Monitoring Priority Threatened Species

An overview of monitoring methods for the Collared Delma, Adorned Delma (Delma torquata)

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Acknowledgement of Country

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 <u>EMSA Threatened Species Survey</u> <u>Guidelines</u> website. Additional information, particularly monitoring methods and techniques not included that should be considered, can be brought to the author's attention by emailing <u>tern@adelaide.edu.au</u> 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

• Vulnerable

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 Collared Delma. More information on the TSX, including how to contribute threatened species monitoring data to the index, can be found at <u>tsx.org.au</u>

1.2 Distribution

- The Collared Delma (*Delma torquata*) has a broad distribution in south-east Queensland, within the South East Queensland, Condamine, Burnett Mary and Fitzroy (Queensland) Natural Resource Management regions (DEWHA 2008; Chapple *et al.* 2019).
- The species is currently known from the western suburbs of Brisbane and the following sites: Bunya Mountains, Blackdown Tableland National Park (NP), Bullyard Conservation Park, D'Aguilar Range NP, Expedition NP, Naumgna and Lockyer Forest Reserves, Western Creek near Millmerran, and the Toowoomba Range (Davidson 1993; Ryan 2006).
- The Collared Delma is known to typically occur in small isolated populations throughout its distribution, restricted to small areas of habitat in the order of 1 ha (100 x 100 m; Peck 2003).

1.3 Habitat

- The Collared Delma occurs on rock outcrops in dry, open eucalyptus-acacia woodlands with an understorey of grass and shrubs (Porter 1998).
- Subpopulations may also be encountered in other eucalypt associations without rocks, and also in Brigalow Belt vegetation.
- The Collared Delma has been recorded in a variety of disturbed habitats (Cogger 2014; Chapple *et al.* 2019).
- The presence of rocks, logs, bark and other coarse woody debris, and mats of leaf litter (typically 30–100 mm thick) appears to be an essential characteristic of the Collared Delma microhabitat (Davidson 1993; Brigalow Belt Reptiles Workshop 2010).
- At Mount Crosby, Porter (1998) found the species had a preference for larger than average rocks (preferred average 172 cm) and vegetation cover lower than that typically available (preferred average 31%). Pitfall trapping captured lizards in vegetation some distance from rocky outcrops, suggesting the species is not entirely reliant on rocky habitat.
- The Collared Delma occurs in the following Queensland Regional Ecosystem Land Zones (LZ) and Regional Ecosystems (RE; Brigalow Belt Reptiles Workshop 2010):





- LZ 3 Alluvium (river and creek flats)
- LZ 9 Undulating country on fine-grained sedimentary rocks
- LZ 10 Sandstone ranges.
- RE 11.3.2 Poplar Box (Eucalyptus populnea) woodland on alluvial plains.
- RE 11.9.10 Poplar Box/ Brigalow (Acacia harpophylla) open-forest on fine-grained sedimentary rocks.
- RE 11.10.1 Lemon-scented Gum (Blue Spotted Gum) (Corymbia citriodora) open forest on coarse-grained sedimentary rocks
- RE 11.10.4 Gum-topped Ironbark (Eucalyptus decorticans), Budgeroo/Brown Hazelwood (Lysicarpus angustifolius) +/- Eucalyptus species, Corymbia species, Acacia species woodland on coarse-grained sedimentary rocks.

1.4 Ecology

- Collared Delmas produce two small white, elongated eggs in December, which hatch in February–March (Peck and Hobson 2007; DOE 2023).
- Two recaptures of specimens beneath the same rock after periods of around a month suggest the use of a specific home site.
- The second recapture of a specimen after 427 days only 18.2 m from its previous location, also indicates a small home range. However, the lack of recaptures may also be interpreted as an indication of a highly mobile species (Porter 1998).
- Collared Delmas are active during the day. Porter (1998) observed actively moving amongst low grasses at 08:45 hours at an air temperature of 26°C.

1.5 Threats

- Habitat loss through clearing for agriculture.
- Habitat degradation by overgrazing by stock and weed invasion.
- Removal of rocks, coarse woody debris and ground litter.
- Use of agricultural chemicals.
- Feral Cat (Felis catus) and Red Fox (Vulpes vulpes) predation (DOE 2023).





