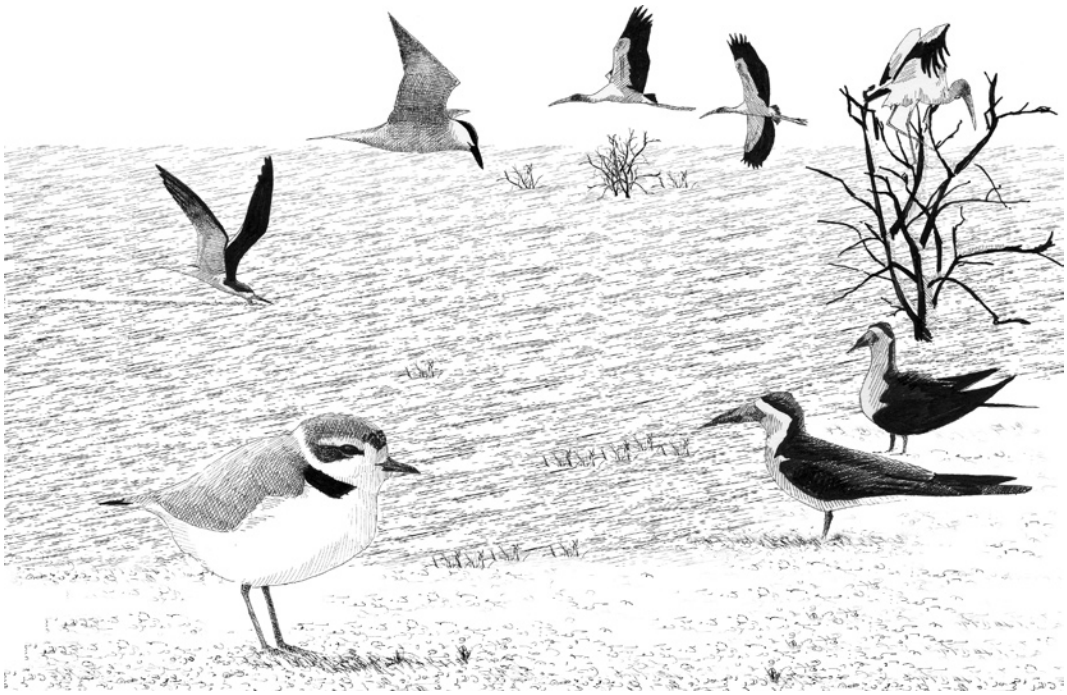
II

SPECIES ACCOUNTS



Andy Birch

PDF of Loggerhead Shrike account from:

