

# Woolgoolga to Ballina Pacific Highway Upgrade, Section 10: Old Bagotville Road Connectivity Review



Sandpiper Ecological

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## Document Review

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Cover Photo: Long-nosed potoroo (*Potorous tridactylus tridactylus*) recorded at the eastern end of the temporary exclusion fence.

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# 1. Introduction

The approval to the Koala Management Plan (RMS 2016) required “The provision of temporary fencing along Old Bagotville Road through Wardell Heath to the east of the alignment, should project related construction vehicle movements increase existing traffic volumes on Old Bagotville Road to more than 100 vehicles per day”. The condition was required due to concerns about potential road mortality from increased koala (*Phascolarctos cinereus*) movement triggered by the Phased Resource Reduction (PRR) program and increased haulage of material from nearby quarries. A temporary floppy-top exclusion fence (the fence) was installed either side of Old Bagotville Road (OBR) in May 2017.

Following construction of the fence, concern was raised about potential disruption of movement by long-nosed potoroo (*Potorous tridactylus*) inhabiting the Wardell heath. Approval of the Jali and Gibson Borrow site management plan included several conditions to address potential risks to the long-nosed potoroo. Condition 12 required:

The connectivity measures for the long-nosed potoroo shall be reviewed by the secretary 6 months after commencement of material haulage and following the cessation of material haulage on Old Bagotville Road. The review shall be prepared with the EPA and DOEE, and include:

- a) Details of daily traffic volumes on Old Bagotville Road based on up to date daily traffic counts;
- b) Results of fauna monitoring carried out during material haulage (roadkill and fauna movement);
- c) Summary of non-compliances recorded in the in-Vehicle Management System Register;
- d) Signage and speed limits for the duration of construction; and
- e) Retention of the temporary fauna fencing and impacts on koala.

The aim of this review is to assess connectivity measures for long-nosed potoroo and particularly the positive and negative aspects of the temporary exclusion fence on the Wardell heath population. Impacts on koala of retaining the temporary fence for longer than six months are also discussed.

