduction. Small scale clearing, such as during roadworks and fence construction, continues to destroy habitat and it will be decades before revegetated areas supply adequate forage sites.
- The loss of old hollow bearing trees has reduced nest sites, and increased competition with other native and exotic species that need large hollows with small entrances to avoid predation. Felling of hollow trees for firewood collection or other human demands increases this competition.
- Competition with the introduced Honeybee for both nectar and hollows exacerbates these resource limitations.
- Infestation of habitat by invasive weeds.
- Inappropriate fire regimes.
- Aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners.
- Climate change impacts including reduction in resources due to drought.
- Degradation of woodland habitat and vegetation structure due to overgrazing.

Assessment

The activity will impact on the eucalypt forest habitat preferred by this species for foraging and nesting. Critical nesting resources for this species will not be impacted because no hollow-bearing trees will be removed.

Up to 940m² of Eucalypt forest will be removed to develop the campground, including 55 Eucalypt trees: 27 Ironbark, 16 Tallowwood, 7 Grey Gum, and 5 White Mahogany. Although the soils of the campground are not nutrient-rich, being formed on acid volcanics, Ironbarks are particularly significant because they are highly productive and flower in winter when resource shortages for nomadic pollinators can occur.

To mitigate these (and other) unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

To minimise any additional impacts on trees, the Tree Removal and Protection Plan – Manns Road Campground (Appendix 6) identifies trees within the campground development footprint that require further assessment to determine specific protection measures that may be required to protect them from unintended and unassessed impacts associated with construction.

It is unlikely that the impacts on forage habitat will result in a viable local population being placed at risk of extinction. Any (minor) fragmentation impacts are not significant because the species is highly mobile. The forage habitat being impacted is unlikely to be important to the long-term survival of the species. Habitat compensation will be provided.

References

DPIE 2017, *Little Lorikeets - Profile*, DPIE, viewed 18 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20111>>

Office of Environment & Heritage 2016, *Planting to Conserve Threatened Nomadic Pollinators in NSW*, OEH, Sydney.

Marbled Frogmouth (*Podargus ocellatus*) – Vulnerable

Distribution, Habitat and Habitat Use

There are two widely separated subspecies of Marbled Frogmouth in Australia: one is confined to central-eastern Cape York Peninsula, and the other is restricted to south-eastern Queensland and north-eastern NSW, between about Gladstone and Lismore, and inland to Burnett Range in Queensland and west of the Richmond Range.

The Marbled Frogmouth prefers subtropical rainforest, particularly in deep, wet, sheltered gullies along creeklines and often containing stands of Bangalow Palms or ferns. In NSW, it is most often found in moist, lowland, mesophyll vine forest.

Less often, they are found in the ecotone between rainforest and wet Eucalypt forests, or occasionally in cool rainforest and higher elevation temperate rainforests. Rarely in wet eucalypt forest.

Like other frogmouths, the Marbled Frogmouth is nocturnal, hunting at night and roosting by day.

The diet consists mainly of large nocturnal insects. They hunt from large perches, such as stumps or low branches, sallying out to take their prey from the ground or from the foliage of plants.

Birds breed from about August to December. The usual clutch is usually one egg but is sometimes two eggs. Both parents incubate the eggs. A stick nest is constructed on a tree branch.

There are three records in the park all in the south: near Mount Jerusalem (A Smith 1992); on Rockface Road (G Watts 1992) and near the headwaters of Coopers Creek (W Braithwaite 1995). The closest record is at Upper Main Arm, directly adjacent to the park (D Milledge 2011).

Threats

- Clearing, fragmentation and isolation of rainforest and associated wet eucalypt forests for agriculture and forestry has been the main cause of past declines and continue to operate as a threat for the species.
- Opening of the canopy and promotion of dense understorey growth caused by timber harvesting.
- Invasion of habitat by weeds following disturbance.
- Isolation of patches of habitat owing to frequent burning of connecting forest.

Assessment

The wet sclerophyll forest, with a well-developed rainforest below, and the rainforests and ecotones around Unicorn Falls on South Chowan Creek most closely align with preferred forage habitat for this species.

Impacts to construct the walking track in this area will be small-scale comprising loss of two Coachwoods and one laurel and 100m² of rainforest understorey. Operation of the DUA may result in any Marbled Frogmouths roosting in close proximity moving further away to roost. The DUA has an existing pattern of low-level visitor use. Although this usage is expected to increase, it will be concentrated during the day and is anticipated to reduce in the cooler months.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

It is unlikely that these small-scale impacts will result in a viable local population being placed at risk of extinction. The forage habitat being impacted is unlikely to be important to the long-term survival of the species. Habitat compensation will be provided.

References

DPIE 2018, *Marbled Frogmouth - Profile*, DPIE, viewed 18 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10640>>

Tanton M. 1996, *Proposed Forestry Operations in the Murwillumbah Management Area – Environmental and Fauna Impact Statement – Fauna Appendix (Volume 3)*,

Prepared on behalf of State Forests of NSW, State Forests of NSW, Pennant Hills, Sydney.

Masked Owl (*Tyto novaehollandiae*) – Vulnerable

Distribution, Habitat and Habitat Use

The distribution of the Masked Owl extends from the coast, where it is most abundant, to the western plains, with no seasonal variation in its distribution. Overall, records for this species occur within approximately 90% of NSW, excluding the most arid north-western corner.

The Masked Owl lives in dry eucalypt forests and woodlands from sea level to 1100m. Although a forest owl it preferentially hunts along ecotones within forests and on the edges of forests, including roadsides.

The typical diet consists of tree-dwelling and ground mammals, especially rats.

Pairs have a large home-range of 500 to 1000 hectares. They roost and breed in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.

Habitat requirements include dense trees or shrubs to shelter fledglings and high densities of terrestrial small mammals. Specific habitat requirements are dry eucalypt forest/woodlands on productive sites on gentle terrain, a grassy understorey with a mosaic of sparse and dense cover and a high density of hollow bearing trees.

There are records from six locations spread widely throughout the park (north to south): two locations near Mt Chowan (S Debus 1990), Middle Ridge Trail (State Forests 1995), Blackbutt Plateau (State Forests 1995) and two locations on Kooyum Range (State Forests 1995).

Threats

- Loss of mature hollow-bearing trees and changes to forest and woodland structure, which leads to fewer such trees in the future.
- Clearing of habitat for grazing, agriculture, forestry or other development.
- A combination of grazing and regular burning affects the quality of ground cover for mammal prey, particularly in open, grassy forests.
- Secondary poisoning from rodenticides.
- Vehicle strike.

Assessment

The two sites, at Unicorn Falls and Manns Road, meet only a few of the habitat requirements of this species and would be considered marginal. Masked Owls may use the ecotones and roadsides for hunting and, because of its simpler structure and the flatter terrain, the forest in and around the Manns Road campground may be used for hunting. The mesic vegetation around South Chowan Creek may be used for nesting or roosting, however, very few hollow-bearing trees occur. Soils are relatively low-nutrient.

Possible impacts include loss of foraging habitat at Manns Road campground (1077m²) and vehicle strike associated with increased vehicle movements. Most

vehicle movements to the campground and day use area would occur during the day which will minimise this impact. No hollow-bearing trees will be removed.

It is unlikely that these small-scale (potential) impacts on marginal habitat will result in a viable local population being placed at risk of extinction. The habitat being impacted is unlikely to be important to the long-term survival of the species.

References

Department of Environment & Conservation 2006, *NSW Recovery Plan for the Large Forest Owls: Powerful Owl (Ninox strenua), Sooty Owl (Tyto tenebricosa) and Masked Owl (Tyto novaehollandiae)*, DEC, Sydney.

<<https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Recovery-plans/large-forest-owls-recovery-plan-060413.pdf>>

DPIE 2017, *Masked Owl - Profile*, DPIE, viewed 18 February 2020,

<<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10820>>

Powerful Owl (*Ninox strenua*) – Vulnerable

Distribution, Habitat and Habitat Use

The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. It occurs at low densities throughout most of its eastern range, rare along the Murray River and former inland populations may never recover.

The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well.

The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine (*Syncarpia glomulifera*), Black She-oak (*Allocasuarina littoralis*), Blackwood (*Acacia melanoxylon*), Rough-barked Apple (*Angophora floribunda*), Cherry Ballart (*Exocarpus cupressiformis*) and a number of eucalypt species. Coachwood (*Ceratopetalum apetalum*), Lilly Pilly (*Acmena smithii*) and Sassafras (*Doryphora sassafras*) are also commonly used. Roost sites comprise similar-sized trees with dense foliage between 3-15m.

