

Research Plan

Sagehen Experimental Forest

Introduction

The ability to conduct scientific research, to apply research findings on the National Forest System lands, and to transfer them to others for use on all of the nation's forest land sets the Forest Service apart as a natural resource agency. A unique and exceedingly valuable part of the infrastructure in place to conduct this research is the national network of experimental forests and ranges, a land base authorized by Congress and designated by the Chiefs of the Forest Service over the last 100 years. These experimental forests and ranges are not historical relics, but the sites for most of the long-term research conducted by Forest Service Research and Development and our partners. The experimental forests and ranges are living laboratories where Forest Service scientists not only make discoveries but also demonstrate research results for cooperators and stakeholders. They provide the opportunity to conduct the bold, imaginative research that will be required for the future.

Experimental forests and ranges (and other experimental areas within this network) remain as some of the few places where ecological research can be maintained over the long term. This kind of protection allows for experiments that can last longer than an individual scientist's career. Because experimental forests and ranges often encompass whole watersheds and large areas, it is possible to do landscape-scale experiments. Finally, operating as a network of ecological research sites representing a wide range of forest and range types allows scientists to conduct cross-site comparisons, to help leverage funding, and to evaluate landscape patterns and processes at landscape to regional scales.

Purpose/Mission of Sagehen Experimental Forest

The objectives for establishing Sagehen Experimental Forest are: (1) to provide lands for conducting research that benefits management of national forests, (2) to provide education opportunities for students, the general public, academic institutions, and Forest Service staffs, (3) to serve as site providing local, regional, and global long-term environmental monitoring data. Through the collaboration of the Pacific Southwest Research Station (PSW), the Tahoe National Forest (TNF), the University of California at Berkeley, the University of California Natural Reserve System, and other educational institutions that may wish to join in this, we endeavor to maximize our collective abilities to fulfill these objectives.

Location/Geography

Sagehen Experimental Forest encompasses almost the whole upper Sagehen Creek watershed. This secures its value for research, especially hydrology and riparian ecosystem related subjects. A diverse riparian zone is associated with the perennially-flowing Sagehen Creek, including meadows, fens and a headwater area with virgin fir

forest. The fens in Sagehen Experimental Forest are well-known for their scientific value and represent areas of Special Interest.

The Tahoe National Forest has been managing the Sagehen Experimental Forest site with an emphasis of its research value (Tahoe National Forest 1990a). Establishment of the Sagehen Experimental Forest fulfills the management direction set by the Tahoe National Forest Land and Resource Management Plan, meets the mission of Pacific Southwest Research Station, and strengthens the cooperation between Forest Service, the University of California, Berkeley, and the University of California, Natural Reserve System.

Principles of Research at Sagehen

The Sagehen Experimental Forest offers a rich set of circumstances (e.g. variety of habitat types, easy access, significant levels of instrumentation, well developed databases and archived information, land management objectives focusing on research) for achieving excellence in ecological research and education. There are certain key characteristics of this research facility that set it apart from other such facilities and, in turn, represent areas of emphasis for the short and long term research goals of the Sagehen Experimental Forest:

1. *Long-term, baseline data collection.* Sagehen already has a number of legacy data sets, long term data that are of extraordinary value to current and future research efforts in and around the Sagehen Basin. We will continue these long-term data series and encourage the development of other such data sets.
2. *Demonstration areas.* As opportunities present themselves, we will identify appropriate locations for application of research results as demonstrations for education, outreach, and future research.
3. *Standardized digital data base.* We intend to continue the development of a comprehensive archive of data collected in the Basin. All participating researchers will be asked to make appropriate contributions to this body of information that will benefit future research. This includes both a metadata catalog as well as an integrated database of raw sets from individual research programs.
4. *Advanced Technology Instrumentation of the Watershed.* The Sagehen Basin is already known for advanced instrumentation including atmospheric and hydrological data collection stations at multiple locations in the Basin. Many of these facilities are capable of remote transmission of data and storage of data for remote download. We will encourage and facilitate the continued instrumentation of the Basin for physical, chemical and biological data collection.
5. *Dissemination of Research and Monitoring Results.* We individually and collectively promote and support thorough and timely disclosure of research findings to management and policy communities and to the public. We will work together to explain what research is being done, what we have learned, and what potential implications this information has for managers and the public.
6. *Implementation of Treatments that Facilitate Research Activities.* When research implementation can address Forest Service performance measures, the Forest/District will generally provide services for NEPA, contract preparation,

