

Effects of Fire on the Ecology of the California Gnatcatcher (*Polioptila californica*), and Associated Bird Species, in the Coastal Sage Scrub Community of Southern California

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Abstract. The California gnatcatcher (*Polioptila californica*) occurs in the sage scrub communities of southern California and Baja California, Mexico. Fire is an integral part of this community, but its effects on the gnatcatcher are unknown. By determining density of the gnatcatcher and associated bird species, we can determine the relationship between bird utilization of coastal sage scrub communities and fire history. Study sites included both burned and unburned habitat, and were located on Camp Pendleton in San Diego County and at Lake Mathews in Riverside County. On unburned areas, 2 pair/ha were found, but only .02 pair/ha were found on burned areas. Presence of gnatcatchers in burned areas may indicate post-fire dispersal or the availability of refugia from fire.

Keywords: California gnatcatcher; Camp Pendleton; coastal sage scrub; fire history; habitat utilization; Lake Mathews; Riverside County; San Diego County.

Introduction

The California gnatcatcher (*Polioptila californica*) has one of the most restricted distributions of all birds found on the Pacific slope of southern and lower California (Woods 1921). Lumped for much of its scientific history with the black-tailed gnatcatcher, *P. melanura*, of the southwestern deserts, the California gnatcatcher is now recognized as a distinct species (Atwood 1988, American Ornithologists' Union 1989). The species is presently distributed from Ventura County, California south to the tip of Baja California, Mexico, with the subspecies *P. c. californica* occurring along the coast from Ventura and Los Angeles counties south to approximately 30° N latitude in Mexico (Atwood 1991). Gnatcatchers are generally restricted to coastal sage scrub below 250 m in Los Angeles, Orange, and San Diego counties, and below 500 m in western Riverside County (Atwood 1992). It is rare to nonexistent in the

northern part of its range due to extensive habitat loss in recent years (Atwood 1992), and current population studies estimate there are less than 2,000 pairs left in California (Salata 1991).

It is very clear that there has been significant loss of suitable habitat in the past 70 years (Atwood 1980, 1992, Rea and Weaver 1990), and the species is now a controversial candidate for endangered species listing in the United States. Indeed, because of the rapid loss of this habitat to development in the last 20 years (Atwood 1980, 1992, Rea and Weaver 1990), associated species such as the San Diego cactus wren (*Campylorhynchus brunneicapillus sandiegensis*) are also in serious jeopardy, and it is imperative to develop a data base on the relationship of the entire avian community with fire frequency and intensity.

Little is known about the effects of fire on the avian members of the coastal sage scrub community. One factor potentially important is fire history. Fire history of an area is likely to affect succession after fire, due to differences in fuel loads, which affect the intensity of the fire (Malanson and Westman 1991). Intense fires may be more destructive and leave less standing vegetation. This study was aimed at evaluating the effects of fire on these birds.

Study Sites and Methods

Because of ecological differences between coastal and inland gnatcatcher populations, and between different coastal sage scrub "subtypes" (Kirkpatrick and Hutchinson 1980), we selected sites near the coast and in the interior. The coastal population was at Camp Pendleton, a large military base that is off limits to the general public. Gnatcatcher surveys were conducted at Camp Pendleton in 1989 by the U.S. Fish and Wildlife Service, and approximately 175-200 pairs of gnatcatchers were located. In November of 1990, two fires burned over 6,500 acres of coastal sage scrub at Camp

Pendleton that was utilized by California gnatcatchers (Salata 1991). Each of our two study areas, Basilone-San Onofre and Uniform, included unburned habitat as controls adjacent to habitat that burned in the 1990 fire.

The Inland population was adjacent to the Metropolitan Water District's Lake Mathews in Riverside County. It is also off limits to the general public. Gnatcatcher studies have been conducted there since 1991. Our study site includes an area that was burned in 1990.

Sites were surveyed for the presence of gnatcatchers, their reproductive activity, and associated species. Birds were located visually and by calls. Reproductive success was quantified by monitoring nests to determine clutch size, fledging success, fledgling survival, dispersal rates and distances moved. Vegetation at the study sites has been quantified by Dr. Jan Beyers, Pacific Southwest Research Station, Forest Fire Laboratory, Riverside, California.

Results

At the Camp Pendleton sites approximately 20 pairs of gnatcatchers utilized the unburned Basilone site, and approximately 14 pairs utilized the unburned half of the Uniform site. At least three pairs of gnatcatchers were recorded from the burned San Onofre site, and single birds have been found on the burned Uniform site. Other sensitive species on the Pendleton sites included the San Diego cactus wren (*Campylorhynchus brunneicapillus sandiegensis*), rufous-crowned sparrow (*Aimophila ruficeps*) and the grasshopper sparrow (*Ammodramus savannarum*). The plant community on the burned Pendleton sites was dominated by a mixture of introduced grasses, black mustard (*Brassica nigra*), and resprouts of native laurel sumac (*Malosma laurina*), California sagebrush (*Artemisia californica*), coyotebush (*Baccharis pilularis*), and elderberry (*Sambucus mexicanus*). Unburned controls at Pendleton were dominated by a mixture of California sagebrush, laurel sumac, cacti (*Opuntia* sp.), deer weed (*Lotus scoparius*), elderberry, and various seasonal herbaceous plants.

At the Lake Mathews Site, 15 pairs utilized the unburned area and no gnatcatchers were observed on the 3 year old burned area. Other sensitive species on the Lake Mathews study area were the rufous-crowned sparrow, sage sparrow (*Amphispiza belli*), and tricolored blackbird (*Agelaius tricolor*). The plant community on more mesic sites at Mathews was dominated by California sagebrush and desert brittlebush (*Encelia farinosa*); more xeric stands were nearly pure brittlebush. Plant succession on the burned area has been limited to introduced grasses, with sparse resprouts of sage-

brush and brittlebush. Recovery in the burned riparian has been rapid.

Discussion

Although gnatcatcher density may be initially reduced by the occurrence of fire, some pairs may establish territories in burned areas as soon as three years postfire. The presence of gnatcatchers may be dependent on suitable vegetation, whether left by the fire as refugia or as seedlings and resprouts arising after the fire. At Camp Pendleton, modest shrub cover is present on the San Onofre burn area which supports at least three breeding pairs of gnatcatchers, and some small shrubs are reappearing on the burned area at the Uniform study site, where a few gnatcatchers have been spotted periodically. Those gnatcatchers found on the Uniform site most likely represent dispersal from the unburned area of Uniform. At Lake Mathews, the burned area supports low grass and no shrub cover, and no gnatcatchers have been observed on this area. Beyers and Peña (in press) have also found a positive correlation between shrub cover and gnatcatcher density. The abundance of shrub cover may be dependent on fire history, and on the intensity of the last fire on the area.

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