The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. There may be marked regional differences in the prey taken by Powerful Owls. In southern NSW, Ringtail Possum make up the bulk of prey in the lowland or coastal habitat. At higher elevations, such as the tableland forests, the Greater Glider may constitute most of the prey for a pair of Powerful Owls. Flying foxes are important prey in some areas; birds comprise about 10-50% of the diet, depending on the availability of preferred mammals. As

most prey species require hollows and a shrub layer, these are important habitat components for the owl.

Pairs of Powerful Owls demonstrate high fidelity to a large territory, the size of which varies with habitat quality and thus prey densities. In good habitats, 400 ha can support a pair; where hollow trees and prey have been depleted the owls need up to 4000 ha.

Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him. Nests are usually within 100m of streams or minor drainage lines.

Powerful Owls are monogamous and mate for life. Nesting occurs from late autumn to mid-winter but is slightly earlier in north-eastern NSW (late summer - mid autumn). Clutches consist of two eggs.

There are records from seven locations within the park: on the central western park boundary on Rockface Road (A Smith 1992), Middle Ridge Trail (State Forests 1995), two locations near Mt Chowan (S Debus 1990), Blackbutt Plateau (State Forests 1995) and two locations on Kooyum Range (State Forests 1995).

Threats

- Historical loss and fragmentation of suitable forest and woodland habitat from land clearing for residential and agricultural development. This loss also affects the populations of arboreal prey species, particularly the Greater Glider which reduces food availability for the Powerful Owl.
- Inappropriate forest harvesting practices that have changed forest structure and removed old growth hollow-bearing trees. Loss of hollow-bearing trees reduces the availability of suitable nest sites and prey habitat.
- Can be extremely sensitive to disturbance around the nest site, particularly during pre-laying, laying and downy chick stages. Disturbance during the breeding period may affect breeding success.
- High frequency hazard reduction burning may also reduce the longevity of individuals by affecting prey availability.
- Road kills.
- Secondary poisoning.
- Predation of fledglings by foxes, dogs and cats.

Assessment

The activity will result in impacts on forage habitat, primarily, the loss of 1076m² of wet sclerophyll forest at the Manns Road campground. Two Coachwoods will be removed for the walking track at Unicorn Falls and are potential roost habitat. No hollow-bearing nest trees will be removed. Potential impacts on the species from the loss of 210m² of regrowth vegetation, adjacent to South Chowan Road at Unicorn Falls, is expected to be minor. Possible impacts include vehicle strike associated with increased vehicle movements. Most vehicle movements to the campground and day use area would occur during the day which will minimise this impact.

To minimise any additional impacts on trees, the Tree Removal and Protection Plan – Manns Road campground (Appendix 6) identifies trees within the campground development footprint that require further assessment to determine specific protection measures that may be required to protect them from unintended and unassessed impacts associated with construction.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

It is unlikely that these small-scale impacts will result in a viable local population being placed at risk of extinction. The forage habitat being impacted is unlikely to be important to the long-term survival of the species. Habitat compensation will be provided.

References

Department of Environment & Conservation 2006, *NSW Recovery Plan for the Large Forest Owls: Powerful Owl (Ninox strenua), Sooty Owl (Tyto tenebricosa) and Masked Owl (Tyto novaehollandiae)*, DEC, Sydney.
<<https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Recovery-plans/large-forest-owls-recovery-plan-060413.pdf>>

DPIE 2017, *Powerful Owl - Profile*, DPIE, viewed 18 February 2020,
<<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10562>>

Rose-crowned Fruit-Dove (*Ptilinopus regina*) – Vulnerable

Distribution, Habitat and Habitat Use

Rose-crowned Fruit-Doves occur along the coast and ranges of eastern NSW and Queensland, from Newcastle to Cape York. Vagrants are occasionally found further south to Victoria. They occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. They are shy pigeons, not easy to see amongst the foliage, and are more often heard than seen.

They feed entirely on fruit from vines, shrubs, large trees and palms, and are thought to be locally nomadic as they follow the ripening of fruits. Some populations are migratory in response to food availability. Numbers in north-east NSW increase during spring and summer then decline in April or May.

There are two records in the park: 2.6km south west (W Braithwaite 1995) and near Blackbutt Plateau 6.5km south (W Braithwaite 1995).

Threats

- Clearing and fragmentation of low to mid-elevation rainforest.
- Logging and roading in moist eucalypt forest with well-developed rainforest understorey.
- Burning of remnant rainforest habitat.
- Invasion of habitat by introduced weed species

- Removal of Camphor Laurel food source without appropriate mitigation measures.

Assessment

The main impact on this species' requirements is on forage and nesting habitat. At Unicorn Falls, the rainforest and wet sclerophyll forest with a well-developed understorey provides a range of fruit sources and nesting habitat for this species. Impacts in this area are removal of roadside regrowth, including young rainforest (47m²) for the carpark; loss of 97m² of understorey/mid storey, two Coachwoods and a laurel for walking track construction.

The mesic understorey at the Manns Road campground may also provide suitable forage species. 1076m² of vegetation will be removed at the campground. The campground is planned around an existing cleared area and has been reduced in size to further minimise impacts.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

It is unlikely that the small-scale impacts at Manns Road and Unicorn Falls will result in a viable local population being placed at risk of extinction. The species is highly mobile and beyond large tracts of forested habitat, it forages in small remnants and regrowth patches and in Camphor Laurel (*Cinnamomum camphora*) regrowth in farmland. The forage habitat being impacted is unlikely to be important to the long-term survival of the species. Habitat compensation will be provided.

References

DPIE 2018, *Rose-crowned Fruit-Dove - Profile*, DPIE, viewed 19 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10708>>

NSW Scientific Committee 2008, *Rose-crowned Fruit-dove Ptilinopus regina - Review of Current Information in NSW*, <<https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/sc-rose-crowned-fruit-dove-ptilinopus-regina-review-report.pdf?la=en&hash=E1C9F83274ECAFE66B6B6343CAA17AB0B3545D60>>

Sooty Owl (*Tyto tenebricosa*) - Vulnerable

Distribution, Habitat and Habitat Use

Sooty Owls occupy the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. Territories are occupied permanently.

They occur in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. They roost by day in the hollow of a tall forest tree or in dense vegetation and hunt by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (*Pseudocheirus peregrinus*) or Sugar Glider (*Petaurus breviceps*). They nest in very large tree-hollows.

Their home ranges have been estimated at between 200ha and 800 ha depending on habitat productivity. Preferred nesting and foraging habitat comprises moist forest in unlogged corridors in gully systems. Habitat requirements include a dense mid-storey of rainforest trees and shrubs.

Sooty Owls have been recorded from twelve locations on park. Two records (G Holmes) from the mid-1980s are close to the Unicorn Falls DUA. One record is directly adjacent to the DUA near Chowan Creek and the other is around 600m downstream.

Other records: 1.5km west and 2km south west (S Debus 1990), 3km south west (W Braithwaite 1995) 3.6km west (A Smith 1992), 7km south (A Smith 1992 & State Forests 1995), two records around Blackbutt Plateau (1995), two records at Koonyum Range - 8km south east (S Debus 1992) and 9 km south east (D Stewart 1987).

Threats

- Loss of mature hollow-bearing trees and changes to forest and woodland structure, which leads to fewer such trees in the future.
- Clearing of habitat for grazing, agriculture, forestry or other development.
- A combination of grazing and regular burning is a threat, through the effects on the quality of ground cover for mammal prey, particularly in open, grassy forests.
- Secondary poisoning from rodenticides.

Assessment

The wet sclerophyll forest at Unicorn Falls with its well-developed rainforest layer and the intergraded rainforest closely align with habitat preferences. This is borne out by the two Sooty Owl records at the DUA site and nearby. No hollow-bearing trees habitat will be removed.

Impacts of the activity are on forage habitat: removal of roadside regrowth, including young rainforest (47m²) for the carpark; loss of 97m² of rainforest understorey/mid storey and two Coachwoods and a laurel (10m - 15m) for the walking track.

The moist eucalypt forest and rainforest in the park provides extensive preferred habitat for this species. The main constraint is on availability of hollow-trees suitable for nesting and the competition for these.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

It is unlikely that the small-scale impacts at Unicorn Falls will result in a viable local population being placed at risk of extinction. The impacts will not fragment habitat and the species is highly mobile. The forage habitat being impacted is unlikely to be important to the long-term survival of the species. Habitat compensation will be provided.

References

DPIE 2017, *Sooty Owl - Profile*, DPIE, viewed 19 February 2020,

<<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10821>>

Department of Environment & Conservation 2006, *NSW Recovery Plan for the Large Forest Owls: Powerful Owl (Ninox strenua), Sooty Owl (Tyto tenebricosa) and Masked Owl (Tyto novaehollandiae)*, DEC, Sydney.

