Central Valley Winter Raptor Survey (2007 – 2010): Loggerhead Shrike Habitat Associations

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While conducting the Central Valley (CV) raptor surveys (Pandolfino et al. 2011), we also recorded all Loggerhead Shrikes (*Lanius ludovicianus*) occurrences. This species could be considered an honorary raptor, as it preys on a variety of small vertebrates (birds, rodents, reptiles) and large insects. As an open country specialist, it is easily observed and deserves special attention due to the widespread population declines documented across North America (Morrison 1981, Peterjohn and Sauer 1995, Cade and Woods 1997), in California (Sauer et al. 1995, Humple 2008), and in the CV (Pandolfino 2008).

Loggerhead Shrikes use a variety of open habitats across their range, including grasslands, desert scrub, shrub-steppe, and open savannah (Yosef 1996). Habitat associations of this species have been studied in much of its breeding and wintering range, including Missouri (Kridelbaugh 1982), Virginia (Luukkonen 1987), Florida (Bohall-Wood 1987), New York (Novak 1989), South Carolina (Gawlik and Bildstein 1990 and 1993), Illinois (Smith and Kruse 1992), Arizona (Boal et al. 2003), and Mexico (Perez and Hobson 2009). We are aware of no prior studies of winter habitat associations of Loggerhead Shrike in the CV. Indeed, with the exception of work on the ecology of the San Clemente Island subspecies (*L. l. anthonyi*; see Collins 2008 and references therein), the only study of Loggerhead Shrike habitat use in California of which we are aware is a qualitative assessment of habitat types used in spring in Yolo County (Hampton and Yamamoto 2004). In his exhaustive review of taxonomy and natural history of North American shrikes, Miller (1931) included some anecdotal observations of Loggerheads in the grasslands and open agricultural lands of the San Joaquin Valley.

STUDY AREA AND METHODS

Survey methods are described in the accompanying overview and methods paper (Pandolfino and Smith 2011). We determined habitat associations by comparing the average density of Loggerhead Shrikes (birds per 40 ha block) in a given habitat type to the average density over all blocks. For each habitat type we determined the 95% confidence interval around the average density using the Data Analysis Package of Microsoft Excel. When the average density in a habitat type was significantly higher than the average density across all habitats, that habitat was considered preferred.

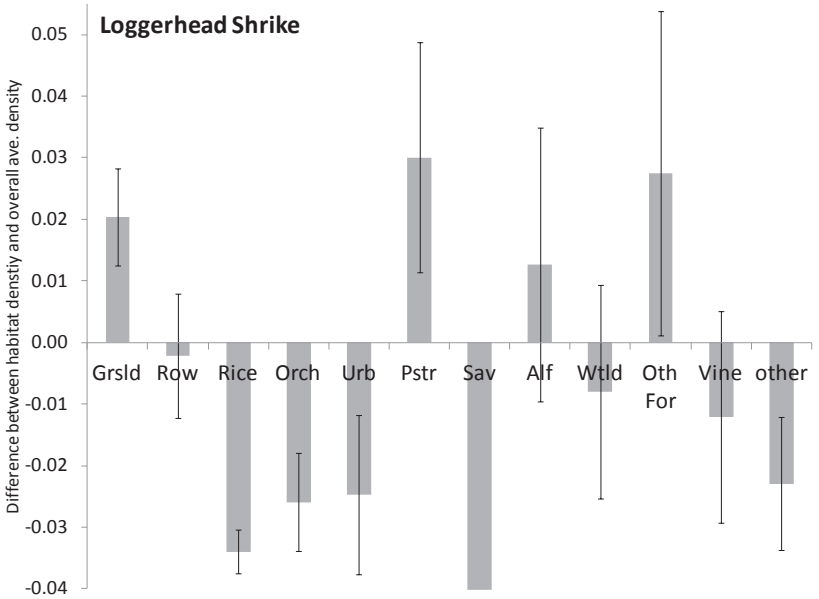

Figure 1. Differences between the density of Loggerhead Shrikes (birds per 40 ha block) in a various habitat types and the average shrike density over all habitat types. Error bars represent 95% confidence interval. (Grsld = grassland, Row = row crop, Orch = orchard, Urb = urbanized, Pstr = irrigated pasture, Sav = savannah, Alf = alfalfa, Wtld = wetland, Oth For = other forage, Vine = vineyard).

When the average density in a habitat type was significantly below the overall average, the habitat was considered to have been avoided.

RESULTS AND DISCUSSION

Loggerhead Shrikes preferred grassland, irrigated pasture, and other forage (mostly hay and winter wheat) and avoided rice, orchards, urbanized areas, and oak savannah. They also avoided the "other" habitat (a mix of habitat types present in small amounts). Most studies on habitat use by Loggerhead Shrikes have focused on the breeding season. Bohall-Wood (1987) observed no significant difference between breeding and wintering habitat, and banding data indicate that Loggerhead Shrikes are relatively sedentary in most of California (Miller 1931, Pandolfino 2008). Therefore, it is reasonable to assume that seasonal habitat requirements are similar, with the possible exception of the requirement for trees or shrubs to provide nesting sites in the breeding season (Yosef 1996).

