CopperString 2.0 Project:

Potential Night Parrot Habitat Desktop Analysis

10th June 2021

Summary

A desktop analysis of potential Night Parrot habitat, focused on the CopperString 2.0 Project alignment in north-western Queensland is presented. The aim of this desktop analysis was to determine whether suitable Night Parrot habitat occurs within the project area. The report also considers what risks the project may present to any Night Parrots that do occur in the project area, and how these risks could be assessed or mitigated. We conclude that suitable habitat does occur in the project area, which could support Night Parrots. We recommend acoustic surveys to detect any long-term stable roost sites along the alignment, and consideration of how to assess and mitigate the ongoing risk of collision with powerlines once construction of the project is complete.

Project Team

Nick Leseberg

Nick has been researching Night Parrots since 2016, and is nearing completion of his PhD at the University of Queensland. Nick's research has focused on using historical reports to establish the current status and distribution of the Night Parrot, and also how to detect the species using acoustic recorders. Nick has written several papers describing the ecology and calls of the Night Parrot, and has assisted with the discovery of Night Parrots at several locations in both Queensland and Western Australia.

Al Healy

Currently a PhD student at the University of Queensland, Al is a remote sensing and GIS specialist, with particular expertise applying remote sensing techniques to analyse the properties of vegetation communities. He has been involved with Night Parrot research since 2016, primarily developing a remote sensing technique that can distinguish floodplain and run-on areas with particular properties that are known to provide important foraging habitat for Night Parrots.

Dr Steve Murphy

Steve is a rangeland ecologist with several decades of experience. He was the first researcher to be involved in the Night Parrot project following their rediscovery in western Queensland in 2013. Steve conducted the initial fieldwork that established acoustics as the primary detection method, and also lead the effort to capture and radio tag two Night Parrots. The data from that research has informed our understanding of the Night Parrot's resource requirements and habitat preferences.

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Contents

1. Introduction

GHD recently engaged Adaptive Natural Resource Management Pty Ltd (ANRM) to undertake a desktop analysis of potential Night Parrot habitat along the alignment of the CopperString 2.0 Project, where that alignment traverses potential Night Parrot habitat in north-western Queensland. The aim of the desktop analysis is to determine whether Night Parrots could occur in the project area, and if so, determine what risks the project may represent to those birds and how those risks can be assessed or mitigated.

This document outlines the methodology supporting the desktop analysis, and presents the results of the analysis. This document also outlines what steps would be required to progress from this desktop analysis to an acoustic survey and subsequent analysis.

2. Analysis methodology

The aim of this desktop analysis is to determine whether Night Parrots could occur within the project area, and if so, suggest how the risk to Night Parrots of the current project alignment could be assessed and mitigated. The impact of the alignment will be considered in two respects:

(1) the impact of disturbance along the alignment itself, associated with the construction of powerlines; and,

(2) once powerlines have been installed, the ongoing risk to Night Parrots of collision with those powerlines.

Accordingly, the analysis will seek to establish whether potential Night Parrot habitat occurs along the alignment itself, and whether Night Parrots are likely to use the available habitat in a way that presents an ongoing risk to Night Parrots once construction of the powerlines is complete. The analysis is based on the results of research from western Queensland, and is supported by preliminary research from Western Australia. Three key assumptions provide the foundation of this analysis.

2.1. Night Parrots require open, long unburnt *Triodia* for roosting

Night Parrots in western Queensland, central and northern Western Australia, establish long-term stable roost sites in long unburnt *Triodia* (Jackett *et al*. 2017, Murphy *et al*. 2017a, Murphy *et al*. 2017b), and may occupy these sites for extended periods of up to several years (S. Murphy, N. Leseberg unpubl. data). All areas where long-term stable roost sites have been detected in both Queensland and Western Australia have been open (Jackett *et al*. 2017, S. Murphy, N. Leseberg unpubl. data). While there may be some scattered shrubs or isolated trees, these sites are practically treeless.

2.2. Night Parrots require productive sites for foraging

The nightly foraging activity of Night Parrots in western Queensland focuses on productive patches in an otherwise unproductive landscape, and preliminary research

in Western Australia suggests similar behaviour (Murphy *et al*. 2017b, N. Leseberg unpubl. data). These productive sites, characterised by their hydrology and the quick growth response of their vegetation after inundation, are detectable using remote-sensing techniques. The proximity of such areas to suitable roosting habitat is likely to be an important factor determining the ability of a landscape to support Night Parrots.

2.3. Night Parrots occupy long-term stable roost sites and can be detected at these sites using automated recording units (ARUs)

Research in western Queensland and Western Australia has determined that acoustic monitoring of potential long-term stable roost sites using automated recording units (ARUs) is the most reliable and repeatable method for detecting and monitoring Night Parrots. This research has also determined how ARUs should be spaced within potential habitat to maximise the probability of detecting Night Parrots if they are present (Leseberg *et al*. in review).

3. Desktop analysis

This analysis consists of four steps:

(1) examination of historical reports to determine the likelihood that Night Parrots could occur in the project area;

(2) identification of areas of open, long unburnt *Triodia* in the project area that could support long-term stable roost sites;

(3) identification of productive patches that could represent suitable feeding habitat within the project area; and,

(4) combining the results of steps (1), (2) and (3) to determine where within the project area Night Parrots could occur, and what those patterns of occurrence may be.

