

Castiarina insculpta

Miena jewel beetle



Image by Sally Bryant

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Common name: Miena jewel beetle

Scientific name: *Castiarina insculpta* (Carter, 1934)

Group: Invertebrate, Coleoptera, Buprestidae

Name history: *Stigmodera insculpta* Carter, 1934

Status: *Threatened Species Protection Act 1995*: **endangered**

Environment Protection and Biodiversity Conservation Act 1999: **Not listed**

Distribution: Endemic status: **Endemic**

Tasmanian NRM Regions: **South**

IBRA Regions: **Central Highlands**

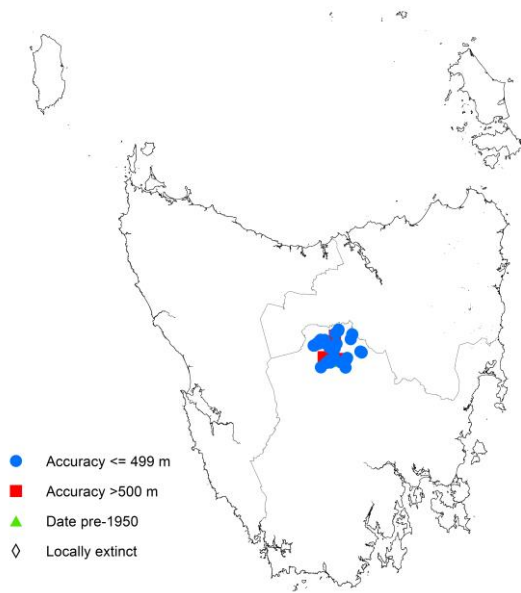


Figure 1. The distribution of the Miena jewel beetle, showing NRM regions



Plate 1. The Miena jewel beetle (image by Karen Richards & Chris Spencer)

SUMMARY: The Miena jewel beetle (*Castiarina insculpta*) is an iridescent, metallic, blue-green beetle with bright yellow patches on its grooved wing coverings, which end in sharp inwardly pointing spines. The Miena jewel beetle is endemic to Tasmania, occurring in the vicinity of Great Lake on the Central Plateau.

The species has been recorded in open alpine and subalpine heathland and sedgeland above 840 m elevation where it feeds on scaly everlastingbush (*Ozothamnus hookeri*).

There is insufficient information available to estimate the total population size of the Miena jewel beetle, but sizeable subpopulations have been recorded at several localities.

Threats to the species include loss of habitat through conversion, grazing, fire and climate change.

Management objectives include better documenting the distribution of the species, increasing knowledge about its ecology and biology, and increasing public awareness of the species.

IDENTIFICATION AND ECOLOGY

The Miena jewel beetle (*Castiarina insculpta*) is a member of the beetle family Buprestidae, one of the largest beetle families in the world. The genus *Castiarina* used to be considered a subgenus of *Stigmodera* (Baker 1979, 1986, 1988, 2006). Members of the family Buprestidae are best recognised by their vivid jewel-like metallic colours and patterns.

The Miena jewel beetle is an iridescent, metallic, blue-green colour with six bright yellow patches on the grooved elytra (wing coverings) and a metallic green or blue-green head, thorax, legs and ventral aspect. Three yellow patches of variable shape occur on each elytron; an additional narrow yellow patch occurs laterally on each elytron in the vicinity of the middle leg. The elytra culminate in a sharp inwardly directed spine, which is one diagnostic feature for this species (Plate 1).

Female Miena jewel beetles are larger than males with a maximum total body length of 13.5 mm and 5.2 mm width. Male beetles have a maximum length of 11.5 mm and a width of 4.5 mm.

The larvae of buprestids, commonly called flatheaded borers, are soft bodied with a large expanded yet flattened head, short antennae, and ambulatory pads on the dorsal and ventral sides of the abdominal segments (see the image of *Castiarina rudis* larva in Richards and Spencer (2017)).

The larvae of *Castiarina* species are known to be root/stem borers. Correspondingly, larvae of the Miena jewel beetle are stem borers, which are dependent solely on *Ozothamnus hookeri*. Studies suggest that Miena jewel beetles have a two-year larval period and adult beetles emerge in early summer (Richards and Spencer 2017).

