R&R Other Project Information, Field 8

Year 2 Project Narrative

In the southeastern U.S., forests occupy 60% of the land area, with a large fraction dominated by the genus *Pinus*, about half naturally regenerated and half planted with genetically improved seedlings. Because of their large area and high productivity, southern forests are a significant portion of the U.S. carbon budget, containing 12 Pg of C, 36% of the sequestered forest carbon (C) in the conterminous United States (Turner *et al.*, 1995). Forests in the region annually sequester 76 Tg C, equivalent to 13% of regional greenhouse gas emissions, and have the potential to sequester more through reforestation, afforestation, and improved forest management (Johnsen *et al.* 2001, Han *et al.* 2007). Southern pine forests are also central to the economic vitality of the nation: the forest products industry is responsible for 5.5% of the jobs and 7.5% of total industrial output in the region (Wear & Greis 2002). Nationally, this industry employs more people than the automotive, chemical or plastics industries. In the SE U.S., ~85% of all forestlands are privately owned, and planted pine forests will remain important for the foreseeable future.

Over the past 50 years, the productivity of planted pine has tripled (Fox *et al.* 2007, Jokela *et al.* 2010), enabling southern forests to produce about 16% of global industrial wood, more than any other *country* (Prestemon & Abt 2002). These productivity gains are attributable to widespread implementation of improved genetics, seedling culture, and nutrient and competition management technology developed and deployed by university-led cooperative research programs involving forest industry, federal and state forestry agencies, forest management consulting firms and state extension services (Stanturf *et al.* 2003, Fox *et al.* 2007). The research infrastructure established by SE U.S. forestry research cooperatives is singular, and includes thousands of progeny trials and other genetics experiments, thousands of permanent plots and experiments designed to parameterize statistical growth and yield models, and hundreds of replicated experiments testing the effects of diverse silvicultural treatments on pine productivity, all of which provide cooperative members with vital information and approaches on which their decision systems are built. This substantial infrastructure investment, intended initially for creation of applied knowledge, has been leveraged by scientists in the region to further our fundamental understanding of the biological and genetic controllers of tree and forest productivity (e.g., Jokela *et al.* 2004, Emhardt *et al.* 2007, Samuelson *et al.* 2008), disease and insect resistance (e.g. Strom *et al.* 2002, Kayihan et al. 2005, Isik *et al.* 2008), and C sequestration (e.g., Tyree *et al.* 2008, Radtke *et al.* 2009, Gonzalez-Benecke *et al.* 2010, Noormets *et al.* 2010), among others. Taken as a whole, the accumulated data, germplasm, research trial base, and scientific expertise associated with SE U.S. forestry research cooperatives is unmatched, and has made the southern pine plantation system arguably the best understood production forestry system in the world.

The impact of cooperative research on SE U.S. forest management is difficult to overstate, as members of the cooperatives in the project manage > 20 million acres of planted forests in the region (about 55% of the total privately owned planted pine forestland), and produce 95% of the pine seedlings planted in the region each year (McKeand *et al.* 2003). Because research cooperatives include scientists and land managers from member organizations, research innovations from the cooperatives are translated seamlessly and

rapidly into practice on both lands managed for industrial wood production, as well as to non-industrial private forestland (NIPF) owners by major forestry consulting companies and state agency members. Because these cooperatives are based in land-grant universities, the research findings are easily conveyed to private forest landowners and extension agents.

