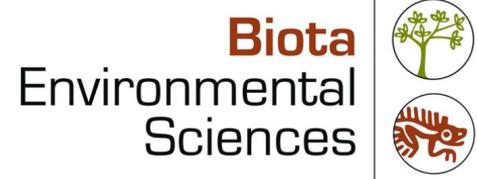


Bussell Highway (Hutton to Sabina) Western Ringtail Possum Assessment





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1.0 Introduction

1.1 Background and Scope

Main Roads Western Australia (Main Roads) is planning to construct a second carriageway along a 13.5 km section of the Bussell Highway, starting at approximately 950 m west of Hutton Road to 450 m west of the Sabina River crossing. The purpose of this upgrade is to alleviate traffic congestion frequently occurring on this section of Bussell Highway for commuters travelling between Capel and Busselton.

The road upgrade will require the clearing of both native vegetation and rehabilitated/regrowth vegetation, including habitat for the Western Ringtail Possum. Main Roads engaged Biota Environmental Sciences (Biota) to carry out a targeted Western Ringtail Possum survey of the study area shown in Figure 1.1, which generally extended 50 m each side of the centerline of Bussell Highway and extended to the turnoffs to side roads. The study area is 175 ha in size, of which 123.3 ha is cleared of vegetation and includes the existing Bussell Highway.

The purpose of the survey was to estimate the abundance of Western Ringtail Possums within the study area and to map potential Western Ringtail Possum habitat.

The scope of the work included:

- two-phases of strip-sampling targeting the Western Ringtail Possum; and
- reporting of the survey findings, including discussion of habitat significance and linkages.

1.2 Western Ringtail Possum

The Western Ringtail Possum or Ngwayir (*Pseudocheirus occidentalis*) is listed as Critically Endangered under the State *Biodiversity Conservation Act 2016* a classification that indicates that the species is considered to be “facing an extremely high risk of extinction in the wild in the immediate future...”. The species is also listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and is thereby significant in a national context.

The Western Ringtail Possum is a medium-sized arboreal marsupial, endemic to south-western Western Australia. The species is exclusively folivorous, feeding on leaves of myrtaceous species, predominantly Peppermint but also Marri and Jarrah. During the day, possums rest in tree hollows or dreys (nests constructed from vegetation), which are generally in the canopy but can occasionally be found at ground level. Home range size varies with the productivity of the habitat but is generally less than 5 ha, although densities of up to 20 individuals per hectare have been recorded in Peppermint woodland near Busselton (DPaW 2017). Some populations breed throughout the year, but on the southern Swan Coastal Plain females give birth to one young (more rarely up to three) in autumn (April-June); these are weaned and independent at six to seven months (DPaW 2017).

The species was once widely distributed across southern and south-western Western Australia, however due to habitat clearing and fragmentation for agricultural and urban development it is now restricted to three areas: the southern Swan Coastal Plain, the Jarrah forests near Manjimup, and the south coast between Albany and Walpole (DPaW 2017). Habitat loss and fragmentation continues to represent the major threat to the species; other threats include predation by introduced carnivores, climate change, logging, fire and competition for nest hollows (DPaW 2017). The population size in the Bunbury to Dunsborough region has been estimated to be between 2,000 and 5,000 animals (DPaW 2017). Based on a peer reviewed distance sampling program, Biota (2020) estimated the 2019 population within 4,924.4 ha of remnant habitat within the Swan Coastal Plain to be approximately 6,500 individuals.



Figure 1.1: Location of the study area.

2.0 Methodology

2.1 Field Survey

The study area was systematically surveyed for the Western Ringtail Possum using a strip-transect technique and spotlighting. This was conducted in spring 2019 (Phase 1: part 11 September/remainder 19 October 2019) and summer 2020 (Phase 2: 10 February 2020). The aim of the survey was to record all Western Ringtail Possum individuals occurring within the study area. To ensure coverage of habitat, indicative transects were placed over the vegetation running parallel to the highway. Where the width of the study area allowed for multiple transect, they were spaced at 25 m as this has been showed to result in a probability of detection greater than 90% when modelling detection functions from over 3,000 Western Ringtail Possum observations as part of other studies (Biota 2020). Transects and aerial imagery were then loaded onto a high-accuracy GPS. Each 25 m wide strip transect was searched for Western Ringtail Possums by a zoologist using a high-powered head torch (LED Lenser XEO 19R model). The middle section of the study area, where vegetation was sparse and consisted of single trees and shrubs, was in some parts spotlighted from a vehicle. Spotlighting commenced when conditions became effectively dark (30 minutes after sunset) and ended by 1:30 am. The total search effort as applied in Phase 1 is depicted Figure 2.1 (the Phase 2 survey used the same transects).

