PINEMAP Year 4 Progress Report 2
April 2015
Aim 5 (Education)

This is the final Aim progress report for year 4 (March 1, 2014-February 28, 2015). The information provided in these reports is used to track Aim-level outputs and outcomes over the course of the project and to fulfill NIFA reporting requirements via the annual continuation proposals and REEport progress report.

The purpose of this report is to gather information on progress since the previous progress report completed in September 2014.

To streamline this process, information reported in September 2014 is provided below, so you will simply need to review and update each section as necessary.

Please return the completed report to Grace no later than April 10

OUTCOMES/IMPACTS

Outcomes and ***Impacts*** are tangible results for stakeholders and society that the project has produced to advance on the societal challenge (e.g., ***changes in knowledge, actions, or conditions*** that result from project activities). Outcomes and impacts are similar, but impacts are typically longer-term; outcomes are used as a nearer-term proxy for impacts.

Describe how Aim-level activities, results, findings, techniques, or products contribute to project-level outcomes and impacts (e.g., changes in knowledge, actions, or conditions resulting from activities).

A narrative has been drafted below. Please modify or update as necessary.

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 undergraduate course titled Effective Communication Skills was offered in fall 2014 and nine undergraduate fellows completed it while the remaining three fellows finish it during spring 2015. This cohort delivered 75 presentations on forest resources at 23 secondary schools in the southeastern US and reached a total of 1,367 students. The PINEMAP Undergraduate Fellowship Program's fourth year will begin in May 2015 with an expected 12 fellowship positions. To date, the PINEMAP Undergraduate Fellowship Program has included 30 undergraduates, 19 graduate and post-doctoral researcher mentors, 55 public secondary schools, 84 individual secondary school teachers, and 5,043 secondary school students.

The Project Learning Tree/PINEMAP secondary module, *Southeastern Forests and Climate Change*, was completed, with input from more than 140 people who helped with the module development through writing and reviewing activities, or participating in the advisory committee, expert content review, or pilot test. Using PLT's network of state coordinators, facilitators, and educators in the Southeast, a total of 94 people were trained at three regional

workshops held in North Carolina, Arkansas, and Florida. These "train-the-trainer" workshops introduced the module to 12 state coordinators, 46 facilitators, and 36 educators. More than 2,500 books have been distributed to PLT state coordinators, workshop facilitators, and educators throughout the Southeast. The module website was also finalized in fall 2014, and we currently have almost 200 registered website users. Mini-grants have been distributed to 11 states through National PLT to assist state coordinators with their upcoming educator workshops. These workshops are expected to reach at least 1,000 educators. A summative evaluation with 45 teachers and over 3,400 students from 10 states is currently underway which will enable us to report on change in student knowledge, hope, and systems thinking skills.

The Tier III site in Oklahoma hosted two intensive authentic research experience programs in the summer of 2014. First, a group eight Oklahoma high school science teachers spent a week on-site, learning about the research project goals and objectives, as well as the experimental design and instrumentation used to measure tree water use, soil respiration, and soil moisture. Teachers then developed formal study plans for classroom use as part of the week. This was hosted by PINEMAP researchers, graduate students and technicians, with formal curriculum development through the University of Oklahoma K20 Center.

Second, the Tier III site hosted 10 minority and female undergraduates as part of a three week internship in Oklahoma, Texas and Louisiana. The Tier III site was visited as a demonstration of an intensive ecological research site, and was hosted by PINEMAP researchers, graduate students and technicians.

OUTPUTS

Products

Products include published or in press peer-reviewed publications; other written materials such as white papers, research summaries, fact sheets, or popular press articles; audio or video products; etc.

The lists below summarize year 4 (March 1, 2014-February 28, 2015) products reported in the September 2014 Progress Report.
Please update as necessary and highlight in yellow any products added to the list for the April 2014 Progress Report.

Peer-reviewed publications

Monroe, M. C., J. Ireland, and T. A. Martin. 2015. Integration of forestry research and Extension in an Online Graduate Course. Journal of Forestry. 113(2): 240-247.

Theses/Dissertations

None reported for April 2014-September 2014

Kunkle, K.A. (2015). *Cultural Cognition and Climate Change Education: Why Consensus is Not Enough.* Gainesville, FL: University of Florida, School of Forest Resources and Conservation.

Other publications

Monroe, M. C., & Oxarart, A. (Eds.). (2014). *Southeastern forests and climate change: A Project Learning Tree secondary environmental education module*. Gainesville, FL: University of Florida and American Forest Foundation.

Oxarart, A. and M. C. Monroe. 2015. A cognitive approach to environmental education. *Across the Spectrum: Resources for Environmental Educators*. Washington DC: North American Association for Environmental Education. Pages 93-106.

Kunkle, K. and M. C. Monroe. 2015. Addressing Misconceptions and Understanding the Psychological Mechanisms of Climate Change Communication. *Across the Spectrum: Resources for Environmental Educators*. Washington DC: North American Association for Environmental Education. Pages 147-167.