The overarching goal of this proposal is to create, synthesize, and disseminate the knowledge necessary to enable southern pine landowners to harness forest productivity to mitigate atmospheric CO_2 and to more efficiently utilize nitrogen and other fertilizer inputs, and to adapt their forest management approaches to increase resilience in the face of changing climate. Our focus is on planted pine forests in the Atlantic and Gulf coastal states from Virginia to Texas, plus Arkansas and Oklahoma, managed by industrial and non-industrial private landowners. Our primary focus will be on loblolly pine, the dominant commercial species in the region (Schultz 1997). The economic, environmental and social benefits of our efforts will be rapid and maximized with a focus on these landowner/producer groups because (1) technology transfer connections are well established and efficient between cooperative research programs and all major industrial forestland owners in the region, as well as many private non-industrial owners through consulting firms, (2) non-industrial entities own 58% of all forestland in the region (Smith *et al.* 2009), so even incremental changes in this group will have substantial cumulative regional benefits, and (3) regional Extension and education programs are well- connected through the Southern Regional Extension Forestry Office and national Project Learning Tree network. Our approach will build trans-disciplinary research, education and outreach capacity aimed at mitigating climate change impacts through an understanding of adaptation and management potential in the region. We will integrate disciplinary expertise from all major regional university forestry cooperative programs, as well as accumulated data, germplasm, and infrastructure, with outreach and education specialists from major research universities and minority-serving institutions in the region, the USDA Forest Service, and climate scientists associated with the multi-state SE Climate Consortium and state climate offices.

The project goals will be accomplished by completing the following aims:

(1) Establish a region wide three-tiered monitoring network based on existing cooperative research trials, and develop standardized methods to quantify C, water, and nutrient storage and flux baselines and responses to climate and management.

(2) Apply a multi-scaled modeling program incorporating data from the monitoring network, empirical growth and yield models, stand-level biophysical C balance models, and watershed to regional scale C and water models driven by remote sensing to assess alternative forest management systems for sustainably increasing mitigation of greenhouse gases while adapting to changing climate and associated disturbances.

(3) Analyze genetics of breeding and natural populations to discover alleles in genes controlling important adaptation and mitigation traits that enable future tree breeding strategies, and deliver deployment guidelines for genotypes suited for varied climatic conditions to maximize resiliency and reduce adverse impacts of climate change on productivity.

(4) Conduct comprehensive life cycle analyses of regional forest management systems and multi-scale policy and economic analysis of market and non-market forest benefits and services to evaluate regional tradeoffs and interactions among policy, climate scenarios, C/water/nutrient/energy footprints, forest management, and genetic deployment, and assess adoption of alternative approaches by private landowners.

(5) Create educational resources and training programs for teachers and extension agents to convey the value and relevance of southern forests and climate change impacts, engage undergraduate interns in research and teaching activities, and contribute to an existing national educational network in the development and delivery of inquiry-based middle and high school lessons that feature our research strategies and tools. Prepare graduate students to address climate change mitigation and adaptation issues.

(6) Develop Extension programming that combines regional climate expertise and forest management outreach to deliver knowledge and state-of-the-art information, resources and management decision support tools to forest landowners, resource managers and policy makers.

Table 1 outlines Aim-level tasks and deliverables that will occur during year 2. The green bars indicate the timing of the task and the red indicates a deliverable. Detailed work plans for all Aims for year 2 are near completion.

Table 1: Year 2 Aim-level Tasks and Deliverables	Year 2			
	Q1	Q2	Q3	Q4
Aim 1: Establish monitoring network and develop standardized methods				
Initial regional C and nutrient baselines from Tier 1 data				
Measure Tier 2 sites, C, nutrient, soil respiration….				
Measure Tier 3 sites				
Regional C, H_20, baseline with responses to field manipulation				
Quantification of regional variation in soil respiration				
Initial regional quantification cross-region fertility rating and stomatal response functions				
$d^{18}O$ & $d^{13}C$ from Tier 2 wood samples				
Characterize tree water use efficiency (WUE) of different provenances and clones				
Aim 2. Develop multi-scaled modeling program to assess forest management systems…				
Develop & assess management alternatives w/ Tier I data & existing models of C seq.				
Adapt 3PG to run as real time geoprocessing server				
Improved process & hybrid models parameterized from network measurements				
Improved growth & yield models with climate inputs & C balance				
Regional map of potential climate or anthropogenic limitations to productivity				
Refinement of forest management modules for integration into DSS				
Prototype carbon management decision support tools to solicit structured feedback - Forest Management				
Aim 3. Analyze productivity & adaptive traits in breeding and natural populations …				
Version 2 of genetic deployment tool with progeny data				
Genotyping of ADEPT2, CCLONES & PSSSS populations				
Phenotyping Cold Tolerance Traits in ADEPT2 & CCLONES				
Phenotyping insect resistance traits in ADEPT2 & CCLONES				
Phenotyping growth and responsiveness to nutrition in ADEPT2 & CCLONES				
Discover alleles associated with nitrogen responsiveness				
Aim 4. Conduct life cycle, policy & economic analyses of regional forest management…				
Assessment of policies & programs that may affect C mitigation in planted pine forests				
NPV analysis & regional market impacts of adaptive management impacts				
Life cycle inventory for key physiographic regions				
Cradle to gate life cycle inventory for wood products				
Bioeconomic modeling of nontimber market ecosystem services				
Landowner & regional economic losses from altered disturbance risks				

