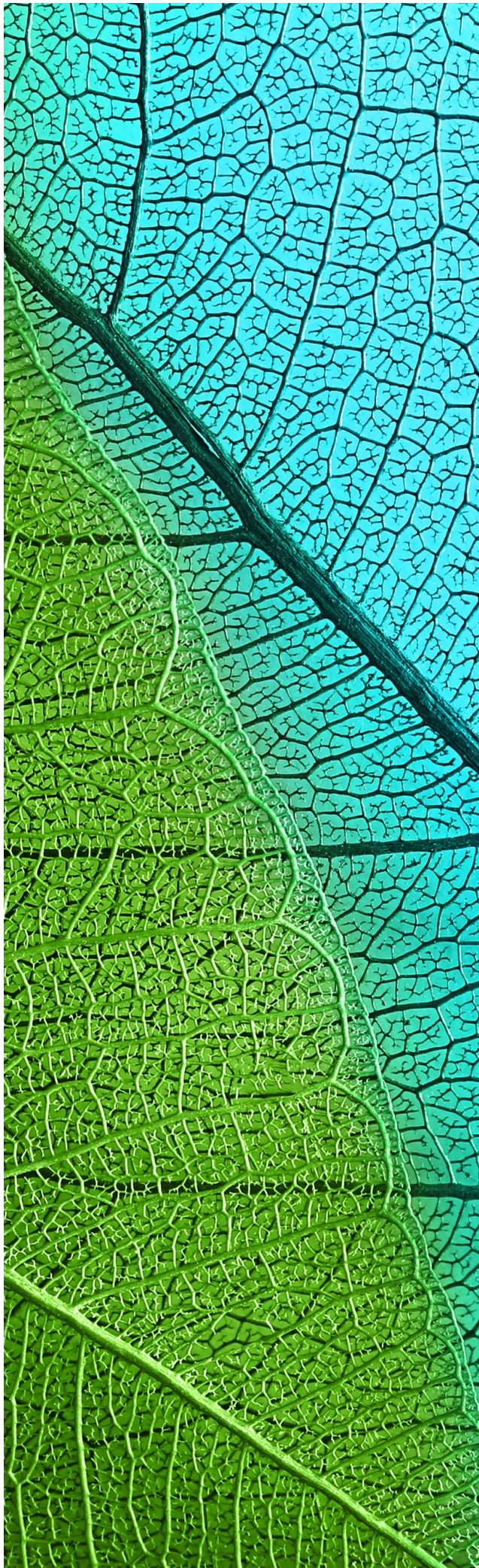




Bango Wind Farm

White-throated Needletail Trigger Investigation

Prepared for Bango Wind Farm

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Nature Advisory acknowledges the traditional owners and sovereign custodians of the land on which we work from – the Wurundjeri people of the Woi Wurrung language group. We extend our respect to their Ancestors and all First Peoples and Elders past, present, and future.

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1. Introduction

The Bird and Bat Adaptive Management Plan (**BBAMP**) for the Bango Wind Farm (BWF) (Nature Advisory 2021) sets a framework for identifying and managing the impacts of the wind farm on birds and bats. Section 4 of the BBAMP outlines the decision-making framework and mitigation responses in the event of an impact trigger. The BBAMP defines an impact trigger for a threatened species as follows.

“Impact Trigger for Threatened Species occurs if a threatened bird or bat species (or recognisable parts thereof) listed under the EPBC Act or NSW Biodiversity Conservation Act 2016 (BC Act) is found dead or injured within the search area under a turbine, or within 100m of it incidentally, either during any formal mortality search or incidentally by BWF personnel.”

On the 15th January 2024, an unidentified carcass was found 62m out from the base of Turbine 14 by a Nature Advisory zoologist. This carcass was subsequently reviewed by senior ornithologists at Nature Advisory and was identified as a White-throated Needletail (**WTNT**) (*Hirundapus caudacutus*) on the 17th of January. This species is listed as ‘Vulnerable’ and ‘Migratory’ under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and as such, meets the criteria for a threatened species trigger.

