## California Gnatcatcher *Polioptila californica*

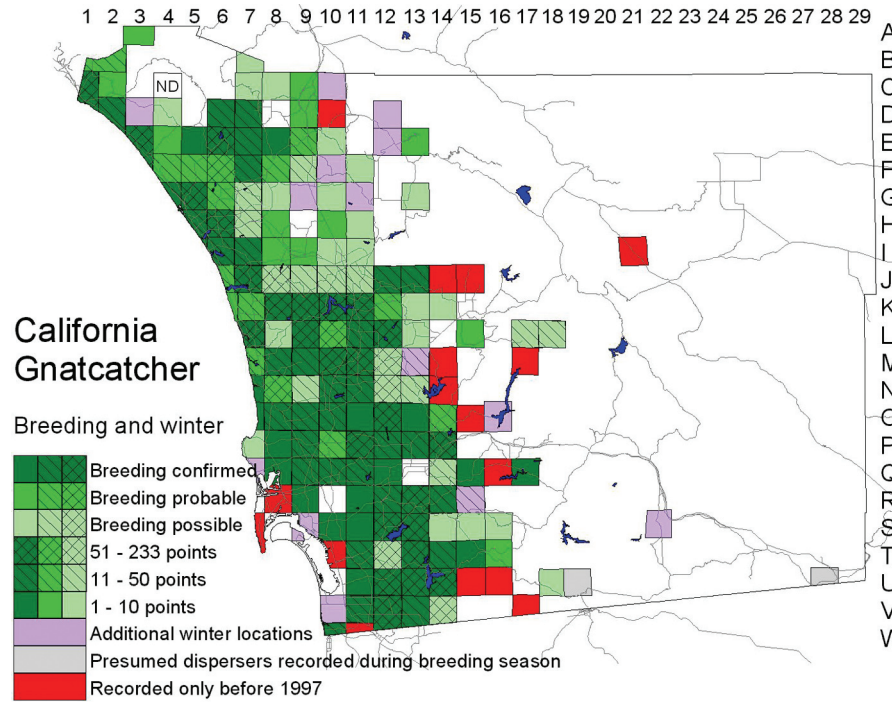
*Patrick J. Mock*

Within the United States, the California Gnatcatcher lives only in coastal southern California's sage scrub, a habitat threatened by the continuing spread of agriculture and suburbia. Even within the sage scrub the gnatcatcher is localized, preferring patches dominated by California sagebrush and flat-top buckwheat and avoiding those dominated by sage, laurel sumac, and lemonadeberry (Weaver 1998a). The east edge of its range appears constrained by winter cold rather than by vegetation type (Mock 1998). As an "umbrella" or flagship species for its habitat, the California Gnatcatcher has been the focus for regional habitat-conservation planning in San Diego County since before it was listed as a threatened species by the federal government in 1993 (Atwood 1993).

*Photo by Anthony Mercieca*

**Breeding distribution:** In spite of its habitat being much constricted by urbanization, the California Gnatcatcher still occurs widely in San Diego County's coastal lowland. It prefers open sage scrub with California sagebrush as the dominant or co-dominant plant (habitat use summarized by Atwood and Bontrager 2001). In general it is more numerous near the sage scrub–grassland interface than where sage scrub grades into chaparral; it occupies dense sage scrub less frequently than more open sites. In the more open chaparral on the flat mesa of Miramar, however, many territories encompass both sage scrub and chamise (K. Fischer). Much of the gnatcatcher's range in the United States has been surveyed according to a standard protocol approved by the U.S. Fish and Wildlife Service. Elevation appears to limit the distribu-

tion in San Diego County, where over 90% of locations are below 1000 feet (Atwood and Bolsinger 1992, Mock 1993, 1998). The only sites above 2000 feet are on the east side of the San Diego River near Cedar and Boulder creeks (L17/L18), where the species has occurred up to 2400 feet. "Core" population areas supporting 30 or more pairs include Camp Pendleton/Fallbrook, Oceanside, north Carlsbad, southeast Carlsbad, southwest San Marcos, Rainbow/Pala, Olivenhain/Lake Hodges/San Pasqual, Poway, upper San Diego River/El Capitan Reservoir, Mission Trails Regional Park/Miramar, Lakeside/Dehesa, Sweetwater River/Reservoir, Jamul Mountains, Otay Lakes/Mesa, west Otay Mountain, and Tijuana River mouth (Mock 1993). Probably the single largest population concentration is around Lake Hodges (K10): the highest daily count reported by an atlas observer was 36 there on 21 March 1998 (R. L. Barber). The greatest number of gnatcatcher locations in the database for San Diego's Multiple Species Conservation Plan (MSCP), based largely on surveys 1987–95, is from the same area.