Adult Miena jewel beetles fly during the day and are most active on hot days with bright sunlight and little wind during summer. The *Castiarina* group are nectar feeders and typically cluster in nectar-bearing flowers and trees, especially species of *Melaleuca* and *Leptospermum*. However, the Miena jewel beetle has a very strong feeding preference for *Ozothamnus hookeri* (scaly everlastingbush) although adults have occasionally been recorded on *Baeckea gunniana* (alpine baeckea), a shrub occurring infrequently within the beetle's range (Richards and Spencer 2016, 2017).

Survey techniques

Surveys should be conducted during the period of adult activity (mid-January and late February). Warm sunny days with low wind conditions are best to detect feeding and flying adults. Targeting the flowering food plant (*Ozothamnus hookeri*) provides the best chance of positive beetle sightings. However, the two-year lifecycle of the species means that adults are scarce in alternate years. Therefore, if surveys fail to locate adult beetles, surveys need to target the presence of emergence holes in the stems of *Ozothamnus hookeri* to identify potentially new populations, followed up by a return survey next season to confirm adult presence.

Castiarina species may be captured by hand when foraging or taken in flight by sweeping a hand net above foliage. Care must be taken on approach when attempting to hand capture as they are active beetles with acute vision and will drop to the ground when threatened.

Confusing species

The Miena jewel beetle co-occurs with several other *Castiarina* species. While the colour and patination are vaguely similar among these species, the most useful characteristic for distinguishing Miena jewel beetle from other similar beetles is the presence of the inwardly curved spines that extend from the rear of the elytra (wing coverings). In other, similar looking species, these spines are not curved or are absent (Barker 2006). Carter (1934) discussed the distinctiveness of the Miena jewel beetle, especially in relation to closely related species, and Barker (2006), Cowie (2001), Smith *et al.* (2004) and Bonham *et al.* (2013) provided excellent images of the species. Other good images of the species have recently been uploaded to the internet. However, any specimens suspected of being the Miena jewel beetle require specialist confirmation.

DISTRIBUTION AND HABITAT

The Miena jewel beetle is endemic to Tasmania (Table 1, Figure 1), and is restricted to an area of approximately 876 km² in the Central Highland lakes region (in the vicinity of Great Lake/Lake Augusta/Arthurs Lake) on the Central Plateau. Surveys undertaken since 2013 have extended the range west to Lake Ada, southeast to Waddamana Road, east to Arthurs and Little lakes, and north, to approximately 500 m from the northern edge of Great Lake. The species' distribution is linked closely with extensive patches of its food plant *Ozothamnus bookeri*. While it is possible that the species may extend further than the current known range, surveys conducted in discontinuous patches of *Ozothamnus bookeri* to the west, east and southeast of the present range have so far failed to locate additional subpopulations of the beetle.

The Miena jewel beetle has been recorded in open alpine sedgeland and heathland as well as two patches of subalpine woodland and subalpine heathland supporting *Ozothamnus bookeri* above 840 m elevation in an area defined by Great Lake - Lake Augusta - Little Pine Lake - Tods Corner - Arthurs Lake - Little Lake in Tasmania (Plate 2a, b).

All sites occur on Jurassic dolerite. Current information suggests that the Miena jewel beetle has a specific association with the scaly everlastingbush (*Ozothamnus bookeri*) as both its larval host and adult food plant.



Plate 2a. Habitat of the Miena jewel beetle at Tods Corner (image by Karen Richards & Chris Spencer)



Plate 2b. *Ozothamnus bookeri*, food plant of the Miena jewel beetle at Tods Corner (image by Karen Richards & Chris Spencer)

Following mating, female Miena jewel beetles descend the branch to oviposit (lay eggs) into fissures in the bark. Upon hatching the larvae bore into the branch where they remain, to feed and grow and finally pupate, emerging as adults in summer. The length of the larval period is thought to be of a two-year duration.

Emergence holes displaying a pointed-ovoid, D-shape, characteristic of *Castiarina*, are visible in the stems of *Ozothamnus bookeri* (Plate 3) and may be a useful feature to locate potential subpopulations of the beetle.



Plate 3. Emergence hole of the Miena jewel beetle on *Ozothamnus bookeri* (image by Karen Richards & Chris Spencer)

POPULATION PARAMETERS

There is insufficient information available to estimate the total population size of the Miena jewel beetle. Until 2013, only six specimens were held in formal collections, all of which were female. In 2013 a concerted survey effort by the Tasmanian Field Naturalists Club identified a sizable population of live Miena jewel beetles. Subsequent surveys located further populations in the vicinity of Great Lake.