Nature Advisory notified BWF of the impact trigger on 17th January 2024. To comply with Schedule 3, Condition 21 of the Project Approval, and as stated in Section 4.1.2 of the BWF BBAMP, the decision and reporting framework states that a rapid investigation will be undertaken and a proposal for this was provided to BWF (the **Proposal**). As per the same decision and reporting framework, BWF notified the DCCEEW, NSW DCCEEW and NSW DPHI, via email, on the 18th January 2024 of the impact trigger

Considering this find; another two sparse feather spots found on the 13th December 2023, as part of formal monthly searches, preliminarily identified as Sacred Kingfisher (*Todiramphus sanctus*), were reviewed by senior ornithologists at Nature Advisory and subsequently confirmed as WTNT after careful consideration on the 29th of January 2024. Two further White-throated Needletail carcasses have since been detected by Nature Advisory zoologists on the 23rd January 2023 within the base area of Turbine 10 during the additional searches resulting from the implementation of the decision-making framework. A total of five White-throated Needletail mortalities have been recorded.

As per the Proposal, the following report constitutes a desktop investigation which coincides with expanded carcass searches to identify any additional impacts to the species. The searches are ongoing, consisting of all 46 turbines to be searched fortnightly for six weeks, and will conclude on the 1st of March. This immediate desktop investigation includes:

- **Status of knowledge on the WTNT**, including literature review and database search of past records from the local and wider region;
- **Distribution and occurrence** in Australia and locally to BWF and any known migration/movement patterns;
- **Habitat availability** in and around BWF to understand what habitat may be available to the species in the vicinity of the site;
- **Cause of death**, and any threats leading to potential species population decline
- **Undertake a risk assessment** of the likelihood of reoccurrence; and
- **Discuss possible additional monitoring** and next steps to identify ongoing or additional impacts.

Investigations will inform the cause of death, and potential for further occurrences. As per the decision-making framework, a assessment of the significance of the impact is not required as part of the

immediate investigation. This will be undertaken as part of reporting of results of the six-week expanded carcass searches.

This report is scheduled to be submitted to DCCEEW within 10 business days of the find (1st of February 2024, taking into consideration the public holiday on the 26th). A subsequent final report will be produced at the conclusion of the expanded carcass searches providing analysis of results, further advice on the likelihood of reoccurrence and recommend further actions, surveys, or potential mitigation measures.

This report includes the following sections:

Section 2 presents the desktop investigation.

Section 3 outlines the methods of the expanded field investigation.

Section 4 provides conclusions and recommendations.

This investigation has been carried out by a team from Nature Advisory including; Joshua Brown (Zoologist) and Jackson Clerke (Ecologist and Project Manager).

2. Desktop Investigation

The following section provides review of species ecology and occurrence in the BWF vicinity.

2.1. Species ecology

The WTNT is a large swift with long-pointed wings (20 cm in length), weighing approximately 115–120 grams. The sexes are alike, with no seasonal variation in plumage. Juveniles have a similar appearance to the adults, but with duller plumage and little gloss (Higgins 1999). The White-throated Needletail generally occurs in flocks when in Australia, though they are occasionally seen singly (Higgins 1999).

The species is widespread in eastern and southern Australia while on the mainland. It is a highly mobile and migratory species, and thought to be almost exclusively aerial, ranging from heights of one metre up to 1.8 kilometres above sea level (Higgins 1999, Menkhorst et al. 2017). Yamaguchi (2021) used geolocators to show that this species regularly travels up and down the east coast of Australia, moving up to 900 kilometres in 24 hours.

Occurring over most types of habitat but prefer wooded areas along the coastal regions and inland of the Great Dividing Range (TSSC 2020). Recorded most often above wooded areas, including open forest and rainforest, and may also fly below the canopy between trees or in clearings (Higgins 1999). When flying above farmland, they are often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks (TSSC 2020). In coastal areas, they have been observed flying over sandy beaches or mudflats, and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes (TSSC 2020).

WTNT lay eggs from late May to early June in their breeding grounds in north-eastern Asia (Higgins 1999, TSSC 2020). Clutches usually comprise two eggs but some may be as large as seven eggs, and these are incubated by both sexes for 40 days with chicks fledging after 40–42 days (TSSC 2020). There are no published details of the ages of sexual maturity or life expectancy of the WTNT, however, the estimated generation time is 8.5 years (BirdLife International 2018).

Most individuals arrive in south-eastern Australia in approximately December (some may arrive in October, and most depart around March to April) (Menkhorst et al 2017). When flying through Australia, they migrate along coastal regions over land and ocean (Yamaguchi, et al 2022) and have been recorded eating a wide variety of insects, including beetles, cicadas, flying ants, bees, wasps, flies, spiders, termites, moth, locusts and grasshoppers (TSSC 2020; Higgins 1999).

