

THE TOXOSTOMA THRASHERS OF CALIFORNIA: SPECIES AT RISK?

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Abstract: Four of the 10 described species of *Toxostoma* thrasher breed in California—California thrasher (*T. redivivum*), Bendire's thrasher (*T. bendirei*), Crissal thrasher (*T. crissale*), and Le Conte's thrasher (*T. lecontei*). Urbanization, agricultural development, fire management, and livestock grazing are among the land uses that affect large tracts of the habitats occupied by these species. Other uses generally impact smaller areas. None of these species are likely to be eliminated from the California avifauna in the foreseeable future. However, they are potentially susceptible, in varying degrees, to localized extirpations because (1) they occur at low densities, (2) portions of their ranges are fragmented, and (3) only the Bendire's thrasher is known to regularly move long distances. Thus, in addition to direct habitat loss and degradation, California, Crissal, and Le Conte's thrashers may be susceptible to population declines following habitat fragmentation. Similarly, other species, subspecies, and populations of the California breeding avifauna with similar life history traits could suffer comparable declines. This potential is especially high among the numerous taxa of nonmigratory shrubland birds. Shrub-dwelling species have generally been overlooked by wildlife biologists and land managers. A systematic review, survey, and monitoring of the California avifauna is needed to identify taxa and populations that may become threatened.

The genus *Toxostoma* is comprised of 10 species of thrashers found in North America; the majority of these breed in the arid southwestern United States and Mexico (AOU 1983). California (*T. redivivum*), Le Conte's (*T. lecontei*), and Crissal thrashers (*T. crissale*) are year-round residents in California while Bendire's thrasher (*T. bendirei*) breeds in California, but generally winters in southern Arizona and northwestern Mexico. The habitats used by these birds are generally shrub-dominated, ranging from sparse desert scrub to dense chaparral and woodlands with a shrub understory.

Shrublands, including desert shrublands, cover a larger proportion of the state (approximately 39% of 101 million acres) than any other major structural type (e.g., marsh, grassland, woodland, or forest) (CDFFP 1988). Yet these habitats have received little attention from wildlife ecologists and land managers. This treatment undoubtedly is due to the perception that the economic value, species diversity, and endangerment of shrubland wildlife is low. Nonetheless, human activities have affected shrublands for over a century.

The most obvious impact has been habitat loss due to agricultural and urban development. Other activities have had more subtle, but still potentially damaging effects. For example, decades of fire suppression have caused a heavy accumulation of fuels (Biswell 1989), controlled burning in late winter and early spring has shifted the timing of fire in chaparral, and livestock

grazing in desert scrub has altered plant species composition (Wagner 1978). The scale of these changes can vary from a few acres (e.g., mineral extraction) to hundreds of thousands of acres (e.g., fire suppression, livestock grazing).

Soulé et al. (1988), working in San Diego County, have documented a previously unreported factor affecting shrubland birds in California—habitat fragmentation, generally by housing developments, followed by local extirpation of isolated populations. They observed that some native birds are lost as patches become isolated and vegetation is altered. The probability of localized extinction depends on the size of remaining patches, distance to other patches, and time since fragmentation. One of the birds that Soulé et al. (1988) found susceptible to local extinction was the California thrasher.

Our objective in this paper is to examine the status and potential threats to the four *Toxostoma* thrashers that breed in California. This review is based on existing literature and unpublished data collected by the authors on the distribution, population status, and life history characteristics of these thrashers. This analysis is timely in light of the fragmentation effects documented by Soulé et al. (1988) on California thrasher and because the other three species are classified as Species of Special Concern by the California Department of Fish and Game (CDFG 1991). Each of us has field experience with at least one of these thrashers [Crissal (W.F. Laudenslayer),

California (A.S. England), Bendire's (A.S. England and W.F. Laudenslayer), and Le Conte's (San Joaquin Valley—S. Fitton and L. Saslaw and deserts A.S. England and W.F. Laudenslayer)]. We also are or have been directly involved with management activities that affect thrasher habitat.

