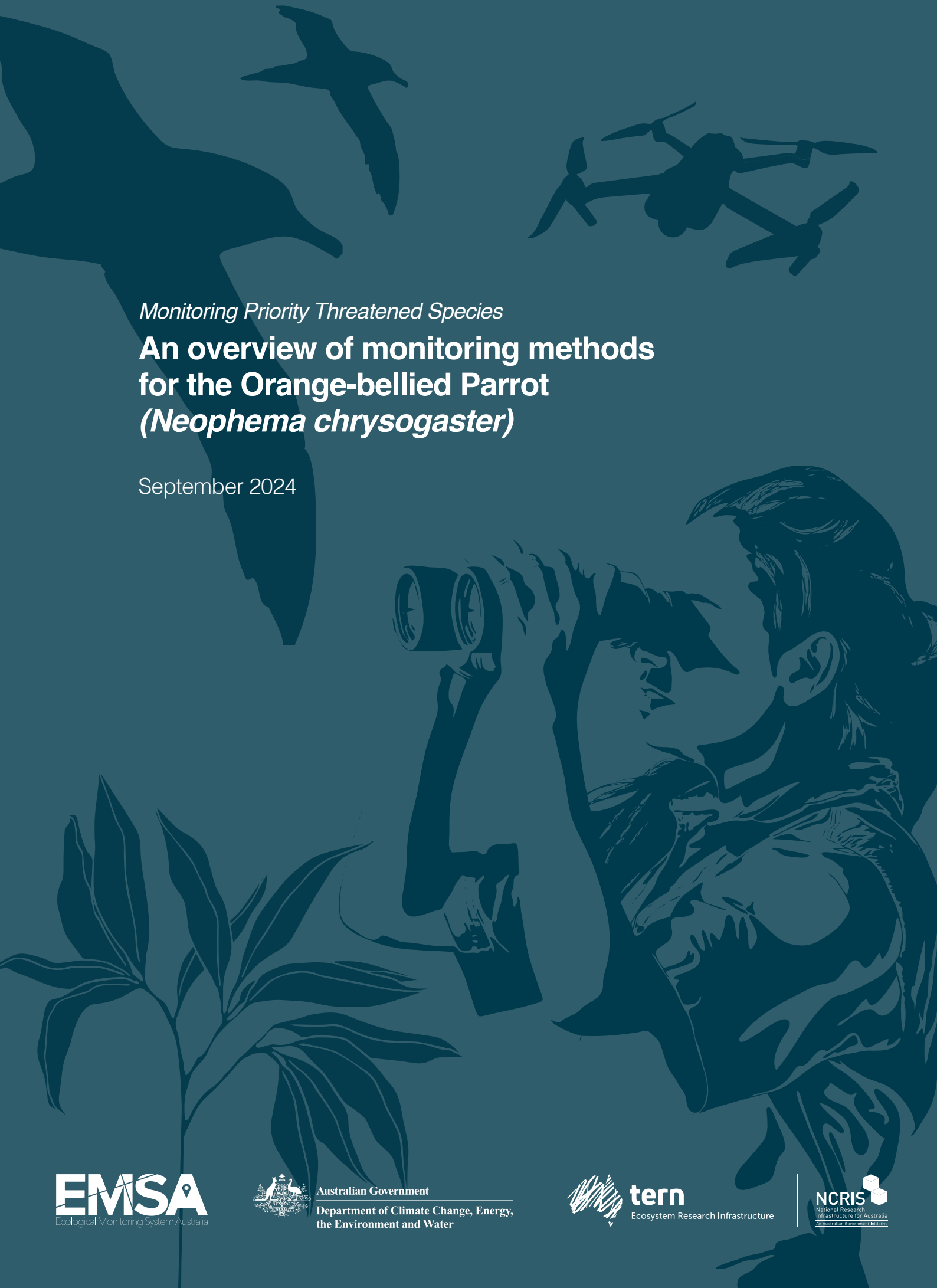

Monitoring Priority Threatened Species

An overview of monitoring methods for the Orange-bellied Parrot *(Neophema chrysogaster)*

September 2024

EMSA
Ecological Monitoring System Australia

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We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

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About

This literature overview collates information on one of the 110 priority threatened species identified in the *Threatened Species Action Plan 2022-2032* and has been reviewed by invited practitioners experienced in monitoring the species.

