

Guidelines for determining the likely presence and habitat usage of night parrot (*Pezoporus occidentalis*) in Western Australia

Background

The purpose of this document is to provide guidance on how to determine and assess the likely presence of night parrots (*Pezoporus occidentalis*).

The night parrot is an elusive parrot endemic to Australia. Night parrots are highly cryptic in nature, being nocturnal, primarily ground-feeding parrots, that inhabit remote arid and semi-arid areas of Australia.

The night parrot is listed as a threatened species, at the rank of Critically Endangered under *Biodiversity Conservation Act 2016* (BC Act) and Endangered under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth). Additionally, it is listed as Critically Endangered in *The Action Plan for Australian Birds 2020* (Leseberg *et al.* 2021). Due to its threatened status, it is necessary to determine whether night parrots may occur in an area when undertaking development impact assessment or land management activities within the species' likely range.

It is important to note that because of the rarity and highly cryptic nature of the species, it is very difficult to prove the presence of night parrots at the landscape scale, and even more difficult to establish absence.

Note: This information is provided as a guide only and the document is subject to change as new information about night parrots becomes available. Survey practitioners are encouraged to check the Department of Biodiversity, Conservation and Attractions' (DBCA) [night parrot webpage](#) for the latest version of this guideline.

Night parrot distribution and ecology

Historic and contemporary records provide evidence of the past and present distribution of the night parrot. Previously found throughout most of arid and semi-arid Western Australia (WA), since 2017 all night parrot records from WA have occurred in central and northern areas of WA's interior.

Figure 1 shows night parrot survey bioregions. High Priority Survey Bioregions are those in which all contemporary, and the most high veracity historical records of night parrot have occurred, or where a bioregion is in close proximity to contemporary records. The Priority Survey Bioregions include those with historical reports (some of high veracity) but no reported contemporary records, and are likely to contain suitable habitat that could support night parrot populations.

Research from Queensland (QLD), coupled with recent observations from WA, provide insight into night parrot ecology and habitat requirements. At the landscape scale, night parrots require two distinct habitats:

1. patches of low, dense vegetation in which they roost during the day; and
2. nearby floodplains or other low-lying areas supporting diverse assemblages of native grasses and herbs in which to feed at night.

Both roosting and foraging habitat is typically on flat or gently sloping ground, and is very open, with few trees or shrubs (see Figures 2 – 4). Night parrots have been known to fly up to 10 km from their roosting sites during foraging expeditions, and possibly further (Murphy *et al.* 2017b), so foraging habitat is not necessarily within or immediately adjacent to roosting areas.

Roost sites may be occupied for extended periods of several months, up to several years, and are also used by the birds for breeding. This can occur at any time of year if there have been significant rainfall events (Murphy *et al.* 2017a). These roosting and breeding sites are 'long-term stable roost sites'. All contemporary roosting/breeding observations have been from *Triodia* dominated habitats, but historically night parrots have also been reported roosting at sites dominated by chenopods, such as samphire and *Sclerolaena*, and in some cases lignum. Structurally and topographically, these chenopod-dominated sites are similar to known *Triodia*-dominated roost sites.

At the local (site) level, long-term stable roost sites are found in areas that support long unburnt *Triodia* hummocks, especially *Triodia* species that are ring-forming, such as *Triodia longiceps*. The *Triodia* is typically structurally complex, with a mix of hummock sizes (see Figures 2 and 3). A roosting site is typically a few hectares in area and occupied by a pair or small groups of 3-4 birds (probably adults and dependent young).

The *Triodia* may occur as large, connected expanses, or isolated patches. There is currently no known minimum extent of *Triodia* expanse that would prohibit night parrots from establishing a roost site, assuming the *Triodia* is structurally suitable for roosting. Birds have been known to establish roost sites in relatively isolated patches of only a few hummocks. However, at sites where night parrots have persisted, suitable patches of *Triodia* are widespread at the landscape scale. Patches of *Triodia* that have been recently burnt, or which are low (i.e. uniformly less than about 40-50 cm in height) are not likely to provide adequate shelter. Often the vegetation in areas of suitable habitat will be naturally fragmented and therefore well-protected from fire. While long-term stable roost sites may be occupied for extended periods, research to-date suggests there may be some local movement, with birds roosting at different sites nearby for short periods. Over time, the birds tend to favour the same patches of suitable roosting habitat.