THREATS TO THRASHER HABITAT

California Thrasher

California thrashers are widespread in the lowlands and foothills of cismontane California in a variety of habitats, similar in that all have a dense and continuous shrub cover (Grinnell 1917). They are primarily found in chaparral and some river bottom thickets, but also in 'informally kept gardens' (Grinnell and Miller 1944:351). The primary threats to the habitat of California thrashers are urbanization, conversion to agriculture, and the resulting fragmentation from these events. Soule et al. (1988) have documented that California thrashers are extirpated from small patches of habitat isolated by urban development in southern California. The interaction between wildfires and habitat fragmentation has not been studied directly, but the combination could eliminate this species from patches that might otherwise support populations. For the first 2-3 years following a fire, California thrashers are either eliminated or their numbers are severely depressed (A.S. England, unpublished data, Moriarty et al. 1985). Population recovery begins approximately five years after a fire but does not reach peak abundance until after 20 years. Thus, an isolated population could be eliminated unless recolonized from another site.

California thrashers may persist in developed areas where some native vegetation is retained or where dense, non-native shrubbery compensates, to some extent, for the loss of larger tracts of suitable habitat (Grinnell and Miller 1944, W.F. Laudenslayer, pers. obs.). The birds also do not show any 'aversion to lawns and other open spaces' adjacent to dense shrubs (Woods writing in Bent 1948:407). Thus, developed areas adjacent to isolated fragments of native habitat could become more suitable for the species as landscaping matures.

Le Conte's Thrasher

This thrasher is widespread in the Mojave and Colorado deserts but in the San Joaquin Valley is now restricted to only a small portion of its former range (Figure 1). In the deserts, it is found in open desert scrub, alkali desert scrub, and desert succulent shrub, as well as Joshua tree (*Yucca brevifolia*) dominated habitats (Sheppard 1970). In the San Joaquin Valley, it is found primarily in habitats dominated by saltbush (*Atriplex*

polycarpa) (Grinnell and Miller 1944, Sheppard 1970; S. Fitton and L. Saslaw, unpublished data). They often frequent desert washes and flats with scattered bushes and areas of open sandy, alkaline soils (Grinnell and Miller 1944), or gypsum soils (S. Fitton and L. Saslaw, unpublished data).

The habitat of this species has been altered by conversion to agriculture, urbanization, oil, and gas development, fire, and heavy livestock grazing. Agricultural development has severely reduced the distribution of suitable habitat in the San Joaquin Valley and has fragmented the remaining suitable habitat (Fig. 1). Heavy livestock use in the San Joaquin Valley during droughts may also have substantially altered the character of the remaining thrasher habitat, thereby reducing the canopies of large shrubs used for nesting and reducing the litter in which birds forage (S. Fitton and L. Saslaw, unpublished data). Fire has also eliminated or fragmented the saltbush community. These same types of impacts have also occurred in desert habitats occupied by Le Conte's thrasher, but the extent of losses appears to be considerably less relative to available habitat than those taking place in the San Joaquin Valley. Urbanization has also been an important factor in habitat loss in the Antelope, Mojave River, and Coachella Valleys (K.L. Garrett, pers. comm.).

Crissal Thrasher

This thrasher is found in desert riparian and desert wash habitats where dense thickets of shrubs or low trees screen the ground (Grinnell and Miller 1944). Characteristic shrubs include mesquite (*Prosopis* sp.), desert ironwood (*Olneya tesota*), catclaw acacia (*Acacia greggii*), willows (*Salix* sp.), sagebrush (*Artemisia* sp.) (Grinnell and Miller 1944), and thickets of the exotic salt-cedar (*Tamarix* sp.) where mixed with mesquite (Hunter et al. 1988). Soils tend to be of loose sand or alluvium (Grinnell and Miller 1944).

