

WESTERN BIRDS



Volume 20, Number 3, 1989

DISTRIBUTION AND SEASONAL MOVEMENTS OF BENDIRE'S THRASHER IN CALIFORNIA

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The ecology and distribution of Bendire's Thrasher (*Toxostoma bendirei*) have been little studied and are poorly understood. Garrett and Dunn (1981:280) classified the species as a "fairly common but very local summer resident on the Mojave Desert" in southern California. California breeding populations are known primarily from the eastern Mojave Desert and scattered locations in and around Joshua Tree National Monument in the southern Mojave Desert (Johnson et al. 1948, Miller and Stebbins 1964, Garrett and Dunn 1981), areas frequently visited by bird watchers and naturalists. However, records from other parts of the Mojave and Colorado deserts suggest that breeding populations of Bendire's Thrasher may be more widely distributed than currently recognized. Also, the preferred breeding habitat in California is relatively widespread. This habitat is typically described as Mojave desert scrub with either Joshua Trees (*Yucca brevifolia*), Spanish Bayonet (*Y. baccata*), Mojave Yucca (*Y. schidigera*), cholla cactus (*Opuntia acanthocarpa*, *O. echinocarpa*, or *O. ramosissima*), or other succulents (Grinnell and Miller 1944, Bent 1948, Garrett and Dunn 1981).

Remsen (1978) considered the total California breeding population of Bendire's Thrasher to be under 200 pairs, and the species has been placed on the list of Bird Species of Special Concern by the California Department of Fish and Game (Remsen 1978). It was placed on this list because populations are small and locally distributed and believed to be threatened by off-road vehicle use, overgrazing, and harvesting of Joshua Trees and other species of yucca.

In this paper, we report the results of a 2-year study of the breeding-season distribution and movement patterns of Bendire's Thrasher in California. Our findings are based on a review of historical records and field surveys designed to (1) document more accurately the extent of

known breeding populations in the eastern and southern Mojave Desert, (2) reinvestigate the presence of breeding populations at sites suggested by historical records, (3) locate previously undocumented breeding locations, and (4) characterize seasonal movement patterns in California.

METHODS

Review of Historical Records

We compiled over 350 distribution records of Bendire's Thrashers from four primary sources: (1) Middle and Southern Pacific Coast regional reports in *Audubon Field Notes/American Birds*, volumes 1-42, (2) Vertebrate Species Distribution Data and museum records on file with the California Desert District Office of the Bureau of Land Management (BLM), Riverside, (3) published scientific literature on Bendire's Thrasher, and (4) field notes of several ornithologists including ourselves. BLM data were gathered by employees and contractors working on the California Desert Plan Program between 1975 and 1979, and most of these observations have never been published. These BLM records also include data transcribed from labels on specimens and egg sets in major ornithological collections in California. We have not personally examined documentation for most published and unpublished records and some could be erroneous. However, most are by reliable observers and have previously been accepted by regional editors of *American Birds*, Garrett and Dunn (1981), or peer-reviewed journals, and fit within patterns for the species.

Breeding-Season Survey Techniques

We established 44 transects along existing roads during 1986 and 1987 (Figure 1); 23 transects were surveyed both years of our field study, and the other 21 transects were surveyed only one year (see Appendix). The location and distribution of our transects were designed to maximize coverage of areas we considered to represent potentially suitable breeding habitat. We concentrated our efforts in relatively diverse plant communities dominated by Joshua Trees, Mojave Yucca, Spanish Bayonet, and cholla cactus. We conducted only a few surveys at lower elevations where breeding Bendire's Thrashers would be extremely unlikely. Detailed maps and descriptions of each transect are on file with the California Department of Fish and Game, Sacramento.

Individual transect surveys were conducted on days with wind <15.0 km/hr, began approximately one-half hour after sunrise, and usually continued until mid-afternoon. We covered our routes by vehicle, with stops at 0.4- to 4.8-km intervals. Within a transect, the distance between stops was variable and depended on vegetation characteristics, local topography, and whether we detected Bendire's Thrashers at nearby stops. Sample points were placed closer together in apparently suitable habitat with Joshua Trees, yuccas, and cholla and in areas not previously known to support Bendire's Thrashers. Such adjustments allowed extensive coverage of large areas.

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At each stop, we recorded time and weather conditions, and noted dominant plants, presence or absence of wash vegetation, and types of human disturbance. The location of the point was marked on a U.S. Geological Survey topographic map (scale 1:24,000 or 1:62,500), and

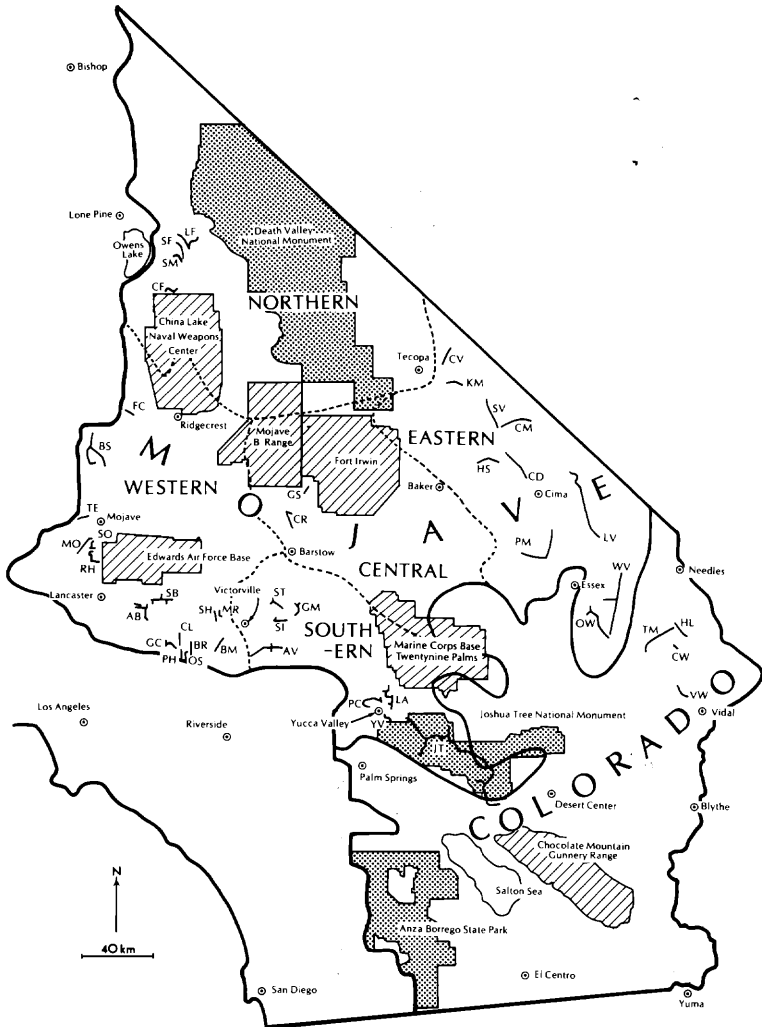


Figure 1. Locations of Bendire's Thrasher transects surveyed in 1986 or 1987. Transects are identified with two-letter initials that correspond to abbreviations in Table 5. Solid line, the Mojave-Colorado Desert boundary; dashed lines, subdivisions of the Mojave Desert.

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Table 1 Historical Breeding-Season (mid-March through July) Observations and Specimen Records of Bendire's Thrashers in the Mojave and Colorado Deserts^{a,b}

Date	Locality	Number	Reference ^c
Eastern Mojave Desert ^d			
24 Mar 1976	Granite Mtns., SB	1	JVR (AB 30:892, 1976)
11 Apr 1977	Wash on S side Granite Pass, SB	1 pair	SWC (BLM)
11 Apr 1977	Cottonwood Wash, Granite Mtns., SB	1 adult	SWC (BLM)
22 Apr 1977	Cottonwood Wash, Granite Mtns., SB	1 adult	SWC (BLM)
24 Apr 1978	Cottonwood Wash, Granite Mtns., SB	2	KJ <i>fide</i> SWC (pers. comm.)
16 May 1976	Shadow Valley, SB	1	JVR (BLM)
24 May 1975	Salt Creek, 25.0 mi. N Baker, SB	1	SWC (pers. comm.)
29 May 1978	Powerline Rd. N of Clark Mtn., SB	1+1 singing male	PM (pers. comm.)
Early June	Near Clark Mtn., SB	1	GMc (AFN16:448, 1962)
14 Jun 1976	Granite Pass, SB	1 adult w/food	Cardiff (BLM)
14 Jun 1976	Granite Pass, SB	1 adult	Cardiff (BLM)
11 Jul 1977	Halloran Summit, SB	1 adult	SWC (BLM)
Southern Mojave Desert			
Apr 1974	Around Yucca Valley, SB	2 pairs	ASm, GSS (AB 28:950, 1974)
13 Apr 1974	Salton View, JTNM, RIV	1 singing male	JM (AB 28:950, 1974)
May 1896	Warren's Well, Yucca Valley, SB	fairly common	Heller (1901)
May 1975	JTNM, RIV	2	USFWS BBS
May 1984	Near Pioneertown, SB	1	TMe (pers. comm.)
7 May 1916	Near Victorville, SB	1 adult male	MVZ 54556; Pierce (1919)
10 May 1981	Near Cottonwood Spring, JTNM, RIV	2	RMc (pers. comm.)
13 May 1973	Near Cottonwood Spring, JTNM, RIV	1	AB 27:821, 1973
22 May 1969	Near Victorville (Stoddard Mtn.), SB	1 w/food	GSS (AFN 23:627, 1969)
25 Mar 1978	JTNM, RIV	1	DZ (AB 32:1056, 1977)
6 Jun 1981	Near Pioneertown, SB	1	EAC (AB 35:979, 1981)
Jun-Jul 1975	Near Yucca Valley, SB	6	FH (AB 29:1034, 1975)
8 Jul 1986	Near Lucerne Valley, SB	3	RMc (AB 40:1256, 1986)