<<https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Recovery-plans/large-forest-owls-recovery-plan-060413.pdf>>

Superb Fruit-dove (*Ptilinopus superbus*) – Vulnerable

Distribution, Habitat and Habitat Use

The Superb Fruit-dove occurs mainly from north-east Queensland to north-east NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya.

It inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.

Part of the population is migratory or nomadic. There are records of single birds flying into lighted windows and lighthouses, indicating that birds travel at night. At least some of the population, particularly young birds, moves south through Sydney, especially in autumn.

Breeding takes place from September to January. The nest is a structure of fine interlocked forked twigs, giving a stronger structure than its flimsy appearance would suggest, and is usually 5-30 metres up in rainforest and rainforest edge tree and shrub species. The male incubates the single egg by day, the female incubates at night.

There are no records on park with the closest records at Clarrie Hall Dam (D Hannah 2016) 6.3km west, Stokers Siding (2017), and in Inner Pocket NR, Mt Warning NP 13km northwest, and Goonengerry NP, 12km south.

Threats

- Clearing and fragmentation of low-elevation rainforest resulting in irregular food availability throughout the year.
- Changes to rainforest habitat with climate change including drying and increased fire frequency.

Assessment

Impacts of the activity are on forage and nesting habitat and comprise: removal of roadside regrowth, including young rainforest (47m²) for the carpark; loss of 97m² of rainforest understorey/mid storey and two Coachwoods and a laurel (10m - 15m) for the walking track. Extensive areas of rainforest supporting preferred forage and nesting habitat occur in the park.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the

DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

It is unlikely that the small-scale impacts at Unicorn Falls will result in a viable local population being placed at risk of extinction. The impacts will not fragment habitat and the species is highly mobile. The habitat being impacted is unlikely to be important to the long-term survival of the species. Habitat compensation will be provided.

Reference

DPIE 2018, *Superb Fruit-dove - Profile*, DPIE, viewed 19 February 2020, < <https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10709>

Varied Sittella (*Daphoenositta chrysoptera*) – Vulnerable

Distribution, Habitat and Habitat Use

The Varied Sittella is sedentary and inhabits most of mainland Australia except treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Population size in NSW is uncertain but is believed to have undergone a moderate reduction over the past several decades.

They inhabit eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. Sittellas feed on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.

They build a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.

There is one record in the park: 11km south east on Koonyum Range (Longmore & Mason CSIRO 1995). The closest records are in Inner Pocket NR (M Stanton 1990) and at Clarrie Hall Dam (D Hannah 2017).

Threats

- Apparent decline has been attributed to declining habitat. The sedentary nature of the Varied Sittella makes cleared land a potential barrier to movement.
- The Varied Sittella is also adversely affected by the dominance of Noisy Miners in woodland patches
- Threats include habitat degradation through small-scale clearing for fencelines and road verges, rural tree decline, loss of paddock trees and connectivity, 'tidying up' on farms, and firewood collection.
- Infestation of habitat by invasive weeds.
- Inappropriate fire regimes.
- Climate change impacts including reduction in resources due to drought.
- Overgrazing by stock impacting on leaf litter and shrub layer

Assessment

The vegetation at the Manns Road Campground most closely aligns with the habitat requirements of Varied Sittella. Impacts on this area comprise removal of 1076m² of

eucalypt forest dominated by Ironbark, Grey Gum, Tallowwood and White Mahogany. Seventy trees will be removed.

The campground is planned around an existing cleared area and has been reduced in size to further minimise impacts. To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

It is unlikely that the loss of eucalypt habitat at the Manns Road campground will result in a viable local population being placed at risk of extinction. Extensive areas of contiguous habitat occur in the park. The impacts will not fragment habitat however they will expand an existing clearing within the forest, adjacent to Manns Road. The habitat being impacted is unlikely to be important to the long-term survival of the species. Habitat compensation will be provided.

Reference

DPIE 2017, *Varied Sittella - Profile*, DPIE, viewed 19 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20135>>

White-eared Monarch (*Carterornis leucotis*) - Vulnerable

Distribution, Habitat and Habitat Use

The species is endemic to the coastal lowlands and eastern slopes of the Great Divide of eastern Australia, extending from Cape York Peninsula south to north-eastern NSW. In NSW, White-eared Monarchs are generally found from the Queensland border south to Iluka, at the mouth of the Clarence River, and inland as far as the Richmond Range.

In NSW, White-eared Monarchs occur in rainforest, especially drier types, such as littoral rainforest, as well as wet and dry sclerophyll forests, swamp forest and regrowth forest.

They appear to prefer the ecotone between rainforest and other open vegetation types or the edges of rainforest, such as along roads.

They are highly active when foraging, characteristically sallying, hovering and fluttering around the outer foliage of rainforest trees. They are usually observed high in the canopy or subcanopy. They eat insects, but their diet is not well studied.

They breed from about September to March, usually nesting high in the canopy, and often at the edge of patches of rainforest.

There are six locations where they have been recorded on park. 700m west (1996 Australian Museum), 1.6km north west (W Braithwaite1995), 3km south west (W Braithwaite1995), 3 x 7.5 km south (W Braithwaite1995, Anon 1985, D Milledge 1987). They have also been recorded at Upper Main Arm.

Threats

- Clearing and increasing fragmentation and isolation of habitat, especially low-elevation subtropical rainforest, littoral rainforest and wet sclerophyll forest, through agricultural, tourist and residential development or forestry activities.

Appendix 4 Threatened Species Assessments – BC Act & EPBC Act

- Forest management that results in conversion of multi-aged forests to young, even-aged stands.
- Invasion of forests by weeds.
- Inappropriate fire regimes that degrade habitat or allow invasion by weeds.
- Degradation or loss of habitat through grazing of stock.
- Changes to rainforest habitat with climate change including drying and increased fire frequency.
- Lack of information on the species habitat requirements in NSW, particularly breeding habitat.
- Easily disturbed by the presence of people.

Assessment

Vegetation removal associated with the activity will impact on breeding and forage habitat for this species. 1076m² of wet sclerophyll forest at the Manns Road site and at Unicorns Falls, removal of roadside regrowth, including young rainforest (47m²) for the carpark; loss of 97m² of rainforest understorey/mid storey and two Coachwoods and a laurel for the walking track. The rainforest may be marginal habitat as it does not conform with the preferred drier rainforest types.

Impacts have been minimised by reducing the footprint of the activity as much as possible and focussing on existing cleared areas.

Human usage of both sites may result in White-eared Monarchs avoiding these areas. It is expected that visitor use will reduce in the winter months. Extensive areas of wet sclerophyll forest and rainforest supporting forage and nesting habitat occur in the park.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

It is unlikely that the loss of habitat at the Manns Road and Unicorn Falls will result in a viable local population being placed at risk of extinction. Extensive areas of contiguous habitat occur in the park. The impacts will not fragment habitat however they will expand existing clearings within the forest, adjacent to roads. The habitat being impacted is unlikely to be important to the long-term survival of the species. The footprint of the activity has been reduced as much as possible and habitat compensation will be provided.

Reference

DPIE 2018, *White-eared Monarch - Profile*, DPIE, viewed 19 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10540>>

Wompoo Fruit-dove (*Ptilinopus magnificus*) – Vulnerable

Distribution, Habitat and Habitat Use

Wompoo Fruit-Doves occur along the coast and coastal ranges from the Hunter River in NSW to Cape York Peninsula. It is rare south of Coffs Harbour. Three

subspecies are recognised, with the most southerly in NSW and south-eastern Queensland.

It occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests where it feeds on a diverse range of tree and vine fruits. They appear to be most abundant in warmer, mature rainforests dominated by *Ficus* spp. and less common in fragments.

The species has a seasonal altitudinal migration, spending time in upland forests during summer and moving to lower elevations during winter. Occasionally, particularly during autumn and winter when rainforest fruit is scarce, individuals will move up to 15 km to temporarily occupy more open country. It is thought to be an effective medium to long-distance agent of seed dispersal.

It is an obligate frugivore, feeding on a variety of rainforest fruits. Often fruits are large and eaten whole. Most foraging is done high in the canopy although the species will also secure food in the lower storeys of the forest.

Wompoo Fruit-Doves selectively forage on species that are more common in well-developed rainforest than in regrowth. Fruit is taken from palms (Arecaceae), vines (Vitaceae) and trees in the families Araliaceae, Cunoniaceae, Ebenaceae, Elaeocarpaceae, Lauraceae, Meliaceae, Moraceae, Myrtaceae, Oleaceae, Pennantiaceae, Rutaceae and Sapindaceae. Individual mature paddock trees such as figs (*Ficus* spp.) may also be visited during fruiting.