- contract administration, etc. Regardless of who is responsible for any NEPA or other environmental work, Forest/District/Station will seek ways to keep requirements as simple and efficient as possible while providing appropriate resource protection. The Forest/District will seek ways to use contracts, cooperative funds, etc to assist in research project installation/implementation.
7. *Research Priorities.* Generally, any type of research will be considered on the Sagehen Experimental Forest but where there is a possibility of conflict or disturbance among research projects, decisions on approval or prioritization will consider the following in order of importance:
 - Research that makes use of the unique attributes of Sagehen Experimental Forest, and thus cannot be done elsewhere
 - Research that benefits national forest management
 - Research funded by the Forest Service
 - Research that benefits forest management in general
 8. *Sagehen Experimental Forest is considered to be an “epicenter” for research in the Region.* Sagehen can function as focal center for research in the general area of the central/northern Sierra, and in particular for research on eastside Sierra issues. As such Sagehen will attract research but the Tahoe National Forest encourages and cooperates with research on other parts of the forest and the greater region as well.

Primary research themes

The consortium of research institutions in the Basin will encourage and facilitate all appropriate research that could be conducted in the Basin. We welcome all ideas and will make every effort to accommodate new research projects if compatible with ongoing research efforts and the greater purpose of the Sagehen Experimental Forest. As examples, we have identified some particular research themes that we believe Sagehen and its underlying purpose as an experimental forest especially suited to support. Among these themes are:

1. **Function of an eastside mixed-conifer forest (EMCF) watershed and its component parts.** This emphasis area will focus on how an eastside mixed-conifer forest ecosystem works. Research will strive to gain a better understanding of the physical, chemical, and biological processes at all relevant geographic and time scales.
2. **Response of an EMCF to the array of land management treatments applied to managed forests elsewhere in the Sierra Nevada.** Experimental forests are especially suited to manipulative experiments that target learning about ecosystem response to human-induced land management activities. Having an entire watershed in which to conduct such experiments provides unique opportunities for learning about treatment-induced response of the system at various geographic scales.

3. **Methods/tools for restoration of a healthy EMCF ecosystem.** The Sagehen Basin has been subject to a number of natural and human-induced perturbations over the last 100 years. A key information need for land managers involves learning the most effective and cost-efficient methods for restoring disturbed habitats/landscapes. There are ample opportunities for investigating different restoration methods in different kinds of habitats (including sensitive wetland habitats) that are found in the Basin.
4. **Response of EMCF ecosystem to an array of public uses.** The Sagehen Basin has been subject to various public uses for many decades. Public use of National Forest lands is increasing and there is a need to better understand how ecosystems respond to different public uses such as Off-Highway Vehicle use. This Experimental Forest will offer some advantageous opportunities for these kinds of investigations.
5. **Indian resource management techniques.** There is a need to provide opportunities for investigation of traditional land management practices originally used by California Indian people. Sagehen Experimental Forest has the capacity to accommodate some experimentation of traditional uses and learn how the forest ecosystem responds to these methods of management.
6. **Specialty Wildland Management Topics.** There are some special or unique land and resource management activities that require additional research or demonstration to hone management techniques and inform future decision-making. Some examples that could be accommodated in the Sagehen Basin include:
 - a) Avalanche control and management
 - b) Monitoring methods/techniques development
 - c) Restoring displaced native species populations (LCT and Mountain Yellow Legged Frogs)

Featured Research Opportunities at the Sagehen Experimental Forest

While the Sagehen Experimental Forest will undoubtedly serve as a location for a wide variety of research topics we believe that this location and its unique ecological attributes in combination with the circumstances of technical expertise among the participating research institutions, socio-economic setting, and participation of the local and regional public makes this facility especially suited to certain research themes. These themes will represent specific foci for what Sagehen will be known for in the future. We will endeavor to promote an emphasis on research in these specific theme areas over the near and long term. As our experiences accumulate we will likely add to this list. Initially we provide emphasis to these following themes:

1. **Strategically Placed Areas Treatments (SPLATs).** Response of ecosystem elements and processes to a network of fuels treatments. Given the emerging research on fuels treatments, their importance to land managers and the public, and the opportunity to conduct experimental treatments across an entire watershed, the Sagehen Experimental Forest is well suited to supporting this kind of research.
2. **Hydrologic processes.** The Sagehen Basin is already equipped with a network of sensors capable of monitoring surface water flow and quality. This growing network of instrumentation will enable a wide array of related research.
3. **Advanced Instrumentation.** In addition to the existing instrumentation in the Basin, efforts are growing to provide other opportunities for installing advanced devices for physical, chemical, and biological monitoring. We will encourage the use of the Sagehen Basin to both develop emerging environmental monitoring technologies and to demonstrate their use in ecological research.
4. **Wildlife/Road Interactions.** Develop a landscape level understanding of the movements and behavior of wildlife species and the effects of road mortality on population dynamics

