

Curriculum Vitae

CHARLES G. WILLIS
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Education

PhD, Duke University, Durham, NC, United States. Biology June 2013
Dissertation/Thesis Title: The Role Of Dispersal And
Adaptive Divergence In The Diversification And
Speciation Of The Tribe Brassiceae And Genus Cakile
Advisor: Kathleen Donohue

MA, Harvard University, Cambridge, MA, United States. June 2009
Organismal and Evolutionary Biology
Advisor: Charles C Davis

BS, University of Minnesota, Minneapolis, MN. Ecology, December 2005
Evolution, and Behavior
Minor: History

Academic Appointments

University of Minnesota
College of Biological Sciences, Biology Teaching and August 2019 - Present
Learning: Teaching Assistant Professor

Consulting

Secretary, Non-Governmental Organization (NGO), Recycle January 1, 2022 - Present
Land
Minneapolis, Minnesota, United States
Serving as secretary for a new non-profit organization focused on the development and restoration of marginal and
unused land within urban areas.

RESEARCH, SCHOLARSHIP, AND CREATIVE WORK

Grants, Contract, Awards: External Sources

Award: RCN-UBE OCELOTS: A Platform for Facilitating Online Content for Experiential Learning of Tropical Systems

Award ID: 2120141

Project Investigators: Russell, Ann E (Contact PI), Macey, Suzanne (Co-Principal), Willis,
Charles George (Steering Committee), Aide, T. Mitchell (Steering Committee), Beck, Chris
(Steering Committee), Berglund, Jennifer (Steering Committee), Ganong, Carissa (Steering
Committee), Hardin, Rebecca (Steering Committee), Klemens, Jeffery (Steering
Committee), LaMar, Drew M (Steering Committee), McClearn, Deedra (Steering
Committee), Middendorf, George (Steering Committee), Nufio, César (Steering Committee),
Powers, Jennifer Sarah (Steering Committee), Valdez, Ursula (Steering Committee)

Status: Accepted

Sponsoring Organization: National Science Foundation

Institution: Iowa State University

Date Proposal Submitted: January 27, 2021

Award Dates: September 2021 - September 2026
Funded Amount for Entire Grant Period or Proposed Grant Period: \$499,997.00

Award: BII-Implementation: The causes and consequences of plant biodiversity and its emergent properties across scales in a rapidly changing world

Principal Investigator: Cavender Bares, Jeannine M.

Status: Accepted

Sponsoring Organization: THE NATIONAL SCIENCE FOUNDATION

Award Dates: September 1, 2020 - August 31, 2025

Project: Administrative - BII-Implementation: The causes and consequences of plant biodiversity and its emergent properties across scales in a rapidly changing world

Project Team: Charles Willis (Co-Investigator), Sarah Hobbie (Co-Investigator), Nathan Springer (Co-Investigator), Peter Reich (Co-Investigator), Ethan Butler (Co-Investigator), Holly Menninger (Co-Investigator), Forest Isbell (Co-Investigator), Rebecca Montgomery (Co-Investigator), Jeannine Cavender Bares (Principal), Arindam Banerjee (Co-Investigator), Artur Stefanski (Co-Investigator), LAURA WILLIAMS (Co-Investigator), Caitlin Potter (Co-Investigator), Ya Yang (Co-Investigator), Jesus Pinto Ledezma (Co-Investigator)

Status: Approved

Project Dates: September 1, 2020 - August 31, 2025

Award: BII Implementation: The causes and consequences of plant biodiversity across scales in a rapidly changing world

Award ID: 2021898

Project Investigators: Willis, Charles George (Senior Personnel, Educational assessment consultant Funded: 0%), Cavender Bares, Jeannine M (Principal), Reich, Peter B (Co-Principal)

Status: Accepted

Sponsoring Organization: National Science Foundation

Institution: University of Minnesota

Date Proposal Submitted: February 4, 2020

Award Dates: September 1, 2020 - August 31, 2025

Funded Percent Effort: 0%

Funded Amount for Entire Grant Period or Proposed Grant Period: \$5,105,356.00

Award: RCN-UBE Incubator: ALIVE, a platform for facilitating Authentic Learning In Virtual tropical Environments

