Loggerhead Shrike
(Lanius ludovicianus)

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Legal Status
Federal: Bird of Conservation Concern (USFWS Regions 1[a], 2, 3, 5, and 6) (USFWS 2002).
State: Species of Special Concern.

Global and State Conservation Status: G4S4: Global Rank, G4 = Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors; State Rank, S4 = Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors.

Recovery Plan: None.

Species Description and Life History

The loggerhead shrike (*Lanius ludovicianus*) is a medium-sized songbird (20-23 cm [8-9 in]) found throughout North America. Their distinctive gray and white plumage with black wings, tail, and mask are features that make them easily distinguished from other species, except for the similar Northern Shrike, a rare winter visitor to California. They are most often seen perched on telephone wires, barbed-wire fences, and isolated shrubs along pastures, grasslands, and agricultural fields. Shrikes are unique among songbirds in that they prey upon small birds and mammals (Yosef 1996, Humple 2008).

Seasonal Patterns

Seasonal patterns vary among loggerhead shrikes in different regions (Humple 2008). Throughout most of the southern portion of its range including California, the shrike is resident year round. Northern populations are migratory and may winter in California (Yosef 1996). The breeding season generally extends from February through July.

Reproduction

Loggerhead shrikes initiate their breeding season in February and may continue with raising a second brood as late as July. They often re-nest if their first nest fails or to raise a second brood. Females lay four to seven eggs and then incubate them for an average of 16 days. Nestlings remain in the nest for an average of 20 days and are fed by both parents. Brown-headed cowbird (*Molothrus ater*) brood parasitism rates are not well known or widely reported; however, because loggerhead shrikes are known to

aggressively chase cowbirds from nesting areas, parasitism rates may be lower than for other grassland/shrubland species (Yosef 1996).

Home Range/Territory Size

Shrikes are highly territorial and aggressive during the breeding season. In geographic locations where shrikes are resident, including the Central Valley, they usually live in pairs on permanent territories (Yosef 1996). Migratory populations establish and defend winter territories during the non-breeding season (Miller 1931; Smith 1973). Miller and Stebbins (1964) observed large territories of 12.1-16.2 ha (30-40 acres) while Yosef (1996) sites a mean territory size of 8.5 hectares (21 acres). Territories in California range from 4.4 ha (10.9 acres) to 16 ha (39.5 acres) (Miller 1931, cited in Yosef 1996) and are jointly defended by pairs during the breeding season, but during the fall these pairs disband and defend separate, although often adjacent, winter territories (Yosef 1996).

Foraging Behavior and Diet

In general, loggerhead shrikes prey upon large insects, small birds, amphibians, reptiles, and small rodents (*Microtus*, *Peromyscus*, and *Mus* spp.) (Yosef 1996, Humple 2008). In central California, however, they are primarily insectivorous (Craig 1978). Important groups of insects in the diet of shrikes in Florida included dragonflies and damselflies, beetles, true bugs, butterflies and moths, and grasshoppers and crickets (Yosef and Grubb 1993). Shrikes hunt from perches on electrical lines, fences, shrubs, and trees, and often return to these perches to impale their prey on barbed wire and thorns.

Unlike other birds of prey, shrikes have weak, non-raptorial feet and so must kill vertebrate prey by piercing the cerebral vertebrae with their specialized, hooked bills.

Habitat Requirements and Ecology

Nesting

Loggerhead shrikes occur in open landscapes characterized by widely spaced shrubs and low trees within a variety of plant associations, including arid shrublands, grasslands, savannahs, pasturelands, and farmlands. Trees and shrubs used for nesting generally share common characteristics of having dense foliage, and being bushy or thorny (Poole 1992, Brooks and Temple 1990). Shrikes usually avoid nesting in continuous hedgerows and riparian corridors, possibly in response to higher nest predation rates in those locations from scrub-jays, crows, magpies, and other species (Yosef 1996). Native shrubs are regularly used where available; Woods and Cade (1996) found the most nests (65%) in Idaho were constructed in sagebrush (*Atemisia tridentata*), as well as frequent use of bitterbrush and greasewood shrubs. CNDDB (2007) reports shrike nest sites from central and southern California occurring in willow (*Salix* spp.), coyotebrush (*Baccharis pilularis*), mule fat (*Baccharis salicifolia*), western juniper (*Juniperus occidentalis*), and unidentified ornamental shrubs. Suitable nesting sites in Yolo County include small

isolated native and ornamental trees along irrigation canals, roadsides, rural driveways, farmyards, feedlots, and rural residences. Nest tree selection appears primarily related to the amount of cover and protection the plant provides rather than the tree species. Shrikes will readily use ornamental shrubs and small trees if they provide sufficient protection (Porter *et al.* 1975, Gawlik and Bildstein 1990). Presence of foraging perches may also be important in nest site selection (Woods and Cade 1996).