The *Survey Guidelines for Monitoring Threatened Species* project, a collaboration of the Department of Climate Change, Energy, the Environment, and Water (DCCEEW) and the Terrestrial Ecosystem Research Network (TERN), aims to improve our knowledge of threatened species by enhancing accessibility and sharing of quality scientific threatened species data. By developing best practice field survey guidelines and recommendations, practitioners will be better equipped to conduct standardised, repeatable surveys.

By identifying the monitoring methods typically implemented by practitioners, documenting and assessing the techniques known to work, and identifying opportunities to standardise the methods, we can move towards ensuring all monitoring is species-appropriate, comparable between practitioners and populations, and repeatable over time. Further, together with consistent terminology, guidelines, instructions, and data collection, we can refine efforts and resources to measure and share information. Data collected using robust, standardised methods will improve our knowledge of threatened species and underpin threatened species recovery at scale. This project is essential to establishing monitoring protocols and data repositories to enhance the accessibility and sharing of threatened species data.

TERN has prepared the literature overviews for the Department of Climate Change, Energy, the Environment, and Water. For further information, please visit the EMSA Threatened Species Survey Guidelines website. Additional information, particularly monitoring methods and techniques not included that should be considered, can be brought to the author's attention by emailing tern@adelaide.edu.au for consideration for future updates.

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1 Background

1.1 Conservation status and species trajectory

1.1.1 Current EPBC Act status

- Critically Endangered

1.1.2 Summary of data held in the Threatened Species Index

The Threatened Species Index (TSX) provides reliable and robust measures of change in the relative abundance of Australia's threatened and near-threatened species at national, state and regional levels. Understanding these changes in species populations is crucial for monitoring Australia's conservation progress and allows users to measure and report on the benefits of conservation investments, and to justify and design targeted management responses. Currently, the index is restricted to birds, plants and mammals, with new groups to be added in the near future.

The table below summarises Orange-bellied Parrot data held in the TSX. More information on the TSX, including how to contribute threatened species monitoring data to the index, can be found at tsx.org.au

Table 1. Summary of Orange-bellied Parrot data held in the Threatened Species Index

TSX information	Orange-bellied Parrot data held in the TSX
Data held in the TSX	Yes
Number of data sources	1
Number of unique sites	7
Average time series length	28.3
Average number of sampling years	28.3

1.2 Distribution

- The distribution of the Orange-bellied Parrot is seasonally dependent. They are known to occur in south-western Tasmania, coastal Victoria and south-eastern South Australia (DELWP 2016 and references therein).
- The breeding range encompasses the south-west coast of Tasmania from Birchs Inlet in the north to Louisa Plains in the south (Menkhorst *et al.* 2021).
- Historically, the non-breeding range extended from the Yorke Peninsula, south-east through the Coorong, Robe, Beachport and Port MacDonnell in SA, through south-western coastal Victoria, Port Phillip and Western Port bays to South Gippsland, with isolated, outlying records from near Nowra and Sydney, New South Wales (Menkhorst *et al.* 2021).
- Between 1988 and 2008 the total population was estimated to be around 100 individuals (Holdsworth *et al.* 2011) by 2010 the population had dropped to fewer than 50 and in the 2016/17 breeding season just 27 mature birds were identified (DEE 2020).
- An ongoing captive breeding and release program has bolstered and supported the population and at the end of the 2022 breeding season 139 individuals migrated north from

their breeding habitat (DNRE 2023). It is yet to be seen how many of these birds will survive to the following breeding season.