Li, J. & Monroe, M. C. (2014). Measuring the effectiveness of educational materials on climate change and forests. http://www.pinemap.org/publications/research-summaries

Audio/video products

Krantz, S. (Producer). 2014. PINEMAP Focus on Research: Focus on Water. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. https://www.youtube.com/watch?v=-qFvYSG4r9E&index=13&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl

Krantz, S. (Producer). 2014. PINEMAP Focus on Research: Drought, Fertilization and Tree Growth. Video from the Southeastern Forests and Climate Change: A Project Learning Tree Secondary Environmental Education Module. https://www.youtube.com/watch?v=QPfvctc47EA&index=14&list=PLgM-uU3vOAbIVCkFxqkwGNQPkRL0Rs7gl

Events/Activities

Events/activities include presentations (oral and poster) given at meetings or conferences; workshops/trainings/courses conducted; and experiments/surveys/data collection conducted.

The table(s) below summarizes year 4 (March 1, 2014-February 28, 2015) events/activities reported in the September 2014 Progress Report.
Please update as necessary and highlight in yellow items added to the list for the April 2015 Progress Report.

Presentations

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
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
Kunkle, K. and M. Monroe	Evaluating Websites and Web Tools in Extension Education	Poster Presentation	March 22, 2014	League of Environmental Educators in Florida (LEEF) Conference, Altoona, FL
Li, J. and M. Monroe	Uncovering Teens' Misconceptions About Climate Change	Poster Presentation	March 22, 2014	League of Environmental Educators in Florida (LEEF) Conference, Altoona, FL

Li, J. and M. Monroe	Climate Change in the Classroom	Presentation	March 22, 2014	League of Environmental Educators in Florida (LEEF) Conference, Altoona, FL
Monroe, M, A. Oxarart, J. Li, T. Ritchie, K. Kunkle, and S. Krantz	Southeastern Forests and Climate Change	Presentation	March 22, 2014	League of Environmental Educators in Florida (LEEF) Conference, Altoona, FL
Li, J. and M. Monroe	Uncovering Teens' Misconceptions About Climate Change	Poster Presentation	March 28, 2014	9th Annual Conference of the Social Sciences, Gainesville, FL
Kunkle, K. and M. Monroe	Applying a Motivated Reasoning Framework to Climate Change Education	Poster Presentation	April 4, 2014	SFRC Graduate Student Symposium, University of Florida, Gainesville, FL
Ritchie, T. and M. Monroe	Can Using Systems Thinking Improve Student Success with Climate Change Education?	Poster Presentation	April 4, 2014	Graduate Student Symposium, University of Florida, Gainesville, FL
Li, J. and M. Monroe	Uncovering Teens' Misconceptions About Climate Change	Poster Presentation	April 4, 2014	Graduate Student Symposium, University of Florida, Gainesville, FL
Monroe, M.C.	Southeastern Forests and Climate Change: A PLT Secondary Module	Webinar	April 16, 2014	Climate Educators Professional Development, Will Steger Foundation, Minnesota
Kunkle, K. and M. Monroe	Evaluating Web Tools in Environmental Education and Extension	Poster Presentation	May 14-16, 2014	PINEMAP Annual Meeting, Athens, GA
Kunkle, K. and M. Monroe	Applying a Motivated Reasoning Framework to Mitigate Cultural Conflict in Climate Change Education	Poster Presentation	May 14-16, 2014	PINEMAP Annual Meeting, Athens, GA
Li, J. and M. Monroe	Effective Climate Change Education: Making Hope Happen	Poster Presentation	May 14-16, 2014	PINEMAP Annual Meeting, Athens, GA
Li, J. and M. Monroe	Evaluating the Effectiveness of PLT Secondary Module	Poster Presentation	May 14-16, 2014	PINEMAP Annual Meeting, Athens, GA
Ritchie, T. and M. Monroe	Can Using Systems Thinking Improve Student Success with Climate Change Education?	Poster Presentation	May 14-16, 2014	PINEMAP Annual Meeting, Athens, GA
Monroe, M.C.	PINEMAP's Required Graduate Course: An innovation in integrated education	Presentation	May 14, 2014	PINEMAP Annual Meeting, Athens, GA
Monroe, M.C.	PINEMAP Outcome Themes: Engaged and Literate Public	Presentation	May 14, 2014	PINEMAP Annual Meeting, Athens, GA
Monroe, M. C., A. Oxarart, and J. Li	Designing appropriate teacher in-service training	Presentation	May 20, 2014	Association of NR Extension Professionals (ANREP), Sacramento CA
Kunkle, K., J. Li, M. Monroe, and T. Ritchie	Evaluating websites and webtools in Extension education	Presentation	May 21, 2014	Association of NR Extension Professionals (ANREP), Sacramento CA
Monroe, M. C.	Southeastern Forests and Climate Change: A PLT Secondary Module	Webinar	June 5, 2014	Climate Science Initiative, Association of NR Extension Professionals (CSI-ANREP)
Monroe, M. C.	Southeastern Forests and Climate Change: A PLT Secondary Module	Presentation	Sept 4, 2014	Southern Region Extension Climate Academy (SRECA), Forests Sector
Ritchie, T.R. and Monroe, M.C.	Assessing Students' Systems Thinking Skills	Poster Presentation	September 19, 2014	3rd Annual Southeastern EE (SEEA) Alliance Conference Research Symposium, Asheboro, NC

