

*Toxostoma
bendirei*SPANISH:
Cuitlacoche Sonorense,
*Cuitlacoche Piquicorto*FRENCH:
*Moqueur de Bendire***Bendire's
Thrasher**

Bendire's Thrasher was the last thrasher described for mainland North America. Major Charles E. Bendire collected the first specimen in 1872 near Camp Lowell, now downtown Tucson, Arizona. Although Bendire recognized this as a new species (he had heard its song and found its nest), Robert Ridgway when presented with this first specimen did not. He believed it to be a female Curve-billed Thrasher (*Toxostoma curvirostre*), and Elliott Coues was not sure (Coues 1873). Thus, beginning with the first specimen, our understanding of this species has been clouded by confusion with similar species, by its migratory wanderings, by its rather secretive behavior, and by the meager number of observers that work in its desert habitats. Much of our limited knowledge about this species is derived from anecdotal information on nesting, distribution, and food habits collected in the late 1800s and early 1900s.

Bendire's Thrashers forage primarily on the ground, probing the soil for insects and occasionally plucking insects and fruit from vegetation. They generally inhabit sparse desert habitats in the southwestern United States and northwestern Mexico, although within this range their distribution is spotty and, in some areas, still

poorly understood. Unlike other southwestern *Toxostoma* thrashers, they leave the northern portion of their breeding range in winter, a season when wanderers sometimes appear at unexpected locations.

The Birds of North America

Life Histories for
the 21st Century

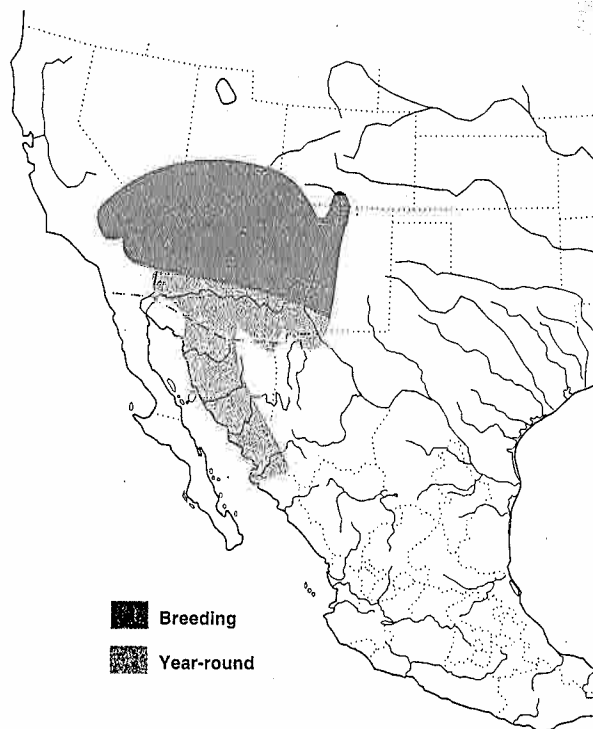


Figure 1.

Breeding and year-round range of Bendire's Thrasher. In winter, northern breeders retreat south and overlap with residents. Boundaries shown here are substantiated by specimens and repeated observations.

DISTINGUISHING CHARACTERISTICS

Medium-sized songbird; smaller than other sympatric, congeneric thrashers. Total length of males 23.2–24.7 cm, females 22.7–24.7 cm (Ridgway 1907); mass about 60 g. Separable from other North American passerines except thrashers by combinations of the following characters: medium size; wings relatively short and rounded; 10 primaries; tarsi scutellate on anterior surface; bill acuminate, upper mandible not hooked over lower mandible, and culmen weakly decurved distally; coloration on crown, back, wings, and tail relatively uniform (i.e., lacks distinct spotting, streaking, barring, and wingbars, though feather edges may be lighter in fresh feathering); external nares not covered by feathers; and tail as long or longer than body.

Distinguishable from most potentially sympatric thrashers by combinations of the following characters (see also Appendix 1): dorsal coloration relatively uniform dark drab to olive-brown; white markings on tail feathers limited to corners of outer rectrices (may be absent in worn plumage); distinct white wingbars and wing patches lacking; iris yellow to orange-yellow; short, thin, upward-pointing, triangular spots on breast arranged in distinct streaks on upper breast, less distinct on lower breast, and may extend faintly onto sides (all streaks and spots may be absent in worn plumage); and bill relatively short, not conspicuously decurved, upper mandible dark gray and slightly decurved distally, and lower mandible nearly straight and pale towards base.

Most similar to Sage Thrasher (*Oreoscoptes montanus*), Gray Thrasher (*T. cinerium*), and Curve-billed Thrasher especially in worn and faded feathering during the late spring and summer prior to molt in the fall (Garrett and Dunn 1984, Kaufman 1990, Kaufman and Bowers 1990). Sage Thrasher is smaller and has a shorter, straighter bill. Bill and eye color, and tail markings similar to Bendire's Thrasher. Sage Thrasher has heavy streaking on breast (sometimes extending to sides and abdomen) and white wingbars which may not be prominent even in freshly molted feathering. Both characters fade considerably by late spring, but in all seasons show more contrast than Bendire's Thrasher.

Bold, nearly black, teardrop-shaped spots and streaks on underside of Gray Thrasher extend from breast to flanks; contrast apparent even in worn plumage. Flanks and rump tinged with cinnamon-rufous.

Curve-billed Thrasher larger than Bendire's. Bill of adult Curve-billed relatively long and

decurved; bill of immature birds may be as short and straight as Bendire's. Bill color usually black in adult and immature Curve-billed Thrashers but some individuals may be pale towards base (Kaufman and Bowers 1990) and light yellow gape of immatures may be confused with pale horn color at base of bill in Bendire's Thrasher. At all ages, gonycal angle (where the upper and lower beak meet) is rounded in Bendire's and acutely angled in Curve-billed (Phillips et al. 1964). Spots on breast of adults roughly circular, may be triangular in center of lower breast; less distinct from background color than in Bendire's Thrasher; and generally more distinct in *T. c. curvirostre* than in *T. c. palmeri*, and generally do not coalesce to form streaks. Juvenile Curve-billed have distinct, triangular marks on breast. Iris generally yellow in Bendire's but some individuals orange-yellow; Curve-billed generally orange in adult *T. c. curvirostre* but more yellow in *T. c. palmeri* and can be yellow in immatures.