Table 1: Year 2 Aim-level Tasks and Deliverables, cont'd	Year 2			
	Q1	Q2	Q3	Q4
Aim 5. Create educational resources & training programs…				
Education advisory council meets				
Assess existing activities and provide to Undergrads and Advisory Committee				
Begin designing activities to fill gaps and provide to Undergrads				
Draft PLT module				
Create application and selection process; market program; select grad students				
UG interns in new states for the summer				
Create and maintain web site for program				
Develop distance course on education				
Run distance course on education				
Attract middle school teachers and introduce program				
Distance class on climate change education and interdisciplinary research project				
Training of graduate and postdocs in multi-disciplinary research				
Aim 6. Extension programming combining climate & forest management expertise to deliver…				
Develop project website (portal) and pilot				
Implement and Strengthen forestry Extension/climatologist partnership				
Assess audiences needs				
Develop extension products for region				
Face-to-face training workshops for educators, extension professionals and practitioners				
Web-based continuing education for educators, extension professionals and practitioners				
Develop User Interface to DSS and Pilot Test				
eXtension modules				
Assess impacts of outreach				
DSS development				
DSS training for Extension Specialists, refinement				

Table 2 outlines project milestones that are anticipated to be completed during year 2. In this table, a number of activities, such as extension program delivered and GHG monitoring, will occur continuously across year 2. For these continuous activities, a red square is only included at the end of each year to indicate completion during the year and harmonize the chart with the more discrete milestones.

Table 2: Year 2 Project Milestones	Year 2			
	Q1	Q2	Q3	Q4
Administration				
External Advisory Board meeting				
Annual All-Project meeting				
Annual report				
Annual integrative work plan				
Cooperative Industrial Advisory Council meeting in association with annual silviculture or genetics meetings				
Executive Committee phone and video conferences - minimally quarterly, more often as needed				
Aim Leader phone and video conferences - minimally quarterly, more often as needed				
Aim 1. Establish monitoring network and develop standardized methods…				
Assessment of Tier III treatment effects				
Initial C and nutrient baselines estimated from existing Tier I data				
Assessment of climate, soil & management impacts on soil GHG flux				
Regional C, nutrient, H2O baselines and responses to management from measured Tier II data				
Aim 2. Develop multi-scaled modeling program to assess forest management systems…				
Improved process and hybrid models parameterized from network measurements				
Regional map of potential climate or anthropogenic limitations to productivity				
Climate, land use, genetics, pests/fire risk, fertilizer modules for integration into DSS				
Aim 3. Analyze productivity & adaptive traits in breeding and natural populations …				
New markers for genotypes in ADEPT2, CCLONES & PSSSS populations				
Phenotypes for adaptive traits in ADEPT2 & CCLONES				
Phenotypes for growth and growth responsiveness to nutrition in ADEPT2 & CCLONES				
Aim 4. Conduct life cycle, policy & economic analyses of regional forest management…				
Assess policies & programs that may affect C mitigation in planted pine forests				
Life cycle inventory analysis within forest & various management strategies				
Landowner & regional economic assessment of altered disturbance risks				
Aim 5. Create educational resources & training programs…				
Web-based course in multidisciplinary research for graduate students delivered				
Distance course for UG intern/educators completed				
Graduated MS & PhD students				