In California away from the Colorado River, Crissal thrasher is restricted to small patches of habitat often isolated from other suitable habitat such as washes within pinyon-juniper woodlands (e.g., Clark Mountain in the eastern Mojave Desert). Large portions of suitable habitat in the lower Colorado River Valley have been converted to agriculture. Livestock grazing and off-highway vehicle use may present problems to this bird, but evidence is lacking.

Bendire's Thrasher

This thrasher breeds in habitats generally described as flat desert floor with clumps of cholla (*Opuntia* sp.) or yucca (*Yucca* sp.) (Grinnell and Miller 1944). In California, it is typically found in Mojave desert scrub

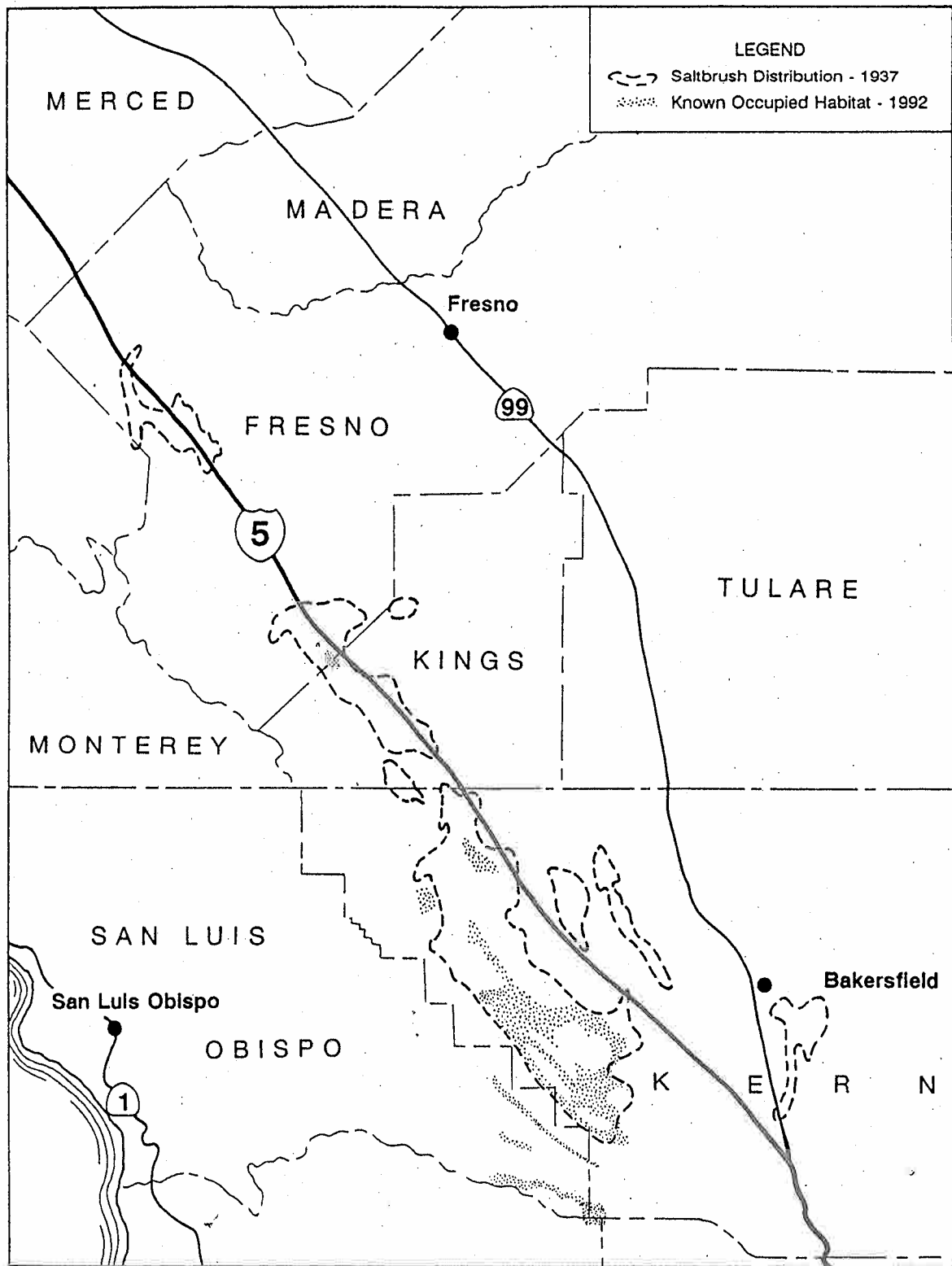


Fig. 1. Presumed historic (1937) Le Conte's thrasher habitat, based on the distribution of saltbush (*Atriplex polycarpa*) (Piemeisel and Lawson 1937), and known occupied Le Conte's thrasher habitat (1992) in the San Joaquin Valley (S. Fitton and L. Saslaw, unpublished data)

with a considerable ground cover of grasses and other annuals, and a variety of understory shrubs generally associated with Joshua Trees. These shrubs include Spanish Bayonet (*Yucca baccata*), Mojave Yucca (*Y. schidigera*), various species of cholla (*Opuntia acanthocarpa*, *O. echinocarpa*, or *O. ramosissima*) or other succulents, or junipers (*Juniperus* sp.) (England and Laudenslayer 1989).

In California, Bendire's thrasher is restricted to disjunct locations well isolated from one another (England and Laudenslayer 1989). Historically, the perceived threats within the California breeding range have included mining, yucca harvest, and livestock grazing. Mining continues today, but yucca harvesting, relatively common in the 1970s, now appears to be very limited. The total number of acres where yuccas have been removed for all purposes in the last 10 years lies somewhere between 2,000 to 4,000 acres (K. McMullan pers. comm.). Livestock use, at current levels, does not appear to be causing declines in thrasher numbers (Boyer and Wessman 1980).

DISTRIBUTION AND MOVEMENT PATTERNS