DISTRIBUTION

THE AMERICAS

Breeding range. Figure 1. Details of distribution poorly understood and documented. Surveys of breeding birds in New Mexico (Darling 1970) and California (England and Laudenslayer 1989a) greatly expanded known distribution in both states, but surveys not available for other areas. Distribution patchy within breeding range. Apparently suitable breeding habitat has a discontinuous distribution; many apparently suitable sites are not occupied.

Isolated observations of birds during the breeding season, unsupported by photographs or specimens and evidence of breeding, warrant skepticism because of similarity with Curve-billed and Sage thrashers, and by observations away from breeding areas during pre- and postbreeding movements; e.g., Godfrey (1986) reports sight records from Saskatchewan and Manitoba in mid- and late May, and on 21 Jun an immature female was collected in fir-pine forest on Mt. Charleston, Clark Co., NV (Austin and Bradley 1965).

Sparse or sporadic occurrence north of primary breeding range, suggested by sight records but unsupported by specimens and photographs.

Winter range. Withdraws from breeding areas in Mojave and Great Basin deserts, on the Colorado Plateau, and on the Arizona/New Mexico Plateau (Fig. 1). Reported to s. Sinaloa (Am. Ornithol. Union 1983), implying movement south of the breeding range, but may be regular winter visitor

only to n. Sinaloa and casual further south (Phillips 1986). Presence in s. Sinaloa apparently based only on record in Bent (1948). Migrant and casual winter visitor (1) in California west of the deserts, where individual birds have returned to the same locations for several winters; (2) at isolated locations in the California Deserts (England and Laudenslayer 1989a); and (3) along the lower Colorado River (Rosenberg et al. 1991). Hypothetical in Texas (Arnold 1984).

Status in Baja California unresolved. Reported by Wilbur (1987) as uncommon transient and winter visitor in Baja California with observations south to La Paz. Disputed by Everett (1988) who states the species is unrecorded in Baja California. Likely a migrant and casual winter visitor in Baja California as in Alta California west of the deserts (England and Laudenslayer 1989a). Specimens needed to clarify distribution and status relative to Gray Thrasher, a resident in Baja California.

OUTSIDE THE AMERICAS

Not reported.

HISTORICAL CHANGES IN DISTRIBUTION

Difficult to distinguish changes from inadequate knowledge about distribution. New locations discovered during breeding surveys in New Mexico (Darling 1970) and California (England and Laudenslayer 1989a) likely due to better coverage. Breeding first confirmed in Sulphur Springs Valley, Cochise Co., AZ in 1985 (Stejskal and Witzeman 1985) and in San Luis Valley, CO, in 1984 (Andrews and Righter 1992). Failure to find it previously at these locations may be due to range expansion, sporadic breeding, or lack of prior coverage.

FOSSIL HISTORY

Reported from Pleistocene asphalt deposits at McKittrick in s. San Joaquin Valley, CA (Miller 1937). Le Conte's Thrasher (*T. lecontei*) now resident in the s. San Joaquin Valley (Laudenslayer et al. 1992) where Bendire's is unrecorded. Closest confirmed breeding location to McKittrick approximately 120 km east at western fringe of the Mojave Desert in Kelso Valley, e. Kern Co., CA (McCaskie 1987, England and Laudenslayer 1989a). Howard and Miller (1933) recorded *Toxostoma* sp. from Shelter Cave, NM, which may be this species.

SYSTEMATICS

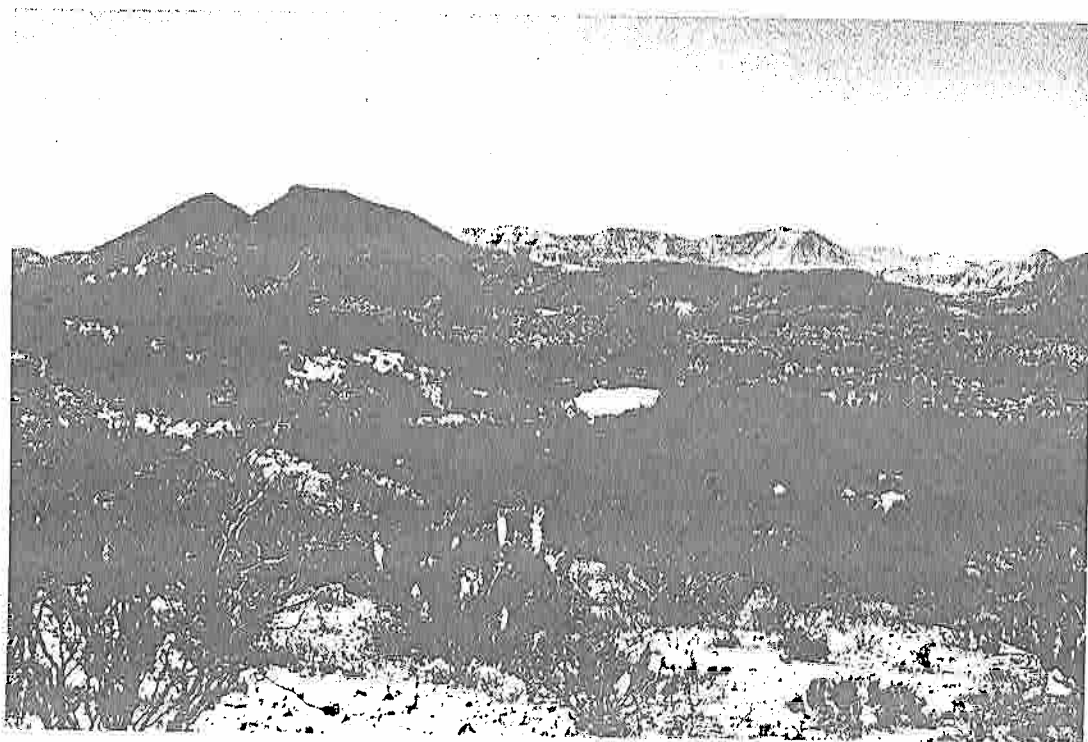
Based on descriptions by van Rossem (1942), three subspecies (*T. b. bendirei*, *T. b. candidum*, and *T. b. rubricatum*) recognized by Miller et al. (1957) and Mayr and Greenway (1960), but not recognized by the American Ornithologists' Union (1957) or Phillips (1986). Subspecies distinguished by van Rossem (1942) solely on coloration. *T. b. candidum* (central w. Sonora) paler, more ashy brown dorsally, and much whiter ventrally than *T. b. bendirei* (sw. United States to n. Sonora), with pale grayish buff flanks and under tail coverts. *T. b. rubricatum* (interior central and s. Sonora) generally darker and redder, with more prominent spotting than *T. b. bendirei*. Phillips (1962, 1986) states that apparent differences between subspecies are due to season, wear, and fading. Most northern and western birds withdraw from the breeding range in mid-Aug, just before molting. Most museum specimens with fresh plumages are from wintering grounds in Sonora and Sinaloa, and most northern specimens are heavily worn, paler, and with a less cinnamon hue. Phillips (1962) concludes that geographic color variation in the species has not been proven.