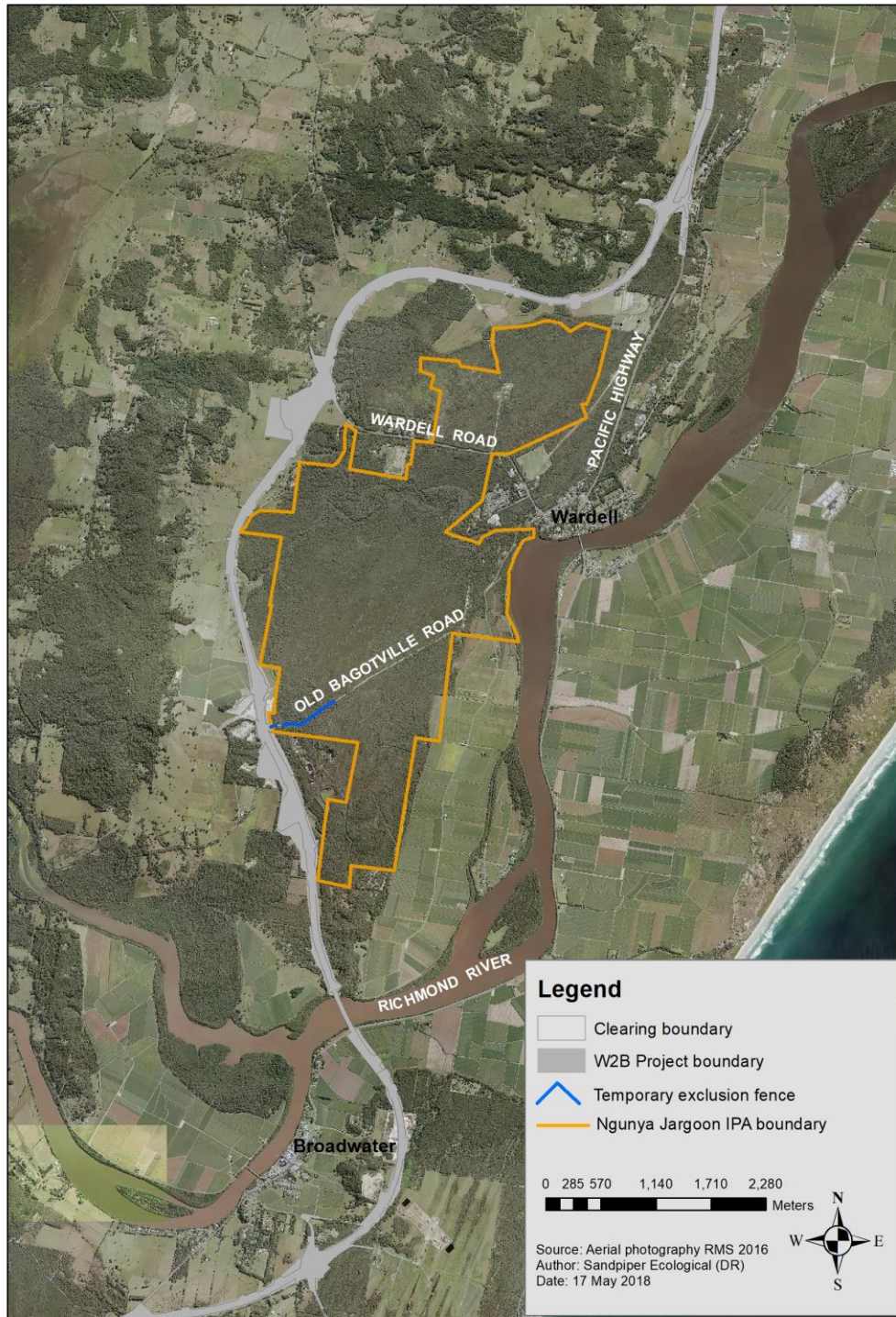
## 2. Study Area

The study area includes OBR from its intersection with the Pacific Highway Upgrade Alignment east to Back Channel Road, and surrounding habitat (Figure 1). Vegetation surrounding OBR consists of a mosaic of wet and dry heath, woodland with a heathy understorey and swamp sclerophyll forest on sand. The Ngunya Jargoona (Jali) Indigenous Protected Area (IPA) covers 1114ha and extends north and south of OBR. The IPA is managed by the Jali Local Aboriginal Land Council (LALC) in accordance with a management plan (Holmes & Hill 2013). Approximately 320 ha of vegetation south of OBR was burnt on 4 and 5 September 2017.

The temporary exclusion fence consists of 1.8m tall chainmesh and star pickets. The top of the chain mesh hangs above star pickets to create a “floppy top” (Plate 1). The temporary fence extends east for approximately 735m from the edge of the new highway alignment at chainage 148900 to the unnamed management trail running south through the Ngunya Jargoona IPA (Figure 1). A gap of approximately 75m near the west end of the fence, where a drainage line crosses OBR, is bordered by two koala/cattle grids (Plate 2). The gap was provided to enable fauna movement across the road,



with the grids installed to stop koalas moving along the road. Several fauna drop-downs/escape ramps were also installed along the fence to provide an escape option for fauna trapped within the road corridor (Plate 1).



**Figure 1:** Location of Old Bagotville Road and the temporary exclusion fence in relation to the W2B Pacific Highway Upgrade and locality.





**Plate 1:** Old Bagotville Road temporary exclusion fence viewed from the eastern end. The gap width (fence to fence) in this area is approximately 13m. Temporary escape ramps are situated on both sides of the road near the vehicle.



**Plate 2:** Koala grid installed on the west end of fence gap on Old Bagotville Road.

### 3. Ecology of long-nosed potoroo

The long-nosed potoroo is a small, bandicoot sized, macropod from the family Potoridae. Body length ranges between 259 and 410mm and males weigh up to 1600grams. In northern NSW the species overlaps in size with the northern brown bandicoot (*Isodoon macrourus*) and long-nosed bandicoot (*Perameles nasuta*) but can be distinguished from these species by its longer and heavier tail (up to 235mm long), blunt forehead, and distinct hopping gait.

Long-nosed potoroos occupy a variety of habitats from sub-tropical rainforests, through tall open forests with dense understorey, woodland with a heath understorey, and coastal heaths (DEHP 2017). Long-nosed potoroos are regarded as cover dependent but typically rely on a mosaic of habitats that include areas of dense cover interspersed with open areas used for foraging (Bennett 1993; Norton *et al.* 2011). Their range extends along the east coast from about Gladstone in Queensland to the Victoria/South Australian border and includes Tasmania and some Bass Strait Islands (DotE 2018; OEH 2017). Within its range potoroos are restricted to highly disjunct populations in remnant patches of habitat (DotE 2018).

Long-nosed potoroos primarily forage on hypogeous and epigeous fungi with vascular plants and invertebrates also consumed. They are most active at night, in the early morning, and late afternoon and seek shelter in dense ground vegetation during the day. Home range varies from 1-19ha, with larger home ranges in temperate areas (DEPI 2013). Home range estimates in northern NSW range from 1.5 to 5.1ha (Bali *et al.* 2003). There is substantial within sex and between sex overlap in home range (Bali *et al.* 2003; Frankham *et al.* 2012).