Highly vagile species are easily capable of long distance movements across areas of unsuitable habitat. Species with low vagility may not cross even a short gap to another visible patch of suitable habitat. A tendency to not move across unsuitable habitat is a life history trait that makes it difficult for recolonization to occur after a disturbance has eliminated an isolated population.

An examination of U.S. Fish and Wildlife Service records for the four species of *Toxostoma* thrasher under study revealed that (1) few individuals have been banded and (2) all recoveries have been in the same 10-minute block where the individual was originally banded. This latter observation suggests that California, LeConte's, and Crissal thrashers may have weak dispersal abilities; Bendire's thrasher is a migratory species. The following discussion briefly summarizes other existing information on the movement patterns of these species.

California Thrasher

This species is considered resident (AOU 1957, 1983), 'quite sedentary' (Garrett and Dunn 1981:282), and nonmigratory (Engels 1940), although McCaskie et al. (1979) state that they wander locally in winter. California thrashers are generally found in California north to Humboldt, Shasta, and Siskiyou counties west of the Cascades-Sierra Nevada axis and the deserts, and in northwestern Baja California. They are casual in southwestern Oregon around Medford (AOU 1983:573).

Extralimital records are known from Medford, Oregon (Roberson 1980) (but see information from AOU

1983 above) and the Palos Verdes Peninsula, Los Angeles County, Calif. (Garrett and Dunn 1981). However, the latter record may indicate a remnant breeding population, possibly extirpated, rather than a wandering bird (K.L. Garrett, pers. comm.). Historically, this thrasher was found in the Sutter Buttes (W. Anderson, pers. comm.) but they are no longer found there and may be unable to recolonize from nearby populations (Anderson 1983). The species has not been recorded from the Channel Islands even though extensive suitable habitat exists (Garrett and Dunn 1981). It has not been recorded on the Farallon Islands, where all the migratory members of the family Mimidae [northern mockingbird (*Mimus polyglottos*), gray catbird (*Dumetella carolinensis*), brown thrasher (*Toxostoma rufum*), Bendire's thrasher, and sage thrasher (*Oreoscoptes montanus*)] have been reported (DeSante and Ainley 1980, Pyle and Henderson 1991).