Table 2: Year 2 Project Milestones, cont'd	Year 2			
	Q1	Q2	Q3	Q4
Aim 6. Extension programming combining climate & forest management expertise to deliver				
State extension & climatologist teams organized				
Extension programs delivered				
Extension program evaluation				
Decision Support System pilot				

Summary of Progress: Year 1

A full-time Project Coordinator was hired in July 2011. The Project Coordinator will be responsible for coordinating and compiling project work plans and reports; monitoring progress on group work plans; monitoring and ensuring compliance with project reporting requirements; and coordinating project-level communication, activities, and meetings. Since being hired, the Project Coordinator has established a system for tracking project deliverables and milestones and aim group work plans using an online project management software; developed a quarterly reporting protocol and template; developed a schedule and agenda for monthly Executive Committee web conference meetings; developed a web site content outline; and begun the process of hiring a web site designer with the goal of having a web site live in October. Furthermore, the Project Director is in the process of finalizing the Operating Principles and Guidelines and identifying and inviting members for the External Advisory Board.

Project aim groups have made significant progress to date during year 1. A summary of work completed/progress for each aim group is detailed below.

Aim 1

Funding for the PINEMAP project was received at the University of Florida and subcontracts were issued to the participating universities.

Research Associates have been hired at Virginia Tech, The University of Georgia, the University of Florida and Oklahoma State University to coordinate work on the Tier III rainfall exclusion study. A Post Doc has been hired at Virginia Tech to conduct research on greenhouse gas emissions. Graduate students have been recruited to work on the Aim 1 portions of the project. Several of these students will start graduate school in the fall 2011 and the remainder will begin in 2012 at the following institutions:

Auburn University: 1 Ph.D. and 1 M.S.
Oklahoma State University: 1 Ph.D. and 1 M.S.
University of Florida: 1 M.S.
Virginia Tech: 1 PhD and 1 M.S.
Texas A&M: 1 Ph.D. and 1 M.S.
N.C. State: 1 Ph.D.

The Aim 1 team worked with other Aim teams and the project leadership to develop operating guidelines for the PINEMAP project that outline project management, data sharing, authorship, and other issues. The operating guidelines were reviewed by the participating university scientists and have been forwarded to the Executive Committee for approval. The protocols for carbon sampling in southern pine plantations that will be used in the Tier II and Tier III sites are being developed.

Aim 1 team members have been evaluating research sites that are suitable for the Tier I, Tier II and Tier III installations. As soon as the operating procedures are approved, data from sites selected as Tier I and Tier II installations will be made available to the PINEMAP group. Tier I Forest Inventory and Analysis plots in the Western Gulf Region have been spatially overlaid with soil data and paired to the closest NOAA weather station. Potential sites for the Tier III

rainfall exclusion are being evaluated in Virginia, Georgia/Alabama, Florida and Oklahoma. The study sites in Virginia and Oklahoma have been selected and initial plot installation is underway.

Seven sites have been selected across the South for studies of N volatilization and uptake efficiency following forest fertilization. ^{15}N urea was purchased and converted into five different N fertilizer formulations that are being used in the following treatments: check, urea, NBPT treated urea, DAP coated urea, and polymer coated urea. Fertilizers were applied to one set of plots in the winter and a second set of plots in the summer at each site. Soil and foliage samples have been collected monthly. A companion study of N volatilization was conducted at each site. Virginia Tech has purchased an Isotope Ratio Mass Spectrophotometer and renovated a lab to facilitate analysis of ^{15}N in the samples.

A study of soil fluxes of greenhouse gases (CO2, N2O and CH4) following forest fertilization has been initiated to compare soil drainage class, fertilizer type, fertilizer rate, and season of fertilizer. Plots have been located and treatments established. GHG fluxes are being measured at 6 week intervals over the next year. A GC with ECD and FID detectors, a methanizer and an auto sampler have been purchased at Virginia Tech to facilitate this work.

