PINEMAP Year 3 Progress Report 2
April 2014
Aim 5 (Education)

OUTCOMES/IMPACTS

Aim 5 activities contribute to project-level outcomes and impacts through educating graduate and undergraduate students, along with high school teachers and students, on climate science, forestry, and interdisciplinary research. The PINEMAP distance graduate course, Climate and Forests, was offered again in the 2013 spring semester, with a total of 19 students participating. The course provides a platform for faculty to interact and help students better understand the variety of interdisciplinary research, education, and outreach elements within the PINEMAP project. The PINEMAP undergraduate course titled Effective Communication Skills was offered in fall 2013 and all 12 undergraduate fellows completed it. The PINEMAP Undergraduate Fellowship Program's second year began in May as 12 undergraduate fellows began working with paired PINEMAP graduate students at host institutions. This internship experience was used in the fall 2013 Effective Communication Skills course where interns educated public secondary school students about forest resources and climate change, developed scientific abstract and a scientific poster and PowerPoint® presentation. The draft Project Learning Tree/PINEMAP secondary module was completed, with input from the 2012 Education Advisory Committee and from 25 PINEMAP researchers and external experts who reviewed the activities. A new Education Advisory Committee was created for 2013 to guide the formative evaluation and module website development. The module website and online training resources were developed, and 44 educators throughout the Southeast participated in the module pilot test. The module is currently being revised based on pilot tester feedback. Revisions include the development of a new introductory activity, so the final module will contain 14 activities. The team coordinated a Climate Change Symposium for 53 teachers in partnership with the Center for PreCollegiate Education and Teaching at the University of Florida in May 2012.

OUTPUTS

Products

Peer-reviewed publications

Monroe, M.C. 2012. Enhancing both Cooperative Extension and national environmental education resources. *Journal of Extension* 50(6): Article 6IAW6. http://www.joe.org/joe/2012december/iw6.php

Monroe, M.C., A. Oxarart, and R.R. Plate. 2013. A role for environmental education in Climate Change for Secondary Science Educators. *Applied Environmental Education and Communication* 12: 4-18. doi: http://dx.doi.org/10.1080/1533015X.2013.795827

Monroe, M. C., R. R. Plate, D. C. Adams, and D. J. Wojcik. In Press. Harnessing homophily to improve climate change education. *Environmental Education Research*.

Plate, R. and M. Monroe. 2014. A structure for assessing systems thinking. *The Creative Learning Exchange, 23*(1): 1-6. http://clexchange.org/ftp/newsletter/CLEx23.1.pdf#page=1

McCabe, S.M., J.F. Munsell, and J.R. Seiler. 2014. Forest Field Trips among High School Science Teachers in the Southern Piedmont. Nat. Sci. Educ. doi:10.4195/nse2013.01.0001

Theses/Dissertations

Hall, Stephanie. May 2013. Addressing climate change through biology concepts: Insights for educators. University of Florida Masters Thesis.

Other publications

Kidd, J. and J. Seiler. 2013. The PINEMAP Fellowship Program: notes from year one. *Engagement Matters* 6(2). http://cnre.vt.edu/community/newsletter/engagement-matters-2013-may.pdf.

Hall, S. and M. Monroe. 2013. *Addressing Climate Change though Biology Concepts*. PINEMAP Research Summary.

Monroe, M., A. Oxarart, and R. Plate. 2012. *Understanding Southeastern Science Teachers' Interest in Climate Change Education*. PINEMAP Research Summary.

Monroe, M., A. Oxarart, and A. Stenstrup. 2013. Southeastern forests and climate change: A Project Learning Tree secondary environmental education module, final draft. Gainesville: University of Florida. http://sfrc.ufl.edu/extension/ee/climate/wp-content/uploads/Module_Final.pdf

Audio/video products

Krantz, S. (Producer). 2013. Module introduction. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. http://www.youtube.com/watch?v=Ifz7tvSsf1I&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl&index=3

Krantz, S. (Producer). 2013. Global climate models. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module.

http://www.youtube.com/watch?v=q13i0RHiuZg&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl&index=10

Krantz, S. (Producer). 2013. Systems thinking. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. http://www.youtube.com/watch?v=kSeKzWxiuUg&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl&index=8

Krantz, S. (Producer). 2013. Forest profile: Private family landowner. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. http://www.youtube.com/watch?v=zrk6BSeKkgY&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl&index=9

Krantz, S. (Producer). 2013. Loblolly pine genetics. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. http://www.youtube.com/watch?v=fnQP-Vw9ArY&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl&index=4

Krantz, S. (Producer). 2013. Exploring the carbon cycle. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. http://www.youtube.com/watch?v=PV1ac6gFyRY&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl&index=7

Krantz, S. (Producer). 2013. Measuring carbon sequestration. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. http://www.youtube.com/watch?v=ozaBUl75c8M&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl&index=1

Krantz, S. (Producer). 2013. Using a clinometer. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. http://www.youtube.com/watch?v=9zY3JcfaTkc&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl&index=6

Krantz, S. (Producer). 2013. Positive and negative externalities. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. http://www.youtube.com/watch?v=5_wOVSBigws&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl&index=5

Krantz, S. (Producer). 2013. Using the life cycle inventory database. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. http://www.youtube.com/watch?v=FwE93ernvC4&feature=player_embedded

Krantz, S. (Producer). 2013. Life cycle analysis. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module.

http://www.youtube.com/watch?v=MwakzG79t0M&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl&index=2

Krantz, S. (Producer). 2013. PINEMAP Focus on Research: Modeling Climate and Tree Growth. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. http://www.youtube.com/watch?v=UgIkNzw8ZvE

