Australian Field Ornithology 2025, **42**, 148–152
http://dx.doi.org/10.20938/afo42148152

History and status of Lewin's Rail *Lewinia pectoralis clelandi* in south-western Australia

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Abstract. Lewin's Rail *Lewinia pectoralis* is a species found in Australia, Papua New Guinea and the Lesser Sundas and Timor. An enigmatic south-western Australian subspecies *L. p. clelandi* was described by Matthews in 1911 but is now considered extinct. Because of the paucity of information on this subspecies, we aimed to document all known specimens and present data on contemporary searches. In total, just seven specimen skins were collected between 1866 and 1918, with no definitive evidence of the subspecies' survival subsequently. Two putative eggs are also known. A preliminary but extensive assessment of presumed suitable wetlands in the previously known range of occurrence of this subspecies was conducted and concurrent brief surveys failed to detect any Lewin's Rails.

Introduction

Lewin's Rail *Lewinia pectoralis* is a widespread species with seven recognised subspecies (BirdLife International 2016; Taylor 2020; BirdLife Australia 2022) and occupies a broad range from Tasmania and south-eastern Australia, along the eastern coast of Australia to coastal eastern Queensland, and Papua New Guinea, the Lesser Sundas and Timor (Taylor 2020). Regarded as a cryptic species throughout its range, it is widespread though its population is regarded as declining (BirdLife International 2016).

Mathews (1911) described a geographically isolated subspecies, *L. p. clelandi* (at that time described as *Rallus brachypus clelandi* but also known by the genus name of *Hypotaenidia*), from south-western Australia. However, it is regarded as highly enigmatic with only one published sighting since its initial description by Mathews and no ecological description or precise habitat information. The last accepted occurrence was in 1933 (Whittell 1933) and this subspecies is now presumed extinct (Jaensch *et al*. 2021).

Subspecies *clelandi* is described as larger than subspecies *pectoralis*, with a longer deeper bill and a breast that is a clearer grey (Marchant & Higgins 1993). Some previously described plumage differences such as a darker throat and neck-stripe are now considered to overlap with the documented plumage variation in other subspecies (Marchant & Higgins 1993).

The habitat of *L. p. clelandi* is not well known. Other populations of Lewin's Rail are generally described as favouring permanent, densely vegetated wetlands, though the species has been recorded using a wide range of waterbodies including ephemeral sources and farm dams and occurring in parks, gardens and dryland sites (Marchant & Higgins 1993). Lewin's Rail is regarded as secretive, commonly remaining concealed in dense vegetation, with many aspects of its life history poorly known because of its behaviour and habits (Marchant & Higgins 1993). Diet includes a wide range of molluscs, annelids and, especially, insects and crustaceans, with observed feeding occurring on the edges of soft mud or dry ground (Marchant & Higgins 1993; Johnstone & Storr 1998).

The objective of this paper is to present a list of all known specimen records and associated information on *L. p. clelandi* and to summarise all published information on this subspecies obtained from a review of the published literature. We further document contemporary search efforts for this subspecies. In so doing we aim to present a comprehensive summary of the state of knowledge of this possibly extinct subspecies and encourage further searching in possibly suitable habitat.

Methods

Specimens

We reviewed all historical and contemporary records of Lewin's Rail *L. p. clelandi* in south-western Australia. Sources of data included all specimen and sightings records on the database of the Western Australian Museum, Ozcam (Australian Museums database) and the Global Biodiversity Information Facility (GBIF). We specifically searched for specimens in museums internationally and worked with relevant curators to derive information on these specimens.

Literature searches

The peer-reviewed scientific literature was reviewed by searching Web of Science, Scopus and Google Scholar with the keyword searches 'Lewin's Rail', '*Hypotaenidia brachypus*', '*Lewinia pectoralis*', '*Rallus pectoralis*' and 'Western Australia', and any records pertaining to south-western Australia were extracted and included. We also searched all copies of some key non-indexed publications, including the *The Western Australian Naturalist* and *Journal of the Royal Society of Western Australia.*

On-ground surveys

We also report here on contemporary, loosely structured but preliminary and informal search efforts for Lewin's Rail in south-western Australia.

From 2014 onwards, and intensively during 2015–2017, RJ developed experience in detection of Lewin's Rail *Lewinia pectoralis pectoralis*, generating >250 records in south-eastern Queensland that were entered in the wildlife database WildNet of the Queensland Government. Records were predominantly from swampy watercourses and margins of the tidal Brisbane River, in the south-western part of metropolitan Brisbane and its vicinity. This work led RJ to conclude that a favoured habitat of Lewin's Rail was creeks where water normally flowed slowly through dense emergent vegetation (weedy or native), and associated swamps.