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Table 1 (Continued)

Date	Locality	Number	Reference ^c
Central Mojave Desert			
1 Apr-20 May 1981	Superior Valley N of Barstow, SB	5 singing males	ASE
Western Mojave Desert			
4 Apr 1981	California City, KE	1	GWP (AB 35:864, 1981)
7 Apr 1979	Near Lancaster, LA	1 singing male	JD (pers. comm.; AB 33:806, 1979)
18 Jun 1982	Kelso Valley, KE	1 singing male	BrE (AB 36:1017, 1982)
Northern Mojave Desert			
23 May 1970	Oasis Ranch, Fish Lake Valley, MON	1	GMc (AB 24:645, 1970)
23 May 1977	Mesquite Springs, DVNM, INY	1	GMc (AB 31:1048, 1977)
28 May 1977	Furnace Creek Ranch, DVNM, INY	1	KG (AB 31:1048, 1977)
1 Jun 1974	Stovepipe Wells, DVNM, INY	1	JVR (AB 28:853, 1974)
Colorado Desert			
14 Mar 1952	Hwy. 95 8.0 mi. N Vidal Jct., SB	1	GMo (pers. comm.)
19 Mar 1953	Lake Havasu Rd. 5.0 mi. E Hwy. 95, SB	1	GMo (pers. comm.)
19 Mar 1983	Palm Spring, SD	1	EAC (AB 37:913 1983)
31 Mar 1953	Hwy. 95 8.0 mi. N Vidal Jct., SB	1	GMo (pers. comm.)
8 Apr 1885	Palm Springs, RIV	1	Stephens (1919)
16 Apr 1980	Mouth of Whitewater Canyon, RIV	1	RMc (AB 34:816, 1980)
18 Apr 1950	Between Vidal Jct. and Lake Havasu Rd., SB	2	GMo (pers. comm.)
25 Apr 1974	Near Twentynine Palms, SB	2 pairs	GLB (AB 28:950, 1974)
26 Apr 1952	Between Vidal Jct. and Lake Havasu Rd., SB	1	GMo (pers. comm.)
27 Apr 1951	Between Vidal Jct. and Lake Havasu Rd., SB	2	GMo (pers. comm.)
30 Apr 1972	Brock Ranch, IMP	1 singing male	AB 26:812, 1972
6 May 1980	Cholla Garden, JTNM, RIV	2	RMc (pers. comm.)
7 May 1984	W of Dale Dry Lake, SB	1	RMc (pers. comm.)
7 May 1984	Clarks Pass E of 29 Palms, SB	2	RMc (pers. comm.)
9 May 1947	Hwy. 95 <8.0 mi. S of Lake Havasu Rd., SB	1	GMo (pers. comm.)

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Table 1 (Continued)

Date	Locality	Number	Reference ^c
12 May 1984	Twentynine Palms, SB	1	RMc (pers. comm.)
17 May 1951	Hwy. 62 E of Vidal Jct., SB	1	GMo (pers. comm.)
22 May 1897	Whitewater, RIV	1	EH (Grinnell 1915)
22 May 1951	Between Vidal Jct. and Lake Havasu Rd., SB	1	GMo (pers. comm.)
23 May– 8 Jun 1985	Pinto Basin, JTNM, RIV	2	RMc (pers. comm.)
28 May 1950	Hwy. 62 between Earp and Vidal Jct., RIV	1	GMo (pers. comm.)
29 May 1949	Hwy. 95 <8.0 mi. S of Lake Havasu Rd., SB	1	GMo (pers. comm.)
30 May 1950	Hwy. 95 at Lobeck's Pass, Sawtooth Mtn., SB	1	GMo (pers. comm.)
1 Jun 1948	Hwy. 95 <8.0 mi. S of Lake Havasu Rd., SB	1	GMo (pers. comm.)
2 Jun 1950	Between Vidal Jct. and Lake Havasu Rd., SB	2+	GMo (pers. comm.)
11 Jun 1947	Hwy. 95 S of Chemehuevi Wash, SB	2	GMo (pers. comm.)
19 Jun 1951	Between Vidal Jct. and Lake Havasu Rd., SB	1	GMo (pers. comm.)
19 Jun 1963	Near Needles, SB	5	RS, AW (AFN 18:536, 1964)
25 Jun 1951	Between Vidal Jct. and Lake Havasu Rd., SB	1	GMo (pers. comm.)

^aExcludes approximately 200 records from area previously recognized as the primary range of Bendire's Thrasher in the eastern Mojave Desert (Figure 3).

^bAbbreviations: *Localities*—DVNM, Death Valley National Monument; IMP, Imperial Co.; INY, Inyo Co.; JTNM, Joshua Tree National Monument; KE, Kern Co.; LA, Los Angeles Co.; MON, Mono Co.; RIV, Riverside Co.; SB, San Bernardino Co. *References*—ASE, A. Sidney England; ASm, Arnold Small; AW, Art Wang; BBS, Breeding Bird Survey; BLM, Bureau of Land Management; BrE, Brett Engstrom; DZ, David Zumata; EAC, Eugene A. Cardiff; EH, E. Heller; FH, Fred Heath; GLB, Gordon L. Bolander; GMc, Guy McCaskie; GMo, Gale Monson; GSS, G. Shumway Suffel; GWP, Gary W. Potter; JD, Jon Dunn; JM, Joe Morlan; JVR, J. V. Remsen; KG, Kimball Garrett; KJ, Kent Johnson; MVZ, Museum of Vertebrate Zoology, Univ. Calif., Berkeley.; PM, Paul Mack; RMc, Robert McKernan; RS, Rich Stallcup; SWC, Steven W. Cardiff; TME, Tony Metcalf; USFWS, U. S. Fish and Wildlife Service.

^cReferences to *American Birds* (AB) or *Audubon Field Notes* (AFN) are not included in the Literature Cited.

^dSubdivisions and boundaries of the Mojave and Colorado deserts are illustrated in Figures 1 and 3.

the elevation was interpolated from the map. At each stop, we played a taped recording of a Bendire's Thrasher song to elicit responses from nearby birds. Each playback session was approximately 5 minutes long and consisted of 60 seconds of song followed by 60 seconds of silence, 30 seconds of song, 60 seconds of silence, 30 seconds of song at low volume, and ended with 60+ seconds of silence. Sheppard (1970) had found this playback protocol to be effective for locating LeConte's Thrashers (*Toxostoma lecontei*). During the playback session, we recorded the number of individuals for all species in the family Mimidae and whether the detection was visual or auditory. In 1986, we used the song playback technique at 445 points on 38 transects in the Mojave Desert and at 27 points on four transects in the Colorado Desert. These data were collected between 26 April and 4 May and between 31 May and 8 June. In 1987, we conducted surveys between 8 May and 23 May at 292 points on 25 transects in the Mojave Desert.

RESULTS AND DISCUSSION

Breeding Phenology

The breeding schedule of Bendire's Thrashers in California is known primarily from nests and breeding pairs observed only once. Records of singing Bendire's Thrashers indicate that territorial behavior begins when birds first return to breeding areas beginning in mid-March and continues through mid-June, by which time most young from first nests are fledged (Figure 2). Presumed first clutches have been observed from late March through the end of April (Figure 2). Nestlings from first clutches have been recorded from early May through early June, and fledglings leave the nest between late April and mid-June. The dates for various breeding phenology milestones are consistent with observations in Arizona (Brown 1901).

The only breeding attempt in California observed repeatedly was one followed in Kelso Valley in the western Mojave Desert (R. Saval, pers. comm.; Table 2; Figure 2). The nest contained two chicks on 13 June but was empty on 17 June, and an adult with a single fledgling was observed on 22 June. On 3 July Saval discovered a second nest with four eggs within 100 m of the first nest. On 19 July two adults and two nestlings were observed at the second nest. This record is the only evidence of multiple broods for California, but second and even third nestings are well known from Arizona (Brown 1901).

