

## Esther Elizabeth Dale

Research Associate

Manaaki Whenua - Landcare Research, New Zealand

currently based in Lausanne, Switzerland

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### Qualifications

- University of Otago** PhD in Botany, 2019  
Dunedin, New Zealand Supervisors: William G. Lee (Manaaki Whenua - Landcare Research)  
Steven I. Higgins (University of Bayreuth)  
Matthew J. Larcombe (University of Otago)  
David A. Orlovich (University of Otago)  
*Thesis: The role of biome shifts in lineage diversification*
- University of Auckland** MSc in Biosecurity & Conservation, with first class honours, 2013  
Auckland, New Zealand Supervisors: Bruce R. Burns (University of Auckland)  
Peter J. de Lange (Unitec)  
*Thesis: The ecology of Cook's scurvy grass (Lepidium oleraceum s.s.) and its relationship with seabirds*  
PGDipSci in Biosecurity & Conservation, with Distinction, 2012
- BSc in Ecology, 2011  
Undergraduate record: 17 A+ grades, 5 A grades, 2 A- grades

### Publications

- Dale, E. E.;** Foest, J. J.; Hackett-Pain, A.; Bogdziewicz, M. & Tanentzap, A. J. (2021).  
Macroevolutionary consequences of mast seeding. *Philosophical Transactions B*  
376: 20200372
- Dale, E. E.;** Larcombe, M. J. & Lee, W. G. (2021). The effect of single biome occupancy on  
biome shifts and the detection of biome conservatism. *PloS one* 16(3):e0248839.
- Liddell, L. G.; Lee, W. G.; **Dale, E. E.;** Meudt, H. M. & Matzke, N. J. (2021). Pioneering  
polyploids: the impact of whole-genome duplication on biome shifting in New  
Zealand *Coprosma* (Rubiaceae) and *Veronica* (Plantaginaceae). *Biology Letters*  
17(9):20210297
- Dale, E. E.;** Lee, W. G.; Larcombe, M. J. & Higgins, S. I. (2020). Diversification is decoupled  
from biome fidelity: *Acacia* a case study. *Journal of Biogeography* 47:2, 538-552.
- Dale, E.,** de Lange, P. & Burns, B. (2017). Seed dispersal but not seed germination facilitated  
by seabirds: seed ecology of Cook's scurvy grass. *New Zealand Journal of Ecology*,  
41(2), 226-233.

## Publications (continued)

### Accepted

**Dale, E. E.;** Larcombe, M. J., Potter, B. & Lee, W. G. (2022). Diversification and trait evolution in New Zealand woody lineages across changing biomes. *Journal of the Royal Society of New Zealand* for a special issue titled “Evolutionary Biogeography of Aotearoa New Zealand”.

### In preparation

**Dale, E. E.;** Igea, J.; Larcombe, M. J., Tanentzap, A. J. & Lee, W. G. Does the appearance of new biomes promote diversification? Contrasting diversification strategies of New Zealand plant lineages. (Draft completed, co-authors currently commenting).

**Dale, E. E.;** Larcombe, M. J. & Lee, W. G. Genomic downsizing in the New Zealand flora. (Analyses completed, writing manuscript).

## Research experience

**Postdoctoral researcher,** Université de Lausanne, Ecology and Evolution of Plant Sexual Systems Group, Department of Ecology and Evolution starting Oct 2022

In this upcoming postdoc I will examine the evolution of diocey and polyploidy in plants.

**Research Associate (remote),** Manaaki Whenua – Landcare Research, NZ

**Long-term research visitor (remote),** Ecosystems and Global Change Group, Department of Plant Sciences, University of Cambridge 2020-2022

I have been examining the macroevolutionary effects of masting globally. We utilised a new global database of reproductive time series, MASTREE+, with the largest available species-specific estimates of speciation and seed mass evolution rates. I have also been continuing my work on polyploidy and genomic downsizing in New Zealand plant lineages. Part time.

