PINEMAP Year 5 Progress Report 1
July 2015
Aim 5 (Education)

This is the first Aim progress report for year 5 (covering activity from March 1, 2015- June 30, 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 in April 2015, and **to prepare for submission of our no cost extension (NCE) in July.**

To streamline this process, information reported in September 2014 and April 2015 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 July 15.

NO COST EXTENSION EXCEPTIONAL CIRCUMSTANCES:

The NCE process requires us to list **work completed** and **work remaining to be completed under the one-year no-cost extension** period (from the original objectives). This should be covered in the narrative below, but please try to be specific about what has been completed to date, what you project will be completed before 2/29/16, and what would be occurring during the 1 year NCE.

We must draft a narrative including the **exceptional circumstances** that contribute to the need for the requested no-cost extension. The justification should be compelling such that it demonstrates a bona fide need to convince program staff and the Awards Management Division that the no-cost extension is warranted for successful completion of the award. **Please list your compelling reasons for the work projected to occur during the 1 year NCE, both reasons for delay and improvements in originally planned outputs that will be possible with extra time.**

A key part of our justification will be that in a number of important areas, we need additional time to complete tasks and deliverables, and that the additional time taken will enable us to do a much better job or have a better outcome than we had initially anticipated. **Please consider your aim tasks and those of associated integration platforms, and identify a small number of major tasks or deliverables that fit this model, and write a brief description.** We will use this information in the preparation of our extension application, so **please spend some time discussing this with your colleagues.**

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. Ten undergraduate fellows completed it while the remaining two fellows work toward finishing it during summer 2015. This cohort delivered 81 presentations on forest resources at 24 secondary schools in the southeastern US and reached a total of 1,518 students. The PINEMAP Undergraduate Fellowship Program's fourth year began in May 2015 and has 14 undergraduates participating in research at 8 institutions. To date, the PINEMAP Undergraduate Fellowship Program has included 44 undergraduates, 24 graduate and post-doctoral researcher mentors, 57 public secondary schools, 88 individual secondary school teachers, and 5,207 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 2,700 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 300 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 was recently completed and data is currently being analyzed regarding changes 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

Outputs are activities, events, services, and products that reach people.

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 products reported in the September 2014 and April 2015 Progress Reports (March 1, 2014-February 28, 2015)
Please update as necessary (including in press publications that are now published) and highlight in yellow any new products added to the list for the July 2015 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.

Monroe, M.C., R.R. Plate, L. Colley. 2015. Assessing an Introduction to Systems Thinking. Natural Sciences Education, 44(1): 11-17.

Note to Grace: Aim 6 report should include:

Monroe, M.C., Plate, R. R., Adams, D. C. and Wojcik, D.J. 2015. Harnessing homophily to improve climate change education. Environmental Education Review, 21(2): 221-238.

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

No additional entries provided in April 2015 report.

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 summarize products reported in the September 2014 and April 2015 Progress Reports (March 1, 2014-February 28, 2015)
Please update as necessary and highlight in yellow any new products added to the list for the July 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.	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	Presentations (10) (Education)	Nov.17-Dec 11, 2014	Juana Rosario, Aguada, PR
Donner, I.	If a Tree Grows, Will 'Yew' Know?	Presentations (3) (Education)	Nov.5, 2014	Twin Springs High School, Twin Springs, VA
Donner, I.	If a Tree Grows, Will 'Yew' Know?	Presentations (7) (Education)	Nov., 2014	Blacksburg Middle School, Blacksburg, VA
Vial, S.	What Causes Trees to Grow?	Presentations (3) (Education)	Nov.14, 2014	Blacksburg Middle School, Blacksburg, VA

Vial, S.	What Causes Trees to Grow?	Presentations (3) (Education)	Nov.7, 2014	Pulaski Middle School, Pulaski, VA
Hamill, A.	Photosynthesis: The Breath of Life	Presentations (4) (Education)	Nov 5, Dec. 8, 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	Presentations (3) (Education)	Dec. 15, 2014	Pulaski Middle School, Pulaski, VA
White, A.	The Real Cost: Raw Environmental Expenses Challenge	Presentations (2) (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	Presentations (2) (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	Presentations (2) (Education)	Dec. 2, 2014	Carl Wunsches High School, Spring, TX
Mitchell, S.	Forest Management and Water Quality	Presentations (5) (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?	Presentations (2) (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?	Presentations (2) (Education)	Nov.6, 2014	New Hanover High School, Wilmington, NC
Cheek, M.	Forests, the Land, and You	Presentations (2) (Education)	Dec. 10, 2014	Fuquay-Varina Middle School, Fuquay Marina, NC
Cheek, M.	Forests, the Land, and You	Presentations (2) (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	Presentations (2) (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	Presentations (2) (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
Monroe, M. Ardoin, N	Measuring Our Impact: Environmental and Sustainable	Presentation	Feb 6, 2015	Green Building Coalition Meeting to establish goals to