For each stage in the nesting cycle for which records exist, the earliest California observations are in the Colorado Desert and the latest are from the western Mojave Desert (Figure 2). This pattern suggests that breeding begins earlier in the southeast and progresses across the desert to the northwest. However, the number of records in the Colorado Desert and the western Mojave Desert is inadequate to permit a firm statement that this pattern is real, and the single singing male observed in February in the Colorado Desert (Table 3; Figure 2) may have been a migrant.

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Only five nests with eggs have been found in California. Three nests contained four eggs each; the other records did not report clutch size. Brown (1901) indicated that in Arizona most clutches have 3 eggs, 4-egg clutches are the typical upper limit, but 5-egg clutches are known.

Breeding-Season Distribution in the Deserts of California

Our analysis of the breeding-season distribution of Bendire's Thrasher in California is presented below for five geographical subdivisions of the Mojave Desert and for the Colorado Desert. The boundaries between these regions are shown in Figure 1.

Eastern Mojave Desert. The best-known and largest breeding area for Bendire's Thrasher in California has been the eastern Mojave Desert (Table 2; Figure 3). The existence of this population was first

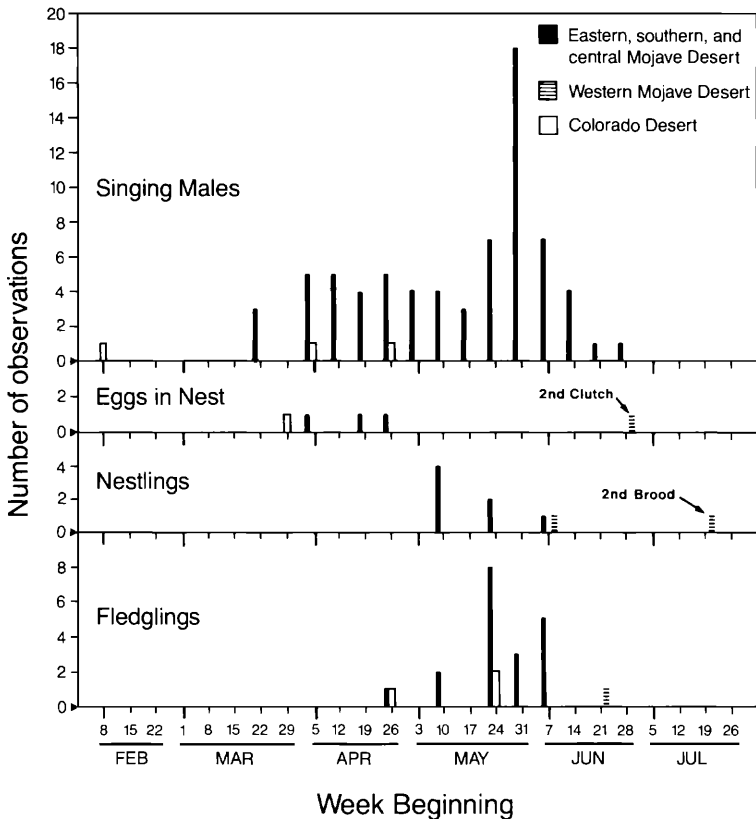


Figure 2. Breeding phenology of Bendire's Thrashers in the deserts of California based on historical records.

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Table 2 Confirmed Breeding Records of Bendire's Thrasher from California^a

Date	Locality	Number	Reference ^b
Eastern Mojave Desert ^c			
22 Apr– 28 May 1976	Lanfair Valley, SB	1 pair + 4 nestlings	SWC (pers. comm.)
12–14 May 1978	SW edge of Lanfair Valley, SB	1 pair+4 juveniles	SWC (BLM; AB 33:94, 1979)
14 May 1938	2.0 mi. NNE of Cima, SB	2 juveniles	Johnson et al. (1948)
15 May 1938	2.0 mi. NNE of Cima, SB	1 pair + 4 juveniles	Johnson et al. (1948)
15 May 1987	13.0 mi. SE Ivanpah, SB	1 pair + 3 juveniles	BAC (NRC)
26 May 1980	Cima Rd. 2.25 mi. N I-15, SB	1 pair + 4 nestlings	BM, AS (pers. comm.)
27 May 1972	Near Cima, SB	adults+ juveniles	SWC (BLM)
24 Apr– 29 May 1976	2.5 mi. SE of Cima, SB	1 pair + 1 nestling	EAC (BLM; NRC)
29 May 1976	5.5 mi. SSE of Cima, SB	1 pair + 4 juveniles	Cardiff (BLM)
30 May 1976	6.0 mi. NW of Cima, SB	1 pair + 1 juvenile	Cardiff (BLM)
30 May 1976	7.5 mi. SE of Cima, SB	1 pair+ 1 juvenile	Cardiff (BLM)
3 Jun 1979	Watson Wash, SB	1 juvenile	SWC. (pers comm.)
4 Jun 1979	Lanfair Valley, SB	1 adult + 4 juveniles	SWC (pers. comm.)
11 Jun 1978	Lanfair Valley, SB	1 pair + 2 juveniles	BAC, SJN (BLM; AB 33:93, 1979)
12 Jun 1976	12.0 mi. SE of Ivanpah, SB	4 nestlings	SWC (NRC)
12 Jun 1976	13.5 mi. N of Goffs, SB	2 pairs + 1 juvenile	Cardiff (BLM)
12 Jun 1976	13.25 mi. ESE of Cima, SB	1 pair + 2 juveniles	Cardiff (BLM)
12 Jun 1976	13.25 mi. ESE of Cima, SB	1 juvenile	Cardiff (BLM)
13 Jun 1976	10.0 mi. S of Mountain Pass, SB	1 pair + 1 juvenile	Cardiff (BLM)
Southern Mojave Desert			
11 Apr 1920	Victorville, SB	4 eggs	SBCM 5987; Pierce (1921)
26 Apr 1920	Victorville, SB	1 female + 3 juveniles	Specimen; Pierce (1921)
26 Apr 1975	1.0 mi. NW Yucca Valley, SB	1 pair + 3 juveniles	JAD (NRC)

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Table 2 (Continued)

Date	Locality	Number	Reference ^b
11 May 1987	2.5 mi. N Belle Campground, JTNM, SB	1 pair + 1 juvenile	AMC (pers. comm.; AB 41: 1488, 1987)
28 May 1974	Hidden Valley Campground, JTNM, SB	1 pair + 3 juveniles	RR (AB 28: 950, 1974)
1 Jun 1974	Ryan Mtn., JTNM, RIV	1 pair + 4 juveniles	RR (AB 28: 950, 1974)
Central Mojave Desert			
12 May 1982	Superior Valley N of Barstow, SB	1 adult + 3 nestlings	ASE (AB 36: 1017, 1982)
3 Jun 1981	Superior Valley N of Barstow, SB	1 pair + 2 juveniles	ASE
Western Mojave Desert			
13 Jun– Jul 1987	Kelso Valley, KE	1st nest + 2 nestlings 2nd nest + 4 eggs	RSa 19 (pers. comm.; AB 41: 1488, 1987)
Colorado Desert			
1 Apr 1920	Turtle Mtns., SB	Egg set	SBCM 1632
5 May 1985	Corn Springs, RIV	1 adult + 3 juveniles	RMc (pers. comm.)
24 May 1953	Hwy. 95 12.0 mi. N Vidal Jct., SB	3 juveniles	GMo (pers. comm.)
29 May 1949	9.0 mi. N Vidal Jct., SB	3 juveniles	GMo (pers. comm.)

^aAbbreviations: *Localities*—JTNM, Joshua Tree National Monument; KE, Kern Co.; RIV, Riverside Co.; SB, San Bernardino Co. *References*—AMC, Alan M. Craig; AS, Andy Sanders; ASE, A. Sidney England; BAC, Barbara A. Carlson; BLM, Bureau of Land Management; BM, Bev MacIntosh; EAC, Eugene A. Cardiff; GMo, Gale Monson; JAD, James A. Davis; MVZ, Museum of Vertebrate Zoology, University of California, Berkeley; NRC, Nest Record Card, Laboratory of Ornithology, Cornell University; RMc, Robert McKernan; RR, Richard Rowlett; RSa, Rick Saval; SJN, Sheldon J. Newberger; SWC, Steven W. Cardiff.

^bReferences to *American Birds* (AB) or *Audubon Field Notes* (AFN) are not included in the Literature Cited.

^cSubdivisions and boundaries of the Mojave and Colorado deserts are illustrated in Figures 1 and 3.