California thrashers also are generally not found on the deserts away from their 'limited breeding localities' (Garrett and Dunn 1981:282). Beedy and Granholm (1985) indicate that California thrashers are residents of the foothills and never migrate into the higher mountains. Vagrant California thrashers have not been reported from the lower Colorado River Valley (Rosenberg et al. 1991), Arizona (Monson and Phillips 1981), Utah (Behle and Perry 1975, Hayward et al. 1976), or the Great Basin (Ryser 1985). Soule et al. (1988) indicate that these thrashers persist in large, isolated canyons, but are found only in those small canyons that have been recently isolated, suggesting that birds do not easily move between habitat patches. Thus, the literature indicates that California thrashers are quite sedentary and their capacity to move even relatively short distances is extremely limited.

Le Conte's Thrasher

This thrasher is considered resident (Merriam 1895, Engels 1940, AOU 1957, 1983), and Sheppard (1970) reports that it is very territorial through much of the year. In California, it occurs in two disjunct geographic areas. Outside the Mojave and Colorado Deserts, it is found in the southern San Joaquin Valley of Kern County, and in Cuyama Valley and on the Carrizo Plain of San Luis Obispo and Santa Barbara Counties. Birds have also recently been found in the vicinity of Avenal, Kings County (Morlan and Erickson 1988), and elsewhere in the Kettleman Hills, Fresno County (Yee et al. 1990, S. Fitton and L. Saslaw, unpublished data). On the deserts, east of the Sierra Nevada, the range of the species extends north to Mono and Inyo counties, southern Nevada, southwestern Utah, and western and south-central Arizona south to northeastern Baja California and northwestern Sonora; and in west-central Baja California

Table 1. Average counts of birds from 10-minute point counts in chamise chaparral, Glenn County, California (1983-1985, A.S. England, unpub. data)

Time Since Last Burn and Species	Sample Size	Mean $\pm$ SE
Less than 5 years		
Wrentit	54	1.27 $\pm$ 0.20
California thrasher	54	0.20 $\pm$ 0.06
Sage sparrow	54	2.67 $\pm$ 0.29
Greater than 20 years		
Wrentit	20	3.05 $\pm$ 0.24
California thrasher	20	0.67 $\pm$ 0.10
Sage sparrow	20	0.76 $\pm$ 0.17

(AOU 1983:573). Le Conte's thrasher is possibly a resident or transient along the edge of the lower Colorado River Valley, but there are very few records from localities within the floodplain (Rosenberg et al. 1991). In California, Garrett and Dunn (1981) note that this thrasher has been found 'near Niland and Bard', Imperial County, 'which suggests at least a slight movement away from the breeding localities,' and near Moreno, Riverside County, which is 'clearly extralimital' (Garrett and Dunn 1981:282-283), but only a few miles west of known breeding localities in San Geronio Pass near Banning. In Arizona, 'a specimen from Union Pass between Kingman and Davis Dam may have been a vagrant or migrant' (Monson and Philips 1981:124). Le Conte's thrashers have not been recorded from the Farallon Islands (DeSante and Ainley 1980, Pyle and Henderson 1991), Northern California (McCaskie et al. 1979), the Great Basin (Ryser 1985), Texas (Arnold 1984), Oregon, or Washington (Roberson 1980). Le Conte's thrashers are generally resident, and the existing data suggest they do not regularly move long distances.

Crissal Thrasher

This species is considered resident (AOU 1957, 1983, Bradley and Deacon 1967, Rosenberg 1991). It is primarily sedentary, but some populations exhibit seasonal elevational movements (Engels 1940), and there is local movement between habitats (Bradley and Deacon 1967, Rosenberg et al. 1991). In Arizona, these thrashers are considered fall migrants (Monson and Phillips 1981), and the species is more plentiful in the Verde Valley, Arizona, in winter than in summer (Mearns 1886). Wauer (1973) reports that the species is a resident in

Table 2. Spring densities (pairs/40 ha) of thrashers and other common species in the Mojave and Colorado deserts of southern California (based on breeding bird surveys published in *American Birds* in 1977 and 1978).