Award ID: 1919640

Project Investigators: Russell, Ann E (Contact PI), Gansemer-Topf, Ann (Co-Principal), Willis, Charles George (Steering Committee)

Status: Funded

Sponsoring Organization: National Science Foundation

Institution: Iowa State University

Date Proposal Submitted: July 2019

Award Dates: August 2019 - July 2021

Funded Amount for Entire Grant Period or Proposed Grant Period: \$72,186.00

Publications

Asterisk() - indicates co-senior author*

Underline - indicates student author

Peer-Reviewed Journal Article

Cavender-Bares, J., Reich, P., Townsend, P., Banerjee, A., Butler, E., Desai, A., . . . others (2021). BII-Implementation: The causes and consequences of plant biodiversity across scales in a rapidly changing world. *Research Ideas and Outcomes*, 7, e63850.

Zhang, C., Willis, C. G., Donohue, K., Ma, Z., & Du, G. (2021). Effects of environment, life-history and phylogeny on germination strategy of 789 angiosperms species on the eastern Tibetan Plateau. *Ecological Indicators*, 129, 107974.

Zhang, C., Cadotte, M. W., Chiarucci, A., Loreau, M., Willis, C. G., Si, X., . . . Cianciaruso, M. V. (2021). Scale-dependent shifts in functional and phylogenetic structure of Mediterranean island plant communities over two centuries. *Journal of Ecology*.

Daru, B. H. (Lead Author), Davies, T. J. (Corresponding Author), **Willis, C. G.**, Meineke, E. K., Ronk, A., Zobel, M., . . . C. C. (Corresponding Author) (2021). Widespread homogenization of plant communities in the Anthropocene. *Nature Communications*, 12(6983). [doi: 10.1038/s41467-021-27186-8](https://doi.org/10.1038/s41467-021-27186-8)

Worked on writing and analyses

Publications Submitted or in Progress

Asterisk() - indicates co-senior author*

Underline - indicates student author

Peer-Reviewed Journal Article

Russell, A. E. (Lead Author), Aide, M. T., Braker, E. H., E. M., Ganong, C. N., Hardin, R., . . . Valdez, U. Novel approaches for bringing tropical biology into undergraduate classrooms: the OCELOTS Network. *Biotropica*. [Revising to Resubmit]

Presentations, Posters, and Exhibits

Underline - indicates student presenter

Presentation/Talk

Willis, C. G., (Author & Presenter) "Snapshot Serengeti Online: A Fully Online, Open-source Inquiry Lab on Tropical Ecology," Department Seminar Biology Teaching and Learning, Minneapolis, Minnesota, United States. (December 15, 2021). *Peer-reviewed/refereed*.

The Snapshot Serengeti Lab is a multi-week, inquiry lab designed to teach undergraduate students the full scientific process using authentic data from an ongoing camera-trap research program on African wildlife. The lab has been refined over seven years and is regularly cited as a highlight of students' experiences in several undergraduate biology courses at the University of Minnesota. despite its success, the lab has been difficult to disseminate to other institutions because it relies on complexity, proprietary statistical software, and materials built for a specific learning management system. The Snapshot Serengeti Lab served as an initial case study for the NSF RCN-UBE the OCELOTS Network (A Platform for Facilitating Online Content for Experiential Learning of Tropical Systems) to develop a fully online, open-source inquiry lab on tropical ecology. Our specific goals were to revise the lab such that it retained its inquiry-based nature while 1) removing the dependency on the proprietary statistical software, and 2) transferring the lab freely available, online platform. We used the open-source software RShiny to design an interactive, web-based graphical analytics dashboard. We also rewrote the lab to exist entirely on the free, online Gala platform. The revised version of Snapshot Serengeti has been deployed at 3 universities in various stages of development. The response from students and faculty at these universities has been overwhelmingly positive, especially to the new online analytical and data visualization totals. The renovation of Snapshot Serengeti has improved the lab and made it more accessible than previous iterations, yet challenges remain. For instance, while the lab no longer requires costly, complicated proprietary software, there are still costs associated with hosting RShiny applications. The Snapshot Serengeti Online Lab, nonetheless, demonstrates a way forward for the development of fully online research-focused teaching modules that can be interactive, inquiry-driven, and enriching educational experiences for biology students.