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documented by Johnson et al. (1948), and ornithologists and bird watchers continue to return to the area in search of this species. We located approximately 200 historical records for the eastern Mojave Desert, all but 10 in the area extending south from the south side of Clark Mountain, over Cima Dome, through a few canyons in the Mid

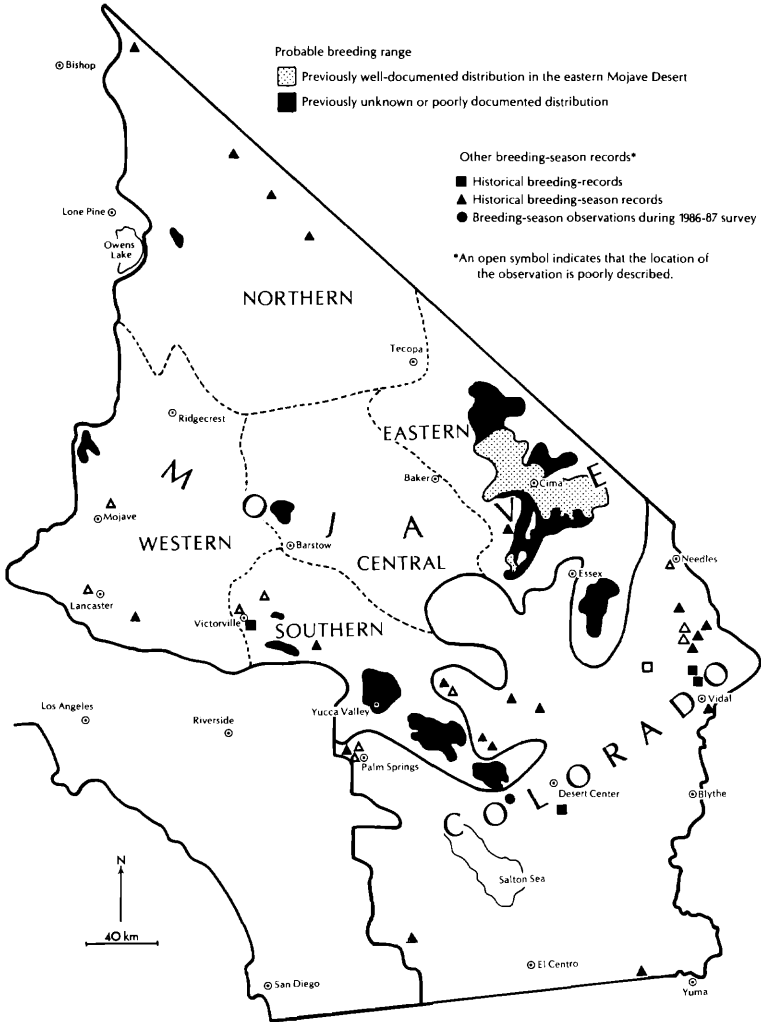


Figure 3. Breeding range of Bendire's Thrasher in the Mojave Desert based on historical records and the results of our study. Historical records for the Colorado Desert are also shown.

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Hills, and through Lanfair, Gold, Round, and Pinto valleys on the south side of the New York Mountains and Mid Hills to northern Fenner Valley. Seven historical records were from the area near Granite Pass between the Granite and Providence mountains and the adjacent bajadas (Table 1). We located only four records from suitable breeding habitat for the area north or west of Cima Dome, with the most noteworthy being of a pair on the north side of Clark Mountain (Table 1). The bird observed at Salt Creek was in habitat apparently unsuitable for breeding and its status was not known. However, this species was not found at the site during biweekly surveys conducted from November 1977 through January 1979 (A. S. England, unpublished data).

We conducted song playback surveys on 10 transects in the eastern Mojave Desert in 1986 and on five transects in 1987 (Table 5). Bendire's Thrashers were present at 36 of 73 sample points within the traditionally well-known breeding range of the species (Table 5). On the Lanfair Valley transect, we found birds in southern Ivanpah Valley, on the north side of the New York Mountains, and farther south than previously recorded along Lanfair Road into upper Fenner Valley. We also detected this species at 8 of 12 sample points in suitable habitat on the Providence Mountains transect along the flanks of these mountains. This thrasher was relatively common on the transect along the north side of Clark Mountain and on the Shadow Valley transect west of Clark Mountain and north of Cima Dome. On the basis of these results, we have concluded that this relatively well-known population of Bendire's Thrasher is more widely distributed than previously documented (Figure 3).

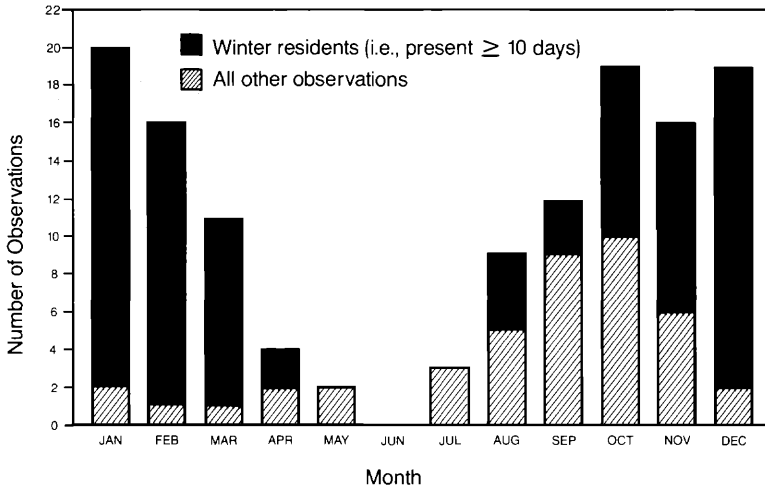


Figure 4. Monthly distribution of California observations of Bendire's Thrashers away from known breeding locations (Tables 3 and 4). Birds present at a location in more than 1 month were counted as one observation for each month detected.

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Table 3 Desert Records for Bendire's Thrasher in the Nonbreeding Season (August through mid-March)^a

Date	Days ^b	Number	Locality	Reference ^c
Mojave Desert ^d				
13 Aug 1978	1	2	Round Valley, ^e SB	SWC (BLM)
13 Aug 1985	1	1	Pinto Valley, ^e SB	SWC (pers. comm.)
13–14 Aug 1985	2	1	Cedar Canyon Rd., Mid Hills, ^e SB	SWC (pers. comm.)
22 Aug 1978	1	6	Lanfair Valley, ^e SB	ASE
28 Aug 1978	1	2	Lanfair Valley, ^e SB	SWC (pers. comm.)
29 Aug 1985	1	1	Lanfair Valley, ^e SB	LSUMZ 126499
29 Aug 1985	1	1	Lanfair Valley, ^e SB	LSUMZ 126521
29 Aug 1985	1	1	Lanfair Valley, ^e SB	LSUMZ 126597
29 Aug 1985	1	1	Lanfair Valley, ^e SB	LSUMZ 126598
30 Aug 1978	1	1	Lanfair Valley, ^e SB	SWC (BLM)
30 Aug 1985	1	1	Lanfair Valley, ^e SB	LSUMZ 126599
1 Sep 1980	1	6	Kelso, Mid Hills, ^e SB	EAC <i>vide</i> SWC (pers. comm.)
10 Sep 1978	1	1	Lanfair Valley, ^e SB	SWC (BLM)
8 Oct 1978	1	2	Lanfair Valley, ^e SB	BAC (BLM)
8 Oct 1978	1	1	Lanfair Valley, ^e SB	SWC (AB 33: 216, 1979)
12 Oct 1985	1	1	Near Lancaster, LA	FH (AB 40: 160, 1986)
13 Nov 1973	1	1	Near Lancaster, LA	AB 28:109, 1974
17 Nov 1968– 1 Dec 1968	15	1	Morongo Valley, SB	JS, RMa (AFN 23:110 and 522, 1969)
19 Nov 1978	1	1	Lanfair Valley, ^e SB	BAC (BLM)
17 Dec 1983– 5 Mar 1984	80	1	Near Lancaster, LA	JD (AB 38:358, 1984)
Winter 1977–78	1	1	Salt Lake, INY	RMS (AB 33:94, 1979)
1 Jan 1966	1	1	7.0 mi. E of Red Mtn., KE	LACM 66090
29 Feb 1984	1	1	Lanfair Valley, ^e SB	SWC (pers. comm.)
Colorado Desert				
1 Nov 1964– 27 Jan 1965	88	1	S end of Salton Sea, IMP	Garrett and Dunn (1981)
12 Nov 1967	1	1	Near Niland, IMP	EAC (AFN 22:90, 1968)
17 Dec 1973– 1 Feb 1974	46	1	Bard, IMP	RS (AB 28:693, 1974); Rosenberg et al. (in press)

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Table 3 (Continued)

Date	Days ^b	Number	Locality	Reference ^c
14 Feb 1987– 15 Feb 1987	2	2 ^f	Chemehuevi Wash, SB	RMc (AB 41: 331, 1987)
2 Mar 1968	1	1	Near Niland, IMP	GSS, DAG (AFN 22:479, 1968)

^aAbbreviations: *Localities*—IMP, Imperial Co.; INY, Inyo Co.; KE, Kern Co.; LA, Los Angeles Co.; SB, San Bernardino Co. *References*—ASE, A. Sidney England; BAC, Barbara A. Carlson; BLM, Bureau of Land Management; DAG, David A. Gaines; EAC, Eugene A. Cardiff; FH, Fred Heath; GSS, G. Shumway Suffel; JD, Jon Dunn; JS, Jay Sheppard; JVR, J. V. Remsen; LACM, Los Angeles County Museum; LSUMZ, Louisiana State University Museum of Zoology; RMa, Ralph Manke; RMc, Robert McKernan; RMS, Robert M. Stewart; RS, Rich Stallcup; SWC, Steven W. Cardiff;

^bNumber of consecutive days between the first and last observations at a location.

