

Preface

One of the problems photographers have with photographing insects is identifying them. My earliest identifications were either short horn grasshoppers or long horn grasshoppers. Of course we were two entirely separate families. Furthermore this did not indicate how unusual & unique our short horn grasshoppers are.

To the best of my knowledge there has only been one book written on New Zealand grasshoppers and this was a University of Canterbury publication by Dr Robert Bigelow. While this book is useful it only contained drawings and is without photographs. It is also a technical publication which makes it difficult to read for non-entomologists. All of the information to understand it was in the book. You just had to read it carefully and understand the names of the various parts & organs of a grasshopper.

After coming to grips with all of the scientific wording even my brain was starting to make some sense of this. At that point I put a couple of photos of two different species of grasshoppers onto the inaturalist site and commented that I was new to identifying grasshoppers and would someone verify if I had identified them correctly. Not only was the answer that yes I had identified them correctly but they also gave me a site to download later research information.

More importantly it gave me confidence to always have a go at identifying insects even if you get it wrong. Someone will correct it and also you may get a tip on what points they look for when identifying a particular species.

After over a decade of photographing grasshoppers (and other insects) I realised that I had literally 1000's of photos of grasshoppers, different species, different angles and giving visual clues for identifying the species. That is when I realised that I may be able to put a publication together for nature photographers that would allow them to identify the species they have photographed.

Currently there are no photos of *Brachaspis collinus*. I am unable to show simple visual attributes that could be photographed that distinguishes them with confidence from *Brachaspis nivalis*. Similarly there are a further five rare species in the South Island that should be included but I need to be about twenty years younger to be able to photograph them. Hopefully this will inspire younger photographers to fill in the gaps.

Geoff Tutty

Acknowledgement

I wish to acknowledge the help of Simon J Morris for his assistance reviewing this document, giving advice and ensuring the accuracy of my photos and information.

Simon has spent over 25 years studying New Zealand Acrididae. Published over 20 articles on New Zealand Acrididae. Described two new species of grasshoppers (*Sigaus homerensis* & *Sigaus takahe*). Currently described new species and reviewing all of New Zealand grasshoppers.

Photographing Insects in their Natural Habitat.

I have always had an interest in trying to photograph insects, particularly our unique New Zealand species. In the age of film photography this was extremely difficult. Low 100 ISO film with slow shutter speeds required a tripod

to obtain sharp images. Manually focussing a lens was slow and insects seldom waited around or followed your orders to position them into their best portrait position.

There were good photographers who managed to accomplish this task with various techniques. Some of techniques were fine such as photographing them in the early morning when they were cold & inactive and even covered in dew. Some of the methods were definitely shonky – such as putting them in the refrigerator or worse moving the insect onto a patch of super glue.

The reason my wife & I detest these methods is that we are photographing insects in National Parks and Nature Reserves. Native insects have the same protection as our native birds, plants & trees. It is illegal to remove them from the park or reserve & they should not be hurt or interfered with.

Enter the digital camera – even the cheaper DSLR's came with features that I just dreamed about. You could change to a higher ISO speed. Cameras were using various techniques to counteract slight camera movement and with instant replay you can monitor your technique. Lenses are virtually all auto-focus allowing the photographer to quickly focus on an insect. I will describe a technique to counteract "focus hunting" later.

Equipment:

For insects a lens with a focal length of around 100mm is ideal. With shorter focal lengths the insect is more prone to taking off. A 2X teleconverter can be used successfully with a 50mm lens but it does cut down the light requiring slower shutter speeds.

For larger insects such as grasshoppers, wetas, butterflies & etc, the macro setting on a zoom lens will work.

Method:

We both use the lenses in autofocus mode. We are both senior citizens and the camera's focus is probably more accurate than our eyes. However the main reason is the speed to capture the photograph of an insect before it disappears. The problem with using autofocus is that the lens will focus on something other than the insect and will start hunting i.e. going in & out of focus continuously.

To overcome this, pre-focus on something large close to where you are looking for insects. Then when you find the insect ensure your focussing area is over the insect, it may be blurred but move in until the insect blur completely covers the focussing area. At that point when you press the shutter it will focus on the insect, not the surroundings. If you misfire with the focus & the lens starts to hunt you have to have the discipline to repeat the process from restart. Do not waste time letting the lens hunt as it is extremely unlikely to finally focus on the subject.