3.1. Distribution of the Night Parrot within the project area

Historically, Night Parrots were found throughout arid central Australia (Leseberg *et al*. in press). There are several historical reports of the Night Parrot from the project area (Garnett *et al*. 1993, Leseberg *et al*. in press), with most coming from the early 1990s, in an area to the west of the currently proposed CopperString 2.0 Project alignment between Cloncurry and Selwyn (Fig. 1). The spatial accuracy of these reports is high. Two of these reports are supported by enough detail to be considered probable Night Parrots records. These reports come from an area approximately 30 km to the west of the alignment (Leseberg *et al*. in press). The remaining reports from this cluster were not supported by enough information to be considered probable records, although this does not necessarily mean they were not Night Parrots. It simply means the reports did not contain enough detail to conclude whether or not they were likely to be Night Parrots, so should be considered potential Night Parrot reports.

Topographically, it is important to note that most of these records are associated with the less rugged and more open terrain to the west of the Cloncurry River and the CopperString 2.0 Project alignment, rather than the rugged range country to the east of the alignment between Cloncurry and Selwyn. This correlates with all recent discoveries; while Night Parrots may be found near range country, they seem to spend most time in open, relatively flat terrain.

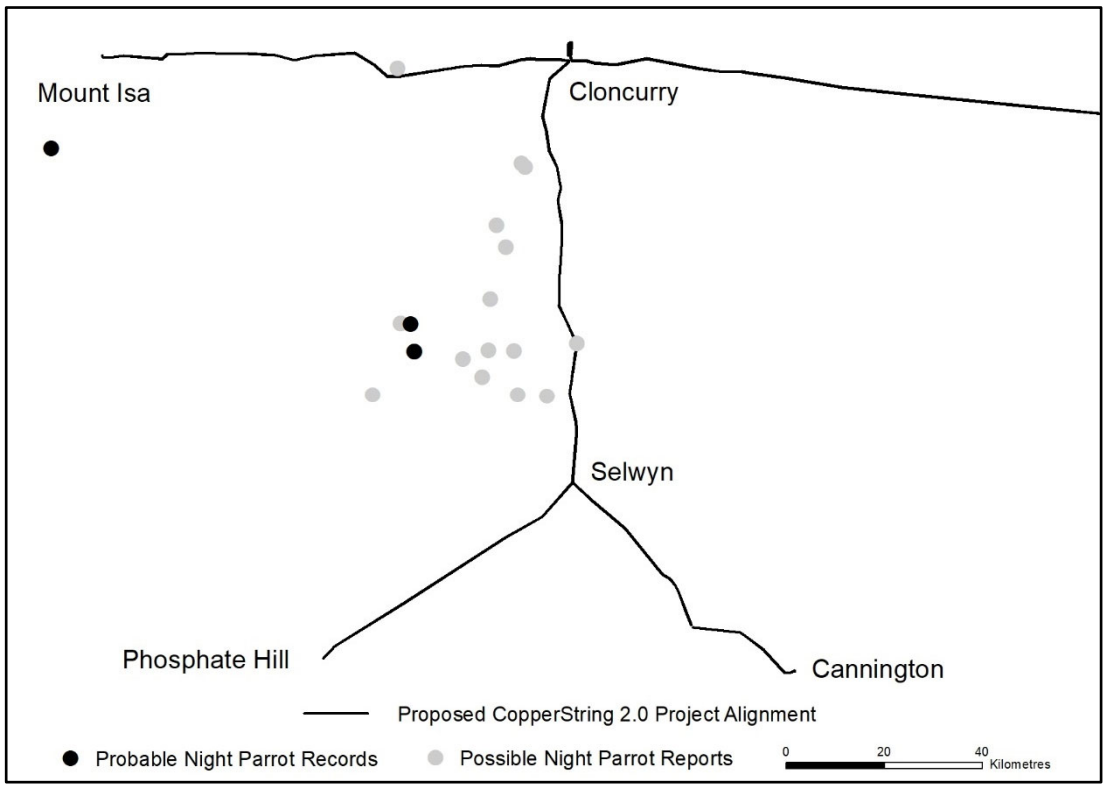

Fig. 1. Location of historical Night Parrot reports in relation to the proposed CopperString 2.0 Project alignment. The cluster of reports to the west of the alignment are all from the early 1990s and 2000s. While the majority of these are only considered possible Night Parrots, two records contained enough detail to be considered probable Night Parrot records (Leseberg *et al*. in press).

While there are no historical records from near the south-western or south-eastern arms of the alignment, the flat open terrain surrounding Phosphate Hill and to the south and east of Cannington suggest that Night Parrots could occur in these areas. The nearest historical record to these sites is a dead bird found north of Boulia in 1990, approximately 85 km southwest of Phosphate Hill.

There is one report from 1990 of a Night Parrot seen while driving from Cloncurry to Mount Isa (Leseberg *et al*. in press). This report contains very little detail and is not considered a probable sighting. There is a probable sighting from 1965, approximately 30 km southwest of Mount Isa (Leseberg *et al*. in press). This sighting is likely associated with an area of potentially suitable habitat floodplain habitat which extends south and southwest from the approximate location of that sighting. There is no apparently suitable Night Parrot habitat between the location of the sighting and Mount Isa, suggesting the project alignment is unlikely to represent a risk to Night Parrots in this area.

Given this analysis of historical reports, we confined our analysis to the section of the alignment from Cloncurry south to Selwyn, and the sections from Selwyn to the Phosphate Hill and Cannington mines respectively. We did not include the sections of the alignment from Cloncurry west to Mount Isa, or from Cloncurry to the east in this analysis. These sections of the alignment are dominated by rugged and rocky range country with significant tree and shrub cover (Queensland Herbarium 2018), whereas recent discoveries suggest Night Parrots require flat, open terrain, interspersed with productive areas. Given the topography and lack of probable historical records, we consider it unlikely that these sections of the alignment represent important Night Parrot habitat.