Favoured foraging sites are likely to vary across the species range, particularly in response to the time of year (seeding/flowering), rainfall and fire. In QLD, night parrots feed in floodplain and run-on areas rich in forbs, grasses and grass-like plants (Figure 4). Preliminary research suggests similar areas are also important in WA. *Triodia* is likely to provide a good food resource at least in times of mass flowering and seeding. Chenopods, probably *Sclerolaena* (based on relative abundance), are known to be consumed, possibly as a source of food or moisture. Other known food plants include both annual and perennial grasses, such as *Uranthoecium truncatum* (Qld) and *Astrebla* spp. (Mitchell grass), and herbs such as *Trianthema*. Foraging habitat is likely to be more important if it is adjacent to or within about 10 km of patches of suitable roosting habitat.

Night parrots are known to use free-standing water for drinking, including artificial water sources such as earthen 'tanks'. It is unknown if free-standing water needs to be present for an area to be suitable. Metabolic water-balance modelling suggests that night parrots may be able to obtain enough water from succulent plants such as *Sclerolaena*, but it is unclear if they actually do this when conditions are suitable, or whether they need to drink from free-standing water in hot conditions (Kearney *et al.* 2016).

All contemporary records from QLD and WA have been associated with paleodrainages or eroded rocky areas; landscapes that support both roosting and foraging habitat. Paleodrainages, including salt lake edges and nearby interdunal claypans often support suitable foraging habitat. The margins of these drainages can be topographically complex, and support isolated patches of *Triodia* that are protected from fire. In these systems, chenopod-dominated areas are also considered potential roosting or foraging habitat. Eroded rocky areas, including stony pavements and the edges of breakaways, can also be topographically complex. That complexity, plus extensive areas of bare stony ground, provide protection from fire for areas of *Triodia*. At these sites, run-on areas and shallow depressions, or other areas of slight relief can support patches of suitable foraging habitat.

Assessing whether suitable night parrot habitat is present

The High Priority Survey Bioregions represented in Figure 1 show where the occurrence of night parrot must be considered in the planning and assessment of proposals prior to approval or implementation. Within the Priority Survey Bioregions, which may support night parrots, assessments need to consider whether suitable habitat occurs in the area of interest.

A desktop assessment of habitat is the first step when assessing if night parrots are likely to be present. The focus should be on *Triodia*-dominated roosting habitat, although the possibility that night parrots use chenopod-dominated habitats should also be considered during the desktop analysis, given confirmed historical records. The techniques outlined below are applicable to either *Triodia* or chenopod-dominated roosting habitat.

Initial analysis should utilise all available data to determine whether there are areas of both open, long unburnt *Triodia* for roosting, and open floodplain or run-on areas for foraging. For example, a desktop assessment could initially be undertaken by using occurrence data records, which can be requested from DBCA Species and Communities Program via fauna.data@dbca.wa.gov.au, together with vegetation and fire mapping. Note that information should be confirmed by comparing with high resolution satellite imagery or aerial photography. Analysis should attempt to determine the extent of suitable roosting habitat, not just at the specific site of interest, but in the wider landscape (i.e., within 10 km of the site or area of interest).

This initial analysis recognises two important factors:

1. An isolated patch of suitable *Triodia* at a specific site may still be an important refuge for night parrots that occur in the landscape, even if that patch is not occupied at that point in time.
2. If a site represents good foraging habitat, whether night parrots may use that foraging habitat can only be determined by assessing whether there is suitable roosting habitat in the wider landscape, not just at the site scale.

If a thorough desktop analysis for a site cannot identify any suitable roosting habitat within 10 km of the area of interest, it is unlikely that night parrots occur in that area, and further surveys are unlikely to be required. However, if potentially suitable roosting habitat and foraging habitat is identified during the desktop assessment, the suitability of that habitat should be confirmed with follow up field assessment. Direct observation of habitat in the field should be used to examine whether the *Triodia* has the structure and extent necessary to support night parrots.

