CENTER FOR THE
STUDY OF THE
FORCE
MAJEURE

SAGEHEN

in the Sierra Nevada

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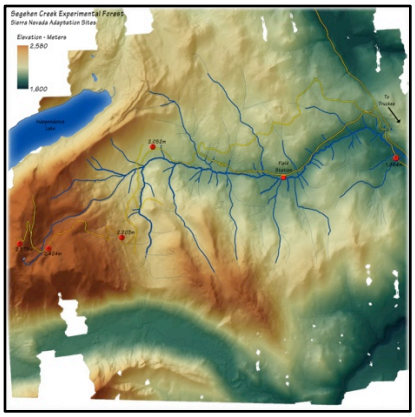
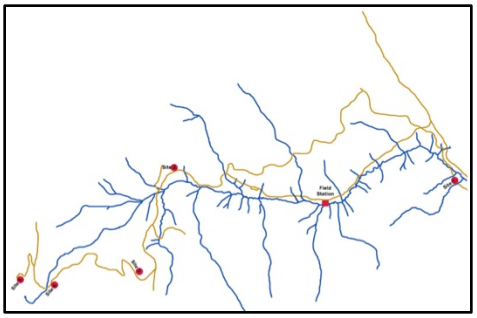
335 Linden Street
Santa Cruz 95062

Sagehen: A Proving Ground

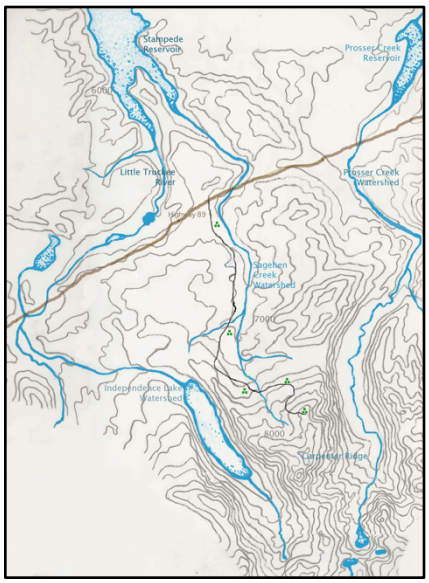


Topographical View of drainage basin

Location of planting sites



Sagehen water system, road and sites



Sagehen Creek Watershed

Summary

The Sagehen research project is designed to answer the following question: As glacial ice cover and snowpack in high alpine regions recede in the face of accelerated warming trends, are there sustainable, ecologically informed human interventions that can partially (or completely) replace the water sequestration, flood and drought protection they provide to downstream river systems and the human and environmental cultures they support? This study tests whether planting specific plant ensembles can accelerate the natural upward movement of species that occurs during warming periods, to substantially improve the “sponge effect,” or natural water carrying capacity of mid-Sierra soil structures. If effective, using these techniques can provide tools to mediate the impact of flooding, fire and erosion in both high altitude regions and the downstream watersheds they support.

Experimental Design

Experimental design considerations include:

1. Geography: Establishing a transect from the highest useful point in the Sagehen watershed, slightly below Carpenter Ridge, dropping about 750 meters (2,500 ft.) in a 5.8-mile span past the Sagehen Creek Field Station down to Highway 89. The transect (see map) is designed to span the major climate zones in the basin; for practical considerations and to minimize disruption to the larger environment, we have placed the experimental stations on the most disturbed sites.

2. Site Selection: The 5 sites were chosen for their common soil type. Each site is approximately 160 meters in altitude above the prior one and their placement spans a little over 750 meters in elevation from near Hwy 89 to just below Carpenters Ridge, at the top of the Sagehen Basin. The difference in precipitation is close to four times from the lowest elevation site to the highest.

3. Site Description: Each site includes three 20x40 foot fenced plot areas with identical plantings to confirm consistency of results, for a total of 15 plots. Each plot will have an 8' wire fence that is removable in the winter but otherwise protects new growth from the encroachment of the deer population.

