

INVERTEBRATE ADDENDUM TO WILDLANDS REPORT R3470
ON THE PROPOSED TE KUHA MINE

INTRODUCTION

The proposed Te Kuha coal mine site was visited on 9-10 September by Brian Patrick, entomologist. Although two trips were made to the site over that time, less than half a day of actual sampling was possible. All of the survey work was performed in the daytime with helicopter access to the highest ridge and hut site. Sampling involved observation of characteristic feeding damage on vegetation, hand collection including lifting rocks, and sweep netting of vegetation.

This addendum to Wildland Consultants (2014) discusses and summarises changes and additions to the conclusions of that report in light of the field visit.

ANNOTATED LIST OF KEY INVERTEBRATES FOUND

Forest ringlet butterfly: *Dodonidia helmsi* (Lepidoptera: Nymphalidae: Satyridae)

The elegant forest ringlet butterfly *Dodonidia helmsi* was first found and later described from the Paparoa Range. A significant population of this rare and attractive butterfly species was located from 700-800 m at the Te Kuha site. Larvae were abundant on the larval host plant *Gahnia procera*, and feeding damage was noticeable on all populations of the host plant seen in the understorey of the shrubland and low forest areas. Two size classes of larvae were found (10 and 26 mm) confirming that the life cycle is two years but that some adult butterflies emerge every year (Patrick & Patrick, 2012). This species was not found by Mitchell Partnerships 2013).

The Department of Conservation national threat ranking for this species is At Risk-Relict (Hitchmough *et al.* 2014) reflecting the major decline this species has experienced over the past 70 years. The species is one of our rarest butterflies and has gone from being widespread and locally common from lowland to montane areas from Northland south to Lewis Pass and the south end of Paparoa Range, to now being found only in upland remote sites such as Te Kuha.

Although the exact causes of its decline are unknown, it is believed to be related to the introduction of German wasp, common wasp, and several paper wasp species, all of which prey on the larvae, combined with widespread habitat destruction (Patrick & Patrick, 2012).

Less than 20 populations of this butterfly are known nationwide, and where it has been studied it is still in decline. It has disappeared completely from some sites and regions, several of which are substantial, such as the Waitakere Ranges west of Auckland.



Plates 1 and 2: The larvae of the forest ringlet butterfly *Dodonidia helmsi* (left) found at Te Kuha (700-790m) on the larval host plant *Gahnia procera*, and adult butterfly (right) from Mohikinui (adult image by Melissa Hutchison)



Plate 3: Typical habitat at Te Kuha of the forest ringlet butterfly and its larval food plant.

Helm's stag beetle: *Geodorcus helmsi* (Coleoptera: Lucanidae)

Three individuals of this impressive stag beetle were found under rocks on the summit of Te Kuha. The live male was released but the two dead females retained. Males can be as large as 44 mm long by 20 mm wide and sport impressive “horns”. Females are more modest, at 24 mm long. This species was not found by Mitchell Partnerships (2013).

Of our ten endemic stag beetles in this genus, this is the most widespread species, being distributed from Stewart Island and Southland through Fiordland and up the West Coast to the Kohaohai River in Northwest Nelson. This large flightless species is or was found from sea-level to just above treeline, but has gone from many areas, probably due to the presence of rats and other predators. It is a cumbersome species with no natural defense against these introduced predators (see below).



Plate 4: *Geodorcus helmsi*.

Although eight of the ten *Geodorcus* species are classified as Nationally Threatened or At Risk, this one is not. However, in my experience, it should be as it has definitely declined in terms of both relative abundance and distribution over the past 50 or more years.

Holloway (2007), in a recent revision of this beetle family, commented on studies that showed that rats definitely had an effect on this taxon and had possibly eliminated it from islands such as Breaksea in Fiordland.