It is vital to note that at present, if suitable roosting habitat exists in the landscape, unless all available roosting habitat in an area can be surveyed simultaneously using the methods described in the next section, it is not possible to irrefutably demonstrate that night parrots are absent at the landscape scale. Habitat assessment is therefore critically important. Where suitable habitat is identified within the priority survey areas, even if the species cannot be confirmed as present, it might be present at another time of year or in another year. In such cases, assessments should consider the likelihood of occurrence based on the quality of the habitat at the site, and the possibility that the species may occur if there is, e.g., a decrease in grazing pressure, or changed fire regimes. Conversely, if habitat assessment demonstrates that there is no suitable habitat within the landscape, it is unlikely that night parrots occur in the area, and further consideration may not be necessary.

Field survey techniques for night parrots

The most effective field survey technique for night parrots is passive acoustic survey (Leseberg *et al.* 2022). Night parrots establish roost sites, which they occupy for extended periods of up to several years, and call from these roost sites most nights throughout the year. Most calling occurs in the two hours after sunset, and the two hours before sunrise, but birds will call occasionally throughout the night, particularly when breeding. Night parrots also call as they move around the landscape to foraging and drinking sites. Night parrots are known to move around and call more frequently at prospective roost sites in response to significant rain (> 1 standard deviation from the mean; Murphy *et al.* 2017a). These predictable calling patterns mean night parrots are very detectable at their roosting sites using autonomous recording units (ARUs). As ARUs may also detect night parrots moving around the landscape at night it is recommended they are set to record from 25 minutes after sunset until 25 minutes before sunrise.

An acoustic survey program using ARUs to detect night parrots in an area may take one of several possible approaches, depending on the purpose of the surveys.

1. Detecting night parrots at a specific site

ARUs can be deployed for short durations in patches of likely suitable roosting habitat, where there is limited suitable roosting habitat, and little or no suitable roosting habitat in the surrounding landscape.

- ARUs should be deployed for a minimum of six nights in good recording conditions (i.e., little or no wind, rain or acoustic disturbances).
- The detection distance will depend on the model of ARU used (e.g., SM4, SM Mini, BAR), microphone condition and how the acoustic data are analysed. Consult Appendix S2 of Leseberg *et al.* (2022) for details.
- A sampling rate of 24,000 Hz is typically used although 16,000 Hz may be used to reduce the memory requirements for long-term deployments.
- Assuming good recording conditions and equipment requirements are met, night parrot roosting and calling can be detected within 200 m of an ARU.
- Deployment length should be extended for longer periods where good recording conditions cannot be met within six nights.
- Refer to Appendix S3 of Leseberg *et al.* (2022) for a worked example of how to plan ARU deployments. These guidelines should be followed as a minimum, including details on the probability a call will be detected.

If all patches of suitable *Triodia* within the landscape can be surveyed using ARUs, night parrot presence can be determined with high confidence.

2. Detecting night parrots at a landscape scale

It is more difficult to determine whether night parrots occur when there is extensive suitable roosting habitat at the landscape scale. Two possible approaches are recommended.

- i. Where the extent of potential roosting habitat is relatively limited:
 - A survey program that involves multiple short ARU deployments (six non-windy nights) covering all suitable roosting habitat within the area of interest may be feasible. This approach should determine whether night parrots are roosting within the area of interest with relatively high confidence.

- ii. Where there is a significant amount of potential roosting habitat in the area of interest, and it is not feasible to cover this area with a series of short deployments:
 - A program of longer deployments will need to be implemented to increase the likelihood of detection. This approach will require multiple ARUs to be spaced more widely throughout areas of suitable roosting habitat, and left in place for a period of several months. The aim of this approach is to detect night parrots as they move around at night.
 - Where these deployments can be timed to coincide with periods of significant rain, chances of detection are increased, given the birds move around and call more in response to rain. The longer the ARUs are able to be left in place recording, the more likely it is that night parrots present in the landscape will be detected.

