

# Angela Jeanette Brandt

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## RESEARCH INTERESTS

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I seek to understand the mechanisms maintaining species diversity and the processes structuring ecological communities. I connect basic and applied ecology to guide conservation and land management, particularly regarding biological invasions. Specifically, I am interested in integrating evolutionary and ecological processes, investigating the role of spatio-temporal environmental heterogeneity in coexistence, exploring both above- and belowground drivers of assembly, and relating functional traits to species interactions and community structure. I combine observational, experimental, and synthetic approaches in my work, with a strong emphasis on quantitative ecology involving statistical modelling.

## EDUCATION

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**Te Wānanga o Aotearoa**      Level 4, Te Ara Reo Māori, 2016  
Dunedin, New Zealand

**Oregon State University**      Ph.D. in Zoology, June 2011  
Corvallis, Oregon      Advisors: Eric W. Seabloom and Sally D. Hacker  
*Thesis: The Roles of Provenance and Phylogeny in Recruitment, Community Assembly, and Species Coexistence in California Grasslands*

**Colgate University**      B.A. in Biology, *summa cum laude*, 2003  
Hamilton, New York      Advisor: Timothy S. McCay  
*High Honors Thesis: Effects of Temperature and Photoperiod on Activity Patterns of the Northern Short-tailed Shrew (Blarina brevicauda)*

**University of Montana**      Summer 2002 Aquatic Ecology Field Course Series  
Flathead Lake Biological Station, Polson, MT

## SKILLS AND EXPERTISE

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Biodiversity monitoring

Community ecology

Conservation biology

Invasion & restoration ecology

Above- & belowground linkages

Functional traits

Experimental design: field, greenhouse, common garden

Data management

Statistical analysis: standard parametric statistics, linear models (including mixed effects models & Bayesian techniques), multivariate statistics, geospatial statistics, Mantel tests

Computer software: Microsoft Office, R Statistical Environment, PC-Ord, Stan, WinBUGS

University teaching: large lecture formats, laboratory practical, quantitative biology lecture/laboratory

Te Reo Māori – completed 2 years of Te Ara Reo Māori course

## RESEARCH EXPERIENCE

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### **Post-doctoral Researcher**, Landcare Research, Dunedin, New Zealand

**Supervisor:** Dr. William Lee

**Dates:** 11/13-present

As part of a Marsden-funded project, I investigated how colonization history and subsequent diversification of the NZ flora produced priority effects on an evolutionary timescale that affect current species distributions and community composition. I currently contribute to several projects, including developing tools for biodiversity assessment on farms in the NZ Sustainability Dashboard programme, data management and analysis for the NZ Garden Bird Survey, and the Winning Against Wildings MBIE-funded research programme. I conduct analyses in R, including Bayesian analytical approaches using WinBUGS and Stan.

### **Post-doctoral Research Assoc.**, Department of Biology, Case Western Reserve University, Cleveland, OH

**Supervisor:** Dr. Jean Burns

**Dates:** 5/11-10/13

I conducted experiments to determine 1) how environmental heterogeneity and turnover in resident and invader populations interact to affect community invasibility, and 2) whether phenotypic plasticity in response to environmental heterogeneity mediates coexistence between close relatives. We characterized soil biota in these treatments using T-RFLP. I am also continuing to collaborate with the Cleveland Metroparks staff to determine how environmental heterogeneity, independent of resource availability, relates to the abundance of invasive species within the park system. Performed statistical analyses exclusively in R.

### **Graduate Research Assistant**, Department of Zoology, Oregon State University, Corvallis, OR

**Supervisors:** Drs. Elizabeth Borer and Eric Seabloom

**Dates:** 3-6/10, 3-6/09, 3-6/08, 3-6/07, 3-6/06

Participated in grassland community, restoration, and disease ecology experiments, including supervising field crews. Conducted data analyses in R and PC-Ord, including regression, spatial, and multivariate analyses. Produced phylogeny of observed plant species and conducted phylogenetic community analyses using R, Mesquite, MUSCLE, PhyML, and Phylocom.

