SC CASC SCIENCE NEEDS 2014

In Fiscal Year 2014, the SC CSC is interested in inviting Statements of Interest (SOIs) that address the following topical science needs:

The over-arching theme that threads through this funding opportunity for SC CSC will be "Precipitation Variability." The South Central region exists in a zone of dramatic transition both in terms of eco-climate system diversity and in terms of occurrence of extreme events. This transition zone is the perfect natural laboratory for development of climate and ecological models, and decision support tools for land and water managers, and culture keepers. Precipitation variability should be a component of consideration in the proposals along with the science priorities listed below.

Also, the projects funded should provide relevant tools, data sets, models, etc. that help land managers make decisions at a landscape scale. That is not so say the more basic research will not be funded, but describe in the SOI and proposal why the basic research is needed and how it is related, or how it will be used in the development of the applied tools and models. (Example: Understanding soil microbiology may not help one make an immediate land management decision. However, it may be a critical component to build into ecosystem models to help predict whether a drought is of intensity and length to lead to desertification.)

The science priorities for the 2014 funding are:

1. **Regional Physical Climate Variability and Trends**
    a. **Comprehensive Tools**
    Develop tools to comprehensively assess strengths, weaknesses, and gaps in the understanding of the drivers of regional physical climate variability and trends across the South Central CSC Region. The project should incorporate observations, modeling and development of new methods and techniques that enhance adaptive management strategies.

    Within the SC CSC Region, areas of New Mexico, West Oklahoma, and West Texas have suffered extreme droughts in recent years. Develop technology transfer tools to evaluate scenarios of climate

change on water management, groundwater and surface water availability, economics and potential land use changes. This could include models that show the change predicted (i.e. groundwater and surface water maps under various climate scenarios and water management strategies).

Develop a critical analysis of what is known, and what are the key information gaps related to controls on precipitation variability. (For example: summarize the state of knowledge of studies done at intermediate time scales, and geographic coverage of these studies).

Example for over-arching theme: Develop a decision support system that utilizes information on precipitation variability to model landscape management decisions (e.g., rangeland/wetland/water-resources models or web tools).

b. Drought Monitoring

At present, the drought information that is available is typically not developed with stakeholders/managers in mind, therefore is often not responsive to their needs. Identify the drought information needs of stakeholders in the South Central region and the most effective methods of communicating drought information.

Evaluate the drought indices that are used for monitoring and predicting meteorological, agricultural, and hydrological drought and evaluate their effectiveness in the South Central region.

Develop new drought monitoring products that are responsive to user needs (e.g., soil moisture-based drought indices) and evaluate their effectiveness.

Develop tools that effectively communicate drought information and the associated uncertainty to stakeholders.

2. Ecosystems and Landscapes

a. Identify major ecosystem drivers and disturbances across the South Central Region; focus is fire and drought. Develop products that assess the impacts of fire or drought on land use change on ecosystem recovery or change, and assess the current level of understanding of each. (Example: What is the state of the science in the South Central

Region for fire science).

b. Develop a methodology for compiling, organizing and assessing available data in the South Central CSC Region, and for integrating results across varying scales (spatial, species, time, etc.). (Example: Identify linkages between qualitative scenario narratives and quantitative models for management applications at an intermediate time scale).
c. Along with fire, there is a gradient from the west to east where we see desertification. What are the ecologic drivers for that tipping point? Develop tools or datasets that would enhance the understanding of desertification across the SC CSC Region.
d. Develop proposals that use existing data and climate projections to generate products (namely maps) demonstrating change in range or disturbance regimes as related to climate change and precipitation variability. Examples: Where will woody plants (e.g., Eastern red cedar, mesquite, etc.…) and invasive species reside in 2050? How will the fire regimes change? Using an existing fire regime model (e.g., Guyette et al 2012. Predicting Fire Frequency with Chemistry and Climate. Ecosystems 15(2): 322-335.) paired with existing climate projection models to develop maps of projected change.
e. Develop a product (or generate the science needed to develop a product) such as an Alien Plant Ranking System applied throughout SC CSC Region that incorporates climate change. These products could define plants, animals, insects or diseases whose distribution may be affected by ecosystem changes. (e.g., http://www.npwrc.usgs.gov/resource/literatr/aprs/index.htm)
f. Protocols exist for development of vulnerability assessments: (e.g.,https://connect.natureserve.org/science/climate-change/ccvi). These tend to be state based on priority species in state wildlife action plans. The need exists to complete more vulnerability assessments as well as develop synthesis products that allow evaluation of vulnerability across regional scale.

