



ECOLOGY OF WILLOW FLYCATCHERS (*EMPIDONAX TRAILLII*) IN THE SIERRA NEVADA, CALIFORNIA: EFFECTS OF MEADOW CHARACTERISTICS AND WEATHER ON DEMOGRAPHICS

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ABSTRACT.—Population declines in songbirds are often attributed to regional habitat loss and fragmentation caused by land-use practices, which might be further aggravated by climate change. These concerns are particularly evident in the Intermountain West, where riparian areas are considered a priority for conservation because of predicted reductions in winter precipitation and increases in spring temperatures. These climatic changes might increase the susceptibility of species reliant on riparian areas to regional extirpation from loss of habitat. The Willow Flycatcher (*Empidonax traillii*) is a California species of concern because of precipitous population declines in the past three decades. In 1997, we established a long-term research program to determine population demographics and the effects of weather events and regional-scale meadow distribution and vegetative structure on nesting success of Willow Flycatchers. We monitored territory establishment and reproductive success of 786 territories and 850 nests in meadows distributed south and north of Lake Tahoe, California, from 1997 to 2008. We documented near extirpation of Willow Flycatchers south of the lake and a declining trend in the number of territories north of the lake. Late-spring storms and low temperatures at the start of the breeding season reduced the length of the breeding season, affecting the ability of Willow Flycatchers to renest. Nest age better predicted nest survival than meadow-scale landscape and weather variables. Although weather parameters were not significant as a direct influence on nest survival analyses, our results suggested a weak negative relationship with increased snowfall. For our nest-scale model evaluation, over-nest vegetation concealment increased nest survival in large meadows but had little effect on nest survival in smaller meadows. Evidence from our dispersal data implied that Willow Flycatchers in our study regions had high natal- and breeding-site fidelity, which suggests that recruitment across these study regions might be limited. Given that we observed a declining population trend in the South Tahoe region, our results suggest that populations in the South Tahoe region may not rebound. Compared with a reference site that we established in 2003, where the population of Willow Flycatchers appeared to be stable, reproductive success was lower at our long-term sites. We suggest that differences in breeding-season length and the quality of habitat in meadows contributed to lower reproductive success and to the observed population declines.

Key words: California, *Empidonax traillii*, population change, reproductive success, Sierra Nevada, weather, Willow Flycatcher.

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