LOGGERHEAD SHRIKE
Lanius ludovicianus

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Management Status: Federal: USFWS Species of Concern
California: Species of Special Concern (CDFG, 1998)

General Distribution:

Loggerhead Shrikes are widely distributed across North America, from Alberta south to the Isthmus of Tehuantepec in southern Mexico, absent heavily forested areas in the Pacific Northwest and Canada, as well as much of the midwestern and northeastern United States (Yosef, 1996). The species departs northern areas in winter, with individuals remaining as far north as northern Nevada in the western United States. In the deserts of southern California there is a modest influx in winter, with breeding birds probably remaining resident (Grinnell and Miller, 1944).

Distribution in the West Mojave Planning Area:

This shrike is one of the most widely distributed vertebrates in the WMPA, although it is not truly common anywhere in the deserts. As the records compiled for this report suggest, the species is to be expected virtually anywhere in the WMPA except the centers of the largest and most barren dry lake beds. Distribution in the WMPA may be limited primarily by the presence of adequate nesting sites and foraging posts, and the degree and nature of local habitat degradation or augmentation by man. In some areas, adequately dense nesting substrate may be a limiting factor, as the species is well-known to use artificial plantings at ranchyards and roadsides.

Natural History:

Loggerhead Shrike is relatively well-studied among North American birds (Yosef, 1996), due to its wide distribution, interesting habits, and conspicuous nature. Studies of behavior and energetics are numerous, however most research in recent decades appears to have been conducted in the eastern United States, where population declines have been most severe (Yosef, 1996). The few published studies of the species addressing desert populations include Miller (1931); Reid and Fulbright (1981); Reynolds (1979); Peterjohn and Sauer (1995); Sauer et al. (1995); and Woods (1994, 1995a, 1995b); none of these include field studies in or close to the WMPA. Information on aspects of the species' biology as a whole has been compiled in Yosef (1996). Information below is from Yosef (1996) except as cited otherwise.

Adult Loggerhead Shrikes average about 1.66 ounces (47.5 g) in mass and 8.27 in. (210 mm) in total length. There are no thorough studies of longevity or survivorship, as efforts have been stymied by a lack of quantification of emigration and immigration rates.

This species is generally monogamous, with minor exceptions (Verner and Wilson, 1969; Haas and Sloane, 1989; Yosef, 1996). Egg-laying extends from early February through June, with a peak in April (Kiff and Irwin, 1987; Yosef, 1996). Nests are generally well-hidden in taller shrubs or low in trees, and often at a break in the landscape, such as at the base of slopes or edge

of a woodland or clump of trees (Bent, 1950; Yosef, 1996; pers. obs.). Mean nest height in several studies (see Yosef, 1996) ranged from 31-91 in. (0.8-2.3 m) above ground and probably reflects in part the local availability of plants of adequate density. Clutch size is typically 5 or 6 eggs (mode 6; mean 5.4), based on data sets from several large samples over a large area.

Limited published data appears to be available on when young become independent from adults, and the age of dispersal. Scott and Morrison (1990) noted that parental care on San Clemente Island lasted 50 days (SD 11.9 days; n=4), and young began foraging at approximately 30 days after hatching. In two mainland studies, the ability to kill vertebrate prey developed gradually, averaging 40 (Smith, 1972) or 41 days (Busbee, 1976). Banded juveniles are rarely recaptured in later seasons (Collister, 1994 cited in Yosef, 1996), and adult females appear to show much lower nest site fidelity than do adult males (Haas and Sloan, 1989).

Loggerhead Shrikes are opportunistic and generalist in diet, with prey items including primarily arthropods, and as available, a variety of small to medium-sized vertebrates (Miller, 1931; Yosef, 1992; Chapman and Castro, 1972; Reid and Fulbright, 1981; Scott and Morrison, 1995; Yosef, 1996). The majority of the diet in all or nearly all areas is invertebrates, but individual prey can also potentially exceed the shrike in mass (Balda, 1965). The importance of vertebrates in the diet in desert areas is not well-established, but may be critical at some seasons (e.g., Scott and Morrison, 1990, on San Clemente Island, California). The species is known to occasionally forage on carrion, including road kills (Anderson, 1976; Hayes and Baker, 1987).

