

Australian Entomological Society

AES Conservation Committee Species Nomination

Taxonomy

Scientific name: *Kosciuscola tristis* Sjösted 1934 (Orthoptera: Acrididae)

Common name: Thermocolour Grasshopper / Chameleon Grasshopper

Description

Male: Head, pronotum and abdomen roughly uniform turquoise at body temperatures above 25°C, same almost black at body temperatures < 10°C (Key and Day, 1954a, 1954b; Umbers, 2011). Prosternal process pointed (Rivera et al., 2016). Brachtyperous.

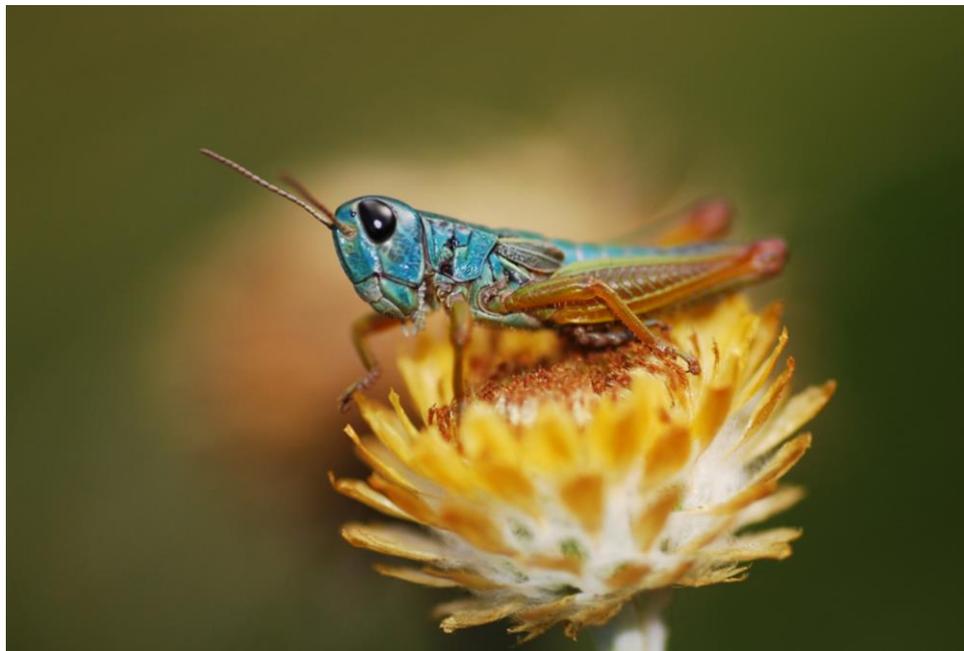


Photo: Kate Umbers

Female: Females can be pink and green, all brown, or partially blue. Prosternal process pointed. Brachtyperous.



Photo: Kate Umbers

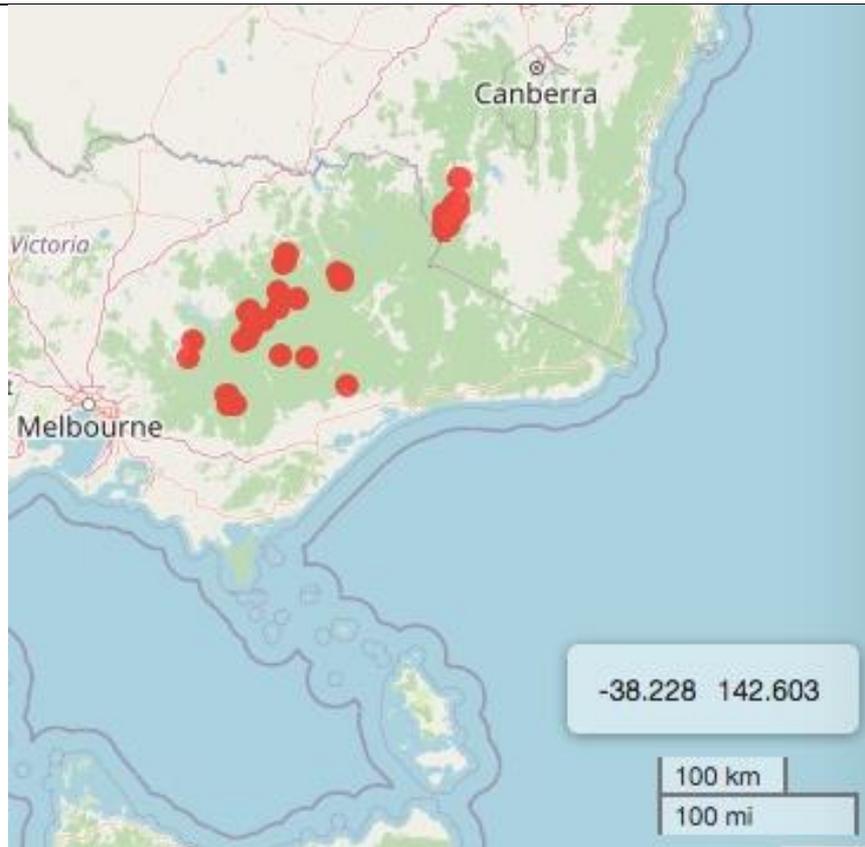
Note the taxonomy is currently being revised and prepared for publication. Population genomics work is also being prepared for publication.