**Postdoctoral Researcher,** Department of Botany, University of Otago & Manaaki Whenua – Landcare Research, Dunedin, NZ 2019-2020

I explored the role of duplicated genomes in plant evolution, focusing on downsizing of genomes and evolution of traits in polyploid lineages using model-generated traits. Other projects I worked on included modes of species forming in New Zealand, predicting evolutionary potential of lineages in novel biomes, and the evolution of divaricating plants. I also mentored PhD students.

**PhD Candidate,** Department of Botany, University of Otago & Manaaki Whenua – Landcare Research, Dunedin, NZ 2015-2019

Supervisors: William Lee, Steven Higgins, Matthew Larcombe & David Orlovich

*The role of biome shifts in lineage diversification*

I studied the role of biomes in plant evolution, testing how biome shifts influence diversification. This involved a combination of biogeographic modelling, trait measurements (e.g. SLA, cold sensitivity, leaf nutrient content) and evolutionary analyses. Focal lineages were Australian wattles, New Zealand grasses, and three New Zealand woody clades: *Melicytus*, *Myrsine*, and *Pseudopanax*.

Research experience (continued)

**Technical Assistant**, Manaaki Whenua – Landcare Research, Dunedin, NZ 2015-2019

I have assisted with field work on a range of projects, primarily botanical ones, including vegetation surveys in forest, wilding conifer monitoring, pollination experiments, long term grass monitoring, manipulative field experiments, acoustic recordings, and seedling predation experiments. Part time.

**Field Ecologist**, School of Biological Sciences, University of Auckland, NZ 2014

I conducted field work on two projects, one involving rats and hedgehogs in study determining whether a motorway was acting as a barrier to movement. This involved live-trapping, anaesthetising, weighing and tagging rats and hedgehogs. I also did traffic management training so I could undertake road inspection manoeuvres on a motorway to access field sites. The other project was on Mexican dung beetles examining their distribution in relation to forest-pasture boundaries and an experiment with cow dung in paddocks. This involved a manipulative experiment, invertebrate trapping, and extracting invertebrates from dung samples.

**Vegetation Sampling Contractor**, Manaaki Whenua - Landcare Research, Hamilton, NZ

2014

I worked with a team of botanists and technicians to re-sample vegetation plots in a mountain sanctuary a decade after the construction of a predator-proof fence. This included plant identification, following sampling protocols and navigation to plot locations.

**MSc Student**, School of Biological Sciences, University of Auckland, NZ 2012-2013

Supervisors: Bruce Burns & Peter de Lange

*The ecology of Cook's scurvy grass (Lepidium oleraceum s.s.) and its relationship with seabirds*

My work focused on the ecology of a threatened coastal plant, examining its association with seabirds to determine if its threatened status was due to seabird declines. A key question was the effect of bird guano enrichment on germination, growth and reproduction. I used a combination of statistical modelling, field sampling, and experiments in the shadehouse and lab.

**Summer Student**, School of Biological Sciences, University of Auckland, NZ 2010-2011

Supervisor: Bruce Burns

*Aspects of the ecology of tree fern epiphytes*

This project explored epiphyte composition and distribution on tree fern trunks and the role of water limitation.

**Summer Student**, School of Biological Sciences, University of Auckland, NZ 2009-2010

Supervisor: Philip Harris

*Does cellulose content affect wood shrinkage?*

A study looking at the relationship between cellulose content and physical properties of wood using chemical isolation of cellulose in the lab.