Events/Activities

Presentations

Author(s)/Presenter(s)	Title	Type	Date	Venue/Location
Monroe, M.C.	Unraveling public perceptions of climate change [poster]	Poster Presentation	May 16-18, 2011	National Workshop on Climate and Forests, Northern Arizona University, Flagstaff, AZ
Kidd, J.B. and J.R. Seiler	Effective Communication Skills (3 credit undergraduate communication course)	Training/Workshop/ Course	Fall 2012	Online course
Kidd, J.B., J.R. Seiler, M.C. Monroe, and S. Sriharan	The PINEMAP Intern Program: Integrating undergraduates into forest resource and climate change research and education	Poster Presentation	August 5-10, 2012	Ecological Society of America Annual Meeting, August 5-10, Portland, OR
Ryan, Cl, M. C. Monroe, C. Ginger, K. Nelson	Disciplinary integration in education and research: from rhetoric to reality	Panel Discussion	June 6, 2012	International Symposium on Social Science and Resource Management, Estes Park CO
Monroe, M.C. and J. Ireland	PINEMAP Distance Graduate Course Webinar	Webinar	July 27, 2012	Webinar presentation given to CSCAP and REACCH team members
Seiler, J., J. Kidd, M. Monroe, A. Oxarart, and S. Hall	Internship Successes and Education Research-- PINEMAP's Integrating Education Projects	Webinar	September 21, 2012	PINEMAP Internal Webinar Series
Hall, S. and M.C. Monroe	Climate change education for secondary students [poster]	Poster Presentation	October 9, 2012	North American Association for Environmental Education (NAAEE) Research Symposium, Oakland, CA
Monroe, M.C., A Stenstrup, S. Hall, J. Li, and A. Oxarart	Project Learning Tree Secondary Module: Southern Forests and Climate Change	Presentation (Conference)	October 11, 2012	North American Association for Environmental Education (NAAEE) Conference, Oakland, CA
Gregory, B.	Where's the Water?	Presentation (Education)	November 2012	Bluewell Boyscout Troop
Gregory, B.	Where's the Water?	Presentation (Education)	November 2012	Rocky Gap High School, Rocky Gap, VA (Course: Agriculture; Teacher: Faith Copenhaver)
Gregory, B.	Where's the Water?	Presentation (Education)	November 2012	Rocky Gap High School, Rocky Gap, VA (Course: Agriculture; Teacher: Faith Copenhaver)
Gregory, B.	Where's the Water?	Presentation (Education)	November 2012	Bland High School, Bland, VA

Author(s)/Presenter(s)	Title	Type	Date	Venue/Location
Gregory, B.	Where's the Water?	Presentation (Education)	November 2012	Bland High School, Bland, VA
Gregory, B.	Where's the Water?	Presentation (Education)	November 2012	Bland High School, Bland, VA
Gregory, B.	Where's the Water?	Presentation (Education)	November 2012	Rural Retreat High School, Rural Retreat, VA
Gregory, B.	Where's the Water?	Presentation (Education)	November 2012	Rural Retreat High School, Rural Retreat, VA
Gregory, B.	Where's the Water?	Presentation (Education)	November 2012	Rural Retreat High School, Rural Retreat, VA
Gregory, B.	Where's the Water?	Presentation (Education)	November 2012	Wilson Memorial High School, Fishersville, VA
Faison, A.	PINEMAP Experience at Virginia Tech	Presentation (Education)	November 2, 2012	Peabody Middle School, Petersburg, VA (Course: Biology, 8th; Teacher: Cindy Forehand)
Faison, A.	PINEMAP Experience at Virginia Tech	Presentation (Education)	November 6, 2012	Colonial Heights High School, Colonial Heights, VA (Course: Ecology, 10th; Teacher: Christine Hutto)
Faison, A.	PINEMAP Experience at Virginia Tech	Presentation (Education)	November 12, 2012	Sussex High School, Sussex, VA (Course: Biology, 11th; Teacher: Frianeza Rowena)
Faison, A.	PINEMAP Experience at Virginia Tech	Presentation (Education)	November 12, 2012	Sussex High School, Sussex, VA (Course: Biology, 12th; Teacher: Lakesha Sherrita)
Faison, A.	PINEMAP Experience at Virginia Tech	Presentation (Education)	November 12, 2012	Sussex High School, Sussex, VA (Course: Earth Science, 11th; Teacher: Isaac Linton)
Faison, A.	PINEMAP Experience at Virginia Tech	Presentation (Education)	November 12, 2012	Sussex High School, Sussex, VA (Course: Chemistry, 11th; Teacher: Felicitas Corpuz)
Faison, A.	PINEMAP Experience at Virginia Tech	Presentation (Education)	November 12, 2012	Sussex High School, Sussex, VA (Course: Mathematics, 12th; Teacher: Jerry Parham)
Gregory, B.	Where's the Water?	Presentation (Education)	November 14, 2012	Chatham High School, Chatham, VA
Decker, P.	Counting the Carbon	Presentation (Education)	November 15, 2012	Shawsville Middle School, Shawsville, VA (Course: Physical Science, 8th; Teacher: Angela Borealo)
Decker, P.	Counting the Carbon	Presentation (Education)	November 15, 2012	Shawsville Middle School, Shawsville, VA (Course: Physical Science, 8th; Teacher: Angela Borealo)
Decker, P.	Counting the Carbon	Presentation (Education)	November 15, 2012	Shawsville Middle School, Shawsville, VA (Course: Physical Science, 8th; Teacher: Angela Borealo)
Decker, P.	Counting the Carbon	Presentation (Education)	November 15, 2012	Shawsville Middle School, Shawsville, VA (Course: Physical Science, 8th; Teacher: Angela Borealo)