Similar species: *Kosciuscola usitatus* is distinguished by colour, which is typically grassy green with a strong stripe on the head above each eye which is absent in *K. tristis*. Prosternal process not pointed but wide (Rivera et al., 2016).

Distribution

IBRA region: Australian Alps (AUA)

Distribution: Main range, VIC, and Mt Jangungal, NSW (>1500m elevation). The species has two distinct populations: one on the Kosciuszko Plateau in NSW and the other on the Victorian main range, of which the individuals are distinct in colouration (Slatyer et al., 2014; Tatarnic et al., 2013).



Location data from the Atlas of Living Australia (ala.org.au)

Land tenure: NPWS - All known populations occur within protected land.

Biology

Kosciuscola tristis is known for two unusual life history traits for a grasshopper: (1) temperature dependent colour change, and (2) intense male fighting (Filshie et al., 1975; Key and Day, 1954a, 1954a; Muschett et al., 2018, 2017; Umbers, 2011; Umbers et al., 2013a, 2013b, 2012). All available evidence suggests the species is semelparous. The species overwinters as eggs, and is likely dependent on snow cover that buffers against cold winter temperatures (Umbers, unpublished data). How many winters eggs endure is unknown, but many sources suggest two (Green and Osborne, 1994). Nymphs hatch around October, though this varies from year to year (Green, unpublished data). A greater proportion of males than females are adult in mid summer, and the majority of individuals eclose to adult by mid-February (Muschett et al., 2017; Umbers et al., 2013b). Males engage in fierce fighting especially over ovipositing females (Rivera et al., 2016; Umbers et al., 2013b, 2012).

Ecology

Kosciuscola tristis eat sedges and other water-loving plants, as well as snow grass and alpine and sub alpine herbs (Umbers, unpublished data). The nymphs and adults are prey of skinks, birds, spiders, and probably small snakes and mammals (Umbers, unpublished data). They also serve as hosts to tachind fly larvae and grasshopper nematodes (Umbers et al., 2015).

Critical habitat

Thermocolour grasshoppers are classified in the subfamily Oxyinae (water-loving grasshoppers) and as such are found in very large numbers around bogs and streams (Key, 1970). Thermocolour grasshoppers require bare ground in which to oviposit and moisture in their habitat (Umbers et al., 2012). They usually do not occur below 1500m elevation (Green and Osborne, 1994), but are not especially cold tolerant, so the cool thermal conditions at elevation are perhaps not physiologically critical for them (Slatyer et al., 2016). However, snow cover to protect eggs from freezing winter temperatures in the top soil layer is probably critical to the survival of the species over winter (Slatyer et al., 2016).

Key threatening processes

Evidence of decline: No direct evidence; however, Key and Day (1954a) noted that *K. tristis* used to be the most abundant species above the tree line. Today, it is rare above the treeline, but still abundant at the treeline, suggesting its elevational abundance may have changed.

Past threats: Hooved mammals (e.g. horses, cattle), habitat destruction.

Current threats: Climate change, hooved mammals, introduced predators (foxes, etc), habitat destruction, fire. The long term effect of climate change is likely to reduce suitable habitat and 'isolate' populations to mountain peaks, and increase the frequency and intensity of fires. Hooved animals compact the soil, damage snow and soil integrity and reduce habitat through feeding and trampling of host plants. Predators such as foxes are known to eat *Kosciuscola* grasshoppers (Green unpublished data).

Potential future threats: Climate change, hooved mammals, introduced predators (foxes, etc), habitat destruction, fire.

Community engagement and conservation management

Community engagement: Umbers is currently working with Sydney-based artists Eggpicnic (www.eggpicnic.com) to promote this species (<https://eggpicnic.com/product/turquoise-grasshopper/>) with plans for a public installation focused on alpine invertebrates.

Conservation management and actions: none

Conservation status

International (IUCN Red List): not listed.

National (EPBC): not listed.

State: not listed.

Proposed conservation status evaluation

The conservation status of *K. tristis* is likely **Vulnerable**, the NSW population may be **Endangered** but more data are required.

Assessment of Vulnerable Criteria for *Kosciuscola tristis*

The whole species occupies an area less than 20 000 km² (Victorian Population occupies approximate 14000km²) and probably exists in fewer than 10 locations, and the quality of the egg overwintering habitat is project to decline.

Assessment of Endangered Criteria for NSW *Kosciuscola tristis*

The NSW population occupies approximately 1 600km², an area less than 5000 km², and the quality of its habitat is projected to decline in terms of sufficient snowpack for egg overwintering, however populations are large and seemingly stable and they are found at more than 5 locations.

Scientific and/or social value

The combination of the two unique characteristics among these grasshoppers, temperature dependent colour change and ferocious male fighting behaviour, makes this species physiologically and behaviourally distinct. *Kosciuscola tristis* is also super-abundant when at the height of its season and can be easily encountered by hikers. The ease with which visitors to the alps can encounter and interact with this species makes it a valuable flagship for alpine insects, as well as its striking colouration and fascinating behaviour.

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Nominator/s

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