Willis, C. G., (Author & Presenter), Klemens, J., (Author & Presenter), Agrawal Bejarano, R., (Author), Hebert, S., (Author), Russell, A. E., (Author) "Snapshot Serengeti Online: a fully online, open-source inquiry lab on tropical ecology," Virtual Meeting of the Association for Tropical Biology and Conservation Association for Tropical Biology and Conservation, Virtual. (July 2021). *Peer-reviewed/refereed*.

BACKGROUND: The Snapshot Serengeti Lab is a multi-week, inquiry lab designed to teach undergraduate students the full scientific process using authentic data from an ongoing camera-trap research program on African wildlife. The lab has been refined over five years and is regularly cited as a highlight of students' experiences in several undergraduate biology courses at the University of Minnesota. Despite its success, however, the lab has been difficult to disseminate to other institutions because it relies on complexity, proprietary statistical software and materials built for a specific learning management system. OCELOTS (A Platform for Facilitating Online Content for Experiential Learning of Tropical Systems) is an international network of tropical biologists, educators, software developers and media specialists dedicated to the development of free, fully online educational experiences that integrate authentic research, data analysis, and local perspectives in tropical ecology.

OBJECTIVE: The Snapshot Serengeti Lab served as an initial case study for the OCELOTS network because it was well worked out and included online elements. Our goals were to revise the lab such that it retained its inquiry-based nature while 1) removing the dependency on the proprietary statistical software, and 2) transferring the lab freely available, online platform. **METHODS:** We used the open-source software RShiny to design an interactive, web-based graphical analytics dashboard. We also rewrote the lab to exist entirely on the free, online Gala platform. The dashboard integrated seamlessly into Gala, allowing students to explore and use the data set to answer questions. Ultimately, the students used the dashboard to answer their own question as part of an independent research project. **RESULTS:** The revised version of Snapshot Serengeti has been deployed at 3 universities, where it is in various stages of development. The response from students and faculty at these universities has been overwhelmingly positive, especially to the new online analytical and data visualization tools. In sum, the analytical dashboard provided a wide degree of flexibility, while greatly reducing student and faculty time spent on software questions. **IMPLICATIONS:** The renovation of Snapshot Serengeti has improved the lab and made it more accessible than previous iterations, yet challenges remain. For instance, while the lab no longer requires expensive and complicated proprietary software, there are still costs associated with hosting RShiny applications e.g., paying for subscription-based hosting services or in-house servers. The Snapshot Serengeti Online Lab, nonetheless, demonstrates a way forward for the development of fully online research-focused teaching.

Other Research/Research in Progress

Willis, C. G., Lane, K. On-Going, "Impacts of Online Proctoring on Inclusion in Undergraduate Biology". Collaboration with Kelly Lane in BTL, as well as, multiple faculty at other institutions. Survey of student on how online proctoring affects perceptions of inclusion and cheating.

Willis, C. G., Klemens, J., Hebert, S. On-Going, "Development of an Online, Interactive Snapshot Serengeti Lab Module".

TEACHING

Instructional Activity

University of Minnesota

Workshop, COBE Digital Teaching Workshop Series, College of Biological Sciences, Developer, Panelist, 60 participants

March 16, 2021 - May 15, 2021

A series of public workshops on the bringing the lessons of COVID into the classroom. We will discuss technological and pedagogical practices used in remote teaching that would be useful to adopted for in-person teaching.

Iowa State University

Workshop, OCELOTS Networkshop, Iowa State University, Presenter, 20 participants

January 15, 2021

OCELOTS Network is an NSF-UBE Incubator network focused on developing interactive, online labs in ecology for undergraduates.

SERVICE

Service to the University/College/Department

University of Minnesota

College

Member, Center for Online Biology Education Working Board July 1, 2018 - Present

Reviewer, CBS TA Awards 2021 March 2021 - April 2021

Department

Member, Executive Committee September 2021 - Present

Member, Diversity, Equity, and Inclusion Committee August 1, 2020 - Present

Member, Teaching & Curriculum Committee September 1, 2019 - Present

University

Advisor, University Learning Technology Advisors October 4, 2019 - Present