Potoroos display a promiscuous breeding strategy, with breeding occurring throughout the year, with an average of 2.5 births per year recorded (DEPI 2013; Frankham *et al.* 2012). A single young is born after a gestation of 37 days and remains in the pouch for 100-125 days, reaching sexual maturity at about 12 months. Potoroos can live for over 7 years, although 4-5 years is more common (DEPI 2013). Adult and juvenile female potoroos display strong philopatry but juvenile males may disperse several kilometres (DEPI 2013; Frankham *et al.* 2014).

### 4. Long-nosed potoroo in the study area

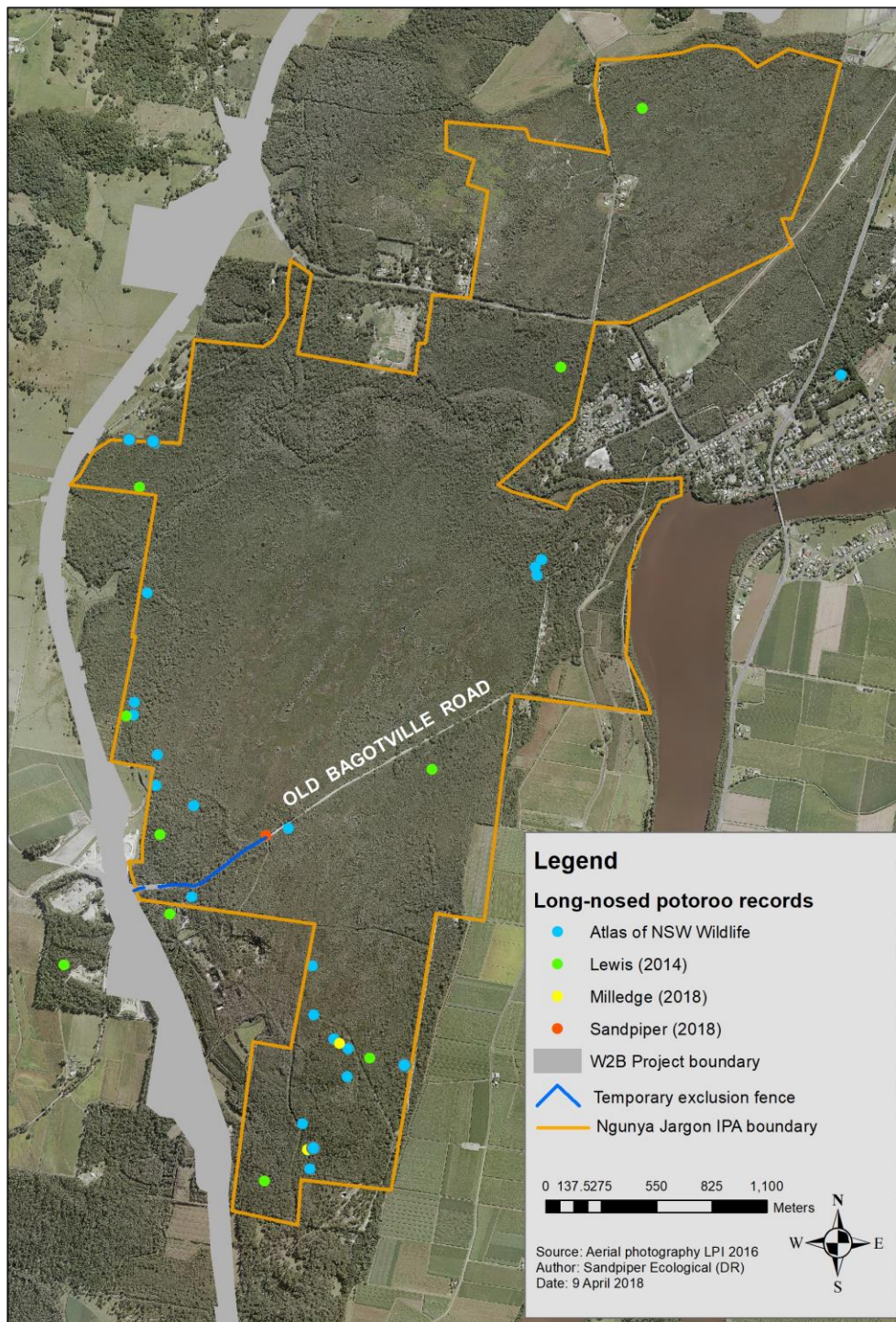
#### 4.1 Previous studies and potoroo records in the study area

Potoroos in the OBR area have been the subject of three targeted camera trap surveys, Lewis (2014), Andren (unpublished) between 2009 and 2012 and Milledge 2012-2018. Sandpiper Ecological (2018) have monitored fauna interactions with the temporary exclusion fence since July 2017. Ngunya Jargoona IPA Plan of Management shows a potoroo monitoring area along the western boundary extending along Bingal Creek from about Wardell Road in the north to Monti's Quarry in the south (Holmes & Hill 2013). It is unknown if this area has been the subject of targeted survey.

