

NSW SCIENTIFIC COMMITTEE

Final Determination

The Scientific Committee, established by the *Threatened Species Conservation Act 1995* (the Act), has made a Final Determination to list the Guthega Skink *Liopholis guthega* (Donnellan, Hutchinson, Dempsey & Osborne, 2002) as an ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act. Listing of Endangered species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. The Guthega Skink *Liopholis guthega* (Donnellan, Hutchinson, Dempsey & Osborne, 2002) (family Scincidae) is described by Cogger (2014) as “Pale grey or fawn above, usually with a pale brown or russet vertebral stripe bordered on either side by dark brown or blackish zones and enclosing a series of small, white, cream or yellow spots. Each of these zones extends on to the upper flanks where each meets a blackish upper lateral zone that extends from the ear to the base of the tail and encloses a series of two or three roughly longitudinal small whitish spots. This zone is bordered by a paler dorso-lateral stripe that may enclose some pale, black-edged spots anteriorly. The lower flanks may also enclose a few small pale spots, but gradually merge into the paler silvery-grey to whitish ventral colour. Usually a narrow, pale subocular stripe along upper lips from snout to, or almost to, ear-opening and narrowing edged above with black. Auricular lobules white or cream. Limbs with a few scattered small white spots. Scales in 35–40 rows at mid-body, the scales smooth with faint striations. Base of tail without enlarged, expanded upper caudals. 4–5 moderate ear lobules. 6–10 supraciliaries. Post-narial groove faint or absent. Head shields regular, unfragmented. Nasals separated. Interparietal usually much narrower than frontal in adults, nearly as wide as frontal in juveniles. Subdigital lamellae 17–20, smooth, single, notched or sometimes divided basally. 95mm (snout-vent), the tail round, tapering and about 125% of snout-vent length.”
2. The Guthega Skink can be distinguished from other *Liopholis* species by the “presence of a blackish upper lateral stripe usually overlain by two or three roughly longitudinal series of light grey or cream dots. Adults with complex back pattern similar to that of *L. whitii*, but with only two colours, a greyish background colour and blackish brown pattern.” It can be further distinguished from *L. montana* and *L. whitii* by lower numbers of subdigital lamellae (< 20, *cf.* > 20) and shorter tail (<140% SVL, *cf.* >140% SVL) (Donnellan *et al.* 2002).
3. The Guthega Skink is endemic to New South Wales (NSW) and Victoria, where it is restricted to the sub-alpine and alpine zones (> 1,500 m a.s.l.). In NSW, the Guthega Skink has only been observed within Kosciuszko National Park (NP) extending from Ramshead Range in the south to Schlinks Pass in the north (NSW Wildlife Atlas 2016; Z. Atkins, unpublished data). In Victoria, the species is found in the Bogong High Plains (Donnellan *et al.* 2002). The species is listed as Threatened under the Victorian *Flora and Fauna Guarantee Act 1988* and as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