3.2. Identification of potential roosting habitat within the project area

Night Parrots are known to travel at least 10 km from their roost sites to forage and drink, and have been recording travelling at least 40 km in a single night (Murphy *et al*. 2017b). It is likely they are able to travel much greater distances if required. Based on this research, we reasoned that searching for habitat within 20 km either side of the alignment would capture any birds likely to be impacted by the project, either by construction activity, or ongoing risk of collision with powerlines once construction is complete.

Fig. 2. Four different sites where Night Parrots have established long-term stable roosts. The *Triodia* is not necessarily extensive, but has complex structure and at least some large hummocks.

All long-term stable roost sites detected in western Queensland and Western Australia have been found in relatively open areas of long unburnt *Triodia* (Fig. 2). Although the total extent of *Triodia* at these sites does not appear critical, the size distribution of hummocks is important. The sites where Night Parrots occur all contain at least some

patches of large, long unburnt *Triodia* hummocks, and are in open areas with few or no trees or shrubs. The tree and shrub density is typically fewer than 10-15 stems per hectare within roosting sites, and often lower than this (S. Murphy, N. Leseberg, unpubl. data).

We searched for suitable roosting habitat using a combination of two techniques. Initially, we analysed the Queensland Regional Ecosystem (RE) descriptions (Queensland Herbarium 2018, Version 11) to identify those REs described as *Triodia* grassland (Table 1). At each site where Night Parrots have been found in the Channel Country bioregion of western Queensland, the relevant RE code typically contains at least one RE described as *Triodia* grassland. We then extracted any RE polygons within the project area defined by an RE code that contained one of the open *Triodia* RE descriptions, including subdominant REs in heterogeneous polygons.

We mapped these *Triodia* REs, then using publicly available satellite imagery (Satellites Pro and Google Earth), examined these locations for evidence of suitable patches of open *Triodia*. Sites containing open, long unburnt *Triodia* can usually (but not always) be discerned using this imagery. Where potentially suitable areas of *Triodia* were identified these were mapped by placing a 300 m x 300 m grid over the entire area of interest, and identifying those cells within the grid which contained potentially suitable roosting habitat.

Table 1. RE descriptions defined as *Triodia* grassland, which were used to establish where suitable roosting habitat may occur. Not all of these REs occurred in the project area.

RE Code	**Short Description**
1.5.12	*Triodia longiceps* hummock grassland on older alluvium
1.7.3	*Triodia pungens* hummock grassland on ferricrete and on silcrete
1.7.4	*Triodia brizoides* and/or *T. molesta* hummock grassland on ferricrete and on silcrete
1.9.12	*Triodia pungens* hummock grassland on Cambrian limestones
1.9.14	*Triodia pungens* hummock grassland with emergent *Eucalyptus pruinosa* on Precambrian shales
1.11.11	*Triodia* spp. hummock grassland on metamorphic hills (south)
1.11.12	*Triodia pungens* hummock grassland (north)
4.5.8a	*Triodia pungens* hummock grassland on Quaternary sand sheets
4.5.8x60	*Triodia basedowii* hummock grassland on isolated patches of Quaternary dunefield
4.7.2x1	*Triodia* spp. hummock grassland on plateau margins
4.7.2x1a	*Triodia* spp. hummock grassland on plateau margins
4.7.2x1b	*Triodia* spp. hummock grassland on plateau margins
4.7.2x1c	*Triodia* spp. hummock grassland on plateau margins

Although RE mapping provides a good initial indication of where suitable habitat may be found, potentially suitable patches of *Triodia* also exist in areas that are not mapped as open *Triodia*. These are often near mapped patches, but are sometimes also associated with specific topographical features in the landscape, such as range foothills and drainage lines. Using satellite imagery we searched for suitable patches of open,

long unburnt *Triodia* near such features, and where patches were found, mapped them using the same 300 m x 300 m grid placed over the entire area of interest.

Fig. 3 shows all areas of suitable roosting habitat mapped using the above methods.

Given Night Parrots only roost in long unburnt *Triodia*, the identification of suitable roosting habitat could be improved further by creating a fire history using high resolution imagery to refine the location of unburnt *Triodia*. Even a moderate resolution fire history would be useful, but unfortunately the fire histories publicly available via Northern Australia and Rangelands Fire Information do not cover the project area. Producing such a history is beyond the scope of this work.