Habitat Requirements:

Grinnell and Miller (1944) state of this species that, "chief requisites are open terrain with well spaced lookout posts, at least two feet high, from which moving animals -- insects or small vertebrates -- may be seen below on the bare ground or in short or sparse grass. Densely timbered areas and chaparral are avoided." Garrett and Dunn (1981) add that, "Loggerhead Shrikes are very widespread in open and semi-open habitats throughout the lowlands of the region. Often only very limited taller vegetation is required. There is some expansion into open agricultural areas in winter." The same habitat types are occupied all year.

Brooks and Temple (1990) and Yosef and Grubb (1994) have performed important habitat analyses. Both found that suitable hunting perches were very important. The latter study experimentally added wooden posts averaging 53 in. (135 cm) tall to shrike territories. Productivity rose and territory size decreased for those with perches added, compared with controls. The authors concluded that, "Areas to be managed as prime [Loggerhead] shrike habitat should include not only an appropriate prey base and nest sites, but also an abundance of hunting perches."

As the species is a food generalist (see Natural History), and many potential prey items (e.g., small lizards) are common and widespread in the WMPA, the prey base per se does not appear likely to be a limiting factor in most areas, although competition with certain other species that are increasing because of man may be a problem in desert areas (see Threats Analysis). There is anecdotal evidence that sufficiently dense nest sites at appropriate heights may limit the species' occurrence in desert areas during breeding (Yosef, 1996; pers. obs.), in contrast to more mesic areas, where the availability of fallow meadows and other open ground for foraging may be a limiting factor.

Population Status:

This species has declined precipitously in portions of eastern North America, and Breeding Bird Survey data indicate a significant negative trend in much of the west, including Mojave Desert areas (Peterjohn and Sauer, 1995; Sauer et al., 1995), but there is no specific information on total population size or trends within the WMPA. Based on existing information (e.g., Miller, 1931) along with observations gathered for this report, it appears likely that there is a slight seasonal increase in the total number in the WMPA in winter, compared with summer. Temple (1995) hypothesized that most shrike populations are limited outside the breeding season, and if so, conditions in the WMPA may be an important limiting factor for populations breeding elsewhere and wintering in or migrating through the WMPA.

Threats Analysis:

Yosef (1996) notes that, "the Loggerhead Shrike is one of the few North American passerines whose populations have declined continentwide in recent decades. Changes in human land-use practices, the spraying of biocides, and competition with species that are more tolerant of human-induced changes appear to be major factors contributing to this decline." Yosef (1996) mentions American Kestrel (*Falco sparverius*) and European Starling (*Sturnus vulgaris*) as potential competitors for food. Common Raven (*Corvus corax*) and the nonnative Old World rats (*Rattus* spp.) and House Mouse (*Mus musculus*) may also be potential food competitors in the WMPA, especially near dwellings. Interference competition is a potential issue with starlings, kestrels and other species, which harass or are harassed by shrikes.

The role of biocides has not been fully elucidated. Anderson and Duzan (1978) found thinning of eggshells in shrike eggs from southern Illinois, while Morrison (1979) found none in shrike eggs from California and Florida, however for both studies, sample size was very small (Klaas et al., 1974). It remains unclear how such potential eggshell changes, and various tissue levels of biocides, affect Loggerhead Shrikes.

Based on studies summarized in Yosef (1996), the primary causes of direct mortality appear to be: (1) inclement weather (mainly affecting nestlings and fledglings); (2) predation (many known predators, including raptors, native predatory mammals, and feral cats (*Felis cattus*); low nests and hunting posts, and frequent foraging bouts to the ground probably heighten their vulnerability, as does association with habitat edges, a trait in common with many predators); (3) and collisions with vehicles and other man-made objects (the species often forages at road edges). There is no evidence that shooting and other direct persecution are significant mortality factors in desert areas. Though the use of prominent perches may make this species vulnerable, the problem may be impossible to measure with any precision.

Other species of predators and generalists, such as American Kestrel and Common Raven, appear to have benefited from human alteration of the landscape in desert areas (Sauer et al., 1997; Boarman and Berry, 1995). Because they are known to take similar foods as do shrikes as well as taking fledgling songbirds, and ravens frequently depredate eggs (kestrel: Richards, 1967; Palmer, 1988; raven: Nelson, 1934; Engel and Young, 1989; Stiehl and Trautwein, 1991), these two species may compete with as well as predate Loggerhead Shrikes and their nestlings. Nest failure directly due to human disturbance, or indirectly by depredation from opportunistic species, has apparently not been documented. However it certainly occurs to some degree, given the

species' proclivity for ranchyards and other altered sites in the WMPA. Nest parasitism of shrikes by Brown-headed Cowbird is apparently quite rare (DeGeus and Best, 1991).