Interpreting results of acoustic surveys for night parrots

Call analysis should be performed by suitably qualified persons with experience in identifying night parrot calls. Some night parrot calls are of very short duration, meaning that they can easily be missed, or confused with calls of some other species, such as honeyeaters (Leseberg *et al.* 2019). To eliminate potential misidentification, the recordings should be compared carefully to those of other species with similar calls (e.g., pallid cuckoo, other parrot species, honeyeaters) that are known or anticipated to occur in the area.

It is important to note that the conclusions available about the presence of night parrots based on ARU surveys are quite specific.

- If night parrots are not detected during a short duration survey of a specific site, the only available conclusion is that birds were unlikely to have been roosting in proximity to the ARU location during that survey period. It does not mean night parrots are not present in the wider landscape, or that they do not use that site from time to time.
- If a network of ARUs is deployed for a short duration, conclusions are similarly limited to the area within the detection radius of the ARUs. Current knowledge suggests that if all suitable roosting habitat out to a distance of around 10 km from an area of interest is surveyed with simultaneous short duration surveys, high confidence conclusions about the presence or absence of night parrots are possible.
- If night parrots are detected during the night (i.e., outside of the peak dusk and dawn calling periods) using longer duration deployments of widely spaced ARUs, assessments should proceed on the basis that night parrots are resident within the landscape and probably roost within 10 km of the point where they were detected. Additional surveys would be required to locate the long-term stable roost site(s) and better understand how night parrots are using the landscape.
- Conversely, if night parrots are not detected using longer duration deployments of widely spaced ARUs, it is not possible to conclude that night parrots do not occur in the landscape somewhere. They may still occur but have remained undetected.

For these reasons, in a landscape with extensive suitable habitat, detailed and methodical multi-year surveys are the only method for determining with high confidence whether night parrots are present. Ultimately, the challenges associated with detecting night parrots at the landscape scale reinforce the importance of detailed habitat assessments. These assessments will not only inform acoustic surveys, but assist proponents to understand whether night parrots are likely to exist in an area of interest, and how the impacts of development or changed land management could affect local populations of the species.

Legal considerations

Section 40 Authorisation

A section 40 authorisation under the *Biodiversity Conservation Act 2016* (BC Act) is required to take or disturb threatened fauna. Threatened fauna are those species that are listed under section 19 of the BC Act as critically endangered, endangered or vulnerable. When determining if a section 40 authorisation is required it is important to consider the frequency of the activity or the actions that are undertaken as part of that activity (e.g., number of visits to a site) and the impacts that this may have on fauna. If the response of a fauna species to an activity is unknown but has the potential to meet the legislated definition of disturb, then the activity should be assessed. Where there is uncertainty, the precautionary principle should be applied. The deployment of passive acoustic recorders in known night parrot habitat requires a section 40 authorisation.

Access to lands

Before undertaking survey activities, permission must be obtained from: (a) the owner or occupier of private land; or (b) the department or authority controlling Crown land, on which the threatened fauna occurs. This includes obtaining the written endorsement from DBCA if the activity is proposed for land managed by DBCA.

Animal ethics

Survey activities are likely to require animal ethics approval. Enquiries relating to the *Animal Welfare Act 2002*, scientific purposes licence and animal ethics committee approvals should be directed to the Western Australian Department of Primary Industries and Regional Development (<https://www.agric.wa.gov.au/animalwelfare>).

Commonwealth

Please be aware that Commonwealth requirements may differ from State requirements. Any activities that may impact fauna that is listed under the EPBC Act may require approval from the Commonwealth Department of Climate Change, Energy, the Environment and Water (<https://www.dcceew.gov.au/environment/biodiversity/threatened/permits>) under the EPBC Act and/or *Environment Protection and Biodiversity Conservation Regulations 2000*.

Disclaimer: this document is not definitive; it is the responsibility of individuals to ensure that they comply with the requirements of all applicable legislation. DBCA has exercised due care in preparing and compiling the information and data in this guideline. Notwithstanding, DBCA, its employees and advisers disclaim all liability, including liability for negligence and for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying on any of the information or data in this publication to the maximum extent permitted by law.

Further information

EPBC SPRAT profile – Night Parrot (http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=59350).