## Presentations

## Invited talks

- Dale, E. E. (2020).** Does the appearance of new biomes promote diversification? Contrasting diversification strategies of New Zealand plant lineages. Seminar to the EcoSpat group, University of Lausanne, Lausanne, Switzerland (via Zoom).
- Dale, E. E. & Lee, W. G. (2019).** *Conservation and the ecological context for speciation in New Zealand*. Paper presented at the Joint Conference of the Australasian Systematic Botany Society and the New Zealand Plant Conservation Network, Wellington, New Zealand.
- Dale, E. E. (2019).** *Explorers and remainers: contrasting diversification strategies of New Zealand plant lineages*. Forest Ecology and Conservation seminars, Department of Plant Sciences, University of Cambridge, Cambridge, United Kingdom
- Dale, E. E. (2018).** *Lineage diversification in relation to biomes: within or across biome boundaries?* Departmental Seminar, Department of Botany, University of Otago, Dunedin, New Zealand
- Dale, E. E. (2016).** *Do biome shifts promote lineage diversification?* Departmental Seminar, Department of Botany, University of Otago, Dunedin, New Zealand
- Dale, E. E. (2013).** *Growing with guano: Cook's scurvy grass (*Lepidium oleraceum* s.s.) and its relationship with seabirds*. Invited speaker, Auckland Botanical Society AGM, Auckland, New Zealand

## International conferences

- Dale, E. E. (2020).** *Does the appearance of new biomes promote diversification? Contrasting diversification strategies of New Zealand plant lineages*. Paper presented at Macro2020: Macroecology of the Anthropocene, Konstanz, Germany.
- Dale, E. E.; Lee, W. G.; Larcombe, M. J. & Higgins, S. I. (2017).** *Diversification is not associated with biome fidelity in Australian Acacia*. Paper presented at Ecotas2017, Hunter Valley, NSW, Australia.
- Dale, E. E.; Lee, W. G., & Higgins, S. I. (2017).** The role of biomes in the diversification of Australian *Acacia*. Paper presented at the 10th Annual Meeting of the Macroecology Working Group for the Ecological Society of Germany, Austria and Switzerland, Vienna, Austria.
- Dale, E. E. (2013).** *A sticky situation: seed dispersal of Cook's scurvy grass*. Paper presented at EcoTas13 Conference, Auckland, New Zealand

## Other presentations

- Dale, E. E.; Larcombe, M. J. & Lee, W. G. (2019).** *Does shifting out of forest promote diversification in New Zealand plant lineages?* Paper presented at the New Zealand Ecological Society Conference, Lincoln, New Zealand.
- Dale, E. E.; Larcombe, M. J. & Lee, W. G. (2018).** *Diversification of NZ woody lineages: are biome shifts important?* Paper presented at the New Zealand Ecological Society Conference, Wellington, New Zealand.
- Dale, E. E. (2018).** *Do new habitats create new species?* Three Minute Thesis presentation, Science 3MT Heats, University of Otago, Dunedin, New Zealand.

## Presentations (continued)

- Dale, E. E.; Lee, W. G.; Larcombe, M. J. & Higgins, S. I. (2017).** *Lineage diversification not associated with biome specialisation in Australian Acacia*. Oral presentation, Botany Colloquium, University of Otago, Dunedin, New Zealand.
- Dale, E. E. (2015).** *Seabirds, salt and soaking: seed dispersal and germination of Cook's scurvy grass*. Paper presented at the New Zealand Plant Conservation Network Conference 2015, Dunedin, New Zealand.
- Dale, E. E. (2015).** *Are we out of the woods yet? Biome shifts within New Zealand plant lineages*. Oral presentation, Botany Colloquium, University of Otago, Dunedin, New Zealand
- Dale, E. E. (2015).** *Are we out of the woods yet? Habitat shifts in plants*. Three Minute Thesis presentation, Science 3MT Heats, University of Otago, Dunedin, New Zealand
- Dale, E. E.; Burns, B. R. & deLange, P. J. (2013).** *Cook's scurvy grass (*Lepidium oleraceum* s.s.): current threats and the importance of seabirds*. Paper presented at New Zealand Plant Conservation Network Conference, Auckland, New Zealand
- Dale, E. E.; Burns, B. R. & deLange, P. J. (2012).** *The influence of seabirds on Cook's scurvy grass (*Lepidium oleraceum* s.s.), a threatened coastal cress*. Paper presented at New Zealand Ecological Society Conference, Lincoln University, New Zealand
- Dale, E. E. (2012).** *Growing with guano: the ecology of Cook's scurvy grass, a seabird-associated species*. Paper presented at Joint Graduate School in Biodiversity and Biosecurity Student Seminar Day, University of Auckland, New Zealand

## Teaching experience

**Senior Demonstrator**, Department of Botany, University of Otago, Dunedin, NZ 2015-2019  
I prepared teaching materials, made educational videos, ran labs, maintained an interactive app in R that visualised the data for students, and trained a successor to take over from me for the experiment component of a stage one botany course. The course had an experiment that ran over the semester in half of the lab sessions looking at ecosystem function in communities with different levels of plant diversity.