Observations of non-target fauna species were also recorded.

The following information was recorded with every observation:

- species;
- animal location using GPS, taken while standing directly underneath;
- time;
- number of individuals;
- age class: adult, adult with young at heel, or female with young on back;
- cue: seen (eyeshine), seen (no eyeshine), heard, or silhouette;
- drey or hollow at observation point; and
- dominant habitat at observation point.

2.2 Survey Timing and Field Team

The entirety of study area was sampled in spring 2019 (Phase 1: part 11 September/remainder 19 October) and summer 2020 (Phase 2: 10 February). Survey timing, weather conditions and personnel are detailed in Table 2.1. Weather data sourced from BoM station 9603 (Busselton Aero).

Table 2.1: Survey timing, weather conditions and personnel.

Phase	Survey Date	Temperature (°C)	Precipitation (mm)	Survey Personnel
1	11 September 2019	14.3 – 20.4	0	Victoria Ford, Brandon King
	19 October 2019	8.5 – 28.8	0	Brandon King, John Graff
2	10 February 2020	9.6 - 31.3	0	Nathan Beerkens, Brandon King, John Graff, Joshua Keen

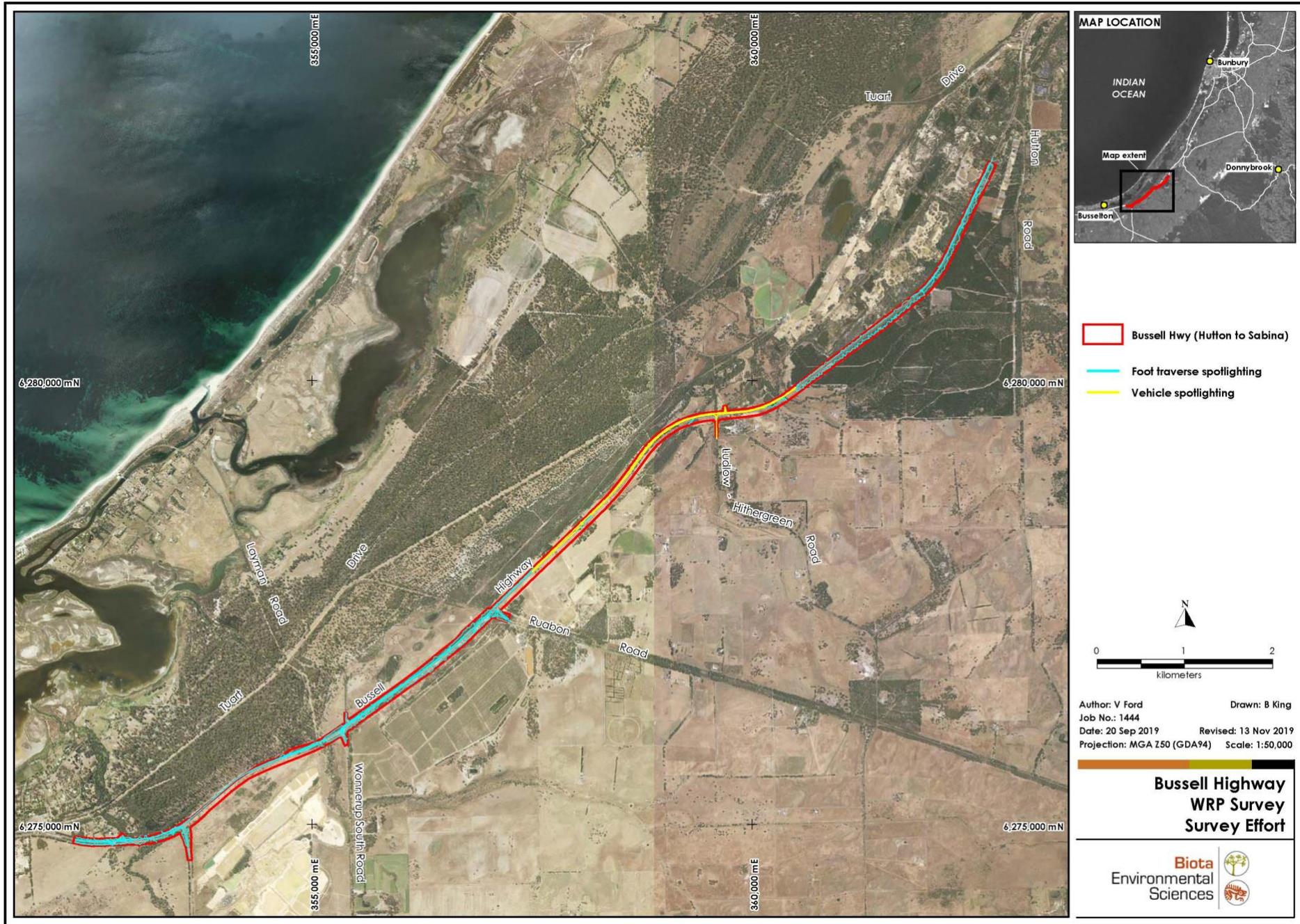


Figure 2.1: Survey effort applied to spotlighting for Western Ringtail Possums.

3.0 Results

3.1 Spotlighting Observations

During the Phase 1 (spring) survey 55 individual Western Ringtail Possums were recorded from 41 observations and in Phase 2 (summer) 77 individuals were recorded from 74 observations. The distribution of Western Ringtail Possum observations over the study area is illustrated in Figure 3.1 and Figure 3.2. The general locations of records within the study area remained similar across both phases with the exception of the area west of Ludlow Hithergreen Road intersection where 10 individuals were recorded in Phase 2 and none were detected in Phase 1.

Both surveys included observations of females with juveniles, typically at heel, although more were observed in the spring survey ($n = 10$) than summer ($n = 3$) despite lower altogether abundance at that time.

A total of 51.85 ha of vegetation was surveyed within the study area and the recorded abundances represent a Phase 1 Western Ringtail Possum density of 1.06 individuals per hectare and a Phase 2 density of 1.49 individuals per hectare.

The Common Brushtail Possum (*Trichosurus vulpecula*) was observed in both phases, 22 in Phase 1 and 34 in Phase 2. The only other non-target species observed was one individual *Rattus* spp.