The nest is a typical pigeon nest - a flimsy platform of sticks on a thin branch or a palm frond, often over water, usually 3 - 10 m above the ground.

It breeds in spring and early summer; laying one egg. The species has an estimated home range requirement of approximately 20 ha when breeding. Core breeding range occurs at mid to high elevation sites around the Mt Warning and Focal Peak shield volcanoes but also occurs in the Washpool- Chaelundi area and Dorrigo Plateau. In far north NSW, breeding extends to lower elevations in forest continuous with extensive mid to high elevation forests. Much of this core breeding habitat occurs in conservation reserves.

The species has been recorded at Unicorn Falls (Birds Australia 2001) and 1km east near South Chowan Road (Birds Australia 2011). It has also been recorded from near Hells Holes, 3km south west (1995 State Forests; 2011 Birds Australia), 7km south around Blackbutt Plateau (1987 Milledge; 1984 Anon) and 8.7 km south west on Koonyum Range (D Stewart 1987).

Threats

- Clearing and fragmentation of low to mid-elevation rainforest due to coastal development and grazing.
- Logging and roading in moist eucalypt forest with well-developed rainforest understorey.
- Burning, which reduces remnant rainforest habitat patches.
- Infestation of rainforest habitat by invasive weeds.

Assessment

The vegetation at Unicorns Falls closely aligns with preferred habitat which is borne out by a local record of the Fruit-Dove. Impacts of the activity are primarily removal

of potential forage and breeding habitat. Impacts comprise removal of roadside regrowth, including young rainforest (47m²) for the carpark; loss of 97m² of rainforest understorey/mid storey and two Coachwoods and a laurel for walking track construction. Impacts have been minimised by reducing the footprint of the activity as much as possible and focussing on existing cleared areas.

Significant areas of contiguous rainforest and moist eucalypt habitat occur in the park. To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

It is unlikely that the small-scale impacts at Unicorn Falls will result in a viable local population being placed at risk of extinction. The impacts will not fragment habitat and the species is highly mobile. The habitat being impacted is unlikely to be important to the long-term survival of the species. Habitat compensation will be provided.

References

DPIE 2018, *Wompoo Fruit-Dove - Profile*, DPIE, viewed 19 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10707>>

NSW Scientific Committee 2010, *Wompoo Fruit-dove Ptilinopus magnificus Review of Current Information in NSW*, <<https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/sc-wompoo-fruit-dove-ptilinopus-magnificus-review-report.pdf?la=en&hash=6DADEE5AB7275DB9851F138874747298F62C31B9>>

AMPHIBIANS

Giant Barred Frog (*Mixophyes iteratus*) – Endangered

Distribution, Habitat and Habitat Use

The Giant Barred Frog is distributed along the coast and ranges from Eumundi in south-east Queensland to Warrimoo in the Blue Mountains. Declines appear to have occurred at the margins of the species' range, with no recent records south of the Hawkesbury River and disappearances from a number of streams in QLD. Northern NSW, particularly the Coffs Harbour-Dorrigo area, is a stronghold.

Giant Barred Frogs are found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation.

Moist riparian habitats such as rainforest or wet sclerophyll forest are favoured for the deep leaf litter that they provide for shelter and foraging, as well as open perching sites on the forest floor. However, Giant Barred Frogs will also sometimes occur in other riparian habitats, such as those in drier forest or degraded riparian remnants, and even occasionally around dams.

Breeding takes place from late spring to summer. Once eggs are laid and fertilised in the water, the female kicks them out of the water where they stick onto a suitable bank (e.g. overhanging or steeply sloped). Hatchlings drop or wriggle into the water.

Tadpoles grow to about 11cm and it may take up to 14 months between egg laying and the completion of metamorphosis.

Although generally found within about 20m of the stream, outside the breeding season, the Giant Barred Frog may disperse away from the stream, 50m or further. It is a generalist feeder, with large insects, snails, spiders and frogs included in its diet.

There are records at two locations on park, both on the tributaries of Doon Doon Creek above Clarrie Hall Dam (all D Hannah 2018). The nearest record off-park is 4.5km north west near Rowlands Creek Rd (I Stych 2012).

Threats

- Much of the habitat of the Giant Barred Frog occurs in the lower reaches of streams that are also the focus of agricultural and rural residential activities. Clearance of riparian vegetation is a major threat in these environments.
- Tall, dense weed infestations can decrease the quality and amount of habitat available, particularly where there are canopy gaps in the riparian vegetation. Lantana and exotic grasses decrease habitat suitability.
- Reduction in water quality or alterations to flow patterns. Embryos and tadpoles can be vulnerable to siltation.
- Inadequate protection of riparian habitat during forestry activities.
- In some locations, the Giant Barred Frog is known to carry chronic infections of the fungal pathogen *Batrachochytrium dendrobatidis* that causes chytridiomycosis. This pathogen is a threat as it is a known cause of decline in frog species, however it is unclear whether the Giant Barred Frog is currently declining from this cause.
- Predation of individuals and disturbance of habitat or destruction of eggs by feral pigs.
- Damage to riparian habitats from grazing and physical disturbance by domestic stock.
- Small population sizes particularly within the south of the species range may make it susceptible to stochastic events and loss of genetic variation.

Assessment

A rapid habitat assessment for this species and two other threatened frogs was conducted in June 2019 (D Milledge, Landmark Ecological Services). It determined that flatter terrain with a well-developed litter layer around the clearing at the DUA was potential forage habitat. Both tributaries of Chowan Creek which converge above the falls, the pools above and below the falls and associated riparian areas are potential foraging and breeding habitat.

There will be no direct impacts on the ground layer beyond the clearing, however, indirect impacts caused by visitors entering this area may occur. It is unlikely that leaf litter would be removed, only disturbed. Toilets will be provided which should largely eliminate such disturbance.

Construction of the walking track will impact on the ground layer on the lower slopes near the creek. 41m² of midstorey, understorey and groundcover will be removed on the DUA side of the creek. Approximately 15m² will be impacted on the opposite side of the creek before the walking track starts ascending a steep slope and becomes

less favourable habitat. In total, approximately 56m² of potential forage habitat will be impacted.

The pools currently experience a low-level of use. This is expected to increase with construction of the day use area and promotion of the hinterland walking track. Usage of the pools is expected to be higher in the warmer months and lower when the weather cools off. Turbidity following rain was noted in the pools at the time of the field investigation.

The rapid habitat assessment report recommends the following measures to minimise impacts on potential Giant Barred Frog habitat:

- Install effective sediment traps about the South Chowan Road bridges over the eastern and western tributaries of Chowan Creek to reduce sedimentation of breeding habitat above and below Unicorn Falls.
- Post signage at the DUA warning against excessive disturbance of the pools about Unicorn Falls during the spring-summer breeding season and particularly against the use of shampoo.

If the above recommendations are implemented and care is taken to restrict impacts to the construction footprint, the impacts on foraging habitat are not expected to result in a viable local population being placed at risk of extinction. Habitat will not be fragmented and the walking track would not present a barrier to movement. The small area of forage habitat being impacted is unlikely to be important to the long-term survival of the species, considering the retention of similar habitat locally and along the creek downstream.

Sedimentation of potential breeding habitat is already occurring with unknown impact and will continue unless addressed. The activity presents an opportunity to remove this threat to potential breeding habitat by renewing or rectifying sedimentation traps around the road bridge and monitoring the outcome.

References

DPIE 2017, *Giant Barred Frog - Profile*, DPIE, viewed 19 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10538>>

Milledge D 2019, A Rapid Habitat Assessment for Threatened Frog Species and Mitchell's Rainforest Snail in the Area of the Proposed Unicorn Falls Track, Mt Jerusalem National Park, North East NSW. A report to NPWS.

Pouched Frog (*Assa darlingtonia*) – Vulnerable

Distribution, Habitat and Habitat Use

Pouched Frog is a relict species that occupies disparate and restricted mesic forest refugia mainly within north-east NSW but also extending into south-east Queensland. Pouched Frog occurs in dense, scattered colonies. There are five isolated populations: Dorrigo Plateau, Gibraltar Range, Border Ranges and two in south-east Queensland.

Pouched frogs live in cool, moist rainforest, including Antarctic Beech, or moist eucalypt forest in mountainous areas, mostly above 800 m but have been found as low as 300m.

They spend most of the time in damp leaf litter, or under rocks and rotten logs.