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4. The Guthega Skink is found in a variety of vegetation types, including open *Eucalyptus niphophila* (Snow Gum) woodland with grassy or shrubby understoreys, dry tussock grassland and tall and short heath (Donnellan *et al.* 2002). Areas preferred are usually associated with a substrate of granite boulders or sub-surface boulders hidden beneath decomposing granite soils or thick vegetation (Donnellan *et al.* 2002; Green and Osborne 2012). This species constructs burrows in the soft soils beneath shrubs, rocks and logs (Green and Osborne 2012). Soil and snow cover provide important insulation from the winter cold (Donnellan *et al.* 2002). The Guthega Skink is an opportunistic forager with a diet primarily consisting of invertebrates and some plant material (Chapple 2005).
5. Little is known about the breeding and social biology of the Guthega Skink. It mates in late spring or early summer and 1–3 live young are born February–March (Z. Atkins, unpublished data; Donnellan *et al.* 2002). They lives in colonies in deep extensive burrow systems (Donnellan *et al.* 2002; Green and Osborne 2012). The similar species *L. whitii* lives in stable social groups of 2–6 individuals, consisting mainly of either adult pairs or adult pairs with closely related juveniles (Chapple and Keogh 2006). There are no data on age at first breeding or longevity for the Guthega Skink, however information on closely related species suggests that the Guthega Skink could take 3–4 years to reach sexual maturity and have a lifespan of 8–10 years (Chapple 2003), or potentially up to thirteen years (Bellamy 2006).
6. The home range of the Guthega Skink is unknown, but it is likely to be small as adults seem to have considerable site fidelity with the majority of basking and foraging occurring within close proximity of familiar burrows (Green and Osborne 2012). Other social, burrow dwelling *Liopholis* species are known to have small home ranges (Chapple and Keogh 2006) and it is likely to be the same for the Guthega Skink. The maximum short-term dispersal distance for the Guthega Skink may be 300 m (Chapple 2003; Atkins *et al.* 2015), based on information from the closely related species *L. whitii*. Small home ranges and limited capacity for dispersal make this species more vulnerable to habitat disturbances which reduce habitat connectivity and isolate populations.
7. As a result of its narrow altitudinal range and specific habitat requirements, the Guthega Skink has a limited capacity for dispersal (Atkins *et al.* 2015; Chapple 2003). Most sites occupied by the Guthega Skink are separated by distances that are thought to be beyond the dispersal ability of the species (> 300 m). In addition, the Guthega Skink's distribution in NSW is fragmented by alpine resort buildings and/or groomed ski slopes, roads and tracks. Hence, populations of the Guthega Skink are considered to be severely fragmented.
8. The total population size of the Guthega Skink in NSW is unknown. No systematic surveys have been undertaken across its distribution (Z. Atkins *in litt.* June 2016; M. Schroder *in litt.* June 2016). However, based on the limited number of locations that have been surveyed, colonies vary in size from two to over 100 individuals, with an average colony size of around 15 animals (Z. Atkins unpublished data). Factors influencing colony size include past disturbance, vegetation composition, soil type, rock availability and aspect (Z. Atkins *in litt.* June, 2016).

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9. The geographic range of the Guthega Skink in NSW is considered to be highly restricted. Based on known records (NSW Wildlife Atlas 2016; Z. Atkins unpublished data), the extent of occurrence (EOO) is estimated to be 160 km² based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by IUCN (2014). However, as a result of the 2003 fires, the Guthega Skink appears to have been extirpated from several locations (*e.g.* Smiggin Holes, Schlinks Pass) so it is likely that the EOO is now 119 km². Based on all known records for the species in NSW, the area of occupancy (AOO) is estimated to be 68 km² based on 2 x 2 km grid cells, the scale recommended for assessing AOO by IUCN (2014). However, if Smiggin Holes and Schlinks Pass are excluded, then the current AOO is estimated to be 60 km².
10. There are a number of threats to the Guthega Skink including habitat loss and degradation, weeds, wildfire, exotic predators and climate change. In the past, areas of habitat have been destroyed by the establishment and expansion of alpine resort villages and associated infrastructure (*e.g.* roads, tracks and ski runs). These have also resulted in the fragmentation of habitat. In Kosciuszko NP three of the four alpine ski resorts (Thredbo, Perisher and Charlotte Pass) occur within the distribution of the species and approximately 225.2 ha of potential habitat has been disturbed (M. Schroder *in litt.* June 2016). Although Guthega Skinks are known to occur within some disturbed localities (*e.g.* Leichhardt T-Bar), they are absent in areas from which native vegetation has been completely removed and replaced by exotic grasses, such as super-groomed slopes (Sato *et al.* 2014b; M. Schroder *in litt.* June 2016). Continued development of alpine resorts, including the further modification of ski slopes and plans for an increase in summer based activities such as mountain bike riding, are likely to further degrade habitat (Sato *et al.* 2014a; M. Schroder *in litt.* June 2016). 'Clearing of native vegetation' is listed as a Key Threatening Process under the Act.
11. The habitat of the Guthega Skink has also been degraded by feral horses, deer, pigs and rabbits in the past, cattle, through soil compaction and erosion, trampling and grazing of vegetation, and the spread of weeds (OEH 2012). The population of Fallow Deer (*Dama dama*) and feral horses (*Equus caballus*) are increasing in the region and they have been detected at higher elevations within Kosciuszko NP (Green and Pickering 2002). Rabbit populations are also increasing around ski resorts and moving into higher elevations (Pickering *et al.* 2004). 'Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus*', 'Herbivory and environmental degradation caused by Feral Deer' and 'Predation, habitat degradation, competition and disease transmission by Feral Pigs' are listed as Key Threatening Processes under the Act.
12. Weed species have increased within the alpine and sub-alpine areas of Kosciuszko NP since the 1950s as a result of increased infrastructure development and recreational pursuits (Pickering *et al.* 2008, Schroder *et al.* 2015). In particular, sections of Kosciuszko NP where the Guthega Skink occurs have been invaded by *Hieracium aurantiacum* (Orange Hawkweed) and *H. pilosella* (Mouse-ear Hawkweed). These species are declared Class 1 Noxious Weeds in NSW (OEH 2012) and have the ability to outcompete native grasslands in sub-alpine areas, suppressing native plant species and creating a monoculture (Williams and Holland 2007; Caldwell and Wright 2014). Transformation of native vegetation into exotic dominated assemblages is likely to reduce the extent of suitable habitat for the Guthega Skink.