Plot Type and Species	Mean $\pm$ SE
Plots with Bendire's thrasher (n=6)	
Ash-throated flycatcher	3.73 $\pm$ 0.74
Bendire's thrasher	1.70 $\pm$ 0.37
Black-throated sparrow	6.38 $\pm$ 1.86
Cactus wren	3.96 $\pm$ 0.52
Gambel's quail	2.83 $\pm$ 0.98
Mourning dove	10.77 $\pm$ 2.44
Plots with Crissal thrasher (n=9)	
Ash-throated flycatcher	11.45 $\pm$ 3.76
Black-tailed gnatcatcher	13.63 $\pm$ 3.16
Crissal thrasher	5.48 $\pm$ 1.21
Gambel's quail	27.66 $\pm$ 13.92
House finch	9.22 $\pm$ 4.46
Mourning dove	40.38 $\pm$ 15.90
Verdin	26.21 $\pm$ 4.02
White-winged dove	15.99 $\pm$ 7.21
Plots with Le Conte's thrasher (n=12)	
Ash-throated flycatcher	9.85 $\pm$ 2.89
Black-tailed gnatcatcher	9.32 $\pm$ 3.00
Black-throated sparrow	5.00 $\pm$ 1.54
Gambel's quail	19.75 $\pm$ 11.01
House finch	7.08 $\pm$ 3.48
Le Conte's thrasher	3.87 $\pm$ 1.60
Mourning dove	26.48 $\pm$ 11.84
Verdin	12.56 $\pm$ 4.07

summer and winter and a migrant exhibiting fall and spring movements, with post-nesting birds wandering into adjacent lowlands. There is a record from Furnace Creek Ranch (McCaskie 1988) and a fall record from Death Valley Junction (Garrett and Dunn 1981) but the authors do not indicate if the latter bird was a fall migrant, a juvenile, or if breeding habitat is nearby. No Crissal thrashers have been recorded from the Farallon Islands (DeSante and Ainley 1980, Pyle and Henderson 1991); the Great Basin (Ryser 1985), although Behle and Perry (1975) reported these thrashers as uncommon residents in southwestern Utah, as in Oregon and Washington (Roberson 1980). Crissal thrashers generally appear to be resident, but do exhibit a regular pattern of seasonal movements by some portion of the population.

Bendire's Thrasher

This species is the only migratory *Toxostoma* thrasher that breeds in California. It is known to breed from southeastern California, northwestern Arizona, southern Nevada, southern Utah, southeastern Colorado, and western and central New Mexico, south to central Sonora. Birds winter from southern Arizona and southwestern New Mexico south through Sonora to southern Sinaloa. Casual wintering birds are found north to central California and north-central Utah (AOU 1957, 1983). In California, breeding Bendire's thrashers occur in isolated populations (see figure 3 in England and Laudenslayer 1989). These thrashers are capable of extensive movement, having been recorded on the Farallon Islands five times (Pyle and Henderson 1991), as a vagrant in northern Utah (Behle and Perry 1975), as a rare and irregular visitor in winter and spring in the lower Colorado River Valley (Rosenberg et al. 1991); and numerous times, mainly in the fall, in coastal southern California (K.L. Garrett, pers. comm.). Bendire's thrasher is a relatively strong flier and capable of negotiating long distances in its migration. Thus, difficulties in invading or reinvading suitable habitat are more likely to be related to the probability of finding suitable habitat than to the capability of flying to such areas.