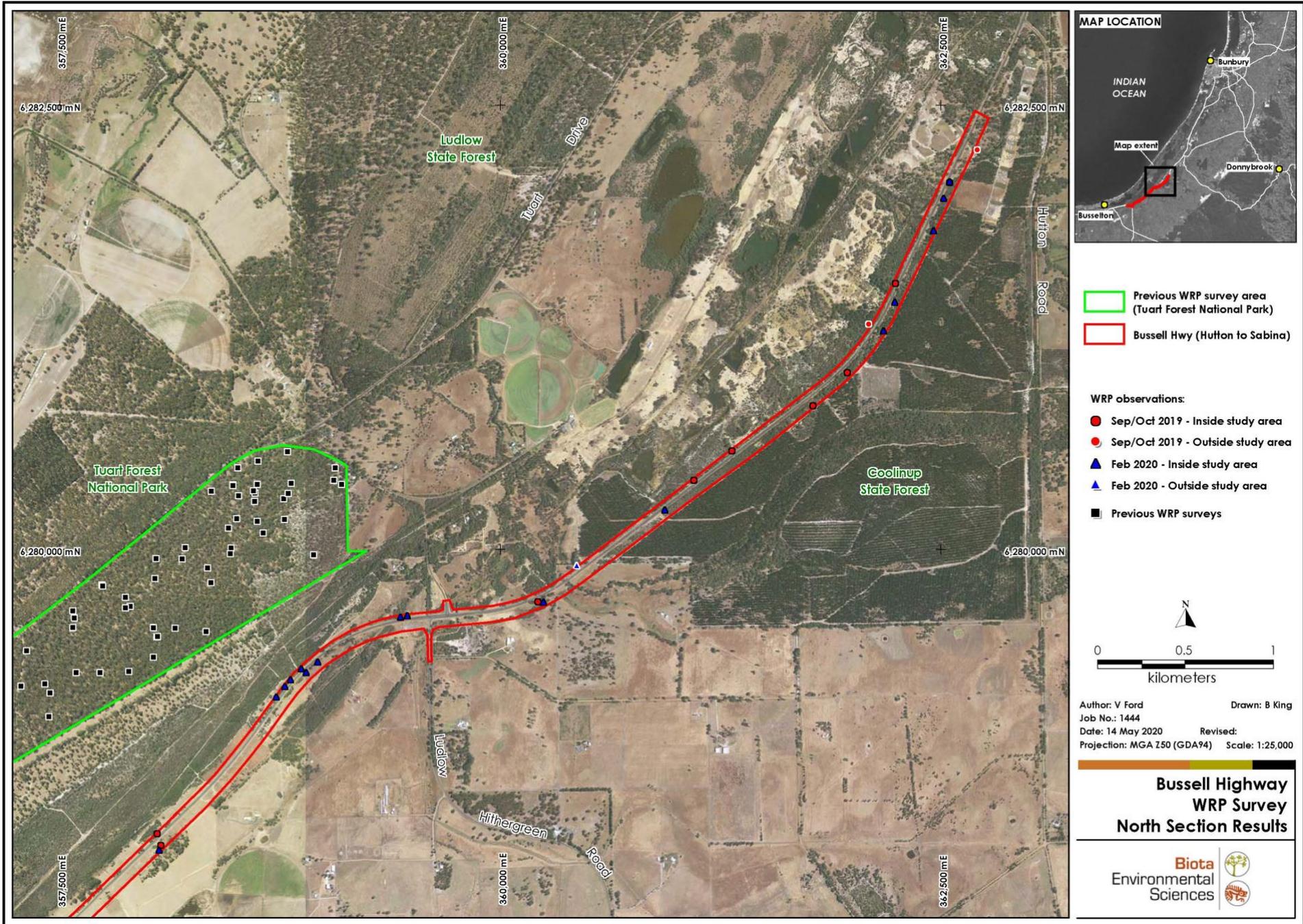


Figure 3.1: Western Ringtail Possum observations from current survey (red) and previous surveys in adjacent bushland (blue) (northern section map 1/2).

