

# Andrea C Westerband

PLANT ECOLOGIST

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Early career scientist specialising in plant acclimation and adaptation to stressful environments. Expertise conducting large-scale field campaigns and greenhouse experiments, population modelling, measuring ecophysiological traits, teaching (10+ years), and laboratory management. Proven track record of high quality research publications, funding success, mentoring, and community service. Unwavering commitment to science education and outreach, particularly among underrepresented groups. American based in Sydney, Australia. Seeking a tenure-track assistant professorship role, beginning in late 2021/early 2022.

**Keywords:** functional traits, intraspecific trait variation, invasive species, limiting resources, plant ecology, plant ecophysiology, plasticity, population dynamics, stress tolerance

## Employment History

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### Postdoctoral Research Associate

August 2018 – Present

Mentored by Ian Wright

Department of Biological Sciences, Macquarie University

*Key achievements:* I applied principles of micro-economics to predict how plant traits would vary across gradients of aridity and soil fertility in Australia. Using fieldwork and data compilation, I showed that soil phosphorus exerts an equally strong if not stronger influence than climate on traits of Australian species.

### Postdoctoral Research Associate

August 2016 – August 2018

Mentored by Kasey Barton and Tiffany Knight

Botany Department, University of Hawai'i at Mānoa, USA

*Key achievements:* Investigated controls of inter- and intraspecific variation in plant traits conferring invasiveness, across an aridity gradient in the Hawaiian Islands. Using fieldwork and manipulative experiments, I showed that leaf economic traits do not explain invasion in a global biodiversity hotspot, and that climate strongly controls intraspecific variation and therefore species interactions.

## Academic Qualifications

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**PhD**, Advised by Carol C Horvitz  
Biology, University of Miami, USA

May 2016

*Key achievements:* I develop the first mathematical model that predicts population growth rates using plant traits. I conducted a four-year field study in the tropical forests of Costa Rica, and showed that high rates of leaf photosynthesis increase population growth under low light environments.

**BS**, Summa Cum Laude  
Environmental Biology, State University of New York College of Environmental Science and Forestry, USA

May 2010

## Publications

- Westerband, A.**, J. Funk, and K. Barton. 2021. Intraspecific trait variation in plants: a renewed focus on its role in ecological processes. *Annals of Botany* (in press).
- Paillassa, J., Wright, I.J., Prentice, I.C., Pepin, S., Smith, N.G., Ethier, G., **Westerband, A.C.**, Lamarque, L.J., Han, W., Cornwell, W.K. and Maire, V. 2020. When and where soil is important to modify the carbon and water economy of leaves. *The New Phytologist*. <https://doi.org/10.1111/nph.16702>
- Westerband, A.**, T. Knight, and K. Barton. 2020. Intraspecific trait variation and reversals of trait strategies across key climate gradients in native Hawaiian plants and non-native invaders. *Annals of Botany*. DOI: 10.1093/aob/mcaa050
- Westerband, A.**, T. Knight, and K. Barton. 2020. Intraspecific variation in seedling drought tolerance and associated traits in a critically endangered, endemic Hawaiian shrub. *Plant Ecology and Diversity*, 13(2), 159-174. <https://doi.org/10.1080/17550874.2020.1730459>
- Westerband, A.**, A. Kagawa-Viviani, K. Bogner, K. D. Beilman, T. Knight, and K. Barton. 2019. Seedling drought tolerance and functional traits vary in response to the timing of water availability in a keystone Hawaiian tree species. *Plant Ecology*, 220(3): 321-344. <https://doi.org/10.1007/s11258-019-00917-0>
- Westerband, A.**, and C. Horvitz. 2017. Photosynthetic rates influence the population dynamics of herbs in stochastic light environments. *Ecology*, 98: 370-381. DOI: 10.1002/ecy.1664
- Westerband, A.**, and C. Horvitz. 2017. Early life conditions and precipitation influence the performance of widespread understory herbs in variable light environments. *Journal of Ecology*, 105: 1298-1308. DOI: 10.1111/1365-2745.12757
- Westerband, A.**, and C. Horvitz. 2015. Interactions between plant size and canopy openness influence vital rates and life-history tradeoffs in two Neotropical understory herbs. *American Journal of Botany*, 102: 1290-1299. DOI: 10.3732/ajb.1500041
- Westerband, A.**, M. Dovčiak, G. LaQuay-Velazquez, J.S. Medeiros. 2015. Aspect influences soil moisture and species coexistence in semi-arid pinyon-juniper woodlands of the southwestern United States. *The Southwestern Naturalist*, 60: 21-29. DOI: 10.1894/FMO-18.1

