Australian Entomological Society

AES Conservation Committee
Species Nomination Form

Taxonomy

Scientific name: *Moggridgea rainbowi* (Pulleine, 1919) (Araneae: Migidae)
Original description: *Aganippe rainbowi* Pulleine, 1919: 74, pl. 12, figs 1-5.

Synonymy: *Moggridgea australis* Main, 1991: 390, figs 4 A-B, D, 5A-L (synonymised by Harrison et al. 2016: 2010).

Common name: Kangaroo Island Micro-Trapdoor Spider

Description

Moggridgea rainbowi is a medium-sized migid spider (length ca. 10mm), with a more or less uniform dark brown/black colouration. Image by J. Marsh.

Similar species: *Moggridgea rainbowi* is the only member of the genus *Moggridgea* known from Australia. It appears to be a member of the *M. quercina*-group (otherwise known only from South Africa), and the most similar described species is *Moggridgea intermedia* Hewitt, 1913, from South Africa (Harrison et al., 2016, 2017). All lines of evidence, including molecular divergence dating, suggest that the ancestor/s of *M. rainbow* dispersed

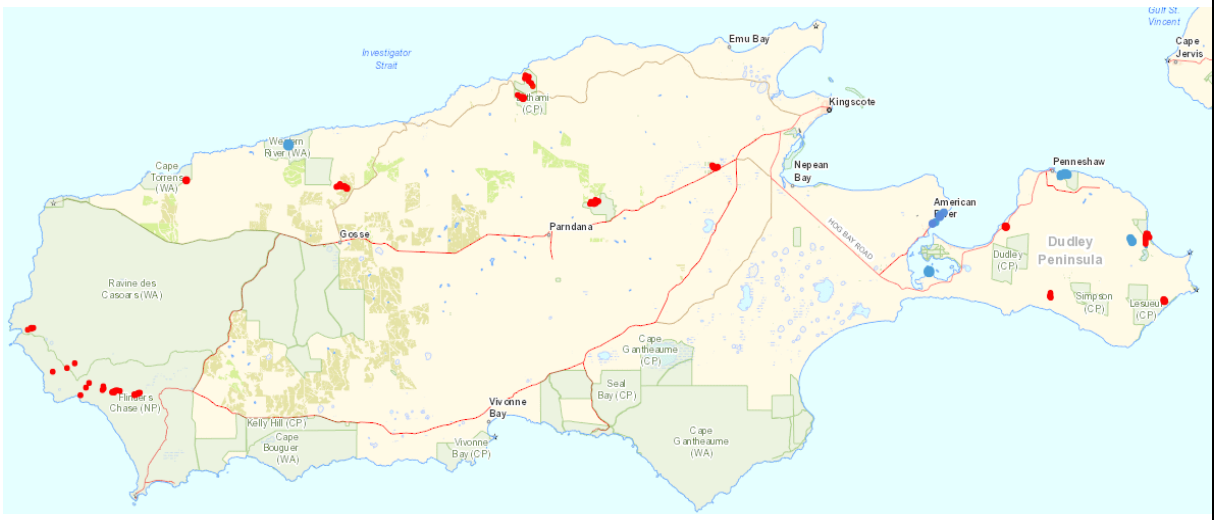
to Kangaroo Island from southern Africa via long distance oceanic dispersal, sometime during the last 2–16 million years (Harrison et al. 2016, 2017).

The remaining three migid genera found in Australia are known to occur in Western Australia, Tasmania and Queensland. Species of *Moggridgea* can be distinguished from these other Australian migids by the presence of erect, ventral lamellate setae on patellae I, III, IV; an absence of spines on tarsi I-IV; and the presence of a long, apically pointed ectal lobe of the male palpal tarsus (Harrison et al., 2016).

Distribution

IBRA region: KAN (Kanmantoo)

Distribution: *Moggridgea rainbowi* is known only from Kangaroo Island, South Australia. It is known from five sites on Kangaroo Island, four sites located at the eastern end of the island and one from the west. The entire known range of the western population of the species was burnt during the 2020 KI fires. It is not known at this stage how this has affected the spiders.



Distribution map for *Moggridgea rainbowi.* Presence records are marked with blue points, absence records are marked with red points. Map produced using NatureMapsSA 2020.

Land tenure: Two of the known sites occur in conservation parks; one being located in Baudin Conservation Park, Dudley Peninsula and the other in the Western River Wilderness Protection Zone, Western River. Of the remaining three sites, two are on crown land and one is on private property.

Biology

Mature males have only been collected in autumn (Harrison et al., 2016). Mature females have been collected all year round and were found with eggs in spring and with spiderlings in their burrow during summer. Juvenile spiders appear to stay in the maternal burrow for a period of time before dispersing, with juveniles of different sizes having been found in

maternal burrows (pers. obs.). As with most mygalomorph spiders, it is believed that the dispersal distance of the juveniles from the maternal site is limited (Harrison et al., 2017).

Ecology

Moggridgea rainbowi construct short burrows, of about six centimeters in length, directly into vertical clay banks. The silk lined burrows have a hinged lid that fits tightly when closed. At one of the known sites, burrows are found in small creek lines leading up to the coast as well as in the steep clay banks along the edge of the coast. At all of the remaining sites burrows have only been located in vertical creek banks. At all sites, burrows are found within a meter of the bed of the creek/base of the bank and populations are clustered so that many burrows may occupy a small area. In captivity spiders stay alive if kept in their burrow, however, if removed from their burrow they quickly die, even when all other conditions are maintained (pers. obs.), suggesting a possible regulatory mechanism for temperature or humidity within the burrows. In captivity, once removed from their burrow, mature females do not construct a new burrow.