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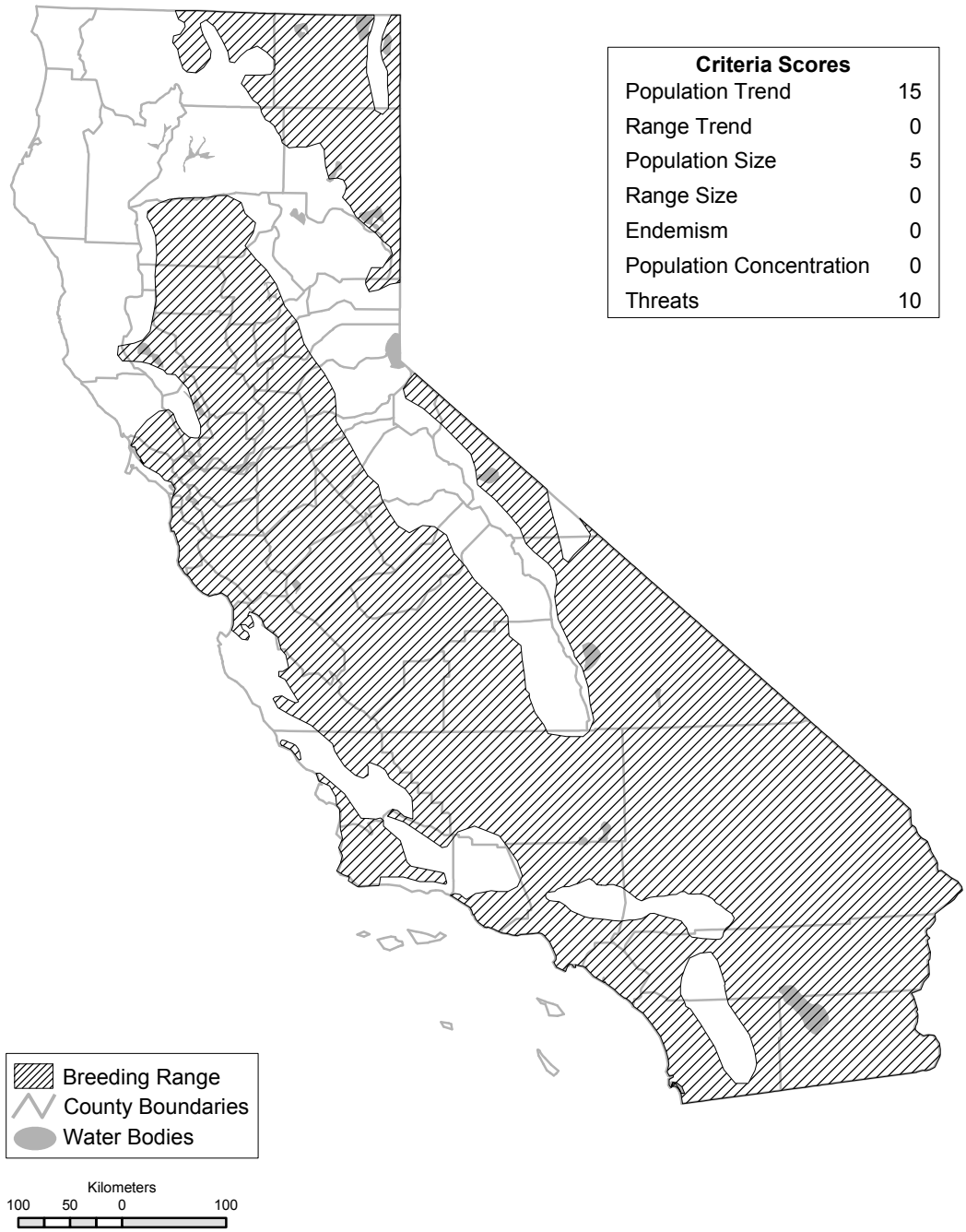
LOGGERHEAD SHRIKE (*Lanius ludovicianus*) (mainland populations)

Diana Humple



Breeding range of mainland populations of the Loggerhead Shrike in California. Although the outline of the overall range generally is stable, numbers have declined greatly and the species is nearing extirpation in broad areas of coastal southern California. Breeding populations in the north are migratory (entirely resident south of 39°), hence resident populations to south are augmented in winter, when some birds also occupy areas locally where none breed.

Special Concern Priority

Currently considered a Bird Species of Special Concern (breeding), priority 2. Not included on the original prioritized list (Remsen 1978), but the full species was included on CDFG's (1992) unprioritized list.

General Range and Abundance

Breeds in Canada in southern Alberta, Saskatchewan, and Manitoba; widely throughout the United States except portions of the Northwest, the Northeast, and higher elevations throughout; and in much of western Mexico (Phillips 1986, Howell and Webb 1995, Yosef 1996). Largest concentrations occur in areas of Texas and Louisiana. Winters throughout much of the United States, in portions of southern Canada (Sauer et al. 1996), and throughout much of Mexico (Howell and Webb 1995). Continent- and nationwide declines have been documented (Pruitt 2000, www.audubon.org/bird/cbc, Sauer et al. 2005).

Subspecies delineations have been much debated, with the number recognized ranging from 7 to 12 (summarized in Yosef 1996). Five subspecies occur in California. *L. l. excubitorides* is largely resident in southeastern California, *L. l. gambeli* is resident throughout much of state north and west of the range of *L. l. excubitorides*, and *L . l. grinnelli* is resident in coastal San Diego County. Island (*L. l. anthonyi*) and San Clemente (*L. l. mearnsi*) Loggerhead Shrikes are excluded from this account, which is restricted to mainland populations.

