CONSERVATION MANAGEMENT OF HABITAT FOR THE CHRYSTALLS BEACH BOULDER COPPER BUTTERFLY

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CONSERVATION MANAGEMENT OF HABITAT FOR THE CHRYSTALLS BEACH BOULDER COPPER BUTTERFLY

Female Chrystalls Beach boulder copper butterfly: one of the World's rarest and most threatened butterflies.

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1. INTRODUCTION

Chrystalls Beach is a six kilometre stretch of coastline east of Milton in South Otago, approximately 50 kilometres southwest of Dunedin. It is located in Tokomairiro Ecological District and the iconic Cooks Head, a 24 metre high basalt plug, rises prominently from a quartz sand dune at the southern road end of Chrystalls Beach Reserve Road. This impressive outcrop marks the boundary between the Southland greywacke and Otago schist rocks and is a geologically significant feature for southern New Zealand (Nelson 1982). Cooks Head is also significant as it has the only occurrence of the mineral Taranakite in the South Island.

An old image (Anon 1905) of Cooks Head and adjacent dunes shows the vegetation and dune topography at that time reasonably clearly: a dune system of low stature with what appears to be silver tussock or sand tussock, or similar, being the dominant component of the vegetation cover.

Patrick (1992) listed and discussed the moth fauna of the cushionfield and adjacent sand dunes following his discovery of this significant area in 1986. The vegetation, particularly the cushionfield south of Cooks Head, has since been described in detail by Allen (1988), Drobner (1995), and Drobner *et al*. (1995).

The Chrystalls Beach boulder copper butterfly (*Lycaena* new species) is a distinctive, undescribed and isolated species of butterfly known only from the northern end of Chrystalls Beach (Patrick & Patrick 2012). It was discovered in January 2001 by Dr Robin Craw at the end of Chrystalls Beach Road, on the property known as Glenledi, at the northern end of Chrystalls Beach (Figure 1), where he found it to be locally abundant. Its known habitat comprises two small areas of road reserve in front of three coastal cribs. This record was followed up by B. & H. Patrick on 28 January 2001 and its local presence was confirmed and the habitat was described.

A field inspection of the site was undertaken on 23 January 2017, in the company of John Barkla (Department of Conservation) and Ian Miller (local landowner), to assess the site and evaluate potential management requirements to improve the current situation of the Chrystalls Beach boulder copper butterfly.

This report provides an overview of our current knowledge of the species and its habitat, and discussion of future management requirements to sustain and enhance the population.

2. BACKGROUND

A male and female are illustrated in Patrick & Patrick (2012) and morphological differences from related species are described. The colouration of the male is bright and shining purple while the female is orange with brown lines and a blue outer band across the forewings (cover photograph and Figure 2). Males and females are both brightly coloured, with a wingspan of 21-24 mm. This species cannot be confused with other butterflies or day-flying moths found in the area because of its size and distinctive colouration.

Figure 1: Topographic map showing Chrystalls Beach with Cooks Head and the cushionfield (CF) area to the southwest of it within the Department of Conservation Reserve, and the butterfly habitat at the end of Chrystalls Beach Road. Close-up images of the two areas are shown at the bottom right corner of the map. Map supplied by the Department of Conservation.