The Atlas of NSW Wildlife contained 22 records of LNP in the area bordered by Wardell Road in the north and the Richmond River in the south and east (Figure 2). One additional record, from 1980, occurred east of the town of Wardell. Lewis (2014) recorded potoroos at 10 sites distributed from Lumley's Lane in the north to the Richmond River in the south (Figure 2). Sandpiper Ecological (2018) recorded long-nosed potoroo at the east end of the temporary exclusion fence on 11 occasions between 11 October 2017 and 10 May 2018. Milledge (unpublished data) has been conducting



camera surveys near OBR as part of a long-term monitoring project, including samples pre and post September 2017 wildfire. Four camera traps installed in March/April 2018 recorded 12 passes of LNP at three sites (Figure 2).



**Figure 2:** Distribution of long-nosed potoroo records in relation to the Old Bagotville Road temporary exclusion fence.

Potoroo records occur north and south of OBR and appear restricted to vegetated sections of the Pleistocene sand plain that abuts the Blackwall Range to the west, volcanic derived soils to the north, and the Richmond River to the east. According to Andren *et al.* (2013) scribbly gum woodland with a heathy understorey is particularly important for long-nosed potoroo in northern NSW.

Detailed vegetation mapping of the Ngunya Jargoona IPA shows that Scribbly gum-bloodwood heathy open forest occurs north and south of OBR, with other large patches further north near Bingal Creek and at the southern end (Appendix A; Landmark Ecological Services 2015). A Blackbutt-scribbly gum-Satinwood-Tassell rush community occurs north east and north west of OBR (Appendix A). The temporary exclusion fence bisects the Scribbly gum-bloodwood heathy open forest community that extends north and south of OBR. The majority (~90%) of potoroo records shown on Figure 2 are associated with the abovementioned vegetation communities.

The distribution of potoroo point locality records in the study area partially reflects survey effort and the prevalence of records in the western half of the IPA is attributed to greater effort in that area. Lewis (2014) sampled potoroos at six sites on the western edge of the study area and four on the eastern side and recorded potoroos at all sample sites. The absence of potoroo records in the large expanse of heath north and south of OBR and north of Wardell Road may be due to lower survey effort in that area. Heathland without woodland elements (i.e. scribbly gum and blackbutt) may lack the necessary hypogaeous fungi required to support resident individuals.

Milledge (unpublished data) has found that potoroos persisted after the September 2017 fire by using small unburnt patches of habitat. Recent monitoring results show that potoroos persist south of OBR seven months after the fire.

### 4.3 Population estimates, home range and habitat

There are no published population estimates or home range studies of long-nosed potoroo in the Wardell heath. DoTE (2018) quote density estimates ranging from 0.19-2.55 animals/ha across the species range. In northern NSW density estimates include 0.9-1.1 animals/ha at Cobaki (Bali *et al.* 2003) and 0.23-0.26 animals/ha at Tyagarah (Mason 1997). Using the lower figure of 0.23 animals/ha and the area of potential habitat of 1423ha, calculated by Andren *et al.* (2013), the population in the Wardell heath may be in the vicinity of 327 individuals. Scientific Committee (2017) suggest that the Wardell population occupies an area of 2050ha, and despite citing the density estimates of Mason (1997), suggest that the population is fewer than 250 individuals. Density is predicted to vary across the study area and may be greatest in woodland communities on the western side of the IPA, north and south of OBR.

Potoroos in northern NSW occupy overlapping home ranges (Bali *et al.* 2003). At Cobaki, home ranges of 1.5 to 5.1ha were recorded (Lewis 2015) and a figure of 2-5ha for NSW populations (see OEH 2017) seems appropriate for the study area.

Andren *et al.* (2013) assessed the distribution of potoroo habitat on the NSW north coast, including the Wardell heath. That study analysed potoroo distribution and calculated the area of potential and high quality habitat. Woodland communities with a heath understorey and heathland on Pleistocene sands were identified as important, with heathy scribbly gum woodland identified as a particularly significant habitat (Andren *et al.* 2013). All of the above communities occur in close proximity to OBR.