Research Management

Managing research at a large facility like Sagehen, with many projects ongoing simultaneously, requires protocols for how research is conducted, how data are archived, and how results are disseminated to various outlets. As we gain more experience in the management of research activities we will re-evaluate our research management strategies. Initially we will focus on the following guidelines:

1. **Process for reviewing research proposals.** We will form a small review committee to oversee and manage the research program at the Experimental Forest. All requests for use of the Experimental Forest and the Field Station will be reviewed by the committee. Initial review will be completed within 10 working days of submission of proposals. Additional reviewers can be recommended by any member of the committee. This committee will be comprised of:
 - (1) District Ranger, Truckee Ranger District, Tahoe National Forest
 - (2) Designee of PSW Station Director
 - (3) Faculty Director, UC Berkeley Office of the Vice-Chancellor for Research
 - (4) Sagehen Creek Field Station Manager
 - (5) PSW At-large ScientistOr their designees
2. **Research Study Plans.** All research activities are expected to provide research study plans in support of their proposal. Small (in geographic, time and impact scope) projects need only provide a 1-5 page plan describing the nature of the proposed work. Larger projects will be required to submit full study plans. Recommended format for a study plan is provided in the appendix. This format is

not required, it is provided as a suggestion. The basic content of the recommended study plan should be included.

3. **Curation of research monuments, flagging and markers.** We will need a protocol for using temporary or permanent markers in the field. The Station Manager will maintain a centralized database for all markers. Direction will be provided on what kinds of markers are appropriate and what kinds of markers/colors should be used to avoid conflicts. This direction will include a description of existing marking/flagging protocols for the Tahoe National Forest to minimize confusion and conflicts. The Station Manager will provide this information to approved users on the website.

4. **Providing long-term baseline data.** The Experimental Forest will maintain a thorough, long-term database of physical, chemical, and biological data for the Basin. These data will be made available to all researchers. This effort will be a valuable feature of the Experimental Forest, providing long-term data that can be of importance to many research programs that take place in and around the Basin. Some examples of the kinds of data that will be collected and archived include:
 - a. Weather
 - b. Streamflow and water quality
 - c. LIDAR topography and canopy structure
 - d. State-of-the-art vegetation data that include:
 - i. Tree size
 - ii. Canopy cover
 - iii. Tree Species distribution
 - iv. Understory composition
 - v. Ground surface cover
 - e. Baseline GIS data of the basin
 - f. aerial and satellite imagery
 - g. MAPS survey (bird mist-netting)
 - h. Calhoun line
 - i. Fish stream surveys
 - j. bats survey
 - k. long term data on key taxa:
 - i) Mountain Chickadee
 - ii) beaver
 - iii) American Marten
 - iv) others?

5. **Metadata Catalog.** All research activities that take place on the Experimental Forest will be required to provide standard metadata on the project to be included in a catalog of all research activities that occur (past and present) in the Basin. This enables interested parties to gain a comprehensive understanding of the full spectrum of research activities in the basin. This catalog will be maintained by the Station Director and available on the Station Website.

6. **Develop a strategy for recruiting researchers.** The primary partners in this effort, the Pacific Southwest Research Station, the Tahoe National Forest, and the University of California at Berkeley will work together to encourage research from other institutions to work in this Basin and collaborate with ongoing research activities.

Outreach, Education, Public Engagement

As we have indicated through our operating principles of research at the Sagehen Experimental Forest above, we intend to pay close attention to effective outreach and education. We believe this is a crucial component of effective research and we will devote effort to various means of accomplishing this. In the future we will devote more concerted time and energy to development of a complete outreach plan. In the near-term we intend to pursue the following outreach and education activities:

1. Continue the Summer speaker series, include field trips associated with appropriate speakers.
2. Sagehen Place-based Service Learning Institute. Establish tours and workshops suitable for various audiences.
3. Enlist Extension personnel from Berkeley, UNR, Davis. There are a number of activities that UC extension is already doing that could be extended to Sagehen.
4. Outreach to
 - e. Elected officials – Federal, State, Local
 - f. Agency folks – state and federal land managers and regulators
 - g. Organizations
 - h. Public
 - i. K-12
2. Demonstration areas. We will look for opportunities to develop sites to demonstrate research results for managers, policy-makers, researchers, educators, students, and the general public. These demonstration areas are intended to increase understanding of forest management and associated issues, and to provide an opportunity to see first-hand how research results might be incorporated into ongoing forest management.
3. Bilingual interpretive trails. At strategic locations we will place interpretive hiking trails to illustrate science themes or other information of interest to the public. This activity will be coordinated with the appropriate Truckee Ranger District staff.
4. Docent program. If we can generate enough interest we will develop a core group of local citizens who would assist the Experimental Forest with management of public education and information pertaining to the activities of the Experimental Forest.
5. Adventure Risk Challenge Program
6. Writer in Residence Program

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