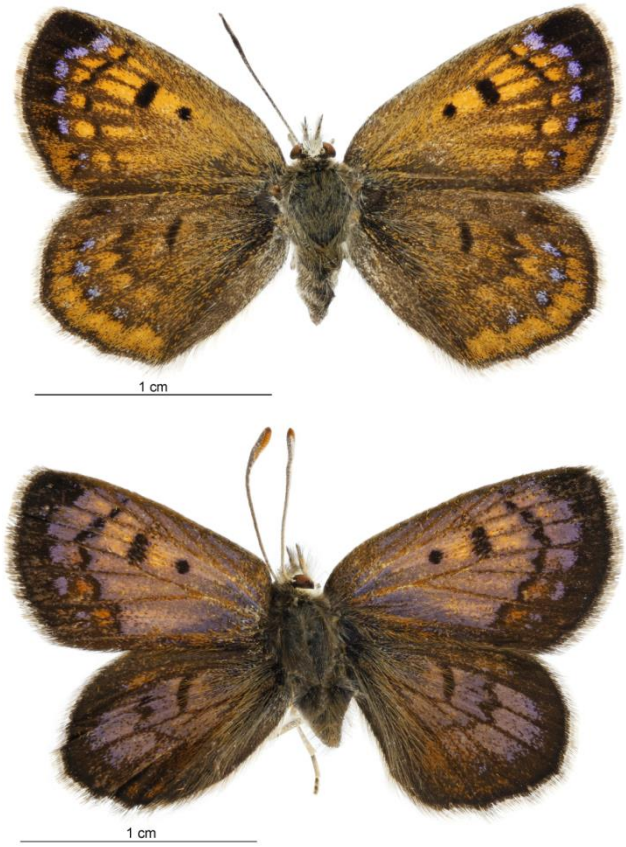

Figure 2: Female (above) and male (below) of the Chrystalls Beach boulder copper butterfly. Images from Patrick & Patrick (2012).

This butterfly was first recognised as a separate species by Hamish Patrick (Lincoln University) who performed a DNA study of New Zealand copper butterflies which confirmed that morphological differences were supported by molecular differences. These results were used to propose that the Chrystalls Beach boulder copper butterfly, and various others across the South Island, were sufficiently distinct from the named species to be treated separately. This taxonomic study has not been completed and a proposal to complete it is currently with the Department of Conservation, Wellington.

3. HABITAT AND HOST PLANT

The habitat of the Chrystalls Beach boulder copper is a road end carpark for a legal road reserve managed by Clutha District Council (Plates 1-4). A gravel road (Chrystalls Beach Road) terminates in a fenced grassland area in front of three cribs (Figure 1). The site comprises two discrete but adjacent areas, with a total area of less than 2,000 m².

Apart from the section of gravel road, the site is dominated by exotic grasses and herbs with fine gravels exposed in small patches. The butterfly's larval host plant *Muehlenbeckia axillaris* is widespread but is distributed irregularly in the grassland throughout this fenced area. The typical small-leaved form of the plant is present on the road edges (Plate 3) whereas in the dense grassland sward a larger leaved form and many intermediates of the plant are common and locally abundant, probably due to the shelter the grasses provide.

The habitat is a grassed carpark for visitors to the northern end of Chrystalls Beach, at the end of Chrystalls Beach Road (Plates 1-5). Its precarious localised status has led to it being classified as **Threatened-Nationally Critical** in the list of threatened New Zealand Lepidoptera (Stringer *et al*. 2012).

Plate 1: Grassed habitat of the Chrystalls Beach boulder copper butterfly at the end of Chrystalls Beach Road. Both small areas of butterfly habitat are shown here: the foreground area on both sides of the road and the area immediately in front of the three cribs in the background (marked in red in Figure 1 above).

Plate 2: John Barkla (DoC) pointing out the roadside population of the butterfly's larval host plant *Muehlenbeckia axillaris* growing amongst exotic grasses and herbs in front of the three cribs at Chrystalls Beach at the end of Chrystalls Beach Road. Note the longer exotic grassland to the right, outside the recently-mowed area.

Plate 3: Main habitat of the Chrystalls Beach boulder copper butterfly in front of the three cribs. Recent mowing of the vegetation by one of the owners has made the area more open and possibly more suitable for the butterfly.

Plate 4: *Melicytus alpinus* agg. shrubland between the two small areas of butterfly habitat.

Plate 5: The ship monument area supports good populations of the butterfly and its host plant in a highly modified setting. The Cook's Head volcanic plug at the southern end of Chrystalls Beach is just visible to the right of centre in the background, to the left of the tall trees by the group of cribs.

An area of bare sand and several shrubs of the indigenous *Melicytus alpinus* agg. (Plate 5) separate the two small areas of butterfly habitat in front of the three cribs.

Adults (cover photograph and Figure 2) has been recorded between late October and early April, indicating two generations per year. Each time the species has been found it has been described as locally common in the vicinity of the larval host plant in short vegetation or open areas, including sunbathing on the gravel road. This is normal behaviour for this group of butterflies. They prefer open areas, often rock or gravels, where the adult butterfly sunbathes on stones and bare ground and their larval host plant occurs in crevices of the rock or in sparsely-vegetated areas of predominately low-growing vegetation. The host plant for the larval stage - *Muehlenbeckia axillaris* - can tolerate modified areas dominated by exotic plant species, particularly roadsides.