### **Biological Sciences Research Technician**, Department of Zoology, Oregon State University, Corvallis, OR

**Supervisors:** Drs. Elizabeth Borer and Eric Seabloom

**Dates:** 2/05-9/05

Supervised field crews and planned field research and research laboratory set-up. Participated in grassland and arthropod community monitoring and experiments.

### **Plant Conservation Research Assistant**, Institute for Applied Ecology, Corvallis, OR

**Supervisor:** Dr. Thomas Kaye, Executive Director

**Dates:** 10/04-2/05, 5/03-2/04

Participated in population and common garden studies for rare plant monitoring and reintroduction, including data collection, analysis, and write-up. Updated Native Seed Network user database.

### **Biological Science Technician – Wildlife**, Plum Creek, Coos Bay, OR

**Supervisor:** John Moore, Senior Wildlife Biologist

**Dates:** 3/04-8/04

Participated in stream and fish population studies, and conducted presence surveys for fish, spotted owls, and marbled murrelets.

### **Prairie Restoration Research Assistant**, Biology Program, Oregon State University, Corvallis, OR

**Supervisor:** Dr. Deborah Clark

**Dates:** 10/03-12/03

Assisted with experimental design and establishment for two Willamette Valley prairie plant restoration studies.

### **Biological Aid – Plants**, Bureau of Land Management – Salem District, Salem, OR

**Supervisor:** Claire Hibler, District Botanist & IWM Coordinator

**Dates:** 5/02-6/02, 5/01-8/01, 5/00-8/00

Participated in density management study, botanical surveys of federal lands, rare plant monitoring, noxious weed management, and native plant program. Developed a noxious weed identification and treatment database and Special Status Species database.

## PUBLICATIONS

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- Brandt, A. J.**, W. G. Lee, A. J. Tanentzap, E. Hayman, T. Fukami, and B. J. Anderson. 2017. Evolutionary priority effects persist through major environmental disturbance but not plant invasion. *New Phytologist*. DOI: 10.1111/nph.14544.
- Brandt, A.**, C. MacLeod. 2017. How to frame a sustainability assessment question: comparing the approaches of two online tools. The New Zealand Sustainability Dashboard Research Summary 17/08. Published by ARGOS.
- Burns, J. H., **A. J. Brandt**, J. E. Murphy<sup>†</sup>, A. M. Kaczowka\*, and D. J. Burke. 2017. Spatial heterogeneity of plant-soil feedbacks increases per capita reproductive biomass of species at an establishment disadvantage. *Oecologia* 183(4): 1077-1086.
- Brandt, A. J.**, A. J. Tanentzap, D. R. Leopold<sup>†</sup>, P. B. Heenan, T. Fukami, and W. G. Lee. 2016. Precipitation alters the strength of evolutionary priority effects in forest community assembly of pteridophytes and angiosperms. *Journal of Ecology* 104(6): 1673-1681. **Editor's Choice article in November 2016 issue**
- Robinson<sup>†</sup>, J. H., K. M. Donald, **A. J. Brandt**, and D. E. Lee. 2016. *Magasella sanguinea* (Leach, 1814) and *Magasella haurakiensis* Allan, 1949: resolving the taxonomic placement of these endemic New Zealand brachiopods using morphological and molecular traits. *Journal of the Royal Society of New Zealand*. 46(2): 139-163.
- Tanentzap, A. J., **A. J. Brandt**, R. D. Smissen, P. B. Heenan, T. Fukami, and W. G. Lee. 2015. When do plant radiations influence community assembly? The importance of historical contingency in the race for niche space. *New Phytologist* 207(2):468-479. **Contribution to the Special Feature: Evolutionary plant radiations.**
- del Pino\*, G. A., **A. J. Brandt**, and J. H. Burns. 2015. Soil heterogeneity driven by plant-soil feedbacks has non-additive effects on plant trait expression. *Plant Ecology* 216(3):439-450.
- Brandt, A. J.**, S. C. Leahy\*, N. M. Zimmerman\*, and J. H. Burns. 2015. Plant trait expression responds to establishment timing. *Oecologia* 178(2):525-536.
- Burns, J. H., and **A. J. Brandt**. 2014. Heterogeneity in plant-soil feedbacks and resident population dynamics affect mutual invasibility. *Journal of Ecology* 102(4):1048-1057.
- Brandt, A. J.**, G. A. del Pino\*, and J. H. Burns. 2014. Experimental protocol for manipulating plant-induced soil heterogeneity. *Journal of Visualized Experiments* 85:e51580.
- Brandt, A. J.**, H. de Kroon, H. L. Reynolds, and J. H. Burns. 2013. Soil heterogeneity generated by plant-soil feedbacks has implications for species recruitment and coexistence. *Journal of Ecology* 101(2): 277–286. **Contribution to the Special Feature: Plant-soil Feedbacks in a Changing World.**  
**F1000Prime Recommended article**
- Brandt, A. J.**, and E. W. Seabloom. 2012. Seed- and establishment-limitation contribute to long-term native forb declines in California grasslands. *Ecology* 93(6): 1451-1462.  
**Data from this work used in a meta-analysis: Loydi et al. 2012. J Ecol doi: 10.1111/1365-2745.12033**