Pouched Frog was recorded calling at Unicorn Falls in January 2020 (E Kirsner 2020, pers. comm., 25 January). It has also been recorded from the central section of the park 2.8km south west around Scrub Fire Trail (K Harvey CSIRO1995; W Braithwaite 1995) and in the southern part of the park: 7km south in the vicinity of Blackbutt Plateau (W Braithwaite1995, H Bower 1996) and 6km south west (A Smith 1992).

Threats

- Timber harvesting.
- Road clearing.
- Weed invasion in productive environments
- Removal of fallen logs and leaf litter through frequent fire, particularly fire associated with grazing management.
- Anthropogenic climate change
- Infection by amphibian chytrid fungus
- Drought and climate change leading to increased temperatures.
- Habitat damage from trampling by domestic stock.

Assessment

A rapid habitat assessment for this species and two other threatened frogs was conducted in June 2019 (D Milledge, Landmark Ecological Services). It determined that potential foraging and breeding habitat occurred in the rainforest in the vicinity of the DUA and extended along the slopes and benches adjacent to the creek system. Higher quality habitat was typified by well-developed moist litter. Areas of heavy past logging with lantana invasion were also identified as suitable habitat, if the requisite litter layer was present. Logs and large tree buttresses on slopes were also identified as potential habitat, the highest quality of this habitat was in wetter areas.

The rapid habitat assessment report recommends the following measures to minimise impacts on potential threatened frog habitat:

- Remove and spread soil from benching upslope on more even terrain and away from logs and moist, well-developed litter layers.
- Adjust the track route locally to avoid large logs and buttresses of large trees, particularly in wetter areas with well-developed litter layers.
- Attempt to retain large logs requiring removal upslope on benches below the track as habitat for threatened frog and snail species.
- Progressively remove small patches of Lantana rather than large expanses because of the likelihood of the presence of Pouched Frog habitat.

Since the rapid habitat assessment, the track route assessed has been abandoned. A number of the report's recommendations applied to the steep sections of the track route to the campground proposed at that time. The only moderately steep track section remaining the subject of this assessment is across the creek from the day use area. The recommendations are equally relevant to that section of track.

Impacts on potential habitat comprise the vegetation to be removed for the carpark (210m²) and for the walking track from the DUA to the falls (97m²).

If the above recommendations are implemented and care is taken to restrict impacts to the construction footprint, the impacts on breeding and foraging habitat are not expected to result in a viable local population being placed at risk of extinction. Habitat will not be fragmented and the walking track would not present a barrier to movement. The small area of breeding and forage habitat being impacted is unlikely to be important to the long-term survival of the species, considering the retention of suitable habitat locally along the creek system and adjacent slopes, as identified in the rapid habitat assessment.

References

DPIE 2019, *Giant Barred Frog - Profile*, DPIE, viewed 19 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10070>>

Milledge D 2019, A Rapid Habitat Assessment for Threatened Frog Species and Mitchell's Rainforest Snail in the Area of the Proposed Unicorn Falls Track, Mt Jerusalem National Park, North East NSW. A report to NPWS.

REPTILES

Stephen's Banded Snake (*Hoplocephalus stephensii*) – Vulnerable

Distribution, Habitat and Habitat Use

Stephen's Banded Snake occurs along the coast and ranges from Southern Queensland to Gosford in rainforest and eucalypt forests and rocky areas up to 950 m in altitude.

Stephens' Banded Snake is nocturnal, and shelters between loose bark and tree trunks, amongst vines, or in hollow trunks limbs, rock crevices or under slabs during the day. At night it hunts frogs, lizards, birds and small mammals. It feeds in the canopy as well as on the ground.

There is one records of this species on park: 7km south at Blackbutt Plateau (State Forests 1995). There are numerous records in Nightcap NP, Whian Whian SCA, Mt Warning NP and at Coopers Ck and Wanganui Gorge.

Threats

- Clearing and fragmentation of habitat.
- Forestry practices which result in loss of old or dead trees.
- Too frequent burning for fuel reduction or grazing management which destroys old and dead trees and removes understorey vegetation.
- Illegal collection of snakes from the wild.
- Poor knowledge of the species' habitat preferences.

Assessment

Impacts on potential forage and shelter habitat for this species comprise loss of moist eucalypt vegetation at the Manns Road campground (1076m²), roadside

vegetation (210m²) at Unicorn Falls, including (47m²) of dense rainforest regrowth, and rainforest midstorey and understorey for the walking track (97m²), including tree rainforest trees (to 15m). No hollow-bearing trees will be removed.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

It is unlikely that the loss of potential habitat at the Manns Road and Unicorn Falls will result in a viable local population being placed at risk of extinction. Extensive areas of contiguous habitat occur in the park. The impacts will not fragment habitat and the walking track will be able to be crossed readily and will not form a barrier. The habitat being impacted is unlikely to be important to the long-term survival of the species. The footprint of the activity has been reduced as much as possible and habitat compensation will be provided.

References

DPIE 2018, *Stephen's Banded Snake - Profile*, DPIE, viewed 19 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10414>>

Tanton M. 1996, *Proposed Forestry Operations in the Murwillumbah Management Area – Environmental and Fauna Impact Statement – Fauna Appendix (Volume 3)*, Prepared on behalf of State Forests of NSW, State Forests of NSW, Pennant Hills, Sydney.

INVERTEBRATES

Mitchell's Rainforest Snail (*Thersites mitchellae*) – Endangered

Distribution, Habitat and Habitat Use

Mitchell's Rainforest Snail is found in remnant vegetation on the coastal plain between the Richmond River and Tweed River on the NSW north coast. It has also been recorded from some adjacent mid-elevation areas including Wilsons River and Mount Jerusalem.

Preferred habitat is remnant areas of lowland subtropical rainforest and swamp forest on alluvial soils. Slightly higher ground around the edges of wetlands with palms and fig trees are particularly favoured.

The snail is typically found among leaf litter on the forest floor, and occasionally under bark in trees. It is active at night and feeds on leaf litter, fungi and lichen.

On park, four specimens were recorded around Mt Chowan approx. 2km north of the Unicorn Falls site (J Stanistic & J Parkyn 2004).

Off-park it has been recorded 2km south east at Upper Main Arm (D Milledge 2011), at Murwillumbah (D Pike 2017) and at Wilson's Creek. A survey at the Wilson's Creek site failed to relocate the species (Stanistic 1999).

Threats

- Clearing of lowland rainforest, swamp forest and wetland margins for agriculture.

Appendix 4 Threatened Species Assessments – BC Act & EPBC Act

- Clearing of lowland rainforest, swamp forest and wetland margins for urban development.
- Damage to remnant areas of habitat from grazing by domestic stock.
- Damage to remnant areas of habitat by fire.
- Damage to remnant areas of habitat by weed invasion.
- Predation of snails by introduced rats.
- Habitat fragmentation increasing edge effects including increasing the severity of disturbance from fire, weeds and predation by introduced rats.
- Use of herbicides and pesticides in and near areas of habitat.
- Impacts on habitat as a result of dieback caused by root rot fungus (*Phytophthora cinnamomi*).
- Loss of coastal populations from sea level rise and climate change.
- Damage to habitat from changes in hydrology.
- Poor knowledge of species distribution.
- Lack of awareness of the species within the community.

Assessment

A rapid habitat assessment for this species (D Milledge, Landmark Ecological Services 2019) concluded that potential habitat was difficult to predict and assumed that micro-habitat preferences observed in floodplain areas would also be preferred away from the coast. In coastal areas, the species is known to shelter under large logs and in *Ficus* spp. buttresses on relatively level ground, where a high moisture regime is maintained.

The report notes that the species may occur in vegetation around the clearing at the Unicorn Falls day use area site where scattered large logs and a deep litter layer provide a potential forage substrate and shelter. Other locations on relatively flat terrain with deep litter layers and logs would also provide potential habitat.

The report recommends retaining large logs on the forest floor wherever possible as they function as potential habitat for threatened frogs and snails and avoiding impacts on the buttresses of large trees.

Impacts on potential forage and shelter habitat for this species comprise loss of roadside vegetation (210m²) at Unicorn Falls, including (47m²) of dense rainforest regrowth. Construction of the walking track will impact on the ground layer on the lower slopes near the creek: 41m² of midstorey, understorey and groundcover will be removed on the DUA side of the creek and approximately 15m² will be impacted on the opposite side of the creek before the walking track starts ascending a steep slope and becomes less favourable habitat. In total, approximately 56m² of potential forage habitat along the walking track route will be impacted.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the campground, the DUA and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

If the above recommendation is implemented and care is taken to restrict impacts to the construction footprint, the impacts on shelter and forage habitat are not expected to result in a viable local population being placed at risk of extinction. There are other

areas along the creek system in the park which share similar microhabitat features, and some locations are noted in the report, however their extent is unknown.

