

Action Statement

Flora and Fauna Guarantee Act 1988

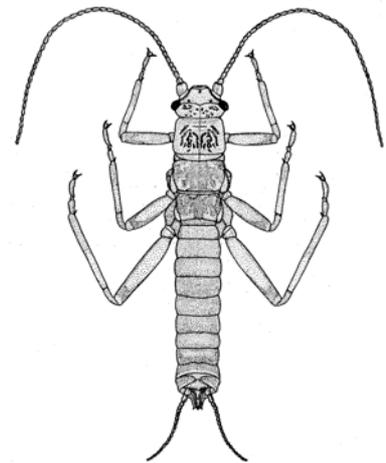
No. 125

Mount Donna Buang Wingless Stonefly *Riekoperla darlingtoni*

Description and Distribution

The Mount Donna Buang Wingless Stonefly, *Riekoperla darlingtoni* (Illies 1968) is a cryptic insect belonging to the Family Gripopterygidae in the Order Plecoptera (stoneflies). Members of this order are distinguished from other insects by their long cerci and the absence of a median tail filament. The adult Mount Donna Buang Wingless Stonefly is brown, with darker markings on the thorax (Illies 1968), and has a body length of about 12 mm, with antennae about 8 mm and cerci about 3 mm (slightly less in females) (Neumann & Morey 1984). The nymph (the sub-adult aquatic stage) resembles the adult in form, but is smaller (Neumann & Morey 1984) and has a terminal gill tuft. Aquatic immature stages and poor powers of dispersal mean that they are only found near freshwater. (Harvey & Yen 1989). Although adults of the majority of Australian stonefly taxa have two pairs of well-developed wings (CSIRO 1991), the 'wings' of this taxon are present only as tiny flaps (Illies 1968) which preclude flight and, no doubt, further limit dispersal.

Despite searches of a number of mountain forest habitats in Victoria and New South Wales (Illies 1968, Hynes 1974a), the taxon is known only from the vicinity of Mount Donna Buang, near Warburton, in the Victorian Central Highlands. Since discovery of the stonefly at Mount Donna Buang in 1931, all specimens had apparently been collected within about 1km of the summit (Hynes 1974a, Neumann & Morey 1984). However, in 1993, a university researcher (E. Tsyrlin), while confirming the continued presence of the taxon near the summit, located it at an additional site 3km to the north-east. Further visits to this site subsequently failed to find the stonefly, until one further nymph was recorded there in May 1999 (L.



Mount Donna Buang Wingless Stonefly
Riekoperla darlingtoni (male) [illustration from
Illies (1968)]



Distribution in Victoria
[source: Atlas of Victorian Wildlife, DSE 2004]

Ahern *pers. obs.*). All sites from which the stonefly has so far been recorded lie between about 1 000-1 200m above sea level. A number of other prospective sites within about 3km of Mount Donna Buang have been searched unsuccessfully for the stonefly in 1982-3 (Neumann & Morey 1984) and by E. Tsyrlin in 1993.

The known distribution of the Mount Donna Buang Wingless Stonefly is within the Yarra Ranges National Park (NP) (reserved December 1995), and supports montane wet forest dominated by Alpine Ash *Eucalyptus delegatensis* and Shining Gum *E. nitens*, with cool temperate rainforest patches characterised by Myrtle Beech *Nothofagus cunninghamii*. Although lacking true sub-alpine or alpine vegetation communities, Mount Donna Buang receives significant winter snowfalls and (though technically not a snowfield) the summit has been progressively developed for tourism and winter snow-play activities. The only sites where the stonefly has been consistently found to occur are close to the development area. Nymphs were confirmed as still present here as recently as June 1999 (L. Ahern *pers. obs.*).

Nymphs of the stonefly have typically been found in small ephemeral streams and weak trickles along natural stream courses, usually with a dense understorey of Myrtle Beech (Hynes & Hynes 1975, Neumann & Morey 1984, E. Tsyrlin *pers. obs.*). These small streams usually dry up during summer. However, at the 1993 collection site, the understorey was more diverse, and the recently found nymph was in a more substantial tributary of Cement Creek. Adults are typically found in nearby vegetation, sheltering and feeding in rolled-up strips of bark shed from the tall eucalypt overstorey (Hynes 1974a, b).