A final, potentially important issue is alteration of desert habitats through invasion by non-native plants, especially exotic grasses; in one Mojave Desert study, non-native Red Brome (*Bromus madritensis* ssp. *rubens*) accounted for 97% of the annual biomass total (Rundel and Gibson, 1996; pp. 312-314). Increased herb cover potentially decreases foraging efficiency, increases predation risk (if additional time is spent at or near the ground, especially by fledglings learning to hunt), and/or alters the prey base.

Biological Standards:

As noted above, there has been little or no formal study of Loggerhead Shrikes in the Mojave Desert. Thus population structure, size and trends in the WMPA are unknown during both breeding and winter seasons. As population trends based on Breeding Bird Surveys and Christmas Bird Counts in the western United States, and more specifically the Mojave, have been consistently and significantly negative over the last 30 years (see above), it is likely that the trend is similar in the WMPA. In addition, based on the information presented here in Threats Analysis, it is likely that continued alteration and development in the Mojave Desert by man will lead to additional declines.

Minimum management requirements in the WMPA should include the following five steps: (1) whenever feasible avoid removal of all dense, isolated trees and large shrubs (i.e., over 6 ft., or 2 m, tall), including non-native trees (unless replaced by suitable natives), as they provide nesting sites; (2) discourage use of biocides and other toxins or other intensive pest control within the WMPA, as this can both directly kill and cause nest failure (due to lack of food) in Loggerhead Shrikes; (3) all BLM and BLM-approved biological evaluations for projects and planning changes (e.g., road or other construction, changing land use such as grazing) should include an explicit evaluation of the impacts or benefits to this species, including cumulative impacts; (4) insofar as practical, limit disturbance to known, occupied shrike nests, including that from vehicles, until the species tolerance for such disturbance is clarified; and (5) maintain an ongoing database of sensitive species information for the WMPA, made available upon request by researchers.

In the short term, the primary conservation needs for Loggerhead Shrike in the WMPA are to halt and/or offset ongoing degradation of nesting and foraging habitat as a result of past and current land management decisions, and to address suspected mortality factors such as increased predation and vehicle strikes. In the longer term, it is vital to protect and properly manage the species' habitat through acquisition of sound information as a basis for sound land management decisions. Examples are the need for research to evaluate the influence of Common Raven population increases in desert areas on Loggerhead Shrike winter and breeding populations, and relative productivity and mortality under variable conditions of disturbance and habitat conditions, such as invading non-native plants.

Literature Cited:

Anderson, R.M. 1976. Shrikes feed on prey remains left by hawks. Condor 78:269.

Anderson, W.L. and R.E. Duzan. 1978. DDE residues and eggshell thinning in loggerhead shrikes. Wilson Bull. 90:215-220.

Balda, R.P. 1965. Loggerhead shrike kills mourning dove. Condor 67:359.

Bent, A.C. 1950. *Lanius ludovicianus excubitorides* Swainson: White-rumped Shrike. pp. 155-157 *In:* A.C. Bent (ed.), Life Histories of North American Wagtails, Shrikes, Vireos, and Their Allies. U. S. Natl. Mus. Bull. 197.

Boarman, W.I., and K.H. Berry. 1995. Common ravens in the southwestern United States, 1968-92. pp. 73-75 *In:* E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, and M.J. Mac (eds.), Our Living Resources, U.S. Dept. Int., Natl. Biol. Serv., Washington, D.C.

Brooks, B.L., and S.A. Temple. 1990. Habitat availability and suitability for loggerhead shrikes in the upper Midwest. Am. Midl. Nat. 123:75-83.

Busbee, E.L. 1976. The ontogeny of cricket killing and mouse killing in loggerhead shrikes (*Lanius ludovicianus* L.). Condor 78:357-365.

Chapman, B.R., and S.D. Castro. 1972. Additional vertebrate prey of the loggerhead shrike. Wilson Bull. 84:496-497.

Collister, D.M. 1994. Breeding ecology and habitat preservation of the loggerhead shrike in souteastern Alberta. Master's thesis, Univ. of Calgary, Calgary, Alberta.

DeGeus, D. W., and L.B. Best. 1991. Brown-headed cowbirds parasitize loggerhead shrikes: First records for family Laniidae. Wilson Bull. 103:504-506.

