



# Ecological Restoration Monitoring and Mapping

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## Abstract

The San Bernardino National Forest (SBNF) has completed ecological restoration projects in high impact areas throughout the Forest for over 20 years. For the past five years, the Southern California Mountains Foundation (SCMF) has worked directly with the USDA Forest Service (USFS) to engage volunteers in forest restoration and public land management.

The SBNF is one of the most heavily recreated National Forests in the country with over 2.4 million visitors annually, leading to many acres of disturbed lands. A struggle to patrol and monitor all the restoration projects has been an outcome of the overwhelming visitors to this forest. With many ongoing small and large scales restoration efforts, monitoring, tracking and data collection have always been a struggle.



San Bernardino National Forest Sign, 2010

## Project Objectives

The focus of this project was to compile existing forest restoration data of 740 sites along with other collected data and mapped data for prior, ongoing, and future restoration project sites in the San Bernardino National Forest. The mapping of completed and ongoing restoration sites and the future mapping and photo documentation of disturbed sites has assisted the USDA Forest Service/SCMF restoration programs in completing a five-year priority restoration plan for high impact sites. Data compiled by this project will also be used in future SBNF Watershed Condition Assessments to show completed, ongoing, and future restoration projects by watershed.

- ✦ Collect existing forest-wide restoration site data, including map layers, site list and time frame of restoration projects. These data was compiled using the ArcGIS Program with the USDA Forest Service GIS department, USDA Forest Service Natural Resources Department and SCMF Great Seeds Restoration Manager and their GIS specialist.
- ✦ Identify projects that do not have current GIS points, lines, and polygons and schedule site visits to map using the GPS unit and to photograph sites.
- ✦ Work directly with USDA Forest Service and SCMF staff to photograph, monitor, map, and number future restoration sites.
- ✦ Conduct forest restoration monitoring and maintenance and complete forest monitoring reports during data collection portion of the project.
- ✦ Work directly with SCMF to create a layer, through GIS, of projects which SCMF has taken the lead in restoring, including past and current restoration sites.
- ✦ Additional objective is to create a main Restoration Database through ArcGIS10 that brings together past, present, and future restoration sites.

## Project Methods

The approach to this project needed to be simple. The goal was to create a database that could be used to track projects and to assist with future funding requests. The first step was to meet with the lead USDA Forest Service employees in the program and SCMF to determine which past, present, and future restoration sites needed to be plotted with the GPS GIS program and entered in the Restoration Database (once it had been created). We then prioritized sites that needed to be mapped and frequently monitored. Currently, we have 740 restoration sites on record and more to map. These restoration sites occur within the Northern Mojave, Southern Mojave and Santa Ana Watersheds.

### Work Directly with SCMF to Create a Main Restoration Database and Layer:

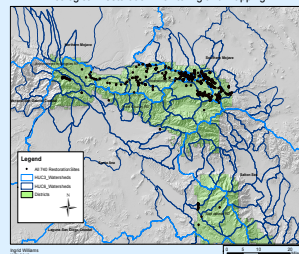
GIS experts from the USFS and SCMF at the USDA Forest Service Supervisor's Office, based in San Bernardino, helped compile necessary tools and files to create the main Restoration Database. By creating a main Restoration Database, it kept all past, current, and potential restoration sites together and allowed the information taken from the monitoring forms to be stored on one database instead of in multiple files. The database also showed the annual progress being made in the USDA Forest Service/SBNFA restoration programs. The database was created through ArcGIS 10 and attached the database to the main network allowing all Forest Service staff to access it.

The Database was created to be updated frequently. All USDA, USFS, and SCMF staff will be updating the Database using the User Guide I created.

### Data Collection of Existing Forest-Wide Restoration Sites:

Following database creation, appending the necessary restoration points, lines, and polygons files into their specifically designed feature class. This main Restoration Database allows everything within the USDA Forest Service/SCMF restoration program to be consistent and serves as a tool to track completed, ongoing and future work.

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Map created from ArcGIS 10 Restoration Database of SBNF restoration projects

### Collaboration with Restoration Staff to Photograph, Map, Number, and Complete Monitoring Form and Maintenance to Restoration Sites:

Upon completion of the database, I began my field work on current restoration sites. Through the WRI program, the SCMF bought a Nikon GP-1 GPS unit that I attached to the Forest Service Nikon camera to better document progress on our restoration projects. Every day, the other interns and I went out photographing and mapping site with the Magellan GPS Unit.



Nikon GP-1 GPS unit

I also monitored the recently planted restoration sites and completed site treatments such as watering, weeding, slashing, and fencing. The primary restoration sites we focused on were those on the Mountaintop District in Holcomb Valley, Cactus Flat, and the many route decommissioning restoration projects across the District. We used the monitoring forms to properly document the status and work done at each restoration site. Data from the completed monitoring forms were then entered into the main Restoration Database and then filed in our restoration project folders.

## Project Outcomes

This mapping project was successful because it brought together data to look at forest restoration projects holistically for the first time in 20 years.

One objective of this project was to compile a SCMF Ecological Restoration Plan to identify and prioritize restoration needs for the next 5 years. Seven new on the ground restoration projects were identified within 3 watersheds on the Forest.

- ✦ **Southern Mojave:** Bighorn Wilderness Decommissioned Route Restoration;
- ✦ **Northern Mojave:** Deep Creek Inventoried Roadless Area Unauthorized Route Decommissioning, Coxe Meadow Unauthorized Route Restoration and Snow Valley Ski Area Slope Stabilization;
- ✦ **Santa Ana:** Meadow Restoration in Fuels Reduction Projects, Noxious Weed Mapping, Removal and Restoration along the state highways and within the Big Bear Lake Watershed.

Using the USDA Forest Service Watershed Condition Framework, project planning information for these new restoration sites will include: 1) watershed information (name/HUC/Area/% NFS ownership, Existing Watershed Condition Class/Improved Watershed condition class), 2) resource value descriptions and watershed problems, and 3) descriptions of required restoration, estimated costs and outcomes (final condition class and years need to complete work).

In addition, seven ongoing projects were identified as priority to complete. These projects are:

- ✦ **Southern Mojave:** Cactus Flat OHV Staging Area Erosion Control Project, ARRA Route Decommissioning re-vegetation Projects; Monitoring and Maintenance of Active Restoration Sites;
- ✦ **Northern Mojave:** Cienega Larga, Cienega Redonda and Little Green Valley Meadow Restoration, Monitoring and Maintenance of Active Restoration Sites

The Cienega Larga Meadow Project, restoration was needed after the 2007 wildfire and later flooding cut through the meadow. Looking at the last 3 years of photos we can see the restoration activities that were done and what it looks like now. Without the work done on this meadow through the USDA Forest Service/SBNFA restoration program, the meadow and stream would have continued to down cut reducing ground water levels over time.



Unhealthy meadow



Healthy meadow

August 26, 2009

The rock in this photo is the top layer of many rock grade stabilizers installed in 2008. Large storms damaged the site again and in 2009 many geo-fences were put in and then covered with more soil.



September 10, 2009

The site was seeded and mulched to prepare it for winter storms of 2010.



May 14, 2011

Large storms again eroded the meadow uncovering the tops of the geo-fences shown as black lines in this photo. Soil also washed away.



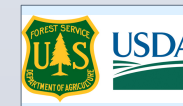
February 12, 2012

In fall of 2011, USFS and SBNFA staff added small rock to strengthen the geo-fences to prepare the site for winter storms of 2012. The rock helped to slow down the water and stabilize the site. Small pools developed also. Crews are adding more rock, seed and plants in the summer and fall of 2012.



## Acknowledgements

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