**PUBLICATIONS (CONTINUED)**

**Brandt, A. J.**, and E. W. Seabloom. 2011. Regional and decadal patterns of native and exotic plant coexistence in California grasslands. *Ecological Applications* 21(3):704-714.

**Brandt, A. J.**, E. W. Seabloom, and P. R. Hosseini. 2009. Phylogeny and provenance affect plant-soil feedbacks in invaded California grasslands. *Ecology* 90(4):1063-1072.

**Brandt, A. J.**, and T. S. McCay. 2005. Temperature and photoperiod effects on activity of the northern short-tailed shrew (*Blarina brevicauda*). *BIOS* 76(1):9-14.

Kaye, T. N., **A. Brandt**. 2005. Seeding and transplanting rare Willamette Valley prairie plants for population restoration. Final Report from Institute for Applied Ecology to Bureau of Land Management.

\*Undergraduate student

†Post-graduate student

**GRANTS**

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**National Science Foundation Doctoral Dissertation Improvement Grant, 2009-2011.**

Determining how environmental heterogeneity and species traits interact to affect species invasion and coexistence over large spatio-temporal scales. \$9,756 (Brandt; co-PIs E. W. Seabloom and S. D. Hacker)

**2009 Oren Pollak Memorial Student Research Grant for Grassland Science**, The Nature Conservancy.

Is the abiotic or biotic environment a greater driver of observed highly-localized extinctions of native forbs in the California grasslands? \$3,577 (Brandt; co-PI E. W. Seabloom)

**Department of Zoology Research Funds, Oregon State University, 2009-2010.**

Does phylogenetic relatedness better predict which species respond similarly to the environment and coexist compared to provenance or functional group? \$500 (Brandt)

**INVITED SEMINARS**

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Products of history: Immigration timing of New Zealand plant ancestors affects present-day communities.

- Botanical Society of Otago monthly meeting, Dunedin, NZ, Oct 2015

Do environmental disturbance and non-native invasions obliterate evolutionary priority effects?

- Keynote speaker at Botany Postgraduate Student Colloquium, University of Otago, Dunedin, NZ, Oct 2015

Products of history: Immigration timing of New Zealand plant ancestors affects community assembly & lineage diversification.

- Bio-Protection Research Centre at Lincoln University, Lincoln, NZ, June 2015

Implications of environmental heterogeneity and plastic trait expression for plant community assembly.

- Biology Department at Kent State University, Kent, OH, Aug 2013

Using community assembly and coexistence theory to understand biological invasions.

- Environmental Studies at Colgate University, Hamilton, NY, Feb 2012
- Biology Department at Case Western Reserve University, Cleveland, OH, Feb 2012

**PRESENTATIONS (FIRST AUTHOR)**

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Brandt, A. J., A. J. Tanentzap, B. J. Anderson, P. B. Heenan, T. Fukami, and W. G. Lee. Do environmental disturbance and non-native invasions obliterate evolutionary priority effects?