^cReferences to *American Birds* (AB) or *Audubon Field Notes* (AFN) are not included in the Literature Cited.

^dThe boundary between the Mojave and Colorado deserts is illustrated in Figures 1 and 3.

^eKnown breeding location.

^fIncludes one singing male.

Table 4 California Records for Bendire's Thrashers outside the Mojave and Colorado Deserts^{a, b}

Date	Days ^c	Locality	Reference ^d
11 Jan– 19 Feb 1984	40	Goleta, StB	ABi (AB 38:358, 1984)
14 Jan 1959	1	Near Shandon, SLO	Garrett and Dunn (1981)
14 Jan– 14 Feb 1986	32	Palos Verdes Peninsula, LA	BL (AB 40:335, 1986)
26 Jan– 22 Mar 1985	56	Near Lakeview, RIV	AMC (AB 39:211, 1985)
28 Jan– 3 Mar 1985	35	Coronado, SD	JC (AB 39:211, 1985)
16 Feb– 16 Mar 1985	29	Otay Mesa, SD	MO (AB 39:211, 1985)
4 Apr 1970	1	Imperial Beach, SD	GMc (AB 24:645, 1970)
17–18 Apr 1980	2	Farallon Islands, SF	BrB (AB 34:812, 1980)
1 May 1982	1	San Luis Obispo, SLO	FRT (AB 36:894, 1982)
19 May 1984	1	Farallon Islands, SF	JP (AB 38:955, 1984)

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Table 4 (Continued)

Date	Days ^c	Locality	Reference ^d
14 Jul 1975	1	Farallon Islands, SF	DeSante and Ainley (1980)
21 Jul 1985	1	Irvine, ORN	DRW (AB 39:963, 1985)
30 Jul– 2 Aug 1976	4	San Pedro, LA	IPL, JD (AB 31:224, 1977)
1 Aug 1977– 8 Apr 1978	251	Courtland, SAC	RS (AB 32:254, 396, and 1052, 1978)
8 Aug 1976– 11 Apr 1977	247	Courtland, SAC	AP (AB 31:219, 371, and 1045, 1977)
17 Aug– 12 Oct 1980	57	Pt. Loma, SD	DP (AB 35:227, 1981)
21 Aug 1983	1	Santa Clara River Estuary, VEN	SDR (AB 38:247, 1984)
25–29 Aug 1979	5	Goleta, StB	PL (AB 34:202, 1980)
25 Aug 1978– 28 Feb 1979	188	Courtland, SAC	AP (AB 33:211 and 311, 1979)
27 Aug 1964	1	Solana Beach, SD	GMc, JS (McCaskie et al. 1967)
30 Aug 1983	1	Santa Barbara Island, StB	CD (AB 38:247, 1984)
1 Sep 1976	1	Malibu, LA	TC (AB 31:224, 1977)
2–5 Sep 1973	4	Farallon Islands, SF	DeSante and Ainley (1980)
14 Sep 1973	1	Imperial Beach, SD	HK (AB 28:109, 1974)
15 Sep–1 Oct 1979	17	Pt. Mugu, VEN	BB (AB 34:202, 1980)
15–16 Sep 1979	2	San Clemente Island, SD	PJ (AB 34:202, 1980)
16 Sep 1988	1	Gaviota, StB	PK (AB 43:169, 1989)
18 Sep 1968	1	Palos Verdes Peninsula, LA	RS, GSS (AFN 23:110, 1969)
29 Sep 1973	1	San Nicolas Island, StB	LJ, JD (AB 28:109, 1974)
Early October 1966	1	El Capitan State Park, StB	RMW (AFN 21:78, 1967)
1–2 Oct 1964	2	Imperial Beach, SD	GMc, GSS (McCaskie et al. 1967)
4 Oct 1970	1	Imperial Beach, SD	GMc (AB 25:110, 1971)
4–11 Oct 1973	8	San Diego, SD	JWD (AB 28:109, 1974)
7 Oct–2 Dec 1980	57	Malibu, LA	BE (AB 35:227, 1981)
10 Oct 1912	1	Los Angeles, LA	MVZ 23259; Miller (1913)
15 Oct 1988– 11 Mar 1989	148	Acampo (Lodi), SJ	DGY (AB 43:164 and 363, 1989)
16 Oct 1975	1	Imperial Beach, SD	JD (AB 30:128, 1976)
16 Oct 1975– 31 Mar 1976	168	Courtland, SAC	AP, RS (AB 30:122 and 763, 1976)
17 Oct 1975	1	Santa Barbara Island, StB	LJ, KG (AB 30:128, 1976)
21 Oct 1973	1	Imperial Beach, SD	GSS (AB 28:109, 1974)
31 Oct 1987– 1 Mar 1988	123	Acampo (Lodi), SJ	GE, DGY (AB 42:131 and 318, 1987)
8 Nov 1973– 31 Jan 1974	85	Imperial Beach, SD	JD (AB 28:109 and 693, 1974)

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Table 4 (Continued)

Date	Days ^c	Locality	Reference ^d
9–12 Nov 1978	4	Pt. Mugu State Park, VEN	TC (AB 33:216, 1979)
12 Nov 1978	1	Imperial Beach, SD	EC (AB 33:216, 1979)
16 Nov 1962	1	Imperial Beach, SD	GMc (McCaskie and Banks 1964)
27 Nov 1974	1	Near San Diego, SD	SW (AB 29:123, 1975)
9 Dec 1984– 26 Jan 1985	49	Lake Perris, RIV	AMC (AB 39:211, 1985)
17 Dec 1978– 10 Mar 1979	84	Imperial Beach, SD	EC (AB 33:315, 1979)
20 Dec 1969	1	Imperial Beach, SD	AFN 24:455, 1969
21 Dec 1968	1	Imperial Beach, SD	CSULB 3742; JS (AFN 23:522, 1969)
21 Dec 1984– 23 Jan 1985	34	Goleta, StB	RAH (AB 39:211, 1985)
21 Dec 1985– 15 Feb 1986	57	Acampo (Lodi), SJ	TM, ML (AB 40:327, 1986)
24–27 Dec 1979	4	San Pedro, LA	HF (AB 34:308, 1980)

^aAbbreviations: *Localities*—LA, Los Angeles Co.; ORN, Orange Co.; RIV, Riverside Co.; SAC, Sacramento Co.; SD, San Diego Co.; SF, San Francisco Co.; SJ, San Joaquin Co.; SLO, San Luis Obispo Co.; StB, Santa Barbara Co.; VEN, Ventura Co. *References*—AB, Allyn Bissel; AMC, Alan M. Craig; AP, Arvill Parker; BB, Bruce Broadbrooks; BE, Barbara Elliott; BL, Barbara Lachina; BrB, Bryant Bainbridge; CD, Charles Drost; CSULB, California State University, Long Beach; DGY, David G. Yee; DP, Dennis Parker; DRW, Douglas R. Willick; EAC, Eugene A. Cardiff; EC, Elizabeth Copper; FRT, Fern R. Tainter; GE, Gil Ewing; GMc, Guy McCaskie; GSS, G. Shumway Sufel; HF, Hal Ferris; HK, Harry Krueger; IPL, Isabel P. Ludlum; JC, Jim Coatsworth; JD, Jon Dunn; JP, J. Pennimon; JS, Jay Sheppard; JWD, John W. DeWitt; KG, Kimball Garrett; LJ, Lee Jones; ML, Mike Lippsmeyer; MO, Marty Orell; MVZ, Museum of Vertebrate Zoology, University of California, Berkeley; PJ, Paul Jorgensen; PK, Pat Kelly; PL, Paul Lehman; RAH, Robb A. Hamilton; RMW, Russ and Marion Wilson; RS, Rich Stallcup; SDR, Steve and Diane Ross; SW, Susan Wise; TC, Terry Clark; TM, Tim Manolis.

^bAll observations are of single birds.

^cNumber of consecutive days between the first and last observations at a location.

^dReferences to *American Birds* (AB) or *Audubon Field Notes* (AFN) are not included in the Literature Cited.

We also discovered a previously unreported population of Bendire's Thrashers southeast of Essex along the Old Woman Mountains transect (Table 5; Figure 3). In 1986 and 1987, we detected the species at 10 of 13 sample points above an elevation of 850 m. On the adjacent Ward Valley transect, we found three birds in this elevational range on the south side of the Piute Mountains (Table 5). The habitat in the Old Woman and Piute mountains lacked Joshua Trees but had fairly dense stands of Mojave Yucca and other succulents. The thrasher population apparently extended from the south side of the Piute Mountains at least to the center of the Old Woman Mountains.

We did not locate Bendire's Thrashers along either the California Valley or the Kingston Mountains transects (Table 5). The plant species composition appeared to be suitable for the thrasher at both sites, but the soil in California Valley was rocky desert pavement and the topography along the Kingston Mountains transect was extremely steep with rocky soils.