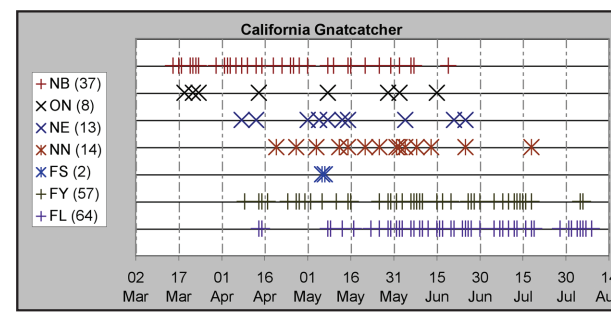

San Diego County's California Gnatcatcher population exceeds 2000 pairs, but fires in 1996 and 2003 temporarily reduced the carrying capacity of several of the habitat cores: Lake Hodges/Olivenhain, Mission Trails/Miramar, Jamul Mountains, and west Otay Mountain (Mock 1993, USFWS 1996, Bond and Bradley 2004). The size of a breeding pair's territory is highly variable but correlated with distance from the coast, ranging from less than 1 hectare along the coast to over 9 hectares farther inland (Mock and Bolger 1992, Braden 1992, Preston et al. 1998, Atwood et al. 1998). During the nonbreeding season, a pair's home range is about 80% larger than during the breeding season (Preston et al. 1998, Bontrager 1991).

The easternmost locations for the gnatcatcher in the breeding season are the base of Nate Harrison Grade, Pauma Valley (E13; one on 16 May 1999, C. Sankpill), 0.5 mile east of Saddleback along Cedar Creek (L18; male 28 August 2001, pair building a nest 20 March 2002, J. Turnbull), the upper end of Loveland Reservoir (Q17; pair and four nestlings banded 26 May 1997, P. Famolaro), and Grapevine Creek (U19; one on 13 June 1999, M. and B. McIntosh). The species is irregular at these marginal locations.

Completely unexpected was the sighting of a male California Gnatcatcher apparently paired with a female Blue-gray on Jacumba Peak (U28) 23 April 2000 (C. Jones, J. Radtke). The photos taken are not adequate to distinguish the bird from a Black-tailed Gnatcatcher, but the observers were experienced with the species and heard the typical mewing calls. This record offers the only recent parallel to old specimens of the California Gnatcatcher from the desert slope at Palm Springs in Riverside County (Atwood 1988) and "San Felipe Canyon" (probably San Felipe Valley, I21) in San Diego County (13 February 1893, SDNHM 1678).

The map for the California Gnatcatcher expresses the species' abundance in terms of number of points by square in the MSCP and Camp Pendleton databases. These sources include many records before 1997, many from sites where the species has been eliminated subsequently. Conversely, a single pair or territory may be represented by more than one point. Therefore, as with most other species, this feature of the map should be taken as an indication of only relative, not absolute, abundance.

**Nesting:** The California Gnatcatcher's biology has been studied intensively; see the many papers in *Western Birds* volume 29, issue 4 (1998). The birds typically nest on slopes of a gradient less than 40%. The lower portions of gullies and drainages, when available within the territory, are frequently used as nest sites. Though nest success varies significantly by host shrub species, the birds are not selective, using shrubs in proportion to their availability, typically California sagebrush, flat-top buckwheat,



California sunflower, and broom baccharis (Mock and Bolger 1992, Grishaver et al. 1998). Many other less common sage scrub species are used less frequently. Grishaver et al. (1998) found the nest's average height from the ground to be 82 cm (range 30–292, $n$ = 101), in shrubs of average height 135 cm (range 62–155, $n$ = 103). The shrub cover around the nest is typically between 20% and 60%, with a gap between shrubs of 153 to 176 cm (Bontrager 1991, Mock and Bolger 1992, Grishaver et al. 1998). Site selection may influence risk of nest predation; nests within 70 cm of the ground are less successful than those placed higher (Sockman 1997).

Mid March to early July is the main season for California Gnatcatchers to lay in San Diego County. Frequent nest predation results in many replacement clutches during the nesting season. Roach (1989) found the California Gnatcatcher nesting as early as late February in San Diego County; Patten and Campbell (1994) reported two nests fledging young in Orange County as late as 12 and 25 August in 1991, implying laying as late as about 16 and 29 July. Patten and Campbell (1998) suggested that cowbird parasitism is responsible for a historical trend toward California Gnatcatchers nesting earlier in the year. Warming of the climate could contribute to this trend as well.

**Migration:** The California Gnatcatcher is nonmigratory. During postbreeding dispersal, in late summer and fall, juveniles typically move less than 3 km; their longest documented dispersal distance is 20 km (Hunsaker et al. 2000). Dispersing young cross riparian woodland, chaparral, and artificial landscapes, including major highways and residential development (Lovio 1996, Bailey and Mock 1998, Campbell et al. 1998, Galvin 1998, Haas and Campbell 2003). Nonbreeding California Gnatcatchers have been detected three times on Point Loma (S7; Bailey and Mock 1998). The many examples of occupied habitat patches isolated by extensive development also attest to such movement. First-year birds establish territories by October and remain on them through the winter (Mock and Bolger 1992, Preston et al. 1998). Extensive movements by adults are relatively rare (Bailey and Mock 1998); the longest documented dispersal distance by an adult is 10 km (Hunsaker et al. 2000).