Author(s)/Presenter(s)	Title	Type	Date	Venue/Location
Decker, P.	Counting the Carbon	Presentation (Education)	November 15, 2012	Shawsville Middle School, Shawsville, VA (Course: Physical Science, 8th; Teacher: Angela Borealo)
Decker, P.	Counting the Carbon	Presentation (Education)	November 16, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Life Science, 7th; Teacher: Jim Shockley)
Decker, P.	Counting the Carbon	Presentation (Education)	November 16, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Life Science, 7th; Teacher: Jim Shockley)
Decker, P.	Counting the Carbon	Presentation (Education)	November 16, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Life Science, 7th; Teacher: Jim Shockley)
Decker, P.	Counting the Carbon	Presentation (Education)	November 16, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Life Science, 7th; Teacher: Jim Shockley)
Decker, P.	Counting the Carbon	Presentation (Education)	November 16, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Life Science, 7th; Teacher: Jim Shockley)
Decker, P.	Counting the Carbon	Presentation (Education)	November 26, 2012	George Wythe High School, Wytheville, VA (Course: Horticulture; Teacher: Kristin Walsh)
Decker, P.	Counting the Carbon	Presentation (Education)	November 26, 2012	George Wythe High School, Wytheville, VA (Course: Horticulture; Teacher: Kristin Walsh)
Kennerley, W.	Photosynthesis, Respiration, and Combustion: Carbon Cycling in Action	Presentation (Education)	November 26, 2012	Twin Springs High School, Nickelsville, VA (Course: Environmental Research; Teacher: April Addington)
Faison, A.	PINEMAP Experience at Virginia Tech	Presentation (Education)	November 27, 2012	Petersburg High School, Petersburg, VA; Course: Biology, 11th; Teacher: Gilbert Capate)
Kennerley, W.	Photosynthesis, Respiration, and Combustion: Carbon Cycling in Action	Presentation (Education)	November 28, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Life Science, 7th; Teacher: Jim Shockley)
Kennerley, W.	Photosynthesis, Respiration, and Combustion: Carbon Cycling in Action	Presentation (Education)	November 28, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Life Science, 7th; Teacher: Jim Shockley)

Author(s)/Presenter(s)	Title	Type	Date	Venue/Location
Kennerley, W.	Photosynthesis, Respiration, and Combustion: Carbon Cycling in Action	Presentation (Education)	November 28, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Life Science, 7th; Teacher: Jim Shockley)
Kennerley, W.	Photosynthesis, Respiration, and Combustion: Carbon Cycling in Action	Presentation (Education)	November 28, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Life Science, 7th; Teacher: Jim Shockley)
Kennerley, W.	Photosynthesis, Respiration, and Combustion: Carbon Cycling in Action	Presentation (Education)	November 28, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Life Science, 7th; Teacher: Jim Shockley)
Gregory, B.	Where's the Water?	Presentation (Education)	November 30, 2012	Twin Springs High School, Nickelsville, VA (Course: Environmental Research; Teacher: April Addington)
Gregory, B.	Where's the Water?	Presentation (Education)	November 30, 2012	Twin Springs High School, Nickelsville, VA (Course: Earth Science; Teacher: April Addington)
Kennerley, W.	Photosynthesis, Respiration, and Combustion: Carbon Cycling in Action	Presentation (Education)	November 30, 2012	Carroll County High School, Hillsville, VA (Course: Natural Resources, 10-11th; Teacher: Scott)
Kennerley, W.	Photosynthesis, Respiration, and Combustion: Carbon Cycling in Action	Presentation (Education)	November 30, 2012	Carroll County High School, Hillsville, VA (Course: Biology, 10th; Teacher: Scott)
Kennerley, W.	Photosynthesis, Respiration, and Combustion: Carbon Cycling in Action	Presentation (Education)	November 30, 2012	Carroll County High School, Hillsville, VA (Course: Biology, 10th; Teacher: Scott)
Kennerley, W.	Photosynthesis, Respiration, and Combustion: Carbon Cycling in Action	Presentation (Education)	November 30, 2012	Carroll County High School, Hillsville, VA (Course: Honors Biology, 10th; Teacher: Scott)
Jarvis, R.	Our Changing Climate	Presentation (Education)	December 4, 2012	Auburn High School, Riner VA (Course: Ecology, 11th-12th; Teacher: Terri Shepard)
Jarvis, R.	Our Changing Climate	Presentation (Education)	December 4, 2012	Auburn High School, Riner VA (Course: Ecology, 11th-12th; Teacher: Terri Shepard)
Jarvis, R.	Our Changing Climate	Presentation (Education)	December 4, 2012	Auburn High School, Riner VA (Course: Ecology, 11th-12th; Teacher: Terri Shepard)
Jarvis, R.	Our Changing Climate	Presentation (Education)	December 6, 2012	Pulaski County High School, Dublin, VA (Course: Dual Enrollment Biology; Teacher: Eileen Petzold and Michael Hoffman)
Jarvis, R.	Our Changing Climate	Presentation (Education)	December 6, 2012	Pulaski County High School, Dublin, VA (Course: Dual Enrollment Biology; Teacher: Eileen Petzold and Michael Hoffman)

Author(s)/Presenter(s)	Title	Type	Date	Venue/Location
Jarvis, R.	Our Changing Climate	Presentation (Education)	December 6, 2012	Pulaski County High School, Dublin, VA (Course: Dual Enrollment Biology; Teacher: Eileen Petzold and Michael Hoffman)
Jarvis, R.	Our Changing Climate	Presentation (Education)	December 6, 2012	Pulaski County High School, Dublin, VA (Course: Dual Enrollment Biology; Teacher: Eileen Petzold and Michael Hoffman)
Jarvis, R.	Our Changing Climate	Presentation (Education)	December 13, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Earth Science, 6th-7th; Teacher: Michaelle Wilkins)
Jarvis, R.	Our Changing Climate	Presentation (Education)	December 13, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Earth Science, 6th-7th; Teacher: Michaelle Wilkins)
Jarvis, R.	Our Changing Climate	Presentation (Education)	December 13, 2012	Blacksburg Middle School, Blacksburg, VA (Course: Earth Science, 6th-7th; Teacher: Michaelle Wilkins)
Monroe, M.C. and J. Ireland	2 credit PINEMAP Distance Graduate Course, Climate and Forests	Training/Workshop/Course	Spring 2013	Online course for PINEMAP Graduate Students
Hall, S. and M.C. Monroe	Student learning with two different ways of teaching about climate and carbon	Presentation (Meeting)	April 24, 2013	PINEMAP 2013 Annual Meeting, Athens, GA
Hall, S. and M.C. Monroe	Incorporating Climate Change into the Biology Classroom	Poster Presentation	April 24-26, 2013	PINEMAP Annual Meeting, Athens, GA
Li, C. and M.C. Monroe	Exploring Factors Affecting Students' Learning and Characteristics for Educative Curriculum to Build Teachers' Self-Efficacy in Climate Change Education	Poster Presentation	April 24-26, 2013	PINEMAP Annual Meeting, Athens, GA
Oxarart, A., M. Monroe, S. Hall, and C. Li	Climate Change and Southeastern Forests: A Project Learning Tree Secondary Module	Poster Presentation	April 24-26, 2013	PINEMAP Annual Meeting, Athens, GA
Monroe, M. C.	Why so many perceptions about climate?	Presentation	May 24, 2013	Climate Change Symposium for Teachers, University of Florida, Gainesville FL
Monroe, M.C. and A. Oxarart	Climate Change Symposium (Teacher in service training)	Training/Workshop/Course	May 24, 2013	University of Florida, Gainesville, FL
Monroe, M. C., and J. Li	Climate Change Mitigation & Adaptation	Presentation	July 18, 2013	University of Florida Center for Precollegiate Education and Training, Gainesville, FL
Monroe, M. C.	Engaging Adult Learners in Extension Programs	Webinar	September 9, 2013	Minnesota Extension Professional Development

