

## SCIENTIFIC AND MANAGERIAL COLLABORATION

# The Strategic Framework for Science in Support of Management in the Southern Sierra Nevada, California

By Koren Nydick and Charisse Sydoriak

## IN 2008, FEDERAL MANAGERS AND

scientists in the Southern Sierra Nevada Ecoregion (fig. 1) challenged themselves to develop and carry out a strategic science framework to help mitigate impacts from, and adapt to, climate change. The group took a landscape approach, which transcends jurisdictional boundaries and is reflected in the Department of the Interior Landscape Conservation Cooperatives and the U.S. Forest Service (USFS) All Lands Approach. Initial collaborators were Sequoia and Kings Canyon National Parks, the U.S. Geological Survey Western Ecological Research Center, the USFS Pacific Southwest Research Station, Sequoia National Forest, and Giant Sequoia National Monument. The agencies held a science symposium to review the current state of scientific research. Then, an inter-agency team of managers and scientists crafted the framework. This document (NPS et al. 2009), released in June 2009, centers on four overarching questions: (1) What ecosystem changes are happening, why are they happening, and what does it mean? (2) What is a range of plausible futures we could face? (3) What can we do about it? (4) How can relevant information be made available to all who need or desire it? Under these four questions, broad goal statements express the desired results. Each goal is subdivided into objectives and tasks, which are expanded upon by focused questions (table 1).

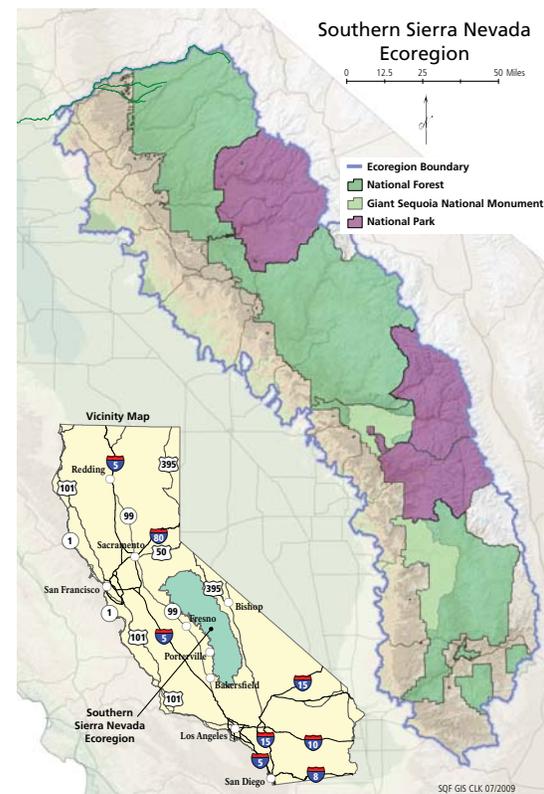
To apply the framework, federal and state agency representatives met several times in 2010. They were joined by nonprofit organizations engaged in climate change adaptation planning and formed a public-

## Abstract

Accelerated climate change is projected to interact with existing agents of change and pose unprecedented challenges for the protection of native species and ecosystem services. Responding to this challenge calls for extraordinary levels of collaboration across the landscape and partnership among scientific researchers and resource managers. The Strategic Framework for Science in Support of Management in the Southern Sierra Nevada Ecoregion was collaboratively developed by federal agencies to face this challenge head-on. The framework will be carried out by the Southern Sierra Conservation Cooperative, a collaborative group of government agencies and nonprofit organizations in the Southern Sierra Nevada Ecoregion. The framework contains four goals: understanding where and why changes occur, anticipating possible futures, developing tools required to take effective action, and providing easy access to and delivery of information to target audiences.

**Key words:** landscape-scale collaboration, science framework, Southern Sierra Conservation Cooperative

**Figure 1.** The Southern Sierra Nevada Ecoregion as defined by the Strategic Framework for Science in Support of Management.



**Table 1. Examples of focused questions in the strategic framework**

- How does each agent of change (e.g., climate, fire, air quality) affect important ecosystem elements?
- What is a plausible range of ecosystem responses to agents of change?
- Which agents of change can be mitigated and how?
- What tools and approaches further ecosystem resilience, resistance, realignment, and response to known agents of change?
- What tools support prioritization of management response (i.e., triage approaches)?
- How can we strategically identify parts of the landscape for different management actions?

private science conservation partnership. The National Park Service and the U.S. Forest Service crafted an interagency agreement to fund a science coordinator to lead the effort. The collaborative group

**Table 2. Southern Sierra Conservation Cooperative founding members and observers**

<b>Federal agency members</b>
• Bureau of Land Management: Central California District
• National Park Service: Devils Postpile National Monument (pending), Sequoia and Kings Canyon National Parks
• U.S. Forest Service: Inyo National Forest, Sequoia National Forest/Giant Sequoia National Monument, Sierra National Forest
• U.S. Geological Survey: Western Ecological Research Center (pending)
<b>Nongovernmental organization members</b>
• Conservation Biology Institute
• Sierra Business Council
• Sequoia Riverlands Trust (pending)
<b>State of California member</b>
• Sierra Nevada Conservancy (pending)
<b>Observers</b>
• NPS Sierra Nevada Network Inventory and Monitoring Program, Stanislaus National Forest, The Nature Conservancy, Yosemite National Park

