

An Overview of the Southern Nevada Agency Partnership Science and Research Synthesis

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Executive Summary

Maintaining and restoring the diverse ecosystems and resources that occur in southern Nevada in the face of rapid socio-economic and ecological change presents numerous challenges to Federal land managers. Rapid population growth since the 1980s, the land uses associated with that growth, and the interactions of those uses with the generally dry and highly variable climate result in numerous stresses to ecosystems, species, and cultural resources. In addition, climate models predict that the rate of temperature increase and, thus, changes in ecological processes, will be highest for ecosystems like the Mojave Desert. The Southern Nevada Agency Partnership (SNAP; <http://www.SNAP.gov>) was established in 1999 to address common issues pertaining to public lands in southern Nevada. Partners include the Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, and USDA Forest Service and they work with each other, the local community, and other partners. SNAP agencies manage more than seven million acres of public lands in southern Nevada (95% of the land area). Federal land includes two national recreation areas, two national conservation areas, four national wildlife refuges, 18 congressionally designated wilderness areas, five wilderness study areas, and 22 areas of critical environmental concern. The partnership's activities are mainly centered in Southern Nevada's Clark County (fig. 1.1), but lands managed by SNAP partner agencies also include portions of the Lake Mead National Recreation Area in Mohave County, Arizona, U.S. Fish and Wildlife Service, and USDA Forest Service-managed lands in Lincoln and Nye Counties, Nevada, and all lands and activities managed by the Southern Nevada District Office of the Bureau of Land Management. These lands encompass nine distinct ecosystem types (fig. 1.2), support multiple species of management concern and 17 listed species, and are rich in cultural and historic resources. This introductory executive summary discusses the Science and Research Strategy developed by the SNAP agencies, the Science and Research Report, and need for science-based management in southern Nevada.

Science and Research Strategy

The SNAP agencies are interested in developing an interagency science program that is consistent across agency boundaries and that can inform management decisions regarding natural resources, cultural resources, and human use of public lands. A science and research team was established by the SNAP agencies to develop the interagency science program. This team published the SNAP Science and Research Strategy (Strategy) in 2009. The Strategy is designed to integrate and coordinate scientific research programs in southern Nevada and to improve the efficiency and effectiveness of these programs.