Aware that this type of habitat is a common feature in the wetter south-western corner of Western Australia, RJ resolved to casually investigate examples while on recreational visits to the state in 2014 and 2016. The aim was to assess the present extent and suitability of habitat for Lewin's Rail in the region within which the historical records were made. This survey assumed that ecological requirements of the eastern and western subspecies of Lewin's Rail were similar, a question for which historical records provide few answers. These investigations were planned in collaboration with JL, who was based in Busselton and familiar with some of the Crown Lands in the target area. It was resolved that readily accessible samples of forest watercourses in catchments of Margaret River, lower Blackwood River and Donnelly River, mainly in Crown Land, would be explored. Examination of satellite imagery and forest maps yielded a preliminary set of probably accessible target areas to visit. Basic features of vegetation and wetland type at sample sites were noted. Fieldwork was conducted from 30 October to 2 November 2014 and from 23 to 24 November 2016.

During the habitat assessments, a brief effort by RJ to detect Lewin's Rail was conducted once-off at sites that seemed to have suitable habitat. This generally lasted for part of an hour (e.g. 15 minutes) rather than an hour or more, to ensure no significant disturbance to birds present. It included incidental visual search (which was expected to be rarely effective because of nearly continuous, dense vegetation cover) plus limited use of call-playback in short bursts (e.g. 10 seconds), and listening for bird calls.

Results

A total of seven specimen skins and two eggs of Lewin's Rail are known from south-western Australia (Table 1). The oldest specimen is in the Australian Museum and is from 1866 from King George's Sound (modern day Albany and wider region). There is a note against this specimen – "OC" which means 'Old Collection' – and is generally attributed to the Dobroyde Collection, a historic collection of skins and eggs that the Ramsay brothers, prominent collectors of bird specimens in Australia in the late 1800s, had established (https://adb.anu.edu.au/biography/ramsay-edward-pierson-4446).

The holotype (AMNH 545038; see Table 1) is from 1881 and is sourced to Gould and is listed as the holotype of *Rallus pectoralis clelandi* in Mathews' *The Birds of Australia* volume 1, part iv, plate 46, page 189 (August 1911). It has a small beige label in unknown hand denoted "W. Australia". The donor was John Gould 1st May 1881, then to the British Museum of Natural History (NHMUK) to L.W. Rothschild, to G.M. Mathews, then to the American

Table 1. Known specimens of Lewin's Rail *Lewinia pectoralis clelandi* from south-western Australia. Abbreviations used: AM = Australian Museum; AMNH = American Museum of Natural History; ANSP = Academy of Natural Sciences of Drexel University, Philadelphia, USA; NHMUK = Natural History Museum, Tring; WAM = Western Australian Museum; F = female, I = immature, M = male, U = unknown. Lengths of bill, wing and tarsus are given in mm.

Institution, specimen number	*Collector*	*Date*	*Location*	*Sex*	*Bill*	*Tarsus*	*Wing*	*Notes*
Eggs								
WAM A1315	J. Keane	11 March 1918	Western Australia					Two eggs
Skins								
AM O23280	G. Masters	March 1866	King George Sound	U				
AMNH 545038	Unknown possibly Gilbert for Gould	1881	W.A.	U	42	36	114	Holotype
ANSP 6163	–	–	Swan River	M				Ex-mount with glass eyes
ANSP 6167	–	–	West Australia	F				
NHMUK 1894.10.26.58	–	26/10/1894	W.A.	I				
NHMUK 1905.12.26.455	G.C. Shortridge	23/3/1907	Margaret River, W.A.	M				
NHMUK 1905.12.26.456	G.C. Shortridge	23/3/1907	Margaret River, W.A.	U				

Figure 1. The two specimens of *Rallus pectoralis clelandi in* the Academy of Natural Sciences of Drexel University, Philadelphia, USA. Photo: Nate Rice

Museum of Natural History (AMNH). It is noted as a very poor skin.

Two specimens with no known data and collector are present in the Academy of Natural Sciences of Drexel University (formerly Philadelphia) (ANSP) and according to label attributions are ex-Rivoli and Gould collections (Figure 1). Although the exact date is unknown, they are likely to be from around the 1880s.

Following this are three specimens in the NHMUK. The first is an immature bird from 1894 with the locality simply listed as W.A. The following two specimens both from 1907 appear to have been collected together and are described by Ogilvie-Grant & Shortridge (1909, p. 187) as the collection of two specimens in Margaret River (one of which is a male). There was further a note added by Shortridge: "I believe that Lewin's Rail is fairly plentiful in the south-west; but it is shy and easily over-looked". These represent the only known records from the south-western capes region of Western Australia.