Jackett, N. A., Greatwich, B. R., Swann, G., and Boyle, A. (2017). A nesting record and vocalisations of the Night Parrot *Pezoporus occidentalis* from the East Murchison, Western Australia. *Australian Field Ornithology* **34**, 144-150.

Kearney, M. R., Porter, W. P., and Murphy, S. A. (2016). An estimate of the water budget for the endangered night parrot of Australia under recent and future climates. *Climate Change Responses* **3**, 14–31. doi:10.1186/s40665-016-0027-y

Leseberg, N. P., Murphy, S. A., Jackett, N. A., Greatwich, B. R., Brown, J., Hamilton, N., Joseph, L., and Watson, J. E. M. (2019). Descriptions of known vocalisations of the Night Parrot *Pezoporus occidentalis*. *Australian Field Ornithology* **36**, 79–88. doi:10.20938/afo36079088

Leseberg, N. P., McAllan, I. A. W., Murphy, S. A., Burbidge, A. H., Joseph, L., Parker, S. A., Jackett, N. A., Fuller, R. A., and Watson, J. E. M. (2021). Using anecdotal reports to clarify the distribution and status of a near mythical species: Australia's Night Parrot (*Pezoporus occidentalis*). *Emu - Austral Ornithology* **121**, 239-249.

Leseberg, N. P., Murphy, S. A., Burbidge, A. H., Jackett, N. A., Olsen, P., Watson, J., and Garnett, S. T. (2021). Night Parrot *Pezoporus occidentalis*. In 'The Action Plan for Australian Birds 2020'. (Eds S. T. Garnett and G. B. Baker.) pp. 444–447. (CSIRO: Melbourne, Victoria.)

Leseberg, N. P., Venables, W. N., Murphy, S. A., Jackett, N. A., and Watson, J. E. M. (2022). Accounting for both automated recording unit detection space and signal recognition performance in acoustic surveys: A protocol applied to the cryptic and critically endangered Night Parrot (*Pezoporus occidentalis*). *Austral Ecology* **47**, 440-455.

Murphy, S. A., Austin, J. J., Murphy, R. K., Silcock, J., Joseph, L., Garnett, S. T., Leseberg, N. P., Watson, J. E. M., and Burbidge, A. H. (2017a). Observations on breeding Night Parrots (*Pezoporus occidentalis*) in western Queensland. *Emu - Austral Ornithology* **117**, 107-113.

Murphy, S. A., Silcock, J., Murphy, R., Reid, J., and Austin, J. J. (2017b). Movements and habitat use of the night parrot *Pezoporus occidentalis* in south-western Queensland. *Austral Ecology* **42**, 858–868. doi:10.1111/aec.12508

Night Parrot Recovery Team [webpage \(www.nightparrot.com.au\)](http://www.nightparrot.com.au). Includes downloadable reference calls, guidance on effective, non-intrusive survey techniques and sighting reporting protocols.

DBCA night parrot webpage (<https://www.dbca.wa.gov.au/management/threatened-species-and-communities/resources/threatened-and-priority-fauna-resources>). Includes the most up to date night parrot survey guidelines.



