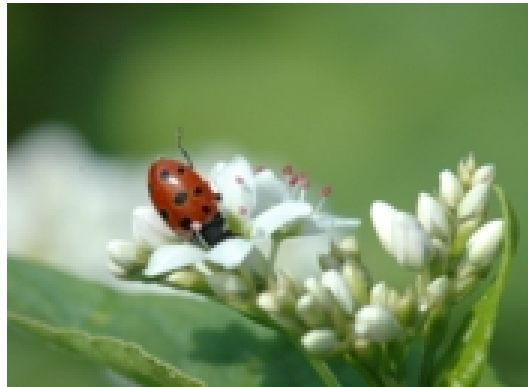


**Faculty of Agriculture and
Life Sciences
Department of Ecology**

BayerBoost Summer Scholarships
2009/2010



**Lincoln
University**
Te Whare Wānaka o Aoraki
CHRISTCHURCH-NEW ZEALAND

List of Project Titles

No. Project Title

1. Ecology of native invertebrate specialists on the New Zealand cabbage tree
2. Ecology of New Zealand's sandy beaches
3. Conservation of the Banks Peninsula tree weta (*Hemideina ricta*) in Eastern Banks Peninsula, Canterbury
4. Resampling of Carabidae (ground beetles) in Ahuriri Scenic Reserve, Port Hills, Canterbury
5. Ecology and distribution of Canterbury Knobbled Weevil – New Zealand's rarest beetle (Canterbury foothills)

Please read the project information below. Applicants must contact the supervisor prior to submitting an application.

1. Ecology of native invertebrate specialists on the New Zealand cabbage tree

The New Zealand native cabbage tree has a set of ten known specialist native herbivores. Across Canterbury the distribution and abundance of these specialists varies considerably and provides us with an excellent model system for examining a range of interesting problems in population and community ecology and conservation.

Our previous research within this system has led to some interesting observations. Some of these specialists, such as the cabbage tree moth *Epiphyryne verriculata*, show an interesting pattern where they are found in greater abundance on cabbage trees originating from the South Island than those originating from the North Island, when all grown in the same common garden at Landcare Research in Lincoln. This suggests it is possible that these native species have evolved genetically-determined preferences for cabbage trees grown in their local environment. In addition, we have only found some other species, such as the native weevil *Tanysoma comatum*, in native bush sites. Given that cabbage trees are so common in gardens in Christchurch and on parts of the Canterbury Plains it is important for insect conservation to know why specialist herbivores like *Tanysoma* have not spread across the Canterbury landscape.

In this scholarship you will have the opportunity to explore one or more questions within this system that are of interest to you.

Possible research questions may be:

- (i) Is there a genetic basis for *E. verriculata* performing better on locally-sourced cabbage tree leaves? This would involve rearing up caterpillars on leaves sent from around New Zealand.
- (ii) Why is *T. comatum* strictly limited to native bush sites in Canterbury? This would involve field surveys and attempted rearing.

Through this research scholarship, you will have the opportunity to conduct field work, learn to culture some of these unique native insects, perform laboratory experiments, analyse ecological data, and write up your results.

Staff who would supervise the student

Dr Hannah Buckley and Dr Jon Sullivan

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Jon.Sullivan@lincoln.ac.nz

2. Ecology of New Zealand's sandy beaches

New Zealanders like their beaches. We like to have nice stable sand dunes that stay where we put them and protect our roads and coastal settlements from the sea, while maintaining a long stretch of beach for sunbathing and walking. Consequently, there are virtually no sand dune ecosystems left in New Zealand that have not been extensively modified by humans. The primary human impact has been the introduction of exotic plant species, such as marram grass, ice plant, and pine trees to stabilise the dunes. Over the last few decades, restoration programs have resulted in plantings of primarily two native sandbinders: pīngao (*Desmoschoenus spiralis*) and spinifex (*Spinifex sericeus*) in the foredunes of many New Zealand beaches. However, we know little about the interactions between introduced plants and these natives or the effects of these restoration plantings on dune structure and the native invertebrate fauna.

By undertaking this scholarship, you will have the opportunity to develop and conduct a project of your choice within this study system (not to mention spend your summer working on the beach!). This is an excellent opportunity to collaborate with university, Department of Conservation, and Christchurch City Council staff. You can gain skills in: scientific study design,

ecological sampling and identification of plants and/or invertebrates, use of a global positioning system (GPS) and geographic information systems (GIS), and restoration ecology. The data you gather will contribute to a long-term study investigating the ecology of New Zealand's sand dune ecosystems.