A study was installed and measured repeatedly during the summer of 2011 testing the feasibility of deep coring to separate heterotrophic from autotrophic soil respiration. Eight replications were installed in pine plantations that are similar to those that will be used as Tier III sites. Six weeks following core installation, efflux rates have decreased 30% compared to adjacent uncored soil suggesting that autotrophic respiration in this stand of loblolly pine is 30% of the total CO2 efflux.

Aim 2

The modeling group has made good progress during the first year of the project. Through a series of conference calls and meetings, key linkages between the models were identified to facilitate the development of appropriate temporal and spatial scale data bases to support model parameterization, calibration, testing and validation. Progress has been made in both the research and publication of progress.

Major accomplishments in research include: 1) developed and tested techniques for identifying and mapping forest carbon "hot spots" using FIA data; 2) proposed approach to the forest stand component of the scale-up modeling system was drafted and distributed for comment; 3) the work plan milestone “Preliminary assessment/case study of climate change factors on loblolly pine carbon and water exchange” has been completed. The MS student involved in this research, Charles Bryars, graduated in July 2011 from the University of Georgia; 4) an agreement has been reached between PINEMAP and NASA Ames allowing our use of the NASA Earth Exchange (NEX) high performance computing environment; 5) 3-PG (as parameterized by the UGA team) has been converted to standard ANSI code to facilitate its use in southwide simulations on NEX; 6) Following feedback, initial components of the stand-level growth and yield prediction system have been fitted with Tier 1 data that are presently available. Additional capabilities are continually being added to the model structure; when the complete Tier 1 data set is assembled, parameters in the growth and yield model component will be estimated using the complete set of

observations; 7) hired a post-doc to work on the linking WaSSI and 3PG models and to address the issues of upscaling uncertainties; and 8) hired a PhD student, working on 3-PG modeling.

Major accomplishments in publication include; 1) Domec et al., "A comparison of three methods to estimate evapotranspiration in two contrasting loblolly pine plantations: age-related changes in water use and drought sensitivity of evapotranspiration components". *Forest Science* in review; 2) Noormets et al., "Forest rotation length impacts on ecosystem carbon balance". To be submitted September to *Forest Ecology and Management*; 3) Domec et al. "The impact of soil texture and water table depth on root hydraulic redistribution and consequences for the carbon and water budgets of Southern U.S. pine plantations". To be submitted September to *Tree Physiology*; 4) Bryars et al. "A single physiological parameter set for the 3-PG model produced accurate estimates of loblolly pine growth in stands in the Coastal Plain and Piedmont Provinces of Georgia, USA". To be submitted in September to *Forest Ecology and Management*; and 5) Bryars et al. "Parameterization of the 3-PG model for use with two contrasting clonal loblolly pine genotypes and their simulated performance under altered climate regimes". To be submitted to the *Southern Journal of Applied Forestry* in September.

Aim 3

Texas A&M University identified and hired a Post doctorial Research Associate, Dr. Tomasz Koralewski, to coordinate the Aim 3 portion of Texas A&M's contribution to the project. He has begun the process of building a location database for the progeny tests and the parents represented in those progeny tests that can be linked to climactic data. This database will form the backbone for the Uniform Response Function analysis to optimize seedling deployment. In addition, the genetics group has recruited a PhD student, Miranda (Mengmeng) Lu, whose time will be shared by Drs. Loopstra and Krutovsky. Her initial responsibility will be to help evaluate the efficiency of Agilent SureSelect target gene enrichment system (https://www.agilent.com/genomics/sureselect) for the following Illumina GAII and HiSeq high-throughput sequencing and genotyping of loblolly pine megagametophytes. She is starting oligo probe design using the Agilent on-line eArray tool (https://earray.chem.agilent.com) and the most recent and comprehensive unigene set consisting of 42077 sequences representing individual genes expressed in loblolly pine (http://www.conifergdb.org/db/spp3352v1/index.php). The group has also contributed to the formulation of the Aim 3 work plan for years one and two.

