

## Postburn Monitoring of the Eagle Fire: First Year Recovery on Sites Seeded with Buckwheat and Coastal Sage

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**Abstract.** A spring wildfire on the Cleveland National Forest in San Diego County burned 1860 ha (4,600 ac) including coastal sage scrub habitat occupied by the California gnatcatcher (*Poliopitila californica*). Concern over possible poor recovery of the site due to the season of fire led to development of a habitat restoration project. Flat-top buckwheat (*Eriogonum fasciculatum*) and coastal sage (*Artemisia californica*) were seeded and a rice mulch was applied to a portion of the burn site. Monitoring of postburn recovery indicates poor re-establishment of these species in untreated areas. A relatively high seedling density was observed on most seeded sites which is expected to accelerate recovery of these shrubs. A modification in seed mix to reduce the seeding rate of buckwheat and elimination of the use of mulch is recommended for further treatments.

**Keywords:** Gnatcatcher; revegetation; seeding.

### Introduction

Fire is an integral part of southern California landscapes. It is imperative that land use planners understand this fact and design human systems which are compatible with the maintenance of fire regimes in wildland areas. Managing southern California fire regimes to maintain ecosystem function will require an adaptive management approach where we take every opportunity to learn more about the effects of our management decisions and make mid-course corrections. In sensitive habitats such as coastal sage scrub the need is critical due to the limited amount of habitat remaining and extensive human influence.

In May 1993, the Eagle Fire burned 1,860 ha (4,600 ac) of Diegan coastal sage scrub and chamise chaparral in a popular recreation area east of Ramona, California. This area is a part of the Cleveland National Forest adjacent to recent urban development, in a previously rural area of San Diego County. Large fires have been recorded in this area at approximately 28 year intervals

since fire history records have been kept. In May, 1986 a prescribed fire (the Barona Fire) was conducted on a hillslope adjacent to the community of San Diego Country Estates. The Eagle Fire burned through the 8 year old coastal sage scrub vegetation at the base of the Barona Fire but was stopped by the eight year old chamise chaparral on a hillslope below the community. Portions of the earlier Barona Fire had poor shrub recovery, including patches of chamise with 100 percent mortality and no seedling establishment. This observation led to a concern that the Eagle Fire might respond in a similar manner due to the season of the burn.

A population of thirty four pairs of California gnatcatcher were documented to occur on the Eagle Fire Site just months before the fire. The territories were mapped and a vegetation inventory of each was conducted with the line intercept method. Six transects were sampled before the fire, providing a record of the preburn vegetation.

A habitat restoration plan was developed in consultation with the U. S. Fish and Wildlife Service. Monitoring of sprouting success in the months following the fire showed that most of the dominant shrubs were resprouting with the exception of coastal sage (*Artemisia californica*) and flat-top buckwheat (*Eriogonum fasciculatum*). This was consistent with observations on the earlier prescribed burn site. A trial habitat restoration project was proposed on 32 ha (80 ac) of the burn. The prescribed seed application density was 215 viable seeds/m<sup>2</sup> with 80 percent coastal sage and 20 percent flat-top buckwheat. A rice mulch was applied to reduce soil loss and prevent rilling on steep slopes where past rilling was evident. The application density of the mulch was 9884 kg/ha (2 tons/ac). The plan also calls for monitoring of this trial to determine if additional restoration is needed.

### Methods

Vegetation monitoring in the first spring after the fire was conducted on four sites within the

area of the fire. Sampling on unseeded areas was conducted by The Nature Conservancy and San Diego State University as part of a larger study of coastal sage scrub response to fire. Each monitoring site was 625/m<sup>2</sup>, (25 x 25 m). Four 25 m transects were randomly located along the north baseline of the plots. Thirty 1 m<sup>2</sup> quadrats were randomly located along the transects. Cover by species was estimated within each quadrat. In addition, shrub density was counted and recorded by the seedling, sprout, and dead categories.

Surveys of the surrounding unburned coastal sage scrub for California gnatcatchers were conducted after the fire. These surveys monitored each of the preburn territories through May of 1994.

### Monitoring Results and Discussion

Plant species found on 10 or more quadrats are shown in Table 1. Cover and frequency of occurrence are also shown. Species richness averaged 10 species/m<sup>2</sup>.