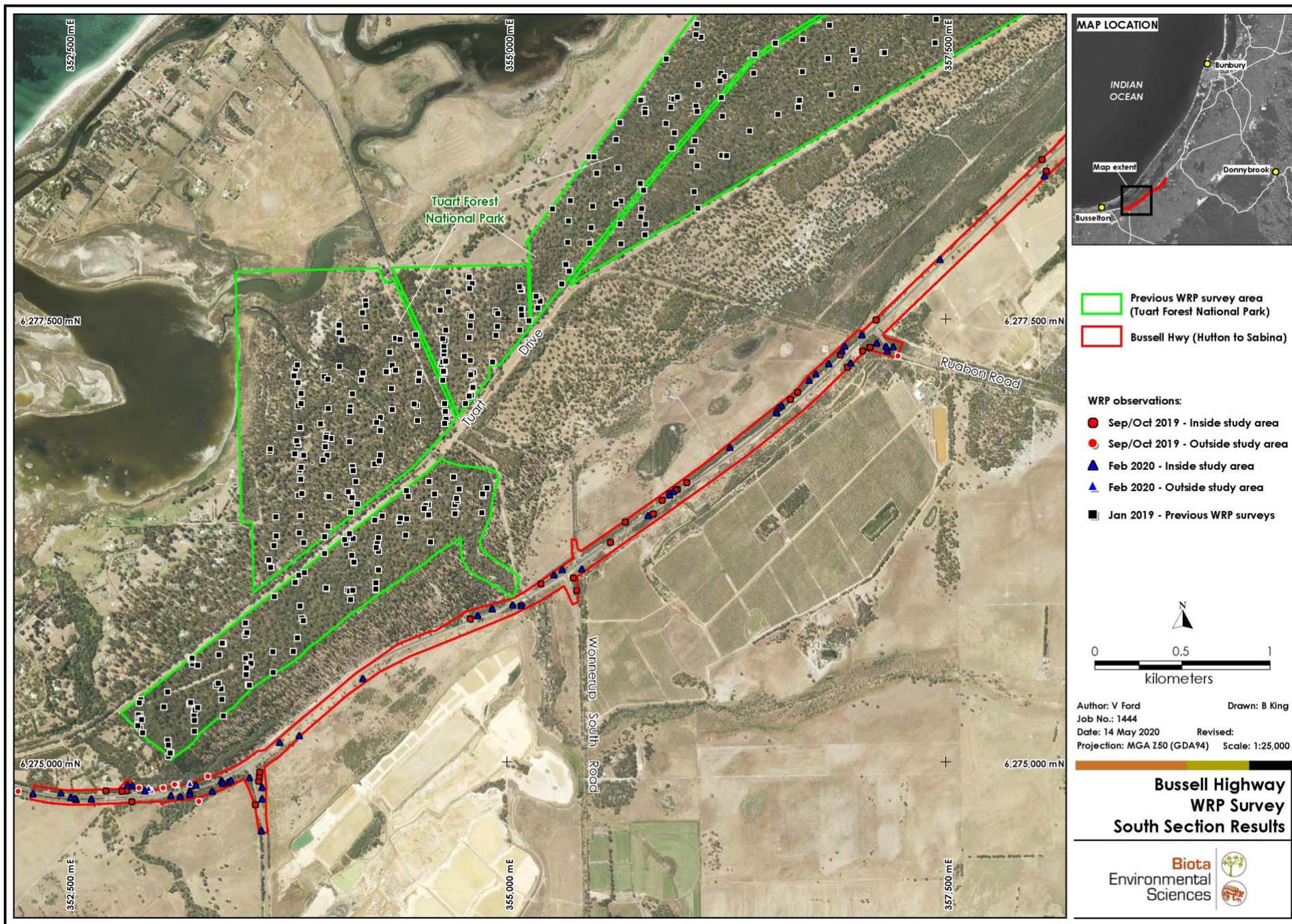


Figure 3.2: Western Ringtail Possum observations from current survey (red) and previous surveys in adjacent bushland (blue) (southern section map 2/2).

3.2 Fauna Habitats

The habitats of the study area ranged from areas of woodland, particularly at the southern Sabina and northern Hutton extremes of the study area, to open shrubland and scattered trees over much of the central portion of the study area. These habitats have been mapped in Figure 3.3 and Figure 3.4 and exemplar photographs in Plate 3.1 to Plate 3.5.

The dominant vegetation types occurring within the study area comprised *Acacia/Melaleuca* shrubland, *Marri/Eucalyptus* woodland and *Peppermint/Eucalyptus* woodland. The approximate area of each of the habitat types and the numbers of Western Ringtail Possums observed in each are detailed in Table 3.1. Those sections of study area containing uninterrupted vegetation supported the highest abundances of Western Ringtail Possum. Most possums were observed in Jarrah, Marri, Tuart and Peppermint trees, however, the species was also observed in less typical habitat types including in *Acacia* and *Melaleuca* shrubs.

The Peppermint woodland habitat mapped where the Sabina River intersects the Bussell Highway was found to support 10 individual Western Ringtail Possums in Phase 2 where none had been recorded in Phase 1. This may represent a contraction of individuals toward well-watered areas in the height of summer as well as the dense shade represented by the Peppermint trees. Western Ringtail Possums are known to be particularly susceptible to heat stress (Yin 2006).

Table 3.1: Habitat types within the study area and occurrence of Western Ringtail Possums in each.

Habitat type	Area (ha)	Western Ringtail Possum Individuals	
		Phase 1	Phase 2
<i>Acacia/Melaleuca</i> shrubland	17.1627	11	15
<i>Marri/Eucalypt</i> woodland	9.62746	8	6
<i>Peppermint/Eucalyptus</i> woodland	9.11564	24	28
Scattered <i>Marri/Eucalypt</i>	6.94668	11	11
Mosaic of <i>Peppermint/Eucalypt</i> woodland and <i>Melaleuca/Acacia</i> shrubland	5.58458	1	5
Peppermint woodland	2.3108	0	10
Scattered <i>Acacia/Melaleuca</i> shrubs	1.10508	0	2
Bare ground	123.2	0	0
Total	175.0529	55	77