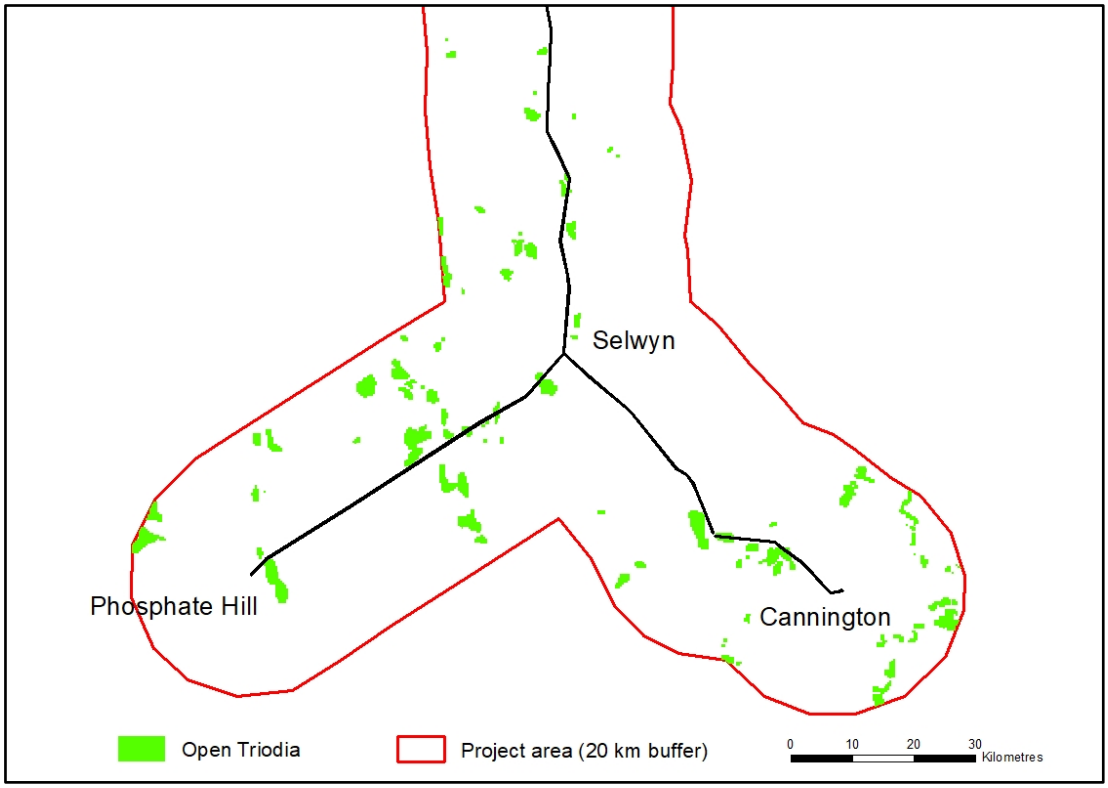

Fig. 3. Areas of open *Triodia* detected within the project area using a combination of RE mapping and satellite imagery analysis.

3.3. Identification of potential feeding habitat within the project area

Unpublished DNA analyses of faecal samples show that Night Parrots in western Queensland eat a relatively broad array of food plants including grasses (e.g. *Triodia longiceps*, *Uranthoecium truncatum*, *Brachyachne ciliaris*, *Astrebla lappacea*, *Dactyloctenium radulans*) and forbs (e.g. *Trianthema triquetra*) (S. Murphy, N. Leseberg, unpubl. data). Tracking studies show that Night Parrots visit floristically diverse run-on zones in the landscape, which can be large (e.g. floodplains) or small (e.g. gilgai formations) (Murphy *et al*. 2017b).

A feature of the places where Night Parrots often feed in western Queensland is that they are fast to respond with vegetative growth after rainfall (A. Healy, unpubl. data).

Analysis of these sites has shown that the annual species respond most rapidly to rainfall, providing an important flush of productivity, including seed production. Rapid increases in greenness are associated with this increase in food resources for Night Parrots, though the actual availability will depend on the local suite of species.

To identify rapidly responding vegetation, we used the single-date Landsat fractional cover products (JRSRP 2020) from January and April 2020 to assess the response across the landscape to a period of heavy rain. Fig. 4 shows areas that had a 20-40% increase in the green fraction over 10-17 days in response to heavy rainfall in early 2020. In western Queensland, areas displaying this response typically contain the species and diversity shown to be important feeding habitats for Night Parrots (A. Healy unpub. data).

A key difference between the responses in the project area and those seen at sites where Night Parrots occur in the Channel Country bioregion further south is the extent and magnitude of the greening response. In the Channel Country the response is typically patchy and limited in extent. In contrast, within the CopperString 2.0 Project area there is a widespread increase in greenness. This suggests that Night Parrots could find food throughout much of the landscape. Although areas of potential feeding habitat are widespread, there appear to be four key areas of particularly suitable feeding habitat, identified in Fig. 4.