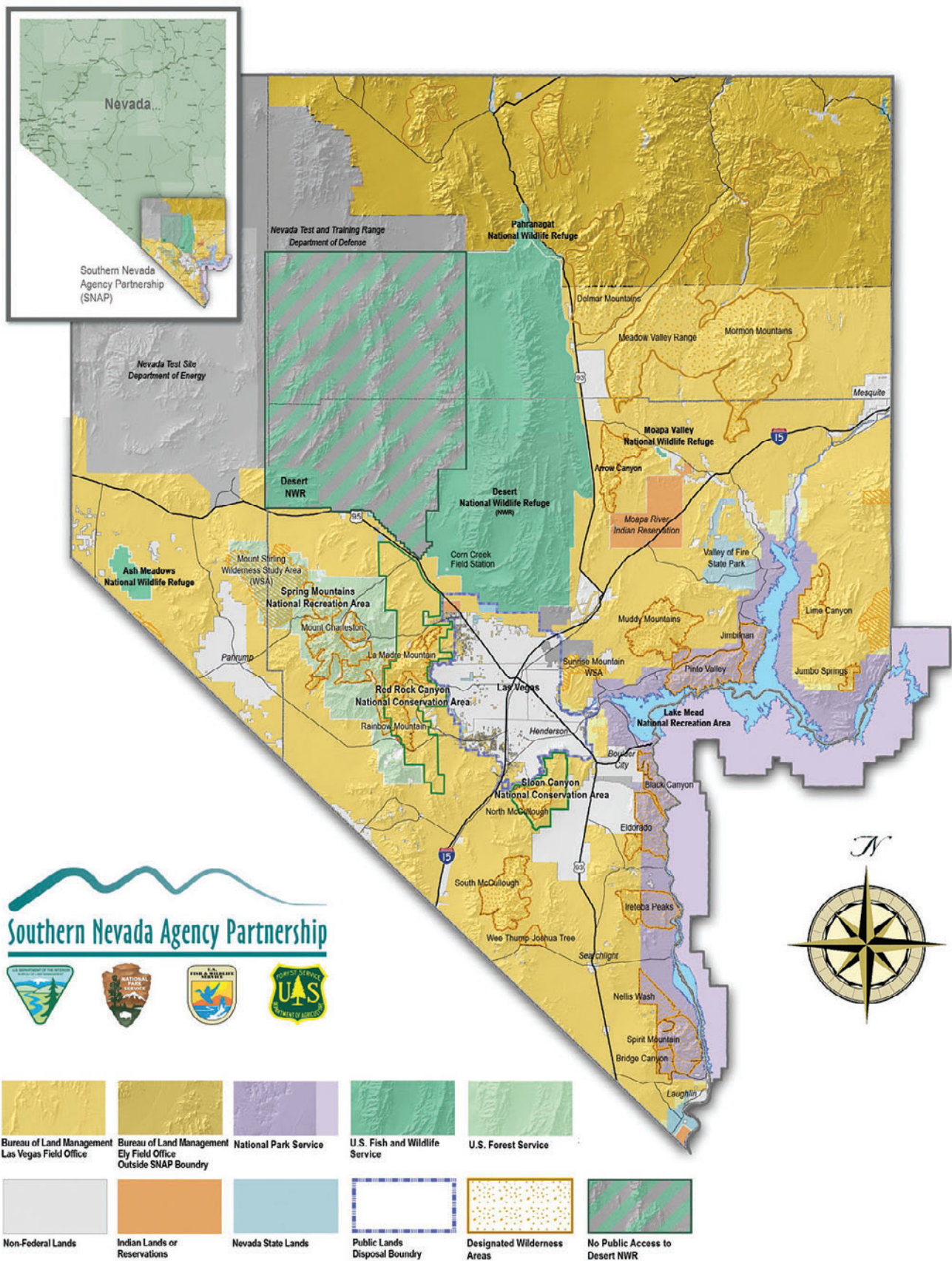


Figure 1.1—Map of the SNAP area illustrating land ownership within the region.

