

North Central Climate Science Center 2013 Annual Report

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THIS YEAR'S HIGHLIGHTS

- Continued to build on the Foundational Science Areas, which contributed to the National Climate Assessment and focused on a drought theme for the North Central domain.
- Published a five year science agenda.
- Ramped up “ReVAMP” through three management-focused applied research projects.
- Built capacity in the region through workshops, training, tool box development, and observations.

In its [five-year science agenda](#), the North Central Climate Science Center dedicated itself to being a “Resource for Vulnerability assessment, Adaptation, and Mitigation Planning” (ReVAMP) for Department of Interior (and other) resource managers in the Missouri River Basin (<http://pubs.usgs.gov/of/2012/1265/>).

The ReVAMP concept will serve as a centralizing theme to coordinate research done through the NC CSC and will also provide the mechanism by which the NC CSC can help serve stakeholder needs. At the foundation of the ReVAMP concept are three research areas led by North Central University Consortium (NCUC) members, which are meant to form an integrated approach to inform resource managers and researchers in our region:

- Climate Drivers: Understanding and quantifying drivers of regional climate changes. (team lead: Joe Barsugli, University of Colorado, Boulder)
- Impact Analysis: Assessing impacts of climate change on the natural resources of the region and the resulting vulnerability of social-ecological system components. (team lead: Andrew Hansen, Montana State University)
- Adaptation: Characterizing adaptive capacity of communities and natural resources. (team lead: Dennis Ojima, Colorado State University)

These Foundational Science Areas have been established to provide integrated science delivery to scientific and management communities across our region (Figure 1).

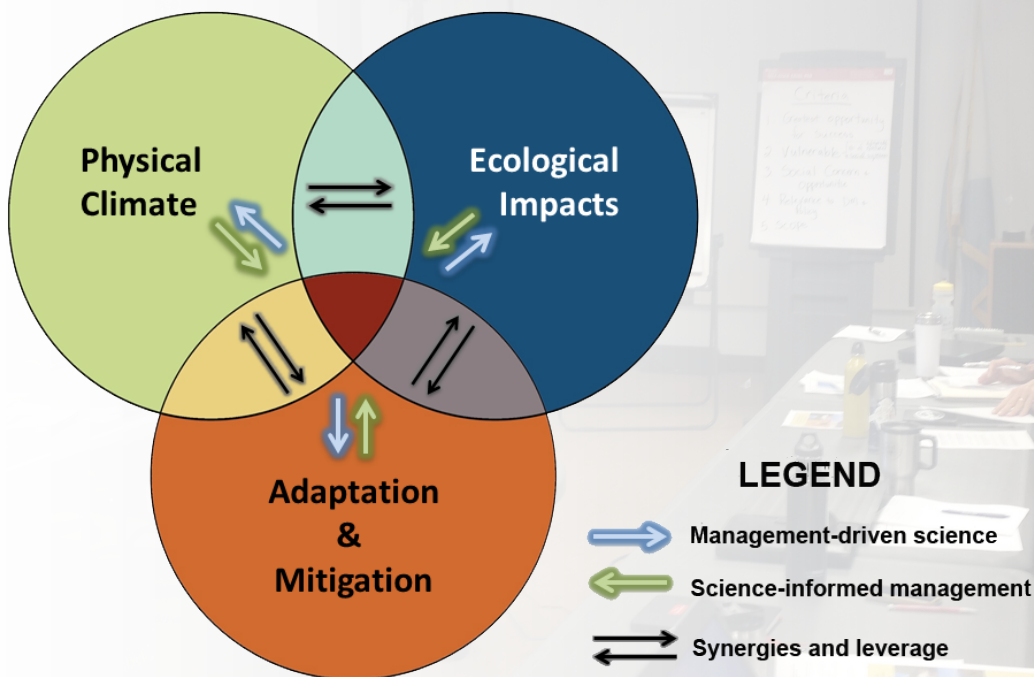


Figure 1. The foundational science areas of the North Central Climate Science Center, with decision-focused, resource management projects meeting at the intersection of these areas. The image is of a stakeholder meeting with managers and NC CSC-funded PIs at the Curecanti National Recreation Area outside Gunnison, CO. Image courtesy of Shannon McNeeley, CSU.

Connecting Research to Land Management Decisions

Stakeholders have expressed a desire to have a resource that can help interpret and untangle the ever-increasing array of climate information. They have asked the NC CSC to focus on management relevance to ensure that land and water managers have access to *useful* and *usable* information. Because managers need quick access to information and tools, they need access to more than peer-reviewed publications. Input from the [Stakeholder Advisory Committee](#), and interactions with resource managers, have identified a need for technical assistance in applying climate science to the management process, including vulnerability assessments, adaptation, and mitigation. The ReVAMP concept will help address this need. The [Resource for Advanced Modeling \(RAM\)](#), with support from USGS and Colorado State University staff, is one example of support the NC CSC can provide to bring researchers and managers together to analyze information in pursuit of resource management solutions.