Large green chafer beetle: *Stethaspis* species probably *suturalis* (Coleoptera: Melolonthinae)

Large larvae of this genus of impressive chafer beetle were found under summit rocks, within the proposed mine footprint. Formerly placed in the genus *Chlorochiton*, these are large beetles (up to 24 mm in length) that have “c” shaped larvae which live in the soil on roots. Adults are “clumsy” fliers. This species was not found by Mitchell Partnerships (2013).

This species is known from the southern North Island south to about Westport, so it is at its southern limit at Te Kuha. In my experience this species is not common across this distribution and its occurrence here is noteworthy and probably indicative of the remoteness and good quality of the habitat at the site.

Stick insect: *Micrarchus* new species (Phasmidea)

Several specimens of a distinctive stick insect were found at 750-800 m on shrubs (see image below). This is an undescribed species that is known from the Paparua Range north to Kahurangi National Park and east as far as Nelson Lakes (Thomas Buckley, Landcare

Research, Auckland, pers. comm., 2014). This species was not found by Mitchell Partnerships (2013).

Another example of a distinctive indigenous insect fauna inhabiting this upland habitat.



Plate 5: An undescribed species of stick insect found on shrubs (*Exocarpos* shown) at 750-800 m and also within the proposed mine footprint.

Large spider: *Uliodon* new species (Arachnida: Zoropsidae)

This very large spider (41 mm length) was found under rocks on the summit of the proposed mining area at Te Kuha, along with several smaller specimens. Although undescribed it is a known taxon which has a range from the Paparoa Range north to the Denniston Plateau (Cor Vink, Canterbury Museum, pers. comm., 2014). As such, it is another large-bodied species restricted to this region. This species was not found by Mitchell Partnerships (2013).

Stonefly: *Omanuperla bruningi* (Plecoptera: Notonemouridae)

A species of stonefly was found, endemic to the northwest sector of the South Island, south to the Paparoa Range. The larvae will inhabit the small streams that originate at Te Kuha. It is another example of a distinctive invertebrate fauna found in this part of New Zealand. This species was not found by Mitchell Partnerships (2013).

Land snail: *Rhytida* species (Mollusca)

A medium-sized (up to 15 mm diameter) snail species was found at 700 m within the proposed mine footprint (see image below). It was photographed and probably equates to the species found by one of the survey groups and recorded in Mitchell Partnerships (2013) as *Rhytida perampla*, a western South Island species.



Plates 6: *Rhytida perampla* landsnail found at 700 m within the mine footprint on a hand for scale.

Zig-zag moth: *Charixena iridoxa* (Lepidoptera: Glyphipterigidae)

Larval damage characteristic of this elegant moth species was commonly seen on *Astelia nervosa* in the forest and shrubland understorey between 700-800 m within the proposed mining footprint at Te Kuha. This species was not found by Mitchell Partnerships (2013).

The white larvae feed within the base of this large *Astelia* and they form an obvious zigzag marking on the elongating growing leaves of the host plant. When the larvae eventually pupate in a cavity of a forming leaf, they are then “transported” about one metre above ground where they later emerge as a purple and yellow day-flying adult.

This moth is widespread in the forests and just above treeline in the mountains of the main divide from Stewart Island to the centre of the North Island, and coastally in a few places along the eastern South Island.

Although widespread in suitable habitat along the Main Divide mountains, it is only found in natural habitat, and only in abundance in high quality natural habitat.



Plate 7: The characteristic mine of the zig-zag moth on *Astelia nervosa* found commonly within forest and shrubland within the mine footprint.

Astelia leaf roller: *Donacostola notabilis* (Lepidoptera: Depressariidae)

This large pale species (wingspan 34 mm) is another specialist feeder on *Astelia nervosa*, where its green larvae bind the leaves together with silk and feed on the leaves from within this protective home. It was found in the upper forested area of the proposed mine site at about 680-750 m. Although sign of the species on *Astelia* is widespread in the montane areas of the main divide from Fiordland to Northwest Nelson the adults are seldom seen. This species was not found by Mitchell Partnerships (2013).