Monroe, M. C. and J, Li	Climate Change in the Classroom	Presentation	September 20, 2014	3rd Annual Southeastern EE (SEEA) Alliance Conference, Asheboro, NC
Li, J. and Monroe, M.	Effective Climate Change Education: Making Hope Happen	Poster Presentation	September 19, 2014	3rd Annual Southeastern EE (SEEA) Alliance Conference Research Symposium, Asheboro, NC
Kunkle, K.A. and Monroe, M.C.	Applying a Motivated Reasoning Framework to Climate Change Education Development	Poster Presentation	September 19, 2014	3rd Annual Southeastern EE (SEEA) Alliance Conference Research Symposium, Asheboro, NC
Monroe, M. C.	Developing educational programs to complement large research projects	Presentation	Oct 31, 2014	Guest speaker, University of Minnesota - Duluth
Oxarart, A. and M. Monroe	Building Innovative Climate Curriculum: Highlights from a New PLT Secondary Module	Poster Presentation	October 10, 2014	North American Association for Environmental Education Ottawa, Canada
Li, J. and M. Monroe	Uncovering Teens' Misconceptions About Climate Change	Roundtable Presentation	October 11, 2014	North American Association for Environmental Education Ottawa, Canada
Li, J. and M. Monroe	Effective Climate Change Education: Making Hope Happen	Presentation	October 8, 2014	North American Association for Environmental Education Research Symposium Ottawa, Canada
Kunkle, K. and M. Monroe	Integrating Motivated Reasoning into Climate Change Education	Poster Presentation	October 8, 2014	North American Association for Environmental Education Research Symposium Ottawa, Canada
Li, J. and M. Monroe	Exploring Characteristics of Educative Curriculum	Poster Presentation	October 8, 2014	North American Association for Environmental Education Research Symposium Ottawa, Canada
Ritchie, T. and M. Monroe	Systems Thinking in Environmental Education: The Big Picture	Poster Presentation	October 11, 2014	North American Association for Environmental Education Research Symposium Ottawa, Canada
Seiler, J., J. Kidd, M. Monroe, and S. Sriharan	Reflections on the PINEMAP Undergraduate Fellowship Program	Presentation	October 11, 2014	Society of American Foresters National Convention, Salt Lake City, UT
Kidd, J. and J. Seiler	Attitudes Toward Research After Participation in an Undergraduate Research Internship	Poster Presentation	Oct. 8-11, 2014	Society of American Foresters National Convention, Salt Lake City, UT
Kidd, J.	Forest Resources Education and Communication in the PINEMAP Undergraduate Fellowship Program	Presentation	Nov. 3, 2014	Department of Forest Resources and Environmental Conservation Seminar, Blacksburg, VA
Hardison, H.	Forest Growth and Climate	Presentation (Education)	Nov.12, 2014	Owasso 7th Grade Learning Center, Owasso, OK
Hardison, H.	Forest Growth and Climate	Presentation (Education)	Nov.12, 2014	Owasso 7th Grade Learning Center, Owasso, OK
Hardison, H.	Forest Growth and Climate	Presentation (Education)	Nov.12, 2014	Owasso 7th Grade Learning Center, Owasso, OK
Hardison, H.	Forest Growth and Climate	Presentation (Education)	Nov.12, 2014	Owasso 7th Grade Learning Center, Owasso, OK
Hardison, H.	Forest Growth and Climate	Presentation (Education)	Nov.12, 2014	Owasso 7th Grade Learning Center, Owasso, OK