Southern Mojave Desert. Historical breeding-season records for this portion of the Mojave Desert are centered around three general locations: Lucerne Valley/Victorville, Yucca Valley/Pioneertown, and Joshua Tree National Monument (JTNM). We located five historical records of Bendire's Thrashers in the Lucerne Valley/Victorville area (Tables 1 and 2), including the first two verified nestings reported in California, but the species has been recorded in this area only twice since 1920 (Table 1). We found only one historical record that confirmed breeding in the Yucca Valley/Pioneertown area (Table 2), but breeding in this area is also suggested by irregular and repeated observations of birds in apparently suitable habitat (Table 1). Our literature review yielded eight historical records for JTNM (Tables 1 and 2); three records confirmed breeding by Bendire's Thrashers in JTNM (Table 2), where the species is considered to be scarce (McCaskie 1973) or occasional (Miller and Stebbins 1964).

In 1986 and 1987, we conducted song playback surveys on four transects in the Lucerne Valley/Victorville area (Table 5; Figure 1). We did not find Bendire's Thrashers on the Stoddard Mountain transect, where the species was reported on 22 May 1969 (Table 1; Figure 1), or on the nearby Goat Mountain transect (Table 5). Both transects were through areas with either Joshua Trees or Mojave Yucca, but the Stoddard Mountain area had been heavily used by off-road vehicles, and the soil at Goat Mountain was very rocky. At both sites, the habitat had widely spaced Joshua Trees, Mojave Yucca, and Creosote Bush (*Larrea tridentata*) with few other shrubs and only sparse annual growth. We did locate Bendire's Thrashers both years on the Sidewinder Mountain and Apple Valley transects (Table 5). The habitat in southeastern Apple Valley was a relatively rich mixture of Joshua Trees and cholla cactus. The area has been partially developed, and houses were scattered along the transect. The Sidewinder Mountain transect crossed an undeveloped area with few obvious signs of human use. The habitat was a diverse mixture of shrubs with numerous Joshua Trees, Mojave Yucca, and cholla cactus.

Table 5 Bendire's Thrasher Detections on Transects in the Mojave and Colorado Deserts during the 1986–87 Surveys^a

Transect (Abbreviation)	1986				1987				Cumulative	
	Sample Points	Points with Thrashers	Birds Detected	Sample Points	Points with Thrashers	Birds Detected	Sample Points	Points with Thrashers	Sample Points	Points with Thrashers
	Eastern Mojave Desert	12	7	10	12	2	2	12	8	12
Cima Dome (CD) ^b	11	0	0	—	—	—	11	0	11	0
California Valley (CV)	12	7	9	—	—	—	12	7	12	7
Clark Mountain (CM)	10	5	5	10	5	6	10	7	10	7
Halloran Summit (HS) ^b	11	0	0	—	—	—	11	0	11	0
Kingston Mountains (KM)	27	9	11	29	11	15	29	13	29	13
Lanfair Valley (LV) ^b	16	9	12	17	5	9	19	10	19	10
Old Woman Mountains (OW)	22	8	9	11	4	5	22	8	22	8
Providence Mountains (PM) ^b	12	4	7	—	—	—	12	4	12	4
Shadow Valley (SV)	16	3	3	—	—	—	16	3	16	3
Ward Valley (WV)	13	1	1	17	3	5	17	4	17	4
Southern Mojave Desert	6	0	0	8	0	0	6	0	6	0
Apple Valley (AV)	41	17	19	—	—	—	41	17	41	17
Goat Mountain (GM)	8	0	0	20	3	3	20	3	20	3
Joshua Tree National Monument (JT)	6	0	0	15	2	2	15	2	15	2
Landers (LA)	10	3	5	10	2	2	10	3	10	3
Pipes Canyon (PC)	10	0	0	10	0	0	10	0	10	0
Sidewinder Mountain (SI)	10	0	0	—	—	—	10	0	10	0
Stoddard Mountain (ST)	6	0	0	—	—	—	6	0	6	0
Yucca Valley (YV)	11	3	4	—	—	—	11	3	11	3
Central Mojave Desert	3	0	0	—	—	—	3	0	3	0
Copper City Road (CR)	19	0	0	15	0	0	19	0	19	0
Goldstone (GS)	7	0	0	—	—	—	7	0	7	0
Western Mojave Desert	9	0	0	9	0	0	9	0	9	0
Alpine Butte (AB)	—	—	—	—	—	—	—	—	—	—
Baldy Mesa (BM)	—	—	—	—	—	—	—	—	—	—
Beekley Road (BR)	—	—	—	—	—	—	—	—	—	—

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Table 5 (Continued)

Transect (Abbreviation)	1986			1987			Cumulative	
	Sample Points	Points with Thrasher	Birds Detected	Sample Points	Points with Thrashers	Birds Detected	Sample Points	Points with Thrashers
Butterbread Spring (BS)	28	0	0	17	1	1	28	1
County Line (CL)	8	0	0	8	0	0	8	0
Freeman Canyon (FC)	8	0	0	—	—	—	8	0
Graham Canyon (GC)	10	0	0	10	0	0	10	0
Mojave (MO)	7	0	0	—	—	—	7	0
Mojave River (MR)	5	0	0	5	0	0	5	0
Oak Spring Ranch (OS)	7	0	0	7	0	0	7	0
Pinyon Hills (PH)	5	0	0	5	0	0	5	0
Rosamond Hills (RH)	8	0	0	—	—	—	8	0
Saddleback Butte (SB)	18	0	0	18	0	0	18	0
Shadow Mountains (SH)	5	0	0	5	0	0	5	0
Soledad Mountain (SO)	6	0	0	—	—	—	6	0
Tehachapi (TE)	2	0	0	—	—	—	2	0
Northern Mojave Desert								
Centennial Flat (CF)	10	0	0	10	0	0	10	0
Lee Flat (LF)	16	3	3	16	6	9	16	7
Santa Rosa Flats (SF)	—	—	—	10	0	0	10	0
Santa Rosa Mines Road (SM)	—	—	—	6	0	0	6	0
Colorado Desert								
Chemehuevi Wash (CW)	2	0	0	—	—	—	2	0
Havas Lake Road (HL)	9	0	0	—	—	—	9	0
Turtle Mountains (TM)	10	0	0	—	—	—	10	0
Vidal Wash (VW)	6	0	0	—	—	—	6	0

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^aSubdivisions and boundaries of the Mojave Desert are illustrated in Figures 1 and 3. The locations of transects are illustrated in Figure 1.
^bWithin the area previously recognized as the primary range of Bendire's Thrasher in the eastern Mojave Desert.

In the Yucca Valley/Pioneertown area, we conducted surveys on three transects in 1986 and on two in 1987 (Table 5; Figure 1). Bendire's Thrashers were not observed on the Yucca Valley transect; this transect crossed a heavily developed residential area with scattered Joshua Trees on remaining undeveloped lots and as landscape plants around homes. We did not find Bendire's Thrashers on either the Landers or the Pipes Canyon transects in 1986, but did locate them on both in 1987 (Table 5). The number of points on each transect was increased in 1987 to include areas not sampled the first year, and in both cases the 1987 observations were at new points. Two birds observed on the Pipes Canyon transect were found near the intersection of Highway 247 and Pipes Wash, west of the Landers transect. Three birds observed on the Landers transect in 1987 were on the uplands due east of Pipes Wash. Thus both transects appeared to intersect the same small population of thrashers. All five locations with Bendire's Thrashers were in habitats with Joshua Trees and cholla cactus. The points in Pipes Wash also had large Catclaws (*Acacia greggii*), but the two birds observed there were at the edge of the wash on nearby hillsides. Mojave Yucca was common along the Landers transect, and houses were scattered along the route.

We used the playback technique to sample thrashers at 41 points along the JTNM transect in 1986 (Table 5; Figure 1) and found the thrasher to be much more common than expected. We located birds at 17 points, and 13 of the points where we did not find them were at low elevations in the Colorado Desert either in Pinto Basin or south of the Cottonwood Pass entrance to JTNM. The habitat at most sites occupied by the thrasher had relatively dense stands of Mojave Yucca and few or no Joshua Trees.

Central Mojave Desert. Bendire's Thrashers were first reported from this region in 1981 at a site west of Lane Mountain near Superior Valley (Table 1), and breeding was confirmed there in 1981 and 1982 (Table 2). We conducted song playback surveys in Superior Valley along Copper City Road and near Goldstone in 1986 and found three birds in Superior Valley (Table 5). Both sites were relatively small, isolated stands of Joshua Tree woodland.

Western Mojave Desert. Our literature review documented three historical breeding-season records of Bendire's Thrashers in the western region of the Mojave Desert (Table 1). Two were early April observations of probable migrants. The other was a mid-June sighting of a singing male in Joshua Tree woodland in Kelso Valley on the eastern slope of the Sierra Nevada west of Red Rock Canyon State Park. Breeding in Kelso Valley was confirmed in 1987 (Table 2).