Once the insect is in focus keep the focussing spot on the insect and move in until your subject covers a reasonable portion of the picture. At that point touch the shutter button to snap the insect into focus.

Speed: Use a speed around 1/1000 sec. This will require an ISO setting of at least 800 or higher.

Aperture Setting: The aperture setting requires some experimenting on your part. If you require everything in focus you would use $f16$. However this would make the background sharp and the insect would not stand out. If you use a large aperture $f3.5$ or $f5.6$ then the background would be nicely blurred but only part of the insect will be in focus.

If you want to show the face of an insect, an aperture of $f5.6$ to $f8$ should suffice. Use the smallest aperture (larger f number) if the insects feelers or proboscis protrudes further than the face, otherwise these will be out of focus.

To keep the whole insect in focus get parallel with the insect and use an aperture of *f9* to *f11*.

Background: This is the most difficult part of photographing insects as a messy background detracts from the subject. To achieve a clear background try the following:

- Photograph from slightly below the insect so that the sky is the background.
- Carefully bend a branch, with the insect on it, to a position where the background is distant and will be blurred.
- For mountain insects wait until, or carefully encourage them to move into a better position.
- Get in as close as you can to the insect to reduce the amount of background.
- Feature them in their natural habitat eg. a stick insect is normally shown on a tree looking like a stick.

Taking good macro shots of insects will have you lying down on the ground in rough rocky scree, getting poked in the eye when pushing the camera into bushes, getting stung by stinging nettle, particularly by our native tree stinging nettle *Urtica ferox*, and being bitten or stung by all manner of sand flies, mosquitoes or beetles.

Sigaüs Campestris



Sigaüs campestris grasshoppers are not common but are not rare. They live at lower altitudes generally below 1000 metres. They can be found on Banks Peninsular, Birdlings Flat & the lower slopes of Korawai Torlesse Park & Ashburton Lakes. They are identified by base of the head section (pronotum) being wavy.
Fig 1. Arrowed.

Photo: Doris Tutty

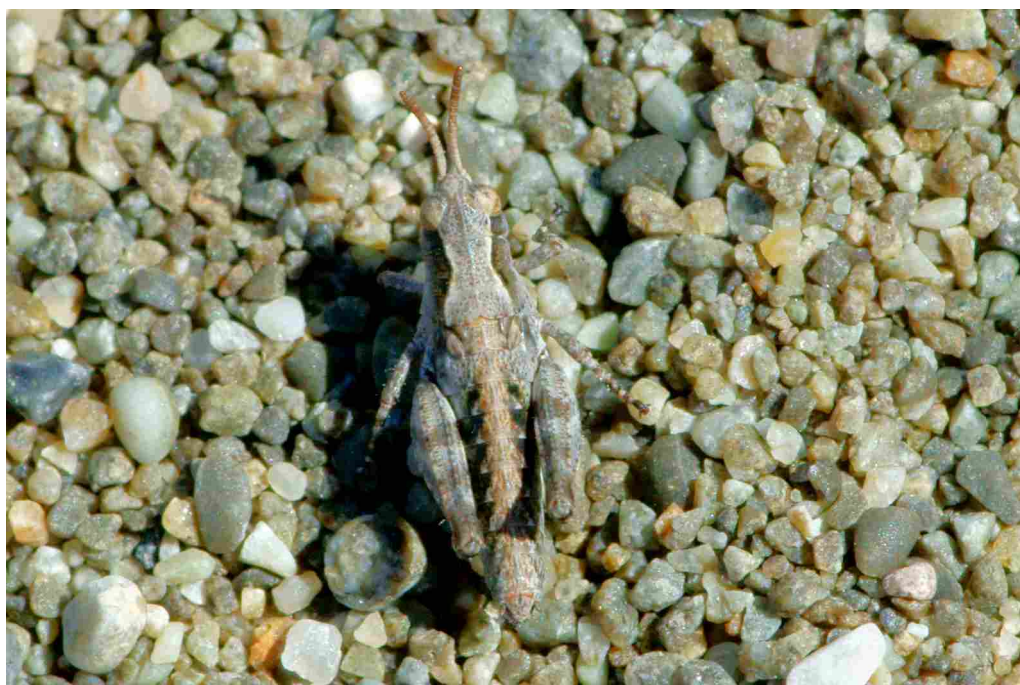


Photo: Doris Tutty

Fig:2 *Sigaüs Campestris* can be found in a variety of colours depending on habitat.



