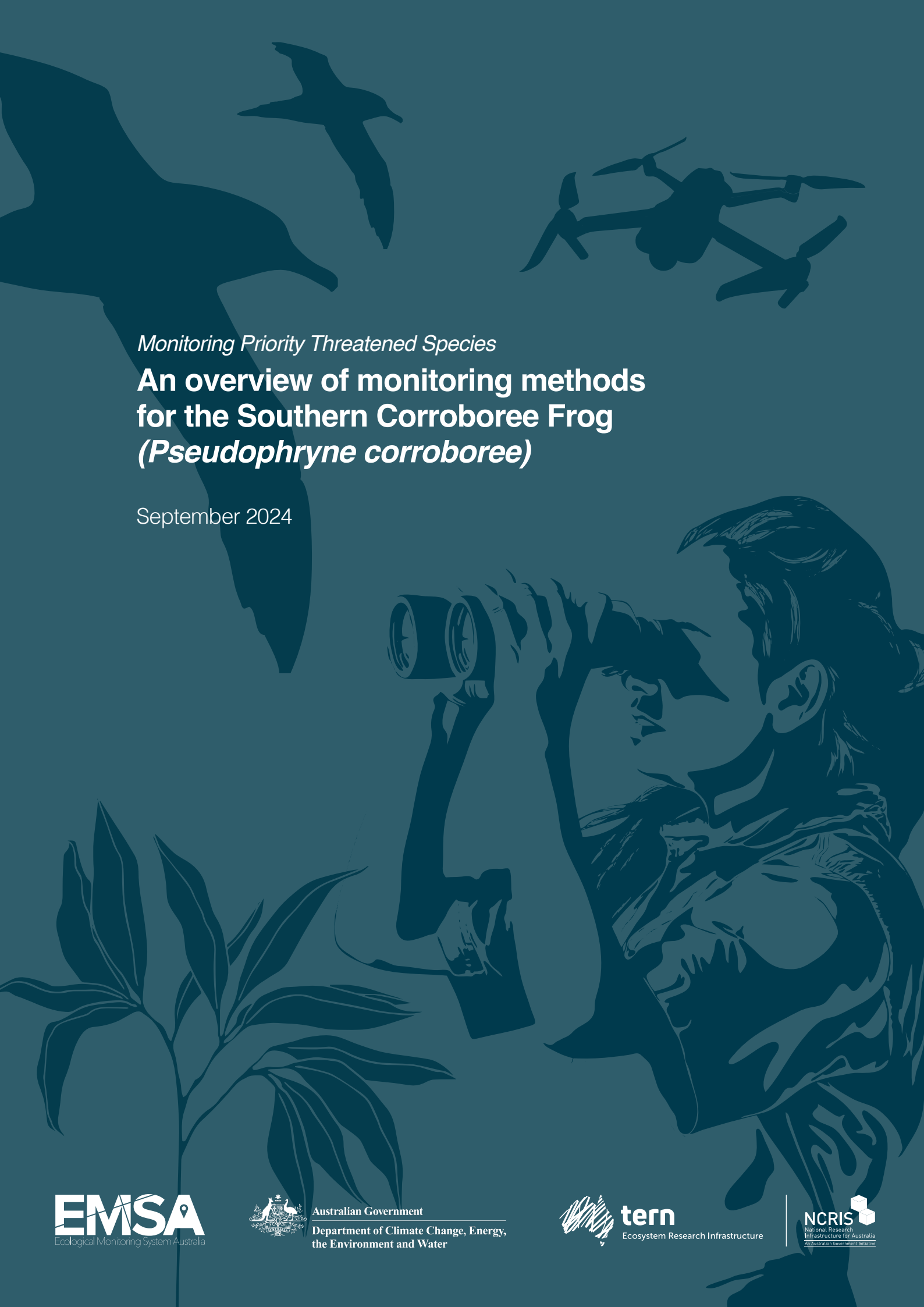




Monitoring Priority Threatened Species

An overview of monitoring methods for the Southern Corroboree Frog (*Pseudophryne corroboree*)

September 2024

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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 TSX does not hold data on the Southern Corroboree Frog. More information on the TSX, including how to contribute threatened species monitoring data to the index, can be found at tsx.org.au

