

LETTER

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AMERICAN KESTRELS ACTIVELY EXCLUDE EUROPEAN STARLINGS FROM USING A NEST BOX

KEY WORDS: *American Kestrel*; *Falco sparverius*; *European Starling*; *Sturnus vulgaris*; *competition*; *invasive species*; *nest box*.

Across North America, invasive European Starlings (*Sturnus vulgaris*) are known to compete for nest sites with native cavity-nesting birds, including the American Kestrel (*Falco sparverius*). An average of 62% of kestrel nest boxes in studies within human-dominated locations across North America (Lincer and Sherburne 1974, Craig and Trost 1979, Stahlecker and Griese 1979, Wilmers 1987) were occupied by starlings (Bechard and Bechard 1996). In Colorado, all nest boxes erected in farmland for American Kestrels were occupied by starlings (Stahlecker and Griese 1979). Koenig (2003) reported equivocal results of starling invasions on kestrel populations, demonstrating potential negative effects using Breeding Bird Survey Data, and positive effects using Christmas Bird Count data. European Starlings are also expanding their range in Mexico (Rodríguez-Estrella et al. 1997) and South America (Peris et al. 2005) suggesting that competition between American Kestrels and European Starlings might not be confined to North America.

The mechanisms by which European Starlings can usurp a nest cavity from American Kestrels seem to be persistence and vandalism (Pearson 1942). Starlings will dismantle the nests of competitors (Pearson 1942) and will re-nest even after researchers repeatedly remove their eggs and nesting material (Heusmann and Bellville 1978). Further, researchers have found broken eggs of American Kestrels under starling nests (Varland and Loughin 1993, Rohrbach and Yahner 1997). However, kestrel nests have also been observed on top of fragments of starling eggs (Varland and Loughin 1993).

The relationship between European Starlings and American Kestrels is further complicated by the fact that American Kestrels sometimes prey on European Starlings (e.g., Smith and Murphy 1973) and therefore one assumes that kestrels would have the advantage in a physical encounter. Koenig (2003) speculated that because of the kestrel's larger size, it was unlikely that it could be evicted by a starling. Despite the myriad studies of nest occupancy by populations of American Kestrels and European Starlings, there are few accounts of physical altercations regarding nest sites. Balgooyen (1976) observed seven aggressive encounters between American Kestrels and European Starlings in California, presumably regarding nest sites, and stated that American Kestrels "take easy command"

during those encounters. Although few details were given, Kohler (1915) reported that a pair of American Kestrels won a three-way encounter also involving a pair of Red-headed Woodpeckers (*Melanerpes erythrocephalus*), and three European Starlings. In contrast, Pearson (1942) presents a report of an observer witnessing a European Starling "whip and drive away a male sparrowhawk," suggesting that the outcome of physical encounters between the two species might depend on the individuals involved and the circumstances of the encounter. Weitzel (1988) observed starlings preventing kestrels from nesting in natural cavities in Nevada through "harassment and aggressive behavior." These published accounts of physical encounters between American Kestrels and European Starlings all describe encounters outside of the nest cavity and none report any grappling between the two species. Here, we present the first detailed account of a fight between a female American Kestrel and a European Starling inside a nest cavity.

The fight was recorded by the KestrelCam, a camera (BOSCH Flexidome NDI-50022-V3) within a nest box installed on the roof of the research library at the campus of the World Center for Birds of Prey in Boise, Idaho. The nest box was modified to include an opaque window on one side to improve lighting for the camera. The fight began at 19:13 H local time on 1 April 2014 and lasted 65 sec. The starling entered the box first and the kestrel entered 7 sec after it. The kestrel dominated during most of the encounter, staying on top of the starling for 46 sec (76%) of the fight and keeping the starling in its talons during the entire encounter. The starling was on top of the kestrel twice, although these events lasted only a few seconds each. The fight ended when the starling escaped and exited the nest box.

When the kestrel was on top of the starling, the kestrel mantled (Fig. 1), grasping the starling in its talons, and repeatedly trying to bite the starling's head or neck. The starling held its mouth open (Fig. 1) during the entire encounter and when the kestrel tried to bite the starling, the starling thrust its bill toward the kestrel's head. The two birds were face-to-face during almost the entire encounter.

We made other observations via our KestrelCam before and after the fight that put the competition for the nest box in context. American Kestrels successfully nested in this same box in 2013 without any observed interference from starlings. In 2014, European Starlings were first re-