## Funding (Total: \$124,330 AUD OR \$94,478 USD )

Amount (AUD)	Agency (Years)
\$ 83,374.00	Hermon Slade Foundation ( <i>Post-doctoral</i> ) (2020-)
\$ 21,078.00	Vaughn-Jordan Foundation (2013-2016)
\$ 5,880.00	Organization for Tropical Studies (2013-2015)
\$ 5,250.00	
\$ 5,250.00	
\$ 1,750.00	
\$ 1,512.00	University of Miami, Department of Biology (2012-2015)
\$ 5,040.00	
\$ 1,680.00	
\$ 1,400.00	Heliconia Society International (2015)
\$ 7,000.00	University of Miami, College of Arts and Sciences Summer Award (2014)
\$ 2,100.00	University of Miami, Center for Latin American Studies (2013)

## Invited Talks and Conferences

### Invited Talks

Sydney Plant Ecophysiology Group	June 2019
Department of Biological Sciences, Macquarie University	October 2018
Department of Geography, University of Hawai'i at Mānoa	July 2017
Department of Biology, University of Hawai'i at Mānoa	July 2017

German Center for Integrative Biodiversity Research September 2017  
Department of Botany, University of Hawai'i at Mānoa Spring 2017  
Evolution and Conservation Biology Research Seminar, University of Hawai'i at Mānoa Fall 2016

### National and International Conference Presentations

- Westerband A., Photosynthetic physiology of the Australian flora over key abiotic gradients: a test of least cost theory. Ecological Society of Australia, November 2019.
- Westerband A., Photosynthetic physiology of the Australia flora of key abiotic gradients: a test of least cost theory. Sydney Plant Ecophysiology Group June 2019.
- Westerband A., K. Barton, T. Knight. Leaf traits in native Hawaiian plants and invaders. Ecological Society of America 2018
- Westerband, A., K. Barton, T. Knight. Functional traits across a rainfall gradient. Ecological Society of America 2017.
- Westerband, A., K. Barton, T. Knight. Functional trait responses of Hawaiian native and invasive plants across spatial scales and a precipitation gradient. Hawaii Ecosystems Meeting. June 2017.
- Westerband, A. Physiological responses to light are important predictors of growth in two understory herbs. Evolutionary Demography Society, October 2015.
- Westerband, A. Size-dependent demographic responses demonstrate that forest-dwelling herbs do not always benefit from increasing light availability. Evolutionary Demography Society, November 2014. *poster*
- Westerband, A. Linking light availability to plant morphological and physiological adaptations using preliminary data. Association for Tropical Biology and Conservation, June 2013. *poster*

### Honors and Awards

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- Outstanding Teaching Assistant** 2015  
Department of Biology, University of Miami, USA
- Best oral presentation** 2015  
Graduate Student Research Symposium, Department of Biology, University of Miami, USA
- Second place, best oral presentation** 2014  
Graduate Student Research Symposium, Department of Biology, University of Miami, USA
- Best poster** 2013  
Graduate Student Research Symposium, Department of Biology, University of Miami, USA
- Phyllis Roskins Memorial Award** 2010  
Recognition of outstanding academic performance for a woman in the biology curriculum

### Technical Skills, Qualifications

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#### Software

Highly Proficient: R, RStudio, Minitab 17 and 18, ImageJ, Microsoft Products  
Basic Proficiency: MATLAB, JMP, LaTeX, ArcGIS, FORTRAN90

#### Hardware

Highly Proficient: LiCor 6800, LiCor 6400 (and XT), porometer  
Basic Proficiency: Campbell Data Logger, Apogee PAR Sensors, DataQ Temperature and Humidity Sensors, Confocal Microscope, fluorometer