Engel, K.A., and L.S. Young. 1989. Spatial and temporal patterns in the diet of common ravens in southwestern Idaho. Condor 91:372-378.

Garrett, K., and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J., and A.H. Miller. 1944. The Distribution of the Birds of California. Pacific Coast Avifauna 27.

Haas, C.A., and S.A. Sloan. 1989. Low return of migratory loggerhead shrikes: winter mortality or low site fidelity. Wilson Bull. 101:458-460.

Hayes, F.E., and W.S. Baker. 1987. Loggerhead shrike feeds on a dead American coot. W. Birds 18:133-134.

Kiff, L., and D. Irwin. 1987. The breeding season of Los Angeles County birds. W. Tanager 53(7):4-5.

Klaas, E.E., H.M. Ohlendorf, and R.G. Heath. 1974. Avian eggshell thickness: Variability and sampling. Wilson Bull. 86:156-164.

Miller, A.H. 1931. Systematic revision and natural history of the American shrikes (*Lanius*). Univ. of Calif. Pub. in Zool. 38:11-242.

Morrison, M.L. 1979. Loggerhead shrike eggshell thickness in California and Florida. Wilson Bull. 91:468-469.

Nelson, A.L. 1934. Some early summer food preferences of the American raven in southeastern Oregon. Condor 36:10-15.

Palmer, R.S. 1988. Handbook of North American Birds. Vol. 5. Yale Univ. Press, New Haven, Connecticut.

Peterjohn, B.G., and J.R. Sauer. 1995. Population trends of the loggerhead shrike from the North American breeding bird survey. Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:117-121.

Reid, W.H., and A.J. Fulbright. 1981. Impaled prey of the loggerhead shrike in the northern Chihuahua Desert, New Mexico, Texas, USA. Southwest. Nat. 26:204-205.

Reynolds, T.D. 1979. The impact of loggerhead shrikes on nesting birds in a sagebrush environment. Auk 96:798-799.

Richards, G.L. 1967. Nest-robbing behavior of the sparrow hawk. Condor 69:88.

Rundel, P.W., and A.C. Gibson. 1996. Ecological Communities and Processes in a Mojave Desert Ecosystem: Rock Valley, Nevada. Cambridge Univ. Press, Cambridge, England.

Sauer, J.R., S. Orsillo, and B.G. Peterjohn. 1995. Geographic patterns in relative abundances and population trends of breeding and wintering loggerhead shrikes in North America. Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:117-121.

Sauer, J.R., J.E. Hines, G. Gough, I. Thomas, and B.G. Peterjohn. 1997. The North American Breeding Bird Survey Results and Analysis. Version 96.4. Patuxent Wildlife Research Center, Laurel, Maryland. Updated 29 July 1997.

Scott, T.A., and M.L. Morrison. 1990. Natural history and management of the San Clemente loggerhead shrike. Proc. West. Found. Vert. Zool. 4:23-57.

Scott, T.A., and M.L. Morrison. 1995. Opportunistic foraging behavior of loggerhead shrikes. Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:117-121.

Smith, S.M. 1972. The ontogeny of impaling behavior in the loggerhead shrike, *Lanius ludovicianus* L. Behavior 42:232-247.

Stiehl, R.B., and S.N. Trautwein. 1991. Variations in diets of nesting common ravens. Wilson Bull. 103:83-92.

Temple, S.A. 1995. When and where are shrike populations limited? Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:6-10.

Verner, J., and M.F. Wilson. 1969. Mating systems, sexual dimorphism, and the role of male North American passerine birds in the nesting cycle. Ornithol. Monogr. No. 9.

Woods, C.P. 1994. The loggerhead shrike in southwest Idaho. Master's Thesis, Boise State Univ., Boise, Idaho.

Woods, C.P. 1995a. Status of loggerhead shrikes in the sagebrush habitat of southwestern Idaho. Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:117-121.

Woods, C. P. 1995b. Breeding ecology of loggerhead shrikes nesting in sagebrush. Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:117-121.

Yosef, R. 1992. Loggerhead shrikes eat crayfish. Florida Field Nat. 20:75-76.

Yosef, R. 1996. Loggerhead Shrike (*Lanius ludovicianus*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 231. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C.

Yosef, R., and T.C. Grubb, Jr. 1994. Resource dependence and territory size in loggerhead shrikes (*Lanius ludovicianus*). Auk 111:465-469.