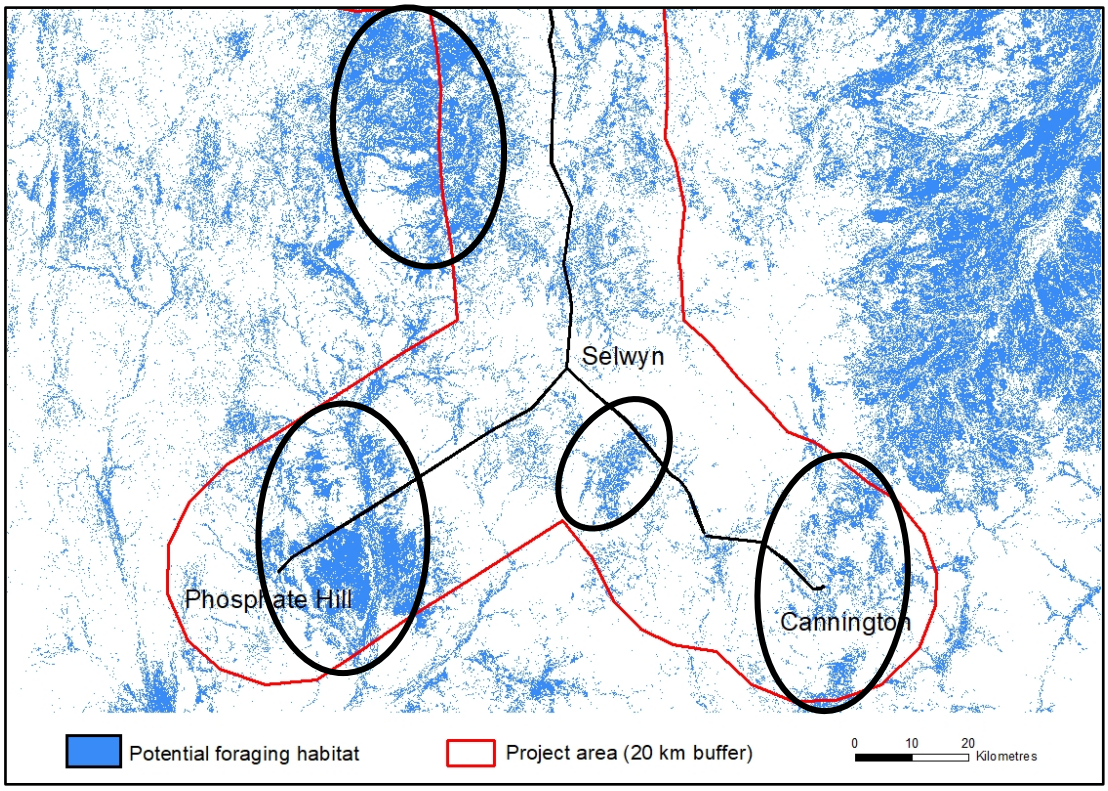

Fig. 4. Areas of potential foraging habitat within the project area. The mapped areas showed a 20-40% increase in greenness following rain in early 2020. Four significant areas of potential foraging habitat are circled.

3.4. Where Night Parrots are likely to occur in the project area

At all sites within Australia where Night Parrots are known to occur, suitable roosting and feeding habitat occurs within a matrix that enables the birds to access the resources they require. Considering this requirement, we now assess the likely presence of Night Parrots along the southern segment of the alignment between Cloncurry and Selwyn, and the south-western and south-eastern arms of the alignment, to Phosphate Hill and Cannington mines respectively.

3.4.1. Alignment from Cloncurry south to Selwyn

There is a significant patch of suitable foraging habitat centred on an area approximately 20 km to the west of this section of the alignment, which coincides with the cluster of historical reports from that area. There are only a few small patches of possibly suitable roosting habitat in proximity to this foraging habitat, and within the project area (Fig. 5). Based on RE descriptions, there are several large areas of potentially suitable roosting habitat mapped to the west of the project area (i.e. outside the 20 km buffer). The location of both this potential roosting habitat and the foraging habitat suggests that the core area of Night Parrot activity is likely to be centred on an area approximately 20 km to the west of the alignment. There could be some activity potentially associated with small patches of roosting and feeding habitat where the Cloncurry River flows north-west across the alignment, approximately 20 km north of Selwyn.

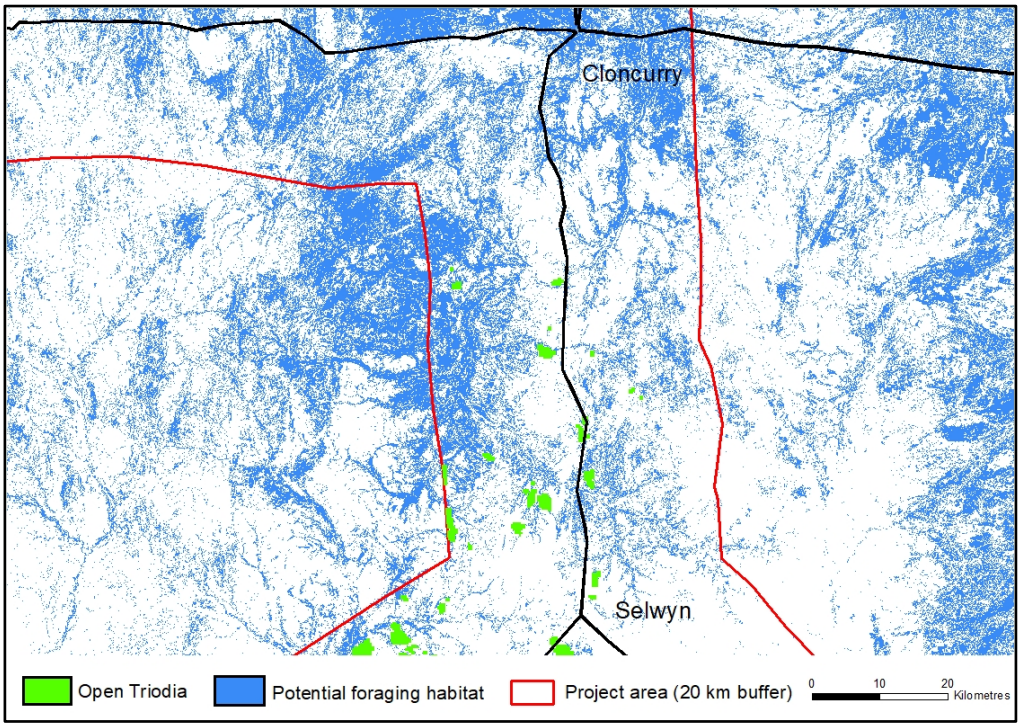

Fig. 5. There is limited suitable roosting habitat within the project area, in proximity to the large area of foraging habitat to the west of the alignment. Although not mapped here, there are significant areas of roosting habitat to the west of the project area, from which Night Parrots could access this foraging habitat.