Author(s)/Presenter(s)	Title	Type	Date	Venue/Location
Monroe, M. C.	Why Deny? How climate deniers justify their beliefs	Poster	October 9, 2013	North American Association for Environmental Education (NAAEE) Research Symposium, Baltimore MD
Krantz, S.	Video as a Research Tool	Roundtable Presentation	October 9, 2013	North American Association for Environmental Education (NAAEE) Research Symposium, Baltimore MD
Li, J.	Formative Evaluation as a Tool for Bridging the Research-Practice Gap	Roundtable Presentation	October 9, 2013	North American Association for Environmental Education (NAAEE) Research Symposium, Baltimore MD
Monroe, M. C., A. Oxarart, J. Li, T. Ritchie, K. Kunkle, K. Glover, A. Stenstrup	Climate Change and Southeastern Forests: A New PLT Secondary Module	Workshop	October 10, 2013	North American Association for Environmental Education (NAAEE conference), Baltimore MD
Krantz, S.	Engaging Audiences through Video	Roundtable Presentation	October 11, 2013	North American Association for Environmental Education (NAAEE conference), Baltimore MD
Kidd, J. B., J. R. Seiler, M. C. Monroe, S. Sriharan	Undergraduates using climate and forest ecosystem issues to engage secondary school students	Poster Presentation	October 23-27, 2013	Society of American Foresters 2013 National Convention, North Charleson, SC
Monroe, M. C., A. Oxarart, J. Li, T. Ritchie, K. Kunkle	Module Activities on Forest Management and Life Cycle Analysis (6, 50-minute classes)	Presentations	November 12-19, 2013	Santa Fe High School, Alachua, FL
Seiler, J., J. Kidd, M. Monroe, A. Oxarart, K. Kunkle, J. Li, and S. Krantz	Integrating Education and Research: All Team PINEMAP	Webinar	December 6, 2013	PINEMAP Internal Webinar Series
Kidd, J. B.	Evaluation of an innovative research experience for undergraduates: The PINEMAP Undergraduate Fellowship Program	Poster Presentation	March 3, 2014	Connections 2014 Conference, Blacksburg, VA
Kidd, J. B., J. R. Seiler, M. C. Monroe, S. Sriharan	Two years in: reflections on the PINEMAP undergraduate fellowship program	Presentation	March 15, 2014	Biennial Conference on Undergraduate Education in Natural Resources (BCUENR) Conference, Auburn, AL
Monroe, M. and J. Li	Climate Change in the Classroom	Presentation	March 22, 2014	League of Environmental Educators in Florida (LEEF) Conference, Altoona, FL
Monroe, M., K. Kunkle, T. Ritchie, and S. Krantz	PLT Secondary Module: Southeastern Forests and Climate Change	Presentation	March 22, 2014	League of Environmental Educators in Florida (LEEF) Conference, Altoona, FL
Ritchie, T.	Using Systems Thinking to Improve Student Achievement in Environmental Education	Poster Presentation	March 22, 2014	League of Environmental Educators in Florida (LEEF) Conference, Altoona, FL
Li, J. and M. Monroe	Assessing Teens' Misconceptions about Climate Change	Poster Presentation	March 22, 2014	League of Environmental Educators in Florida (LEEF) Conference, Altoona, FL

Author(s)/Presenter(s)	Title	Type	Date	Venue/Location
Oxarart, A. and M. Monroe	EE at UF's SFRC: Engaging Activities on Complex Issues	Poster Presentation	March 22, 2014	League of Environmental Educators in Florida (LEEF) Conference, Altoona, FL
Kunkle, K.	Evaluating Websites in Environmental Education and Extension	Poster Presentation	March 22, 2014	League of Environmental Educators in Florida (LEEF) Conference, Altoona, FL

Trainings, workshops, and courses

Undergraduate Fellowship Program

The PINEMAP Undergraduate Fellowship Program has a unique twist on the traditional research experience for undergraduates (REU) in that each of the undergraduates accepted into the program is paired with a PINEMAP graduate student mentor and participates in a distance course following completion of the 12-week, full-time summer internship. Undergraduates from across the southeastern United States are hired as wage employees of Virginia Tech, earning up to $7,000, and are paired with graduate student researchers at one of PINEMAP's collaborating universities. This distributed fellowship affords most undergraduate fellows the opportunity to experience working in a setting outside their home universities. Additionally, the program vertically integrates undergraduates, graduate students, and faculty with the potential for each participant to be exposed to a variety of research interests, skillsets, and learning experiences.

Undergraduates then take gained knowledge and skills back to their universities as they continue their degree programs. This capacity to train undergraduates as researchers and educate them on climate change and forest resources issues addresses PINEMAP's education and training goals. Undergraduate fellows in the 2013 year had learning experiences that were practical and philosophical. Fellows performed technical work on their mentors' projects and learned not just the 'how' but also the 'why' behind the research. Many fellows were also able to help with other research projects as opportunities presented themselves. Twelve more undergraduate fellows completed the second year of the program in December 2013. The program is currently recruiting up to 18 more undergraduate fellows for the third operating year during May-December of 2014.