- Orally at the Ecological Society of America Annual Meeting, Baltimore, MD, Aug 2015
- Poster at the New Zealand Ecological Society annual conference, Christchurch, NZ, Nov 2015

Brandt, A. J., A. J. Tanentzap, R. D. Smissen, P. B. Heenan, T. Fukami, and W. G. Lee. When do plant radiations influence community assembly? The importance of historical contingency in the race for niche space.

- Orally at the New Zealand Ecological Society annual conference, Palmerston North, NZ, Nov 2014

Brandt, A. J., D. R. Leopold, A. J. Tanentzap, P. B. Heenan, T. Fukami, and W. G. Lee. The strength of evolutionary priority effects changes along environmental gradients in forest communities.

- Orally at the Ecological Society of America Annual Meeting, Sacramento, CA, Aug 2014

Brandt, A. J., A. J. Tanentzap, D. R. Leopold, P. B. Heenan, T. Fukami, and W. G. Lee. Evolutionary priority effects affect plant community structure in multiple New Zealand biomes.

- Orally in the 20/20 Science Snapshots session at the Association for Women in the Sciences in NZ triennial conference, Wellington, NZ, July 2014

Brandt, A. J., G. A. del Pino, and J. H. Burns. Does environmental heterogeneity affect the ability of plastic trait expression to mediate plant competition?

- Orally at the Ecological Society of America Annual Meeting, Minneapolis, MN, Aug 2013

Brandt, A. J., H. de Kroon, H. L. Reynolds, and J. H. Burns. Soil heterogeneity generated by plant-soil feedbacks has implications for species recruitment and coexistence.

- Invited presentation in “Plant-soil feedbacks: the past, the present and the future” symposium at the Ecological Society of America Annual Meeting, Portland, OR, Aug 2012

Brandt, A. J., E. W. Seabloom, and M. W. Cadotte. Disturbance and resource supply affect species and phylogenetic diversity in invaded California grasslands.

- Orally at the Ecological Society of America Annual Meeting, Austin, TX, Aug 2011
- Orally at OSU Biology Graduate Student Symposium, Newport, OR, Jan 2011

Brandt, A. J., and E. W. Seabloom. Direct vs. indirect competitive effects of exotic plants on locally-declining natives.

- Orally at the Ecological Society of America Annual Meeting, Pittsburgh, PA, Aug 2010
- Orally at the annual International Congress for Conservation Biology, Edmonton, Canada, July 2010

Brandt, A. J., and E. W. Seabloom. Spatio-temporal plant community patterns in California grasslands: Implications for coexistence and management.

- Orally at the Ecological Society of America Annual Meeting, Albuquerque, NM, Aug 2009

Brandt, A. J. and E. W. Seabloom. Can native plants coexist with exotics? Implications of temporal and spatial patterns in richness and abundance in California grasslands.

- Orally at OSU Biology Graduate Student Symposium, Newport, OR, Feb 2009
- Orally at Ecological Society of America Annual Meeting, Milwaukee, WI, Aug 2008

**PRESENTATIONS (CONTINUED)**

Brandt, A. J., and E. W. Seabloom. When aliens are cousins: influence of species relatedness on plant-soil feedbacks in California.

- Orally at Ecological Society of America Annual Meeting, San Jose, CA, Aug 2007
- Orally at California Native Grasslands Assoc. Annual Conference, Santa Barbara, CA, May 2007

**TEACHING EXPERIENCE**

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**Instructor, BIOL 315/415: Quantitative Biology Laboratory**

Department of Biology, Case Western Reserve University, Cleveland, OH

Supervisor: Dr. Christopher Cullis

Dates: 1/13-5/13

Introduction to data management and manipulation, applied statistics, and graph construction in the R Statistical Environment using plant community data. Includes inquiry-based, service-learning final project in which students use a large monitoring data set from the Cleveland Metroparks to formulate a hypothesis, address it using quantitative tools learned in the course, and present the management implications of their findings to both park staff and community stakeholders.

**Graduate Teaching Assistant/Instructor, Z333: Human Anatomy & Physiology**

Department of Zoology, Oregon State University, Corvallis, OR

Supervisor: Dr. Joseph Beatty

Dates: 6/10-9/10

Instructor of record for the final course in the 3-part human A & P lecture series.