	Literacy			measure impact, Washington DC
Bryce Forrester, Lori Haynes	Introduction to Southeastern Forests and Climate Change	Presentation	March 21, 2015	League of Environmental Educators in Florida 2015 Conference, Venus, Florida
Ritchie, T. and M. Monroe	Methods for Measuring Systems Thinking in High School Students	Poster	April 10, 2015	SFRC Graduate Student Symposium University of Florida Gainesville, FL
Li, J. and M. Monroe	Understanding, Measuring and Cultivating Hope about Climate Change	Oral Presentation	April 10, 2015	SFRC Graduate Student Symposium University of Florida Gainesville, FL
Kunkle, K. and M. Monroe	Cultural Cognition and Climate Change Education: Why Consensus is Not Enough	Oral Presentation	April 10, 2015	SFRC Graduate Student Symposium University of Florida Gainesville, FL
Oxarart, Monroe, Ritchie, Li, Kunkle	Linking Educators and Students to Forests in a Changing Climate	Poster	June 3, 2015	PINEMAP Annual Meeting, Athens GA
Ritchie, T. and M. Monroe	Methods for Measuring Systems Thinking Skills of High School Students	Poster	June 3-4, 2015	PINEMAP Annual Meeting Athens, GA
Li, J. and M. Monroe	Understanding, Measuring and Cultivating Hope about Climate Change among High School Students	Poster	June 3-4, 2015	PINEMAP Annual Meeting Athens, GA
Kunkle, K. and M. Monroe	Cultural Cognition and Climate Change Education: Why Consensus is Not Enough	Poster	June 3-4 2015	PINEMAP Annual Meeting Athens, GA
Monroe, M and Stallard, J	How PLT Supports STEM Instruction and Systems Thinking	Presentation	June 11, 2015	Project Learning Tree Annual Conference, Saratoga Springs NY
Monroe, M., Oxarart, A., Ritchie, T., Li, J., Kunkle, K.	Using Climate Change Curriculum to Improve Systems Thinking and Hope	Poster	July 2, 2015	World Environmental Education Congress, Gothenberg Sweden
Monroe, M.	Framing Science-based Issues for Community Discussions	Presentation	July 15, 2015	Kettering Foundation, Dayton OH

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
Marcia Bisnett	Southeastern Forests and	Educator Workshop	October	Miami, Florida

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
	Climate Change		11, 2014	
Maria McDaniel	Southeastern Forests and Climate Change	Educator Workshop	January 27, 2015	A Time for Science Grifton, North Carolina
Jan Forrest Kent, Lauren Johnson	Southeastern Forests and Climate Change	Educator Workshop	February 5, 2015	Oxbow Meadows Columbus, Georgia
Karen Hargrove, Bonnie Ervin, Cindi Smith-Walters, Dave Walters	Southeastern Forests and Climate Change	Educator Workshop	March 14, 2015	Nashville, Tennessee
Carla Rapp	Southeastern Forests and Climate Change	Educator Workshop	March 24, 2015	Georgia
Lori Nicholson	Southeastern Forests and Climate Change	Educator Workshop	April 11, 2015	St. Marks National Wildlife Refuge St. Marks, Florida
John Guyton, Harold Anderson	Southeastern Forests and Climate Change	Educator Workshop	April 16, 2015	Delta State University, Cleveland, Mississippi
Ellen Powell and Bill Worrell	Southeastern Forests and Climate Change	Educator Workshop	April 16, 2015	2015 VA Forestry Summit, Charlottesville, Virginia
Jennifer Hubbard-Sanchez, William Bennett, Henriette Sheffel	Southeastern Forests and Climate Change	Educator Workshop	April 24, 2015	Buckley Wildlife Sanctuary, Frankfort, Kentucky
Hannah Thompson-Welch	Southeastern Forests and Climate Change	Educator Workshop	May 11, 2015	Granville County Expo and Convention Center, Oxford NC
Jennifer Hubbard-Sanchez and Laura Duffey	Southeastern Forests and Climate Change: PLT Secondary EE Module Overview and Adaptations for Other Regions	Educator Workshop	June 16, 2015	2015 Summer Institute for Climate Change Education Apple Valley, Minnesota
Bonnie Ervin	Educator Workshop	Educator Workshop	June 18, 2015	Teacher's Forest Conservation Workshop, Knoxville, Tennessee