The two eggs in the Western Australian Museum are purported to be of subspecies *clelandi* but some mystery surrounds their identity and provenance. The specimen label has a question mark on it next to *clelandi*. The original register of specimens lists the eggs as Buff-banded Rail and this is then crossed out and changed to *Rallus pectoralis clelandi* with a question mark after it. Next to the record was a note saying that this came from an egg collection of J.J. Keane and noted "collection stated to have been obtained in WA but containing a number not obtainable in the state". The eggs in question have no locality attributed. This raises sufficient doubt in the veracity of these eggs as to require further confirmation before acceptance as a genuine record of *R. p. clelandi*.

The specimen records thus provide scant information on locality except for Albany and Margaret River, and there are no other locations stated.

Literature searches

There are scant mentions in the literature of Lewin's Rail in Western Australia. Ogilvie-Grant & Shortridge (1909, p. 186), described the collection of two males of what was then classified as *Hypotaenidia brachypus* at Margaret River, 23 March (year not stated but presumably 1908). They believed it to be "fairly plentiful in the south-west" but shy and easily overlooked. It is apparent that these two specimens are NHMUK 1905.12.26.455 and NHMUK 1905.12.26.456 in the Natural History Museum (UK). That also means we can infer that the second specimen 1905.12.26.456 listed there as of unknown sex must be male based on the data presented by Ogilvie-Grant and Shortridge.

The only dedicated mention of Lewin's Rail in south-western Australia in the literature comes from Whittell (1933). He presented annotated field notes based on 8 years of surveys around Bridgetown, south-western Australia. Whittell stated that the bird (described there as *Rallus pectoralis*) occurred in at least one swamp 15 miles south-west of Bridgetown. He took a specimen there in December 1931 and observed another bird there in September 1932. These represent the last documented records of Lewin's Rail in Western Australia. No specimen connected to Whittell is known and the fate of the bird he 'procured' is unknown. The described locality 15 miles south-west of Bridgetown is heavy forest with creeks but no obvious swamps. A similar distance due south is among several swamps near Palgarup. The larger of these is Wilgarrup Swamp and we speculate that this might have been the locality intended by Whittell (Anon. 1997).

Preliminary assessment of habitat and brief searches for Lewin's Rail

Ten sites in the Margaret River catchment, from headwater creeks to Margaret River town and including a set of

perched swamps, were assessed and seven of these seemed to have the assumed suitable habitat for Lewin's Rail. One additional site seemed possibly suitable.

Of the 15 sites visited in the lower Blackwood catchment from Jalbarragup to Alexandra Bridge, all were in tributaries, such as Chapman Brook, and only four seemed to have suitable habitat, with another four sites possibly suitable.

Twelve sites in the upper and lower regions of the Donnelly catchment, from the Palgarup district (including an edge of Wilgarrup Swamp) to within 8 km of the sea mouth, were explored or sighted and one site seemed suitable for Lewin's Rail, and six sites possibly suitable.

Sites that seemed suitable for Lewin's Rail typically had braided channels or rivulets, which trickled water through dense thickets of wetland-associated shrubs up to 2 m in height with taller emergents to 3 m in some creeks. Most of the suitable sites were in the gently sloped beds of broad watercourses and several were in swampy flats. Less suitable or unsuitable sites lacked sufficient vegetation cover.

Wetland vegetation in suitable sites was dominated by multi-stemmed shrubs of *Agonis* spp. and *Melaleuca* spp., with an understorey densely covered with sedges (Cyperaceae) and/or rushes (Restionaceae). These plants were standing in or beside shallow water or were in damp soil. Photographs were taken of habitat at most of the 12 suitable sites.

No Lewin's Rails were seen or heard during the targeted searches. Because of the brevity of effort and highly secretive behaviour of the species, lack of detection did not rule out an actual bird presence at the time of survey.

Discussion

The south-western subspecies *clelandi* of Lewin's Rail remains highly enigmatic. We have confirmed a total of seven specimen skins and two putative eggs of this taxon. Locations of specimens include only Margaret River and King George Sound (Albany), with no indication of wetland or habitat type. The other collections are broadly attributed to the developing colony (e.g. Swan River) or even more broadly as Western Australia. The collection dates span 1866 to 1907, with the published sighting of Whittell near Bridgetown in 1931 and 1932 being the last documented records.

One of the several mysteries that remains is the specimen that Whittell 'procured'. This has not yet been found in any collections. It is presumably not one of the undated specimens in Table 1 as these would likely have been associated with the specific collection locality from Whittell. Although Whittell's sightings are largely accepted as the last records because of his expertise in ornithology, it seems from an evidential basis (see Leseberg *et al.* 2020) that there is no proof of the existence of Lewin's Rail in south-western Australia after 1907.

The potentially broad geographical range of *L. p. clelandi* is at odds with its seemingly rapid decline and extirpation. This is even more so when current habitats of the eastern population are considered, and knowing that the eastern population is regarded as fairly flexible in habitat occupied. Other more wetland-associated species such as the Australasian Bittern *Botaurus poiciloptilus* have persisted in the south-west, notwithstanding the pressures affecting other crakes and rails such as predation by Red Foxes *Vulpes vulpes* and Cats *Felis catus*, as well as habitat loss and degradation. It remains a mystery why the south-western Western Australian subspecies of Lewin's Rail should have become extinct.