3. Human dimensions

a. As They Relate to Landscape-Scale Climate Change and Precipitation Variability

The private land holdings make up the majority of the land in the SC CSC Region. Develop models, tools or processes that help the CSC

frame the science needs or articulate the science questions that land owners need answered. Develop processes that help the scientists package the science planning, research activities, and translation to the private landowner in a way that the landowners can understand it and find it beneficial enough to use it in their own land management strategies.

Develop methods that will allow the SC CSC to:

1. Understand how private landowners and agronomists make decisions related to landscape- scale climate change
2. How do they perceive risk (drought, fire, flood, etc.)?
3. What shapes their understanding of that risk (news, weather forecasts, agricultural extension personnel…etc.?)
4. How should the SC CSC frame the science questions and package the results so that it is useful to a private land owner or agricultural industry?
5. Develop an inventory of the social science tools in the SC CSC Region that exist in various communities. Define what tools are available, what they do, what are their strengths and limitations, define the geographic scale, and determine if the tools are site specific or transferable?

b. Native Americans and Cultural Resources

Effects of climate change on the sustainability of cultural resources, including approaches that utilize traditional ecological knowledge, human dimensions, and adaptation strategies

The SC CSC region includes many cultural resources that are increasingly vulnerable in a changing climate, including National Parks, National Wildlife Refuges, National Forests, other federally managed lands, and tribal lands. Managing these lands under the impacts of climate change poses a grand challenge to managers who are entrusted to preserve a variety of resources for the education, enjoyment, and livelihood of future generations. Federally recognized Indian Tribes have a tremendous interest in building capacity for resilience to the impacts of climate change on their lands and communities. Priority will go to projects that build awareness, assess the vulnerability of cultural and/or subsistence resources and explore potential adaptation actions or mechanisms for resiliency,

utilize traditional ecological knowledge, and develop research networks to improve the understanding of how climate change impacts cultural resources.

c. Understanding Organizational Systems and Governance in Conservation Decision Making as it Relates to Climate Change, and Precipitation Variability

Landscape Conservation Cooperatives and the Southeast Conservation Adaptation Strategy (SECAS) have identified conservation governance systems as a priority knowledge gap in the successful implementation of conservation initiatives in response to global changes like climate change. SECAS defines the problem in the following way: "Define and assess the institutional setting within which the conservation community and other communities of practice (e.g., community planning organizations) make conservation decisions." Within the context of this definition of the problem, the conservation community, which includes federal, state, and non-governmental organizations, often fails to effectively consider the following challenges in implementing their conservation priorities: **1)** understanding the institutional/governance context (including hierarchical governance structures) within which decisions affecting conservation are made, and; **2)** understanding how to effectively translate science information and tools into the decision making process. In order to more effectively address these knowledge gaps, the SC CSC is seeking proposals that can effectively answer one or more of the following objectives:

6. Case studies of conservation governance systems in the SC CSC region that demonstrate effective integration of conservation outcomes (targets), economic indicators, ecosystem services, and adaptive learning into decision making.

7. Pilot projects which demonstrate effective establishment of governance systems that successfully integrate conservation objectives into decision making processes at the local scale (i.e., city/municipality/county/community, watershed, private lands cooperatives, etc.). Pilot projects should demonstrate scalability and applicability at larger landscape and/or regional scales, such that landscape-

scale conservation objectives can be successfully implemented through effective conservation governance systems. Pilot projects should demonstrate the relationship and integration of conservation outcomes (targets), economic indicators, and ecosystem services into an adaptive decision making process that is resilient to changing economic and political conditions.