**Graduate Teaching Assistant/Instructor, Z34x/Z44x: Human Anatomy & Physiology Laboratory**

Department of Zoology, Oregon State University, Corvallis, OR

Supervisor: Dr. Douglas Warrick

Dates: 6/06-3/07, 6/07-3/08, 6/08-3/09, 6/09-3/10, 9/10-3/11

Laboratory course instructor of record for 2 human A & P laboratory sections. Presented Z44x recitations to all enrolled students. Revised Z342 laboratory manual.

**Graduate Teaching Assistant, BI211/212: Principles of Biology**

Biology Program, Oregon State University, Corvallis, OR

Supervisor: Dr. Deborah Clark

Dates: 9/05-3/06

Led 1 laboratory section and assisted in a second. Mentored an undergraduate teaching intern in BI212 laboratory.

**PROFESSIONAL DEVELOPMENT**

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**Helping Students Become Better Writers**, Univ Center for Innovation in Teaching & Education, CWRU, April 2013

**Inquiry-based Teaching seminar**, Univ Center for Innovation in Teaching & Education, CWRU, Feb 2013

**Safe Zone Certification Workshop**, LGBT Center, CWRU, Nov 2012

**Student Engagement seminar**, Univ Center for Innovation in Teaching & Education, CWRU, Mar 2012

**The Changing Landscape of Identity**, LGBT Center workshop, CWRU, Mar 2012

**Promoting Inclusive Class Environments Workshop**, OSU Center for Teaching & Learning, Feb 2010

**Understanding Contemporary Students seminar**, OSU Center for Teaching & Learning, Oct 2009

**Teaching Philosophy Workshop**, OSU Center for Teaching & Learning, Oct 2009

**Scientific Teaching & Lab Design Seminar (Z599)**, OSU, Fall 2009—Designed ecology lab for BI21x series

**GTA Training & Development Seminar (AHE 507)**, OSU, Winter 2009

**Assessment Workshop**, OSU Center for Teaching & Learning, Oct 2007

**Success in the College Classroom (MB699)**, OSU, Winter 2007

## AFFILIATIONS

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**Botanical Society of Otago**, 2014-present  
**New Zealand Ecological Society**, 2013-present  
**Ecological Society of America**, 2007-2015  
**Society for Conservation Biology**, 2010-2011  
**California Native Grasslands Association**, 2007-2008  
**Phi Kappa Phi National Honor Society**, Oregon State University chapter, inducted spring 2007  
**Phi Beta Kappa National Honor Society**, Eta Chapter at Colgate University, inducted fall 2002  
**Beta Beta Beta National Biological Honor Society**, Colgate University chapter, inducted spring 2002  
**Phi Eta Sigma National Academic Honor Society**, Colgate University chapter, inducted fall 2000

## HONORS AND AWARDS

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**Oregon Lottery Scholarship (2009-10)**—Academic merit  
**2008 & 2009 nominee, Herbert Frolander Outstanding Graduate Teaching Assistant Award**, OSU  
**2008 Oregon State University Department of Zoology nominee:**  
*University Club Foundation, Inc., Graduate Fellowship*  
*P. F. Yerex & Nellie Buck Yerex Graduate Fellowship*  
**Honorable Mention (2006), National Science Foundation Graduate Research Fellowship Program**  
**Raymond J. Myers Award (2003)**, Dept. of Biology, Colgate Univ.—Academics, research, and service award  
**Charles A. Dana Scholar (2002)**, Colgate University—Academic achievement and leadership award  
**Alumni Memorial Scholar (1999)**, Colgate University—Top 200 applicants for Class of 2003

## OUTREACH & MENTORING

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**Mentored 6 undergraduates** in summer and senior research projects, CWRU 2011-13 & Landcare Research 2015-2016