**Tutor**, School of Biological Sciences &

Department of Statistics, University of Auckland, Auckland, NZ 2013  
I assisted students working through their assignments for a biometry course using R. This involved one-on-one explanations of statistical concepts and coding best practice to students as well as helping them to diagnose coding problems.

**Demonstrator**, School of Biological Sciences, University of Auckland, NZ 2011-2013

I was involved in a variety of different courses as a demonstrator. These included foundation level up to stage three, and a mixture of lab, field, and computer-based activities.

## Skills and expertise

**Topics**

Vascular plants  
Biomes  
Polyploidy  
Evolutionary ecology  
New Zealand flora  
Macroecology

**Quantitative skills**

Coding in R  
Statistical analyses  
Data management  
Macroevolutionary methods: testing for associations between traits and speciation rates  
Phylogenetic methods: statistical analyses accounting for non-independence of related species  
Taxonomic name management  
Biogeographic modelling: modelling biomes occupied back through time by plant lineages to estimate shifts between biomes  
Distribution modelling: modelling species distributions using georeferenced plant collections

**Practical skills**

Functional traits: measuring fundamental traits in a variety of plant species including SLA, cold sensitivity, stem density  
Lab: wet lab, sample processing, microscopy, developing protocols  
Common garden and manipulative experiments  
Databasing: field sites and herbarium accessioning  
Fieldwork: remote islands, urban sites, challenging terrain, plant identification  
Swiss drivers' license

**General scientific skills**

Writing and revising manuscripts  
Seminars and conference presentations  
Collaborative work  
Teaching and mentoring  
Reviewing

## Awards and achievements

Otago Postgraduate Writing Bursary	2019
Otago Doctoral Scholarship, University of Otago	2015-2018
New Zealand Ecological Society Student Travel Grant	2017
Peter Bannister Student Field Work Grant, Botanical Society of Otago	2015
Ralph & Eve Seelye Postgraduate Scholarship	2012
Faculty of Science Masters Award, University of Auckland	2012
Lucy Cranwell Scholarship, Auckland Botanical Society	2012
David Given Threatened Plant Research Scholarship	2011
University of Auckland PGDip Scholarship	2011
Kauri Seed Scholarship, New Zealand Ecological Society	2010
Senior Scholarship in Biological Sciences, University of Auckland	2010
First in BIOSCI 323 (Plant Diversity) and 396 (Terrestrial Ecology)	2010
Summer Research Scholarship, University of Auckland	2009, 2010
Annual Prize in Biological Sciences, University of Auckland	2009
First equal in BIOSCI208 (Invertebrate Diversity), University of Auckland	2009
The University of Auckland Scholarship, University of Auckland	2008-2010

## Affiliations

New Zealand Plant Conservation Network	2011-present
New Zealand Ecological Society	2010-2020
Otago Botanical Society	2015-2020
Auckland Botanical Society	2011-2020

## Professional service

Manuscript reviewer for <i>Plant Ecology &amp; Diversity</i> , <i>Frontiers of Biogeography</i> , <i>Australasian Systematic Botany</i>	
A scientist for Skype a Scientist	2020
Committee member, Otago Botanical Society	2015-2020
Judge of student presentations, New Zealand Ecological Society Conference	2019
Herbarium volunteer, Auckland War Memorial Museum	2013-2014
Accessioning plant specimens into the museum database	

## Academic referees

**Professor William (Bill) Lee**

Conservation Ecologist  
 Manaaki Whenua – Landcare Research  
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 School of Biological Sciences  
 University of Auckland  
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**Professor Andrew Tanentzap**

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