Seasonal Status in California

Present year round throughout most of the California range; breeds from as early as January or February in southern California to July (Unitt 2004, PRBO unpubl. data). Breeding populations in north and possibly elsewhere are migratory; other populations primarily resident (entirely resident south of 39º; Grinnell and Miller 1944, Yosef 1996). Wintering individuals augment resident populations and occupy nonforested areas locally where none breed (Grinnell and Miller 1944, Unitt 2004).

Historic Range and Abundance in California

Grinnell and Miller (1944) mapped the breeding distribution as most of the state except for the primarily forested coastal slope, the Coast Ranges, the Klamath and Siskiyou mountains of northwestern California, the Sierra Nevada and southern Cascades, and high elevations of the Transverse Ranges. Known nesting elevations ranged from –250 ft (–75 m, Death Valley) to 7500 ft (2300 m). They described shrikes as "common" to "abundant" and noted that the largest populations, at least of those west of the southern deserts, occurred in the San Joaquin Valley and in the south coast region. Grinnell and Wythe (1927) described the species as an "abundant" resident in the San Francisco Bay region, with lower numbers toward the coast. Willett (1933) likewise considered the species to be "abundant" in southern California from the coast to the base of the mountains.

Recent Range and Abundance in California

The overall breeding range currently remains similar to what it was in 1944 (see map), though birds have been extirpated locally, reduced in numbers by habitat loss, or documented nesting in some outlying areas where previously unknown. Breeding Bird Survey (BBS) data for California's mainland shrikes show a significant negative trend over the entire study period (1968–2004), reflecting a highly significant declining trend from 1968 to 1979 and relatively stable numbers from 1980 to 2004 (Sauer et al. 2005). Analyses of Christmas Bird Count (CBC) data documented a significant statewide decline from 1959 to 1988 (–1.3% annually; Sauer et al. 1996), which appears to have continued and to be accelerating in some regions (e.g., Hamilton and Willick 1996, Bolander and Parmeter 2000, Unitt 2004). Although Cade and Woods (1997) cautioned about possible problems with CBC data for this species, these trends for California are too strong to be ignored. Breeding abundance is highest in portions of the Central Valley, Coast Ranges, and the southeastern deserts

Breeding Bird Survey Statistics for California

1968–2004					1968–1979			1980–2004			All data from Sauer et al. (2005)
Trend	*P*	*n*	(95% CI)	R.A.	Trend	*P*	*n*	Trend	*P*	*n*	Credibility
–1.6	0.05	108	–3.2, 0.0	2.82	–7.5	0.00	75	0.4	0.71	94	Medium

(Sauer et al. 2005), and in winter throughout the San Joaquin Valley, the south-central and south coasts, and the southeastern deserts (Sauer et al. 1996).

Northeastern California. There has been an apparent increase in abundance in this region (BBS "trend map"; Sauer et al. 2005), though numbers can vary substantially by subregion. In shrub-steppe habitat in the Honey Lake basin, Lassen County, shrikes breed at a density of one pair per 61 ha (Humple et al. 2002), whereas in Sierra Valley, Plumas and Sierra counties, the species is a very rare breeder and not recorded most years at that season (W. D. Shuford pers. comm.). To the south in the Great Basin of Mono County, shrikes are "uncommon" breeders in the greater Mono Basin and Glass Mountain areas (Gaines 1992, Shuford and Metropulos 1996).

