A range extension for the endangered Grey Snake *Hemiaspis damelii* (Günther 1876) in the Murrumbidgee catchment, southern NSW

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Introduction

The Grey Snake *Hemiaspis damelii* (Günther 1876) is a relatively small elapid (mean snout vent length = 42.6 cm, max = 60 cm) (Shine 1987) found across central inland NSW, extending north through the interior of south-eastern Queensland to coastal areas near Rockhampton (Cogger 2014; Hobson 2012; Wilson and Swan 2017). It is crepuscular and nocturnal, feeds primarily on frogs and gives birth to 4-16 live young between January and March (Shine 1987). However, apart from several early life-history studies (Shine 1977, 1978, 1987), the distribution and ecology of *H. damelii* is poorly known, especially in the southern part of its geographical range.

In Queensland, it is listed as endangered (*Nature Conservation Act 1992*) and is reported to occur in Brigalow *Acacia harpophylla* and Belah *Casuarina cristata* woodlands on heavy, cracking clay soils, particularly in association with water bodies, areas with small gullies and ditches, or flood-prone environments along the lower reaches of several major westerly flowing rivers such as the Condamine, Gwydir, Namoi, Macquarie and Lachlan systems (ALA 2019; Wilson 2005; Queensland Government 2019). It is also listed as endangered on the IUCN Red List of Threatened Species (Vanderduys *et al.* 2017), where it is reported to have experienced a population decline.

The Atlas of Living Australia (ALA) lists 261 records for the species, of which the majority of records occur north of Macquarie Marshes in northern NSW (ALA 2019). Furthermore, there are fewer than 20 records in the last decade in the ALA database, which may be a reflection of limited survey effort in the species' preferred habitat (Vanderduys *et al.* 2017). The distribution is considered severally fragmented, with an isolated population occurring in south-western NSW along the lower reaches of the Lachlan River (Swan *et al.* 2004). Historical records of the species in this southern part of its range are limited to 10 museum specimens collected more than 65 years ago. One specimen was collected 35 km north of Balranald by K. Kuno and is held in the South Australia Museum (catalog number - R3566), eight specimens collected from Cumbung Swamp by Charles Tanner in 1954 are held at Museums Victoria (catalog numbers - D8552, D8562, D8563, D8564, D8565, D8638, D8639, D8795), and one specimen registered in 1950 and collected near Oxley by David Fleay is held at the Australian Museum (catalog number - R13814). This record is listed as 90393-035 in the BioNet Atlas of NSW Wildlife (NSW Bionet 2019). Another specimen (Australian Museum catalog number - R18954) was collected much further east near the locality of Bribbaree (registered in 1962 – R18954) and an isolated sight record exists from Parkes (ALA 2019).

In this note, we report the first confirmed sightings of *H. damelii* south of the Murrumbidgee River, representing a southern range extension and confirmation that the species still persists in south-western NSW.

Observations

During a nocturnal frog survey on 28 November 2018, an adult *H. damelii* (SVL 49 cm) was observed at 2107 hrs foraging on an exposed mudflat of a 208 ha private floodplain wetland that had received environmental water in late September 2018 (Nap Nap Swamp: 34°26'23.6"S 144°07'02.5"E). The well-vegetated wetland was dominated by River Red Gum *Eucalyptus camaldulensis* and Black Box *E. largiflorens* with a dense understorey of Tangled Lignum *Duma florulenta* (Figure 1). The snake was measured and photographed for identification purposes (Figure 2), and then released at the point of capture. Approximately 400 m from this observation and approximately at the same time, another adult *H. damelii* was photographed and observed to be foraging along a levee bank (34°26'00.6"S 144°06'48.1"E). A second snake with similar body colouration was observed disappearing into a hole. The maximum recorded air temperature during the day was 28.8°C and at the time of the sightings the air temperature was 19°C. Total rainfall for the month of November was 41.4 mm and was concentrated earlier in the month, although 1 mm of rain was reported during the previous night. Frog diversity and abundance was relatively high with a total count of 49 Spotted Marsh Frog *Limnodynastes tasmaniensis*, 14 Southern Bell Frog *Litoria raniformis*, one Inland Banjo Frog *L. interioris*, one Barking Marsh Frog *L. fletcheri* and one Plains Froglet *Crina parinsignifera* recorded surface active during the two 20 minute frog surveys.