3.4.2. *Alignment from Selwyn southwest to Phosphate Hill*

The floodplain of the Burke River is the most significant area of potentially suitable foraging habitat within the project area, and is bordered on both the east and west by patches of potentially suitable roosting habitat (Fig. 6). We consider this the most likely area within the project area to support Night Parrots.

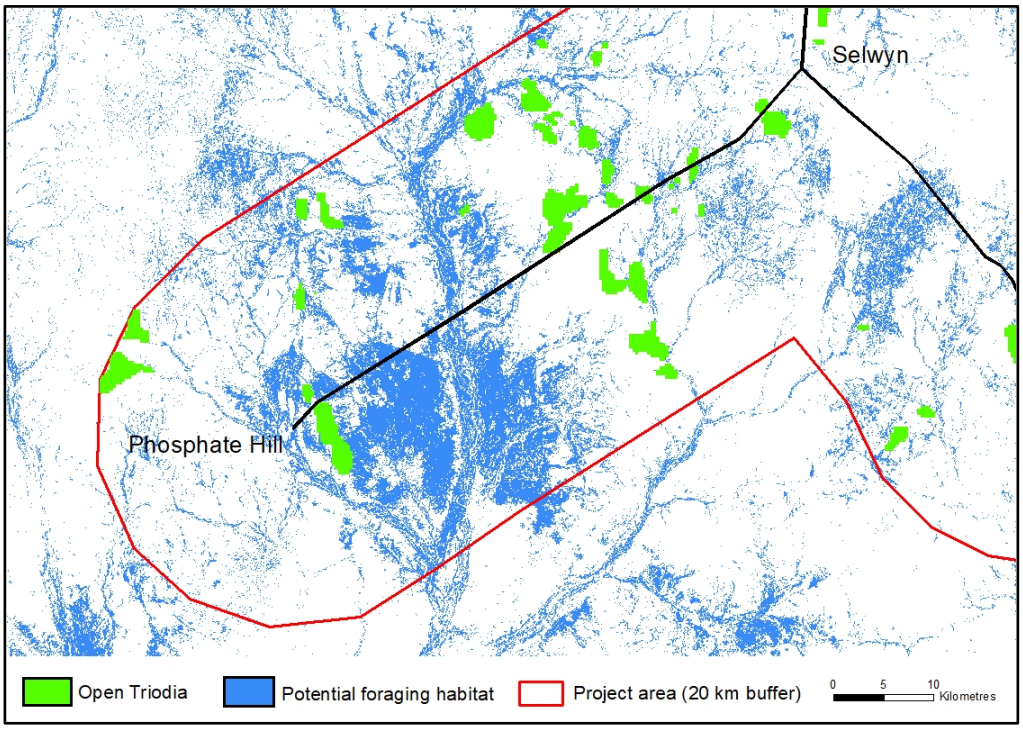

Fig. 6. The Burke River floodplain contains potentially suitable foraging habitat, and is in relative proximity to areas of potentially suitable open *Triodia* to both the east and west. This habitat matrix of suitable roosting habitat juxtaposed with suitable foraging habitat is similar to Night Parrot habitat elsewhere in western Queensland. This is the region most likely to support Night Parrots within the project area.

3.4.3. *Alignment from Selwyn southeast to Cannington*

The north-western half of this segment of the alignment passes just to the north of an area of possible foraging habitat (Fig. 7). However, there appears to be little suitable roosting habitat in this area. Further to the east, there are several patches of suitable foraging habitat associated with the floodplains of the Hamilton River and Blackeye Creek, to the east of Cannington. There are also several patches of suitable roosting habitat associated with range country close to the alignment northwest of Cannington. There is also potential roosting habitat associated with range country to the east of the Hamilton River. It is possible that this matrix of roosting and foraging habitat occurring within a 25 km radius of Cannington supports Night Parrots.