Central coast. Population declines have been observed in the San Francisco Bay region, including south of the bay (BBS "trend map"; Sauer et al. 2005), where oak savannah habitat in the foothills has been lost in recent years (CalPIF 2002). In southeastern Mendocino County, in 1981 a pair of shrikes nested in Crawford Valley between Hopland and Ukiah and another pair was present near Hopland (R. Keiffer in litt.); these outlying records have not been duplicated since. Loggerhead Shrikes are "uncommon" residents in Sonoma County, where numbers have been "considerably reduced" compared to their historic abundance (Grinnell and Wythe 1927, Stafford 1995, Bolander and Parmeter 2000), and they "maintain a tenuous presence" today in Napa County (Berner et al. 2003). Shrikes occur locally in Marin and San Mateo counties (Shuford 1993, Sequoia Audubon Society 2001). They are "uncommon" in Monterey County, especially from Greenfield south, and have declined seriously in the agricultural region of the Salinas Valley (Tenney 1993). Wintering numbers on San Francisco Bay area CBCs also have been reduced severely since the 1970s (Bolander and Parmeter 2000; R. Stallcup pers. comm.).

Central Valley. While overall abundance is relatively high in the Central Valley, BBS data show a significant decline throughout this region (Sauer et al. 2005).

Southern coast. In the early 1980s, shrikes were widespread residents throughout the open lowlands of the south coast region, though absent from heavily urbanized areas (Garrett and Dunn 1981, Unitt 1984), but they have been declining there since. They are "uncommon" to "rare" breeders and "uncommon to fairly common" winterers in Santa Barbara County (Lehman 1994). In Los Angeles County, shrikes have declined substantially on the coastal slope; though occurring fairly widely during breeding bird atlas surveys from 1995 to 2000, nesting is now known from only 2–3 localities per year on the coast and in the Los Angeles basin (L. Allen and K. Garrett pers. comm.). In Riverside County, shrikes have noticeably declined on the coastal slope both as a breeding and wintering bird (J. Green in litt.). In Orange County, they are "fairly common" in the remaining appropriate habitat on the coast and "uncommon" in the interior, with both areas showing declining winter trends on CBCs since the 1970s (Hamilton and Willick 1996). The loss of open and riparian habitat on the Santa Ana River is resulting in declines in the area (Gallagher 1997). Shrike populations are fragmented on the coastal slope of San Diego County, where a decline in numbers on CBCs since the 1980s "accelerated alarmingly" in the 1990s (Unitt 2004). Still, in winter the species occurs more widely than in summer, moving into many areas not occupied during the breeding season. BBS data suggest declines throughout the state's southern coastal region but not in the south-central region ("trend map"; Sauer et al. 2005). Likewise, CBC data reveal a precipitous decline in wintering numbers throughout the south coastal region (NAB 56:224), even in many undeveloped areas (Unitt 2004).

Southern deserts. Shrikes generally are much more numerous in the southern deserts than toward the southern coast. Surveys for the Los Angeles County breeding bird atlas in 1995–2000 found shrikes in almost every block in the Mojave Desert region of the Antelope Valley–Lancaster area (unpubl. atlas data). In Deep Canyon near Palm Springs, Weathers (1983) reported a density of about one pair per 20 ha. Unitt (2004) described shrikes as "uncommon" overall in San Diego County but most numerous in the Anza-Borrego Desert, where "widespread" both on the desert floor and in desert-edge scrub on the east slopes of the mountains. Patten et al. (2003) described shrikes in the Salton Sink as "fairly common" during the breeding season but "more numerous" in winter, when numbers of breeding residents are augmented by migrants from other regions. Status is similar along the lower Colorado River valley, where shrikes are considered "fairly common" breeders and "common" winter residents, and populations were apparently stable in recent years through the 1980s (Rosenberg et al. 1991). Regional BBS data show a significant

decline in the Sonoran Desert but no trend in the Mojave Desert (Sauer et al. 2005).

Ecological Requirements

In California, Loggerhead Shrikes breed mainly in shrublands or open woodlands with a fair amount of grass cover and areas of bare ground. They require tall shrubs or trees (also use fences or power lines) for hunting perches, territorial advertisement, and pair maintenance; open areas of short grasses, forbs, or bare ground for hunting; and large shrubs or trees for nest placement. They also need impaling sites for prey manipulation or storage, which can include sharp, thorny, or multistemmed plants and barbed-wire fences (Yosef 1996, Pruitt 2000). These requirements are met on the east side of the Cascades and Sierra Nevada in shrub steppe and, to a lesser degree, in Western Juniper (*Juniperus occidentalis*) woodland; on the coastal slope and Coast Ranges in chaparral, oak woodland, or oak savannah (Bolander and Parmeter 2000, L. Allen pers. comm.); locally in the Central Valley in riparian edges and (in the south) desert scrub; in the southeastern deserts in desert scrub and sparse riparian woodland (Rosenberg et al. 1991); and occasionally throughout in rural and agricultural hedgerows.