#### 4.4 Ecology of potoroos within the Wardell heath

There are no detailed published studies on habitat use in the Wardell Heath. Potoroos have been recorded in several vegetation communities around OBR and vegetation types used are consistent with published accounts for northern NSW and elsewhere (see Mason 1997; Bali *et al.* 2003; Andren *et al.* 2013). Most records in the Ngunya Jargoona IPA are associated with scribbly gum. Based on studies both locally and across the species range, it is assumed that potoroos at Wardell:

- occupy overlapping home ranges of 2-5ha
- occur at densities ranging from 0.25 to 1.1 animals/ha
- prefer scribbly gum/blackbutt dominated woodland vegetation with a heathy understorey and, to a lesser extent, heathland on Pleistocene sands,
- have multiple breeding events per year
- live (on average) for 4-5 years

#### 4.5 Evidence of movement across OBR

Long-nosed potoroos are regarded as cover dependent and populations are negatively affected by habitat fragmentation (see Andren in press). Whilst their preferred habitat in coastal areas is woodland with a heathy understorey, and heathland, they will forage in areas with open ground cover surrounded by dense vegetation (Bennett 1993). The species will cross small forest gaps, and at Cobaki radio-tracked individuals crossed forest tracks <6m wide but not the Cobaki Parkway, which was 49m wide (Lewis 2015). Frankham *et al.* (2014) found limited dispersal between sites that were only 6–8km apart and linked by contiguous habitat. A specialised diet and preference for dense cover are two likely reasons limiting dispersal.

Camera monitoring of fauna activity at the east end of the temporary exclusion fence recorded a long-nosed potoroo moving directly across OBR on 17 March 2018, with a diagonal movement recorded on 4 March 2018. Whilst the footage does not confirm a complete crossing the manner of movement suggests that a crossing was likely. The gap width at the east end of the temporary fence is 13m, more than double the size of gaps crossed at Cobaki. The frequency of potoroo records within 2m of OBR suggests that they utilise forest edges. It is unclear if movement east of the fence is normal, or an artefact of the fence whereby individuals are directed to the eastern end.

Potoroos have been recorded using underpasses up to 52m long (see Bond & Jones 2014; Sandpiper Ecological 2015; Lewis 2015) and a potoroo has been recorded in an isolated remnant situated between the old and new Pacific Highway at Devils Pulpit (Sandpiper Ecological 2016). Access to that remnant was most likely over the old highway, across a gap of 13-15m. Avoidance of a 50m road gap but crossing of a 50m culvert is possibly related to the closed nature of a culvert which more closely resembles dense forest than an open forest gap. Based on available evidence it is likely that long-nosed potoroo would cross OBR, although the frequency of crossings is predicted to be low and most likely associated with dispersal and breeding rather than frequent (nightly) foraging movements.

Monitoring of fauna activity at the fence ends has detected potoroos on 11 occasions over a period of seven months, including evidence of likely road crossing. No potoroos have been recorded in the western fence gap despite this gap aligning more closely to the distribution of records and in an area reported as being of high value to potoroos (Scientific Committee 2017). Potoroos have not been recorded moving along the central sections of fence, although cameras in that area have targeted drop-down structures. Video footage of a potoroo exiting under the fence at the eastern fence end on



two occasions is attributed to the presence of a 90° fence return at the exit point. Based on results to date regular movement under straight sections of fence is considered feasible but irregular.

## 5. Conservation status of potoroo in the Wardell heath

Andren *et al.* (in press) reviewed threats to LNP populations in coastal northern NSW and concluded that the four remaining coastal populations are under threat and some may already be extinct. Factors threatening potoroos in northern NSW are consistent with those reported throughout their range (i.e. predation, wildfire, vegetation removal, fragmentation). The NSW Scientific Committee made a preliminary determination to list the Wardell long-nosed potoroo population as an Endangered Population. That determination was based on a high risk of extinction in the near future.