Foraging

Shrikes use open habitats for foraging during both breeding and non-breeding seasons. The species is known to forage in open grasslands, pastures with fence rows, old orchards, mowed roadsides, cemeteries, golf courses, open woodlands, riparian areas, agricultural fields and desert and chaparral habitats (Unitt 1984, Yosef 1996). The number and heights of perch sites for hunting is important for the habitat suitability of shrikes, and preferred perch heights vary seasonally (shorter in winter or with shorter vegetation height) (Craig 1978, Yosef and Grubb 1994). Vegetation height in natural grasslands did not affect shrikes (Chavez-Ramirez *et al.* 1994, Yosef and Grubb 1994). The density of hunting perches in agricultural landscapes plays a strong role in determining the amount and suitability of foraging habitat, as shrikes forage within 10 m (33 ft) of perches (Yosef 1996).

A study of shrike predatory behavior in Yolo County found that shrike hunting activity varied during the day and varied seasonally with temperature and insect-prey activity levels (Craig 1978). The average rate of successful captures of prey (mostly insects) was a very high 65 percent of all attacks; however, efficiency was dependent on a minimum density of prey (Craig 1978). Because insects are "cold blooded" and shrikes relied heavily on finding moving prey, the colder temperatures in mornings and during winter were not conducive to insect and shrike hunting activity (Craig 1978). Insect availability is at its lowest in December, when shrikes have a high metabolic rate and are often physically stressed due to low caloric intake (Craig 1978). Changes in vegetation height may alter the availability of insect prey; however, one study found no significant differences between tall grass and mowed fields in shrike foraging success and territory size, and that shrikes altered foraging behavior to increase success in tall vegetation (Yosef and Grubb 1993).

Species Distribution and Population Trends

Distribution

Loggerhead shrikes are still common in much of the western United States but are extirpated from much of the eastern United States and are severely declining in the Midwest and Canada (Yosef 1996, Pruitt 2000, D. Easterla pers. comm.).

Loggerhead Shrikes were once widespread and generally common over North America, in grasslands, steppes, deserts, prairies, and agricultural landscapes (Yosef 1996.). The range of this species has contracted in eastern North America in recent decades, and

populations are generally diminished in many areas (Pruitt 2000). The current breeding range includes Alberta, Saskatchewan, and Manitoba; most of the United States except the Pacific Northwest; and Mexico. Northern populations are migratory; the winter distribution includes areas from northern California, northern Nevada, northern Utah, central Colorado, Kansas, western Missouri, northern Kentucky, and northern Virginia south through the southern United States and Mexico (Yosef 1996, Pruitt 2000).

In the foothills and lowlands of California, loggerhead shrikes are year-round residents or short-distance migrants of open, dry grasslands, farmlands, deserts, and shrub-steppe habitats. Only small, scattered populations currently occur in the metropolitan areas of southern California and the San Francisco Bay region. They do not occur along the coast north of Sonoma County, in the North Coast Range and other high mountain areas such as the Sierra Nevada and Transverse Ranges (Humple 2008); however, nesting has been documented to 7,500 feet elevation (Humple 2008), and where suitable open foraging habitat occurs at higher elevations in Yolo County, it is assumed that the species could occur.

Population Trends

The loggerhead shrike is common throughout much of California, but a decline noticeable by the 1980s in some regions has continued to the present time. Recently, Christmas bird count data and Breeding Bird Survey data have revealed an overall downward trend across the continent that appears to be related to alterations in habitat structure and loss of habitat as well as loss of pasturelands and increase in intensive row-crop agriculture (Cade and Woods 1997; Prescott and Collister 1993; Telfer 1992; Gawlik and Bildstein 1993; Smith and Kruse 1992). Since the 1980s, breeding populations have greatly declined along the California coast (Humple 2008), where shrikes have been eliminated from many areas in Los Angeles and Orange Counties (D. Cooper pers. comm.). Conversion from native grasslands to agriculture may have contributed to early declines (Walk 2006), and more recently, conversion of grasslands, pasturelands, and agriculture to suburban/urban development may be the main factor causing the declines in some regions, but direct causes of the range-wide declines across North America are not well understood. Although California still has a large loggerhead shrike population, development pressures and recent population trends in North America suggest that the species may be subject to population declines in California during the next few decades (Humple 2008).