Example project ideas include:

- (i) Document plant, invertebrate, lizard, and mammal community composition across different dune environments (including Stewart Island!).
- (ii) Establish permanent vegetation transects for monitoring dune height and plant community differences under different restoration treatments over time. These transects could additionally be used to monitor invertebrate populations (e.g., the native katipo spider) and vertebrates (e.g., lizards and mice).
- (iii) Investigate the impacts and potential effects of invasive plant species, such as marram grass, tree lupin, or ice plant.
- (iv) Investigate diets of mice in different sand dune environments by analysing the stomach contents of mice trapped on sand dunes around New Zealand.

Staff who would supervise the student

Dr Hannah Buckley

Email: Hannah.Buckley@lincoln.ac.nz

3. Conservation of the Banks Peninsula tree weta

(*Hemideina ricta*) in Eastern Banks Peninsula, Canterbury

Banks Peninsula (BP) tree weta, *Hemideina ricta* has a restricted range, being found only east of a line between Akaroa Harbour and Pigeon Bay, and is the rarest tree weta in NZ (category B, second highest priority on the DoC ranking system). The Canterbury tree weta *Hemideina femorata* is also present on BP and is thought to be hybridising with its rarer relative *H. ricta*, producing sterile offspring and wasted reproductive effort. Using weta motels (safe rodent-proof refuges), we will monitor weta populations targeting areas of possible hybrid zones. Some molecular work maybe included if scholar is interested. A report will be completed that will give a GPS location of all tree weta species found. Some entomological &/or molecular experience would be an advantage, but not essential.

Staff who would supervise the student

Mr Mike Bowie & Dr Roddy Hale

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4. Resampling of Carabidae (ground beetles) in Ahuriri Scenic Reserve, Port Hills, Canterbury

Ahuriri Scenic Reserve Bush in the Port Hills (172° 37' E, 43° 40' S) is considered to be the best forest remnant remaining on Port Hills. Butcher and Emberson (1981) published a report after 13 months of pitfall trapping (in 1977-1978) and found as many as 14 carabid (ground beetles) species in 11 genera, but only six were considered abundant. Recent restoration work including predator control has the potential to increase numbers of some of the rare species not often found. Small scale monitoring over the last 3-4 yrs has shown Ahuriri to be one of the top reserves in the Port Hills in terms of abundance and diversity of invertebrate fauna, particularly carabids. The baseline study by Butcher and Emberson (1981) provides an

excellent opportunity to quantitatively compare how the abundance and diversity compares today. This would provide the best scientific evidence of biodiversity health in 30 years since it was sampled by Butcher and Emberson (1981). In 2007-2008 sampling was undertaken replicating monitoring done 30 years prior. The specimens have been stored in alcohol for identification. The scholar will use a simple carabid identification key to identify specimens to species for comparison with historic data. Some experience in entomology would be an advantage, but not essential. There is a possibility of some molecular work if the student is interested. The report will be written as a publication.

Reference: Butcher, M.R. and R.M. Emberson 1981. Aspects of the biology of carabid beetles of Ahuriri Bush Scenic Reserve, Banks Peninsula. *Mauri ora* 9: 59-70.

Staff who would supervise the student

Mr Mike Bowie & Dr Rob Cruikshank

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**5. Ecology and distribution of Canterbury Knobbled Weevil
New Zealand's rarest beetle (Canterbury foothills)**

Hadramphus tuberculatus the Canterbury knobbled weevil is listed Department of Conservation's Threatened Species List as "Nationally Critical". *Aciphylla subflabellata* and *Aciphylla aurea*, commonly known as speargrass or Spaniard, is the host plant to this large (14 mm long) weevil. Little is known about the current distribution and abundance of *Hadramphus tuberculatus* in Canterbury other than the existence of this small population at Burkes Pass, therefore information regarding biology would significantly increase the chance of conserving a sustainable population.

The aim of this project is to search for other large patches of *Aciphylla* in the eastern foothills of Canterbury for this elusive weevil during *Aciphylla* flowering around November to January. Weevils caught will be measured, marked with a permanent, non-toxic pen and released as a way to track their movements. Hedgehogs were by far the most abundant predator trapped at Burke Pass by Environment Canterbury & DoC over summer 2008/9 and their stomach contents will be dissected for evidence of any of these rare weevils.

A report will be completed which will document all the *Hadramphus tuberculatus* and other invertebrates found on *Aciphylla* flowers. Results and discussion on weevil activity, movement, predation (from mammal dissections trapped at Burkes Pass) and important aspects of the host plants (*Aciphylla*) e.g. size, density, sex, etc. will be included.

Staff who would supervise the student

Mike Bowie & Warren Chinn (DOC)

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