Fig.3

Photo: Doris Tutty

This range of colours is good camouflage in different habitats & photographers need to keep an eye on the ground watching for jumping grasshoppers.

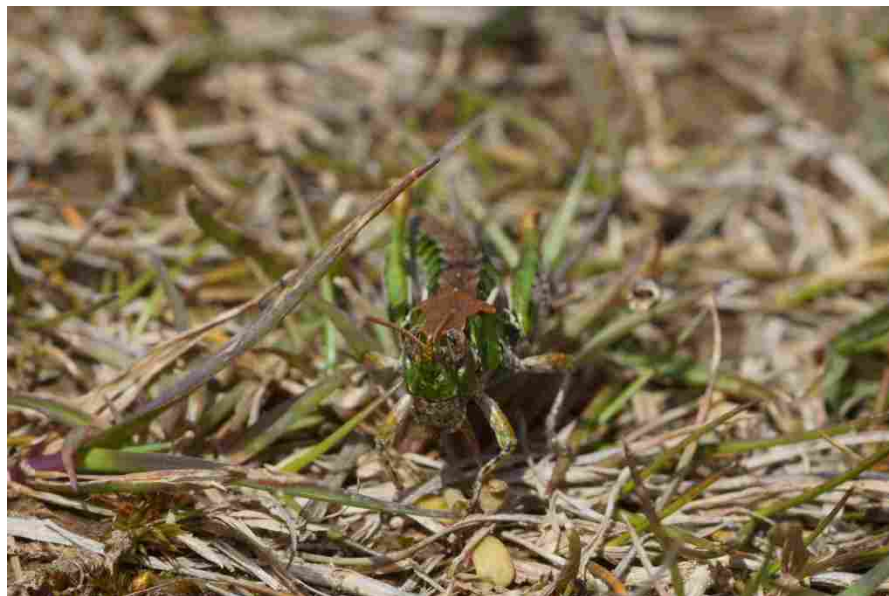


Fig.4

Photo: Doris Tutty

For identification purposes always take a photo looking down on grasshoppers. Also important is the area the photos were taken as grasshoppers are restricted to certain areas of

New Zealand and some species are limited to very restricted areas of the Mackenzie country, Central Otago and Milford National Park.

All of the above information & and photos relates to the best position for taking a photo for identification. It is not the best position to show off the beauty of the grasshopper, or to show your prowess as a wildlife photographer. Hopefully you have grabbed the identification photo just before you loose your dignity and get down to eye level with the grasshopper.



As with portraits of people, positioning yourself at their eye level provides the best position to show of the beauty of our endemic grasshoppers. With this photo I deliberately went slightly higher than eye level to show the distinctive waviness of their neck section.

Our endemic grasshoppers are every bit as unusual as our rare birds. They deserve our protection and their portraits are deserving of the photographer to show them in that fashion.

Sigauss Australis

Sigauss australis are found throughout the Southern Alps between Haast Pass in the south and Mount Torlesse in the north. They live at a height between 1800m to 900m.



Photographed on Fog Peak, Porters Pass.



Dark colour morph.



Sigaus australis photographed from above to show the structure including genitals at the tail.

Sigaus australis feature with a range of different colours. In their northern limit territory such as the Torlesse Range they live in the same area as a similar looking grasshopper, *Paprides nitidus*. This makes it difficult to decide which species you have photographed. While there are subtle differences with the longitudinal white stripes running down the length of the body, the only sure way is to look at their genitals.



Outer genitals of *Sigaus australis*



Outer genitals of *Paprides nitidus*

Sigauss villosus

Sigauss villosus prefers the high altitudes. It is rarely seen below 1500m and prefers the range of 1700m to 2000m.



They are always slate grey in colour as above. They are the largest grasshopper in New Zealand.

Visually *S. villosus* looks like a large *Brachaspis* species. The neck cover (pronotum) is rounded similar to *Brachaspis* species. In fact they were initially described as *Brachaspis villosus* until the shapes of their genitals put them in the *Sigauss* species.

However my intention with this series is to show visually the identification differences and/or other means of identifying them.