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. Nine

hundred and seventy seven high school students provided parents' consent forms and completed pre- and post- surveys before and after they participated a package of five activities from SFCC between January and June 2015. Data collected from summative evaluation enabled us to further test the reliability and validity of the scale. We calculated Cronbach's alpha (.835) and conducted exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to assess the internal consistency of the hope survey. Three dominant factors delineated based on the covariance analysis. Paired t-tests were used (n=977) to compare the differences between students' pretest and posttest mean. Results suggest that hopefulness significantly increased among all packages.

Summative Evaluation

To determine the value of the final product of the secondary module, *Southeastern Forests and Climate Change*, the team began conducting the summative evaluation during spring 2015. The evaluation participants included 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 consisted of activities for biology classes related to carbon. Package 2 was designed for agriculture education courses and had content on forest management. Package 3 consisted of the systems-based activities and was best suited for environmental science courses. Pre and post content surveys for each package were used to measure student learning after completing 5 assigned activities. All students also completed a pre and post Hope survey (described above). Package 3 students received a pre and post Systems survey (described below). Teachers submitted online surveys for each activity to provide feedback on how the activities worked with their students and to offer suggestions, tips and edits that can be added to the module website and future reprints of the book, and an overall survey that evaluated their experience with the module. Teachers submitted their survey responses and student data by the end of June 2015. Thirty-two teachers successfully completed the evaluation process which included data from over 1,000 students that had signed parent consent forms. Data is currently being compiled, entered and analyzed.

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 directly 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 evaluation team developed multiple choice questions to assess the basics of system dynamics which were included on the Package 3 pre and post content surveys. In addition, each student in Package 3 completed a pre and post systems survey. This tool included three open ended questions that explored how students perceived relationships among variables in complex systems. In order to ascertain a deeper understanding of how the students were thinking about systems after completing the activities, 21 students were selected to participate in in-person interviews. The interviews asked students to explain their thought process when answering questions about systems and they also constructed a systems diagram. The interviews have been transcribed and will be analyzed to determine the level of systems complexity used as well as proper systems terminology. The data from all three survey types (content test, systems survey, and in-person interviews) will be used to develop 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. Preliminary findings show that students were not comfortable with proper terminology. While they might have been able to explain a feedback loop in the systems survey or interview, they often did not use that vocabulary. Further analysis is needed to determine if there was consistency across classes and states of terminology used.

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.

How Does Education Enhance Community Resilience for Climate Change?

As part of our literature review for and research with the secondary module and from our work with Aim 6 program development and evaluation, we have developed a useful perspective on the way educators can approach the highly politicized issue of climate change with audiences that may or may not agree with foundational assumptions. We have been asked by the North American Association for Environmental Education to join their national Anecdotes to Evidence

initiative (March 2015) and have launched a process to conduct a systematic review of the literature as it relates to education and outreach and community climate resilience (June 2015).

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 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.)

Text below summarizes products reported in the September 2014 and April 2015 Progress Reports (March 1, 2014-February 28, 2015)

Please update as necessary and highlight in yellow any new products added to the list for the July 2015 Progress Report, with approximate month of estimated completion.

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 (11/30/14)
The student pre and post knowledge survey, systems survey, and hope surveys have been developed, tested, and finalized for both formative and summative evaluations. A workshop pre/post survey was developed, pilot tested, and finalized. We are in the process of finalizing the overall Web survey for all users.

Input: Researchers assist in workshops (11/30/14)
Task: Conduct regional workshops, distribute kits (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. The module is in the process of being revised for a second printing in fall 2015.

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 were conducted in four classrooms in spring 2015. Data are being analyzed.

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.