The current linear range of the species is approximately 30 km (north-south) by 42 km (east-west), although a considerable proportion of this area includes extensive water bodies and encompasses forest communities, which do not provide habitat for the species. It remains impractical to estimate the extent of occurrence and area of occupancy without mapping the distribution of the food plant within this range. Over 50% of the habitat of the Miena jewel beetle was destroyed in the 2019 Pine Tier Lagoon fire on the Central Plateau.

RESERVATION STATUS

A significant proportion of the Miena jewel beetle habitat occurs in the Central Plateau Conservation Area, while there are also sites on Hydro Tasmania land and private property.

CONSERVATION STATUS

The Miena jewel beetle is currently listed as endangered under the Tasmanian *Threatened Species Protection Act 1995*.

It was originally listed in 1995 as extinct on the basis that no individuals had been collected in the wild since at least 1934 (the 1965 collection only came to light in 2004). Following the “rediscovery” of the species (Smith *et al.* 2004), it was downlisted to endangered, meeting criterion D, specifically D1 (total population estimated to number fewer than 250 mature individuals) and D2 (total population with an area of occupancy less than 0.01 km² (1 hectare), and typically in five or fewer locations that provide an uncertain future due to the effects of human activities or stochastic events, and thus capable of becoming extinct within a very short time period).

Following the recent discoveries of robust subpopulations, the listing was again reviewed with the species downlisted to vulnerable, meeting criterion B, specifically B2b (continuing decline, inferred, observed or projected, in area of occupancy) and B3d (extreme fluctuations in number of mature individuals). However, the extensive Pine Tier Lagoon fire in 2019 destroyed over 50% of the habitat and population of the Miena jewel beetle. A review of the species’ status once again raised the species to endangered in 2020.

THREATS, LIMITING FACTORS & MANAGEMENT ISSUES

Specific threats to the Miena jewel beetle include:

Habitat loss (fire, land clearing and other habitat modification): Habitat modification continues to occur within the known range of the species. There is also the potential threat of permanent habitat removal by subdivision, land clearing and grazing.

Unfortunately, fire has proven to be detrimental to the habitat and population of the Miena jewel beetle, decimating the food plant and all stages of the specie’s lifecycle in the short-medium term, causing beetle subpopulations to become locally extinct unless recolonisation occurs.

Table 1. Historical population records summary of the Miena jewel beetle (*Castiarina insculpta*) in Tasmania

	Location	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) seen	(No. detected)/subpopulation density
1	Great Lake	Unknown	South	Miena	pre-1934	(1)
2	Miena	Unknown	South	Miena	1965	(1)
3	Miena	Private property	South	Miena	2004	(1 dead)
4	Little Pine Lagoon or Lake Fergus	Public Reserve or Central Plateau Conservation Area	South	Miena	2004	(1 dead)
5	Lake Augusta	Central Plateau Conservation Area	South	Ada	(2008), 2013	(1 dead) (2 live)/moderate
6	Lake Augusta or Great Lake (Brandum Bay)	Unknown	South	Ada or Miena	(2010), 2013	(1 dead)/ moderate
7	Liawenee, Lake Augusta Rd.	Private property	South	Split Rock	(2013), 2019	(> 60)/high
8	Mickeys Creek	Central Plateau Conservation Area	South	Breona	2013	(1)/low
9	Pine Tree Rivulet, Great Lake	Hydro Electric Commission (HEC)	South	Breona	2013	(10)/moderate
10	North of Liawenee	Rainbow Pt. Conservation Area	South	Split Rock	2013	(12)/moderate
	Lake Augusta Road	Private property	South	Split Rock	2013	(1)/low
11	Little Pine lagoon, southwestern end	Little Pine Lagoon Lakeside Reserve	South	Monpeelyata	2013	(5)/moderate
12	Marlborough Hwy, Miena	Private property	South	Miena	(2014), 2017	moderate
13	Marlborough Hwy, Little Pine Lagoon	Private property	South	Miena	2013	(8)/high
14	Tods Corner – Ellis Plains	Private property	South	Arthurs Lake	2013	(15)/high
15	Lake Ada	Central Plateau Conservation Area	South	Ada	(2015), 2017	(>15)/moderate
16	Arthurs Lake transmission line	HEC or Tasmanian Wilderness World Heritage Area (TWWHA) extension	South	Arthurs Lake	2017	(2)/low

