

Diadem leaf-nosed bat

Hipposideros diadema reginae

Near Threatened (*Nature Conservation Act 1992*) | Ecological Sciences, Queensland Herbarium

Identification

Hipposideros diadema reginae is currently classified by Troughton 1937 as a subspecies of *Hipposideros diadema*, but it may be a distinct species (Csorba et al. 2008). Fur is pale grey to light brown, often with pale buffy spots on the shoulders and belly. Although, individuals in some colonies can be rufous/orange with no spots (e.g. the colony at Iron Range). Ears are broad at the base and acutely pointed. The nose-leaf is well developed, with four depressions separated by ridges in the upper section and three supplementary leaflets under each side of the lower section (see Churchill 2008 for diagrams). It is the largest *Hipposideros* species in Australia: weight 32-57 g; forearm length 77.5-85.1 mm (Churchill 2008).



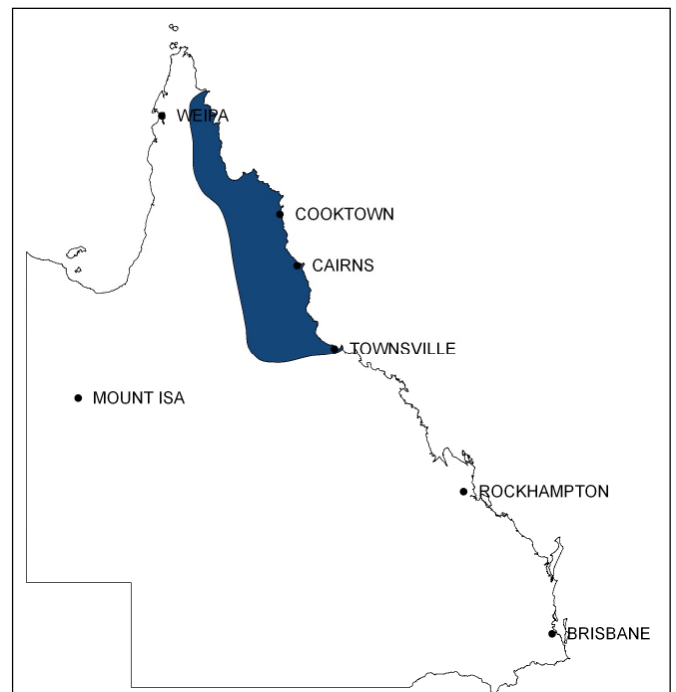
Echolocation call

Echolocation calls of *H. d. reginae* are readily distinguishable from other microbat species. Calls are of constant frequency between 55-58 kHz, terminating in a downward FM sweep to 47 kHz (Pavey et al. 2008). Pulses are approximately 11 ms in duration (Hall and Richards 1985).

Distribution

This subspecies is endemic to Queensland, occurring from Cape York Peninsula south to Townsville and inland to Chillagoe, with records from Iron Range, Hinchinbrook Island, Cape Melville, Chillagoe, Cairns and Coen (Tate 1952, Myroniuk 1988, Pavey 1998).

The extralimital distribution of the *H. diadema* species complex occurs from the Nicobar Islands of India and through Southeast Asia to New Guinea and east to the Solomon Islands.



Habitat: roosting and foraging

Hipposideros d. reginae roosts throughout the year in caves and disused mines, preferring those with large chambers, high domed ceilings and multiple entrances (Hall and Richards 1985; Pavey 1998).

They have also been recorded roosting in buildings and culverts (Churchill 2008). Churchill (2008) reports roost microclimates of 25-26.5°C and 65-80% humidity for this species. *Hipposideros diadema* subspecies outside of Australia have been recorded roosting among foliage and there is speculation that *H. d. reginae* may do likewise (Pavey 1998; Pavey et al. 2008), but this has yet to be confirmed. Colony sizes range from one (solitary males) to ≥ 250 individuals (Pavey 1998). Bats hang from the ceiling individually, maintaining a separation of 20-25 cm (Churchill 2008). Many *Hipposideros d. reginae* roost sites are easily accessible to people, making them particularly prone to disturbance (Pavey 1998).

This species occurs in a variety of habitat types including lowland rainforest, *Melaleuca* forests, eucalypt woodland, deciduous vine thickets, and open woodland; where suitable roosts are available throughout its range (Tate 1952; Brass 1953; Hall and Richards 1985; Myroniuk 1988; Pavey 1989). Bats forage an average of 1.08 km from the roost (range 0.3-2.5 km), in a variety of habitats proportional to availability in the landscape (including in small human settlements) (Pavey 1998). *Hipposideros d. reginae* forages primarily by perch hunting (whereby the bat echolocates while stationary and flies out to capture passing prey) but also forages during short bouts of continuous flight. Typical foraging sites are at vegetation edges or gaps adjacent to open space (Pavey 1998; Pavey and Burwell 2000).