- Turley, L., A. J. Brandt, and W. G. Lee. Drivers of diversification in the New Zealand vascular flora. Summer 2015-16. University of Auckland summer student scholarship.
- Schafer, W. T., A. J. Brandt, and J. H. Burns. Island biogeography provides good model for native species richness in the Cleveland Metroparks. Fall 2013.
- Kaczowka\*, A., A. J. Brandt, and J. H. Burns. Can spatiotemporal heterogeneity in soil moisture affect species coexistence? Summer and fall 2013.
- Odil, E., A. J. Brandt, and J. H. Burns. The role of root foraging behavior in plant competitive responses to soil heterogeneity. Fall 2012; spring 2013.
- del Pino\*, G. A., A. J. Brandt, X. Zhao, and J. H. Burns. Effect of environmental heterogeneity and soil origin on phenotypic plasticity in perennial weeds. Summer and fall 2012; spring 2013.
- Zimmerman, N. M., A. J. Brandt, S. C. Leahy, L. Huffman, and J. H. Burns. Effects of competition distance and soil origin on plant invasions. Fall 2011; spring 2012.
- Leahy\*, S. C., A. J. Brandt, N. M. Zimmerman, L. Huffman, and J. H. Burns. Soil origin affects invasive plant performance. Summer and fall 2011; spring 2012.

\**Summer projects supported by CWRU's Summer Programs in Undergraduate Research (HHMI)*

**Futureintech Ambassador**, 9 career & curriculum presentations to Dunedin schools, 2016-2017

**Judged annual Science Fair** for 6<sup>th</sup>-7<sup>th</sup> graders, Agnon School, Beachwood, OH, Feb 2012

**Biological Invasions course** for 3<sup>rd</sup>-5<sup>th</sup> graders, OSU Precollege Programs: Winter Wonderings, Jan 2010

**OUTREACH (CONTINUED)**

**Public seminars** at CWRU Research Farm, Cleveland Metroparks, and U Cali. Natural Reserve System

- How does environmental variation influence plant invasion? Cleveland Metroparks Natural Resources Research Update poster symposium, Dec 2012
- How do species traits and environmental heterogeneity affect coexistence? CWRU Farm seminar for Cuyahoga Valley National Park interns, April 2012
- Can native plants coexist with nonnatives? Using environmental heterogeneity to protect native species diversity in California grasslands. McLaughlin Natural Reserve, June 2010
- Spatio-temporal plant community patterns in California grasslands: Implications for coexistence & management. Hastings Natural History Reservation, June 2010
- Spatial and temporal plant community patterns in the California grasslands. Hastings Natural History Reservation, May 2008
- Long-term community dynamics in invaded ecosystems. Hastings Natural History Reservation, May 2007

**DEPARTMENTAL & PROFESSIONAL SERVICE**

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**Reviewer** for Case Western Reserve University's Support of Undergraduate Research and Creative Endeavors (SOURCE) student summer project proposals (2012)

**Judged** outstanding student presentations for Buell/Braun Awards at annual ESA meetings (2010-12, 2015)

**Oral Session Presider** at annual ESA meetings (2008-2012, 2015)

**Vice President at Large**, American Federation of Teachers – Oregon (2009-11)

**Secretary-Treasurer**, Oregon State University Coalition of Graduate Employees (2008-10)

**Oregon State University Department of Zoology committees:**

*Biology Graduate Student Symposium Committee (2009-10)*

*Graduate Invited Speaker Planning Committee (2009-10)*

*Chair, S. D. Hacker Promotion & Tenure Graduate Student Committee (October 2008)*

*Co-president of Zoology Graduate Students (2007-08)*

*Graduate Student Welcoming Committee (2005-06)*

*Graduate Curriculum Committee (2005-06)*

**Manuscript reviewer** for *Annals of Botany*, *Axios Review*, *Biological Invasions*, *Ecography*, *Ecological Research*, *Ecology*, *Ecology and Evolution*, *Functional Ecology*, *Journal of Applied Ecology*, *Journal of Ecology*, *Journal of Vegetation Science*, *New Phytologist*, *New Zealand Journal of Ecology*, *Oecologia*, *Oikos*, *Plant and Soil*, *Plant Ecology*, *PLoS ONE*, *Proceedings of the Royal Society B*, and *Scientific Reports*