Critical habitat

Burrows of *Moggridgea rainbowi* are only found in bare, vertical clay banks, usually along or adjacent to small creek lines. At all known sites *M. rainbowi* spider burrows have been situated at <1 m from the ground/creek bed, and within 2.5 km from the coast, with two populations being within 10 m of the high tide mark.

Key threatening processes

Evidence of decline: Data unavailable.

Past threats: Data unavailable.

Current threats: Incursion by Bridal Creeper (*Asparagus asparagoides),* a Weed of National Significance, by other ground-matting exotic weeds (for example Bridal Veil *Asparagus declinatus*) and by exotic rhizomatous, matt forming grasses (for example Kikuyu, *Pennisetum clandestinum).* Bridal Creeper was widespread in three of the five sites that *Moggridgea rainbowi* is currently found and had covered large sections of creek banks. In these sections no *Moggridgea* burrows could be located, despite thorough searching. Bridal Creeper forms thick mats of underground tubers along creek lines and creek banks, the critical habitat for the species, and apparently prevent *Moggridgea rainbowi* from excavating burrows.

Of the five known sites, four are situated adjacent to established walking trails, thus placing them at risk from additional weeds introduced by walkers and from erosion of creek banks due to people walking over them.

The western population was impacted by the 2020 fires on Kangaroo Island, where the known locations burnt at a high intensity. Whilst it is not yet known what the impacts of the fire have been it is unlikely that the shallow burrows would offer much protection from such heat. Additionally during the time of year the fires occurred juveniles are typically found in

the maternal burrow with the female, meaning that the fires could have had catastrophic impacts upon this isolated and genetically distinct population.

Potential future threats: Of the five sites that *Moggridgea rainbowi* is known to exist, three are at or in close proximity (<10 m) to the coast. This makes these sites extremely vulnerable to being impacted as a result of sea level rise, or to extreme high sea level events. For example, erosion of soil and destruction of burrows may occur following climate change-induced high rainfall events, extreme high tide events, sea level rise and consequent flooding. Climate change models indicate with high confidence an increase in the intensity of extreme rainfall events in the Southern and South-Western Flatlands East Cluster (SSWFE), which includes Kangaroo Island, plus very high confidence that mean sea levels will rise, coupled with an increase in the height of extreme sea level events (Hope et al., 2015; CSIRO and Bureau of Meteorology, Climate Change in Australia website). *Moggridgea rainbowi* builds its burrows in about the top six centimetres of soil along creek banks, and as such is vulnerable to burrows being washed away during flooding.

Changes to land use, particularly access to watercourses by grazing stock, has the potential to further erode creek banks and threaten those three (of five) populations that are not protected in conservation estates.

Future fires are a threat to all populations of *Moggridgea rainbowi* on KI and may be particularly detrimental for individuals that managed to survive the 2020 fires in unburnt refugia or less intensely burnt patches.

Community engagement and conservation management

Community engagement: National Parks Rangers and on-ground work teams (DEW) / community groups/ local progress associations / school groups / Friends of Parks groups / private land holders.

Conservation management and actions: There are currently no formalized management plans for *Moggridgea rainbowi*, however suggested actions include: 1) Field surveys of Kangaroo Island creek lines to further map the species' distribution. 2) Habitat restoration by landcare groups/ Department for Environment and Water (DEW) / community groups at known sites. Actions would focus on the removal, or reduction of Bridal Creeper at affected sites. Of the two sites known from National Parks, one has a large covering of Bridal Creeper, and management to control the weed at this site should be a priority.

Conservation status

International (IUCN Red List): N.A.

National (EPBC): N.A.

State: N.A.

Proposed conservation status evaluation

We recommend that the taxon be listed nationally as **Endangered** according to IUCN Red List Criteria B1ab(iii), B2ab(iii). That is, the extent of occurrence (EOO) is <5,000 km^2, the area of occupancy (AOO) is << 500 km^2, known populations are severely fragmented, and the extent and/or quality of habitat continues to decline (see Key Threatening Processes, above).

EOO: Based on the current known distribution of *M. rainbowi*, the EOO is <4,400 km^2, the land area of Kangaroo Island.

AOO: Surveys of creek lines and suitable habitat on Kangaroo Island have confirmed the presence of *M. rainbowi* at only five sites. At four of these five sites, populations are confined to bare, vertical clay banks along small creek lines. At one site they are found in steep clay banks which border the coastline and also along adjacent creek lines. The species has not yet been found at other locations in other suitable habitats, despite multiple survey trips (refer to Distribution Map for negative survey results). It is likely that other populations remain to be found, however, due to the species' specific habitat requirements the AOO is necessarily limited. Indeed, given the requirement for vertical clay banks and the fact that at all of the sites where *Moggridgea* has been found burrows have been constructed in banks <1 m above the ground/creek bed, then, if by a generous estimate there was available 10,000 km of potentially suitable creek line habitat on Kangaroo Island, the AOO would only be 10 km^2.

Scientific and/or social value

Moggridgea rainbowi is a unique, enigmatic and endemic Kangaroo Island species. The story of *M. rainbowi* is a fascinating one, from a scientific perspective and also from a social one; by its nature it is mediagenic, with value both as a local, iconic species, and a scientifically important species of international significance.

Recent morphological and molecular studies have shown *M. rainbowi* to be phylogenetically distinct from all other Australian migids. Its closest relatives are known only from South Africa, from which it split 2-16 million years ago (Harrison et al., 2017). The study by Harrison et al. (2017) was unequivocal in supporting the hypothesis that *Moggridgea* colonised Kangaroo Island via long distance trans-oceanic dispersal between 2–16 million years ago – the only known example of such long-distance dispersal by a mygalomorph spider.

References

[Cite all relevant information]

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Nominator/s

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