Undergraduate Fellowship Program Effective Communication Skills Course

At the end of the summer fellowship, fellows return to their home universities for fall courses and participate in a distance course, *Effective Communication Skills*. This course is an avenue for fellows to educate secondary students near their universities about PINEMAP's goals and research. *Effective Communication Skills* is a three-credit, letter-graded, distance education course co-taught by Virginia Tech faculty. Students receive credit by registering for independent study hours through their universities' academic advisors. The course is conducted synchronously over the Internet using web conferencing software and meets formally for one hour each week during the fall. Students also complete assignments outside of class as their schedules allow. The course has two major components, and both are related to research that

fellows conduct during their summer internship. First, the course covers various interpersonal written, oral, and nonverbal communication skills. Students learn about these skills through multimedia, readings, and self-reflection, and then put these skills to use when developing and practicing presentations to be given in middle and high school classrooms later in the semester. Additionally, students communicate scientific research through writing an abstract and creating scientific poster and PowerPoint® presentations based on their summer research.

The second, and perhaps most important, component of the course is the outreach component: students deliver their presentations to secondary public school audiences. These presentations target primarily middle and high school science classes, but 4-H or scouting groups are also potential audience groups. While developing presentations, students identified standards of learning (SOL) from their states' educational guidelines for the targeted grade level and subject. After selecting a target SOL, students developed an outline for a hands-on presentation that incorporated their personal research interests, climate change issues, and forest resources. This outline became the backbone for a 50-minute lesson on each student's chosen topic and included activities to help secondary students understand the complex concepts. In the second year, 107 presentations were delivered to 2,629 public school students from 25 different schools (Table 1). Twelve undergraduates participated in the course during Fall 2013.

Table 1. Individuals reached through the 2013 PINEMAP Undergraduate Fellowship Program.

Outreach metric	Number
Fellowships completed	12
Presentations delivered	107
Schools visited	25
Teachers visited	40
Students reached	2,629

Spring 2013 Distance Graduate Course

As part of the education outcomes of PINEMAP, the second offering of the online graduate course was conducted during the spring 2013 semester. The course goals were to:

- engage graduate students in exploring climate change mitigation and adaptation issues in southern pine forests and
- build capacity for integration among research disciplines and between research and education/Extension

Based on feedback from the 2012 course evaluation, we revised the course structure for spring 2013. Some of the major changes included revising one of the group assignments to be an individual research assignment on interdisciplinary research, better defining the grading structure with rubrics, reducing the amount of weekly readings, restructuring the lectures to be an introduction to each topic rather than an in-depth exploration of a specific area, making the online discussion required, and better engaging faculty in the online discussion. Nineteen students from eight universities participated in the spring 2013 course, and anecdotal feedback

suggested the revisions have helped students engage to a greater extent and develop a stronger foundation in all of the interrelated topics.

Experiments, surveys, and data collection

Research on Climate Change Education Strategies

Climate change is a global issue that requires knowledgeable citizens who are able to make informed decisions about mitigation and adaptation activities. Currently, neither adults nor teens are well informed on this issue, suggesting the need for a stronger education effort. However, some teachers may avoid climate change because they are unsure of how to approach a controversial issue. Also, some students enter the classroom with misconceptions and attitudes about climate change that are influenced by sources outside the classroom. Using activities drafted for the Project Learning Tree secondary module, the following research questions were being investigated:

1. To what extent are student attitudes about climate change influenced by their perception of their parents' opinions of climate change?
2. How does integrating carbon lessons with climate change affect student interest and knowledge about carbon?
3. Is a role play or discussion more effective for encouraging students to respectfully discuss a variety of opinions about climate change?

Methods

Data were collected at two summer science programs organized by the University of Florida Center for Precollegiate Education and Training, Science Quest (SQ) and Student Science Training Program (SSTP).

Science Quest

Participants were 47 rising high school sophomores in two offerings of a week-long program. Students in each program engaged in a half-day educational experience about forest carbon. The week one group (SQ 1) learned about carbon cycles in the context of climate change (Table 1). The week two group (SQ 2) participated in the same activities, but climate change was not mentioned until after the post test (Table 1). Group interviews were conducted after completing the activities to explore students' attitudes about the lesson.

Table 1. Students' attitudes about the lesson in the SQ1 group and SQ2 group.

SQ1 group- Carbon cycle activities in the context of climate change (n=23)	**SQ2 group- Carbon cycle activities not in the context of climate change (n=24)**
- Pre-test on carbon knowledge - Activities • Students move through the carbon cycle as a carbon atom and discuss human impacts on the carbon cycle • Students measure carbon in a tree, calculate their state's sequestration rate, and compare	- Pre-test on carbon knowledge - Activities • Students move through the carbon cycle as a carbon atom • Students measure carbon in a tree and calculate carbon in the forest - Post-test

to emissions rate - Post-test - Interviews	- Discussion of human impacts on carbon cycle, state's sequestration rate compared to emissions rate - Interviews

SSTP

Participants were 42 rising high school juniors and seniors in a seven-week research program. All students took a pretest that measured their climate change knowledge and attitudes as well as their perception of their parents' attitudes. Students attended a one-hour lecture introducing climate change science and why people hold different perspectives about this issue. Four days later, all students took a posttest on their climate change knowledge and attitudes. Students were split into small groups. Half of the groups participated in a role play with different climate change perspectives in which they were asked to generate three solutions to climate change that everyone could agree on. The other groups participated in a discussion in which they had to agree on three climate change solutions they felt would be practical given that people in their community hold many perspectives (the same perspectives as presented in the role play). Students also completed a questionnaire about the lesson.

Results

Students' Climate Change Attitudes

A forward stepwise regression was conducted to predict student attitudes about climate change. There was a strong R^2 value for SQ2 and SSTP; the most significant term was perception of parents' climate change attitudes. SQ1 had a weak R^2 value and the most significant term was students' political views. This implies that students come into the classroom already holding opinions about climate change that are partially influenced by outside factors, such as perception of parents' attitude and the political party they favor.