Adults emerge from the stream in early spring to commence egg-laying, and are present until late December (Neumann & Morey 1984). Under laboratory conditions, males, and females which had not laid eggs, were found to live for about three weeks, while egg-laying females lived for about six weeks (Hynes 1974b). The scalloped, yellow, bun-shaped eggs are less than 0.5mm long and hatch during late-summer and autumn (Hynes 1974b, Hynes & Hynes 1975). Investigation of the monthly size distribution of nymphs (Hynes & Hynes 1975) has led to the conclusion that the life-span of the taxon is unusually long (somewhat less than three years), with nymphs hatching in autumn but not emerging as adults until spring two years later. Nymphs have been collected from streams during autumn, winter and spring, but are presumably present (in several age-classes) whenever streams are flowing. When these streams dry out in summer, the nymphs apparently burrow into the damp grit of their substrate, in order to escape desiccation (Hynes &

Hynes 1975). The eggs also appear able to survive this seasonal drying (Hynes & Hynes 1975).

Most Australian Gripopterygidae nymphs are detritivore-herbivores (CSIRO 1991). Hynes (1974b) observed that field-caught adults of the Mount Donna Buang Wingless Stonefly appeared to 'scrape' the inner surface of their bark retreats, apparently consuming the green algal layer, and similarly fed on green-encrusted twigs. Other likely adult food sources include lichen, bark, rotten wood, higher plant tissue and diatoms (CSIRO 1991).

The combined features of flightlessness, ability to survive cessation of stream-flow, and long life-span render the taxon of high scientific interest (Wells *et al.* 1983).

Current conservation status

CNR (1995)	Vulnerable (Vic.)
SAC (1991)	Threatened (Vic.)
Wells <i>et al.</i> (1983)	Rare (world-wide)

The Mount Donna Buang Wingless Stonefly has been listed as a threatened species under the **Flora and Fauna Guarantee Act 1988**. The Mount Donna Buang Wingless Stonefly has an extremely restricted distribution (spanning less than 4 km, as currently known) within which it is considered to be rare. It is known from only a few discrete sites and exhibits highly specialised ecological requirements. These characteristics, and the proximity of its habitat to potential sources of disturbance, cause the taxon to be currently considered vulnerable to extinction.

In its final recommendation, the Scientific Advisory Committee (SAC 1991) has determined that the Mount Donna Buang Wingless Stonefly is:

- significantly prone to future threats which are likely to result in extinction, and
- very rare in terms of abundance or distribution.

Major Conservation Objectives

- Within three years, determine more precisely the distribution and conservation status of the Mount Donna Buang Wingless Stonefly.
- Identify, assess and manage existing and potential threats in order to maintain and enhance known populations of the taxon.
- Investigate the ecological requirements of the taxon to assist in identifying and appropriately managing current and potential areas of suitable habitat.
- Protect and maintain environmental values, particularly water quality, in areas of known and potential stonefly habitat.

Management Issues

Very little is known about the ecology of the Mount Donna Buang Wingless Stonefly, with past research focussed mainly on its biology and taxonomy. Although several distributional surveys have been undertaken (Hynes 1974a, Neumann & Morey 1984), the overall distribution of the taxon remains uncertain, and no estimate of population size or monitoring of population trends has been attempted.

The highly specialised adaptations of the taxon, especially its low dispersal capacity, accentuate any threat to its habitat. There is little specific information on the ecological requirements and tolerances of the species in any of its life stages. For example, Hynes and Hynes (1975) suggested that special conditions may be required for egg deposition, as their attempts to induce egg-laying by this stonefly in captivity failed. The role of fire, or its exclusion, as a factor in sustaining suitable habitat requires investigation. There is also a possible threat to the habitat of the stonefly from fungal disease; in particular, Myrtle Wilt, which is caused by the pathogen *Chalara australis* and is observable in Myrtle Beech at Mount Donna Buang. Human activity which results in artificially elevated or epidemic levels of Myrtle Wilt within *Nothofagus*-dominated cool temperate rainforest is the subject of a final recommendation of the Scientific Advisory Committee for listing as a 'potentially threatening process' under the **Flora and Fauna Guarantee Act 1988** (SAC 1999). Such activity may include earthworks and road- or track-making, if these result in stem or branch wounds to Myrtle Beech trees.