2.2. Distribution and Occurrence

WTNT is seasonally spread in eastern and south-eastern Australia (Figure 1). In eastern Australia, the species is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Dividing Range and occasionally onto the adjacent inland plains. Further south on the mainland, it is widespread in Victoria, though more so on and south of the Great Dividing Range, and there are few records in western Victoria. The species occurs in adjacent areas of south-eastern South Australia, where it extends west to the Yorke Peninsula and the Mount Lofty Ranges. It is widespread in Tasmania (Higgins, 1999)

WTNT only occur as vagrants in the Northern Territory (recorded in the Top End, including around Darwin, Katherine and Mataranka and Tennant Creek; and further south around Alice Springs) and in Western Australia (at disparate sites from the Mitchell Plateau in the Kimberley, south to the Nullarbor Plain and Augusta in the South West, and west to Barrow Island, the Houtman Abrolhos Islands and the Swan River Plain) (TSSC 2020). The species is also a vagrant to various outlying islands, including Norfolk, Lord Howe, Macquarie, Christmas and Cocos-Keeling Islands (TSSC 2020). The breeding distribution of the WTNT is

fragmented, with two subspecies occurring in different parts of Asia. The nominate subspecies *H. c. caudacutus* breeds from northern Japan west to central and eastern Siberia, while subspecies *H. c. nudipes* breeds from south-western China to northern Pakistan, and is largely resident (TSSC 2020).

Internationally; assessment of the species status under the IUCN Red list states (Birdlife International 2024) *“This species has an extremely large range, and hence does not approach the thresholds for Vulnerable under the range size criterion (Extent of Occurrence <20,000 km² combined with a declining or fluctuating range size, habitat extent/quality, or population size and a small number of locations or severe fragmentation). The population trend appears to be stable, and hence the species does not approach the thresholds for Vulnerable under the population trend criterion (>30% decline over ten years or three generations). The population size has not been quantified, but it is not believed to approach the thresholds for Vulnerable under the population size criterion (<10,000 mature individuals with a continuing decline estimated to be >10% in ten years or three generations, or with a specified population structure). For these reasons the species is evaluated as Least Concern.”*

Nationally; the WTNT population has previously been estimated at 50,000–100,000 in Victoria but has declined by 49 percent between 1979–1981 and 1998–2000 (Tarburton 2014). Numbers observed per day in eastern Australia more than halved between 1951-1960 and 1991-2020, the same trend of decline in numbers observed per day in Victoria (Garnett and Baker 2021). The current estimation of the population size is 41,000 individuals (Gannett and Baker 2021).

Local records contain up to 54 observations in the last 10 years within a 50km radius of BWF (DCCEEW 2024). The vast majority of these occurred in 2019 to the east of the site in the vicinity of Rye Park and the ridgeline there. This number of records is likely related to survey effort associated with the construction of the Rye Park Wind Farm. Observations held numbers between 1 and 55 individuals primarily between January and April.

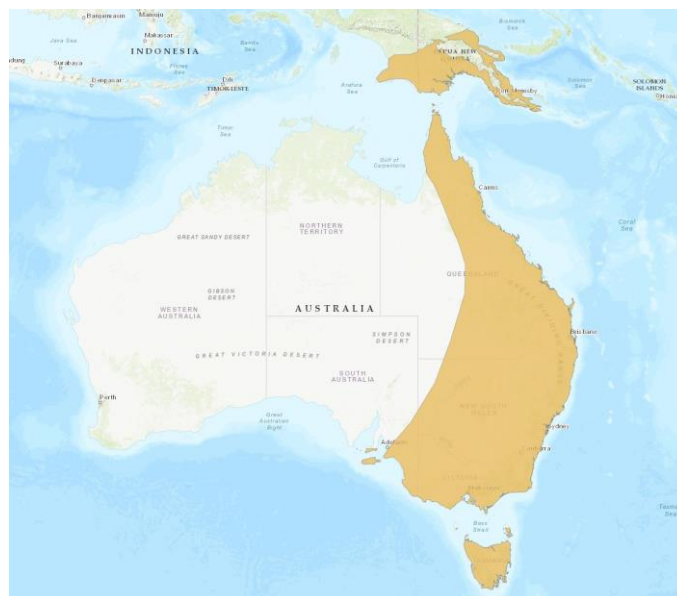


Figure 1: Range of extant (resident) White-throated Needletail (Birdlife International 2024)

2.3. Habitat Availability

Initial ecological assessment before the construction of BWF (ERM 2016) observed suitable habitat within the study site, however it was deemed unlikely to destroy or isolate any habitat that is important to a migratory species. The report did identify the potential for the WTNT to fly over BWF. On site incidental

observations and targeted Bird Utilisation Surveys at BWF conducted by Nature Advisory have not identified further records.