Sigauss villosus are always grey and are noticeably larger than other grasshoppers. In length they are 30% to 50% longer and correspondingly larger in other dimensions. Secondly they have black eyes. Their range is limited to the Craigieburn Range, Torlesse Range & Inland Kaikouras. (*The Grasshoppers of New Zealand* R.S. Bigelow; *The Feeding Behaviour of Alpine Grasshoppers in the Craigieburn Range*. R N Watson) and also found in Mount Hutt ski area and Potts & Arrowsmith Ranges. *Simon Morris*

The above photo was taken on the ridge line between Foggy Peak 1741m. And Castle Hill Peak 1998m.

99% of the population live between 1900 and 2100m however they can be found between 1300m and 1700m on the Craigieburn Range and in Arthur's Pass National Park. *Simon Morris*.

Paprides nitidus



Paprides nitidus is the most common mountain grasshopper in the northern half of the South Island. Similar to *Sigaus australis* it is a tussock grasshopper and lives on the mountains at a height between 800m. To 1500m. At this height the mountains have large patches of tussock and vegetation amongst areas of scree.

Their range starts from near Fox Peak through to NW Nelson & including the Kaikoura Ranges. It covers the eastern side of the Southern Alps, the Canterbury High country, Kaikoura Ranges, Marlborough, Nelson & NW Nelson High country.



Mating pair of *Paprides nitidus* with the male (yellow tail) just making contact with the female. They will lock together so the female can jump out of danger if required and without interrupting the mating. The picture also shows some of the mountain vegetation that tussock grasshoppers need to be near.

I have not found much information on what *Paprides nitidus* eat but according E.G.White & J.R. Sedcole they found peak breeding sequences included a year of notable vegetation vigour. However the following photos shows one eating a spider.



Photo: Doris Tutty

As a photographer this may be of no importance to you but if you spend enough time watching and photographing wildlife you may just record something that has not been seen before. **Identification:**



Paprides nitidus

Sigaus australis

The arrows point to the neck section (pronotum) and particularly the light bands that run from the head and neck. On *Paprides nitidus* the bands are straight while on *Sigaus australis* are curved. You can also check the genitals at the rear of the body that are also different. (see close-up in Section Sigaus australis.)



While the predominant colour of *Paprides nitidus* is green the above two photos show colour variations. The different colours are for camoflage. Sometimes when they see the camera they will jump into a clear area that produces photos with unobtrusive backgrounds.

Although this species normally live in mountainous areas they have been found in one site in North Canterbury in the sand dune areas at sea level. S. Morris

Brachaspis nivalis



The above mating pair of grasshoppers are *Brachaspis nivalis*. This also shows the other unusual fact of our grasshopper species in that the male (the grasshopper on top) is smaller than the female.

Brachaspis nivalis live in and around mountain scree areas seldom below 1500m. Although the above photo was taken at Porters Pass at around 950m. The reason for this anomaly is that winds & storms funnelling through the pass create weather conditions normally consistent with a higher altitude..



Brachaspis nivalis are predominantly mottled grey or mottled brown. The neck section *pronotum* is rounded. See below.



Photo on the right is *Sigaus species* and arrowed is the sharp edge (*lateral carina*) on the neck section (*pronotum*) that is rounded on the *Brachaspis nivalis* on the left.

The photos following will show the range of different colours of mottled grey & brown that *Brachaspis nivalis* exhibit. There are six male instars & seven female instars in *B. nivalis*. (ie. They moult 6 or 7 times from hatching to maturity). Although the major changes are to the genitalia the more obvious difference for the photographer is the growth of their small wings. There is a publication by L. Hudson 1970: Identification of the immature stages of New Zealand alpine acridid grasshoppers that describe the

changes of the different instars. However that is beyond the scope of this publication. The following photographs will show some of the differences between immature & mature.



The top photograph is a mature *B. nivalis* and has wings, a slight central ridge along the body and a slightly rougher body shell.

The bottom photograph is immature, no obvious wings & a smoother body.

On the following page are more mature grasshoppers and show the differences you will find with *B. nivalis*.





Phaulacridium Marginale



Phaulacridium marginale is the the common short horn grasshopper in New Zealand. It is found in open lowland grasslands throughout the country. The maximum height it occupies is around 900m but have been found up to 1300m in South Canterbury & Mackenzie Basin (Simon Morris). They are highly variable in colour and possess larger wings than other short horn grasshoppers. There is some evidence that they can fly short distances but I have never seen this happen. R. S. Bigelow (Author: Grasshoppers of New Zealand) says that very rarely some adults are fully winged. They are very rare, probably less than 0.01%. (Simon Morris)

Identification:



Phaulacridium marginale are easily identified from the tail end of the neck section (pronotum) curved down towards the tail. See arrow. In all other short horn species the curve or angle points towards the head.