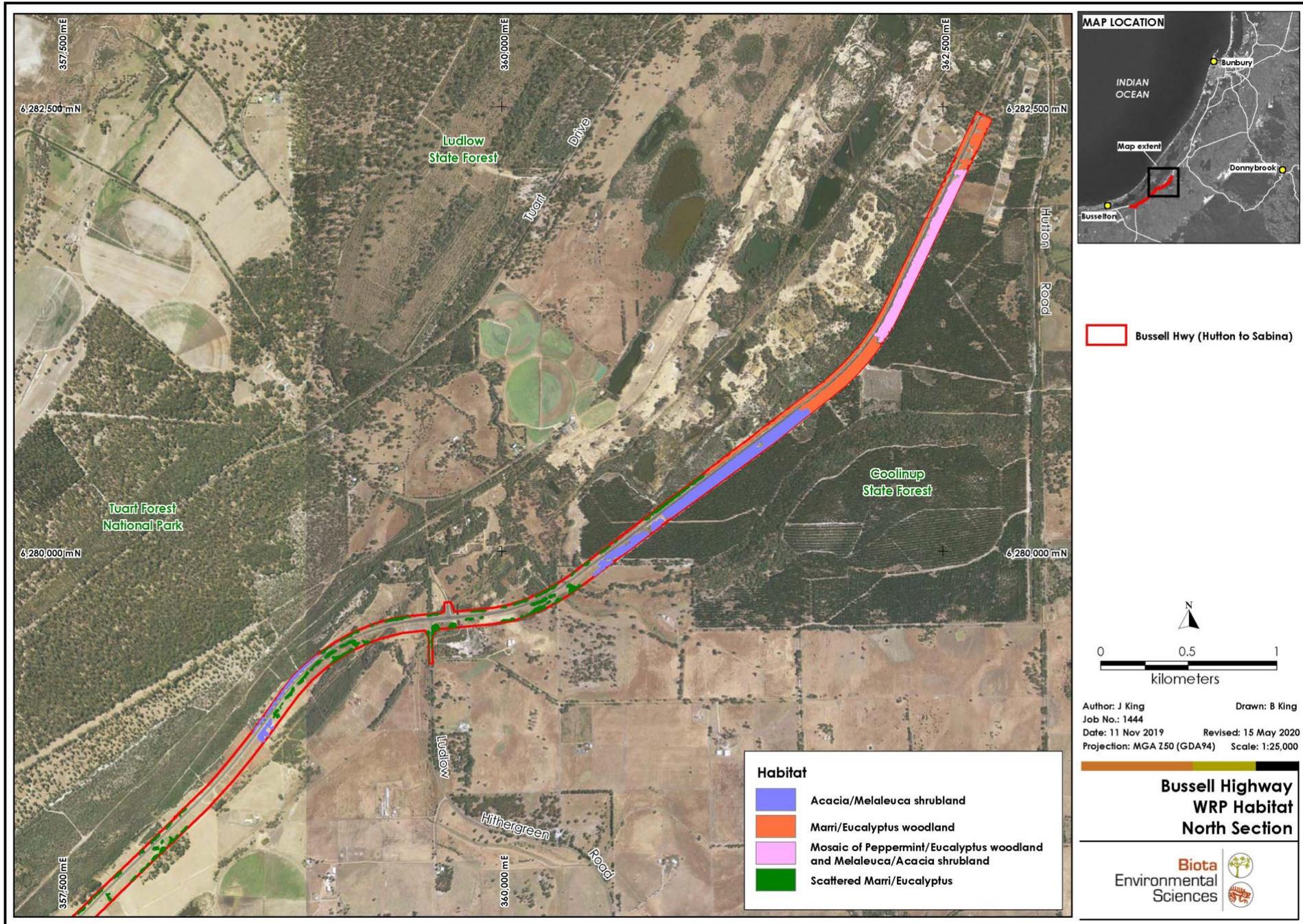


Figure 3.3: Fauna habitats of the study area (northern, map 1/2).