Shrub seedling densities for the two seeded shrubs were high on two of the four seeded plots, indicating successful first year establishment. Natural seedling establishment on adjacent unseeded plots, sampled by The Nature Conservancy and San Diego State University, was extremely low (data from these unseeded plots are not currently available). No resprouts of either flat-top buckwheat or coastal sage were recorded

on the seeded plots. Buckwheat was more successful in establishing seedlings than coastal sage, which could lead to a higher cover of buckwheat when compared to the preburn species composition.

Postburn surveys of California gnatcatcher territories showed that 68 percent of the total habitat for the upper San Diego River population was completely consumed by the fire. Immediately after the fire there was an increase in gnatcatcher use in unburned coastal sage scrub adjacent to the burn. By December 1993, gnatcatcher densities in unburned areas were found to be back to preburn levels. The size of the remaining population is about 13 pairs. Nest parasitism by brown headed cowbirds was observed on one nest in spring, 1994. The upper San Diego River population is isolated, being almost 16 km (10 miles) from the nearest neighboring population.

Transect data is insufficient for analytical study of mulching efficiency, however, some qualitative observations were made. The mulch, although applied evenly, was blown by Santa Ana winds into drifts. This led to a patchy distribution and an excessive depth of the mulch in piles. A non-native grass was observed which was likely introduced by the mulch (*Echinochloa* sp.) Mulch inhibited seedling establishment of both natural herb regeneration and seeded shrubs where the mulch was deep. Shrub seedlings were observed to be abundant at the edges of the mulch piles where the mulch was thin and usually less than 1 inch in depth.

Table 1. First season vegetation on 119 1-m<sup>2</sup> quadrats. Only species found in more than 10 quadrats are listed. Frequency is percent of quadrats, cover is percent of ground surface covered.

Species	Frequency (%)	Cover (%GSC)		Density (#/m <sup>2</sup> )	
		Postburn	Preburn	Postburn	Preburn
<i>Lotus strigosus</i>	95	16			
<i>Erodium cicutarium</i>	86	17			
<i>Dichelostemma capitatum</i>	67	2			
<i>Calystegia macrostegia</i>	56	5			
<i>Gilia</i> sp.	50	4			
<i>Artemisia californica</i>	48	Tr.	32	1.90	.45
<i>Lotus</i> sp.	47	4			
<i>Bromus madritensis</i>	47	3	26		
<i>Eriogonum fasciculatum</i>	45	1	7	10.11	.24
<i>Hypochaeris glabra</i>	34	5			
<i>Lepidium nitidum</i>	31	4			
<i>Centaurea melitensis</i>	25	5			
<i>Cryptantha</i> sp.	24	4			
<i>Emmenanthe penduliflora</i>	24	3			
<i>Crassula conata</i>	23	Tr.			
<i>Mulla maritima</i>	18	3			
<i>Vulpia myuros</i>	18	2	4		
<i>Filago californica</i>	17	4	6		
<i>Lupinus bicolor</i>	15	5			
<i>Calochortus splendens</i>	15	1			
<i>Silene gallica</i>	13	9			
<i>Plagiobothrys</i> sp.	10	2			
<i>Jepsonia parryi</i>	9	1			
<i>Mirabilis californica</i>	8	16			
<i>Vulpia octoflora</i>	8	5			

Soil moving across slope was trapped and held in place by the mulch piles. This was especially evident along drainages and did provide for some repair of rills along steep trails.

#### **Recommended Actions**

Due to many unknowns about the response of this site to the fire, an adaptive management approach was recommended in the restoration plan. Future treatments will be based on results of monitoring a trial treatment area. Although results from the first season of monitoring are preliminary and will require long-term follow-up, the results do indicate the need to adjust some of the restoration practices. Use of the rice mulch should be discontinued due to the possible introduction of non-native weeds, difficulty in application to remote sites, and the fact that it reduced shrub seedling establishment. Another seeding trial is recommended using coastal sage alone or a very low application rate of buckwheat due to the high seedling establishment of buckwheat.

Response of the Eagle Fire Site to spring fire, and the poor recovery of the dominant shrub cover on the

adjacent prescribed burn, have identified a potential concern for use of prescribed fire in the spring in coastal sage scrub. This may be especially true on inland sites, which appear to have relatively low resprouting success in coastal sage and buckwheat (O'Leary and Westman 1988). We recommend that the effect of fire seasonality be a part of future research and adaptive management monitoring studies.

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#### **Literature Cited**

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