Although WTNT spends the majority of its time in the air, recent observations suggest they may also roost in trees at the edge of ridgelines, using the drop to gain speed for flight (Tarburton, 2021), arriving at roost sites after dark and departing before first light (Tarburton and Garnett 2021). There are descriptions of these roosting events but from few recorded instances (Garnett and Baker 2021).

2.4. Cause of death

The individuals found were within the search areas described as part of the carcass search methodology in the BBAMP, and are therefore assumed to have collided with turbines. Most of the finds were in states of advanced decomposition or partially scavenged so further investigation into cause of death may not be not possible.

A major threat to WTNT appears to be the ongoing and accelerated destruction of Siberian forests, where a large proportion of the Australian population requires mature trees with hollows in which to breed (Tarburton 2014). Organochlorine pesticides and herbicides are another possible cause of decline of WTNT, either through a decrease in the abundance of invertebrate prey or from secondary poisoning (Tarburton 2014; Tarburton and Garnett 2021). Loss and reduction of forest and woodland habitats may have also resulted in the reduction of invertebrate prey (Tarburton 2014). Additionally, the loss of roosting sites in Australia may also be a cause of population decline.

Collisions with structures appear to represent another threat to WTNT in Australia (Tarburton and Garnett 2021). Records show collisions occur with wind turbines (Hull 2013, Moloney *et. al.* 2019), powerlines, windows and lighthouses (Tarburton 2021). Tarburton (2021) reviewed 80,000 records across Australia of WTNT, occurring between the years 1900 and 2020, including 56 recorded deaths of which 36 were attributed to wind farms, indicating that this impact trigger is not an unusual occurrence. Nature Advisory has investigated several WTNT impact triggers at other wind farms in Victoria over the last decade during operational monitoring programs, and unpublished findings indicate that detected mortalities can potentially occur, in low numbers, annually.

Five WTNT mortalities have been recorded in BWF to date. The expanded carcass search aim to further understand the impact to the species, and the potential for on-going impacts, which will be included in analysis in reporting at the conclusion of the six-week carcass searches.

2.5. Risk Assessment

The wind farm site falls within the species extensive range and has many records in its vicinity. The number of records in the region during 2019 and the mortalities occurring this year, suggests that the species could potentially interact with BWF occasionally. A paucity of records in the region around BWF before and after 2019 is likely indicative of a lack of survey effort and not a lack of occurrence, given the numbers of observations and individuals observed in 2019. The occurrence of five mortalities could suggest that the species can move through the site in flocks when it does, and that it displays risk behaviour leading to collisions (i.e., flying at heights that would bring it into turbine rotor swept airspace). Public records and Nature Advisory experience (unpublished data) of WTNT mortalities indicate that risk behaviour, leading to collision with turbines, from this species while on wind farms is not unusual.

It is not known whether these were individuals moving through the site at different times, or flocks moving through at once, though the species is known to move in flocks. The finds were made within several weeks of each other, and the level of decomposition could indicate either scenario.

Given the above, and Nature Advisory's experience with operational monitoring at wind farms in south eastern Australia, there is potential for further mortalities to occur at BWF while the species is present on

the mainland. Outside of December to April, the species will migrate back to its breeding habitats internationally and the risk of collision will be negligible during those times.

Nature Advisory has previously attempted to model estimations of WTNT overall annual mortality at operational wind farms, as directed by the state regulator, but the inherent assumptions made when undertaking such analysis are not applicable to this species. The mortality monitoring program under the BWF BBAMP will provide estimations of species mortality assuming they are present on-site year-round which does not apply to this species for two reasons; that they are not present in Australia for large parts of the year, and that they can travel many hundreds of kilometres in a single day. It is not recommended that mortality estimations based on the approved BBAMP monitoring program be undertaken as they may be misleading or inaccurate for this species.

2.6. Additional monitoring and mitigation measures

In line with the decision-making framework in the BBAMP (section 4.1.2), this section discusses further on-site investigations and available mitigation measures outlined in Table 4 of Section 4.3.1.