The walking track would not present a barrier to movement on the lower slopes and gentler sections where the snail's preferred habitat occurs, however crossing the walking track would increase the potential for predation.

Although any loss of habitat is undesirable, the impacts are small-scale and additional habitat with similar microhabitat features will be retained around the day use area site. Toilets will be provided to reduce likelihood of disturbance to the surrounding forest understorey and groundcover. It is unlikely that the small area of habitat being impacted is important to the long-term survival of the species. The footprint of the activity has been reduced as much as possible and habitat compensation will be provided.

References

DPIE 2019, *Mitchell's Rainforest Snail - Profile*, DPIE, viewed 19 February 2020, <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10801>>

Stanisic J 1999, Survey for the Land Snail *Thersites mitchellae* in Northern NSW, II. Investigation of Wilson's Creek Locality, a consultancy conducted for the NSW NPWS.

Key Threatening Processes

Threatened Species Assessments (5 Part tests) *Biodiversity Conservation Act 2016*

Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats

- (e) whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The following Key Threatening Processes (KTPs) were reviewed to consider the impact of the activity on the operation, or increase, in impact of KTPs.

- Aggressive exclusion of birds from woodland and forest habitat by abundant noisy miners, *Manorina melanocephala*

Noisy Miners favour open woodlands and forests with low understorey and ground cover, particularly remnants with high edge to area ratios. They are of particular concern in woodland remnants with low understorey and ground cover and high edge to area ratios. The small-scale expansion of the existing clearing in the open forest at the campground and the small-scale clearing adjacent and within the largely closed forest at the day use area is unlikely to favour expansion of the range of noisy miners (*Manorina melanocephala*).

- Bushrock removal

Rocks have been brought to the Manns Road site and dumped with other spoil. The rock may be re-used on-site or removed but they do not represent in-situ bushrock of the site. No other bushrock removal will occur.

- Clearing of native vegetation

The proposal involves clearing approximately 1900m² of native vegetation to establish the campground and day use area and associated infrastructure. A habitat compensation program has been developed which will result in regeneration of 4.4 ha of forest around the campground, nearby rainforest and rainforest at the day use area.

- Forest eucalypt dieback associated with over-abundant psyllids and bell miners

The causes for the operation of this KTP have yet to be determined, however, some of the forest types most susceptible to dieback occur in forests nearby, for example Flooded Gum open forest. The habitat compensation program will target dense lantana infestations near the campground and day use area and may have a positive effect on the operation of this KTP because dense lantana infestation is suggested as a factor that favours establishment of bell miners. Bell miners have not been recorded in Mount Jerusalem NP but have been recorded from the Nightcap Range to the south-west.

- High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition

Use of the campground and day use area by visitors increases the risk that a campfire may accidentally escape into surrounding forest, increasing fire frequency. This risk will be mitigated by not providing firewood at either the campground or the day use area.

- Importation of red imported fire ants, *Solenopsis invicta*

There is potential for importation of red fire ants in materials from areas where they already occur, for example, south-east Queensland. All materials will be sourced from reputable sources and machinery cleaned prior to use on the park.

- Infection of frogs by amphibian chytrid causing the disease *chytridiomycosis*

Chytrid is a common disease of frogs in NSW. Stream-associated frog species and populations at high altitude (>400m) are more likely to be susceptible to the disease. Frog populations occur along Chowan Creek, including at Unicorn Falls. The disease status of the local frog populations is unknown. Wet or muddy boots and tyres and fishing and camping equipment may contribute to the spread of the disease through transfer of fungal spores. Priority actions for this KTP include developing and distributing hygiene protocols for all relevant stakeholders. If chytrid is identified in frogs locally, information on hygiene protocols should be made available at the campground and day use area.

- Infection of native plants by *Phytophthora cinnamomi*

P. cinnamomi is widespread in NSW, particularly in higher rainfall areas (>600 mm annually). The occurrence or extent of *P. cinnamomi* at either development sites is unknown, however, there are no visible signs of tree dieback. The most favourable conditions for spore production are free water and warm temperatures. *P. cinnamomi* can be spread in water, soil or within plant material that contains the pathogen, and dispersal is favoured by moist or wet conditions. It can be carried in both overland and sub-surface water flow and by water moving infested soil or organic material.

Humans have the capacity to disturb and transport more soil than any other vector. Most of the large centres of infestation that exist today in southern temperate Australia occurred because of human activity, often as a direct result of the introduction of infested soil or road-building materials to vulnerable non-infested areas.

All construction and landscaping materials will be sourced from reputable sources and machinery cleaned prior to use on the park.

If an outbreak of *P. cinnamomi* is identified locally, it is recommended that NPWS install disinfecting facilities, that is, wash-down bays, footbaths and/or scrubbing stations, as appropriate, at primary entrance/exit points for vehicles and foot traffic.

- Introduction and establishment of exotic rust fungi of the order *Pucciniales* pathogenic on plants of the family *Myrtaceae*.

Myrtle Rust occurs in a range of ecosystems including coastal heath, littoral, subtropical and tropical rainforest, wet and dry sclerophyll and sand island

ecosystems. It is not eradicable in mainland NSW by current means. The spores are spread by wind as well as some animals and human activities.

Myrtle Rust has been observed on the two specimens of Scrub Turpentine (*Rhodamnia rubescens*) at the proposed campground and on other specimens of this species recorded locally during field surveys. The proposal includes erecting an 8m x 8m enclosure around the specimens at the proposed campground. Signage will be erected with information about the species under threat and encouraging visitors to assist by staying out of the enclosure.

- Invasion and establishment of exotic vines and scramblers

A habitat compensation program has been developed which will result in regeneration of 4.4 ha of forest around the campground, nearby rainforest and rainforest at the day use area. The program will address any exotic vines and scramblers which may establish.

- Invasion and establishment of the cane toad, *Bufo marinus*

Cane Toads are recorded for Mount Jerusalem NP. They can spread in camping equipment, on vehicles and in building materials and landscape supplies, in addition to toads travelling overland along roads and trails. Cane Toads compete for food with other carnivores, by preying on invertebrates, small vertebrates such as skinks and frogs, and poison larger predators such as goannas, other large lizards, snakes, raptors and quolls when they ingest them directly or ingest other animals which have been poisoned.

It is likely that cane toads will be introduced to the campground either during construction, by campers, or they may already occur. They are likely to be introduced to Unicorn Falls by similar means, or they may already occur. None were observed during field work which occurred during drought conditions.

All construction and landscaping materials will be sourced from reputable sources and machinery cleaned prior to use on the park.

- Invasion of native plant communities by exotic perennial grasses

A habitat compensation program has been developed which will result in regeneration of 4.4 ha of forest around the campground, nearby rainforest and rainforest at the day use area. The program will address any exotic perennial grasses which may establish, in combination with ongoing maintenance by NPWS of turf laid at the campground.

- Invasion of the yellow crazy ant, *Anoplolepis gracilipes* into NSW

Locally, yellow crazy ants were detected in Lismore and at Terania Creek in 2018. DPI have coordinated a response and movement restrictions have now been removed. In the Lismore local government area, they were detected in grass, park and garden vegetation and clippings, untreated timber, woodchips, soil and sand. They have the potential to displace native fauna and to kill invertebrates, reptiles, hatchling birds and small mammals.

All construction and landscaping materials will be sourced from reputable sources and machinery cleaned prior to use on the park.

- Invasion, establishment and spread of Lantana, *Lantana camara*

A habitat compensation program has been developed which will result in regeneration of 4.4 ha of forest around the campground, nearby rainforest and rainforest at the day use area. The program will target existing *Lantana camara* infestations and will include appropriate follow up. Ongoing maintenance of facilities by NPWS will control any future outbreaks around the visitor facilities.

- Loss of hollow-bearing trees

Tree hollows represent a critical resource for many fauna species, providing shelter and nesting-sites. It is thought that hollows are a limiting resource for fauna in many habitats, and that recovery of threatened hollow-dependent fauna is contingent on their increasing availability. Owing to the slow process of hollow development, and the disproportionately high habitat and resource values provided by large old trees, adverse effects from the continuing loss of old hollow-bearing trees will take centuries to reverse.

Hollow-bearing trees are uncommon at both development sites. One tall, hollow-bearing tree occurs adjacent to the campground. The arborist report suggests its retention by bracing it to nearby trees. It is recommended that any infrastructure proposed close to the stag is moved to a safer location. No hollow-bearing trees occur at the day use area.