Loggerhead Shrikes hunt by perching on appropriate substrates and scanning the area, taking prey primarily from the ground but occasionally in flight, and often impaling prey for easier manipulation or for storage for later consumption (Craig 1978, Morrison 1980, Yosef 1996). Consequently, their foraging habitat requirements are similar in the breeding and nonbreeding seasons. The diet of Loggerhead Shrikes varies seasonally and includes arthropods (especially grasshoppers, crickets, beetles and caterpillars), reptiles, amphibians, small rodents, and birds (Craig 1978, Yosef 1996).

In sagebrush steppe in northeastern California, Loggerhead Shrikes are most common in Wyoming Sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and Big Sagebrush (*A. t.* ssp. *tridentata*) communities, and are less frequently encountered at higher elevations in Mountain Sagebrush (*A. t.* ssp. *vaseyana*; Humple et al. 2002). Densities are also high in this region in Greasewood (*Sarcobates vermiculatus*) communities (pers. obs.). In San Diego County, shrikes are found primarily in desert washes containing some trees or shrubs, or in areas with patches of mesquite (*Prosopis* spp.) or saltbush (*Atriplex* spp.), but are absent in areas of thick chaparral or forest (Unitt 2004). In the lower Colorado River valley, birds use appropriate agricultural areas during the nonbreeding season (Rosenberg et al. 1991), as in much of California.

Shrikes place their nests at variable heights above ground, generally 1 to 2 m (see Yosef 1996). In California, average nest heights are 0.95 m (n = 29) in sagebrush steppe in northeastern California, where Big Sagebrush is the most common substrate (PRBO unpubl. data), and 3.15 m (n = 12) in riparian habitat in the San Joaquin Valley, with willows (*Salix* spp.) the most common substrate (PRBO unpubl. data). In southern California, they nest in many substrates, especially thorny or spiny ones when available, but most commonly in mesquite (Unitt 2004). Shrikes will renest persistently after failure, and while generally thought to be single-brooded this appears to be highly variable between populations (see Yosef 1996 for summary).

Population limiting factors are complex (e.g., migratory versus nonmigratory populations) and not well understood. In general, it appears habitat loss and degradation play a role in shrikes' relatively low overwinter and postfledging survival (Brooks and Temple 1990, Yosef 1996, Pruitt 2000).

Threats

The threats responsible for shrike declines in California and the West are poorly understood (Pruitt 2000). Habitat loss, on breeding and wintering grounds as well as along migratory routes, is undoubtedly a major threat to the species. Loss of oak savannah, coastal scrub, and riparian habitats (CalPIF 2002, 2004; RHJV 2004) to agriculture that does not meet the ecological requirements of the species (e.g., vineyards, orchards, row crops) is a continued threat in many regions, as is habitat conversion from increasing urbanization. Exotic grasses and forbs introduced by livestock grazing pose the greatest threat to shrikes in sagebrush-steppe habitats in the northeastern part of the state; the presence of Cheat Grass (*Bromus tectorum*) often results in altered fire regimes by increasing fire frequency and sagebrush loss, and ultimately results in conversion from a shrub- to grassland-dominated landscape (Brooks and Pyke 2001). At an Oregon site, Humple and Holmes (2006) documented a 50% decline in a shrike population and a decline in nest survival after a fire destroyed much of the sagebrush cover. Increased fire frequency and resulting exotic grass invasion is also an increasing threat to desert-scrub habitats in the Mojave and Colorado deserts in the southern part of the state (Lovich 1998).

In some areas in North America, seemingly appropriate habitat is unoccupied (Cade and Woods 1997, Pruitt 2000, Unitt 2004, L. Allen pers. comm.), suggesting other limiting factors or a missing piece in our understanding of critical habitat features.