Considered a member of the Curve-billed Thrasher complex by Hubbard (1973) along with Curve-billed Thrasher, Ocellated Thrasher (*T. ocellatum*), and Gray Thrasher. Hubbard (1973) proposes isolation in refugia (pockets of warmer climate) during Illinoian and Wisconsin Glacial periods as mode of differentiation among species. Gray Thrasher, isolated in the Californian refugium, suggested as the most recent split from Bendire's Thrasher, isolated in the Sonoran refugium. Also considered closely related by Engels (1940) and classified a superspecies by the American Ornithologists' Union (1983).

MIGRATION

NATURE OF MIGRATION IN THE SPECIES

Post-breeding, most individuals apparently depart the northern half of the breeding range (Fig. 1). Some withdraw from s. Arizona, where the species is less abundant in winter than during the breeding season (Monson and Phillips 1981). Migrants presumably move south into the yearlong range in Sonora and n. Sinaloa, but the few recoveries of banded birds are all within a short distance of initial banding locations. May extend range further south into Sinaloa during the winter (Am. Ornithol. Union 1983), but movements and



winter distribution in Mexico poorly known (Phillips 1986). During migration, some birds wander to unexpected locations (e.g., coastal records in California including overwintering individuals; England and Laudenslayer 1989a).

TIMING AND ROUTES OF MIGRATION

On the Mojave Desert, CA, fall migration begins immediately after the end of breeding (see Fig. 4). Most birds depart breeding areas by late Jul to early Aug with nearly all gone by late Aug; a few may depart earlier. In coastal California, fall migrants first appear mid-Jul, with movements continuing until Oct or early Nov. Spring migration begins in Feb, when birds appear in the s. Colorado Desert; continues from mid-Mar through May when birds return to breeding areas in the Mojave Desert (England and Laudenslayer 1989a). Timing similar in Arizona, with earliest migrants returning to Tucson area from late Jan to early Feb and to n. Arizona in Mar (Brown 1901, Phillips et al. 1964). Most birds leave n. Arizona by the end of Aug and s. Arizona in Sep (Phillips et al. 1964).

MIGRATORY BEHAVIOR

No information.

CONTROL AND PHYSIOLOGY OF MIGRATION

No information.

Figure 2.

Typical breeding habitat of Bendire's Thrasher in southern Arizona (Cochise Co.); *Prosopis*, *Acacia*, and *Larrea* are common vegetation. Photo by Dale and Marian Zimmerman.

HABITAT

BREEDING RANGE

Desert habitats from sea level as near Guaymas, Sonora (Belding 1883) to approximately 1,800 m as near Escalante, UT (Woodbury 1939), and Lee Flat, Inyo Co., CA (England and Laudenslayer 1989a). Throughout range, breeders favor relatively open grassland, shrubland, or woodland with scattered shrubs or trees (Fig. 2). Not found within dense vegetation such as riparian woodland or desert wash, but may use fringes. Floristic composition of habitat varies with elevation and latitude. At higher elevations and latitudes, occupies sagebrush (*Artemisia* sp.) with scattered junipers (*Juniperus* sp.). At lower elevations in desert grassland and shrubland, large individuals of one or more of the following spinescent shrubs or cacti are almost always present: cholla (*Opuntia* sp.), Joshua tree (*Yucca brevifolia*), Spanish bayonet (*Y. baccata*), Mojave yucca (*Y. schidigera*), palo verde (*Cercidium* sp.), mesquite (*Prosopis* sp.), catclaw (*Acacia* sp.), desert-thorn (*Lycium* sp.), or agave (*Agave* sp.; Fig. 2). In s. New Mexico and s. Arizona, the bird breeds in degraded desert-grassland and desert scrub supporting various xerophytic microphyllous shrubs (but little grass); it tends to avoid the cholla cactus stands that it favors farther north (e.g., near Albuquerque, NM), perhaps because the chollas are often occupied by the

Curve-billed Thrasher (D. Zimmerman pers. comm.).

Information on habitat is nearly all from the United States (e.g., Gilman 1915a, Grinnell and Miller 1944, Bent 1948, Phillips et al. 1964, Ambrose 1963, Darling 1970, Szaro and Jakle 1985, England and Laudenslayer 1989b, Andrews and Righter 1992); virtually nothing reported from Mexico. Where structure mimics natural habitat, this species is sometimes able to use vegetation around human habitation and agriculture (Gilman 1915a, Phillips et al. 1964, Rosenberg et al. 1991); breeds in a number of areas around agriculture where Curve-billed Thrasher is absent.