## Other

Ion-exchange resin bags, stable isotope analysis  
Fully bilingual in Spanish (*Hispanic ethnicity*)

## Professional Development and Memberships

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- HDR Supervisory Training (Course number HDR31)** *December 2020*  
Online training course through Macquarie University  
Officially able to supervise higher degree research (HDR) students
- Early Career Researcher Workshop** *June 2019*  
Introduction to higher degree research (HDR) Supervision  
Information regarding mentorship and supervision of students
- Scientific Teaching Tools to Promote Active Learning** *Spring 2018*  
University of Hawai'i at Mānoa  
Learned current aims and techniques (e.g. flipped classrooms) of scientific teaching and effectiveness of pedagogical approaches.  
Culminated with design of active learning activities.
- Organization for Tropical Studies field course: Tropical Biology, An Ecological Approach** *June – August 2011*  
Eight-week intensive course including independent research projects across Costa Rica
- Research Experience for Undergraduates** *May – August 2009*  
National Science Foundation, Sevilleta Long-Term Ecological Research Station, New Mexico, USA
- Ecological Monitoring and Bioassessment Course** *June – August 2007*  
Eight-week field course, Adirondack Mountains, New York, USA

### *Active Memberships*

Ecological Society of Australia, Ecological Society of America, Evolutionary Demography Society

### *Previous Memberships*

Botanical Society of America, Association for Tropical Biology and Conservation, Southwestern Naturalist Society, Heliconia Society International

## Service, Education and Outreach

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### ***Education experience within universities***

- Co-convener**, Plant Biology (BIOL3410) *July 2020 – Present*  
Department of Biology, Macquarie University

Duties: Developed and implemented lab-based practical classes for third-year students, and gave lectures as well (via Zoom). In addition, I provided substantial input towards the organisation of the syllabus, was responsible for handling student inquiries, and graded numerous reports and the final exam.

- Leader of practical course**, Diversity of Life (BOT 601) *March – April 2020*  
Department of Biological Sciences, Macquarie University

Duties: Devised lab-based practical classes focusing on floral morphology and plant functional traits

**Leader of practical course, co-lecturer**, Plant Biology (BIOL347) *July – December 2019*  
Department of Biology, Macquarie University

Duties: Developed and implemented lab- and field-based practical classes for third-year students, and gave lectures as well. Met students regularly and assisted with grading reports.

**Leader of practical course**, Ecology (BOT 601) *October 2018, 2019*  
Department of Biological Sciences, Macquarie University

Duties: Devised field-based practical classes focusing on sampling plant functional traits within a community.

*Spring 2017*

**Guest lecturer**, Foundations in Biology (BOT 601)  
University of Hawai'i at Mānoa

Duties: Gave a guest lecture describing my PhD research. Also ran a tutorial showing students how to measure gas exchange.

**Graduate Teaching Assistant**, General Biology, Biodiversity, Ecology (upper-level) *August 2010 – May 2016*  
Department of Biology, University of Miami, USA

Duties: Implemented lab-based practical courses for first-year students in two courses: General Biology and Biodiversity. Developed and implemented lab and field-based practical courses for upper-level students in Ecology. I contributed to the development of the curriculum, gave lectures, grading all assignments, and organised field excursions for 30+ students.

**Undergraduate Teaching Assistant**, Zoology *January 2009 – May 2009*  
Department of Biology, State University of New York College of Environmental Science and Forestry, USA

Duties: Organised and prepared taxidermied animals and tissue samples for laboratory-based exercises as a second-year BS student. Assisted with grading of quizzes.

### ***Service to the scientific community at large***

**Organiser**, Sydney Plant Ecophysiology Research Group, November 2020 – Present

Research group meets six times per year (currently via Zoom) to discuss new and ongoing research in the local community (primarily UNSW, UTS, WSU, Macquarie, U. Sydney). I select and coordinate the speakers, chair the discussion, maintain the listserv and send out all emails.

**Handling Editor for Special Issue in Annals of Botany**, May 2019 – Present

Special Issue Title: Intraspecific variation in plant functional traits, Call for papers issued May 2019 and will be published in 2021. In addition to selecting and contacting potential contributors, I have handled six manuscripts, which includes suggesting reviewers and providing detailed feedback.