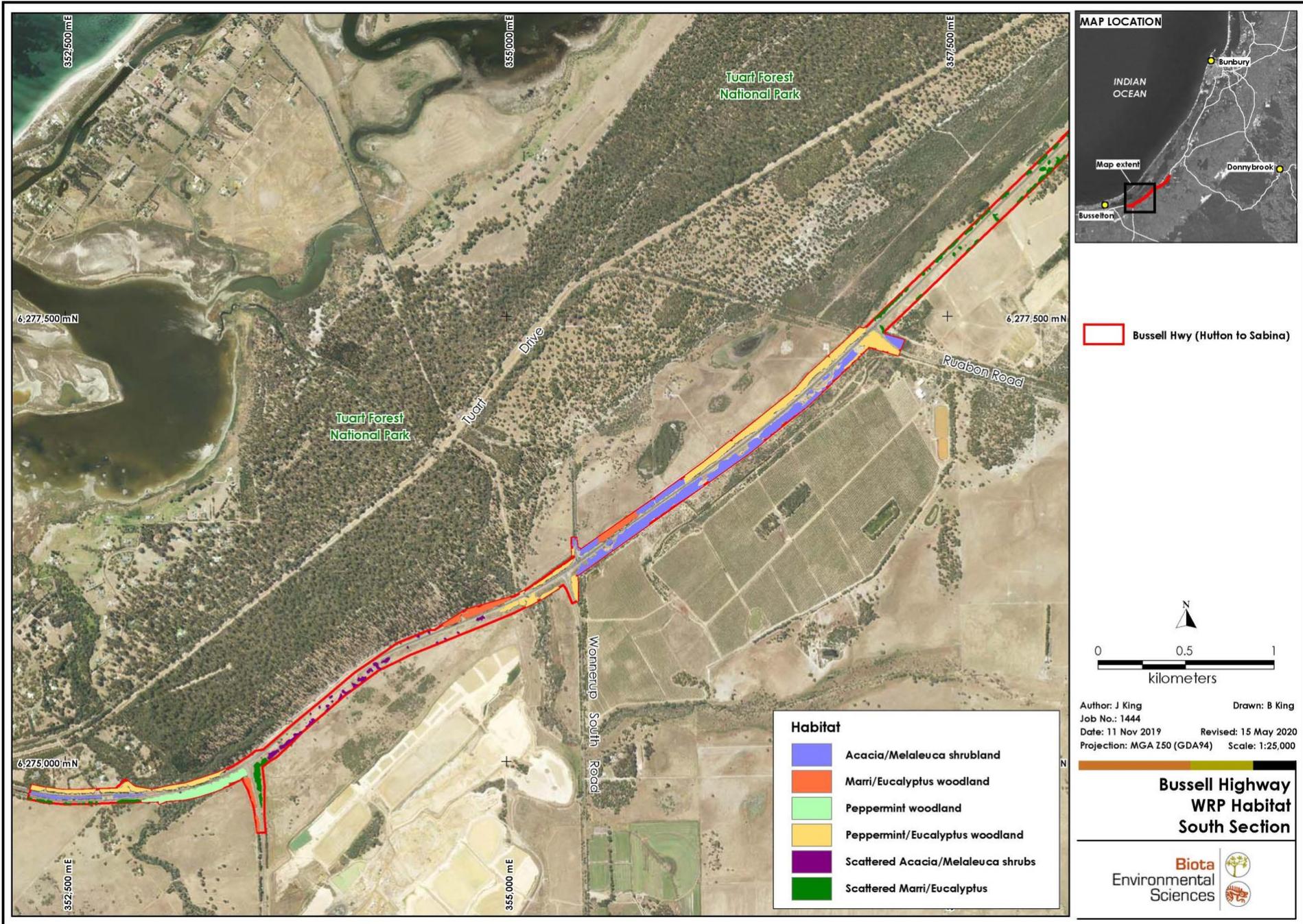


Figure 3.4: Fauna habitats of the study area (southern, map 2/2).



Plate 3.1: *Acacia/Melaleuca* mixed shrubland.



Plate 3.2: *Melaleuca* shrubland (pine plantation in background is outside study area).



Plate 3.3: Mixed woodland



Plate 3.4: *Marri/Eucalyptus* woodland



Plate 3.5: *Peppermint/Eucalyptus* woodland.