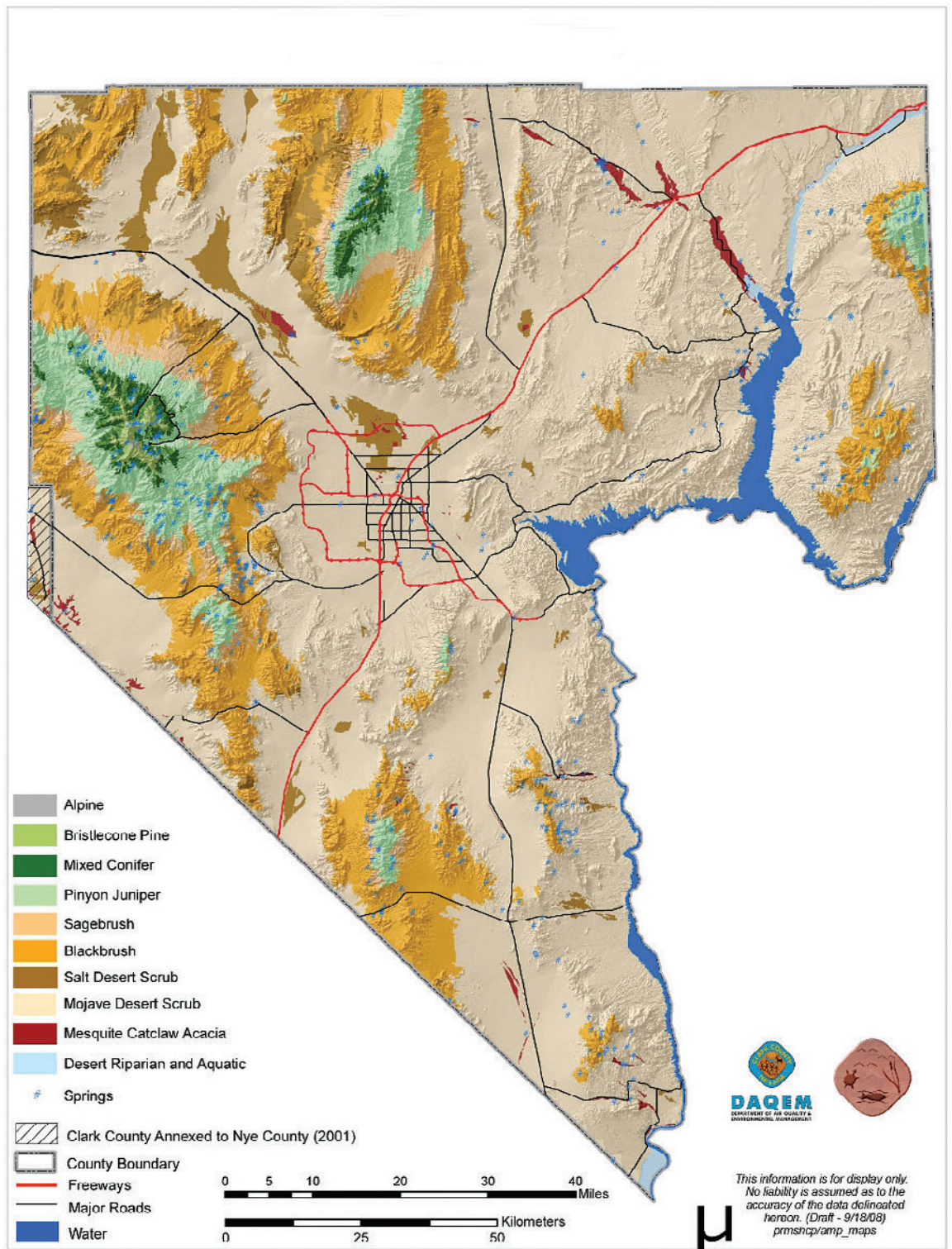


Figure 1.2—Map of the SNAP area illustrating the southern Nevada ecosystem types recognized in the Clark County MSHCP.

The Strategy's purpose is to inform and guide SNAP agencies in identifying the highest priority science and research needs, sharing resources and funds to implement needed research, communicating research needs to potential research partners, and eliminating redundancy between agency research programs.

Key components of the Strategy are an annual SNAP science needs assessment and a SNAP Science and Research Synthesis Report (Synthesis Report). The needs assessment is used to communicate SNAP's science and research needs to the broader scientific research community and to potential research partners. It documents high priority regional and management needs, is prepared by the SNAP science and research team, and is based on input of agency managers, resource staff, and scientists. The Synthesis Report summarizes the state of knowledge and key science findings related to the SNAP Science and Research Strategy Goals, identifies knowledge gaps, and provides management implications. The Synthesis Report is prepared on a 5-year basis and is used to guide the annual SNAP science needs assessments. The first Synthesis Report is comprised of two General Technical Reports; one that has chapters with detailed reviews and one that includes these Executive Summaries of the more detailed chapters.

The SNAP Science and Research Strategy established several Goals for interagency science and research that is conducted in support of resource management in southern Nevada. Development of the Goals was based on individual agency goals, the SNAP Board vision, the interagency science and research team's charter goals, the input of individual agency specialists, and input from interdisciplinary scientists that was obtained during several planning workshops. Each Goal has a set of Sub-goals and questions that address specific science needs. The three main Goals are:

- Goal 1.** Restore, sustain, and enhance Southern Nevada's ecosystems.
- Goal 2.** Provide for responsible use of Southern Nevada's lands in a manner that preserves heritage resources and promotes an understanding of human interaction with the landscape.
- Goal 3.** Promote scientifically informed and integrated approaches to effective, efficient, and adaptive management.

Science and Research Synthesis Report

The Goals and Sub-goals of the SNAP Science and Research Strategy provide key focal areas for both the annual science needs assessments and the science and research Synthesis Report. This Synthesis Report addresses information related to Goals 1 and 2 and their associated Sub-goals (table 1.1). The Sub-goals address the topics of fire, invasive species, landscapes and watersheds, biological diversity, cultural resources, historic content, recreation, land uses, and education. This Synthesis Report provides a summary of the state of knowledge related to each of the nine Sub-goals, addresses knowledge gaps, and provides management implications. It builds on previous efforts to develop the necessary scientific understanding for adaptive management of southern Nevada ecosystems including the Multi Species Habitat Conservation Plan (MSHCP), and a 2007 workshop that was organized by the Desert Research Institute on the characteristics of southern Nevada ecosystems and the threats to ecosystem health. The Synthesis Report is organized around the topics addressed in the Sub-goals, and table 1.1 provides a crosswalk between the chapters in this document and the Goals and Sub-goals in the SNAP Strategy.

Table 1.1—A crosswalk relating the chapters in this document to the Goals and Sub-goals in the SNAP Science and Research Strategy.