The explorations in 2014 and 2016 were neither exhaustive nor highly structured and at best should be considered as encouragement and guidance for future survey efforts. Long reaches and large areas of swampy watercourse that exist in the three catchments visited and in other catchments east to Albany and beyond were not explored. Many of these are in forest or heathland that remains in relatively undisturbed condition.

Nevertheless, from the 2014 and 2016 surveys we concluded that substantial length and area of habitat suitable for Lewin's Rail exists in the south-western corner of Western Australia, assuming that habitat preferences of the eastern and western subspecies are similar. Given the wide spread of historical records (Albany and Margaret River are 285 km apart) and potential habitat across the south-west, it seems unlikely that catastrophic fire events (for example) would have caused extinction of the rail. It is possible that this subspecies was a poor flier rendering it more vulnerable but there is no anatomical evidence to support this in the form of reduced wings. Although vulnerable to feral cats and other predators, the species has been documented widely and in a great many sites in Brisbane – where predators are known to be plentiful – hence it seems possible that the rail could still be extant in the west.

Lewin's Rail is a highly secretive species, often detected only by its calls, which comprise five to ten types depending on classification of variations. In watercourses with continuous, dense emergent vegetation and no open edges where in relatively dry times a rail may need to expose itself in order to feed in remaining water, it may rarely if ever be visible to observers. Some photographs of the eastern subspecies show soil on the bird's bill, implying that it probes for food in wet/damp soil, which can be present within dense shady cover in watercourses and their banks. A study on the eastern subspecies of Lewin's Rail modelled suitable habitat comparing occupied and unoccupied sites and found a preference for low, dense vegetation and an abundance of shrubs in adjoining vegetation (Schmidt *et al*. 2018). This study did also provide evidence for use of degraded wetlands. The behaviour and habitat choice of the Western Australian subspecies are a mystery but can be presumed to be similar and thus guide future search efforts.

Using (ethically applied) call-playback as an aid to surveying, beginning with calls of the eastern subspecies, could be a potentially productive search method. If a Lewin's Rail is discovered in the west and its calls recorded then, based on experience with the eastern subspecies, judicious playback of the local calls in similar habitat is likely to reveal other extant sub-populations. Whether or not armed with local or eastern calls, deployment of acoustic recording devices in a range of potential habitats may also yield positive results. Recent studies showed the potential utility of camera traps as a method for detecting Lewin's Rail (Znidersic 2017) and explored methods

for semi-automated analysis of large acoustic datasets (Znidersic *et al*. 2021). Such improvements in technology will improve the ability of surveying for cryptic species such as Lewin's Rail.

Historical surveys between 1981 and 1985 at wetlands in 197 nature reserves across south-western Australia did not detect any Lewin's Rails (Jaensch *et al*. 1988). Further extensive surveys in the south-west also failed to detect Lewin's Rail (Clarke *et al*. 2011). A renewed focus on surveys for Australasian Bitterns in south-western Western Australia has also failed to detect Lewin's Rail so far (Stokes *et al*. 2021).

Conclusions

The previously reported broad range of Lewin's Rail in south-western Western Australia, and the persistence of a wide range of wetland habitats in extensive tracts of state forest and national park in the former range, offer hope that this taxon may still persist. The cryptic habits would make it difficult to detect if at low densities and the advent of current technologies such as automated camera and audio-recording devices will assist future survey efforts. The taxonomic distinctiveness of *L. p. clelandi* has not been rigorously resolved and requires future work. There also remains the possibility that, since small rails of several species (e.g. Spotless Crake *Zapornia tabuensis*, a similarly secretive species: RJ pers. obs.) are known to have colonised artificial wetlands scattered around the continent, Lewin's Rails could have temporarily established in the south-west from interstate migration or could be vagrant birds. Similar patterns have also been observed for other waterbirds such as Masked Lapwing *Vanellus miles novaehollandiae*, which was not previously considered part of the bird fauna of south-western Australia but is now recorded most years in wetland locations throughout the region, indicating a more permanent shift or invasion in progress (Singor 2010). Such patterns are predicted to increase over time, particularly as a result of climate change (Davis & Watson 2018).

Acknowledgements

We are indebted to Nate Rice from the Academy of Natural Sciences, Philadelphia, USA, and Alex Bond, Natural History Museum, UK, for the provision of information on specimens in their collections and for photographs of the specimens. Leo Joseph, Ron Johnstone and Dick Schodde provided valuable information and insights. Allan Burbidge provided feedback on a first draft of the manuscript.

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Received 22 April 2025, accepted 6 July 2025, published online 8 September 2025