Much of the western Mojave Desert supports Joshua Tree woodland that appears suitable for Bendire's Thrashers, but observations of birds are curiously lacking. Therefore, we concentrated much of our effort in this region, sampling 152 points on 16 transects in 1986 and 99 points on 10 transects in 1987 (Table 5). Despite this intense effort, we located only one Bendire's Thrasher (Table 5). This silent individual was seen on 11 May 1987 in upper Butterbread Canyon, one ridge east of Kelso Valley. The Butterbread Spring transect included sample points in Kelso

Valley, but we did not observe thrashers there. The breeding record for Kelso Valley and other observations in the area suggest that Bendire's Thrashers may breed either sparsely or sporadically in these and possibly other canyons on the southeastern slope of the Sierra Nevada northwest of Mojave (Figure 3), but are otherwise absent from the western Mojave Desert.

Northern Mojave Desert. Prior to our study, the only records of Bendire's Thrashers from this portion of the Mojave Desert were four observations of presumed migrants found between 23 May and 1 June (Table 1; Figure 3). These observations were recorded around Memorial Day in Death Valley National Monument and at Oasis Ranch in Fish Lake Valley. All were at desert oases regularly visited by bird watchers searching for vagrants.

We conducted song playback surveys for Bendire's Thrashers in Joshua Tree woodland along two transects in the northern Mojave Desert in 1986 and along four in 1987 (Table 5). The thrasher was present both years on the Lee Flat transect east of Lone Pine (Figure 3). Although breeding has not been confirmed there, it is strongly suggested by detections at 7 of 16 survey points in apparently suitable habitat, presence in 2 consecutive years, and unsolicited singing. Bendire's Thrashers were not found in similar vegetation at nearby sites.

Colorado Desert. Most historical breeding-season records of Bendire's Thrashers in the Colorado Desert were from the northern edges near the boundary with the Mojave Desert (Figure 3). The only exceptions were of single birds observed at Brock Ranch in southeastern Imperial County and at Palm Spring in Anza-Borrego Desert State Park (Table 1; Figure 3). Approximately 81% of all breeding-season records were between mid-March and May when they could have been of either locally breeding individuals or spring migrants (Tables 1 and 2). Garrett and Dunn (1981) regarded this species as transient in the Colorado Desert. We located four historical breeding records confirming that this species does breed in the Colorado Desert (Table 2; Figure 3). Garrett and Dunn (1981:280) reported "unsubstantiated reports of nesting on the creosote desert to the west of the Colorado R. between Needles and Blythe." The source of this statement may have been a figure illustrating the Arizona distribution of Bendire's Thrasher in *The Birds of Arizona* (Phillips et al. 1964) that indicated summer records exist in California for the area between Needles and Blythe. These observations were not mentioned in the accompanying account for the species. G. Monson and A. R. Phillips (pers. comm.) provided us with 19 records from the late 1940s and early 1950s supporting these observations (Tables 1 and 2), including two observations of juveniles north of Vidal Junction. These records, an egg set collected in the nearby Turtle Mountains (Table 2), and a February 1987 observation in Chemehuevi Wash of two birds including a singing male (Table 3), suggest at least sporadic nesting in Chemehuevi Valley and adjacent areas. The hypothesis that nesting in this region is sporadic is supported by the fact that Daniels (1979a,b) did not report Bendire's Thrashers during winter and breeding-bird surveys in Chemehuevi Wash.

In 1986, we conducted song playback surveys for Bendire's Thrashers on four transects in areas and habitats where birds had been reported but failed to locate any. We did find one Bendire's Thrasher near Chiriaco Summit in the Colorado Desert at the beginning of the JTNM transect (Figures 1 and 3). The habitat there was a dense and diverse stand of desert scrub visually dominated by Palo Verde (*Cercidium floridum*), Ocotillo (*Fouquieria splendens*), and cholla cactus.

Movement Patterns in California

An immature female Bendire's Thrasher collected on 21 June 1961 in pine-fir forest on Mt. Charleston, Clark Co., Nevada (Austin and Bradley 1965), indicates that movements away from breeding habitats begin immediately after the end of the breeding season. Birds seen during late May and early June in habitat not suitable for breeding may be late spring migrants, unsuccessful breeders, or post-breeding dispersers wandering away from breeding habitats (e.g., four records in the northern Mojave Desert, Table 1). Only 28 historical records exist for Bendire's Thrasher in either the Mojave or Colorado deserts between 1 August and 15 March (Table 3), and these include only six observations after 1 September in known breeding areas. Thus, existing records suggest that a few birds linger on the breeding grounds past August (Table 3). This number may be higher than currently documented because the birds are not vocal and are fairly secretive at this time of year, so may be easily missed, and few ornithologists or bird watchers visit the desert from July through February.

Most birds that breed in California presumably migrate southeast to wintering grounds in southern Arizona, southwestern New Mexico, Sonora, and Sinaloa (A.O.U. 1983). However, 53 historical California records of Bendire's Thrasher outside the Mojave and Colorado deserts (Table 4) demonstrate that some individuals move west or northwest from breeding areas in California or elsewhere. Nearly all records from the nonbreeding season (August through mid-March) and away from breeding areas are for sites close to the coast (Tables 3 and 4). Fall migrants first appear in coastal California in mid-July (Table 4; Figure 4), and coastal and desert records indicate that fall movements continue until October or early November. These migrants overlap with a few birds that spend all or part of the winter in California (Tables 3 and 4; Figure 4).

Over 35% of winter records for Bendire's Thrashers in California were of birds present for more than 10 days and could have been winter residents rather than migrants (Tables 3 and 4; Figure 4). Most remarkable were records of presumably the same birds that returned each winter to Courtland, Sacramento County, for 4 consecutive years and to Acampo, San Joaquin County, for 3 of 4 years (Table 4). After the first year they were reported, these birds were first observed each year between August and October and were last observed between mid-February and mid-April (Table 4). Other individuals repeatedly observed during the winter were usually last seen in early to mid-March (Tables 3 and 4), but a few lingered to mid-April (Table 4). Winter records at

Lancaster, the south end of the Salton Sea, and near Bard suggest that a few birds may winter in the California deserts. In view of the scarcity of winter records for the state, Bendire's Thrasher should be considered a rare and possibly sporadic winter resident in California.

Spring migration begins by February, when birds occasionally appear in the southern Colorado Desert (Table 3), and continues through April and May, when a few records exist for coastal California. The end of spring migration may overlap with movements by early post-breeding dispersers and unsuccessful breeders.

Habitat Relationships

Historical records of breeding Bendire's Thrashers in the eastern Mojave Desert all fall between 680 and 1708 m. We found birds from 575 m at Chiriaco Summit in the Colorado Desert to 1775 m on Lee Flat in the northern Mojave Desert. The typical lower elevational limit of probably breeding birds was approximately 950 m. Six possibly breeding birds were found between 800 and 925 m near the transition between the Mojave and Colorado deserts along either the JTNM, Ward Valley, or Old Woman Mountains transects. Two birds observed below 750 m were also along the JTNM and Ward Valley transects. All observations above 1525 m were either at Lee Flat or near Keys View in JTNM.

Our field surveys confirmed that Joshua Trees, Mojave Yucca, or Spanish Bayonet are at all Mojave Desert locations with probably breeding Bendire's Thrashers. The composition of the perennial shrub layer was highly variable. Dominant shrub species at most sites were Creosote Bush, Cheese Bush (*Hymenoclea salsola*), Nevada Squaw-tea (*Ephedra nevadensis*), Burro Bush (*Ambrosia dumosa*), and Big Galleta Grass (*Hilaria rigida*). In most cases, the shrubs were diverse, including California Buckwheat (*Eriogonum fasciculatum*), Spiny Hopsage (*Grayia spinosa*), Cooper Desertthorn (*Lycium cooperi*), Anderson Desertthorn (*L. andersonii*), ratany (*Krameria* sp.), Bladdersage (*Salazaria mexicana*), and goldenbush (*Happlopappus* sp.) as other common species.

Bendire's Thrashers also occurred where the vegetation consisted of Blackbrush (*Coleogyne ramosissima*) with scattered junipers (*Juniperus osteosperma*, *J. occidentalis*, or *J. californica*), Joshua Trees, and cholla cactus. Locations with this type of perennial vegetation included Halloran Summit, the road to Keys View in JTNM, and Clark Mountain near Keany Pass. Although the vegetation on Lee Flat had a sparse overstory of Joshua Trees, the understory differed from that at other sites, consisting primarily of Shadscale (*Atriplex confertifolia*), Spiny Hopsage, Winterfat (*Eurotia lanata*), and Spiny Menodora (*Menodora spinescens*). Historical records from higher elevations in the eastern Mojave Desert indicate that Bendire's Thrashers also breed in areas dominated by Big Sagebrush (*Artemisia tridentata*) with scattered junipers.

Desert washes dominated by Catclaw in the eastern Mojave Desert are typically considered the habitat of Crissal Thrashers (*Toxostoma dorsale*)

(e.g., Garrett and Dunn 1981). Historical records suggest that Bendire's Thrashers also use this vegetation, especially at lower elevations. We found Bendire's Thrashers in washes dominated by Catclaw on only three occasions, but at least two of these observations were of birds that apparently flew into the wash from adjacent habitat in response to the song playback.