THRASHER DENSITIES

Considerable recent evidence from studies in conservation biology and island biogeography suggest that species occurring at relatively low densities are among the first to be locally extirpated after fragmentation (e.g., Pimm et al. 1988, Soulé et al. 1988). Thrashers are generally found at low numbers relative to other bird species inhabiting similar vegetation. In chamise chaparral (Table 1), mean California thrasher counts were 5-6 times lower than counts for wrentits (*Chamaea fasciata*) and over 10 times lower than sage sparrows (*Amphispiza belli*) in prime habitat for that species. Bendire's, Crissal, and Le Conte's thrashers also occurred at low densities relative to other common birds breeding on the same plots in the Mojave and Colorado deserts of southern California (Table 2). Le Conte's thrasher densities from near Maricopa in the San Joaquin Valley were 10 pairs per square mile (1.54 pairs/40 ha) (Sheppard 1970). These sites are thought to be areas of 'very high density' because, in most of the species' range, densities usually range from 0 to 5 pairs per square mile (0-0.77 pairs/40 ha) (Sheppard 1970:86). Since Sheppard's work in the late 1960s, densities in the San Joaquin have declined except in a few core areas (S. Fitton and L. Saslaw, unpublished data).

POTENTIAL FOR LOCAL EXTIRPATIONS OR ENDANGERMENT

California Thrasher

This species has a wide distribution, threats are relatively localized, and birds have a limited ability to use residential edges. Therefore, extinction of the species is unlikely for the foreseeable future. Because the species occurs at low densities and has low vagility, it is susceptible to localized extirpation resulting from population declines after habitat fragmentation. This impact has already been reported from southern California by Soulé et al. (1988), but should also be expected in other expanding urban zones such as the Sierra Nevada foothills and the San Francisco Bay Region. Additional information is needed on dispersal ability to determine whether developments such as major freeways or losses of riparian corridors might be effective barriers to movement.

Le Conte's Thrasher

For the same reasons as described for the California thrasher, extinction of this species is unlikely in the foreseeable future. Because of low vagility, susceptibility to habitat fragmentation, and habitat changes previously described, the amount of suitable habitat in the San Joaquin valley has been greatly reduced, and localized extirpation and isolation of subpopulations are likely to continue. Similarly, populations in the Antelope, Mojave River, and Coachella Valleys have probably suffered similar, undocumented declines. Additional data on distribution, habitat distribution, habitat preferences, and dispersal ability of desert populations is needed before the potential for fragmentation effects in the deserts can be evaluated.

Crissal Thrasher

This bird is widely distributed in the Southwest and appears to be capable of more movement than either of the species previously discussed. The risk of extinction of the species in California appears low. However, because it is found in small, isolated patches of habitat, localized extinctions could easily occur.

Bendire's Thrasher

Bendire's thrashers are capable of long-distance movements and reestablishment should local extirpations occur. This species occurs over an extensive range and, because of their ability to move across distances, the risk of extirpation in California is extremely low, and the risk of localized extinctions persisting through time is not expected to be high as long as the habitat is intact.

CONCLUSIONS

One of the tenets of modern conservation biology is the sound management and preservation of genetic diversity. Implementing this principle requires looking beyond the level of species to subspecies and populations. Taxa that are endemic to an area, especially of relatively small geographic extent, may also be subjected to higher probabilities of extinction. Many birds found in California and adjacent areas of Baja California exhibit a high degree of endemism. A review of the Subfamily Emberizinae (AOU 1957 and 1983) indicates that of the 20 species of towhees and sparrows that breed in the state, 10 (50 percent) have at least 1 endemic subspecies. Of the 60 subspecies that breed in California, 31 (52 percent) are endemic and represent 21 percent of the total number described for North America. This high degree of endemism reflects a high degree of genetic differentiation which may be related to low vagility. Even less is known about the detailed distribution and movement patterns of subspecies than is known about species.

A systematic review, survey, and monitoring of the California avifauna is needed to further identify the taxa with distributions, habitat requirements, life history characteristics, and potential threats that make them susceptible to endangerment. This program needs to be implemented quickly to preserve options as the human population of the state and areas necessary to support it grow.

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