As the Mount Donna Buang Wingless Stonefly appears closely dependent upon montane rivulets (or their substrates) and adjacent vegetation, it is likely to be sensitive to reductions in water quality (such as from siltation, turbidity, and chemical pollution), possibly even if very minor, or short-term, in effect. Such inputs might result from any of the following factors:

- run-off from car-parks, visitor facilities or open spaces (such as picnic and viewing areas, snow-play areas, etc.);
- emissions or spillage's of fuel or oil from motor vehicles;
- inappropriate application of herbicides;
- construction or maintenance of roads and tracks;
- degraded walking tracks.

Other potential disturbances may include alteration to stream patterns and surface soil structure (such as from earthworks or landscaping), and loss of or damage to vegetation along stream courses, due to trampling, clearing or

even fire. In 1993, direct mechanical disturbance (by tractor) was observed along at least one stream line (east of the two lowest car-parks) known to be stonefly habitat (E. Tsyrlin *pers. obs.*). Such habitat disturbances might be expected to cause at least short-term population reductions. No systematic ecological assessment has been made of the effects on the stonefly of development or visitor activity at Mount Donna Buang, although a brief series of surveys of the known stonefly population was carried out during 1982-83 (Neumann & Morey 1984).

Current management direction (Parks Victoria 1998) appears amenable to the habitat requirements of the Mount Donna Buang Wingless Stonefly, but this cannot simply be assumed and will need to be supported by effective ecological monitoring. Environmental vigilance may be essential to the long-term survival of the stonefly. For example, a single fuel-spillage in a carpark could destroy a substantial proportion of the known stonefly population. Through the use of signs or other interpretation, there may be scope for public cooperation to promptly advise rangers of any chemical spills likely to enter local stream lines and potentially affect downstream values. Comprehensive guidelines on construction techniques to minimise soil erosion and sediment pollution (EPA 1991, Garvin *et al.* 1979) are available to assist managers in avoiding unnatural silt inputs to stream courses from earthworks or from maintenance of roads, tracks and car-parks.

Based upon current knowledge, it seems likely that the resort area and surrounds at Mount Donna Buang will constitute a key part of the 'critical habitat' of the taxon, as defined under the **Flora and Fauna Guarantee Act 1988**.

Wider conservation issues

A management plan for the Yarra Ranges NP has been prepared (Parks Victoria 2000). While the southern slopes of Mount Donna Buang (where most of the known stonefly population is located) are proposed to be zoned for 'conservation and recreation', areas to the north of the summit, and west of the entrance road from Donna Buang Road to the summit, are proposed for 'conservation and water supply'. The latter proposed zone incorporates land that is Designated Water Supply Catchment Area (DWSCA), protected under a Closed Catchment Policy which restricts human activity (Parks Victoria 1998). The 1993 extension to the known distribution of the stonefly lies within this restricted area. The Watts Creek Reference Area (890ha) is situated less than 1km north of Mount Donna Buang. Based upon the habitat at current sites of occurrence, there appear to be substantial areas of potentially suitable habitat within 5-10km of Mount Donna Buang. In

particular, Mount Juliet (7.5km to the north-east) supports likely habitat.

Climate change arising from the enhanced greenhouse effect (DEST 1996) may have the potential to extinguish the Mount Donna Buang Wingless Stonefly, due to habitat loss (LCC 1991) or the acute sensitivity of the nymphs to temperature change (E. Tsyrlin *pers. obs.*), or both.

Previous Management Action

- Past surveys have been undertaken by entomologists in areas of similar habitat elsewhere in Victoria and in New South Wales, but have failed to locate any other populations of the stonefly (Neumann & Morey 1984).
- A study of the stonefly and its habitat in 1982–83 (Neumann & Morey 1984) provided useful information on local distribution of the species. Expansion of carpark facilities at Mount Donna Buang was suspended while this investigation was undertaken.
- A search in 1993 by researcher E. Tsyrlin revealed an additional site of occurrence (re-confirmed 1999) remote from the summit of Mount Donna Buang.
- Mount Donna Buang has been nominated for listing (Coy 1991) on the Register of the National Estate, based specifically on the occurrence of the Mount Donna Buang Wingless Stonefly. A final determination has not yet been made.
- Proclamation of Yarra Ranges NP has indirectly contributed to protection of the habitat of the stonefly. Park management initiatives are already addressing some issues which may benefit stonefly habitat. For example, planting is currently in progress on heavily used areas near the summit, in order to arrest surface erosion.