**Table 3. Initiatives proposed by the cooperative and their alignment with the goals of the strategic framework**

<b>Goal 1: Detection and attribution</b>
• Coordinated regional monitoring strategies—tree population dynamics and Pacific fisher populations
<b>Goal 2: Forecasting future conditions</b>
• Alternative fire management futures (in progress; see the following article on page 44)
• Comparison and integration of climate adaptation projects
<b>Goal 3: Tools and actions</b>
• Both projects under goal 2 also address goal 3
• Kaweah Watershed coordinated restoration initiative
• Enabling forest restoration goals via ecologically managed biomass generation, a cost-benefit analysis
<b>Goal 4: Communication</b>
• Information clearinghouse for shared learning
• Education and outreach initiative
<b>Integrative across goals</b>
• Reevaluate invasive plant programs and practices under alternative climate futures
• Investigate the vulnerability of blue oak woodlands to climate change and develop adaptive management guidelines

became the Southern Sierra Conservation Cooperative (“the cooperative,” see table 2). The mission of this cooperative is to leverage partners’ resources and efforts to conserve the regional native biodiversity and other key ecosystem functions in the Southern Sierra Nevada Ecoregion in the face of accelerated agents of change. These agents of change include climate change, habitat fragmentation, encroaching ur-

banization, shifting fire regimes, invasive species, and increasing air pollution. Managers, scientists, and stakeholders in the cooperative have complementary expertise, capabilities, land bases, fund sources, and more, which when added together have great synergistic power. The cooperative’s geographic scope is loosely defined by the boundaries of the Southern Sierra Nevada Ecoregion as defined in the

Strategic Framework for Science in Support of Management (fig. 1), but may shift depending upon the scope of initiatives and membership. To avoid jurisdictional conflicts, the cooperative will not make resource management decisions or forward an agenda of any particular management action. Rather the cooperative will provide and exchange information to better inform decision makers. It will assess ecological and societal vulnerabilities due to agents of change and the associated costs and benefits of potential management actions, but will not make a recommendation to select a preferred alternative.

The cooperative meets twice annually for two-day workshops and holds conference calls every two months between workshops. Many of the founding members have signed the initial memorandum of understanding (others are pending as this article goes to press) and an administrative framework has been developed. Importantly, members and observers have generated a list of initiative ideas to provide critical knowledge, understanding, and tools regarding agents of change and potential response actions (table 3). Several of these ideas have been crafted into formal funding proposals. The “alternative fire management futures” initiative described in the following article is in progress.

Of particular priority is the establishment of an information clearinghouse for shared learning. Scientists, resource managers, decision makers, and members of the public involved in landscape-scale conservation and climate change adaptation planning and implementation need to access, translate, evaluate, and share information ranging from raw data to vulnerability assessments, decision-support tools, reports, technical syntheses, and nontechnical summaries. Existing online clearinghouses offer data specific to agencies, states, and research programs, and can include file sharing and spatial information capabili-

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ties. Despite these resources, no effective means yet exists to collectively serve this range of information on the geographic scale most needed for on-the-ground conservation. Our goal is to determine the most efficient and effective way to design an information resource for landscape-scale conservation that provides multiple levels of accessible, high-quality information appropriate to different audiences while also facilitating collaboration among users. We will not reinvent services already provided by other clearinghouses, but will utilize and connect existing resources into a shared “one stop” landscape-scale portal. A working group was formed, composed of several cooperative member representatives and additional collaborators and in-kind supporters, such as the University of California–Merced’s Sierra Nevada Research Institute, U.S. Fish and Wildlife Service, California Department of Fish and Game, and Environmental Systems Research Institute (ESRI) Conservation Program. The group crafted a proposal to conduct a formal needs assessment and feasibility study, develop an implementation plan, and produce a Web-based prototype that could easily be shared with other landscape conservation partnerships.

The cooperative faces many challenges and already has learned important lessons. First, we have seen that it is critical to quickly move past start-up administrative tasks to keep interest among members

and momentum focused on implementing the Strategic Framework for Science. Second, in order to do so we have learned that membership should grow slowly, as educating new members takes time. Third, progress can be significantly slowed by something as simple as turnover in staff, especially in leadership positions. Fourth, the cooperative must be explicit in stating that its focus is on generating information, tools, and management options, and that it does not make policy decisions or forward an agenda of any particular management recommendation. Last, education and outreach are critical components of any climate change adaptation project and are especially necessary to enable the individual members to engage in efficient management decision-making and implementation efforts.

See the following links:

- <http://www.nps.gov/seki/naturescience/sscc.htm> (general information on the cooperative and download of documents)
- [www.fs.fed.us/r5/spotlight/2009/snfframework.php](http://www.fs.fed.us/r5/spotlight/2009/snfframework.php) (USFS’s overview of the Strategic Framework for Science in Support of Management)
- [www.fs.fed.us/psw/southernscienceresearch](http://www.fs.fed.us/psw/southernscienceresearch) (proceedings of the 2008 Southern Sierra Science Symposium)
- A virtual science learning center Web site, including cooperative information, in development now

## Reference

National Park Service, U.S. Geological Survey, and USDA Forest Service. 2009. A strategic framework for science in support of management in the Southern Sierra Nevada Ecoregion: A collaboratively developed approach. Southern Sierra Nevada Ecoregion, Three Rivers, California, USA. 24 pp. Available from <http://www.nps.gov/seki/naturescience/sscc.htm>.

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