Based on what is known of the ecology of this group of boulder coppers, this taxon probably prefers the more typical small-leaved form of the plant growing in more open areas, to lay its eggs on and for its colourful larvae (Plate 6) to feed on.

Exotic woody weeds, such as gorse (*Ulex europaeus*) and lupin (*Lupinus arboreus*) are also present in this grassland, but in contrast to nearby areas are not dominant here, and their absence or paucity has allowed the butterfly to survive here.

Plate 6: The highly-coloured and cryptic caterpillar of the boulder copper butterfly on its larval host plant *Muehlenbeckia axillaris*.

4. DISCUSSION

The Chrystalls Beach boulder copper butterfly is New Zealand's rarest and most threatened butterfly as its only known population occupies a small Clutha District Council carpark used for access to a section of the northern end of Chrystalls Beach. It may also be among the world's rarest species. Despite the lack of active management for the butterfly, it has survived, probably because the site is relatively isolated and does not experience high visitor numbers, the relative lack of weeds and, importantly, the persistence of the host plant for the larval stage.

While the host plant requires some disturbance to survive, a balance is required in relation to the amount and type of disturbance. Active management and monitoring of the host plant and the butterfly population is required.

The small butterfly population is almost certainly the last vestige of a population formerly more widely distributed along this coastline. Like the cushion plant community further south along Chrystalls Beach, it is indicative of a natural habitat that has almost disappeared.

The closest population of a related boulder copper butterfly to the south is Tiwai Peninsula, south of Invercargill, and to the north the closest species is even further away, at the mouth of the Rangitata River. This emphasises the biogeographic importance and isolation of this taxon and its population,

The sand dune backdrop to its habitat is very highly modified, being dominated by marram grass (*Ammophila arenaria*) and lupin, both exotic plants which now dominate many dune systems nationwide. Some indigenous plants are present nearby, including occasional flax, and a shrubland of *Melicytus alpinus* agg. adjacent to the grassland habitat occupied by the butterfly (Plate 5). The grassland supports other indigenous biota, including the herb *Acaena microphylla* var. *pauciglochidiata* (At Risk-Naturally Uncommon), localised *Lepidium tenuicaule* and *Rumex neglectus*, and the more widespread *Dichondra brevifolia*.

Recently, one of the crib owners has mowed most of the grassed area in front of the three cribs and has also controlled the spreading lupin shrubs within the fenced areas (Ian Miller, pers. comm., 2017) (Plate 4). Importantly, the mowing has not been too intense and has not created a very short sward. Plate 3 shows both mowed and unmowed grassland. Creation of a very short sward, similar to a suburban lawn environment, may have disturbed or locally eliminated the host plant. This management has probably benefited the butterfly population as it has made the site more open and conducive to their survival.

There is also a rabbit population (Ian Miller, pers. comm., 2017) and there has been casual cattle and sheep grazing within the fenced grassland area in the recent past, both of which, to a point, may have benefited the butterfly population as the resultant grazing was not sustained or too intense.

Two very small areas of the larval host plant (*Muehlenbeckia axillaris*) are present in or close to the protected cushionfield many hundreds of metres to the south, near Cooks Head (Drobner *et al*. 1995), and further north at Watson's Beach (personal

observation) The boulder copper butterfly has not been found at these two sites. Other observers have found small populations of *M. axillaris* on the coast between Bull Creek and Chrystalls Beach (Kath Graham, pers. comm.).

Other management factors to consider are the car parking and visitor impacts for which the site was designed, which could potentially have a detrimental effect on the butterfly population. This doesn't seem to be the case as the butterfly is still present and is locally and seasonally common. However, it could become an issue if special events were scheduled for the site such as celebrations and fairs for which large numbers of cars and visitors might use, and adversely affect the site.

Other threats to the butterfly habitat are inappropriate vehicle use of the grassed areas. There is evidence in several places that this has resulted in the ground being "scuffed up", to the detriment of the host plant.