- Loss or degradation (or both) of sites used for hill-topping by butterflies

Hill-tops act as a focus for mating. Certain species of butterfly tend to congregate on hill or ridge tops that are usually higher than the surrounding countryside. Disturbance of plants on, or topography of, the hill-top, or to its slopes and immediate surroundings, may render it unsuitable to butterflies.

It is unknown if the campground is a butterfly hill-topping site. The site is on a prominent ridgeline, has disturbed vegetation and is partially cleared. Hilltops at higher elevations which may be more suitable occur nearby, for example, Mount Chowan and Mount Jerusalem.

- Removal of dead wood and dead trees.

The KTP includes: the removal of forest and woodland waste left after timber harvesting, collecting fallen timber for firewood, burning on site, mulching on site, the removal of fallen branches and litter as general tidying up, and the removal of standing dead trees.

Dead wood and dead trees provide essential habitat for a wide variety of native animals and are important to the functioning of many ecosystems. The removal of dead wood can have a range of environmental consequences, including the loss of habitat (as they often contain hollows used for shelter by animals), disruption of ecosystem process and soil erosion.

Development of the campground will result in loss of dead wood on the forest floor. It is recommended that leaf litter (and dead wood) is stockpiled to use

on the closed northern access road to promote regeneration of native vegetation. Any fallen timber with hollows should be relocated to the forest surrounding the campground.

A pile of timber is located at the proposed day use area carpark. This appears to be a log dump, rather than a natural situation. The logs will be removed for the development of the carpark and would have some fauna habitat value currently.

A habitat compensation program has been developed which will result in regeneration of 4.4 ha of forest around the campground, nearby rainforest and rainforest at the day use area.

References

Department of Primary Industries 2020, *Yellow Crazy Ant – Current Situation*, viewed 12 February 2020, <<https://www.dpi.nsw.gov.au/biosecurity/insect-pests/yellow-crazy-ant>>

DPIE 2019, *Key Threatening Processes - Profiles*, viewed 12 February 2020. <<https://www.environment.nsw.gov.au/threatenedSpeciesApp/>>

CONCLUSION

Considering the results of the threatened species assessments and key threatening process assessment, the activity is unlikely to significantly affect threatened species or ecological communities, or their habitats if additional impacts are avoided and recommended environmental safeguards, mitigation measures and compensatory actions are implemented.

Table 1 Threatened Species Unlikely to be Present (*Biodiversity Conservation Act 2016*)

Common name Scientific name	Species information	Reasons unlikely to occur
Rufous Bettong <i>Aepyprymnus rufescens</i> Vulnerable	Rufous Bettongs inhabit a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. A dense cover of tall native grasses is the preferred shelter. They sleep during the day in cone-shaped nests constructed of grass in a shallow depression at the base of a tussock or fallen log. At night they feed on grasses, herbs, seeds, flowers, roots, tubers, fungi and occasionally insects. Records on park: 700m north east of Manns Rd (S. Gilmore 1981).	Understorey unsuitable (not tussock grass or tall native grasses).
Eastern Cave Bat <i>Vespadelus troughtoni</i> Vulnerable	Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behaviour. Records: 6.5km south – Blackbutt Plateau (SFNSW 1975 & 1995).	Unlikely – not dry forest or near cliffs
Eastern Freetail-bat <i>Mormopterus norfolkensis</i> Vulnerable	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous. Record: 6.5km south (W Braithwaite SFNSW 1975), 8.5km south – Koonyum Range (W Braithwaite SFNSW 1995).	Unlikely – wrong forest type
Rufous Scrub-bird <i>Atrichornis rufescens</i> Vulnerable	The species is now generally only found in high-rainfall areas above 600m in elevation, but formerly occurred in the lowlands of the Richmond and Tweed Rivers. Rufous Scrub-birds are now confined to high-altitude (above 600m elevation) subtropical, warm temperate and cool temperate rainforests, and wet sclerophyll forests. The species formerly occurred in some lower altitude forests in far	Unlikely – low elevation forest.

Appendix 4 Threatened Species Assessments – BC Act & EPBC Act

	<p>north-eastern NSW but was presumably lost as a result of clearing following European settlement. Rufous Scrub-birds spend most of their time foraging in deep, moist litter beneath a very dense layer of vegetation and/or woody debris. They are active foragers, scuttling through litter using their head and bill to toss leaves aside while searching for food such as small invertebrates (including snails and insects). They breed from early spring to summer but very little is known of their breeding behaviour because they are so shy and cryptic, and their habitat is so dense. Male calling peaks in the breeding season but continues throughout the year. The nest is a domed structure built in dense vegetation on or close to the ground.</p> <p>Records on park: Blackbutt Plateau (Anon 1984). Other records: Terania Ck (1), Mt Warning (2) and Border Ranges (numerous).</p>	
<p>Loveridge's Frog <i>Philoria loveridgei</i> Endangered</p>	<p>Restricted mainly to the Nightcap and Mt Warning areas, extending north-west to the Border Ranges-Lamington area on the border of NSW and Queensland. This frog is dependent on high moisture levels, occurring in the headwaters of small streams and about soaks where groundwater is continually present and close to the surface. It favours subtropical and warm temperate rainforest and wet eucalypt forest, but also occurs in moist eucalypt forest where rocky outcropping creates surface water.</p> <p>Record: 3.7km south west (A Smith 1992).</p>	<p>The Rapid Habitat Assessment (Appendix 10) did not detect Pouched Frog habitat at either site however habitat was located further downstream.</p>
<p>Atlas Rainforest Ground-beetle <i>Nurus atlas</i> Endangered</p>	<p>Low-elevation rainforest and wet eucalypt forest with a well-developed rainforest understorey. Other habitat requirements may be relatively undisturbed old-growth forests on highly productive soils and consistently high moisture levels. It is flightless and preys on other ground invertebrates. The species had not been seen for many years and was thought to be extinct until it was rediscovered in Victoria Park near Lismore in 1973. Presently it is only known from this location and a few others in the Lismore-Alstonville area.</p> <p>Records: Alstonville Plateau to Wardell.</p>	<p>Unlikely to occur – restricted distribution, high nutrient sites favoured (D. Charley 2019, pers. comm., 20 June).</p>
<p>Shorter Rainforest Ground-beetle</p>	<p>Subtropical and warm temperate rainforest. <i>Nurus brevis</i> is a flightless carabid that lives in small burrows of up to about 50cm, that it excavates with its powerful mandibles. Burrows are characteristically beneath roots, rocks or</p>	<p>Unlikely to occur – well outside known distribution (D. Charley 2019,</p>

Appendix 4 Threatened Species Assessments – BC Act & EPBC Act

<p><i>Nurus brevis</i> Endangered</p>	<p>logs. It is an ambush predator and maintains a cleared stage at the burrow entrance and waits at the entrance for passing leaf litter invertebrates. Currently the only known populations occur in Lismore and the Richmond Range near Mallangane, west of Casino. Records: 2 records at Lismore - Wilsons Park (2016), Rotary Park (1972).</p>	<p>pers. comm., 20 June).</p>
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Table 2 Threatened Species Unlikely to be Present (*Fisheries Management Act 1994*)

<p>Common name Scientific name</p>	<p>Species information</p>	<p>Reasons unlikely to occur</p>
<p>Purple Spotted gudgeon <i>Mogurnda adspersa</i> Endangered</p>	<p>Purple Spotted Gudgeon are a benthic species that can be found in a variety of habitat types such as rivers, creeks and billabongs with slow-moving or still waters or in streams with low turbidity. Cover in the form of aquatic vegetation, overhanging vegetation from river banks, leaf litter, rocks or snags are important for the species. Most remnant populations in NSW occur in small to medium sized streams. They feed mainly on terrestrial insects and their larvae, worms, small fish, tadpoles, and some plant matter. Males reach maturity at about 4.5 cm and females at about 5 cm in length. Males have an elaborate courtship display and spawning occurs over summer Southern DPI have modelled indicative habitat nearby in Chowan Creek.</p>	<p>Unlikely to occur (B Harrison 2019, pers.comm., 3 May). Modelled habitat in Chowan Creek further downstream.</p>

Consideration of Threatened Ecological Communities and Species Listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

The following is a list of threatened species and an ecological community likely to occur, based on local records and/or habitat availability, and their conservation status under the EPBC Act:

Lowland Rainforest of Subtropical Australia	(Critically Endangered)
Mitchell's Rainforest Snail	(Critically Endangered)
Giant Barred Frog	(Endangered)
Spotted-tailed Quoll	(Endangered)
Grey-headed Flying-fox	(Vulnerable)
Koala population - QLD, NSW & Victoria	(Vulnerable)
Long-nosed Potoroo – SE Mainland	(Vulnerable)
Large-eared Pied Bat	(Vulnerable)

Threatened species assessments in accordance with the NSW *Biodiversity Conservation Act 2016* (BCA Act) have been completed for these species and ecological community (refer to the previous section) which concluded that, if recommended environmental safeguards, mitigation measures and a habitat compensation program are implemented, there is unlikely to be a significant impact on these threatened entities.