Subsequent to the preliminary determination, the NSW *Threatened Species Conservation Act 1995* was repealed and replaced by the *Biodiversity Conservation Act 2016* and *Biodiversity Conservation Regulation 2017*. Under Clause 4.1(5) of the *Biodiversity Conservation Regulation 2017* a population of a species is not eligible to be listed as threatened if the species is separately listed as a threatened species under the *Biodiversity Conservation Act 2016*. Whilst the Wardell heath long-nosed potoroo population satisfies the criteria for listing as an endangered population its vulnerable status at both the state and national level precludes such a determination.<sup>[11]</sup>

## 6. Effect of the fence on long-nosed potoroo

### 6.1 Disruption of movement

Movement of long-nosed potoroo across OBR, within the fenced section, probably occurred prior to fence installation. There are no data on movement frequency and, based on the species preference for cover and reluctance to cross gaps, movement across the road is predicted to be infrequent and mostly associated with breeding and dispersal. Some individuals may have occupied home ranges that encompassed both sides of the road, although this seems unlikely given the preference for cover. Ensuring that potoroos cross OBR is important for ongoing population viability. Indeed, the fence would disrupt movement of individuals recolonising burnt habitat south of OBR.

The temporary fence represents a 610m long barrier to north-south movement and overlays the existing (partial) barrier created by OBR. The management trail extending south from OBR at the eastern end of the temporary fence may also represent a partial barrier to movement, although the trail is <6m wide in many areas and should not substantially inhibit movement. Due to its short length, the 50m section of temporary fence at the west end is not considered a barrier to movement.

Long-nosed potoroo encountering the middle of the eastern (610m long) section of fence would need to move about 300m to find an exit across the road. Such movement exceeds published estimates of home range size and suggests that these individuals would be restricted from accessing individuals and habitat on the opposite side of the road. Overlapping home ranges and the extent of habitat north and south of OBR mean that total isolation of individuals is unlikely and individuals occupying

home ranges near the fence ends may move around the fence. However, the temporary fence may disrupt larger movements associated with breeding and dispersal. Female potoroos display strong philopatry which means they are more likely to be isolated and encounter fewer males during breeding if they are residing near the central section of the fence. In contrast, adult males move more broadly during the breeding season (to encounter more females) and juvenile males may disperse several kilometres from their natal territories (Frankham *et al.* 2014). The temporary fence would represent a partial barrier to breeding and dispersing males wishing to move north or south, although movement around the fence ends is feasible (see Frankham *et al.* 2014; DEPI 2013; OEH 2017).

Habitat adjoining OBR east of the temporary fence is suitable for long-nosed potoroo and available point locality data shows three records within 100m of the road east of the fence, and four records within 100m of the road within the fenced section. Whilst point locality data has limitations it shows that potoroos utilise habitat close to OBR both inside and outside the fenced area. Scribbly gum-bloodwood heathy open forest adjoining the fence is likely to support a higher density of potoroos than the tall Tea tree shrubland community that is prevalent east of the fence. A higher density of individuals would equate to a greater frequency of crossings over a generation.

The lineal extent of the OBR fence (i.e. 660m) covers 26% of the total habitat/ road interface, 87% of the Scribbly gum-bloodwood road interface, and 26% of the Scribbly gum-bloodwood and Blackbutt-Scribbly gum road interface. Whereas the temporary fence has isolated a substantial area of the Scribbly gum-bloodwood community it represents only about a quarter of all Scribbly gum vegetation that intersects OBR.

The key to assessing the impact of the temporary fence is to determine if the reduction in crossings would have a significant impact on the potoroo population when viewed in a generational timeframe. The temporary fence does not represent a total barrier to movement and, its effect on connectivity is limited to the small number of potoroos residing near the center of the fence north and south of OBR.

Using an idealised home range distribution and upper density estimate of 1.1 animal/ha in scribbly gum woodland (Bali *et al.* 2003), it is estimated that 8-9 individuals may be partially isolated within 100m north and south of the fence. In this context isolation refers to individuals that may be restricted from crossing OBR, rather than isolation between individuals. Isolation of individuals should not occur due to the high degree of overlap in home ranges. In the broader population context 8-9 individuals equates to 2.7-3.6% of the Wardell heath population. This isolation effect would be tempered by partial permeability. Movement beneath the fence at the east end is attributed to the presence of a 90° fence return at that location.

## 6.2 Enhancement of threatening processes

Habitat fragmentation and isolation of populations is noted as a key threat to long-nosed potoroo (DEPI 2013; OEH 2017; DotE 2018). The Wardell population is partially fragmented by three roads, and bounded to the west by the new Pacific Highway. Frankham *et al.* (2014) found that island populations were genetically depauperate and suggest this may reflect processes in isolated mainland populations, such as at Wardell. Lower genetic variation is a common feature of island populations (Frankham 1997) and may contribute to higher extinction rates (Frankham 1998). It is therefore critical that populations like that at Wardell are managed to avoid intra-population fragmentation through additional clearing or installation of barriers. Management of feral predators and fire is also important.