1.3 Habitat

- During breeding, the Orange-bellied Parrot inhabits near-coastal buttongrass *Gymnoschoenus sphaerocephalus* plains and sedgelands, with patches of Smithton peppermint *Eucalyptus nitida* forest (Milledge 1972; Bird Observers Association of Tasmania 1979; Brown 1980, 1984; Brown *et al.* 1985; Starks *et al.* 1992).
- The species favours nests in the hollows, limbs or trunks of mature eucalyptus trees; usually Smithton peppermint, and sometimes swamp gum *E. ovata*; in forests and copses near buttongrass plains (Hinsby 1947; Brown and Wilson 1982; Brown 1984; Stephenson 1991).
- On passage in western and north-west Tasmania, the parrot shows preference for heathland, coastal grasslands and pasture and, in north-west Tasmania, saltmarsh (Bird Observers Association of Tasmania 1979; Brown 1980; Brown and Wilson 1982; Brown 1984; Brown *et al.* 1985; Stephenson 1991).
- On mainland Australia, the habitat comprises of mostly sheltered coast where saltmarsh is present (Sainty *et al.* 2012), such as bays, lagoons and estuaries (Belcher 1914; Watson 1955; Carr and Kinhill Planners 1979; Yugpvic 1984; Loyn *et al.* 1986; Hewish and Starks 1988; Starks 1988; Stephenson 1991; Starks 1992, 1993; Loyn *et al.* 1994; Starks 1995; P.W. Menkhorst; Forshaw and Cooper 2002).
    - Saltmarsh contains numerous plant species (both native and exotic) which are known to be important sources of food for the Orange-bellied Parrot, such as *Sueda australis* and *Sarcocornia quinqueflora*. Plants can be used frequently (primary food plants) or occasionally (secondary food plants). Nonetheless, the importance of particular species varies seasonally (Loyn *et al.* 1986; Higgins 1999), geographically (Higgins 1999; OBPRT 2006a, 2006b) and through time (Peter Menkhorst pers. obs.).
    - Bare ground (ideally around 10% cover) is important, as Orange-bellied Parrots utilise such areas to eat seeds from the ground or from low vegetation (Ehmke and Tzaros 2009).
    - Taller shrubs in or close to sites can be used for roosting (Ehmke and Tzaros 2009), while robust tussocks such as *Juncus* may provide some protective cover.
    - Orange-bellied Parrots also utilise pasture and weedy areas adjacent to the coast which may include some remnant elements of saltmarsh (Tolsma *et al.* 2014).
- Historically, the species has been observed on grassy fairways of golf courses adjacent to *Sclerostegia* shrubland; sewage-filtration paddocks; grassy tracks around edges of sewage-treatment ponds or other grassy areas near saltmarsh; and in weedy pastures and seed crops (Wheeler 1950; Jarman 1965; Jessop and Reid 1986; Loyn *et al.* 1986; Starks 1988; Eckert 1990; Starks 1992, 1994; 1995; Holdsworth pers. comm.; Forshaw and Cooper 2002; DEWHA 2010).

1.4 Ecology

- Orange-bellied Parrots breed November to mid-February (Brown and Wilson 1984; North).
- Eggs, late November and mid-December (DEWHA 2010).
- Most young fledge late January to mid-February; adults depart the breeding area late February to early March; juveniles leave mid-March to late April (Brown and Wilson 1984).
- Usually seen singly or in pairs or family parties on breeding grounds; in winter areas, typically encountered in small flocks, sometimes singly and in pairs (DEWHA 2010).