North Carolina State University (NCSU) recruited a graduate student, Alfredo Farjat, to carry out the joint analysis of progeny test data and climate data for the NCSU Cooperative Tree Improvement Program. Mr. Farjat has a MS degree in Statistics from NCSU, and will be pursuing a dual PhD program in Statistics and Forestry. An undergraduate, Benjamin Rusche, has been recruited to work with Dr. Ross Whetten on the pilot scale experiment to test Genotyping-By-Sequencing (Elshire et al, PLoS One 6(5): e19379, 2011) as a cost-effective means of genotyping the experimental populations. A search has also been initiated for a person to fill the technician position partially funded by the project; this individual will carry out the measurements of the wide-range common garden loblolly pine field tests called the Plantation Selection Seed Source Study (PSSSS) and collect foliage samples for genotyping in year 2, after the results of the pilot-scale experiments are available. Discussions with Aim 1 group leaders

have been initiated to coordinate sample and data collection activities for maximum synergy between the ecophysiological and genetic components of the project. Contacts to seek opportunities for synergy have been made with two other CAPs: a pending bioenergy project led by Tim Rials at University of Tennessee-Knoxville that includes southern pines as a biomass resource, and the T-CAP climate change project on wheat and barley that includes genotyping-by-sequencing as a research and breeding tool.

Virginia Tech recruited a PhD student, Rajesh Bawa, who will conduct phenotyping of adaptive traits (cold hardiness, bud phenology) in the loblolly pine progeny trials described above and work with collaborators at North Carolina State University, The University of Florida, and Texas A&M University to conduct genome-wide association mapping between these traits and the re-sequencing data. Mr. Bawa and Co-PI Holliday will also work with collaborators in Canada on comparative studies of adaptation with lodgepole pine (*Pinus contorta*), which is widespread in the western United States and Canada, and the focal species for a large association and landscape genomics study funded by Genome Canada.

University of Florida recruited a student, Jianxing Zhang, to conduct analyses linking progeny test performance with climatic data. Zhang will complete a co-PhD in statistics and forestry. He has started to develop a useful database for the Uniform Response Function analyses that is planned to optimize seedling deployment. Needle samples have been collected from 780 of the 1000 genotypes from the CCLONES 1 population and DNA is being isolated for future genotyping.

Aim 4

The Economics and Policy Aim Group initiated project activities immediately after the funding was officially notified. Good progress has been made during the first project year. The following are major accomplishments.

A. Research
   - developed a detailed work plan to ensure the successful realization of the Aim's milestones and to streamline cooperation within the Aim and with other Aims.
   - developed a survey instrument for evaluating climate change perceptions among key extension people and their audiences (with Aim 6);
   - initiated data collection and modeling activities for assessing regional market impacts, mapping carbon hot spots, analyzing the profitability of forest lands, and estimating the impact of southern pine beetle outbreaks;
   - hired one Postdoctoral Research Associate (University of Florida) and one Graduate Research Assistant (North Carolina State University) and actively recruiting candidates for the remaining positions of Graduate Research Assistants.

B. Publications

Abt, K., R.Abt, and C. Galik. Effect of bioenergy demands and supply response on markets, carbon and land use. *Forest Science* (in review).

Susaeta, A.I., C.A. Gonzalez-Benecke, D.R. Carter, T.A. Martin, and E.J. Jokela. Economical Sustainability of Pinestraw Raking in Slash Pine Stands in the Southeastern United States. *Ecological Economics* (in review).