Student Knowledge Gain and Interest

In the SQ1 group, students scored significantly higher ($p<0.05$) on the posttest than the pretest. The pretest and posttest scores were not significantly different for SQ2. There was no significant difference between the week 1 and 2 pretests, and also no significant difference for posttests. Embedding the carbon cycle lesson in the context of climate change appears to have significantly increased student knowledge about the carbon cycle, although this conclusion would be stronger if there were a significant difference between the posttest scores. In the interviews, students explained that linking carbon cycle activities with climate change makes the topic more interesting and relevant, even for students who are less concerned about climate change.

Role Play and Discussion

Students engaging in the role play activity made more frequent mentions of other perspectives but also had a greater frequency of disrespectful comments than students engaging in the discussion activity. Changing the role play to emphasize respect or adding a moderator could make the conversation more respectful. This modified role play offers a potential strategy for teachers to approach the controversy while not confusing students about the science of climate change.

Discussion

Climate is typically a unit for earth science classes, but it can also enhance the biology curriculum by providing an interesting purpose for learning about topics such as the carbon cycle. Students come into the classroom with knowledge and attitudes influenced by outside sources, however, which could affect learning. Activities should be designed to offer teachers guidance to approach the types of situations they are likely to face and to facilitate interesting and engaging activities with students.

Undergraduate Fellowship Program: Effective Communication Skills Evaluation Survey

Fellows were asked to complete a course evaluation survey at the end of the semester. Four of the five participants completed the survey. The survey contained 19 closed-ended, Likert-type items and 3 open-ended short answer questions.

Respondents indicated that the workload for the course was appropriate for the credit received. Content and assignments were identified as being organized and well-ordered, but due date timing could potentially be improved. Students agreed that course content increased their understanding of the subject matter and that their interests were stimulated. Students also identified that their ability to think creatively increased. Review of submitted assignments was viewed favorably, showing an improvement in this offering of the course.

Responses to open-ended items indicate that students benefited greatly from practicing the public school presentations. The abstract, poster presentation, and oral presentation assignments were positively received and thought to be beneficial. However, due to the timing of these assignments and course schedule, feedback on these assignments suggests that they could be improved. Fellows suggested that the assignments should be spread out giving students more time to discuss them as a group. For 2013, we implemented a peer-review system for the research poster assignment, and students remarked that this was beneficial

Undergraduate Fellowship Program: Effective Communication Skills Public Speaking Apprehension Survey

Undergraduate fellows participating in the PINEMAP internship program's distance education course, Effective Communication Skills, were asked to complete a pre- and post-course quantitative survey using 5 point Likert-type items on their public speaking apprehension. Pre- and post-test responses will be collected each year the course is operated to identify changes in individuals' anxiety about public speaking. At the end of the course in fall 2013, 10 students in the course voluntarily completed both the pre- and post-course surveys, and three students completed only the pre-course survey. Analyses on the survey will be conducted when all students have been through the program and the course has been given one more time to approximately 12 to 18 more students.

Undergraduate Fellowship Program Attitudes Survey

Undergraduate interns were surveyed to determine attitudes toward research before and after a 12 week internship in PINEMAP-related research. Interns were asked to complete a pre-internship survey on their attitudes toward research. Pre-internship results will be compared with those from a post-internship survey as an attempt to detect changes in attitudes. This study will be conducted over the length of the Undergraduate Internship Program, and has a potential maximum sample size of 50 interns. To date, 16 of 18 pre-internship surveys, and 13 of 18 post-internship surveys have been voluntarily completed. Both surveys were completed by 13 undergraduates. Open-ended items from the post-test indicate that these particular students greatly value the research internship experience and gained a greater knowledge of the research process. Some respondents clarified their expected post-graduate career decisions.

Climate Change Symposium for Teachers

This one-day professional development opportunity for middle and high school science teachers was held on May 24, 2013 at University of Florida in Gainesville, Florida. This symposium included faculty research presentations and discussions related to the impact of climate change on marine, coastal, forest, and agricultural systems and engaged educators in novel hands-on activities they can use to teach climate change related topics in the classroom. Florida-specific projections and implications of climate change were used to consider potential risks to coastal development, ecosystems, and forest health. Of the 12 concurrent sessions, 6 were conducted by PINEMAP faculty and students and featured module activities. The symposium brought together five partners: PINEMAP, Florida Climate Institute, UF Center for Precollegiate Education and Training, UF School of Forest Resources and Conservation, and League of Environmental Educators in Florida.

Fifty-three teachers attended the symposium, and more than ¾ of the participants (n=43) completed the pre and post surveys which were used to evaluate the symposium. These respondents are mostly female (62%), teach 9-12th grade (77%), and teach biology or environmental science courses (50%) in public schools. While most of the educators (83%) had taught about climate change in the past, the symposium reached a least a few educators who had not yet included the topic in their curriculum. In addition, the symposium reached some educators who indicated they were not comfortable teaching about climate change, with 19% of respondents reporting they were “somewhat” to “very” uncomfortable. Self-reported knowledge levels about climate change prior to the symposium varied, with about ½ reporting a “moderate” understanding of the issue and about 1/3 reporting a “basic” understanding.

After the symposium, a majority of the respondents, 88%, said that they plan to expand their coverage of climate change in the upcoming year; another 9% may expand their coverage of the topic, and only 2% will not. The symposium influenced 43% of the respondents’ choices “very much” and influenced 35% of respondents’ choices “a fair amount.” The symposium was most successful in providing a respectful learning atmosphere, using credible experts for presentations, and presenting information in a way that participants could understand (Table

1). The symposium was also successful at helping educators feel like part of a community of educators interested in teaching about climate change, increasing educator confidence in teaching about the topic, and preparing educators to incorporate climate change into their course—all of which are important characteristics for those educators who had low levels of confidence or had not taught about the issue in the past.