Hardison, H.	Forest Growth and Climate	Presentation (Education)	Nov.12, 2014	Owasso 7th Grade Learning Center, Owasso, OK
Hardison, H.	A Comparison of Soil CO2 Efflux of Mid-rotation Loblolly Pine (Pinus taeda L.) and the Partitioning of Heterotrophic and Autotrophic Respiration	Presentation (Scientific)	Sept. 27, 2014	Oklahoma Louis Stokes Alliance for Minority Participation (OK-LSAMP) 20th Annual Research Symposium, Stillwater, OK
Hardison, H.	A Comparison of Soil CO2 Efflux of Mid-rotation Loblolly Pine (Pinus taeda L.) and the Partitioning of Heterotrophic and Autotrophic Respiration	Presentation (Scientific)	Oct. 16-18, 2014	Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) 2014 National Conference, Los Angeles, CA
Laguer, D. M.	The Effects of Drought and the Need to Educate About Conservation Agriculture	Presentation (Education)	Nov.17, 2014	Juana Rosario, Aguada, PR
Laguer, D. M.	The Effects of Drought and the Need to Educate About Conservation Agriculture	Presentation (Education)	Nov.17, 2014	Juana Rosario, Aguada, PR
Laguer, D. M.	The Effects of Drought and the Need to Educate About Conservation Agriculture	Presentation (Education)	Nov.18, 2014	Juana Rosario, Aguada, PR
Laguer, D. M.	The Effects of Drought and the Need to Educate About Conservation Agriculture	Presentation (Education)	Nov.18, 2014	Juana Rosario, Aguada, PR
Laguer, D. M.	The Effects of Drought and the Need to Educate About Conservation Agriculture	Presentation (Education)	Dec. 1, 2014	Juana Rosario, Aguada, PR
Laguer, D. M.	The Effects of Drought and the Need to Educate About Conservation Agriculture	Presentation (Education)	Dec. 1, 2014	Juana Rosario, Aguada, PR
Laguer, D. M.	The Effects of Drought and the Need to Educate About Conservation Agriculture	Presentation (Education)	Dec. 3, 2014	Juana Rosario, Aguada, PR
Laguer, D. M.	The Effects of Drought and the Need to Educate About Conservation Agriculture	Presentation (Education)	Dec. 3, 2014	Juana Rosario, Aguada, PR
Laguer, D. M.	The Effects of Drought and the Need to Educate About Conservation Agriculture	Presentation (Education)	Dec. 5, 2014	Juana Rosario, Aguada, PR
Laguer, D. M.	The Effects of Drought and the Need to Educate About Conservation Agriculture	Presentation (Education)	Dec. 11, 2014	Juana Rosario, Aguada, PR
Donner, I.	If a Tree Grows, Will 'Yew' Know?	Presentation (Education)	Nov.5, 2014	Twin Springs High School, Twin Springs, VA
Donner, I.	If a Tree Grows, Will 'Yew' Know?	Presentation (Education)	Nov.5, 2014	Twin Springs High School, Twin Springs, VA
Donner, I.	If a Tree Grows, Will 'Yew' Know?	Presentation (Education)	Nov.5, 2014	Twin Springs High School, Twin Springs, VA
Donner, I.	If a Tree Grows, Will 'Yew' Know?	Presentation (Education)	Nov., 2014	Blacksburg Middle School, Blacksburg, VA
Donner, I.	If a Tree Grows, Will 'Yew' Know?	Presentation (Education)	Nov., 2014	Blacksburg Middle School, Blacksburg, VA
Donner, I.	If a Tree Grows, Will 'Yew' Know?	Presentation (Education)	Nov., 2014	Blacksburg Middle School, Blacksburg, VA
Donner, I.	If a Tree Grows, Will 'Yew' Know?	Presentation (Education)	Nov., 2014	Blacksburg Middle School, Blacksburg, VA

Donner, I.	If a Tree Grows, Will 'Yew' Know?	Presentation (Education)	Nov., 2014	Blacksburg Middle School, Blacksburg, VA
Donner, I.	If a Tree Grows, Will 'Yew' Know?	Presentation (Education)	Nov., 2014	Blacksburg Middle School, Blacksburg, VA
Vial, S.	What Causes Trees to Grow?	Presentation (Education)	Nov.14, 2014	Blacksburg Middle School, Blacksburg, VA
Vial, S.	What Causes Trees to Grow?	Presentation (Education)	Nov.14, 2014	Blacksburg Middle School, Blacksburg, VA
Vial, S.	What Causes Trees to Grow?	Presentation (Education)	Nov.14, 2014	Blacksburg Middle School, Blacksburg, VA
Vial, S.	What Causes Trees to Grow?	Presentation (Education)	Nov.7, 2014	Pulaski Middle School, Pulaski, VA
Vial, S.	What Causes Trees to Grow?	Presentation (Education)	Nov.7, 2014	Pulaski Middle School, Pulaski, VA
Vial, S.	What Causes Trees to Grow?	Presentation (Education)	Nov.7, 2014	Pulaski Middle School, Pulaski, VA
Hamill, A.	Photosynthesis: The Breath of Life	Presentation (Education)	Dec. 8, 2014	Blacksburg High School, Blacksburg, VA
Hamill, A.	Photosynthesis: The Breath of Life	Presentation (Education)	Dec. 8, 2014	Blacksburg High School, Blacksburg, VA
Hamill, A.	Photosynthesis: The Breath of Life	Presentation (Education)	Nov.5, 2014	Blacksburg High School, Blacksburg, VA
Hamill, A.	Photosynthesis: The Breath of Life	Presentation (Education)	Nov.5, 2014	Blacksburg High School, Blacksburg, VA
Hamill, A.	Photosynthesis: The Breath of Life	Presentation (Education)	Nov.3, 2014	Auburn High School, Riner, VA
Hamill, A.	Photosynthesis: The Breath of Life	Presentation (Education)	Dec. 15, 2014	Pulaski Middle School, Pulaski, VA
Hamill, A.	Photosynthesis: The Breath of Life	Presentation (Education)	Dec. 15, 2014	Pulaski Middle School, Pulaski, VA
Hamill, A.	Photosynthesis: The Breath of Life	Presentation (Education)	Dec. 15, 2014	Pulaski Middle School, Pulaski, VA
White, A.	The Real Cost: Raw Environmental Expenses Challenge	Presentation (Education)	Nov.22, 2014	VSU Kids Tech University, Petersburg, VA
White, A.	The Real Cost: Raw Environmental Expenses Challenge	Presentation (Education)	Nov.22, 2014	VSU Kids Tech University, Petersburg, VA
White, A.	The Real Cost: Raw Environmental Expenses Challenge	Presentation (Education)	Nov.25, 2014	Swift Creek Middle School, Midlothian, VA
White, A.	The Real Cost: Raw Environmental Expenses Challenge	Presentation (Education)	Dec. 8, 2014	Essex Intermediate School, Tappahannock, VA
White, A.	The Real Cost: Raw Environmental Expenses Challenge	Presentation (Education)	Dec. 8, 2014	Essex Intermediate School, Tappahannock, VA
White, A.	The Real Cost: Raw Environmental Expenses Challenge	Presentation (Education)	Dec. , 2014	Colonial Heights High School, Colonial Heights, VA
Mitchell, S.	Forest Management and Water Quality	Presentation (Education)	Nov.11, 2014	Timber Academy High School, College Station, TX
Mitchell, S.	Forest Management and Water Quality	Presentation (Education)	Dec. 2, 2014	Carl Wunsches High School, Spring, TX
Mitchell, S.	Forest Management and Water Quality	Presentation (Education)	Dec. 2, 2014	Carl Wunsches High School, Spring, TX
Mitchell, S.	Forest Management and Water	Presentation	Nov.14,	Bryan High School, Bryan, TX