SPRING AND FALL MIGRATION

Little known about habitats used in migration; probably similar to those used for breeding and wintering.

WINTER RANGE

Structure and floristics of habitat similar to that used during the breeding season, but little information reported.

FOOD HABITS

FEEDING

Main foods taken. Insects and other arthropods; also seeds and berries.

Food capture and consumption. Forages primarily on the ground (Engels 1940, Ambrose 1963) but will also glean vegetation for insects and pluck fruit (Ambrose 1963). Uses bill to peck and probe, and to hammer into the ground (Engels 1940). Also digs with bill, but digging not as powerful or efficient as, and used less frequently than, other thrashers (Ambrose 1963). Does not scratch with feet (Engels 1940, Ambrose 1963). Based on life history of prey items found in stomach contents, Ambrose (1963) quantified the method used to capture prey with the bill: surface glean or probe 40.8%, digging 22.1%, scratching 18.9%, and rock-flipping 18.2%.

DIET

Major food items/quantitative analysis. Anecdotal reports of birds observed foraging or carrying prey to the nest indicate a diet dominated by grasshoppers, beetles, caterpillars, and other larvae and pupae; seeds and fruit taken less often (Woodbury 1939, Engels 1940, Bent 1948). In the only quantitative study using stomach contents, Ambrose (1963) found the diet dominated by ants, termites, and lepidoptera larvae (Appendix 2).

NUTRITION AND ENERGETICS

No information.

METABOLISM AND TEMPERATURE REGULATION

No information.

DRINKING, PELLET-CASTING, AND DEFECATION

No information.

FOOD SELECTION AND STORAGE

No information.

SOUNDS

VOCALIZATIONS

Development. No information.

Vocal array. *SONGS.* Song complex and continuous (not broken into discrete segments or abruptly changing character); composed of a highly variable series of elements usually repeated 2–4 times before a transition to the next repeated element (see Fig. 3). Described as a sweet or melodic warble (e.g., Phillips et al. 1964) that generally lacks sharp chips, whistles, and trills. Composition of songs varies greatly, both within and among individuals; no analysis of geographic variation. Rates of singing not measured, but songs frequently > 10 s duration, with many songs given in sequence. Periods of almost constant singing followed by long intervals of silence are typical. Many elements within each song can be heard at > 100 m while others are uttered much more softly. No reports of mimicry as in some Mimids. No information on which sex sings.

CALLS. Two types of calls (Gilman 1909, Ambrose 1963). Most common (but seldom heard) is a *chup* or *chek*, similar to call of the Northern Mockingbird (*Mimus polyglottos*) but not as harsh or loud, more prolonged and slightly trilled, and repeated 2 or 3 times in rapid succession, e.g., *chup-chup-chup*. Second call a quiet whistled *quee* rising in pitch toward the end. When disturbed from the nest, responds with call described as *tirup*, *tirup*, *tirup* by Brown (1901).

OTHER VOCALIZATIONS

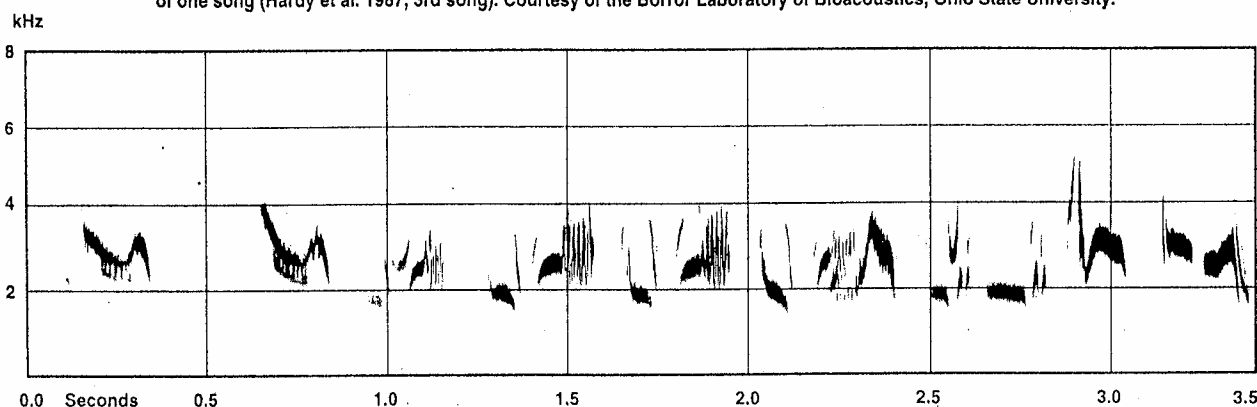
No information.

PHENOLOGY

In central Arizona near Phoenix (Gilman 1909) and in s. Arizona near Tucson (Ambrose 1963), singing begins early Jan. Song given on 3 Jan, "a low warbling song with a decided sparrow 'burr' to it," not readily recognized as belonging to Bendire's Thrasher. Frequency of singing and loudness increases and 'burr' quality decreases as

Figure 3.

Continuous song of Bendire's Thrasher recorded near Hermosillo, Sonora, Mexico; each segment is part of the sequential progression of one song (Hardy et al. 1987, 3rd song). Courtesy of the Borror Laboratory of Bioacoustics, Ohio State University.



breeding season approached (Gilman 1909). Continued singing until late Jun at both locations, and occasionally until the last of Sep near Phoenix, but frequency of singing declines rapidly after breeding and may be seldom heard in areas where extremely vocal several weeks earlier (Visher 1910, Ambrose 1963).

Daily pattern of vocalizing. No information.

Places of vocalizing. Song delivered from high perch such as a Joshua tree, juniper, large shrub, fence post, or the roof of a house (Gilman 1909, ASE and WFL). Near Tucson, AZ, singing perches significantly higher than those used by Curve-billed Thrasher (Ambrose 1963). May also sing from lower, more obscure perches (Kaufman 1990).