**Reviewer for manuscripts**, N=26 since 2017

American Journal of Botany (1), Plant Ecology (1), Ecology (1, co-reviewer), Plant Physiology and Biochemistry (1), Proceedings of the Royal Society B (1), New Phytologist (4), Forests (5), Plant Biology (2), Journal of Ecology (2), Functional Ecology (4), Ecology and Evolution (1), Scientific Reports (1), PLOS One (1), Biological Invasions (1)

**Symposium moderator, Ecological Society of America Annual Conference, 2018**

Symposium: "Downscaling, Extreme Events and Stochastic Population Models"

**Departmental Service**

**Laboratory Manager, Ecology Labs at Macquarie University, 2019 – Present**

10% of my current appointment is spent as official lab manager for the Ecology Lab areas (wet/dry labs used by Ian Wright/Mark Westoby/Rachael Gallagher research groups). My managerial and administrative duties include carrying out routine laboratory inspections, maintaining facilities and chemical inventory, ordering supplies and equipment, training lab personnel, and all matters required to keep the Lab WHS-compliant (including a very substantial administrative load)

**Member of PhD Progress Evaluation Panel, Macquarie University, 2019**

Interviewed HDR students, evaluated progress, and provided recommendations towards completion of their degree

**Graduate Student Organiser, Friday Seminar Series**

Department of Biology, University of Miami, USA, 2014 – 2015

**Graduate Student Committee Chair, Distinguished Visiting Professor Program**

Department of Biology, University of Miami, USA, 2014

**Graduate Student Organiser, Distinguished Visiting Professor Program**

Department of Biology, University of Miami, USA, 2013

**Select Community Outreach Activities**

**Educator**, Science in the City at the Australian Museum of Science  
Plant adaptations and symbioses, primary school

*August 2019*

**Educator**, Expanding Your Horizons  
Led the development of a Fruit and Flowers Workshop for girls  
Grades 6-8. *Fostering women's engagement in science.*

*April 2018*

**Educator**, Expanding Your Horizons  
Led the development of a Fruit and Flowers Workshop for girls  
Grades 6-8. *Fostering women's engagement in science.*

*April 2017*

**Graduate student mentor**, Science Made Sensible  
Education program funded by the United States National Science  
Foundation. *Fostering engagement of underrepresented minority groups  
in science.* Worked collaboratively with high school teachers in  
underprivileged communities within Miami, Florida, USA. Assisted with  
development of science (biology and chemistry) curriculum,  
implementing a flipped classroom (or inquiry-based learning) approach.

*August 2014 – May 2016*

**Educator**, Girl Scouts for America Badge Day  
Led the development of a botany exercise for girls ages 9-11.

*April 2015*

**Educator**, Girl Scouts for America Badge Day *February 2014*  
Led the development of a botany exercise for girls ages 9-11.

**Educator**, Annual Fairchild Challenge at the Fairchild Botanic Garden *November 2014*  
Developed an exercise teaching kids how to measure photosynthesis, and discussed research applications in the context of climate change

**Contributor, Amigos Newsletter** *Spring 2013*  
Short media brief describing my ongoing PhD research at the Las Cruces Biological Research Station in Costa Rica

## Mentorship Roles

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### *Formal*

**Amy Smart**, HDR student, Macquarie University. Fall 2019. I was brought in as a mentor in the final stages of Amy's degree. I showed Amy how to conduct basic statistical analysis in R, and provided significant feedback on the writing of her thesis. Degree awarded in January 2020.

**Andres Fantauzzi** and **Hannah Long**, BS students at University of Miami. I was their mentor as part of the *Science Made Sensible* science education program. We met biweekly and developed lesson plans for high school biology students in Miami. Fall 2015/Spring 2016

**Vincent Hsu** and **Joseph Marvin**, BS students at University of Miami. I was their mentor as part of the *Science Made Sensible* science education program. We met biweekly and developed lesson plans for high school biology students in Miami. Fall 2014/Spring 2015

### *Informal*

**Tiffany Lum** and **Kari Bogner**, MS students at University of Hawaii, I trained them to use the LiCor 6400 and conduct data analysis using R, Fall 2017.