	Quality	(Education)	2014	
Mitchell, S.	Forest Management and Water Quality	Presentation (Education)	Nov.14, 2014	Bryan High School, Bryan, TX
Mitchell, S.	Forest Management and Water Quality	Presentation (Education)	Nov.14, 2014	Bryan High School, Bryan, TX
Mitchell, S.	Forest Management and Water Quality	Presentation (Education)	Nov.14, 2014	Bryan High School, Bryan, TX
Mitchell, S.	Forest Management and Water Quality	Presentation (Education)	Nov.14, 2014	Bryan High School, Bryan, TX
Mitchell, S.	Forest Management and Water Quality	Presentation (Education)	Nov.21, 2014	Klein Collins High School, Spring, TX
Reilly, N.	How Do Pine Trees Wear Their Jeans?	Presentation (Education)	Nov.12, 2014	Pender Early College High School, Burgaw, NC
Reilly, N.	How Do Pine Trees Wear Their Jeans?	Presentation (Education)	Nov.12, 2014	Pender Early College High School, Burgaw, NC
Reilly, N.	How Do Pine Trees Wear Their Jeans?	Presentation (Education)	Nov.13, 2014	Trask Middle School, Wilmington, NC
Reilly, N.	How Do Pine Trees Wear Their Jeans?	Presentation (Education)	Nov.18, 2014	E. A. Laney High School, Wilmington, NC
Reilly, N.	How Do Pine Trees Wear Their Jeans?	Presentation (Education)	Nov.6, 2014	New Hanover High School, Wilmington, NC
Reilly, N.	How Do Pine Trees Wear Their Jeans?	Presentation (Education)	Nov.6, 2014	New Hanover High School, Wilmington, NC
Cheek, M.	Forests, the Land, and You	Presentation (Education)	Dec. 10, 2014	Fuquay-Varina Middle School, Fuquay Marina, NC
Cheek, M.	Forests, the Land, and You	Presentation (Education)	Dec. 10, 2014	Fuquay-Varina Middle School, Fuquay Marina, NC
Cheek, M.	Forests, the Land, and You	Presentation (Education)	Dec. 17, 2014	Garner Magnet High School, Garner, NC
Cheek, M.	Forests, the Land, and You	Presentation (Education)	Dec. 17, 2014	Garner Magnet High School, Garner, NC
Cheek, M.	Forests, the Land, and You	Presentation (Education)	Dec. 11, 2014	Centennial Campus Magnet Middle School, Raleigh, NC
Cheek, M.	The Real Cost	Presentation (Education)	Dec. 17, 2014	Garner Magnet High School, Garner, NC
Cheek, M.	The Real Cost	Presentation (Education)	Dec. 17, 2014	Garner Magnet High School, Garner, NC
Cheek, M.	Forests, the Land, and You	Presentation (Education)	Dec. 18, 2014	Neighborhood Ecology Corps, Raleigh, NC
Cheek, M.	The Real Cost	Presentation (Education)	Dec. 18, 2014	Neighborhood Ecology Corps, Raleigh, NC
Cheek, M.	Tree Introduction	Presentation (Education)	Dec. 18, 2014	Neighborhood Ecology Corps, Raleigh, NC
Bass, A.	Potato Head: DNA the Traits They Code For	Presentation (Education)	Dec. 12, 2014	Trask Middle School, Wilmington, NC
Bass, A.	Potato Head: DNA the Traits They Code For	Presentation (Education)	Dec. 12, 2014	Trask Middle School, Wilmington, NC
Monroe, M	Regional Climate Module from PINEMAP and PLT	Presentation	Feb 25, 2015	Southern Region Extension Forestry Meeting, Athens GA