In order to address this need, in 2013, the NC CSC used a competitive process to fund projects that would connect the foundational science areas with some specific examples of land management actions. The NC CSC solicited projects with a clear “articulation of (a) decision that is being considered and how it addresses important Department of Interior land, water, fish and wildlife, or cultural heritage resources in the region” and that include resource management decision makers as collaborators and/or investigators. The three projects selected are:

- Informing implementation of the Greater Yellowstone Coordinating Committee’s Whitebark Pine Strategy. (PIs: Cathy Whitlock and Andy Hansen, MSU)
- Surrogate species for wetland-dependent birds in the prairie pothole region: selection, evaluation, and management application in the face of climate change. (PIs: Susan Skagen, USGS; and Barry Noon, CSU)
- Building Social-Ecological Resilience in Southwestern Colorado (Project team leads: Nina Burkhart and Rudy Schuster, USGS; Renée Rondeau, CO Natural Heritage Program; Betsy Neely, The Nature Conservancy; Marcie Bidwell, Mountain Studies Institute; Laurie Yung, UMT)

In addition to bringing climate science to the specific management issues, a secondary (but critical) objective of the solicited projects was to help direct the configuration of the ReVAMP. The NC CSC selected projects with participants that expressed willingness to both use and help define the ReVAMP. In this capacity, and to complement the foundational science areas, it is the intention that these three projects focus on the intersection of the latest science on climate drivers, ecological impacts, and adaptation and mitigation (represented as the central, maroon colored intersection of the Venn Diagram, Figure 1).

Capacity Building

The NC CSC is committed to building capacity among diverse stakeholders. To this end we are continuing to develop strong connections with the [National Conservation Training Center](#) for education and training; we have partnered with AmericaView to deploy nine PhenoCams in the Upper Missouri River Basin; we are supporting tribal phenology observations through the Indigenous People Climate Change Working Group; and we are pursuing other outreach activities as opportunities take shape.

Details:

We provided a local offering of the National Conservation Training Center's Climate Change Vulnerability Assessment course to graduate students at Colorado State University, in fall 2013, and we will provide regional offerings of this and other climate-related courses in 2014.

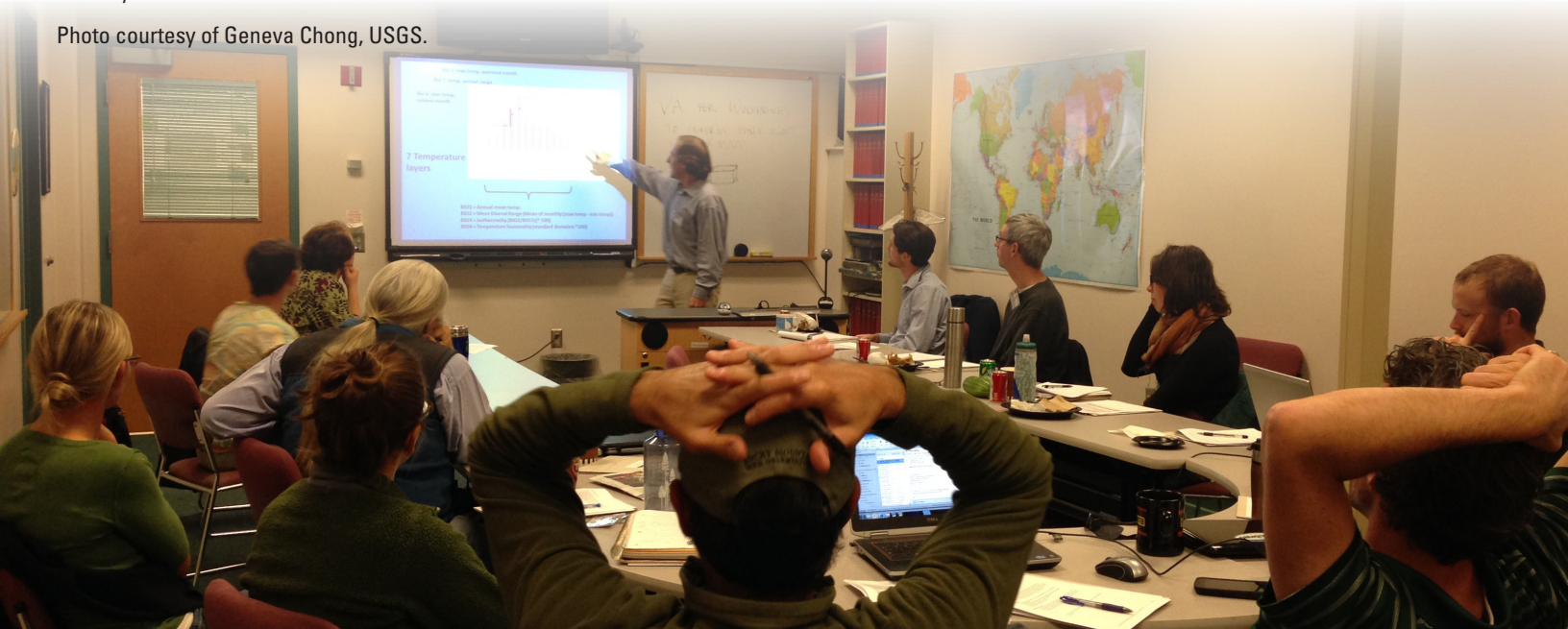
We are working with the AmericaView program to place several new PhenoCams in the Missouri River basin. This will expand the national Phenocam network in the region and provide important base-line information on how climate impacts local phenology. Also, a Tribal Phenology Observation activity supports three Tribal College and University (TCU) mini-grants to initiate student phenological and meteorological observation projects administered through the Indigenous People Climate Change Working Group (IPCCWG), which is housed at Haskell Indian National University and led by Dr. Dan Wildcat.