CONCLUSIONS

Most Bendire's Thrashers leave breeding areas by the end of July; a few individuals may remain into August or later. Most migrants move to wintering grounds to the southeast. However, occasional individuals, from either California or elsewhere, move north and west and spend all or a portion of the winter in coastal California. Spring movements begin in February and early March, and singing birds begin to appear on the breeding grounds in late March and early April.

The eastern Mojave Desert near Cima Dome and Lanfair Valley and the southern Mojave Desert at JTNM are the two primary breeding areas for Bendire's Thrashers in California. However, this species is more widely distributed during the breeding season than previously recorded. The eastern Mojave population extends considerably farther to the north, east, and south than previously known and includes a newly discovered disjunct population in the Old Woman Mountains. Birds in JTNM are more widespread and the population appears to be more contiguous than generally recognized. Elsewhere in the Mojave Desert, Bendire's Thrashers are restricted to widely scattered locations supporting either Joshua Trees, other species of yuccas, or cholla cactus. Large tracts of desert, especially in the western Mojave Desert, support one or more of these plant species but lack populations of Bendire's Thrasher. The habitat variables limiting the distribution of this species have yet to be quantified with the detail necessary to understand its complex distribution. Observations over several years in Superior and Kelso valleys suggest that these small isolated populations are either permanent and previously undetected or persist only a few years. Additional studies could (1) locate new populations, (2) determine population sizes, and (3) establish whether small isolated populations are permanent or undergo regular extinction and recolonization. Bendire's Thrashers do breed very locally and sporadically in the Colorado Desert, where they are restricted to habitats with arborescent species such as Palo Verde. This type of habitat is similar to that occupied by this thrasher in Arizona. Research is needed to clarify the breeding distribution and habitat use of this species in the Colorado Desert.

ACKNOWLEDGMENTS

Partial funding was provided by the California Department of Fish and Game and Bureau of Land Management. Daniel W. Anderson served as project sponsor at the Department of Wildlife and Fisheries Biology, University of California, Davis. Daniel W. Anderson, Kristin H. Berry, Steven W. Cardiff, Gordon Gould,

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Larry D. Foreman, Tim Manolis, J. V. Remsen, Jr., Charles van Riper III, Kent Smith, Philip Unitt, and Jerry Verner provided useful comments on either our initial study design or earlier drafts of this paper. Jay M. Sheppard shared his knowledge about the use of recorded songs to locate thrashers and helped us design the sampling protocol. Steven W. Cardiff, Alan M. Craig, Paul Mack, Bev McIntosh, Robert McKernan, Gale Monson, Allan R. Phillips, and Rick Saval provided information on recent records from their field notes. Karen English-Loeb prepared the original versions of Figures 1 and 3. Janet Williams prepared Figures 2 and 4 and revised Figures 1 and 3.

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Accepted 14 September 1989

APPENDIX

The locations of Bendire's Thrashers detected during the 1986-87 surveys are described below by region of the desert. Each transect name and abbreviation is followed by the date(s) of the survey(s) and the number of Bendire's Thrashers heard, observed, and the total detected. For example, the Cima Dome transect was surveyed on 28 April 1986; six Bendire's Thrashers were heard, seven were observed, and a total of 10 were detected. Only the points or portions of transects where the thrasher was detected are described. SB, San Bernardino County; RIV, Riverside County.

Eastern Mojave Desert

Cima Dome (CD)—(28 Apr 1986: 6, 7, 10; 21 May 1987: 2, 2, 2)—Cima Rd., SB; from 4.0 km SE of Interstate 15 to 3.5 km NW of Kessler Peak.

Clark Mountain (CM)—(28 Apr 1986: 9, 3, 9)—Transmission line road over Keany Pass on N side of Clark Mtn., SB; from 5.0 km NE of Excelsior Mine Rd. to 1.8 km E of Keany Pass.

Halloran Summit (HS)—(28 Apr 1986: 3, 5, 5; 21 May 1987: 4, 5, 6)—Graded dirt road beginning at Halloran Summit, SB, on S side of Interstate 15; proceeding NE for 3.5 km then SE for 5.5 km.

Lanfair Valley (LV)—(29 Apr 1986: 6, 6, 11; 19 May 1987: 6, 13, 15)—Ivanpah Rd., SB. One bird observed on N slope of New York Mtns., 6.5 km SE of Ivanpah. Remainder detected in Lanfair Valley from 11.0 km NNE of Cedar Canyon Rd. to 13.3 km N of Goffs.

Old Woman Mountains (OW)—(30 Apr 1986: 9, 9, 12; 17 May 1987: 6, 7, 9)—Sunflower Springs Rd., SB; from 13.2 km SE of Essex to 1.5 km NE of Sunflower Spring. Also, on ungraded road intersecting Sunflower Springs Rd. 0.7 km NNE of Weaver's Well for 2.6 km towards Willow Spring.

Providence Mountains (PM)—(29 Apr 1986: 6, 6, 9; 18 May 1987: 4, 3, 5)—Black Canyon Rd., SB; from 1.0 km SE of Hole-in-the-Wall, S for 6.8 km. Also, along transmission line road over Foshay Pass from 0.2 km E of the pass to the E for 5.4 km.

BENDIRE'S THRASHER IN CALIFORNIA

Shadow Valley (SV)—(28 Apr 1986: 7, 1, 7)—Excelsior Mine Rd., SB; from 9.6 km NNE of intersection with transmission line road over Keany Pass (Clark Mtn.) to the NNE for 6.4 km.

Ward Valley (WV)—(30 Apr 1986: 3, 2, 3)—Transmission line road E of Little Piute Mtns., SB; at Township 7N, Range 19E, NW 1/4 Section 29. Also, on pipeline road along SE side of Piute Mtns. at Township 7N, Range 18E, SE 1/4 Section 14 and SE 1/4 Section 15.

Southern Mojave Desert

Apple Valley (AV)—(4 Jun 1986: 0, 1, 1; 14 May 1987: 1, 5, 5)—Desert View Rd., SB; from 3.2 km W of High Rd. to 0.8 km W of Milpas Rd.

Joshua Tree National Monument (JT)—(2 May 1986: 12, 12, 19)—One bird on graded dirt road into Lost Palms Canyon, 1.5 km N of Chiriaco Summit, RIV. Cottonwood Springs Rd./Pinto Basin Rd., RIV; from 1.1 km SW of Cottonwood Spring to 1.3 km SSE of intersection with Black Eagle Mine Rd.; at National Park Service housing near Cottonwood Spring; and along dirt road from Pinto Basin Rd., NW for 7.2 km to Smoke Tree Wash at Township 4S, Range 11E, NW 1/4 Section 31. General vicinity of White Tank, Jumbo Rocks, and Ryan campgrounds, RIV, at the following locations: 4.7 km SE and 0.4 km SE of White Tank Campground; 5.5 km NE, 1.9 km NE, and 1.4 km NW of Jumbo Rocks Campground; and 1.2 km WNW of Ryan Campground. Also, on Salton View Rd. 1.3 km W of Keys View, RIV, and on Monument Rd. in SB at Township 1S, Range 7E, SW 1/4 Section 26.

Landers (LA)—(16 May 1987: 1, 3, 3)—Yucca Mesa Rd. 6.1 km N of Highway 62, and La Brisa Dr. 1.4 and 2.0 km W of Yucca Mesa Rd.

Pipes Canyon (PC)—(16 May 1987: 2, 1, 2)—Pipes Wash, SB; 0.4 km NW and 0.4 km SE of intersection of Highway 247 and Pipes Canyon Rd.

Sidewinder Mountain (SI)—(5 Jun 1986: 4, 4, 5; 15 May 1987: 1, 1, 2)—Ungraded road from Highway 247 over Sidewinder Mtn., SB, at the following locations: Township 6N, Range 1W, NW 1/4 Section 29; and Township 6N, Range 2W, NE 1/4 Section 26 and NW 1/4 Section 22.

Northern Mojave Desert

Lee Flat (LF)—(7 Jun 1986: 3, 1, 3; 9 May 1987: 9, 6, 9)—Saline Valley Rd., Inyo Co.; 2.4 km NE of intersection with White Mtn. Talc Rd. Also, along White Mtn. Talc Rd., Inyo Co.; from 2.7 km NW of intersection with Saline Valley Rd. NW for 5.1 km.

Central Mojave Desert

Copper City Road (CR)—(27 Apr 1986: 4, 1, 4)—Copper City Rd./Randsburg-Barstow Rd., SB; from 9.9 km NNW of intersection with Irwin Rd., NNW for 5.3 km.

Western Mojave Desert

Butterbread Spring (BS)—(11 May 1987: 0, 1, 1)—Graded dirt road through Butterbread Canyon, Kern Co.; one bird 6.9 km NW of Butterbread Spring at Township 29S, Range 35E, NW 1/4 Section 7.



Bendire's Thrasher, Acampo, California, 3 November 1989

Photo by David Yee