Trainings, workshops, and courses

Monroe, M. C., A. Oxarart, J. Li, T. Ritchie, K. Kunkle	Teacher Training: Southeastern Forests and Climate Change	Workshop	June 25, 2014	Center for PreCollegiate Education and Teaching (CPET) at the University of Florida

Monroe, M. C., A. Oxarart, J. Li, T. Ritchie, K. Kunkle	Facilitator and Educator Training: Southeastern Forests and Climate Change	Workshop	September 19, 2014	Southeast Environmental Education Alliance Conference Asheboro, NC
Monroe, M. C., A. Oxarart	Southeastern Forests and Climate Change	Workshop	November 13-15, 2014	C.A. Vines Arkansas 4-H Center Little Rock, AR
Monroe, M. C., A. Oxarart, J. Li, T. Ritchie, K. Burja	Southeastern Forests and Climate Change	Workshop	January 23-24, 2015	Jacksonville Zoo and Gardens Jacksonville, FL
Ritchie, T., K. Kunkle, M. Cheek, and A. White	Forests, Climate Change, and You!	Student Workshop	July 31, 2014	4-H University, Gainesville, FL
Seiler, J. and J. Kidd	Effective Communication Skills	Online Course	Fall 2014	Virginia Tech, Blacksburg, VA

NOTE: Aim 6 should report on the Southern Region Extension Climate Academy, Sept 3-5, 2014 in Athens GA. Individual presentations were made by Margaret Clifford (Who we are) and Martha Monroe and Wendy-Lin Bartels (Understanding audiences)

Experiments, surveys, and data collection

Please limit summaries to one **brief paragraph for each item.

Undergraduate Fellowship Program Attitudes Survey

The objective of this survey research is to identify changes in undergraduate student attitudes toward research as a result of participating in a full time summer research internship. Three cohorts of students (n = 30) have come through the PINEMAP Undergraduate Fellowship Program from 2012-2014. The survey was presented in a pre- and post-experience format, and it consisted of 24 Likert-type items (1 represented "strongly disagree" and 5 represented "strongly agree") that integrated 17 items from the "Attitudes Toward Research" (ATR) Scale and 7 scientific-method oriented items. Responses for both surveys were completed by 21 students. From these 21 respondents, 14% were upcoming sophomores, 29% were juniors, 48% were seniors, and 9% were returning seniors. Females (52%) were the majority of respondents. Minorities comprised 34% of the sample with 10% of respondents not reporting a racial background and 56% identifying as White or Caucasian. Approximately 62% of respondents had no previous undergraduate research experience. A Wilcoxon signed-rank analysis of data from 2012-2014 cohorts identified no significant differences for each factor (research use, negative attributes of research, positive attributes of research, and research understanding).

FORMATIVE EVALUATION:

To test the usefulness and effectiveness of the secondary module, Southeastern Forests and Climate Change, the team conducted a formative evaluation during fall 2013 to answer questions about how teachers perceive the module and how the activities can be improved. 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. 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. Participating teachers were from Florida (45%), Kentucky (16%), Virginia (14%), Arkansas (11%), North Carolina (9%), and Georgia (5%). The team obtained excellent and useful feedback from these teachers and their students which enabled us to make systematic revisions to the module (e.g., adding modifications

for younger students) and editing the activities to increase clarity. We also added systems thinking connections to each activity to increase visibility for this important skill. Experts reviewed all changes to the materials to assure that no misconceptions were introduced in the revision process.

HOPE RESEARCH

We developed a 14-item hope scale and administered the pre- and post- survey between September 2013 and January 2014. High school students (n=872) from 18 schools completed survey before and after their teachers conducted a package of four activities from *Southeastern Forests and Climate Change* (SFCC). Students were equally divided by gender (50% male); about 65% were 11th and 12th graders and 35% were 9th and 10th graders. Dependent t-tests were employed to understand whether or not feelings of hopefulness change after exposure to four activities from SFCC. Preliminary results suggest that engaging in the activities significantly increased students' hope about resoling climate change. In addition, we conducted a factor analysis and a path analysis to empirically explore the determinants of hope. We revised the scale based on the preliminary analysis and pilot tested with about 50 high school students in January 2015. The revised hope scale was sent out to 45 summative evaluation teachers and will be administered with more 3000 high school students. Data collected from summative evaluation will enable us to further test the reliability and validity of the scale.

SUMMATIVE EVALUATION

To determine the value of the final product of the secondary module, *Southeastern Forests and Climate Change*, the team began conducting a summative evaluation during spring 2015. The evaluation participants include 45 teachers and over 3,400 students from 10 southeastern states. The activities were separated into three "packages" based on thematic subject area content. Package 1 consists of activities for biology classes related to carbon. Package 2 is designed for agriculture education courses and has content on forest management. Package 3 consists of the systems-based activities and is best suited for environmental science courses. Pre and post student content surveys for each package are being used to measure student learning after completing 5 assigned activities. All students will also complete a pre and post Hope survey (described above). Package 3 students will receive a pre and post Systems survey (described below). Teachers will submit online surveys for each activity to provide feedback on how the activities worked with their students and offer suggestions, tips and edits that can be added to the module website and future reprints of the book.