Figure 1. Vegetation structure at Nap Nap Swamp showing cracking soil and dense Lignum understory cover (Photo: D. Michael).

Figure 2. Adult *Hemiaspis damelii* photographed in situ foraging on an exposed mudflat (Photo: D. Michael).

On 6 December 2018, three *H. damelii* were observed surface active along a 300 m survey transect between 2200 hrs and 2230 hrs on an unsealed road bisecting a River Red Gum and Tall Spike Rush *Eleocharis sphacelata* wetland that had received environmental water in August 2018 (Two Bridges Swamp, Yanga National Park: 34°24'12.6"S 143°47'28.7"E). The maximum recorded temperature during the day was 39.4 °C and at the time of the sightings the air temperature was 30°C and humid. The number of frogs recorded in terrestrial habitats along this transect included five Peron's Tree Frog *L. peronii*, eight Spotted Marsh Frog, four Plains Froglet and one Inland Banjo Frog. No rain had fallen since the previous week.

Between 21 and 23 January 2019, five *H. damelii* individuals were detected at Two Bridges Swamp, five individuals were detected at Nap Nap Swamp and three individuals were detected on the shore of Piggery Lake (Yanga National Park: 34°25'29.7"S 143°46'03.6"E) (Figure 3), again during routine nocturnal frog surveys. Observations were made between 2135 hrs and 2348 hrs at an average temperature of 32°C. On 11 February, two more *H. damelii* were recorded from the levee bank of a fourth wetland in Yanga National Park (Mercedes Swamp: 34°22'48.0"S 143°47'57.1"E). Mean snout-vent length (SVL) measurements for 10 individuals was 42.57 cm (maximum SVL = 50.10, minimum SVL = 30.9 cm and total length of the largest individual = 60.20 cm). Twenty-one sightings were made between late November 2018 and February 2019, all from areas that have received Commonwealth or NSW State environmental water annually since 2015. These sighting are between 15 km

Figure 3. Male and female *Hemiaspis damelii* sheltering in a soil crack and foraging along a levee bank (Photo: D. Michael).

south-east and 23 km south-west of historical Cumbung Swamp records, and represent the first confirmed records of the species in the Murrumbidgee catchment.

Discussion

Limited survey effort, habitat modification and altered flood regimes, in conjunction with the species' nocturnal behaviour and superficial resemblance to a juvenile Eastern Brown Snake *Pseudonaja textilis* are possible reasons why there have been very few recent sightings of *H. damelii* in the southern part of its range since the 1950's. Considering this species is a frog specialist, its distribution and abundance in the lower Murrumbidgee floodplain is likely to be associated with seasonally inundated wetlands that support high densities of floodplain frog species. River regulation, increased water consumption for irrigation purposes and changes to wetland hydrology have had considerable impact on aquatic diversity (Kingsford 2000), including floodplain frog species (Wassens and Maher 2011). Over the past decade, Commonwealth and NSW State environmental watering actions across the Murrumbidgee catchment have contributed to the recovery of aquatic vegetation, frog breeding events and recruitment (Wassens *et al.* 2017), outcomes which may predictably benefit anurophagous snake species. A number of different wetlands have been surveyed across the Murrumbidgee catchment since 2015 (Wassens *et al.* 2017), however, so far *H. damelii* has only been sighted from wetlands that receive environmental water and not from dry wetlands. Despite the apparent high densities of *H. damelii* at some wetlands in this region, further research is required to better understand the broader distribution and ecological requirements of this species in southern NSW, as well as its sensitivity to wetland rehabilitation and environmental water management.

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