3.2.1 Potential Linkages

The southernmost extent of the study area is adjacent to a relatively large continuous area of native vegetation and is thus unlikely to represent a linkage. The section from Layman Road to Ruabon Road comprises continuous vegetation through cleared land and as such may represent a short linkage; 25 individuals Western Ringtail Possums were observed in this segment in Phase 1 and 18 in Phase 2. The section from Ruabon Road north to the Coolilup State Forest is largely bare ground and is unlikely to represent a linkage. The portion of the study area running adjacent to the Coolilup State Forest (largely pine plantation) on the east side of Bussell Highway is continuously vegetated and was found to support eight Western Ringtail Possums in Phase 1 and six in Phase 2, however similar habitat is represented on the west side of Bussell Highway, reducing the likelihood of the study area to represent a linkage, however, there may be an increased likelihood of possums crossing Bussell Highway in this section.

4.0 Discussion and Recommendations

The density of Western Ringtail Possums in the study area (1.06 – 1.49 individuals per hectare) is comparable to other sites sampled on the Swan Coastal Plain (Biota 2020). The Tuart Forests between Busselton and Bunbury are a well-documented stronghold for the Western Ringtail Possum (Jones et al. 1994, de Tores et al. 2005, Shedley and Williams 2014) and recent work in these Tuart Forests again demonstrated high densities in the area (Biota 2020)). The study area lies adjacent to the Tuart Forest South site of Biota (2020) as shown in Figure 3.1 and Figure 3.2. Distance sampling at this location using 75 m spaced transects produced a density estimate of 3.40 ± 0.31 individuals per hectare, the third highest density recorded from over 40 sites across the entire species range (Biota 2020).

The two phases of survey indicated a consistent high abundance of Western Ringtail Possums in the road reserve adjacent the Bussell Highway between Hutton and Sabina. The highest abundances of the species were located at its southern Sabina end, where the road reserve is continuous with large remnant areas of habitat running outside the study area including both the Tuart Forest National Park and the riparian vegetation of the Sabina River. Both of these areas have previously been shown to support high abundances of Western Ringtail Possums. For example, in this same locality, Harewood (2013) recorded 17 Western Ringtail Possums in one night within a 1.5 km stretch of riparian vegetation of the Sabina River.

Of note was the record of Western Ringtail Possums (one in Phase 1 and two in Phase 2) from the median strip where the road is dual carriage at the southernmost extent of the study area. This finding may indicate individuals have been crossing the Bussell Highway, which is in contrast to previous findings that the Western Ringtail Possum will generally avoid road crossings. The study of Yokochi et al. (2015) within the Locke Nature Reserve near Busselton examined whether roads represent a significant barrier to Western Ringtail Possums and found not a single successful road crossing amongst 37 radio-collared Western Ringtail Possums over the course of the three year study and the only confirmed attempts at road-crossings were road deaths. However, tracking work in progress near Bunbury (Biota in prep.) includes one individual who appears to regularly cross a road to access one of its preferred day shelters.

The well-vegetated road reserve between Wonnerup South Road and Ruabon Road may represent a linkage through otherwise cleared land, joining two large remnants of native vegetation directly next to the Bussell Highway. The presence of Western Ringtail Possums in the lower quality shrub habitat types in some of this road reserve may reflect the use of this habitat in a transitory manner (Figure 3.2). A GPS collar study to track the movement of Western Ringtail Possum, particularly possums found in this potential linkage strip, could provide useful information as to what extent the habitats of the road reserve are being utilised and where animals are moving to and from. It is also important to note that this remnant is in itself continuous in areas further away from the Bussell Highway, so the road reserve vegetation does not represent the only habitat connecting these patches.

Surveying the two large remnants directly adjacent the road (i.e. between Sues Road and Wonnerup South Road and between Ruabon Road and Ludlow Hithergreen Road) to determine abundances in these areas would potentially inform the source of individuals occurring within the road reserve. It is possible that the high abundance of individuals at the southern end of the study area may represent an artefact of the high abundances in neighbouring habitat and the road representing a barrier to further dispersal, so the Western Ringtail Possums are accumulating in the road reserve. As such it would also be of value to search the road reserve for evidence of more permanent use such as searches for dreys and latrines that may indicate a preferred foraging location.

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