**Winter:** The gnatcatcher's winter numbers and distribution differ little from those in the breeding season (maximum daily count 53 around the upper end of Lake Hodges, K11, 26 December 1999, E. C. Hall). The species is probably resident in low density in all atlas squares where we noted it in winter but not the breeding season, except for V10 on the floor of the Tijuana River valley (two on 16 December 2000, W. E. Haas). An exceptional winter sighting about 21 km from the nearest site where the species breeds was of one at the northeastern corner of Lake Morena (S22) 5 December 1999 (R. and S. L. Breisch).

**Conservation:** Historical data on the California Gnatcatcher's abundance are minimal; its listing as a threatened species is based on the high fraction of its habitat already lost to agriculture and urbanization and the pressure to develop what remains. The primary strategy for its conservation is the establishment of a network of habitat reserves, encompassing enough of the remaining "core" regions to sustain a viable population, connected by habitat linkages. The strategy is being pursued through the state of California's Natural Communities Conservation Plans, entailing negotiation among many public agencies, landowners, and environmental organizations. Land for the reserves is being acquired through mitigation agreements for developments and public agencies' purchase of privately owned lands under a "willing seller only" policy. Although the design of the network is incomplete, as of early 2004 over 65% of the 172,000-acre reserve network in the area covered by the MSCP was in place. In the incorporated cities of the north county a 19,900-acre network has been proposed, and the participating cities need to develop their detailed plans for approval by the wildlife agencies. As of early 2004, the county of San Diego had initiated an amendment to the MSCP to cover the unincorporated areas of the north county not included in the original plan, but the area to be conserved in this region had not been formally proposed. San Diego County's major military installations (Camp Pendleton, Fallbrook Naval Weapons Station, Marine Corps Air Station Miramar) support important gnatcatcher populations and are mandated under the Sikes Act and Endangered Species Act to manage for this and other formally listed endangered species through "integrated natural resource management plans" that are updated every five years.

Though the California Gnatcatcher is eliminated by development of its habitat, it does not appear especially sensitive to fragmentation of that habitat at the landscape scale (Bailey and Mock 1998), in spite of the report to the contrary by Crooks et al. (2001). Data supporting this conclusion include the species' persistence in patches of sage scrub long isolated from extensive stands, as in Florida Canyon, Balboa Park (R9; pair with two fledglings 1 June 1998, J. K. Wilson) and Chollas Valley near Fairmount Avenue (S10; seven, including three pairs, 11 May 1997, P. Unitt).

Fire and the invasion of exotic vegetation, especially grasses and annual forbs, interact to threaten the gnatcatcher's habitat. In much of coastal southern California, where these exotic plants are well-established and where the irreversible conversion of shrublands to grasslands is likely, fire frequency and burn size should be kept low (Zedler et al. 1983). Where possible, flammable exotics should be removed or reduced. The wildfires of October 2003 affected 4% of known gnatcatcher occurrences, 16% of designated critical habitat, and 28% of the area the U.S. Fish and Wildlife Service's model for suitable habitat (Bond and Bradley 2004).

Disturbances that reduce sage scrub cover, such as frequent fire, mechanical disruption, livestock grazing, off-highway vehicles, and military training appear to reduce habitat suitability for the gnatcatcher (Bontrager et al. 1995, Mayer and Wirtz 1995, Beyers and Wirtz 1997, Wirtz et al. 1997, Atwood et al. 1998). Construction-monitoring studies suggest that California Gnatcatchers

tolerate adjacent construction (Atwood and Bontrager 2001, URS Corp. 2004) and high noise levels (Famolaro and Newman 1998). Over 16% of the point locations recorded for the gnatcatcher in San Diego County are within 500 feet of major roads.

Predation is the most common cause of gnatcatcher nest failure. Information on whether predation rate is influenced by anthropogenic factors is lacking, but the species' nest success along habitat edges is no less than that within the interior of habitat blocks (Mock and Preston 1995, Atwood et al. 1998). Depending on the adjacent habitat's suitability to cowbirds, cowbird parasitism affects some populations of the California Gnatcatcher more than others (Braden et al. 1997, Grishaver et al. 1998, Atwood and Bontrager 2001). But the net demographic effect of nest parasitism may be small, parasitism just substituting for other forms of predation on gnatcatcher nests (Braden et al. 1997). The low rate of parasitism (3 of 134 nests) observed around Rancho San Diego (R13) 1989–92 suggests that the gnatcatchers benefited from cowbird trapping along the nearby Sweetwater River (Grishaver et al. 1998).

**Taxonomy:** The subspecies of California Gnatcatcher in the United States is nominate *P. c. californica* Brewster, 1881, the dark extreme of the species. It ranges south along the coast to Ensenada, south of which it is replaced by *P. c. atwoodi*, in which the back and flanks of the female are paler brown (Mellink and Rea 1994), and by still paler subspecies from El Rosario south to Cabo San Lucas. Analysis of mitochondrial DNA shows little geographic structure of genetic variation in the California Gnatcatcher throughout its range (Zink et al. 2000), suggesting that the subspecies' characteristics are being maintained by natural selection for plumage suitable to their local habitat rather than by restricted gene flow.