V(A). Planned Program (Summary)

Program # 20

1. Name of the Planned Program
Climate Change--Research

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
<th>% 1862 Extension</th>
<th>% 1890 Extension</th>
<th>% 1862 Research</th>
<th>% 1890 Research</th>
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</thead>
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<td>132</td>
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<td>100%</td>
<td>100%</td>
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<tr>
<td></td>
<td>Total</td>
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<td>0%</td>
<td>100%</td>
<td>100%</td>
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</table>

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

<table>
<thead>
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<th>Year: 2009</th>
<th>Extension</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1862</td>
<td>1890</td>
</tr>
<tr>
<td></td>
<td>1862</td>
<td>1890</td>
</tr>
<tr>
<td>Actual</td>
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<td>0.0</td>
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</tbody>
</table>

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

<table>
<thead>
<tr>
<th></th>
<th>Extension</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith-Lever 3b &amp; 3c</td>
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<td>0</td>
</tr>
<tr>
<td>1890 Extension</td>
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<td>0</td>
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<tr>
<td>Hatch</td>
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<td>0</td>
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<tr>
<td>Evans-Allen</td>
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<tr>
<td>1862 Matching</td>
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<td>0</td>
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<tr>
<td>1890 Matching</td>
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<td>0</td>
</tr>
<tr>
<td>1862 All Other</td>
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<td>0</td>
</tr>
<tr>
<td>1890 All Other</td>
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<td>0</td>
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V(D). Planned Program (Activity)

1. Brief description of the Activity

The University of Florida provides overall leadership of agricultural research and extension efforts in the SECC (SEClimate.org) a consortium of eight universities in Florida, Georgia, Alabama, North Carolina, and South Carolina. The overall goal of the SECC is to develop climate information and decision support systems for the Southeastern USA that will contribute to an improved quality of life, increased profitability, decreased economic risks, and more ecologically sustainable management of agricultural ecosystems, forests and other terrestrial ecosystems, and coastal ecosystems of the Southeastern USA. Research is conducted to develop new information to help the agricultural community reduce risks to climate variability and climate change and to take advantage of information to increase economic and environmental benefits. Specific accomplishments of investigators at the University of Florida during the last year are summarized here.

During the previous nine years of the SECC, our research focused on the use of seasonal climate forecasts and our understanding of climate variability to reduce risks of drought, wild fires, excess rainfall, and freezing temperatures on agricultural and forestry systems and on management of water resources. During the last year, research on climate variability continued, but we added a focus on climate change because of the potential impacts on agriculture and the high level of interest among stakeholders. This interest is not only on changes in climate that are likely in Florida, but also on policies enacted at state and federal levels that could impact agricultural systems, either positively or negatively. We initiated a process for identifying
stakeholders that may be interested in climate change information. Social scientists cooperators at UF developed a preliminary research outline for stakeholder interviews to be conducted in February and March 2010 and began planning for stakeholder workshops scheduled for April 2010 in Tifton, GA.

2. Brief description of the target audience

All stakeholders

V(E). Planned Program (Outputs)

1. Standard output measures

<table>
<thead>
<tr>
<th>Plan</th>
<th>Direct Contacts Adults</th>
<th>Indirect Contacts Adults</th>
<th>Direct Contacts Youth</th>
<th>Indirect Contacts Youth</th>
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</thead>
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<td>(NO DATA ENTERED)</td>
<td>(NO DATA ENTERED)</td>
<td>(NO DATA ENTERED)</td>
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<tr>
<td>Actual</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

<table>
<thead>
<tr>
<th>2009</th>
<th>Extension</th>
<th>Research</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Actual</td>
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<td>0</td>
<td>0</td>
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</tbody>
</table>

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- (No Data Entered)
V(G), State Defined Outcomes

V. State Defined Outcomes Table of Content
Outcome #1

1. Outcome Measures

{No Data Entered}

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Florida is a state located in the tropics. Natural disasters such as tropical storms and hurricanes are common annual occurrences in this state. Severe weather conditions such as droughts frequently lead to large-scale fires. Florida also has other weather extremes such as floods leading to large scale damage especially along coastal regions and rivers that can impact research studies.