Aim 5

Project Learning Tree Module

A half-time coordinator has been hired to develop the Project Learning Tree (PLT) module on climate and forests. We have activated the network of PLT coordinators in the Southeast, drafted goals and objectives for the module, and developed a work plan for producing draft materials. A Fall 2011 University of Florida course (Environmental Education Program Development) has been modified so that groups of students will develop a needs assessment of secondary teachers to better understand their need for and use of this supplementary material, will critique existing materials for secondary teachers on climate change, and will begin to develop engaging activities. A meeting is planned for October 12, 2011 in North Carolina to introduce PLT coordinators to a state climatologist and discuss draft materials.

Distance Graduate Course

An overarching goal and objectives for the distance graduate course have been established and used to create a draft syllabus, scheduled for Spring 2012. The draft syllabus is being reviewed by project collaborators. In addition, distance course technologies are being analyzed and an online learning management system to host the course is being planned and developed. Graduate students from multiple collaborating universities will receive independent study credit hours for completing this distance learning course. The course will: enhance capacity for regional, transdisciplinary collaboration among climate and forest scientists, extension and education professionals; prepare graduate students to address climate change mitigation and adaptation issues; and facilitate greater levels of integration across disciplines by encouraging students and postdoctoral assistants to engage in the processes designed to enhance communication, cooperation, and collaboration among disciplines and among research, education, and extension.

Undergraduate Internship Program

A full-time coordinator has been hired to develop and coordinate the undergraduate internship program. This coordinator will also assist with the development of the communications class for the interns to be taught in Fall 2012, as well as assist in reviewing all material associated with Aim 5. A comprehensive survey has been completed by over 300 public school educators across a five state region in the southeastern U.S. The survey was designed to assess current teachers' knowledge of and coverage in classes concerning forest management and climate change. Results of the survey will be available in Fall 2011 and will be presented at the national Society of American Foresters convention in early November 2011. Discussions have been initiated with our collaborator at Virginia State University regarding recruitment of interns and the development of a teaching module (to be used in the undergraduate class) on speaking to students from city schools about climate change and other natural resource issues.

Aim 6

Two coordinators have been hired to date and another coordinator will be hired within the month. One of these coordinators has been hired at North Carolina State University to work closely with the climatology community to engage them in the PINEMAP project. Another coordinator has been hired at Texas AgriLife Extension to assist with overall Extension product development and delivery in the region, including the eXtension activities. The third project coordinator, to be based at the University of Georgia, with the Southern Regional Extension Forestry office, will provide assistance to the network of Extension specialists and others who will be users of the information and technology developed by the scientists in the project.

Aim 6 has completed the development of a 2-year work plan and team members are developing individual plans of work required to accomplish aim deliverables. This group has begun to use a project management software program to implement their plan of work and logic model requirements. The Extension Aim 6 group meets every two to three weeks to discuss activities and progress. Aim 6 personnel are also participating in professional climatological and research cooperative meetings. Specifically, members attended the national forest climate meeting and extension retreat in Flagstaff, Arizona and the 2011 American Association of State Climatologists in Asheville, North Carolina. Furthermore, Aim 6 Extension personnel have developed two poster abstracts, one accepted at the national Society of American Foresters meeting in November.

A survey of extension specialists across the South has been developed, pilot tested by 32 individuals, revised, and sent to 11 states for approval. The survey is being administered to extension agents in Georgia and Mississippi. The survey will enable us to better understand state and county agent perceptions of global warming and climate change, compare them to the American public, and analyze differences between states and between extension program areas. This information will be essential to help us develop materials that extension agents will use with their audiences. Furthermore, an outline of topics and delivery format for in-service extension training webinars has been completed.

In Florida, four counties have agreed to participate in a process to better understand climate perceptions among forest landowners. An honors student has agreed to organize focus groups in each county and analyze the data for an undergraduate honors thesis.

In the western gulf region, individuals have been identified and invited to participate in the western gulf focus group and advisory board. In addition, in Texas, an advisory board has been developed and a two-day multi-county outreach program (Woodlands Resiliency Program) will be conducted later this year. Finally, the theme of the Western Gulf Forest Silvicultural Exchange meeting, which will take place in the winter, has been developed to reflect the goals of this project.