Repertoire and delivery of songs. No information.

Social context and presumed functions of vocalizations. Song presumably used by males to defend breeding territory and to attract mates, but no information found to confirm either of these functions or which sex sings. No information on function of calls.

NONVOCAL SOUNDS

No information.

BEHAVIOR

LOCOMOTION

Walking, hopping, climbing, etc. Birds foraging on the ground hold tail low, move in and out of bushes varying speed from run to slow walk, sometimes fly up into a low bush then directly back to the ground; may jump into air as if flycatching (Engels 1940). Often cock tail over level of back when running (Phillips et al. 1964).

Flight. Smooth and easy, similar to that of Northern Mockingbird (Gilman 1909, Engels 1940). Flight is usual method of locomotion when moving any distance (Engels 1940). Regularly observed flying between trees at heights of 7.6 to 15.2 m (25–50 ft) above the ground. May fly 275 m (300 yd) to bring food to the nest (Engels 1940).

SELF-MAINTENANCE

Preening, head-scratching, stretching, bathing, anting, etc. No information.

Sleeping, roosting, sunbathing. No information.

Daily time budget. Diurnal.

AGONISTIC BEHAVIOR

Physical interactions. No information.

Communicative interactions. No information.

SPACING

No information.

SEXUAL BEHAVIOR

Mating system. Apparently monogamous, but no information in the primary literature.

Pair bond. No information.

Extra-pair copulations. No information.

SOCIAL AND INTERSPECIFIC BEHAVIOR

Degree of sociality. Inconspicuous except when singing. Generally observed in pairs or, immediately after breeding, in small family groups. One questionable observation of immatures in foraging flocks of 40–50 individuals, moving upslope after breeding (Scott 1888); such behavior never reported since, despite far more observers in range.

Play. No information.

Nonpredatory interspecific interactions. Immatures in post-breeding flock observed by (Scott 1888) predominately Bendire's Thrashers

but also a few Curve-billed and Crissal Thrashers (*T. dorsale*). Gila Woodpecker (*Melanerpes uropygialis*) seen attacking a Bendire's Thrasher, but thrasher escaped and pummelled the woodpecker (Gilman 1915b). A pair preparing to start a second brood were driven from a new nest site by Western Kingbirds (*Tyrannus verticalis*) and returned to the nest used to successfully raise the first brood (Gilman 1915a).

Predation. No information.

BREEDING

PHENOLOGY

Pair formation. In Arizona, birds return to breeding grounds in early Feb, gather in small flocks of unmated individuals (Brown 1901). No other information on where or how pair formation occurs.

Nest building. No data, but must begin shortly after returning from wintering grounds because nests with eggs found early Mar in Arizona (Brown 1901), end of Mar in California (Fig. 4; England and Laudenslayer 1989a). Earliest date for eggs in Arizona 24 Feb (Brown 1901).

First brood per season. Difficult to discern dates for first brood based on descriptive nature of published data and apparent propensity for second brood. Based on dates of nests with eggs, first brood initiated late Mar through Apr in California (England and Laudenslayer 1989a). In s. Arizona, first brood initiated as early as late Feb, frequently nesting by first week of Mar but more generally early Apr (Brown 1901).

Second brood per season. In s. Arizona, "preparations for a second brood are well under way" by mid-Apr (Brown 1901) and birds known to nest for a second time on 20 May (Scott 1888). Sole California record of second clutch found last week of Jun (England and Laudenslayer 1989a).

Third brood per season. One record of a bird incubating a third brood on 25 Jul after successfully fledging the first brood on about 1 May and the second on 6 Jul (Gilman 1915).

NEST SITE

Selection. No information.

Site characteristics. Typically placed in shrubs, cacti, or trees; no reports of nests on the ground. Common supporting plants include cholla, mesquite, juniper, and Joshua tree and other species of yucca; fewer reports of nests in catclaw, palo verde, hackberry (*Celtis* sp.), willow (*Salix* sp.), saltbush (*Atriplex* sp.), and desert-thorn (Brown 1901, Gilman 1909, Ligon 1961, North American Nest Record Card Program). Will also use some



Molt

Breeding — Young
Egg
Migration —

Figure 4.

Annual cycle of breeding and migration of Bendire's Thrasher in southern California.

Timing of molt is insufficiently known to be illustrated here; see text for details. Thick lines show peak activity, thin lines off peak.

exotic vegetation around dwellings and agricultural fields (Gilman 1915a). Nests occasionally in mistletoe (*Phoradendron*) on catclaw or juniper. Unusual locations include under the eave on beam in a carport (North American Nest Record Card Program), sharing a common wall with a Verdin (*Auriparus flaviceps*) nest (Gilman 1909), and in a deserted flicker nest (hole in tree; Gilman 1915b). Average height of 39 nests measured by Gilman (1909) 5 ft (1.5 m) (range 3–10 in). The 50 nests reported on by Brown (1901) were typically 2.5–5.0 ft (.7–1.5 m) high (range 6 in–20 ft).

NEST

Construction. No information.

Structure and composition matter. Open, generally bowl-shaped nest similar in general design to that of other thrashers, but usually finer, smaller, and more compact. Outside layer can be conspicuous or nearly lacking (Brown 1901, Ambrose 1963); composed of sticks which may or may not be predominantly thorny (Johnson et al. 1948, Ambrose 1963). Inner layer a well-formed, symmetrical cup lined with a variety of soft materials (e.g., green or dried grass, horse or cow hair, rootlets, feathers, fur, wool, and cotton; Gilman 1909, Pierce 1921, Johnson et al. 1948).

Dimensions. Based on 17 nests, external layer up to 12 in (30.7 cm) in diameter and 3–9 in (7.7–23 cm) deep; internal cup 2.25–3.50 in (5.7–8.9 cm) in diameter and 1.5–3.5 in (3.8–8.9 cm) deep (Brown 1901).

Microclimate. No information.

Maintenance or reuse of nests, alternate nests.