This is another species that, although widespread in the western South Island and not threatened, is typical of high quality indigenous habitat and a distinctive endemic element of such places.

Other moths (Lepidoptera) found:

Two flax moths *Orthoclydon praefectata* (Geometridae) and *Tmetolophota steropastis* (Noctuidae) with larvae on flax are widespread at Te Kuha. Neither species was found by Mitchell Partnerships (2013).

- *Ctenopseustis obliquana* (Tortricidae) was found on a newly recorded host plant. In the mine site, bright green larvae were found feeding on the localised *Exocarpus bidwillii* on the summit of the proposed mine footprint.
- The geometrid *Declana floccosa* was found here as larvae and adults. It is a very widespread species with polyphagous larvae on various trees and shrub species.

An elegant tiny leaf mining moth *Acrocercops panacitorsens* (Gracillariidae) was recorded mining the leaves of *Pseudopanax colensoi* at 700 m. Although it has a widespread distribution, the species is seldom seen. This species was not found by Mitchell Partnerships (2013).

DISCUSSION

This suite of indigenous invertebrate species, the result of a short-duration survey to the proposed mine site, is indicative of a species-rich invertebrate fauna at the site. Only one of the above species appears to have been recorded by Mitchell Partnerships (2013). The fauna assemblage clearly reflects a highly natural and remote site. The invertebrates exhibit many of the characteristics of the New Zealand fauna overall in terms of large body size (*Uliodon* spider), flightlessness in groups that are winged worldwide (*Micrarchus* stick insect), and bizarre life-histories (zig-zag moth). This site and its invertebrate assemblage are typical of ancient New Zealand with elements of the northwestern South Island's endemic species combined with more widespread species. Sites like this are increasingly rare as developments modify, reduce, and eliminate such habitats.

With so many large-bodied flightless species, the invertebrate fauna assemblage is effectively immobile. It 'moves' about the habitable landscape at geological pace, with no ability to recolonise in our timeframes in what we consider to be suitable rehabilitated sites. Each species would need to be reintroduced separately once stable, mature and suitable habitat became available.

At present we know very little about what constitutes "suitable habitat" for these specialised species. Prior to any reintroduction, living collections would have to be made and maintained of each species to ensure that a population was available to reintroduce at a later date. Again our understanding of life histories and ecology are far too limited to attempt this. As can be seen from the invertebrate list above, many of the species are not yet described, let alone having had their life histories and ecologies studied and understood.

The proposed coal mine site at Te Kuha is clearly ecologically significant in terms of its indigenous invertebrate fauna, even based on limited data from a short-duration survey. The character suite of species reflects the remoteness, habitat character, naturalness, and geographical position of the site. It is important from a biodiversity, biogeographic, conservation and scientific perspective for the following reasons:

- Biodiversity: invertebrate richness over many unrelated groups exhibiting a range of different life histories and ecological preferences.
- Biogeography: a suite of species endemic to the northwestern region of the South Island mixed with more widespread species. The mix of species is distinctive in a New Zealand context and probably typical of this region
- Conservation: one At Risk-Relict butterfly and a proposed at risk declining beetle are present here in significant numbers. The site is significant for the conservation of these species being remote, sustainable and with a high degree of naturalness
- Scientific: given the number of undescribed species found here in all the recent surveys it is likely that Te Kuha will become the type locality for several species once they are formally described. The type locality, type populations, and type specimens (Holotype

and Paratypes) are hugely important in defining a species and therefore in defining a place also. A type specimen stored in a museum, being dead and often deformed, can only provide limited information about a species. The type population at the type locality with all its individual variation, including the identity of the opposite sex, life history, and ecology, tell so much more. The ongoing conservation of the type population is vital for knowing and understanding the species. Strictly speaking a “species name” can only be confidently associated with the population at the Type Locality, and specimens from other localities need to be compared to that from the Type Locality and an opinion passed on whether they are indeed the same species.

REFERENCES

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