The temporary fence contributes to cumulative impacts on potoroos in the Wardell heath by causing a slight disruption of breeding and dispersal movement, creating a barrier to fauna in the event of a fire, funneling movement east of the fence, and inhibiting post fire colonisation of habitat. The temporary fence is unlikely to have trapped fauna during the recent wildfire as the Rural Fire Service conducted a back burn from the southern side of the road. This procedure is standard practice and would have occurred irrespective of whether the fence was present. The fence could trap fauna if an uncontrolled fire came from the north or south, although some potoroos would likely escape through gaps under the fence. The bushfire The Bushfire Emergency Action Response Plan (TARP) for the OBR fence specifies that it should be removed should a fire move towards the road.

Fences (& man-made structures in general) represent focal points for feral predators, particularly foxes (*Vulpes vulpes*). The fence would have both a positive and negative influence on predation. It would stop foxes traversing OBR from capturing fauna on the forest edge but may trap fauna being pursued by foxes on the forest side. Foxes have been recorded on both sides of the temporary fence. The fence may also increase potoroo activity at the eastern end, which intersects a management trail. Management trails are noted movement paths for foxes and wild dogs.

### 6.3 Population scale impacts

Woinarski and Burbidge (2016) state an overall decline in long-nosed potoroo population size is inferred and projected, at a rate approaching but not >30% over 9-12 years (= three generations). The causes of this are increasing intensity of destructive wildfires within the species range, effects of habitat fragmentation, and continuing impacts of invasive predators, especially the red fox. The generation length of LNP is reportedly 3-4 years (Woinarski & Burbidge 2016). If retained for a further 2 years the temporary exclusion fence will have been in place for 3 years or almost an entire generation.

Over a period of three years some disruption of home range movement, disruption of dispersal, and lower genetic exchange is possible for a small proportion of the Wardell heath population. Effects may include reduced genetic dispersal as movement by juvenile males is inhibited, and reduced genetic exchange as females encounter fewer males and vice-versa. Reduced genetic diversity is a characteristic of isolated or island populations and is a major factor contributing to the extinction of small populations (Frankham 1998). It does not translate to the immediate demise of a population and it would take many generations before reduced genetic variation had an effect (Frankham *et al.* 2014). In addition, paternity of potoroos on French Island shows that some females bred with single males, suggesting that the mating system may not be totally promiscuous (Frankham *et al.* 2012), and populations can survive with lower levels of genetic exchange. Maintaining an adequate sized population to withstand stochastic events is the critical to avoiding extinction.

In the context of OBR, movement of a few individuals/year across the road would be sufficient to maintain genetic variability within the population and available evidence suggests that such movement is occurring with the fence in place. Whether such movement is sufficient to maintain pre-fence population structure or supplement the population south of OBR following fire is unknown.

The temporary exclusion fence adds to the cumulative impacts of predation, wildfire and land clearing on the Wardell heath population. Managing fire, predators and vegetation removal would have substantial benefits to that population. Indeed, RMS is presently funding feral animal control in the Ngunya Jargoona IPA to reduce impacts on koalas and potoroos. The population benefits of ongoing predator control would outweigh any generational impact associated with the temporary fence.



Exclusion fencing is proven to reduce the incidence of road kill on highways, funnel fauna into crossing structures and exclude feral predators. The temporary exclusion fence at OBR would reduce road strike risk for long-nosed potoroo during the winter months when construction vehicle activity overlaps with periods of potoroo activity (i.e. dawn and dusk). Even low levels of road strike in the fenced area would outweigh the negative impacts of the fence.

#### 6.4 Additional fauna crossing structure

The existing temporary fence includes a 75m gap in swamp sclerophyll habitat near the western end. This gap is intended to provide crossing opportunities for fauna including long-nosed potoroos and koala. To date, no potoroos or koalas have been recorded using the gap despite installation of four ground cameras between October 2017 and April 2018. Over the same period potoroos have been recorded on 11 occasions at the eastern fence end.

The absence of potoroo records in the fence gap may be related to the presence of burnt habitat south of OBR or it could suggest that potoroos infrequently utilise the Swamp mahogany- red mahogany- paperbark community that adjoins the gap. Ongoing camera monitoring of the gap will provide useful information on use by potoroos and koalas.

Installation of a purpose built grid with sufficient space to enable potoroos to move beneath the cross beams or a second fence gap with grids at either end have been considered. Installation of a second fence gap in such a short section of temporary fence would probably render the fence ineffective and would increase the risk of potoroo and koala road strike. Installation of a purpose built grid/fauna underpass has some merit but the effectiveness of such a structure in enabling potoroos to cross the road is unproven. Undertaking minor modifications to the existing fence to allow potoroos to move through a small section of fence that abuts primary habitat has merit.