Bird attempting 3 broods in a single season used the same nest for the first 2 then moved a few feet away in the same tree for the third attempt (Gilman 1915a). No other information.

Nonbreeding nests. No information.

EGGS

Shape. Subelliptical to short subelliptical.

Size. Length: 26.90 mm (24.44–28.94) x breadth 19.24 mm (17.64–20.10; Western Foundation of Vertebrate Zoology).

Color. White or very pale blue green, or gray; speckled or blotched with pale purple, buff, red, and gray (Bent 1948).

Surface texture. Smooth and glossy.

Egg laying. No information.

INCUBATION

No information.

HATCHING

No information on behavior of adults during hatching.

YOUNG BIRDS

Condition at hatching. Altricial (naked, eyes closed) and nidicolous (remain in nest; ASE).

Growth and development. No information.

Causes of death. Two observations of nestling mortality documented the day following strong windstorms (North American Nest Record Card Program).

PARENTAL CARE

Brooding. No information.

Feeding. Nestlings fed by both adults (Johnson et al. 1948; North American Nest Record Card Program, 3 records).

Nest sanitation. No information.

Parental carrying of young. Not known to occur.

COOPERATIVE BREEDING

Not known to occur.

BROOD PARASITISM

One published record of a nest near Red Rock, AZ, with 3 Bendire's Thrasher eggs and one egg from a Brown-headed Cowbird (*Molothrus ater*; Friedman 1934). No reports of cowbird eggs or chicks on 38 nest record cards (North American Nest Record Card Program).

FLEDGLING STAGE

Departure from the nest. Leave nest approximately 12 d after hatching (North American Nest Record Card Program).

Growth. No information.

Association with parents or other young. Adults and immatures found in family flocks during Jul in n. Arizona (Woodbury 1939). In s. Arizona, full-grown young, still in juvenal plumage, seen regularly on their own with no adults nearby (K. Kaufman pers. comm.).

Ability to get around, feed, and care for self. No information.

IMMATURE STAGE

Little known (See Demography and Populations: dispersal from breeding site or colony).

DEMOGRAPHY AND POPULATIONS

MEASURES OF BREEDING ACTIVITY

Age at first breeding; intervals between breeding. No information.

Clutch. Based on inspection of about 500 nests (Brown 1901), 3 is a normal set, 4 is not uncommon; only 2 nests with 5 eggs.

Annual and lifetime reproductive success. No information.

Number of broods normally reared per season. Two broods per season documented in Arizona (Brown 1901) and California (England and Laudenslayer 1989a); suggested in New Mexico by late nesting date (Ligon 1961). One report of three broods in a single season (Gilman 1915a). Raising two broods per season called regular by Brown (1901) and usual by Reed (1904), but population statistics not reported.

Proportion of total females that rear broods. No information.

LIVE SPAN AND SURVIVORSHIP

Few data. U.S. Fish and Wildlife Service reports 25 recoveries (16 individuals) from 226 banded birds; one bird banded as an adult was recaptured and released 4 yr and 2 mo later (Klimkiewicz et al. 1983).

MORTALITY AND DISEASE

No information.

RANGE

Natal philopatry. No information.

Fidelity to breeding site and winter home range. U.S. Fish and Wildlife Service band recovery data reviewed. All recoveries were from s. Arizona where the bird is resident; all birds had been

banded as adults. Twenty-four of 25 recoveries were within the same 10-min block where originally banded; the other recovery was in an adjacent 10-min block. Seven of 18 birds banded between Sep and Feb were recovered Mar-Aug, the other 11 Sep-Feb. Two of 7 birds banded Mar-Aug were recovered during the same period, the other 5 Sep-Feb. These recoveries suggest considerable yearlong site fidelity at this location in Arizona. On 2 separate occasions, birds wintering in coastal California returned to the same location for 4 yr; consecutive years at one location, 3 of 4 yr at the other (England and Laudenslayer 1989a).

Dispersal from breeding site or colony. In the northern part of the breeding range, dispersal can begin immediately after breeding. Two records demonstrate upslope movements into cooler areas, but this type of movement is not widely reported: (1) in Arizona, post-breeding movements upslope into thickets of low oaks (*Quercus* sp.) and junipers (Scott 1888), and (2) an immature female in late Jun at approximately 2,500 m in fir-pine forest, Charleston Mountains, NV; this bird may have moved upslope from nearby desert habitat (Austin and Bradley 1965).

Home range. No information.

POPULATION STATUS

Estimates or counts of density. Infrequently recorded on Breeding Bird Survey (BBS) counts (Fig. 5). In 1977, 33 birds detected on 11 BBS routes out of 1,832. Mean numbers detected per route (1965–1979): Arizona 0.7 (26 routes); California 0.1 (179 routes); Colorado 0.0 (23 routes); Nevada 0.1 (18 routes); New Mexico 1.1 (29 routes); Utah 0.0 (13 routes). Highest counts were from the Sonoran Desert and New Mexico (Robbins et al. 1986). Emlen (1974) reported density as 0.2 birds/40 ha in desert and 0.0 birds/40 ha in urban Tucson.

Trends. No significant trend detected in BBS data (1965–1979) from western states (Arizona, California, Colorado, Nevada, New Mexico, and Utah), but birds detected on < 34 routes (Robbins et al. 1986). In New Mexico, thought to be expanding range, possibly owing to grazing and the increase of scattered junipers (Darling 1970). Populations may have declined in parts of Arizona 1940 to 1960 (Ambrose 1963).