	Location	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) seen	(No. detected)/subpopulation density
17	St Patricks Plains, Waddamana Road	Private property	South	Wihareja	(2017), 2019	(1)/low to moderate (latter based on emergence holes only)
18	Barren Plains Road	HEC	South	Monpeelyata	2015	(5)/moderate
19	Five Rivers property, Marlborough Road	Tasmanian Land Conservancy?	South	Monpeelyata	2017	(1)/low
20	Tumbledown Creek, Arthurs Lake	TWWHA extension	South	Arthurs Lake	(2018 - Jan) 2019	(6)/moderate
21	Little Lake	TWWHA extension	South	Bradys Lookout	2018 (Jan)	(3)/low

*NRM region = Natural Resource Management region

Illegal collection: Jewel beetles are highly sought after by collectors for their aesthetic value and rare beetles have an even greater attraction. Therefore, illegal collection for the purposes of selling or personal insect collections may be a threat to the species. While it is considered a minor threat and there are currently no documented cases of illegal trade in the species, as population numbers fluctuate massively between seasons, collection in seasons of low abundance remains a threat.

Forestry activities: Unconfirmed subpopulations may occur within wood production forests on private property and future potential production forest on the Central Plateau. The effect of native forest silvicultural regimes on this species is unknown.

However, the establishment of a broad-scale monoculture has the potential to permanently remove or fragment the food plant sufficiently to ensure that the beetle is removed from localised areas.

Climate change: The trend towards a warmer climate may increase the frequency and exacerbate the effect of wildfire on the remaining habitat of the Miena jewel beetle. A warmer climate may also result in a less favourable microclimate for the species or its food plant at the higher elevation sites it appears to favour.

Stochastic risk: While the food plant *Ozothamnus hookeri* is relatively widespread in the vicinity of Great Lake, much of this habitat was destroyed in the 2019 Central Plateau fire. The patchy distribution of remaining stands of the food plant and the seasonal fluctuation of beetle numbers may expose the species to a stochastic risk of extinction.

MANAGEMENT STRATEGY

Management objectives

The main objectives for the management of the Miena jewel beetle include protection of known populations, identification and protection of any currently unknown populations, and increasing understanding of the species' ecology, biology and habitat requirements.

What has been done?

Targeted surveys & monitoring: Targeted surveys of sites and habitat considered potentially suitable for the Miena jewel beetle were undertaken between the 1980s and 2013 (e.g. Cowie (2001), Fernandez (2004), Smith *et al.* (2004), by the Tasmanian Field Naturalists Club and several entomologists (2005-2013)). Surveys have also been conducted as part of development proposals e.g. Hydro Tasmania.

Consulting surveys of the eastern alpine heathland along the Ouse River near Miena in February 2008 (R. Brereton pers. comm.) and as part of ecological assessments for developments (Spencer & Richards unpub. data 2019).

More detailed surveys to extend the range, as well as monitoring of known subpopulations, has been conducted each year since 2013 by Spencer and Richards (e.g. Spencer and Richards 2014, Richards and Spencer 2016, 2017). Post-fire surveys to assess the fire impact on the species habitat were undertaken in Feb 2019 (Richards and Spencer 2020).

Forestry management: The Miena jewel beetle was included in the latest version of the *Threatened Fauna Adviser*, a decision-support system used by the forest industry to take account of threatened fauna in wood production forests managed under the *Tasmanian Forest Practices Code* (FPA 2015, 2014).

What is needed?

- To better document the distribution of the species by undertaking extension surveys radiating out from known sites, using targeted search methods followed by systematic surveying of any newly found subpopulations;
- To protect known sites containing subpopulations of the species and new sites as they are discovered;
- To improve understanding of the specie's ecology, biology and habitat requirements by undertaking monitoring of the specie's habitat and population recovery post the 2019 fire;
- To assist in protection of the species by providing information and extension support to relevant Natural Resource Management committees, local councils, government agencies, the local community and development proponents in the locality on the significance and management of known subpopulations and potential habitat of the Miena jewel beetle.

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View:

<http://www.dpipwe.tas.gov.au/threatenedspecieslists>

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Permit: A permit is required under the *Tasmanian Threatened Species Protection Act 1995* to knowingly “take” (which includes kill, injure, catch, damage, destroy and collect), keep, trade in or process any specimen of a listed species.