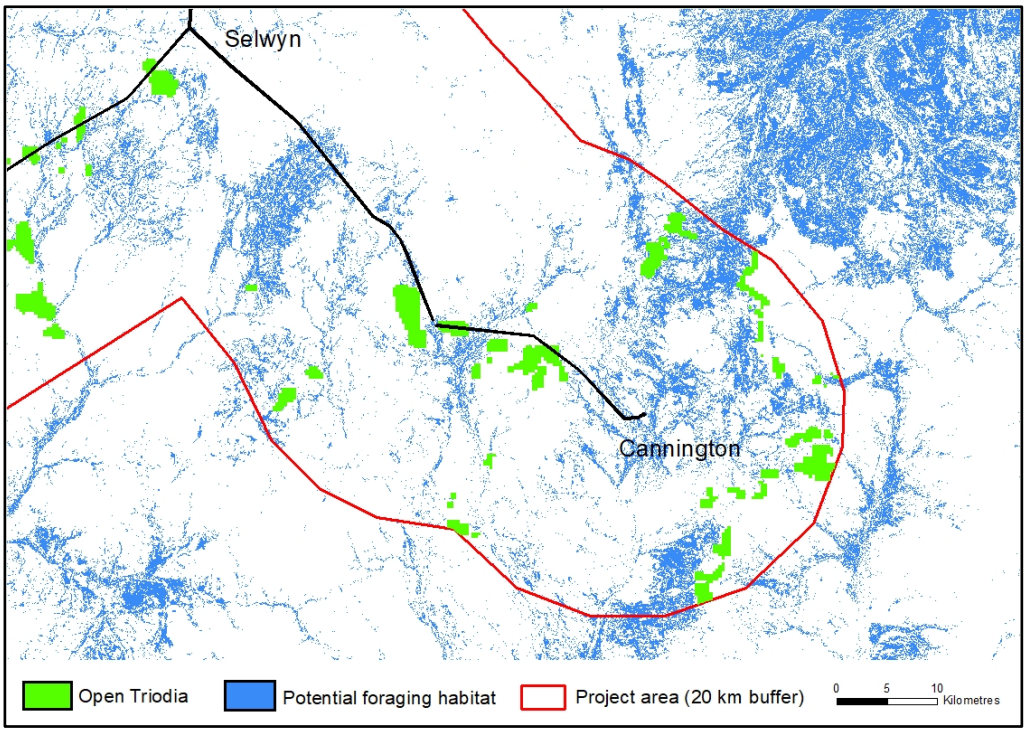

Fig. 7. Although there is a significant foraging area 20 km south east of Selwyn, there is limited roosting habitat in the area. There is a matrix of potentially suitable roosting and foraging habitat within a 25 km radius of Cannington.

4. Risks presented to Night Parrots by CopperString 2.0 Project

We have considered the risk to Night Parrots in two respects:

(1) the short-term risk to long-term stable roost sites posed by disturbance during the construction phase of the project; and,

(2) the ongoing collision risk to Night Parrots posed by powerlines within the landscape.

In this section we provide a general outline of why disturbance and collision with powerlines are risks to the Night Parrot. In the following section we examine these risks more closely in the context of the Copperstring 2.0 project alignment and outline how they can be assessed and mitigated.

4.1. Short-term risk to long-term stable roost sites

Night Parrots occupy long-term stable roost sites for extended periods of up to several years, and while Night Parrots are apparently able to move roost sites, this occurs infrequently. These roost sites are also critical for breeding. These sites typically support a pair or small group of Night Parrots, with individual roosts spread across an area up to several hectares (S. Murphy, N. Leseberg, unpubl. data). The risk to any long-term stable roost sites will be realised when construction activity disturbs the birds at the site.

Given the area that a pair or small group of Night Parrots may occupy at a long-term stable roost site, we consider any roost site within 1 km of the alignment to be at risk of disturbance because of construction activity. This distance is an estimate, as there are no data to support conclusions about what risk to Night Parrots significant construction activity close to a roost site would represent.

4.2. Ongoing risk to Night Parrots of collision with powerlines

Night Parrots are known to travel large distances at night while moving from their roost sites to foraging grounds. Acoustic data also suggest that parrots regularly visit isolated, normally unoccupied *Triodia* patches after significant rainfall, behaviour perhaps associated with nest site selection or searching for mates (S. Murphy, N. Leseberg, unpubl. data). While there is no definitive evidence on flight heights for Night Parrots, observations suggest that birds do move at some height when travelling longer distances. A radio-tagged bird at Pullen Pullen was tracked flying over an observer at an estimated height of 40 m, and the same bird was known to fly over low range country and wooded areas, suggesting it probably flew at a height well above ground level (S. Murphy, pers. obs.). A bird has been observed in a thermal scope taking off from the ground and climbing to at least 30 m in height before it was lost from sight (N. Leseberg, pers. obs.).

Despite being nocturnal, Night Parrots have been modelled as having relatively poor adaptations for nocturnal behaviour, with less visual acuity than the closely related and diurnal Eastern Ground Parrot (Iwaniuk *et al*. 2020). Therefore, Night Parrots are likely to be particularly susceptible to collision with objects such as fences and powerlines.

Given the likelihood of long-distance movements, at night, and at height, and also given the Night Parrot's lack of visual acuity, powerlines are likely to represent a collision risk to the Night Parrot. This collision risk is likely to be greatest in areas where the parrots will cross powerlines while travelling at height, typically to and from foraging and roosting areas.

5. Assessment of risks to Night Parrots and potential mitigation strategies

5.1. Risk to long-term stable roost sites posed by construction activity

5.1.1. Assessment of risk posed by construction activity

Prior to construction activity that would disturb Night Parrots, the presence or absence of long-term stable roost sites within 1 km of the alignment should be assessed using ARUs. The detection radius of Song Meter SM4s when being used to detect Night Parrots is known (Leseberg et al. in review), and they should be deployed to assess all potential roosting habitat within 1 km of the alignment. Night Parrot calling behaviour at long-term stable roost sites is frequent and predictable, and deployments would only need to include four still (non-windy) nights to ensure Night Parrots are detected if they are present. If

Night Parrots are not detected, it is very unlikely the site represents a long-term stable roost.

Based on the mapping of open *Triodia*, we estimate that surveying all suitable roosting habitat within 1 km of the alignment would require approximately 100 SM4 deployments. A more precise survey plan would require site visits, or at a minimum further desktop analysis using very high resolution imagery, to validate the desktop analysis and define survey points. It is important to note that this validation of the desktop analysis is a critical element of developing the survey protocol; if field assessment shows an area mapped as suitable from the desktop analysis is unsuitable (due to excessive shrub or tree cover, or recent fire for example), that area can be excluded from the survey. Conversely, field surveys should also be vigilant for potential roosting habitat that has not been detected during desktop work. In most cases, field validation reduces the number of sites that need to be surveyed (S. Murphy, N. Leseberg, pers. obs.). The time taken to conduct the survey would depend on the final number of survey sites and the resources available, but would probably take approximately 2-3 months, or less if more resources were available.