Department of **Biodiversity,
Conservation and Attractions**

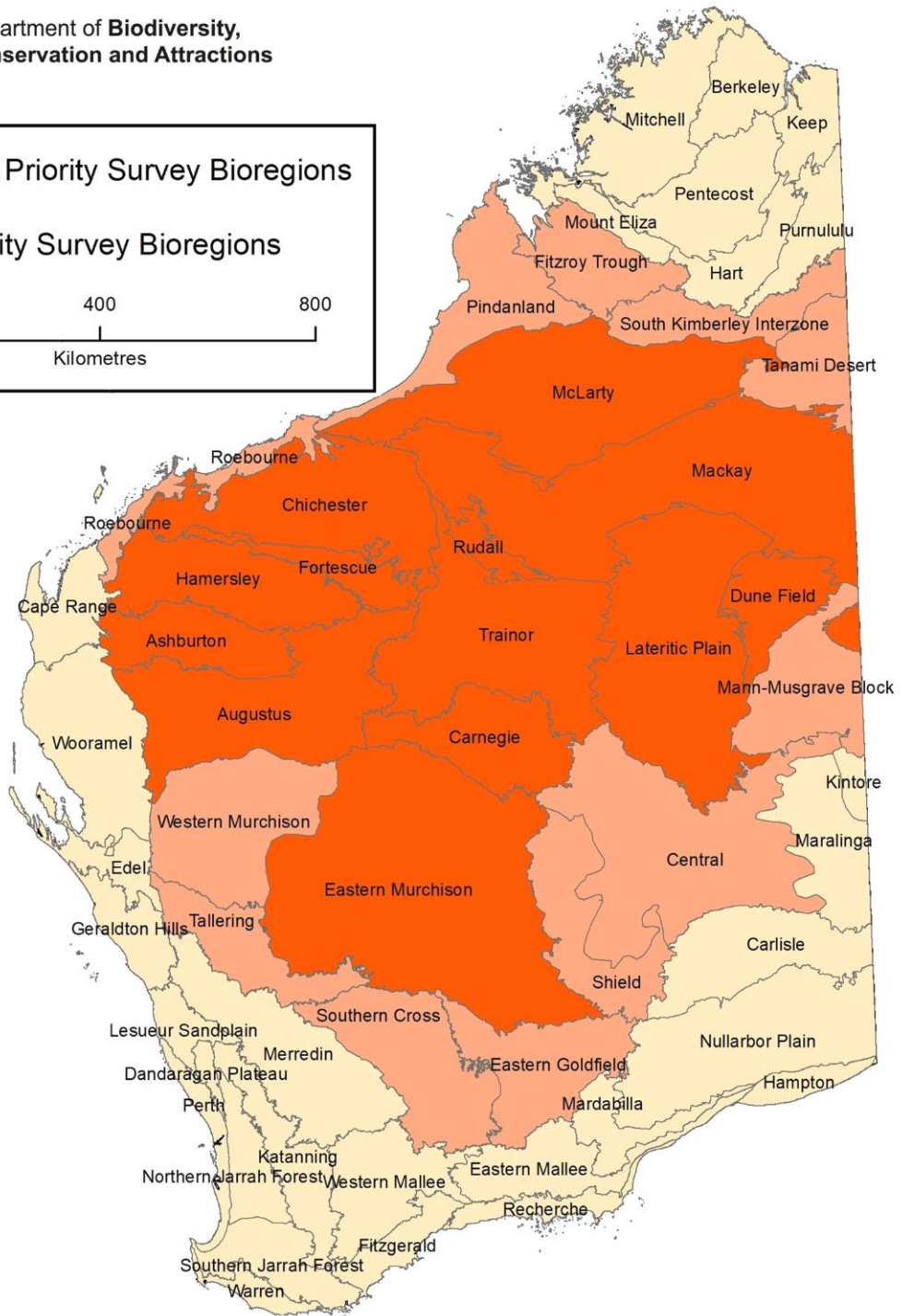
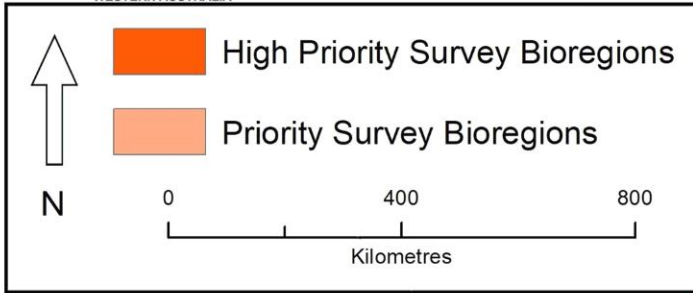


Figure 1. Night Parrot Survey Bioregions.



Figure 2. Flat, open, treeless plain supporting long unburnt *Triodia*. Note the structural complexity, including a mix of small and large hummocks. Night parrots were detected roosting at this site.



Figure 3. A night parrot roosting site from QLD, demonstrating that *Triodia* is not necessarily extensive or dense, but still retains structural complexity. Note the area is open and practically treeless.



Figure 4. Flat, open, treeless floodplain supporting a diverse assemblage of succulents, forbs and annual grasses. Night parrots were detected foraging at this site in western QLD, and there have been detections from similar habitat in WA