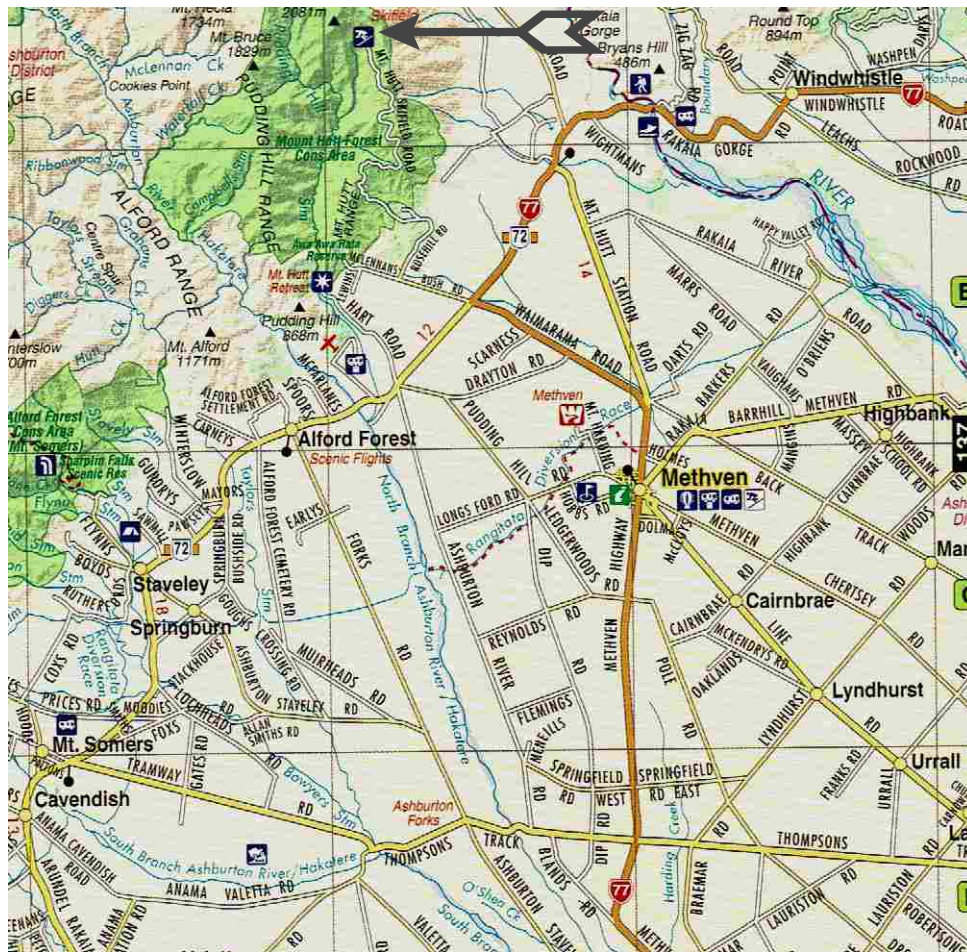


Mating *Phaulacridium marginale*. Farm stream Mt. Binser



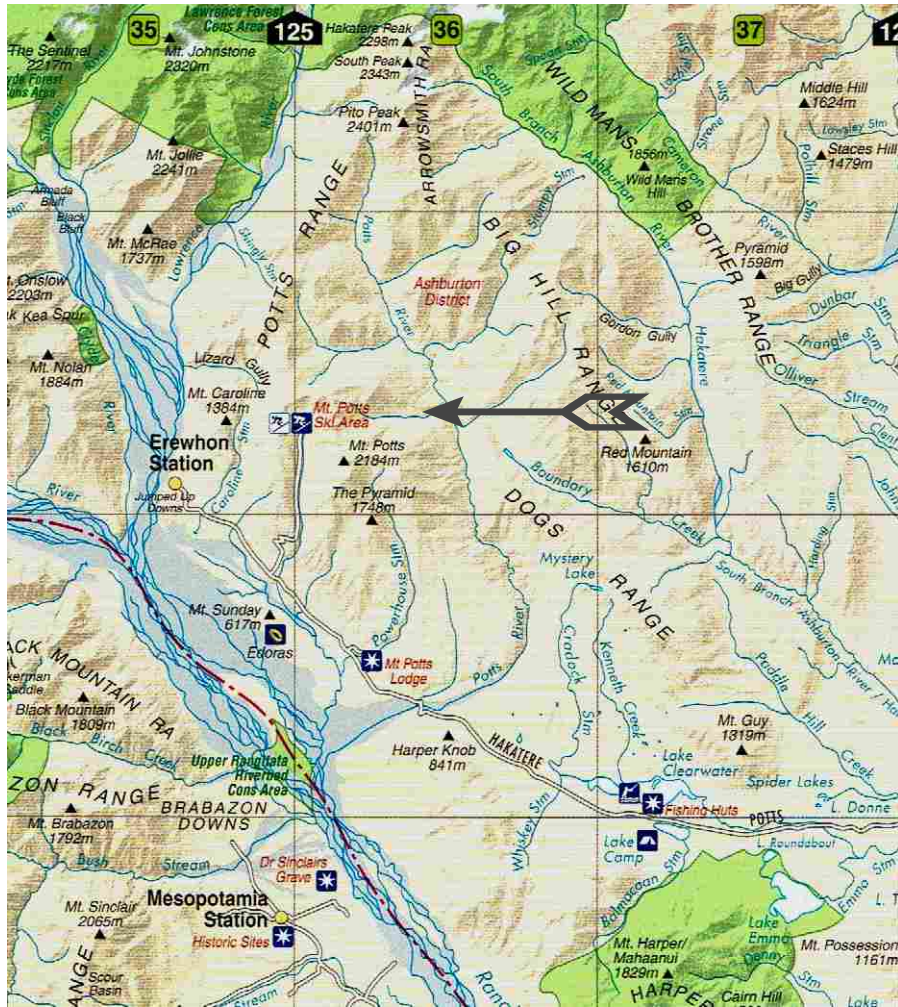
Another Mating Pair Cameron River Valley Lake Heron

Another *Phaulacridium* species *Phaulacridium otagoense* is only found at low elevation on very dry slopes and riverbeds throughout the central South Island (Mackenzie Basin and Central Otago). They are always very small, about half the size of *P. marginale*, and NEVER found in green vegetation. *Simon Morris*.