WTNT has been recorded during bird utilisation studies in several proposed and operating wind farms in south-eastern Australia (Nature Advisory, unpubl. data). However, this is not always a reliable indication of the species occurrence and utilisation of the site, given they can be extremely high flying, fast moving, and associated with storm fronts, they can easily be missed during targeted surveys or no longer be in the region. That they occur on site and exhibit risk behaviours is discussed in the previous section. As such, further 'on-site' elements of the rapid investigation process under the decision-making framework are not appropriate at this stage. Instead; incidental observations of any individuals utilising the site during the six weeks of expanded carcass searches, and indeed the carcasses search results themselves, should be sufficient to inform the next stages in the decision-making framework; assessing the impacts, identifying available mitigation measures and the requirement for them.

As far as Nature Advisory are aware, no effective WTNT mitigation measures at wind farms have been implemented in Australia to date. It is highly mobile, migratory, and primarily an aerial species, and its movement patterns locally are largely unknown, therefore making it difficult to predict occurrence in the vicinity of the wind farm. Most of the mitigation described in Table 4 of the BBAMP would not likely be applicable to WTNT for the reasons described in this investigation, such as; broad habitat preferences making specific interventions unlikely to make a difference to species distribution on and near the site. Therefore; any potential measures considered will require detailed research and investigation into feasibility and as such; no measures can be recommended at this stage.

It is recommended that such evaluation be undertaken to understand what is available as mitigation. This will include analysis of the suggestions in Table 4 of the BBAMP and exploration of other possibilities. Any additional on-site targeted surveys for the species should be undertaken with the aim of understanding behaviour and utilisation to contribute to understanding the feasibility of potential mitigation measures, which have yet to be identified.

At the conclusion of the six-week expanded carcass search effort, the impacts detected will be reassessed to determine whether these are unacceptable or whether they will lead to unacceptable impacts. This will inform the requirement for mitigation measures. These actions can be included as part of reporting at the conclusion of the six-week carcass search.

3. Expanded Carcass Searches

3.1. Intensive Searches

In accordance with the decision-making framework set in section 4.1.2 of BWF BBAMP, carcass searches have been immediately expanded to cover all 46 turbines to a radius of 100m. This radius is chosen to account for the difficulty in searching the area required for six weeks in consideration that 97% of medium sized birds (of which WTNT would be considered one) will fall within 120 metres of the turbines (BBAMP, appendix 4). This will occur on a fortnightly basis in the subsequent six weeks to determine if the species concerned is colliding more than once. This period will occur from the 22nd January to the 1st of March 2024. The searches will be completed by both human and dog search teams and will run in conjunction with monthly carcass searches.

Incidental observations of any WTNT will be recorded during on site surveys and flight paths plotted on satellite imagery of the site. Information recorded will include:

- Dates, time and duration of flights;
- Numbers of individual;
- Behaviours; and
- Flight heights.

A report following the expanded carcass searches will include findings collected and subsequent analysis, which will help determine the likelihood of further WTNT mortalities and potential mitigation measures.

4. Conclusions and recommendations

The following conclusions are considered in line with the decision-making framework:

- The cause of deaths is not determinative, but assumed to be that of a collision with a turbine.
- The circumstances leading to collisions are that the wind farm falls within the species range while migrating through Australia, it may occasionally use the BWF site while moving across its range, and that it displays risk behaviours while doing so.
- The impact itself is not considered to be unacceptable at this stage. The six weeks of carcass searches will provide further insight into the potential ongoing impact.
- Nature Advisory investigation experience and available public records indicate that further mortalities may occur in the future, while the species is migrating in Australia.
- Given the species unpredictable movements and occurrences while in Australia, and wide habitat preferences, effective on-site mitigation measures require further investigation for feasibility and cannot be recommended at this stage.

Given this, as per the decision-making framework, further investigation is warranted over the six-week period of expanded carcass searches, including on:

- Any recent data/information of the species, (e.g., academic literature, EPBC policy statements);
- Research into implementation and information of mitigation measures at other wind farms nationally and internationally; and
- A review of effectiveness of potential mitigation measures specifically in relation to WTNT, including but not limited to those outlined in Table 4 of the BBAMP.; and
- The requirement for mitigation implementation in terms of whether the impacts are considered unacceptable.
- A report should be generated covering the above and the results of the six weeks of carcass searches.

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