## 7. Impacts on koalas

The temporary exclusion fence has partially isolated koala habitat north and south of OBR. Koalas can cross OBR within the fence gap and at the eastern end. Movement around the eastern end is likely based on camera monitoring (Plate 3) and the occasional records of koalas inside the fenced area. Recent surveys found evidence of koalas (i.e. scats) north and south of OBR and an adult female was recorded approximately 400m north of OBR during the autumn 2018 koala population monitoring surveys (Sandpiper Ecological 2018b; & unpublished data). The presence of known koala habitat north and south of OBR means that individuals would be susceptible to vehicle strike, particularly in the early morning and late afternoon, with road strike risk peaking prior to and during the breeding season (i.e. July to December).

The fence is likely to benefit koalas by reducing road strike risk, and concentrating movement into the fence gap. Koalas crossing east of the fence and entering the fenced area is unavoidable given the small length of fence. Koalas are susceptible to predation by dogs and individuals crossing at the east end near a management trail may experience a higher predation risk. Predation risk can be managed by targeted feral animal control, as has recently occurred, and the fence is unlikely to have an irreversible long-term impact on koalas residing near OBR.



**Plate 3:** A koala photographed at the eastern fence end during monitoring of the OBR temporary exclusion fence.

## 8. Conclusion and Recommendations

### 8.1 Long-nosed potoroo

The small size of the Wardell heath potoroo population, its isolation from other populations, and existing degree of fragmentation means that it is vulnerable to stochastic events, such as wildfire, habitat clearing, fragmentation, drought, and predation. The fence is situated in an area of high quality habitat and has most likely affected movement by a small number of individuals. Due to their overlapping home ranges the fence is unlikely to have isolated individual potoroos but rather reduced the frequency of road crossings, by breeding and dispersing individuals and individuals trying to recolonise burnt habitat. The fence may also be causing additional road crossings at the eastern end where individuals may experience a higher risk of predation. Importantly, the temporary fence is not a total barrier to north south movement and some breeding and dispersal movement across OBR seems likely. There is a low likelihood that the fence would cause population scale impacts on the Wardell heath population of long-nosed potoroo.

The fence adds to the cumulative array of impacts currently affecting potoroos in the locality and some additional mitigation is warranted. Mitigation aimed at allowing crossings within the central section of fence and feral animal control would likely have greatest benefit to potoroos. Signage at the eastern fence end encouraging drivers to slow down would also be beneficial.

The fence poses a risk of entrapment during wildfire, The Bushfire TARP includes a provision to cut or remove any sections of fence that may block movement of fauna escaping a fire front. This is regarded as a satisfactory control measure should a wildfire occur whilst the fence remains in place.

Back-burning operations from OBR, as conducted in the September 2017 fire, pose a greater risk to long-nosed potoroo than entrapment caused by the fence, which has some permeability to medium sized ground mammals.

## **8.2 Koala**

Koalas continue to utilise habitat north and south of OBR. The temporary fence is likely to have disrupted movement between feed trees and there is evidence to suggest that koalas are crossing the road at the east fence end. Movement by koalas is predicted to increase between July and January and the fence will assist in reducing road strike risk on OBR. The probable disruption to koala movement caused by the fence is likely offset by a reduction in road strike risk. Koalas would benefit from feral animal control in the Ngunya Jargoona IPA and improved signage at the eastern end of the fence.

## **8.3 Recommendations**

1. Modification of a small section of fence abutting Scribble gum-bloodwood vegetation to facilitate increased movement by potoroos. Modification would involve removing small (potoroo sized) sections of fence and installing perpendicular returns at each hole on both sides of the fence. A series of 3-5 holes/gaps should be installed in a defined area on both the north and south fences.
2. A feral animal control program using either baits or traps should be conducted in the Ngunya Jargoona IPA north and south of OBR. The control program should commence in June 2018, prior to the onset of fox breeding, and continue annually for the duration that the fence is in place.
3. Signage advising motorists that fauna cross OBR should be installed at the eastern fence end and 100m east of the fence end. Options to manage speed at that location should also be considered.
4. Continue camera monitoring of the eastern fence end, fence gap, grids, and dedicated potoroo crossing zone. Monitoring should continue for minimum period of six months, with monthly downloads. Further monitoring should be reviewed after six months based on results.



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# Appendix A – Ngunya Jargoan vegetation communities