Task: launch state grants program (2/28/15)
We worked with National Project Learning Tree staff to develop an application form for state grants to implement workshops that distribute the SFCC module to educators. Applications were received and grants were processed by 2/1/15. We also developed a series of reporting forms to help track the results of the state workshops.

NCE Task: (2/1/17)
To better support state PLT coordinators and market the secondary module to more educators, we plan to work with the national community of AP Environmental Science teachers, provide states a second round of small grants, provide guest speakers to support state workshops, and develop a series of webinars to support educators. The website will be modified to include background information that is typically offered in workshops. These new tasks will help state PLT programs reach new audiences, as many states have not yet developed a strong secondary program.

Task: analyze data to explore climate change and hopefulness, systems thinking, teacher efficacy, teacher worldviews (5/31/15)
Data are being analyzed; papers are being written. An extension will be useful for this task.

Deliverable: Complete summative evaluation (8/31/15)
No progress reported as of September 2014 report or April 2015 report
Summative evaluation data are being analyzed in July 2015.

Task: conduct literature review on climate education for community adaptation (8/31/15)
We launched this project in June 2015 and plan to continue through the extension period.

Deliverable: reprint revised module (11/30/15)
Suggestions from summative evaluation have been compiled for the revision; we requested feedback from state coordinators and facilitators for changes in June 2015.

Task: revise and repeat systems evaluation (11/30/15)
Data from the summative evaluation is being analyzed to help us know how best to revise the research questions and data collection on systems thinking, July 2015.

Deliverable: publications on hope, systems thinking, worldviews (2/29/16)

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

Task: recommendations for Extension programs and education materials based on literature review (post-PINEMAP/NCE)

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)

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)

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)

Interview protocols for interviewing undergraduate and graduate student participants are in development.

Input: Researchers mentor UG fellows (5/31/15)

Twelve PINEMAP graduate students, post-doctoral researchers or faculty submitted proposals for hosting undergraduate students through the PINEMAP Undergraduate Fellowship. Additionally, two faculty members from non-PINEMAP institutions working on southeastern forest ecophysiology were invited to host additional undergraduate fellows as needed.

Task: Train 4th cohort UG fellows (5/31/15)

Fourteen undergraduate students from 10 North American universities were provided with fellowships to work with 13 graduate student, postdoctoral or faculty mentors at 8 universities. These positions include four of PINEMAP disciplinary aims: silviculture, modeling, education, and extension.

Task: Analyze program evaluation data (8/31/15)

Preliminary analysis of student intern attitudes toward research has been conducted on all but the current (2015) cohort. Tasks relevant to the PINEMAP fellowship evaluation remaining are: developing the interview protocol and interviewing undergraduate and mentor participants, and examining student feedback on the fall distance education course.

Deliverable: Enhancing climate education paper (11/30/2015)

This integration paper between the PLT module, graduate student course, and undergraduate fellowship groups is currently being discussed. Writing will depend on the journal, but the focus will be on useful ideas for other projects integrating research and education.

Deliverable: Report on program evaluation (2/28/16)

Due to the inclusion of a fourth cohort of undergraduate students that will complete the fellowship in December, 2015, the evaluation report is expected to be pushed beyond a February 2016 timeline. An extension would allow a more thorough and accurate report on the fellowship program's activities, participants, and outcomes. Additionally, research examining other REU programs will be conducted during a potential no-cost time extension that will allow a comparison of the PINEMAP fellowship to other programs within natural resources disciplines.

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."

We have been asked to assist with the national Anecdotes to Evidence initiative by completing a systematic review of the published literature on effective education and outreach strategies for adapting to climate change. These results will be vital to future Extension programs.

TRAINING

A CUMULATIVE list of all Aim 1 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 and additions from the April 2015 progress report are highlighted in green.
Please update as necessary and highlight in yellow any updates made for this 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; MS student; research staff	UF	2013 Undergraduate Fellow; working with Christine Li at UF. Assisted with development of slide presentations for the web; compiled teacher feedback from summative evaluation for revision of module.
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. Assisting with systematic literature review.
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.
Moreno	Bianca	Undergraduate Intern	UF	2015 Undergraduate Fellow; working with Tracey Ritchie on data organization, entry, tracking, and analysis for the summative evaluation and teacher workshops.
Chaves	Willandia	Doctoral Student Assistant	UF	Assisting with systematic literature review.
Bowers	Alison	Research Staff	UF	Assisted with module development. Assisting with systematic literature review.