- Females usually lay 4-6 eggs and most nests (79%, n=239 total nests) produce fledglings. Pairs are not known to produce more than one brood in a breeding season. Analysis of data collected since 2000 shows that not all females breed in all years, with fewer than 50% of the females at Melaleuca showing signs of breeding activity in some years (Holdsworth 2006)
- The Orange-bellied Parrot breeds in south-west Tasmania and migrates north, along western and north-western coast of Tasmania through western Bass Strait to spend the non-breeding period on mainland Australia between Spencer Gulf in South Australia, and Sydney in New South Wales, although the majority of the population is centred on the area between Gippsland in Victoria, and the Coorong in South Australia (Holdsworth 2006).
- Northward migration occurs from late January to July. The southward migration is more rapid, and occurs September to November (Brown and Wilson 1984). Occasionally some birds stay in Tasmania for entire non-breeding season (Higgins 1999).
- At Melaleuca, Tasmania, between 1959 and 1997, first birds usually arrived between 29 September and 15 October (Brown and Wilson 1984; M. Holdsworth) and most had arrived by early November. The birds inspect nest sites soon after arriving and occupy nests from late October.
- The birds appear to be semi-nomadic in winter, moving between food sources and locations, presumably in response to changing food availability (Ehmke and Tzaros 2009).
- The species appears to avoid areas with human development and high disturbance rates (Ehmke 2009).

1.5 Threats

- Very low population numbers place the species at significant risk of functional extinction (DEECA 2022).According to the DPE (2021) the principal threats to the persistence of this small population are:
    - destruction of habitat
    - clearing of native vegetation
    - urban development of coastal area
    - sea level rise
    - fragmentation of the population
    - competition from introduced bird species
    - stochastic factors such as disease and loss of genetic variation
    - predation pressures by introduced carnivores (foxes and cats)
    - climate change
    - beak and feather disease.

2 Existing monitoring methods

2.1 Summary of existing methods used

- Direct observation
- Refuge checks
    - monitoring nest boxes for egg laying, nestling condition/rescue using inspection and video cameras (Stojanovic *et al.* 2020)

2.2 Existing survey requirements

- Optimal time of year/season/climate conditions (timing with resource availability etc.):
    - Breeding range [now only at Melaleuca in SW Tasmania] searches are generally focused on nesting activity using point observations adjacent to potential nesting habitat (October to January) (DEWHA 2010).
    - A national winter (non-breeding) count on a weekend in late July has been conducted on the mainland each year since 1979 (Starks *et al.* 1992; Starks & Holdsworth in prep.; DEWHA 2010).
- Optimal location of surveys:
    - For breeding, now only at Melaleuca in SW Tasmania.
    - For non-breeding winter counts, at known Orange-bellied Parrot winter foraging sites/regions in coastal Victoria and coastal SE South Australia (Starks *et al.* 1992).
- Minimum survey effort:
    - Hundreds of hours across the known range.
    - For an area <50 ha in suitable habitat at appropriate times of year 20 person hours over 10 days is recommended (DEWHA 2010).
    - Roost point observations "1 hour before dusk to half hour after. Half hour before dawn to one hour after" DEWHA (2010) recommends 60 person hours over 10 days.
    - For breeding range point observations DEWHA (2010) recommends 1 person hour per 100m forest edge, or per 200m forest edge in breeding period, over 1 day.
- Survey personnel:
    - Dozens of volunteers are involved in the annual July winter count.
- Other factors:
    - Video monitoring of nest boxes: "personnel should review camera footage daily (preferably twice daily) so that rescue happens before nestlings die … if the potential risk of nest abandonment from deploying cameras during incubation is unacceptable, cameras could be deployed in all boxes before breeding begins" (Stojanovic *et al.* 2020).
    - Essential for quarantine protocols to protect parrots from Psittacine beak and feather disease (BFDV; Beak and Feather Disease Virus).
    - Breeding range searches are generally focused on nesting activity using point observations adjacent to potential nesting habitats (October to January) (OBPRT 1999).
    - Detection using only sight rarely confirms species identity in the first instance. Therefore, observers must be familiar with flight and alarm calls to distinguish them from other *Neophemas* (DEWHA 2010).

2.3 Existing protocols

Existing protocols identified are identified in Table 1.