5. FUTURE MANAGEMENT

Based on the field inspection and discussions of 23 January 2017, and other relevant experience with this group of butterflies, the following suggestions are provided to improve the state of the butterfly habitat and population:

- Funding should be approved by the Department of Conservation to confirm the identity of the Chrystalls Beach boulder copper butterfly. This taxonomic work will greatly assist in unlocking funding to allow the appropriate management to be implemented to ensure the survival of this distinctive species on the south coast of Otago.

- Undertake a survey of *Muehlenbeckia axillaris* along this section of south Otago coastline to identify locations that potentially provide the best prospects for both the host plant and the butterfly in the long term.

- Confirm or otherwise the preference for this boulder copper to lay its eggs on typical *Muehlenbeckia axillaris* rather than the more robust varieties present in exotic grassland nearby at Chrystalls Beach.

- Based on that survey, a planting plan should be developed for *Muehlenbeckia axillaris* that should include the present area where the butterfly is found. This plan may propose to supplement the small populations of it at nearby Watson's Beach, in the fenced area of cushionfield south of Cook's Head and other locations towards Bull Creek. This planting plan should have explicit timeframes and provide information on propagation methods and numbers of plants. Additionally, if suitable new sites are identified for the host plant and butterfly, a planting plan could be formulated for the host plant at those sites.

- Consider closure of the northern of the two existing areas of boulder copper habitat to vehicular traffic by means of a lockable barrier as vehicular traffic inevitably damages the larval host plant, presumably also squashing some larvae. Crib owners, Council, and Department of Conservation managers should have access through this barrier.

- Fund research to develop a technique to successfully reintroduce the Chrystalls Beach boulder copper butterfly to other populations of the larval host plant in the vicinity of Chrystalls Beach: Watson's Beach and the fenced cushionfield area south of Cook's Head. This research should determine the most appropriate life-cycle stage to move between sites to achieve successful establishment.

- Once these new and supplemented populations of *M. axillaris* are established, introduce the butterfly to new sites using the methods developed above.

- Set up monitoring of the Chrystalls beach boulder copper butterfly at its present site, and monitor any new populations established, initially on an annual basis, but less often as the success of the project is proven. Standard five-minute counts (say 10 counts) while walking a prescribed route through the habitat would be adequate.

- It is important to communicate the above plans and timeframes prior to implementation - to adjacent landowners including the crib owners - to get their input and support.

- With the vehicle barrier in place, experiment with mowing of the northern of the two sites and compare host plant health and butterfly numbers with the southern site.

- Install interpretation panels at the southern of the two sites - by the cribs - to tell the story of the butterfly, its habitat, conservation status, and what has been done to protect it. This action should be delayed until the butterfly is well established elsewhere. Alternatively, a panel covering the geological story including Cook's Head and the cushionfield could be installed sooner.

- Consider production of a brochure or information pack for local schools and visitors to the site that is made available in local information centres.

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REFERENCES

Allen R.B. 1988: *Vegetation of Chrystalls Beach, eastern Otago*. DSIR, Botany Division, Dunedin report to the Department of Conservation. 4 pp.

Anon 1905: *The Cyclopedia of New Zealand* Volume 4 (Otago & Southland Provincial Districts). 1115 pp.

Drobner U. 1995: *The sand dune vegetation of Chrystalls Beach, South Otago, Tokomairiro District, New Zealand*. Botany Department, Otago University. 46 pp.

Drobner U., Steel J.B., Smith B., and Wilson J.B. 1995: The sand dune vegetation of Chrystalls Beach, southern New Zealand with particular reference to the cushion community. *New Zealand Journal of Ecology* 19(2): 143-151.

Nelson K.D. 1982: A suggestion for the origin of mesoscopic fabric in accretionary melange, based on features observed in the Chrystalls Beach Complex, South Island, New Zealand. *Geological Society of America Bulletin* 93: 625-634.

Patrick B.H. 1992: Moths of Chrystalls Beach. *The Weta* 15: 35-38.

Patrick B.H. and Patrick H.J.H. 2012: *Butterflies of the South Pacific*. University of Otago Press. 240 pp.

Stringer I.A.N., Hitchmough R.A., Dugdale J.S., Edwards E., Hoare R.J.B., and Patrick B.H. 2012: *The conservation status of New Zealand Lepidoptera*. *New Zealand Entomologist 35*(2): 120-127.

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