In addition to the structured evaluation with the 45 teachers, all users that register with the website or who participate in a workshop will receive an online survey to obtain data about their use of the module, online resources, and individual activities. This information will help the team better understand how many activities a typical educator will use, how long they take, how well they went with students in a variety of settings and any other feedback they are willing to offer.

All forms from the 45 summative teachers will be returned by the end of June 2015 and will be analyzed over the summer. Data from website registrations will be received and analyzed on a continuous basis and will be included in the final report.

SYSTEMS RESEARCH

The module emphasizes systems thinking skills to help students better understand large scale systems such as forests and climate and to increase understanding of complex environmental

issues such as climate change. Each activity has a systems thinking connection section that highlights the skills, tools, and vocabulary utilized in that activity as well as systems-based discussion questions. There are also nine supplemental systems enrichment exercises available online that reinforce systems thinking skills. These activities are not related to the content, but offer opportunities for students to practice using different systems thinking tools such as behavior over time graphs, stock and flow diagrams, causal loop diagrams, and computer simulations. The team developed multiple choice questions to review the basics of system dynamics that are included on the Package 3 content pre and post surveys. In addition, each student in Package 3 will take a pre and post systems survey. This tool includes open ended questions that explore how students perceive relationships among variables in complex systems. In order to ascertain a deeper understanding of how the students are thinking about systems after completing the activities, several students will be selected to participate in in-person interviews. The interviews will ask students to explain their thought process when answering questions about systems and constructing a systems diagram. Data will be used to construct an assessment tool to measure systems thinking skills in students as well as help determine strategies for effectively incorporating systems-based instruction into science lessons to help students better understand the complexity of large-scale environmental issues.

Cultural Cognition and Climate Change

Previous studies have shown that science educators vary in their willingness to address climate change and their self-reported knowledge of the topic. To understand if and how personal or political values play a role in their professional opinions about climate change education and willingness to use instructional materials, we developed and administered an online survey to formal and non-formal science educators in five states (Florida, North Carolina, Arkansas, Pennsylvania, and Virginia). The survey included quantitative and qualitative measures and was used to evaluate respondents' intentions to support climate change education, assess if and how those respondents' intentions and desired curriculum content vary according to their self-identified worldview, and explore the barriers and advantages of integrating climate change education into meaningful cultural narratives. Among the 251 completed surveys, the largest number of respondents identified as formal educators (55%), who teach in public schools (51%) and teach biology (41%). The results of the study suggest that worldview values and personal beliefs about climate change have a significant influence on respondents' intentions to support climate change education. These variables also exhibited a significant influence science educators' preferred curriculum content, as respondents indicated higher intentions to support lessons that reflect their personal beliefs about climate change. Respondents of diverse perspectives agreed that climate change education can provide valuable opportunities to engage students in current issues, but formal educators perceive limited ability to provide these opportunities given the time and curriculum constraints of the education system. The processes and results of this research can be adapted and applied to diverse audiences or scenarios that require targeted and effective climate change communication strategies.

Teacher Efficacy

At each facilitator and educator workshop, pre and post surveys were distributed to participants. We developed and pilot tested the educator self-efficacy survey with 15 educators in summer 2014. The reliability of the self-efficacy survey was confirmed with Cronbach alpha at .94. Paired t-tests suggest that all three workshops significantly increased participants' self-efficacy in teaching about climate change. In addition, participants (n=85) indicated that it is very likely that

they will use this educational resource in their future work, recommend this educational resource to their colleagues, and expand the coverage on climate change in their work. Several participants provided open-ended comments that indicated their satisfaction with the materials and the workshop. The survey is being used by facilitators at their workshops throughout the Southeast throughout the summative evaluation period.

PROGRESS NARRATIVE

Provide a brief summary of progress on each deliverable/task/input/output listed below. Please provide a *brief* summary of progress on each deliverable/task/input/output listed below. In many cases, a one sentence summary may suffice. If there is no progress update on an item, leave blank. Please highlight additions in yellow. Please do not include any figures or tables, but please do include quantifiable measurements, if available (i.e., # of plots measured, # of samples, # of runs, # of people reached, etc.)

PLT Secondary module

Input: Video researchers (8/31/14)
Task: Make videos (8/31/14)
We have completed three PINEMAP Focus on Research videos.

Task: Design and test summative evaluation tools (8/31/14)
The student pre and post knowledge survey, systems survey, and hope surveys have been developed, tested, and finalized. A workshop pre/post survey was developed, pilot tested, and finalized. We are in the process of finalizing the teacher surveys for the summative evaluation and an overall Web survey for all users.