Table 1: Participants' Ratings of Symposium Characteristics

To what extent did the training:	Mean*(N)
Provide a respectful learning atmosphere	3.91 (43)
Use credible experts	3.86 (43)
Present information that you could understand	3.79 (43)
Help you feel like part of a community of educators interested in teaching about climate change	3.56 (43)
Increase your confidence to teach about climate change	3.26 (43)
Prepare you to incorporate climate change into your courses	3.26 (42)
Provide adequate time for reflection	3.05 (43)
Improve your ability to recognize and address common misconceptions your students may have	2.70 (43)
Increase confusion about this issue	1.19 (43)

*Scale of one to four in which one is "not at all" and four is "very much"

The respondents had many positive comments about the symposium. For example, an integrated science teacher commented, "This was a great symposium with ideas and lesson plans immediately useful and ready to be integrated into classrooms from 5^{th}-12^{th} grade. I was very impressed with all the speakers I had the pleasure of hearing. I've got so many great tools to take back to my students and learned quite a bit myself." Many of the suggestions for improvements related to having more time at the symposium. For example, one participant noted that "it could be nice to have some of the sessions repeated so you could see/hear things that ran at the same time." In addition, some participants suggested that future symposia have different tracks to help provide the right level of detail for participants: "I was hoping to get the update on the latest research and instead each instructor spend 80% of time going over basics. Maybe have different options available and indicate 'for beginners' on the schedule."

A "how-to" report that provides guidance, tips, and lessons learned from our experience is forthcoming. We hope this report will be useful for PINEMAP collaborators who are interested in developing a similar teaching training at their institution.

Formative Evaluation of Secondary Education Module: Teacher Feedback

Objectives

To test the usefulness and effectiveness of this module, the evaluation and research team based at the University of Florida's School of Forest Resources and Conservation conducted a formative evaluation during fall 2013. The formative evaluation plan was developed and revised

with input from the Education Advisory Committee (n=5) and designed to answer the following questions:

a. What are teachers' perceptions of the secondary teaching module?
b. How can the activities be improved?
c. What are teachers' perceptions of the online training resources and secondary teaching? module website?

Procedure and Instruments

After approval from the Institutional Review Board at University of Florida, an invitation was sent through several email lists to recruit pilot testers. From the 123 applicants, 64 teachers were accepted to represent regional and grade-level diversity. Twenty-eight teachers (46.4% high schools and 53.6% middle school) agreed to use two activities and complete the online teacher evaluation form. Thirty-six high school teachers agreed to use four activities, complete the online teacher evaluation form, and involve their students in pre- and post-activity surveys. Teacher evaluation forms were developed, reviewed by 10 experts, revised, and pilot tested with 2 teachers. Student pre- and post-tests were developed, reviewed by 9 experts, revised, and pilot tested with 89 students who participated in the University of Florida's Center for Precollegiate Education and Training Student Science Training Program over the summer of 2013.

Results

Forty-four pilot testers completed their evaluation forms by January 24, 2014, and about half (53%) of the teachers used the activities in environmental science and advanced placement (AP) environmental science classes. About 15% used the activities for middle school integrated science classes and 14% used the activities in biology and AP biology classes. The remaining teachers (8%) used the activities in courses such as earth science, land resources, economics, and ecology. The pilot testers were from Florida (45%), Kentucky (16%), Virginia (14%), Arkansas (11%), North Carolina (9%), and Georgia (5%). Although the activities are designed for high school students, we involved middle school teachers in the pilot test and asked them if the materials could be adapted for their students.

Pilot testers provided positive comments about the organization and detail of the materials and online supplemental resources. About 90% of high school teachers said the activity they pilot tested was ready for classroom use. On average, high school teachers agreed that their students were able to meet the activity's stated objectives (*Mean*=4.27, *SD*=0.78 on a scale of 1 to 5, with 5 = strongly agree) and the activity procedure was appropriate for their students (*Mean*=4.27, *SD*=0.80). As expected, data from middle school teachers suggests that the activities were a little more challenging (*Mean*=3.76, *SD*=1.2) and the students were slightly less able to meet stated objectives (*Mean*=3.91, *SD*=0.90) as compared to high school students. Pilot testers indicated that the online training resources and module website effectively prepared them to use these activities (*Mean*=4.58, *SD*=0.58) and built their confidence to teach about climate science topics (*Mean*=4.54, *SD*=0.56). The results of the formative evaluation suggest that these activities are written in an appropriate tone and provide sufficient background information for teachers to effectively use them in their classrooms.

Recommendations

Teachers provided many excellent suggestions for improving the materials. After reviewing the teachers' feedback and recommendations on all the activities, the module development team is focusing on the following overall changes:

a. Include a section that offers an adaptation of each activity for middle school students or basic high school classes.
b. Provide multiple-choice questions to allow teachers to develop a student quiz and include writing prompts for assessments on each activity.
c. Add comments from teachers about their classroom experience and suggestions for using the materials to both the printed document and website.

Many pilot testers indicated that they would like to implement the lessons with future classes and were very pleased with the formative evaluation process. After the PINEMAP education team completes revisions and updates the website, we will begin plans for regional teacher workshops.

MILESTONES

Report of audience assessment for PLT module

We completed a survey of secondary science teachers in the Southeast. The information gleaned is providing justifications for the Project Learning Tree/PINEMAP module and helping us prioritize activities and resources. These results have been shared with the Education Advisory Committee and PINEMAP collaborators through a research summary, PINEMAP newsletter article, and PINEMAP internal webinar. A peer-review publication has been published in Applied Environmental Education and Communication.

Report of research on climate change education strategies

Data were collected at two summer science programs organized by the University of Florida's Center for Precollegiate Education and Training: Science Quest and Student Science Training Program to determine whether connecting carbon lessons to climate change affects student interest and knowledge gain, whether student's attitudes about climate change are influenced by their perception of their parents' opinions of climate change, and whether a discussion or a role play is more effective in getting students to discuss the variety of opinions about climate change. The results were reported in Stephanie Hall's thesis and are being developed into a journal article.