5.1.2. Mitigation of risk posed by construction activity

If Night Parrots were detected within 1 km of the alignment, mitigating the risk would require consideration of the location of the roost site relative to the alignment, and the configuration of habitats in the immediate area. Changing the alignment to avoid the roost site would likely be a satisfactory option, but may not be required depending on the nature of the roost site, its spatial extent relative to the alignment, and whether or not it was currently supporting breeding activity. If a long-term stable roost site were detected within 1 km of the alignment, permanent monitoring of that site would be recommended while construction occurred and for a period of 12 months post-construction to provide data on the impacts of construction.

If no long-term stable roost sites are detected, construction could occur as planned. Given the relatively small area of potential roosting habitat likely to be disturbed, there will be no residual impacts to the availability of long-term stable roost habitat. No further mitigation or offsetting is likely to be necessary.

5.2. Ongoing risk to Night Parrots of collision with powerlines

5.2.1. Assessment of ongoing risk posed by collision with powerlines

There are two possible approaches to assessing the risk to Night Parrots of collision with powerlines. The first would be to conduct a comprehensive survey for Night Parrots within the entire area of interest (i.e. survey all prospective roosting habitat within 20 km of the alignment) with the aim of concluding definitively whether or not Night Parrots occur in the project area. Based on our initial assessment of the extent of suitable roosting and feeding

habitat, and experience conducting similar surveys elsewhere, such a survey would likely require 18-24 months to complete, at considerable expense.

A second possible approach is to consider the results of the desktop analysis, determine where Night Parrots may occur within the entire area of interest (i.e. within 20 km of the alignment), then identify those segments of the alignment where there is elevated risk, and pre-emptively mitigate on the assumption Night Parrots are present.

5.2.2. Alignment from Cloncurry south to Selwyn

As stated previously, there is an area containing a matrix of apparently suitable roosting and foraging habitat centred on an area approximately 20 km to the west of this segment of the alignment. If Night Parrots are present in this area, it seems likely the majority of Night Parrot activity would occur well to the west of the alignment. Although there are some areas of suitable feeding habitat to the east of this segment of the alignment, the landscape here is primarily rocky range country, and there is little suitable roosting habitat. We consider it very unlikely that these patches of habitat represent important Night Parrot habitat and consider the likelihood of Night Parrots crossing the alignment here to be very low. Therefore, we do not consider collision with powerlines along this segment of the alignment to represent a significant ongoing risk to Night Parrots.

5.2.3. Alignment from Selwyn southwest to Phosphate Hill

As stated previously, we consider the matrix of suitable roosting and foraging habitat associated with the Burke River floodplain to be the region most likely to support Night Parrots within the project area. Given the alignment passes through the centre of this matrix (Fig. 6), if Night Parrots are present, it is likely the powerlines would represent an ongoing risk to Night Parrots moving from roosting areas to the east or west of the Burke River floodplain onto the floodplain. The segment associated with this elevated risk would extend from approximately 15 km southwest of Selwyn through to the end of the powerline at Phosphate Hill.

5.2.4. Alignment from Selwyn southeast to Cannington

Given the lack of suitable roosting habitat, the area through which the north-western half of this segment passes is unlikely to represent an area of significant activity for Night Parrots. Therefore, the 30 km of the alignment from Selwyn to the southeast probably does not represent an ongoing risk to Night Parrots.

From approximately 30 km southeast of Selwyn through to Cannington there are some patches of possible roosting habitat, with foraging habitat to the east associated with the Hamilton River floodplain (Fig. 7). If these patches of *Triodia* close to the alignment supported Night Parrots, this section of the

alignment could present an ongoing risk to Night Parrots as they moved from those roosting sites out to the floodplain. Given the relatively limited amount of roosting habitat, it would be feasible to survey these patches close to the alignment to definitively determine whether Night Parrots occur. If no Night Parrot are found in the patches of *Triodia* close to the alignment, mitigating the risk of collision with powerlines would not be required along this section of the alignment. While these surveys would not determine whether Night Parrots occurred in the areas of open *Triodia* to the north and east of Cannington, birds transiting from these sites to the Hamilton River floodplain are unlikely to conflict with the current alignment, and their presence would not require mitigation.

5.2.5. Mitigating risk of collision with powerlines

Assuming that changing the alignment to avoid large areas such as the Burke River floodplain is not an option, the primary strategy to mitigate the risk of collision to Night Parrots is to make any Night Parrots moving through the area more aware of the powerlines. While the precise details of any appropriate technique are beyond the scope of this report, there is research suggesting that Night Parrots do not have particularly acute nocturnal vision (Iwaniuk *et al*. 2020). Rather, their vision is more likely to detect sharp contrasts. These findings have led to the use of reflective tape and aluminium metal tags to alert Night Parrots to fence lines at sites where they occur in western Queensland. High visibility tags designed for alerting birds to the presence of powerlines are available (see e.g. http://www.poweng.com.au/birdflight.htm), and could perform a similar role. Such tags spaced every 20 m along high risk sections of the powerline are likely to satisfactorily reduce the risk of collision, not just to Night Parrots, but potentially other bird species also.

6. Next steps

Following on from the conclusions of this report, we recommend the following next steps:

(1) further analyses to confirm that areas of mapped open *Triodia* within 1 km of the current alignment do represent suitable roosting habitat. This would be done preferably as a site visit, but if this is not possible, could be completed using very high-resolution satellite imagery or aerial photography;

(2) define an acoustic survey protocol to survey areas of suitable roosting habitat within 1 km of the alignment;

(3) conduct the acoustic surveys and analyse the resulting data; and,

(4) consider the ongoing risk to Night Parrots of collision with powerlines, and decide which strategy will be adopted to either assess and mitigate, or pre-emptively mitigate this risk.

7. References

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