Table 2. Survey guidelines, protocols, and key resources that identify Orange-bellied Parrot monitoring methods

Protocol	Comments	Reference
National survey guidelines for Australia's threatened birds	Recommends area searches, Roost sight point observations and breeding range point observations	(DEWHA 2010)
Birdlife Australia	Survey instructions and data collection forms for active searching by volunteers	https://birdlife.org.au/projects/orange-bellied-parrot-recovery/volunteer-in-the-winter-surveys
A habitat monitoring protocol for the Orange-bellied Parrot Neophema chrysogaster	Citizen science – winter surveys Area surveys conducted between sunrise and 11 am and 3:00 pm and sunset	(Tolsma et al. 2014)

2.4 Methods to consider further

The methods listed below have been identified as potential methods and techniques to survey for the species, either to identify presence or absence, or to assist determining population size and status. Further review of the literature and consultation with experts is required, particularly to identify and assess specific techniques for examining population ecology factors.

2.4.1 Available methods

- Orange-bellied Parrot winter survey
- Direct observation (roost site and breeding range point observation).

2.4.2 Additional methods

- Call surveys using autonomous recording units (ARUs), as used for the Western Ground Parrot, don't seem to be used much for Orange-bellied Parrots and might be useful at known mainland wintering habitats/sites, or even for suspected sites along their migration route. "Contact call in flight and alarm call is diagnostic" (DEWHA 2010). Audio file at https://birdlife.org.au/bird-profile/orange-bellied-parrot.

2.4.3 Methods to rule out

- All survey methods typical for terrestrial birds are considered suitable (no specific methods ruled out).

2.4.4 Relevant Ecological Monitoring Standards Australia (EMSA) modules

The following Ecological Monitoring System Australia (EMSA) modules developed by TERN for the Australian Government should be considered for surveying the Orange-bellied Parrot:

- Vertebrate fauna
- Opportune
- Camera traps

In addition, the Plot description, Floristics, Cover, Soils, Condition and Vegetation mapping modules may be beneficial for assessing the suitability of a location against the species' habitat preferences.

2.4.5 Other 110 priority species with potential links

- Similar monitoring methods:
  - Swift Parrot (Lathamus discolour)
  - Western Ground Parrot, Kyloring (*Pezoporus flaviventris*)
  - Norfolk Island Green Parrot (*Cyanoramphus cookii)*.

3 Considerations for survey guidelines development

Key considerations should a full literature review and/or survey guidelines be developed for the Orange-bellied Parrot are highlighted below.

- Special equipment required:
  - None applicable.
- Estimated time and surveyor effort:
  - Winter surveys require weeks of effort. Opportunistic, point and area surveys by volunteers would comprise 100's of hours over their mainland wintering period.
  - Summer breeding surveys at Melaleuca in SW Tasmania also comprise weeks/months of survey time over the breeding season.
- Vegetation communities or landscapes of the species' preferred habitat not suitable for the optimal survey methods:

Mainland wintering habitat is low coastal samphire vegetation communities.

3.1 Key documents for further review

The documents listed below have been identified as key documents to review should a full literature review and/or survey guidelines be developed for the Orange-bellied Parrot.

Scientific papers and reports

- Department of Environment, Land, Water and Planning (DELWP) (2016). National Recovery Plan for the Orange-bellied Parrot, *Neophema chrysogaster*. Australian Government, Canberra. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/orange-bellied-parrot-2016.
- State wide integrate flora and fauna teams – Orange-bellied Parrot https://www.swifft.net.au/cb_pages/sp_orange-bellied_parrot.php#2020/2021%20season

3.2 Key agencies and organisations involved in the species research and recovery

- Dr Toby Galligan, Orange-bellied Parrot Recovery Program Coordinator
- Birdlife Australia, Wetland Birds program
- Orange-bellied Parrot - Tasmania Program, Biodiversity Monitoring Section, Department of Natural Resources and Environment, Tasmania
- Bob Green, SA Orange-bellied Parrot Regional Coordinator
- Mainland Release Team
- Dr Dejan Stojanovic, Fenner School, Australian National University, Canberra, ACT
- 'Friends of the OBP' [Orange-bellied Parrot] in north-west Tasmania https://wildcaretas.org.au/branches/friendsobp/

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