Goal/Chapter	Sub-goal
Goal 1. Restore, sustain, and enhance southern Nevada's ecosystems	
<i>Chapter 1.</i> An Overview of the Southern Nevada Agency Partnership Science and Research Synthesis	
<i>Chapter 2.</i> Southern Nevada Ecosystem Stressors	
<i>Chapter 3.</i> Water and Water Use in Southern Nevada	<i>Sub-Goal 1.3.</i> Restore and sustain proper function of southern Nevada's watersheds and landscapes
<i>Chapter 4.</i> Invasive Species in Southern Nevada	<i>Sub-Goal 1.2.</i> Protect southern Nevada's ecosystems from the adverse impacts of invasive species
<i>Chapter 5.</i> Fire History, Effects, and Management in Southern Nevada	<i>Sub-Goal 1.1.</i> Manage wildland fire to sustain southern Nevada's ecosystems
<i>Chapter 6.</i> Species of Conservation Concern and Environmental Stressors: Local, Regional, and Global Effects	<i>Sub-Goal 1.4.</i> Sustain and enhance southern Nevada's biotic communities to preserve biodiversity and maintain viable populations
<i>Chapter 7.</i> Maintaining and Restoring, Sustainable Ecosystems in Southern Nevada	<i>Sub-Goal 1.3.</i> Restore and sustain proper function of southern Nevada's watersheds and landscapes
Goal 2. Provide for responsible use of southern Nevada's lands in a manner that preserves heritage resources and promotes an understanding of human interaction with the landscape	
<i>Chapter 8.</i> Human Interactions with the Environment through Time in Southern Nevada	<i>Sub-Goal 2.1.</i> Develop an understanding of human interactions with the environment through time
<i>Chapter 9.</i> Preserving Heritage Resources through Responsible Use of Southern Nevada's Lands	<i>Sub-Goal 2.2.</i> Preserve heritage resources through responsible use of southern Nevada's lands
<i>Chapter 10.</i> Recreation Use on Federal Lands in Southern Nevada	<i>Sub-Goal 2.4.</i> Provide for appropriate (type and location), quality, and diverse recreational experiences, resulting in responsible visitor use on federal lands in southern Nevada
<i>Chapter 11.</i> Science-based Management of Public Lands in Southern Nevada	<i>Sub-Goal 2.3.</i> Manage current and future authorized southern Nevada land uses in a manner that balances public need and ecosystem sustainability <i>Sub-Goal 2.5.</i> Promote an effective conservation education and interpretation program to improve the quality of resources and enhance public use and enjoyment of southern Nevada public lands

Science-Based Management

Science-based management aimed at maintaining sustainable ecosystems is essential if public lands in southern Nevada are to continue to support both multiple land uses and habitat for the region's diverse assemblage of plants and animals. Sustainable or "healthy" ecosystems exhibit resilience to stressors and disturbances and resistance to invasives and supply important ecological services and goods. Due to the strong elevation/climate gradients in the region and the large differences in the abiotic and biotic characteristics of southern Nevada ecosystems, the different ecosystem types exhibit varying levels of ecological resilience. In general, ecosystems that receive the highest levels of precipitation or that are the most productive are the most resilient to stressors and disturbances in the Great Basin and Mojave deserts. For example, among the least resilient are Mojave Desert scrub ecosystems at low elevations and alpine ecosystems at high elevations, while the most resilient are mixed conifer and piñon and juniper ecosystems. In contrast, resistance to invasives tends to be higher in the most stressful environments (salt desert shrub and alpine ecosystems) because only a limited suite of species are adapted to establish and persist under the harsh conditions. Several interacting factors influence both resilience to disturbance and stressors and resistance to invasives in arid and semi-arid ecosystems including the climatic regime and other environmental characteristics of the ecosystem, its ecological condition, the severity and frequency of disturbance, and feedbacks among invasive species and disturbance regimes.

Adaptive management that is aimed at maintaining or increasing resistance and resilience can reduce the uncertainty associated with management decisions and increase the region's capacity to deal with stressors without losing options for the future. Key aspects of adaptive management are a scientific understanding of the underlying processes structuring southern Nevada ecosystems, the effects of the numerous stressors on these ecosystems and their associated species, and the factors that influence their ecological resistance and resilience. Routine assessment of the ecological conditions of the different ecosystem types and monitoring the effects of the region's stressors and of management actions to maintain or restore ecosystem resistance and resilience provides feedback for adaptive management. Periodic science syntheses, like the ones in this GTR, give information on the current state of knowledge and the ecological trajectories of the region's ecosystems and species, and identify needed information for effective management.

For a complete discussion of topics in this executive summary, see Chapter 1, *An Overview of the Southern Nevada Agency Partnership Science and Research Synthesis*, in "The Southern Nevada Agency Partnership Science and Research Synthesis—Science to Support Land Management in Southern Nevada" (RMRS GTR-303).

Key References

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