1.2 Distribution

- The Southern Corroboree Frog (*Pseudophryne corroboree*) is restricted to the Jagungal Wilderness area in New South Wales in the north-west of its former range (DOE 2022).
- The species historically occurred more broadly in sup-alpine regions, but its extent of occurrence has declined by 90% to 60 km² with an area of occupancy of 0.8 km² (NSW National Parks and Wildlife Service 2001; Hunter 2013; DOE 2022).
- The Southern Corroboree Frog is now extinct or in significantly reduced numbers at other locations within its former distribution, including Pretty Plain, Happy Jacks Plain, Finns Swamp, Whites River and the Smiggin Holes and the Guthega area south of the Snowy River (NSW National Parks and Wildlife Service 2001).
- Osborne (1989) undertook a detailed survey covering 257 potential breeding sites in the Snowy Mountains. The species was recorded at 63 locations. Extensive surveys in 1997–1999 found the frog present at 79 sites of 213 survey locations (Hunter 2000; NSW National Parks and Wildlife Service 2001; DOE 2022).
- Extensive surveys in 1997–1999 recorded 450 males calling at 79 sites (Hunter 2000), for surveys in 2006 this number dropped to 39 records at 14 sites (Hunter *et al.* 2006).
- The wild population has recently been bolstered by a reintroduction program. More than 100 captively bred individuals were released into Mt Kosciuszko National Park in 2019, followed by a further 100 individuals in 2023. Before the 2023 release the population was reported to be around 150 individuals (DPE 2023).

1.3 Habitat

- The Southern Corroboree Frog is a habitat specialist restricted to gently sloping montane and sub-alpine habitats between 1300–1760 m above sea level (DOE 2022).
- The species use two distinct habitat types: a breeding season associated with pools and seepages in sphagnum bogs, wet tussock grasslands and wet heath usually occurring on granitic and volcanic substrates; and terrestrial non-breeding habitat in forest, sub-alpine woodland and tall heath adjacent to the breeding area (DOE 2022).

- During the summer, the adult frogs breed in shallow pools and seepages within the breeding area before returning to the adjacent woodland and tall moist heath at the end of the breeding season (Pengilley 1966).
- Vegetation at breeding sites varies considerably but often includes spreading rope-rush *Empodisma minus*, peat moss *Sphagnum cristatum*, and the shrubs *Baeckea gunniana* and *Epacris paludosa*, along with a range of other species (DOE 2022).
- Breeding pools are generally shallow (often ephemeral) and have relatively large surface areas and low water flow rates (Osborne 1990).
- The shallow water in breeding pools makes the water warmer during the day, potentially enhancing tadpole development (DOE 2022).
- Litter, logs and dense ground cover in the understorey of snow gum woodland provide over-wintering habitat (Pengilley 1966).
- Very little is known about non-breeding habitats utilised by the Southern Corroboree Frog (Osborne 1990; DOE 2022).

1.4 Ecology

- Little is known about the Southern Corroboree Frogs life-history after they leave the pools as juveniles (NSW National Parks and Wildlife Service 2001).
- The daily and seasonal patterns of movement of the frogs are mainly unknown, but the species moves between its distinct breeding and non-breeding habitats (DOE 2022).
- Adults can disperse over 300 m into surrounding woodland (Osborne 1988; DOE 2022).
- Research indicates that after metamorphosis, males take 3–4 years to reach sexual maturity, and females take 4–5 years (Hunter 2000; DOE 2022).
- Adult males enter breeding areas in early summer and call during January and February from small chambers in vegetation at the edges of breeding pools (Osborne 1990; Hunter 2000).
- Females only enter the breeding areas briefly to lay their eggs in terrestrial nests, then leave the breeding site (Osborne 1990).
- Eggs are laid in small clutches of 16–38 eggs (Pengilley 1973).
 - Hatching is thought to occur during autumn and winter during periods of high rainfall or snow melt. At the end of winter, when the snow has melted from the breeding sites, tadpoles continue growing slowly until metamorphosis in early summer (NSW National Parks and Wildlife Service 2001).

1.5 Threats

- Southern Corroboree Frog has experienced pronounced population decline for unknown reasons. Possible factors contributing to population declines include long term weather patterns and pathogens such as the Chytrid fungus.
- Climate change may increase the severity and frequency of drought events.
- The invasion of exotic trees, such as Willows (*Salix* spp.), may present a problem for the management of some sites in the future.
- Feral animals, such as feral pigs, feral horses and deer can damage habitats, altering drainage patterns and vegetation structure (DOE 2022).