Intended Management Actions

Research and monitoring

1. Identify, areas of potential habitat of the stonefly (within at least 5 km of Mount Donna Buang), based on altitude and vegetation. Mount Juliet should be included as an outlier worthy of investigation.

Responsibility: DSE Port Phillip Region, Museum of Victoria

2. Undertake surveys to establish the distribution and relative abundance of the stonefly at sites of occurrence.

Responsibility: DSE Port Phillip Region, Museum of Victoria

3. Initiate and support research into an effective means of estimating the size of breeding populations and of monitoring population trends at individual sites of occurrence and monitor selected sites annually for several years.

Responsibility: DSE Port Phillip Region, Museum of Victoria

4. Encourage and support research into the ecology of the stonefly, including life history, significant threats, tolerance to threats, and habitat requirements. Investigations should particularly focus on floristic and structural determinants of suitable habitat, the role of fire in sustaining habitat, the extent of habitat occupied by the taxon at different stages of its life-cycle, conditions and time-periods under which nymphs and eggs are able to survive drying of their habitat, and conditions required for successful oviposition.

Responsibility: DSE Port Phillip Region, Museum of Victoria

Habitat protection

5. Encourage development of Park management strategies which avoid further expansion of visitor facilities, especially car-parks or other landscape modifications, on Mount Donna Buang.

Responsibility: Parks Victoria

6. Ensure that Park management procedures incorporate appropriate measures to protect the stonefly and its habitat on an ongoing basis. In particular, manage activities likely to adversely affect the quality or quantity of run-off into known or potential stonefly habitat, or likely to jeopardise the integrity of associated vegetation. Such activities include the control of streamside woody weeds and blackberry without application of herbicides, and the monitoring and mitigation of Myrtle Wilt disease.

Responsibility: Parks Victoria

7. Monitor and, if necessary, mitigate silt input and erosion processes along water courses known or likely to constitute stonefly habitat. For the water courses south-east of the second-lowest carpark, also maintain closure of the associated vehicle access track.

Responsibility: Parks Victoria

8. Ensure, on an ongoing basis, that all Park management staff are aware of the localities of occurrence of the stonefly at Mount Donna Buang, of potential threats to the stonefly or its habitat.

Responsibility: Parks Victoria, DSE Port Phillip Region

9. Through signage or other interpretation, encourage the public to promptly advise Parks Victoria rangers of any chemical spills likely to enter local run-off and affect downstream Park values.

Responsibility: Parks Victoria

Public involvement

10. Devise and implement an interpretations program at Mount Donna Buang and nearby information centres to inform the public of the features and significance of the stonefly and its environment, emphasising opportunities for public assistance through environmental care and support for management processes.

Responsibility: Parks Victoria, Museum of Victoria

11. Investigate the prospects for involvement of volunteers with relevant expertise (notably from field naturalist or other groups) in stonefly population monitoring or other co-ordinated research or management activities, provided that this involvement will in no way threaten the taxon.

Responsibility: Parks Victoria, DSE Port Phillip Region

Other Desirable Management Action

12. Ensure lodgement with the Museum of Victoria of all outstanding specimen material from past studies of the Mount Donna Buang Wingless Stonefly.
13. Determine appropriate vegetation buffer widths required to protect the species (such as in the vicinity of carparks), based on the area or distance over which individual stoneflies range.
14. Encourage public and government cooperation to help reduce gas emissions likely to contribute to the enhanced greenhouse effect and global warming.

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Further information can be obtained from Department of Sustainability and Environment Customer Service Centre on 136 186.

Flora and Fauna Guarantee Action Statements are available from the Department of Sustainability and Environment website: <http://www.dse.vic.gov.au>

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