Seasonal and timing considerations

There is no published information which suggests the best time of year to conduct surveys of this species. However, sampling is best conducted on warm, calm, dry nights within the survey period whenever possible (Fischer et al. 2009).

Recommended survey approach

This species is readily surveyed using standard techniques and is easily identified by its echolocation call. A combination of the following techniques are recommended:

Acoustic detection: passive monitoring

Detectors should be distributed so as to give good representation of the major habitat types within the project area, and can be placed in potential flyways, and at vegetation edges or gaps adjacent to open space. Detectors should be set up to record for the whole night at multiple locations for multiple nights.

Acoustic detection: active monitoring

Walking transects with a bat detector and spotlight in the evening can be used to increase coverage of the survey area. Walking transects can include potential flyways, gullies, gorges, scarps containing caves, creeks, mine entrances, and along vegetation edges. The large size of *H. d. reginae* makes it possible to identify the species if it is observed by spotlight. Recorded calls will confirm observations of the species and allow independent verifications to be made. Transects should begin at dusk and continue for at least two hours duration, and GPS tracks of transects should be kept to quantify effort and highlight areas surveyed.

Capture techniques

Harp traps and mist nets are useful for surveying *H. d. reginae*. Harp traps and mist nets can be set adjacent to or over water, along escarpments, gullies, gorges, creeks lined with riparian vegetation, flyways through very closed vegetation, and amongst boulder piles. Mist nets can also be set over or adjacent to water.

Roost searches

Prior to the survey it is important to establish whether there are any caves and mines in the area of interest, and any known roosts. In addition, further searches of gorges, gullies, fissures, rocky outcrops, and cliff lines should also be conducted at the site for additional caves or mine audits and shafts, which may be potential roosts for this species. Several hours per day may be required to conduct ground-based surveys for caves and mines.

Survey effort guide

There is currently no information on capture rates or detection probabilities for this species. However, the recommended level of effort below may provide a reasonable opportunity to detect or capture *H. d. reginae* if it is present in the survey area.

Per 100 ha of project area		
Survey technique	Minimum Effort	Minimum number of nights
Passive monitoring	16 detector nights	4 nights
Active monitoring	8 detector hours	4 nights
Harp traps	8 trap nights	4 nights
Mist netting	8 mist net hours	4 nights
Roost searches	2 hours per survey day	

Ethical and handling considerations

Take care when surveying *H. d. reginae* during the breeding season from October to January, as females may be heavily pregnant, have young attached, or be nursing crèched young. Survey methods should not include those which would cause distress resulting in the abandonment or dislodgement of young.

Roost searches

- Avoid entering caves or mines known to be occupied by bats during the day.
- When entering or working at the entrance of roosts be as quiet as possible.
- The number of people entering a cave at any time should be kept to a minimum.
- Any damage to the bat roost, such as removing rubble blocking corridors or bark sheets from trees, is unacceptable, even if these activities would increase the effectiveness of the search.

- Care should be taken when surveying bats during the breeding season (possibly November to January for *H. cervinus*; Churchill 2008), and survey methods should not include those which would cause distress resulting in the abandonment or dislodgement of young during this time.

Capture

- Allow sufficient time to ensure the final check and closure of all traps occurs before early dawn.
- Harp traps must be checked at least twice during the night where lactating females are present, during adverse conditions (very cold or wet) or where predatory animals (e.g. *Antechinus* spp.) are common.
- Mist nets must only be used by trained and competent personnel.
- Do not use mist nets across the entrances of caves or mines unless there is prior knowledge of the number of bats within, and the number is not large.
- Nets must be monitored constantly. To reduce the chance of catching birds, mist nets should be furled until dark, not left open. Nets should be closed when not attended.
- To reduce the chance of catching birds, mist nets should be furled until dark, not left open.
- All bats should be removed as quickly and gently as possible from mist nets to reduce injury and stress.
- If more bats are being caught than can be safely dealt with, the net should be furled as soon as all bats are removed.
- Place bats into a dry calico bag, one bat to a bag, keep bags off the ground.
- Release bats close to their point of capture while it is dark.
- If a bat has entered torpor give it time to warm up before release.
- Care should be taken when working around or handling microbats due to zoonotic diseases, such as Australian bat lyssavirus (for further information see www.health.qld.gov.au). Only fully vaccinated personnel are to handle bats.

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Citation

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