2 Existing monitoring methods

2.1 Summary of existing methods used

- Direct observation/direct encounter
- Call surveys (acoustic and/or call-playback)
- Egg mass surveys
- Larval sampling

2.2 Existing survey requirements

- Optimal time of year/season/climate conditions (timing with resource availability etc)
 - Active breeding season is limited to late December to early February. Surveys should be conducted in the middle period of their calling cycle for the best outcome. Surveying outside the known calling period is unproductive.
- Optimal location of surveys
 - Call surveys should occur in bogs and riparian areas
 - Habitat searches for animals should be under logs, leaf litter, rocks and dense ground cover
- Minimum survey effort
 - A minimum of two consecutive days in locations of suitable habitat at optimal time of year and resource conditions
 - High intensity with repeated surveys over several periods to avoid missed detection
- Survey personnel
 - For all surveys, a single observer is sufficient (unless minimum of two personnel is required for safety considerations)
- Other factors:
 - None have been identified to date.

2.3 Existing protocols

Existing protocols identified are identified in Table 1.

Table 1. Survey guidelines, protocols, and key resources that identify Southern Corroboree Frog monitoring methods

Protocol	Comments	Reference
Survey guidelines for Australia's threatened frogs	Guidelines for visual encounter surveys, call surveys, night driving, pitfall trapping, egg mass and larval sampling surveys and combined approaches that can be applied to a variety of frog species.	DEWHA (2010)

2.4 Methods to consider (for further literature review)

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

- Call surveys

- Visual encounter surveys

2.4.2 Additional methods

- Egg/larval sampling
- eDNA (used for Northern corroboree frog)

2.4.3 Methods to rule out

All survey methods typical for frogs 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 Southern Corroboree Frog:

- Targeted Surveys
- Opportune
- Vertebrate Fauna

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.

2.5 Other 110 priority species with potential links

- Similar monitoring methods:
 - Growling Grass Frog (*Litoria raniformis*)
 - Kroombit Tinker Frog (*Taudactylus Pleione*)
- Similar distribution:
 - Stocky Galaxias (*Galaxias tantangara*)
 - Mountain Pygmy-possum (*Burramys parvus*)

3 Considerations for survey guidelines and/or protocols development

Key considerations should a full literature review and/or survey guidelines be developed for the Southern Corroboree Frog are highlighted below.

- Special equipment required:
 - Acoustic recorder
- Estimated time and surveyor effort:
 - Minimum two nights per location within the species known distribution to detect presence. Locations should be surveyed during the optimal time of year (December-February). Surveys longer than two nights, and repeated occurrences should be undertaken prior to declaring absence.
- Vegetation communities or landscapes of the species' preferred habitat not suitable for the optimal survey methods:
 - None have been identified to date.

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 Southern Corroboree Frog.

- Protocols:
 - Department of the Environment, Water, Heritage and the Arts (DEWHA) (2010). Survey guidelines for Australia's threatened frogs Guidelines for detecting frogs listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*.
- Scientific papers and reports:
 - Osborne, W. S. (1989). Distribution, Relative Abundance and Conservation Status of Corroboree Frogs, *Pseudophryne*-Corroboree Moore (Anura, Myobatrachidae). *Wildlife Research* 16(5): 537-547.
 - Hunter, D. (2000). The conservation and demography of the Southern Corroboree Frog (*Pseudophryne corroboree*). Masters Thesis, University of Canberra.
 - OEH NSW (2012). National Recovery Plan for the Southern Corroboree Frog, *Pseudophryne corroboree*, and the Northern Corroboree Frog, *Pseudophryne pengilleyi*. Office of Environment and Heritage (NSW), Hurstville.
 - Research about the northern corroboree frog that could be leveraged:
 - Lemckert, F., T. Penman and A. Haywood (2011). Adaptive monitoring using the endangered northern corroboree frog (*Pseudophryne pengilleyi*) as a case study. *Proceedings of the International Academy of Ecology and Environmental Sciences* 1(2): 87-96.
 - Rojahn, J., D. Gleeson and E. M. Furlan (2018). Monitoring post-release survival of the northern corroboree frog, *Pseudophryne pengilleyi*, using environmental DNA. *Wildlife Research* 45(7): 620-626.

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

- Amphibian Research Centre

- Taronga Conservation Society Australia

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