We have provided support to the Intertribal Council on Utility Policy (ICoup) to develop a science plan for a prospective scientific study of the projected 30 year climate and weather variability with regard to the management of the Missouri River's water resources and potential impacts on habitat conservation, dam releases and stream flow management, cultural preservation, wind-hydro energy development, and carbon sequestration and emissions reduction, as well as the agricultural and land management sectors of the regional economy.

NC CSC staff collaborated with the National Park Service and the Great Northern Landscape Conservation Cooperative to develop an ArcMap toolbox for analyzing MODIS plant phenology data (<http://pubs.usgs.gov/of/2013/1250/>). Since "changes in phenological events...are among the most sensitive biological responses to climate change" (<https://www.usanpn.org/about/why-phenology>), these tools can be relevant to climate-related activities such as evaluating long-term trends in phenology from an applied research perspective and communicating with the public.

USGS and CSU NC CSC staff members have teamed up to provide training in the use of VisTrails: Software for Assisted Habitat Modeling (SAHM) and ST-Sim state-and-transition simulation models at the USGS Resource for Advanced Modeling (RAM) facility.

Photo courtesy of Geneva Chong, USGS.



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Publications (published and in press; NC CSC staff in bold):

- Bierbaum, Rosina, Smith, Joel B., Lee, Arthur, Blair, Maria, Carter, Lynne, Chapin, F. Stuart, Fleming, Paul, Ruffo, Susan, **McNeeley, Shannon**, Stults, Missy, Wasley, Emily, Verduzco, Laura, 2013a: Chapter 28 - Adaptation. *National Climate Assessment 2013*.
- Bierbaum, Rosina, Smith, Joel B., Lee, Arthur, Blair, Maria, Carter, Lynne, Chapin, F. Stuart, Fleming, Paul, Ruffo, Susan, **McNeeley, Shannon**, Stults, Missy, Wasley, Emily, Verduzco, Laura, 2013b: **A comprehensive review of climate adaptation in the United States: more than before, but less than needed**. *Mitig. Adapt. Strateg. Glob. Chang.*, 18, 361–406, doi:10.1007/s11027-012-9423-1.
- McNeeley, S.M.** 2014. **A “toad’s eye” view of drought: regional socio-natural vulnerability and responses in 2002 in Northwest Colorado**. *Regional Environmental Change*. DOI: 10.1007/s10113-014-0585-0
- Morisette, J.T.**, C.S. Jarnevich, T.R. Holcombe, **C.B. Talbert**, D. Ignizio, **M.K. Talbert**, C. Silva, D. Koop, and A. Swanson, N.E. Young. 2013. **VisTrails SAHM: visualization and workflow management for species habitat modeling**. *Ecography* 36(2): 129-145.
- Ojima, D., J. Steiner, S. McNeeley**, K. Cozzetto, and A. Childress, 2013: Great Plains Regional Climate Assessment Technical Report for the 2013 National Climate Assessment.
- Talbert, Colin**; Kern, Tim; **Morisette, Jeff**; Brown, Don; and James, Kevin, 2013, **MODIS phenology image service ArcMap toolbox: U.S. Geological Survey Open-File Report 2013–1250**, 6 p.
- Talbert, C., Talbert, M., Morisette, J.** and Koop, D. 2013. **Data Management Challenges in Species Distribution Modeling**. *IEEE Data Eng. Bull.* 36(4): 31-40.

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<http://www.doi.gov/csc/northcentral/>
<http://www.revampclimate.colostate.edu/>
2012 Annual Report