POPULATION REGULATION

Sympatric with Curve-billed Thrasher throughout much of range (Gilman 1909, Engels 1940, Ambrose 1963, Tomoff 1974). Engels (1940) concluded that the means of ecological segregation between these species could not be determined. Ambrose (1963) suggested that habitat destruction

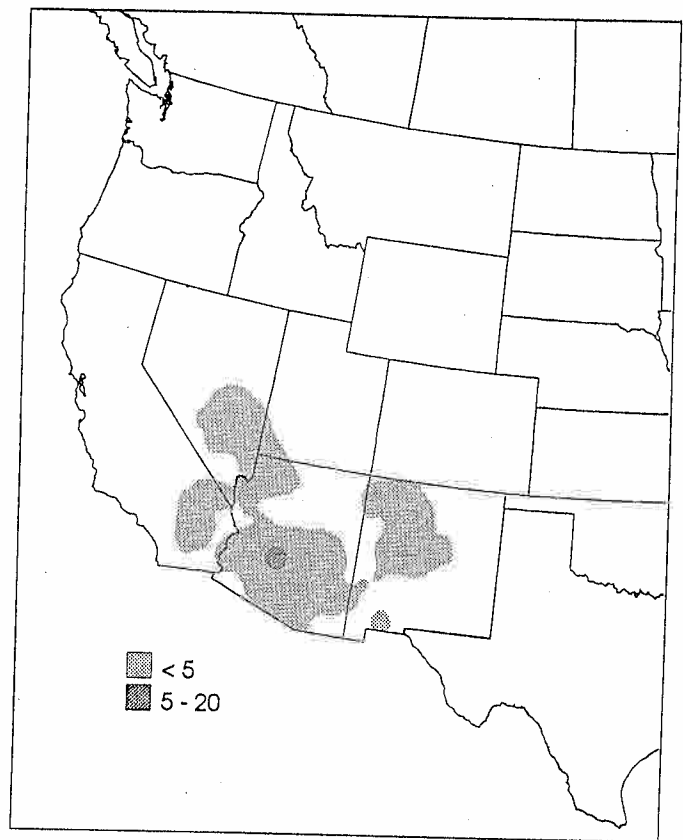


Figure 5. Relative abundance of the Bendire's Thrasher in the United States and southern Canada, 1985–1991, based on data from the Breeding Bird Survey. Numbers shown are the average number of individual birds seen or heard per route per year. Map by Jeff Price.

and competition with Curve-billed Thrasher for a depleted food supply were contributing to a decline in Bendire's populations.

CONSERVATION AND MANAGEMENT

EFFECTS OF HUMAN ACTIVITY

Understanding based on anecdotal reports; no quantitative information available. Populations may persist in rural areas with scattered dwellings near native vegetation (Gilman 1909 and 1915a, Rea 1983) and in agricultural areas with fields bordered by mesquite and other shrubs (Ambrose 1963), but no information available on whether populations decline, increase, or remain stable. Phillips et al. (1964) suggest the species is favored by clearing and agricultural activities and is probably much commoner in Arizona now than originally, while Ambrose (1963) states the species has declined due to habitat destruction. For New Mexico, Darling (1970) suggests that the range of Bendire's Thrasher has expanded because overgrazing has greatly expanded the area with scattered junipers. Remsen (1978) states that potential threats to populations in California include harvesting of Joshua trees and other yuccas,

overgrazing, and off-road vehicle activity. Populations have been eliminated by dense urbanization around Tucson (Emlen 1974) and by large scale agriculture along the Gila River (Rea 1983).

MANAGEMENT

Classified as a "Species of Special Concern" by California Department of Fish and Game (Remsen 1978), and protected from take. No information on other management actions taken in California or elsewhere.

APPEARANCE

MOLTS AND PLUMAGES

Hatchlings. No description on extent, development, or coloration of down in nestlings.

Juvenal plumage. No information on development of Juvenal plumage. Juvenal plumage similar to Definitive Basic plumage except that rump, secondaries and tertials, greater wing coverts, and tail feathers (except central pair) generally fringed with cinnamon-rufous to raw sienna coloration and underparts narrowly streaked with drab (colors interpreted from Ridgway (1907) and Bent (1948) after examining specimens at California Academy of Sciences).

Prebasic I molt (involving only contour plumage and wing coverts) occurs in late summer to early fall depending on date of fledging.

Basic I plumage. Basic I plumage indistinguishable from Definitive Basic plumage (potential to distinguish by retention of worn Juvenal wing and tail feathers may be possible, but not reported; Bent 1948). Definitive Prebasic molt occurs from late Jul through Aug on the breeding grounds prior to migration (Gilman 1909, Bent 1948). Sexes alike. No information on schedule or order of molting of remiges and rectrices.

Definitive Basic plumage. Dorsum nearly uniform medium drab to olive-brown from base of bill to rump; tertials and wing coverts also medium drab to olive-brown but fringes sometimes paler. Tail medium to dark olive-brown; shafts of rectrices rufous-cinnamon or raw sienna at base, gradually changing to dark olive-brown near tip. Inner vane of 2 (sometimes 3) lateral rectrices tipped with grayish white. Remiges slightly darker olive-brown than rest of wing and dorsum. Chin an unmarked light gray with a slight tint of olive-brown. Ear coverts finely streaked light gray and olive-brown; may appear uniform except very close up. Very slight hint of malar stripe in some individuals; likely not visible except in hand. Breast and belly pale whitish gray

Table 1. Measurements of the Bendire's Thrasher based on museum skins (Ridgway 1907). Measurements in millimeters.

	MALE (n = 10)		FEMALE (n = 8)	
	Mean	Range	Mean	Range
Bill length ¹	24.3	21.5–25.5	23.4	21.5–25.5
Wing length	105.7	103.0–107.5	103.2	97.5–108.5
Tail length	111.4	108.0–115.0	107.8	101.5–115.5
Tarsal length	33.8	33.0–34.5	33.2	31.5–34.5
Middle toe length	23.2	22.0–24.0	22.7	21.5–22.7

¹ Exposed culmen.

with an olive-brown, raw sienna tint that increases in intensity towards the sides and bend of the wing; this trait is highly variable. Pale olive-brown streaking can extend from upper breast to upper belly but is variable in extent. Streaks composed of short, thin, upward-pointing, triangular spots.

BARE PARTS

Bill and gape. Upper mandible dark neutral gray, lower mandible dark neutral gray distally, pale horn color towards base. Lining of mouth yellow (Engels 1940).