The preference we observed for grassland, pasture, and hay (other forage) is consistent with prior studies both in winter (Bohall-Wood 1987, Bartgis 1992, and Gawlik and Bildstein 1993) and the breeding season

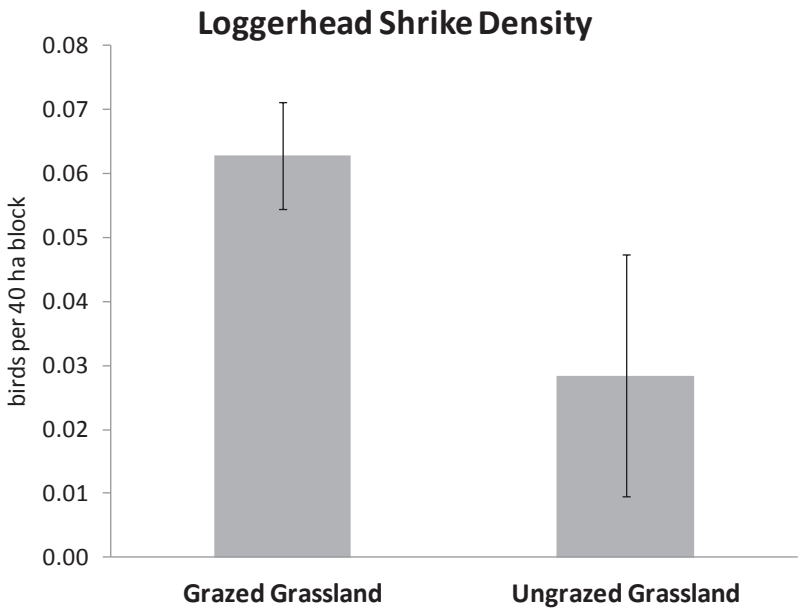

Figure 2. Comparison of density (birds per 40 ha block) of Loggerhead Shrikes in grazed and ungrazed grasslands. Error bars represent 95% confidence interval.

(Kridelbaugh 1982, Luukkonen 1987, Bohall-Wood 1987, Novak 1989, Gawlik and Bildstein 1990, Smith and Kruse 1992, Fornes 2004, and Walk et al. 2006). Avoidance of urban areas was also reported by Bohall-Wood (1987), Smith and Kruse (1992), Boal et al (2003), and Fornes (2004). No prior studies assessed habitat associations with rice or orchards. We found no significant preference or avoidance for row crops. Gawlik and Bildstein (1993) found that Loggerhead Shrikes used row crops most of all habitat types in winter in South Carolina, whereas Walk et al. (2006) found a negative association with row crops in the breeding season in Illinois.

We never observed a Loggerhead Shrike in oak savannah, in spite of surveying over 5,000 ha of this habitat three times per year over three winters across much of the CV (in Shasta, Tehama, Yuba, Placer, Sacramento, Merced, and Mariposa counties). This result is consistent with our personal experience in the CV and with results from CBC circles and Breeding Bird Survey routes in the area. During our surveys, most shrikes were found in pasture and hay fields in the southern Sacramento Valley, grasslands at the edges of the valley, or in grasslands with *Atriplex* shrubs in the San Joaquin Valley. While this species makes use of savannah habitats in other parts of its range (Bohall-Wood 1987, Yosef 1996), this does not seem to be the case in the CV.

The avoided other-habitat category includes many habitat types, but most support woody vegetation (oak woodland or riparian-dominated

blocks).This may explain the negative association, as Loggerhead Shrikes consistently avoid wooded areas in this and other studies (Bohall-Wood 1987, Smith and Kruse 1992, Gawlik and Bildstein 1993). Shrikes may be avoiding such areas because of higher predation risk from woodland raptors such as Red-shouldered Hawks or accipiters or to reduce competition with other species with overlapping prey preferences such as Western Scrub-Jays (Hampton and Yamamoto 2004).

Like three of the four raptor species that preferred grassland (Ferruginous Hawk, Rough-legged Hawk, and Prairie Falcon; Pandolfino et al. 2011), Loggerhead Shrikes also preferred grazed grassland over ungrazed grassland (Figure 2). This use is consistent with a number of studies showing that this species is more likely to choose areas with short rather than tall grass (Bohall-Wood 1987, Boal et al. 2003, Fornes 2004). Perez and Hobson (2009) found that resident shrikes in Mexico in winter were more likely to occupy areas of open ground and short grass than migrant shrikes, suggesting that was the superior habitat type.

Our findings suggest that conservation of Loggerhead Shrikes in the CV depends on retaining large areas of low intensity agriculture, including cattle ranching and forage crop production. This species showed a consistent preference for grassland and irrigated pasture, both of which are associated directly with cattle ranching. Forage crops such as alfalfa, hay, and winter wheat were used by shrikes and all are grown mostly in support of cattle ranching and dairy operations. The fastest-growing land uses in the CV, urbanization, orchards, and vineyards, were all avoided by shrikes. Therefore, there is some urgency to finds ways to support the continuing viability of less intense land uses in the CV.

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