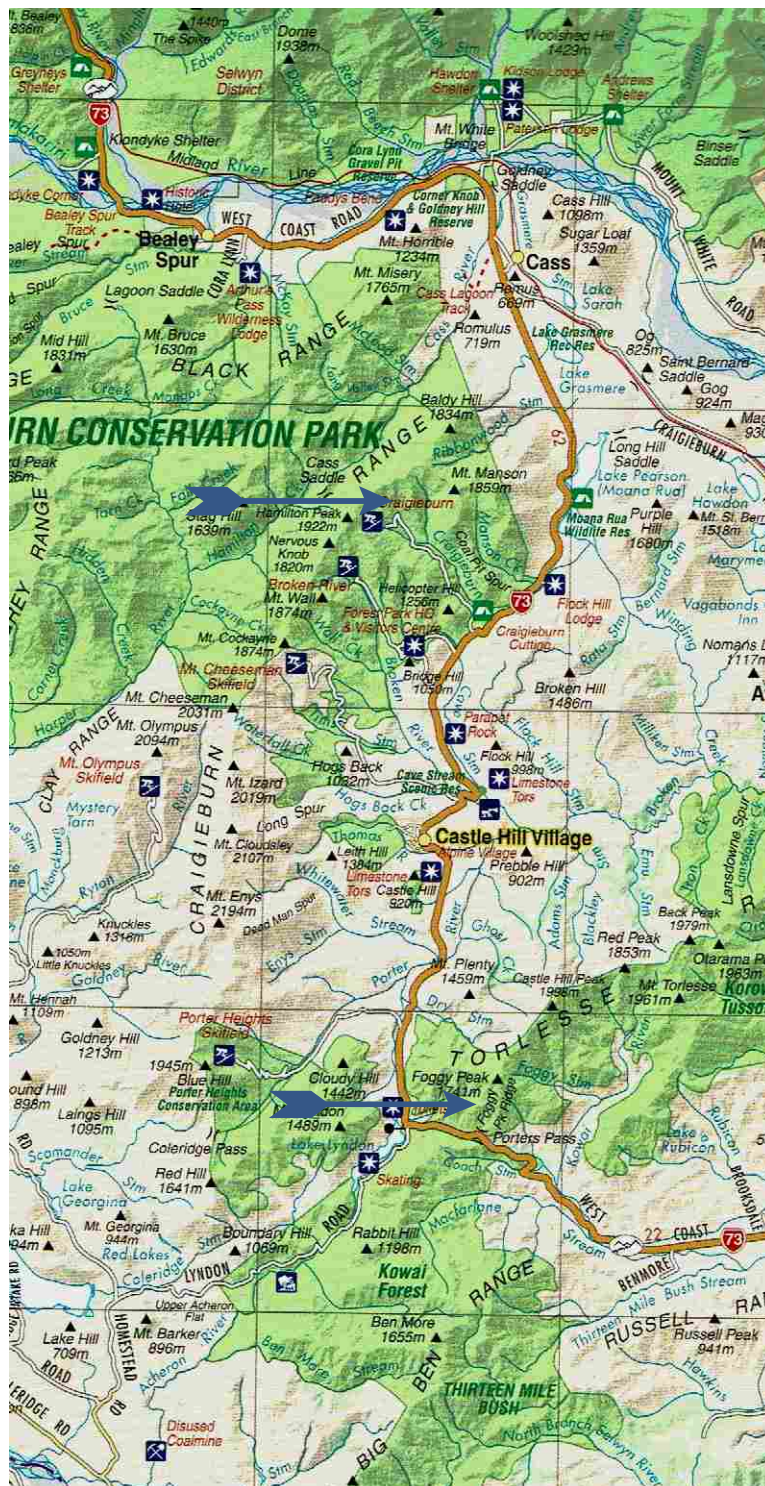
Map 1 Mount Hutt Skifield

Grasshopper species at Mount Hutt skifield include *Brachaspis nivalis* (On the scree) and *Sigauss villosus* (On the Ridgelines).



Map 2 . Mount Potts Range

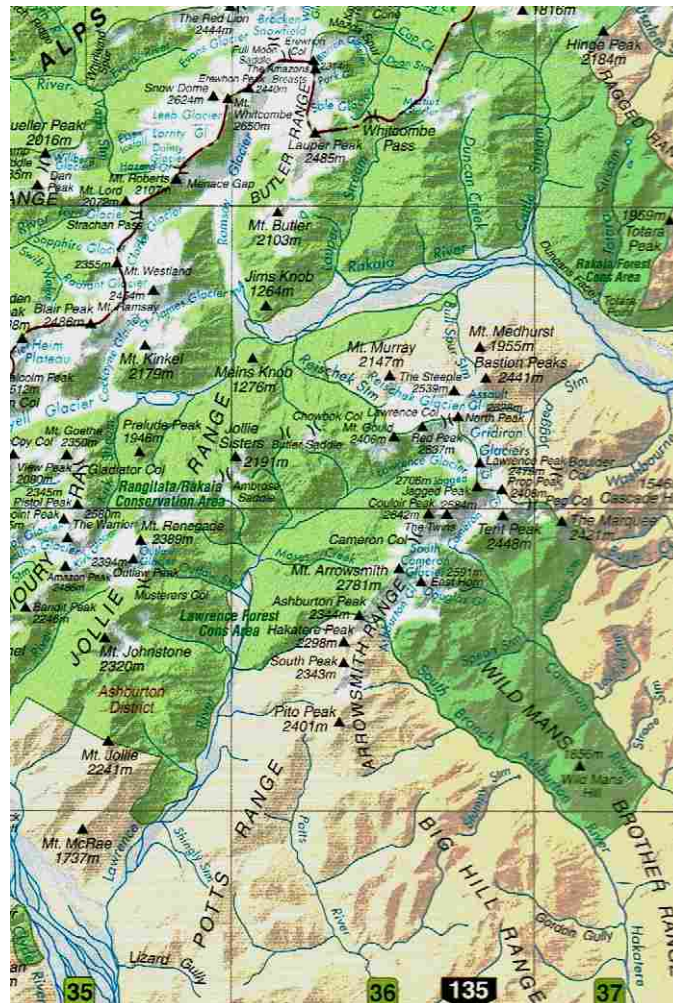
Sigaus villosus can be found on the Potts Range (Skifield ridgelines).