Draft module and training ready for formative test

The final draft of the Project Learning Tree/PINEMAP secondary module was completed. The module contains 13 activities that are designed to introduce students to the important relationship between southeastern forests and climate change, echoing every dimension of PINEMAP's research. Specifically, the goals of the module are to help students

- Understand how climate change could impact forests in the southeastern U.S.;
- Understand how forests can be managed to address changing climate conditions and to reduce greenhouse gas emissions;

- Enhance decision-making skills to make informed choices as consumers to mitigate climate change;
- Develop systems-thinking skills to see connections between climate change, forests, and people;
- Recognize that individual and community actions can help mitigate and adapt to climate change; and
- Become part of future community conversations about climate change and potential solutions.

During the expert review process (Spring 2013), at least 2 members of each PINEMAP Aim reviewed each activity. We received 25 detailed reviews of the activity content, and incorporated their suggestions and edits. Each activity was subsequently reviewed by at least one expert to check those changes. In total, more than 80 people helped develop the module through writing and editing activities, serving on the Education Advisory Committee, reviewing the module content for scientific accuracy, and developing online resources to help teachers use the materials. A new Education Advisory Committee, consisting of 8 formal and non-formal educators or curriculum specialists, was developed in January 2013. This group will help guide the development of the online module resources and the formative evaluation. The group will meet four times by conference call. Two meetings have already been held (March and July 2013).

A module website was developed to provide teachers with online access to the all module materials and to provide training to introduce activities and support teachers in using them (http://sfrc.ufl.edu/extension/ee/climate/). We created the following teacher tools to serve as an online training:

- Tour the Activity: A short training (less than 5 minutes) to provide an overview of the activity and tips for leading the activity with students.
- Check Your Knowledge: A short quiz the teacher can use to gauge their readiness to teach the activity.
- Explore More: Videos and interactive tools to learn about the topic or research related to the activity.

A total of 11 Explore More videos were created, and we are currently requesting new ideas for videos or narrated PowerPoint presentations from Aims 1-4.

The formative evaluation plan was drafted and revised with input from the Education Advisory Committee. Teacher evaluation forms were developed, reviewed by 10 experts, and revised, and teachers will complete these online evaluation forms for each activity they use in their classroom. This data collection opportunity is also being used to explore research questions regarding how environmental education materials can affect high school students' knowledge, attitudes, skills, and behavior. Christine Jie Li is leading this effort as part of her PhD program with Martha Monroe. A subset of the evaluation participants will participate in the research study and will collect student data through pre- and post-tests. Student pre- and post-tests were developed, reviewed by 9 experts, revised, and pilot tested with 89 students who participated in the UF-CPET Student Science Training Program.

The draft module and formative evaluation materials were completed in August 2013, and the pilot test took place from August – December 2013.

Web-based course in multidisciplinary research for graduate students completed

The second offering of the course occurred in spring 2013 term. Nineteen students from 8 universities participated in the course.

Undergraduate research internships completed

Twelve undergraduate fellows began working at their mentors' host universities in mid- to late-May. Fellows remained at their host university through the 12 week internships. After internships concluded mid-August, students returned to their home universities for the fall semester and to participate in the undergraduate *Effective Communication Skills* course.

Undergraduate teaching and communication distance course completed

The undergraduate distance-delivered course, *Effective Communication Skills*, ended in December 2013. The course met this milestone with all 12 students earning credit for completion.

BROAD IMPACTS

One offshoot of the Education Aim work is the opportunity for John Kidd to pursue dissertation research on the PINEMAP Undergraduate Fellowship Program and similar research experiences for undergraduates. John plans to conduct a meta-analysis of natural resource REUs including the Fellowship Program. This analysis would categorize, define, and describe current summer undergraduate research experiences and/or internships within the natural resource discipline. There may be a possibility for opening up any evaluations of the fellowship program to other natural resources REUs that currently do not have evaluations in place.

We have been able to involve many people representing a variety of expertise areas in our module development process through the advisory committee, expert review, pilot test, and incorporating student projects into undergraduate environmental education courses. These connections have provided opportunities to introduce PINEMAP research and to build relationships that will help us distribute and train educators to use the final module.

We have built a strong relationship with the University of Florida Center for Precollegiate Education and Training. This relationship has allowed us to test activities and evaluation tools, to present about climate change and forest topics, and to co-produce the Climate Change Symposium.

TRAINING

Last name	First name	Position	University	Role
Decker	Paul	Undergraduate Intern	VT	2012 Undergraduate Fellow; worked with Stephanie Hall at University of Florida to investigate how to teach high school students about controversial topics such as climate change.
Glover	Kristen	Undergraduate Intern	UF	2013 Undergraduate Fellow; working with Christine Li at UF
Krantz	Shelby	M.S. Student	UF	Produced videos for module website
Holmes	Tiara	Undergraduate Intern	VT	Assisted with video production for module website
Hall	Stephanie	M.S. Student	UF	Research focus: conducting research on how to best introduce potentially divisive and contested concepts in secondary school curricula; also helping to develop and pilot test activities for the PLT/PINEMAP Secondary Module.
Kidd	John	Research Staff	VT	Undergraduate Intern Program Coordinator. Developing the selection criteria, matching students, awarding proposals, developing the fall course, and working with local teachers to set up school presentations for the Undergraduate Internship Program.
Li	Ji (Christine)	Ph.D. Student	UF	Research focus: Assessing interest in climate change based on and hopefulness and relevance of solutions; teacher self-efficacy for teaching about climate; student self-efficacy for participating in climate change solutions.
Oxarart	Annie	Research Staff	UF	Environmental Education Program Coordinator. Working on the development of the PLT/PINEMAP Secondary Module, including assisting with the needs assessment, development and pilot testing of activities, and oversight of the Education Advisory Committee.
Plate	Richard	Postdoc	UF	Assisting with the development and evaluation of activities for the PLT/PINEMAP Secondary Module and analyzing needs assessment data; assisting with data analysis for the Extension climate perceptions survey.
Kunkle	Kristen	M.S. Student	UF	Research focus: conducting evaluation of module website and tools that convey pedagogical content knowledge about climate change to educators
Ritchie	Tracey	Ph.D. Student	UF	Research focus: Conducting summative evaluation and exploring … TBD