Input: Researchers assist in workshops (11/30/14)
Task: Conduct regional workshops (11/30/14)
Mark Megalos was able to assist with the workshop in Asheboro, North Carolina on September 19. Rod Will and Adam Maggard attended the Little Rock, Arkansas workshop and provided a presentation on Tier 3 research. Grace Crummer attended the Jacksonville workshop, and we invited a few UF graduate students as well, but they were not able to attend. Aim 5 students/researchers attended and presented workshops in NC and FL.

Deliverable: Print Module, revise website (11/30/14)
The module was printed and website is complete.

Task: Begin summative evaluation process (2/28/15)
An application was distributed across the Southeast in December 2014. Of the 160 applicants, 45 teachers were invited to participate in the evaluation. All materials and instructions have been sent to the participants. Observations and student interviews will be conducted in some classrooms in spring 2015. All data will be returned by June 30, 2015.

Deliverable: Complete regional workshops (8/31/15)
Three regional workshops were completed.

- September 19, 2014: 6 hour workshop for educators from NC and facilitators from KY, VA, NC, TN, and GA in Asheboro, NC. 39 participants.
- November 13-15, 2014: Two day workshop for educators from AK and facilitators from AR, MS, NC, OK, GA, TX, TN, and SC in Little Rock, AR. 22 participants.

- January 23-24, 2015: 6 hour workshop for educators and facilitators from FL, AL, MS, TX, GA, and SC in Jacksonville, FL. Facilitators also participated in an extra session the evening of January 23. 37 participants.

Deliverable: Complete summative evaluation and analyze data (11/30/15)
No progress reported as of September 2014 report

Deliverable: Module and website used to train students and educators (2/28/15)
The module and website are completed and are currently being used by educators with their students.

Undergraduate fellowship program

Input: Researchers mentor UG fellows (8/31/14)
Eleven graduate students from seven of PINEMAP's collaborating universities agreed to participate in the 2014 undergraduate fellowship program.

Task: Train 3rd cohort UG fellows (8/31/14)
Twelve undergraduate students from eight universities across the southeastern US and Puerto Rico participated in research activities of three of PINEMAP disciplinary areas (Silviculture, Genetics, and Education) and learned about conducting forest resources research.

Task: Begin summative program evaluation (11/30/14)
No progress reported as of September 2014 report
The program has been funded for a fourth year and will have a cohort of approximately 12 undergraduate students and their mentors. Summative evaluation plans will be developed during summer 2015 and implemented during the fall.

Deliverable: Complete 3rd UG fellow cohort (2/28/15)
No progress reported as of September 2014 report
Nine undergraduate students completed their fellowships in December, 2014 and the remaining three will complete their fellowships during spring of 2015.

Task: Conduct interviews of program participants (2/28/15)
No progress reported as of September 2014 report
Interview protocols for interviewing undergraduate and graduate student participants are in development.

Input: Researchers mentor UG fellows (5/31/15)
No progress reported as of September 2014 report

Task: Train 4th cohort UG fellows (5/31/15)
No progress reported as of September 2014 report

Task: Analyze program evaluation data (8/31/15)
No progress reported as of September 2014 report

Deliverable: Report on program evaluation (2/28/16)
No progress reported as of September 2014 report

BROAD IMPACTS

Provide a short narrative describing broad impacts (i.e., far-reaching and possibly unanticipated outcomes resulting from Aim work). Specifically, please highlight leveraged funds and/or partnerships with other projects/external collaborations.

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.

We have strengthened our relationship with Project Learning Tree and between Extension and PLT across the South. State coordinators are working with PINEMAP researchers and Extension faculty to plan and conduct teacher workshops in several states. This effort has also increased educators' likelihood to talk about climate change, as evidenced by workshop comments such as, "I really learned something here." And "This curriculum is an excellent resource and provides educators tools to introduce discussions about climate change or dive into investigations."

TRAINING

A CUMULATIVE list of all Aim 5 undergraduate and graduate students, postdocs, and technical/research personnel trained under this project and descriptions of their research focus and/or role in the project is provided below. Additions/ changes from the Sept 2014 progress report are highlighted in blue.
Please update as necessary and highlight in yellow any updates made for the April 2014 Progress Report.

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: assessing if and how personal and political beliefs influence science educators' intentions to support climate change education and desired curriculum content
Ritchie	Tracey	Ph.D. Student	UF	Research focus: Conducting summative evaluation of curriculum module and exploring how to successfully develop and measure systems thinking skills in high school students
Clifford	Margaret	M.S. students	UF	Assisting with Extension program evaluation; assessing climate perspectives and program needs
Burja	Kristy	M.S. Student	UF	Assisting with materials development and evaluation

Cheek	Morgan	Undergraduate Intern	NCSU	2014 Undergraduate Fellow assisting with module production, evaluation, and research tasks
White	Ahnaia	Undergraduate Intern	VSU	2014 Undergraduate Fellow assisting with module production, evaluation, and research tasks
Hamill	Alyssa	Undergraduate Intern	VT	2014 Undergraduate Fellow; worked with John Kidd at Virginia Tech on a variety of projects related to undergraduate research experiences and secondary education.