Map 3 Graieburn, Torlesse & Big Ben Ranges

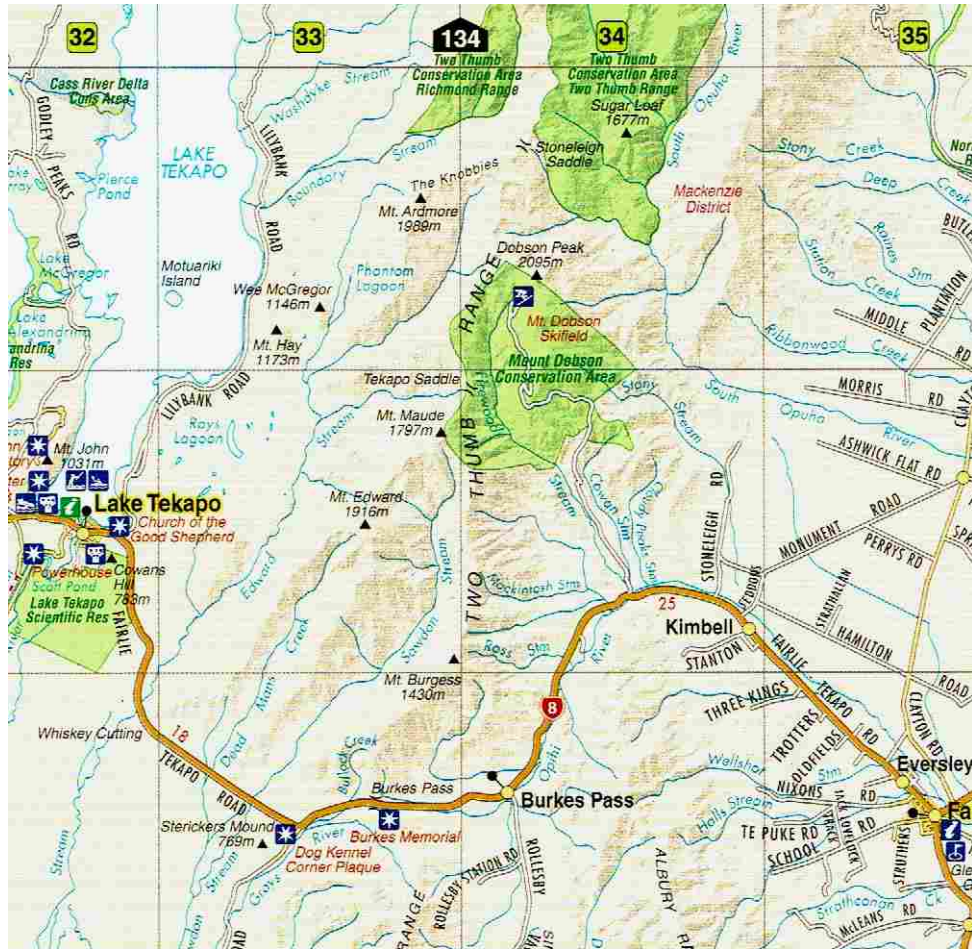
I have photographed the following species from Porters Pass to Castle Peak – *Paprides nitidus*, *Brachaspis nivalis*, *Sigauss australis*, and *Sigauss villosus*. At various places along the Lyndon Road in the Korawai Torlesse Park I have also found *Sigauss campestris*, *Paprides nitidus* and *Phaulacridium marginale*.

Mason reports that the Craigieburn Range, skifields Graigieburn to Mt Cheeseman & Porter Heights skifield have *Brachaspis nivalis*, *Paprides nitidus*, *Sigauss australis* & *Sigauss villosus*.



Map 4 Arrowsmith Range

The Arrowsmith Range has the following grasshopper species; *Brachaspis nivalis* and *Sigauss villosus*. Following up the Cameron Valley from just off the Lake Heron road we have found *Phaulacridium marginale*, *Sigauss campestrestris* and *Brachaspis nivalis*. *Brachaspis nivalis* are small at road level but their size increases higher up the valley.



Map 5 Two Thumb Range

The Two Thumb Range is also an area that contains *Siga* *villosus*.