2 Existing monitoring methods

2.1 Summary of existing methods used

- Direct observation
- Direct observation (special techniques) active searching by rock turning and raking litter
- (tracks, scats, hair-tubes) (includes opportune and sand plots)
- Signs DNA/eDNA/eRNA
- Camera trapping
- Trapping pitfall
- Trapping Elliott/cage/or similar (ground)
- Trapping Elliott/cage/or similar (in canopy)
- Refuge checks (burrows, dens, nests, caves, etc.)
- Aerial surveys
- Invertebrate techniques: (specify)

2.2 Existing survey requirements

- Optimal time of year/season/climate conditions (timing with resource availability, etc.)
 - Collared Delmas have been located beneath rocks during every season of the year and captured in pitfall traps from spring through to late summer (Porter 1998).
 - The species is more likely to be detected when conditions are warm, not too dry and maximum temperatures are hotter than 25°C.
 - Optimal survey times for active searching are early morning (within four hours of dawn) and during the evening on warm nights (Brigalow Belt Reptiles Workshop 2010; DSEWPC 2011; DOE 2023).
- Optimal location of surveys
 - Perhaps Mt Crosby, western Brisbane, as per the definitive research study of Porter (1998).
 - Dry, open eucalyptus-acacia habitats with logs, bark and other coarse woody debris, and mats of leaf litter (typically 30–100 mm thick), with or without rocks.
- Minimum survey effort
 - Sufficient time is required to search the study area thoroughly. The minimum survey effort required includes (Brigalow Belt Reptiles Workshop 2010):
 - A minimum of three survey days to search for new records or monitor known populations in typically small habitat patches (1 ha; Peck 2003).
 - At least one replicate survey employing all of the recommended techniques if the species has not already been detected (DOE 2023).
- Survey personnel
 - 2-4 people depending on the technique (more if doing active searching turning rocks and raking litter less if erecting camera traps).
- Other factors:
 - Targeted surveys to confirm the presence/absence of the Collared Delma are done by actively searching suitable habitats (Brigalow Belt Reptiles Workshop 2010; DOE 2023).



2.3 Existing protocols

Existing protocols identified are identified in Table 1.

Table 1. Survey guidelines, protocols, and key resources that identify Collared Delma monitoring methods

Protocol	Comments	Reference
Camera traps for terrestrial squamates	Not tested on Delma torquata, but likely to be equally or more effective than pitfalls, whose problems for this small legless lizard were highlighted by Porter (1998).	Welbourne et al. (2020) m wn et et
	Details their use of a Reconyx camera in a vertical position ~70cm above the ground, located in a gap in a drift fence, pointing down at a cork floor tile. For each Reconyx HC600 camera-trap "we set the PIR trigger to operate continuously on the highest sensitivity setting and captured three images for each trigger event, and set the time-lapse trigger to capture an image every 5 min between 0700 and 1900 h."	

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

• The Survey Guidelines for Australia's Threatened Reptiles recommend one-off hand searches (including raking through leaf litter), together with a series of pitfall trap lines comprising six 4–10 L buckets and funnel traps spread along a 15 m drift fence (DSEWPC 2011).

2.4.2 Additional methods

• eDNA using soil samples: from under rocks defined by Porter (1998) as being of optimum size.

2.4.3 Methods to rule out

• All survey methods typical for reptiles 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 Collared Delma.

- Vertebrate fauna
- 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

• None have been identified to date.



3 Considerations for survey guidelines development

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

- Special equipment required
 - Numerous camera traps
 - Bookend brackets to orientate camera traps towards the ground
 - Drift fence
 - Cork tiles
 - Rakes
- Estimated time and surveyor effort
 - Three days of active searching and pitfalls per site are recommended (DOE 2023).
 - Multiple weeks (e.g. 3–4) of monitoring using camera traps are recommended to minimise Type II errors.
- Vegetation communities or landscapes of the species' preferred habitat not suitable for the optimal survey methods
 - Pitfall trapping may be difficult in particularly rocky habitats.

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 Collared Delma.

- Protocols
 - Camera-traps are a cost-effective method for surveying terrestrial squamates: A comparison with artificial refuges and pitfall traps (Welbourne *et al.* 2020).
- Scientific papers and reports
 - Observations on a large population of the vulnerable pygopodid, Delma torquata (Porter 1998).

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

- Pullen Pullen Catchments Group Inc.
- Queensland Parks and Wildlife Service, Department of Environment and Science





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