The threatened species assessments (including the KTP assessment) and the assessment of significance test under the BCA Act address essentially the same matters in relation to risk to the entity from the activity as those matters set out in the Commonwealth's *Matters of National Significance Significant impact guidelines 1.1* (Department of Environment 2013). Therefore, additional impact assessments for these entities are not required and, based on the conclusions of these assessments, referral of the activity to the Minister for the Environment is not required.

One species, the Greater Glider (*Petauroides volans*), is listed as threatened under the EPBC Act, is likely to occur and is not listed under the BCA Act. Consequently, no threatened species assessment has been prepared under the BC Act. A threatened species assessment, in accordance with the EPBC Act, has been prepared for Greater Glider (see below).

Significant impact criteria for Vulnerable species

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species
- reduce the area of occupancy of an important population
- fragment an existing important population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of an important population
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
- introduce disease that may cause the species to decline, or
- interfere substantially with the recovery of the species.

Greater Glider (*Petauroides volans*) – Vulnerable

Distribution, Habitat and Habitat Use

The Greater Glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1200 m above sea level. An isolated inland subpopulation occurs in the Gregory Range west of Townsville and another in the Einasleigh Uplands.

The broad extent of occurrence is unlikely to have changed appreciably since European settlement. However, the area of occupancy has decreased substantially, mostly due to land clearing. This area is probably continuing to decline due to further clearing, fragmentation impacts, fire and some forestry activities.

The Greater Glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily a folivore, with a diet mostly comprising eucalypt leaves, and occasionally flowers. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. Distribution may be patchy even in suitable habitat. The Greater Glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.

During the day it shelters in tree hollows and prefers large hollows in large, old trees. In some State Forests in northern New South Wales abundance is significantly greater on sites with a higher abundance of tree hollows. In some State Forests it is absent from surveyed sites with fewer than six tree hollows per hectare. In southern Queensland, Greater Gliders require at least 2–4 live den trees for every 2 ha of suitable forest habitat.

Home ranges are typically relatively small (1–4 ha) but are larger in lower productivity forests and more open woodlands (up to 16 ha). They are larger for males than for females with male home ranges not overlapping.

They give birth to one young between March and June. Sexual maturity is reached in the second year. Longevity has been estimated at 15 years and generation length is likely to be 7–8 years. The relatively low reproductive rate may result in small, isolated populations

Greater Gliders have been recorded from 14 locations on park: two in the northeast (S Debus 1990), four in the central eastern part (S Debus 1990, 2 x W Braithwaite 1995, State Forest 1995), three in the southwest, including two on Blackbutt Plateau (Anon 2002, W Braithwaite 1995, State Forest 1995) and five on Koonyum Range (S Debus 1990, W Braithwaite 1995, 3 x State Forests 1995).

Threats

- Habitat loss (through clearing, clearfell logging and the destruction of senescent trees due to prescribed burning) and fragmentation
- Too intense or frequent fires

- Timber production
- Climate change
- Barbed wire fencing (entanglement)
- Hyper-predation by owls
- Competition from sulphur-crested cockatoos
- *Phytophthora* root fungus

Assessment

The activity will result in impacts on forage habitat, primarily, the loss of 940m² of wet sclerophyll/moist eucalypt forest at the Manns Road campground and loss of 3 Flooded Gums (*Euclayptus grandis*) at Unicorn Falls.

In far northeastern NSW, Greater Gliders have been observed feeding on the following species (D Milledge 2020, pers. comm., 25 February): Blackbutt (*E. pilularis*), Broad-leaved White Mahogany (*E. umbra*), Flooded Gum (*E. grandis*), Grey Gum (*E. biturbinata*), New England Blackbutt (*E. andrewsii*), Pink Bloodwood (*Corymbia intermedia*), Small-fruited Grey Gum (*E. propinqua*), Scribbly Gum (*E. signata*), Sydney Blue Gum (*E. saligna*), Tallowwood (*E. microcorys*), White Mahogany (*E. acmenoides*). They occasionally eat Forest Oak (*Allocasuarina torulosa*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*).

Of the above forage species, the following species will be removed at the campground: 7 Small-fruited Grey Gums, 16 Tallowwoods and 5 White Mahoganies; 28 forage trees in total.

Forest supporting a variety of eucalypts is critical to the species, however, it is unlikely that the small-scale loss of forage resources, amounting to 31 trees of preferred forage species, will affect the survival of the species.

Forest Sheoak (*A. torulosa*), known as an occasional forage species, is recorded in the walk-in tent camp area at Manns Road. This species is particularly important to Glossy Black Cockatoo and it is recommended that all Forest Sheoaks (*A. torulosa*) within the walk-in tent camp and any directly adjoining the campground footprint are clearly identified in the field for retention. This action will potentially benefit both species.

Critical nesting resources for this species will not be impacted because no hollow-bearing trees will be removed. Large areas of eucalypt forest occur with the park, however, hollow-bearing trees are probably a limiting factor for this species because of the park's long history of commercial harvesting which resulted in a widespread reduction in their availability. Competition for the remaining hollows would be high and may result in otherwise suitable habitat for this species being unoccupied. They are noted to have a patchy distribution even within suitable habitat.

Considering the predicted ranges of Greater Gliders (up to 16 ha in lower productivity forest) the small-scale of the impacts are likely to affect the range of an individual (although male and female ranges may overlap). Impacts of the activity will not be significant at a population level.

No impacts on the breeding cycle of the population is likely, however, visitor use of the campground may disturb gliders in the vicinity and they may avoid the area, or only use the area when visitor numbers are low and forage resources are optimal.

The campground provides three drive-in sites and four walk-in sites which are located close together to maintain as much habitat as possible. The low number of sites also caps visitor numbers at a low-level and this will minimise potential impacts from visitor use.

To minimise any additional impacts on trees at the campground, the Tree Removal and Protection Plan -Manns Road Campground (Appendix 6) identifies trees within the development footprint that require further assessment to determine specific protection measures that may be required to protect them from unintended and unassessed impacts associated with construction.

To mitigate unavoidable impacts, the project includes a habitat compensation component to rehabilitate 4.4ha of rainforest and wet sclerophyll forest around the DUA, the campground and at nearby sites. The bush regeneration works will target dense infestations of lantana which degrade habitat and suppress recruitment.

Phytophthora is a risk to some native plants that may be preferred by Greater Gliders. Considering the past level of disturbance at the campground site, including the dumping of soil and rocks, it is possible that *Phytophthora* already occurs, however there are no visible signs of tree dieback. To mitigate risk, all construction and landscaping materials will be sourced from reputable sources and machinery cleaned prior to use on the park.

If a local outbreak of *Phytophthora* is identified, it is recommended that NPWS install disinfecting facilities, that is, wash-down bays, footbaths and/or scrubbing stations, as appropriate, at primary entrance/exit points for vehicles and foot traffic.

There is no recovery plan for this species. The Commonwealth website includes the following statement about recovery planning: 'Recovery Plan required, stopping decline and supporting recovery is complex, due to the requirement for a high level of planning to abate the threats, a high level of support by key stakeholders, a high level of prioritisation and a highly adaptive management process. Existing mechanisms are not adequate to address these needs (2/05/2016).'

Nevertheless, the small-scale loss of forage habitat within a large contiguous area of habitat is unlikely to interfere substantially with recovery of the species.

It is concluded that, if additional impacts are avoided, recommended environmental safeguards, mitigation measures and a habitat compensation program are implemented, the activity is unlikely to have a significant impact on this species and the activity does not require referral to the Commonwealth Minister for the Environment.

Reference

Atlas of Living Australia 2020, *Greater Glider*,
<<https://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:afd.taxon:7e891f26-c72e-4b29-98db-1cd10c4eaa6d>>

Commonwealth Threatened Species Scientific Committee 2016, *Conservation Advice* *Petauroides volans Greater Glider*, Department of the Environment, Canberra.

<<http://www.environment.gov.au/biodiversity/threatened/species/pubs/254-conservation-advice-20160525.pdf>>



Critically Endangered Scrub Turpentine (*Rhodamnia rubescens*) at Manns Road campground (Photo: D. Mackey).