Florida has three international shipping ports and four international airports with a new one scheduled to open in 2010. Besides imported goods over 53 million tourists visited annually from around the world. It has been estimated that because of this international influx into the state, we are the entry point for one new invasive plant, pest or disease each week. Any of these external factors can adversely affect the 1862 research outcomes.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned
- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

Although some information is provided this year in this program area, most information concerning research in the area of climate change will be found in other parts of this report. This program will be fully functional in the 2010 report.

Key Items of Evaluation

A new agricultural reference index for drought (ARID) was developed to provide quantitative information for monitoring and forecasting the effects of climate on crops and pastures. This index is based on sound principles of soil water balance and evapotranspiration of a reference crop. During 2009, we
showed that the index during a crop season is highly correlated with yields of corn, peanut, soybean, cotton, and pasture grasses. Field measurements of soil water and growth of pasture were made to provide ranchers and hay producers with quantitative information of drought on productivity. The aim is to use this index to monitor drought across Florida and other SE states with daily updates at a fine spatial resolution and also to forecast ARID for a 3-6 month time period to allow producers to estimate risks associated with drought. This will be added to our Extension-led AgroClimate.org to reach producers in Florida and other SECC states.

We developed a quantitative methodology for directly comparing the response of observed corn, peanut and cotton yields in the SE USA with ENSO phenomena classified using four dissimilar ENSO indices. Two of these are categorical (Japan Meteorological Association, JMA and modified, or monthly, JMA), and two are quantitative (Oceanic El Niño Index, ONI and Monthly El Niño Index, MEI). Results indicate the superiority of the quantitative indices, and especially the MEI for forecasting crop yields in response to climate variability. This research is aimed at providing farmers with improved capabilities to anticipate yields of different crops and management practices for improving production plans and decisions.

We completed a sensitivity analysis on physics configurations and key surface parameters for the MM5 regional climate model and submitted a manuscript on this work to the Journal of Geophysical Research. A new state-of-the-art regional climate model, WRF, has been installed and test simulations run in the UF High Performance Computational system and in our cluster at ABE. Using WRF and MM5, high resolution (order 500 m to 1 km) runs are in progress to inspect the impact of land use change (LUC) over last decade (1992-2006) on central Florida climate conditions. Working with SECC researchers at Florida State University, UF researchers have linked a regional scale climate model with our dynamic crop models to improve seasonal climate forecasts for agricultural uses. In addition, various advanced statistical methods have been used to determine how reliable forecasts for different crops are. We found that these advanced climate models and statistical methods can improve seasonal climate forecasts that we have been using in the past. These methods provide improved information to the agricultural community and water resource managers.

We conducted research on effects of climate variability on water resources. We used regional climate models to evaluate how well rainfall could be forecast for use in water resource management and on how water quality (nitrogen and phosphorus) in streams could be forecast based on an understanding of climate variability. In addition, work was started last year to develop information and tools for estimating carbon footprint of agricultural systems (initially, strawberry and cattle production in cow-calf operations). Society is starting to demand actions from governments and the private sector to reduce the emissions of greenhouse gases across the globe. The latest science indicates that a large-scale reduction of greenhouse gas emissions will be required across its many sources in our economy, including the agricultural sector, to reduce the anticipated increases in global temperatures. These research projects will lead to tools to help farmers and ranchers reduce their carbon and energy footprints and to take advantage of marketing opportunities. These research initiatives have developed from many interactions with stakeholders.

Due to the interest in our successful web-based climate risk management information and decision support system, www.AgroClimate.org, a new research effort was developed to create an open source project at a national scale for those who are developing tools and information for the agricultural sector about climate variability, climate change, adaptation, and mitigation. This will facilitate the adaptation of AgroClimate by other states or regions and will provide mechanisms for researchers in other states to contribute to an agricultural community climate information and decision support system.