Iris. Iris generally yellow, but some individuals tending to orangish yellow (Rea 1983).

Legs and feet. Tarsi and toes medium to dark neutral gray.

MEASUREMENTS

Only Ridgway (1907) reports linear measurements based on sample sizes greater than five (Table 1); no information available that includes standard deviation or standard error. Mass of yearlong residents in Arizona: 62.2 ± 5.06 g, $n = 23$ (Dunning 1984).

INTERNAL ANATOMY

Engels (1940) provides detailed information on the internal skeletal and muscular anatomy of Bendire's Thrasher and five other species of *Toxostoma* thrashers found in the United States, and relates differences in morphology to differences in feeding habits and locomotion. Data on bill morphology and head musculature are consistent with field observations that species with straight bills acquire food primarily by pecking, poking, or hammering with the bill and not by digging. Tendency of frontal region to overgrow base of bill at the nasofrontal hinge is greater in

Bendire's Thrasher than in the other species of *Toxostoma* studied, but also strong in Brown Thrasher (*T. rufum*). Tendency not found in *Toxostoma* with decurved bills, and believed not needed to absorb direct transmission of force against the base of the bill at the nasofrontal hinge. Extent of overgrowth of frontal region correlated with pecking behavior in woodpeckers and correlation may be true for *Toxostoma* thrashers (Engels 1940). Muscle bundles extending from the pterygoid to the base of the skull are present in all mimids and aid digging. Bendire's Thrasher and other straight-billed species lack several traits found in curve-billed *Toxostoma*: (1) increased mass of several flexor muscles used to move the head, (2) reduction of the adductor muscle which opens the lower mandible, and (3) fusion of the thoracic vertebrae. These characters provide strength and rigidity when digging to the upper jaw of curve-billed species such as California Thrasher (*T. redivivum*).

Length of the wing skeleton is less in proportion to body size in *Toxostoma* than in the Northern Mockingbird. Among the *Toxostoma*, wing proportions of Bendire's Thrasher are the most similar to the Northern Mockingbird and consistent with observation that flight is used for locomotion more frequently than by LeConte's, Crissal, or California thrashers.

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Appendix 1. Comparison of field identification characters between Bendire's Thrasher and other similar thrashers from the southwestern United States and Baja California.

CHARACTER	BENDIRE'S THRASHER	CURVE-BILLED THRASHER	GRAY THRASHER	SAGE THRASHER
Eye color (iris)	Yellow, occasionally orange-yellow	Orange, more yellowish in immatures and in <i>T. c. palmeri</i>	Golden-yellow	Similar
Bill color	Upper mandible dark gray, lower pale towards base but difficult to see	Nearly black, rarely pale towards base; immature may show yellow gape	Similar	Similar
Bill shape	Relatively short, not conspicuously decurved; ventral edge of lower mandible nearly straight	ADULT: relatively long and decurved; IMMATURE: may be as short and straight as Bendire's Thrasher	Intermediate between Bendire's and Curve-billed thrashers	Shorter, straighter
Breast markings	Short, thin, upward-pointing, triangular spots arranged in distinct streaks on upper breast, may be absent in worn plumage; less distinct on lower breast, may extend faintly onto sides	ADULT: roughly circular, may be triangular in center of breast, less distinct from background than in Bendire's Thrasher and less distinct in <i>T. c. palmeri</i> ; generally do not coalesce into streaks. IMMATURE: can have distinct triangular spots on breast	Bold, nearly black, teardrop-shaped spots and streaks; extend to flanks; contrast apparent even in worn plumage	Heavy streaking sometimes extending to sides and abdomen; contrast fades in worn plumage
Wing markings	Lacks distinct white wing bars and wing patches	Similar	Similar	White wingbars, may not be prominent even in fresh feathering, fades in worn plumage
Tail markings	White markings limited to corners of outer rectrices, may be absent in worn plumage	Similar, but less pronounced in <i>T. c. palmeri</i>	Similar	Similar
Dorsal coloration	Uniform dark drab to olive-brown	Grayer	Darker, browner; flanks and rump tinged with cinnamon-rufous	Grayer
Size	Smallest <i>Toxostoma</i>	Distinctly larger with longer tail	Similar	Slightly smaller

Appendix 2. Composition and size of arthropods, seeds, and fruits in stomachs of Bendire's Thrasher taken in the foothills of the Tucson Mountains and other locations in southeastern Arizona (Ambrose 1963).

ARTHROPODS	ITEMS ¹ (%)	STOMACHS (%)	SIZE RANGE (mm)
ARACHNIDA—Salticidae	0.5	12.5	5
ORTHOPTERA—Acrididae	0.8	18.8	30–35
ISOPTERA—Kalotermitidae	25.9	18.8	4
NEUROPTERA—Myrmeleonidae	1.9	25.0	4–15
LEPIDOPTERA			
Phalaenidae larvae	12.9	31.3	15–24
unidentified larvae	0.5	6.3	8–15
unidentified pupae	0.3	6.3	6
COLEOPTERA			
Carabidae larvae	5.1	6.3	8–15
Tenebrionidae	6.5	12.5	4–6
Tenebrionidae <i>Tenebrio</i>	0.5	6.3	12
Cerambycidae	0.3	6.3	25
Curculionidae	0.5	6.3	3–7
Dasytidae	5.1	6.3	3
unidentified	0.3	43.8	4–20
HYMENOPTERA			
Formicidae	35.9	43.8	2–6
Andrenidae	1.9	6.3	8
Halictidae	0.3	6.3	5
SAMPLE SIZE	371.0	1.1	—
SEEDS AND FRUITS			
<i>Carnegiea gigantea</i>	91.5	6.3	1
Gramineae	4.6	31.3	1–3
<i>Condalia lycioides</i>	3.4	12.5	5
<i>Sorghum</i> sp.	0.6	12.5	5
SAMPLE SIZE	328.0	16.0	—

¹Column totaled to 99.2% (for arthropods) in original publication.

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