Diminished quality of winter habitat may be lowering overwinter survival in migrant populations (Brooks and Temple 1990, Yosef 1996, Pruitt 2000). Postfledging mortality appears to be high in most Loggerhead Shrike populations (see Pruitt 2000 for review), suggesting that this period might be limiting, but further study is needed.

Pesticides are considered by many to be a likely cause of shrike population declines, but evidence is mostly circumstantial and exact impacts are not understood. Shrikes have a diet of pure animal matter, making them more vulnerable to pesticide ingestion than most passerines (Kridelbaugh 1981, Stevenson and Anderson 1994, Pruitt 2000). Still, no effect on nesting success has been documented. Eggshell thickness was negatively correlated with DDE concentrations in Illinois (Anderson and Duzan 1978) but not in California, where there was no difference between eggs collected before or after the ban on DDT (Morrison 1979). Cadman (1985) noted that the greatest population declines in Canada were in agricultural regions, and Blumton et al. (1990) noted a correlation between widespread Loggerhead Shrike declines and widespread use of organochlorine pesticides from the 1940s to the 1970s. Organochlorines have largely been banned since the 1970s, suggesting that if it did cause a decline other factors prevented recovery. In a laboratory setting, there were direct effects of dieldrin on juvenile mortality and on the development of hunting skills; pesticide exposure may also lengthen postfledging dependency by inhibiting mental development (Busbee 1977). Additional studies have detected pesticide concentrations in shrikes or shrike eggs (see Pruitt 2000 for summary).

Fatalities from vehicle collisions may be threatening some already declining populations (Flickinger 1995). In Virginia, collisions were second to predation as a cause of winter mortality (Blumton 1989); in Texas, shrike numbers were overrepresented among roadside fatalities relative to their local abundance (Flickinger 1995).

Management and Research Recommendations

- Maintain and increase suitable habitat throughout the shrike's range for use during all seasons. For example, continue efforts to curb conversion of shrub steppe and desert scrub to exotic plant communities.
- Investigate the effects of altered fire cycles and exotic grass invasion on shrike habitat and populations in desert scrub and open juniper woodland.
- Examine effects of habitat fragmentation on Loggerhead Shrike populations (Yosef 1996, Pruitt 2000) in coastal scrub, chaparral, and other habitats incurring such pressure (e.g., effects on nest predation and site selection, effect of distance from parcels of continuous habitat on occupancy of fragmented or isolated habitat patches).
- Study the effects of pesticides (on breeding and wintering grounds) on nest success and adult and juvenile survivorship, and examine levels of contamination in eggs.
- Conduct studies on productivity, postfledging survival, and annual survivorship in relation to land use and habitat to help identify the life stages limiting populations.
- Conduct studies on wintering ecology, degradation of wintering habitat, and connections between breeding and wintering populations (e.g., through DNA studies, stable isotope analysis).

Monitoring Needs

The Breeding Bird Survey appears to sample shrike populations well in California, but data from additional, independent, off-road surveys (e.g., large-scale point counts) in areas not well covered by the BBS would be useful. The Christmas Bird Count also appears to provide good data on population dynamics for the shrike. However, Cade and Woods (1997) discussed potential problems with interpretation of these data. Hence, it would be good to establish a large-scale winter-season population monitoring project including the use of transects. Population declines would be better understood if additional monitoring programs focused on vital demographic rates were established.

The Loggerhead Shrike was recently chosen as one of 15 "transboundary/migratory species of concern" on a pilot Commission for Environmental Cooperation project, which, it is hoped, will result in more focused and increased conservation attention on this species in Mexico, the United States, and Canada (Pruitt 2000). Statewide, greater coordination is needed among biologists to compile and summarize data. As the

shrike is a California Partners in Flight (CalPIF) focal species for both sagebrush-steppe and desert habitats, researchers collecting data will soon be able to contribute to the CalPIF database (www.prbo.org/calpif/data.html), which serves as a repository for breeding status information for the state.

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