Distribution and Population Trends in the Plan Area

Loggerhead shrikes are commonly observed in Yolo County; however, because they are relatively common and because their nests sites are difficult to detect, the species is underreported during the breeding season in Yolo County and throughout California. CNDDB reports only 19 breeding occurrences in the state, none of which are from Yolo County (CNDDB 2007). The UC Davis Museum reports several sightings within Yolo County, both recent and historic (UC Davis Museum 2007). In the Natomas Basin, immediately east of Yolo County, biological effectiveness monitoring for the Natomas

Basin Habitat Conservation Plan reports numerous breeding and non-breeding season occurrences of shrikes, including two to five nest sites each year since 2004 (Jones & Stokes 2007), all associated with agricultural habitats.

In Yolo County, loggerhead shrikes occupy grasslands, pasturelands, and farmlands. While considered fairly common in the lowland and foothill areas of the county, there is no reliable information on nesting distribution or nesting density in the county. Shrikes are also considered fairly common during the non breeding season with up to 274 birds counted in one day during the 2004-2005 Sacramento and Putah Creek Christmas Bird Counts (about one-half of these count areas are in Yolo County).

Threats to the Species and Other Conservation Issues

Displacement of habitat through urban development is a primary concern in portions of the Sacramento Valley. In addition, while the loggerhead shrike is thought to be generally tolerant of human harassment, human disturbances resulting from ongoing encroachment can result in abandoned nesting attempts (Yosef 1996). Sources of mortality include vehicle collisions; poisoning by agricultural pesticides; and predation of nestlings and adults by jays, magpies, crows, and other nest-robbing birds, sharp-shinned and Cooper's hawks, snakes, and carnivorous mammals (Walk 2006, Humple 2008).

Agricultural practices can also affect the availability of habitat and cause direct and indirect mortality (Yosef and Deyrup 1998). Conversion from suitable grassland, pastureland, and hay/row/grain crop agriculture to vineyards and orchards reduces available foraging habitat (Humple 2008). The removal of trees and shrubs along field borders and roadsides reduces available nesting habitat and possibly access to some agricultural foraging habitats. The spraying of pesticides reduces insect prey, and the spraying of herbicides can affect the survivability of isolated trees and shrubs in agricultural habitats. A study of the effect of spraying the common fertilizer, sodium ammonium nitrate, on cattle pastures concluded that the foraging territories of shrikes increased on average to 138% of a control group and the survivorship of eggs, nestlings and fledglings as well as adults was reduced (Yosef and Deyrup 1998).

The overall effect of population-level threats (e.g., habitat loss or pesticides) is of much greater concern than sources of individual mortality (e.g., predation or vehicle collisions), as these former forces operate at a population, regional, or range-wide level.

Although the role of pesticides in the species' decline has been investigated in Canada and the eastern United States, there is no information on pesticide effects on shrikes in California. Pesticides not only eliminate much of the insect prey base but also may cause eggshell thinning and toxic effects on adult shrikes (summary in Yosef 1996). A study of shrikes in natural grasslands in Texas found that, in contrast to agricultural landscapes, manipulating perch densities and vegetation heights had no effect on shrikes (Chavez-Ramirez *et al.* 1994). These results indicate that management for shrike habitat should differ between grasslands and agricultural fields (Chavez-Ramirez *et al.* 1994). The relationship between pesticide use and the availability of suitable insect prey during

different seasons in different agricultural crops and grassland habitats is not fully understood and may have strong effects on shrike physical condition and survivorship.

The status and current population trends of the loggerhead shrike have not been documented in Yolo County. Surveys should be conducted to determine the population size and status in the Capay Valley, Dunnigan Hills, Central Valley and the Yolo Bypass ecoregions. It is not known if a lack of nest sites (isolated shrubs and small trees) is limiting the species' population size in these ecoregions; however, establishment of trees and shrubs along fencerows, field borders, and roadsides where they are currently lacking would enhance the potential for population expansion in Yolo County. Movement patterns of shrikes in Yolo County are unknown, including the percentage of individuals migrating to the county in winter and the percentage of individuals that are year-round residents of the county. Because the dispersal distances of young birds are not known, the contribution of nest success of local breeders to local population trends is also unknown.

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