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13. There is evidence that wildfire is a major threat to the Guthega Skink. Fire impacts upon the species both directly through individual mortality and indirectly through loss and degradation of habitat. Natural fires occur at low frequency in the subalpine and alpine landscape, and post fire regeneration of vegetation is slow in these areas (Williams *et al.* 2009). In 2003, wildfire burnt large areas of the alpine and subalpine zones of Kosciuszko NP (DECC 2008). Subsequently, the Guthega Skink has not been detected during surveys at previously known locations including Smiggin Holes, Whites River and Schlinks Pass (K. Green and Z. Atkins, unpublished data), although survey effort at the Whites River was low relative to other locations. The isolated nature of populations and the limited dispersal ability of the species suggests that intense and high frequency fires have the potential to eliminate, or reduce the viability of populations and to exacerbate the current fragmentation of habitat. 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' is listed as a Key Threatening Process under the Act.
14. Exotic predators such as Red Foxes (*Vulpes vulpes*) and feral Cats (*Felis catus*) are common in developed alpine areas and may prey on the Guthega Skink, although the magnitude of this threat is currently unknown. 'Predation by the European Red Fox' and 'Predation by the Feral Cat' are listed as Key Threatening Processes under the Act.
15. Climate change will potentially have a negative impact on species like the Guthega Skink which is specially adapted to a narrow high elevation range of climatic conditions, occurs in isolated and disjunct populations and depends upon specific vegetation structure (Sinervo *et al.* 2010). As the Guthega Skink occurs on the alpine plateau it has limited scope for uphill migration in response to increasing temperatures and changes to habitat (such as changes in vegetation) which are likely to make sites unsuitable. Changes in vegetation structure resulting from climate change may reduce available habitat for the Guthega Skink. Climate change may also exacerbate threats or potential threats including an increase in the severity and frequency of fire (Flannigan *et al.* 2009) and increased risk of invasion of alpine areas by predators, competing animals, disease and weeds (affecting the species through direct mortality or degradation of habitat) (Pickering *et al.* 2004; Beaumont *et al.* 2009). 'Anthropogenic Climate Change' is listed as a Key Threatening Process under the Act.
16. Guthega Skink *Liopholis guthega* (Donnellan, Hutchinson, Dempsey & Osborne, 2002) is not eligible to be listed as a Critically Endangered species.
17. Guthega Skink *Liopholis guthega* (Donnellan, Hutchinson, Dempsey & Osborne, 2002) is eligible to be listed as an Endangered species as, in the opinion of the Scientific Committee, it is facing a very high risk of extinction in New South Wales in the near future as determined in accordance with the following criteria as prescribed by the *Threatened Species Conservation Regulation 2010*:

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Clause 7 Restricted geographic distribution and other conditions

The geographic distribution of the species is estimated or inferred to be:

- (b) highly restricted,
- and either:
- (d) a projected or continuing decline is observed, estimated or inferred in either of the key indicators:
 - (a) an index of abundance appropriate to the taxon, or
 - (b) the geographic distribution, habitat quality or diversity, or genetic diversity; or
 - (e) the following conditions apply:
 - (i) the population or habitat is observed or inferred to be severely fragmented;
 - (ii) all or nearly all mature individuals are observed or inferred to occur within a small number of populations or locations.

Dr Mark Eldridge
Chairperson
Scientific Committee

Exhibition period: 30/06/17 – 25/08/17

Proposed Gazettal date: 30/06/017

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