4. Species Selection: The species groupings have been selected for their ability to adapt to drought, hold water in the grounds to enhance the sponge effect, be fire tolerant, and function well collectively from a biodiversity perspective. Each plot area contains 800 plants from approximately 30 pre-selected species. At a planting pattern of one plant per square foot we will be planting a total12,000 seedlings.

5. Seed Selection: All seeds and cuttings were collected from the Sagehen basin. Cleaning and storage and growing was managed at the UCSC Arboretum in Santa Cruz, California. Seeds are grown in a sterile seed mix (Pro-grow) composed of peat moss and perlite. Seeds are cleaned, dried and treated with smoke, water, heat and fire simulation where necessary. Every possible care is being taken to avoid contamination. Seedlings will be grown through fall and winter with planting to start in the Fall of 2013 and the Spring 2014

6. Documentation: Each fenced area has a permanently mounted camera taking pictures on a daily basis. These images will be used for both comparative analysis and as visual feedback for organization into a narrative that will carry the aesthetic power and meaning of the experiment and the experience to a non-scientific audience, both in the Nevada Museum of Art and in the field station itself.

7. Multi-Year timeframe: We cannot predict which species will survive and do well at each altitude. We expect survival patterns to emerge during the first two year growth cycles. Through iterative replanting of the most successful species we expect to determine effective plant ensembles in the first 5 years.

8. Art and Science: The work as a whole will function as a complex hybrid form consisting of: a work of art, a scientific experiment, a bio-regional approach to deal with climate change and an educational program. The physical work on the ground will have a strong presence and be associated with a lucid poetic narrative designed to evolve in response to new information generated over time. In addition to providing creative and educational connections with the museum and the community at large, it will also serve to train students.

Project Team

Helen Mayer Harrison/ Newton Harrison
Professors Emeritus- UC San Diego
Research Professors- UC Santa Cruz
Principals- Harrison Studio
Directors- *Center for the Study of the Force Majeure*

Brett Hall – Site Manager
Brett is the Director of the UCSC Arboretum and State Board President of the California Native Plant Society and has many decades of experience sampling and growing montane as well as coastal vegetation. His experience covers botany, ecology, vegetation mapping and classification, propagation and nursery cultivation, garden and landscape design, interpretation and restoration. He is also involved coastal rare plant community conservation research.

Elizabeth Thompson - Manager, *Center for the Study of the Force Majeure*
Elizabeth's career includes work in both art and science. An Emmy Award-winning and Oscar-nominated documentary filmmaker, she twice has taught at Stanford's Graduate Program in Documentary film. On the science and technology side, she has managed the Climate Group at an environmental consultancy and served as director of strategic partnerships at AlgaeOmega and SkyTran.

Science Advisory Council:

V. Thomas Parker, PhD
Professor of Biology. San Francisco State Univeristiy. Specialties: Plant Ecology, Community Ecology, Vegetation dynamics (dispersal, seed banks, seedling establishment, mycorrhizae), Fire Ecology, Vegetation conservation and management, Evolution and Ecology of Arctostaphylos (Ericaceae) and Ceanothus (Rhamnaceae), Tidal Wetlands, Chaparral, Mixed Evergreen Forests. Co-author with Mike Vasey on the genus Arctostaphylos for Flora of North America and the Jepson Manual of California Vegetation.

Michael Vasey, PhD
Interim Director, San Francisco Bay National Estuarine Research Reserve
Biology Lecturer. San Francisco State University. Specialties include Ecology and Evolution, Tidal wetland eco-systems, fire ecology. Co-author with Tom Parker on the genus Arctostaphylos for Flora of North America and the Jepson Manual of California Vegetation.

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Vegetation Classification and Mapping Program
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San Jose, California
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Conservation Biology, Ecology, Natural Areas Stewardship, Geographic Information Systems, Sensor Networks, Eco-Informatics