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NEST-SITE COMPETITION BETWEEN THE EUROPEAN STARLING AND NATIVE BREEDING BIRDS IN NORTHWESTERN NEVADA¹

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Since the European Starling (*Sturnus vulgaris*) first became established in New York City in 1890 (Chapman 1906) the species has spread across all of North America. It eventually reached Nevada in 1947 (Ryser 1985) and was first reported breeding in 1956, at Jiggs, Nevada (Gullion 1956). By now the starling is a common breeding bird throughout Nevada. Despite its widespread occurrence, no studies have been made on this species' effects on the native breeding populations in the state. Here I report on nest-site competition between starlings and native birds in northwestern Nevada over a 10-year period.

STUDY AREA

The study was conducted on my own property 18 km south of Reno, Nevada, in the western foothills of the Virginia Range. The property measures 70 m × 50 m (0.35 ha) and is located in a west-facing canyon at an elevation of 1,500 m, where the desert floor merges with pinyon-juniper woodland. A perennial creek flows through the 91-m wide canyon, with dense riparian habitat on both sides of the creek, primarily Fremont cottonwood (*Populus fremonti*), black willow (*Salix nigra*), and white clover (*Trifolium repens*). The riparian vegetation gives way to open meadow on the north side of the creek and to pinyon pine (*Pinus monophylla*) and Utah juniper (*Juniperus utahensis*) on the south side. At the west end of the property are two dominant Fremont cottonwoods (13 m high), where most of the starling activity occurred. Fifty-five m to the east are my house, barns, and carports.

The property is surrounded by steep hills on all but the west side. The slopes are covered with pinyon pine-Utah juniper woodland with an understory of big sagebrush (*Artemisia tridentata*). This woodland is gradually replaced by a big sagebrush community on the west side of the property.

METHODS

Observations and counts of starlings and native birds on the property were made almost daily throughout the breeding season from 1978 to September 1987. Most observations were made from 06:30 to 08:15 and from 16:00 to 18:00 with additional observations at

various times. I made observations first with binoculars from my living room window, then walked to the two tall cottonwoods and observed from under the trees. Observation periods lasted an average of 1 hr.

RESULTS

Prior to 1978 starlings had never been seen on the study site, either by me or by Mrs. George Minor (pers. comm.), who was born on the property in 1900 and lived there until I purchased the land in 1978. In that year 14 pairs of native birds nested in the two dominant cottonwood trees, nine in cavities, and five in open nests (Table 1).

My first sighting ever of starlings on the property was in March 1978, when five solitary birds and two flocks of seven each entered the cottonwoods, remained in the vicinity for 3 days, then left the study area. The following year, in late February 1979, a flock of five starlings flew into the two dominant cottonwoods and two pairs began nesting activities in cavities. By mid-March the number of nesting pairs of starlings had increased to eight. At this time pairs of American Kestrels (*Falco sparverius*), Mountain Bluebirds (*Sialia currucoides*), Northern Flickers (*Colaptes auratus*), Olive-Sided Flycatchers (*Contopus borealis*), and two pairs of House Wrens (*Troglodytes aedon*) attempted to nest in the cottonwoods as in previous years. However, starling harassment and aggressive behavior caused all of these native species to abandon their nesting attempts. In April and May, one pair of Mourning Doves (*Zenaidura macroura*) and two pairs each of Tree Swallows (*Tachycineta bicolor*), House Sparrows (*Passer domesticus*), and House Finches (*Carpodacus mexicanus*) attempted to nest in the cottonwoods, but were displaced by starlings. None of these nine native species nested on the property in 1979.

The two cottonwoods, and an area up to 20 m in radius surrounding the trees, became an exclusive starling nesting territory and was vigorously defended by all the starlings. One pair of Killdeer (*Charadrius vociferus*), which had nested previously in the open meadow near the cottonwoods, was also driven off by the starlings and therefore abandoned nesting on the property in 1979. The starlings also drove off Lewis' Woodpeckers (*Melanerpes lewis*), Rufous-sided Towhees (*Pipilo erythrophthalmus*), and Western Bluebirds (*Sialia mexicana*). By June 1979, the number of nesting pairs of starlings was eight (Fig. 1) and the total starling count was 27 (Fig. 2).

The events of 1979 were essentially repeated over the next 4 years; native species were prohibited from

¹ Received 30 November 1987. Final acceptance 4 December 1987.

TABLE 1. Numbers of nesting pairs of birds on the study area from 1978 to 1987.

Species	Year									
	78	79	80	81	82	83	84	85	86	87
American Kestrel (<i>Falco sparverius</i>)	1	—	—	—	—	—	—	1	—	1
Killdeer (<i>Charadrius vociferus</i>)	1	—	—	—	—	—	—	1	1	1
Mourning Dove (<i>Zenaidura macroura</i>)	1	—	—	—	—	—	1	1	1	1
Northern Flicker (<i>Colaptes auratus</i>)	1	—	—	—	—	—	1	2	1	1
Say's Phoebe (<i>Sayornis saya</i>)	—	—	—	—	—	—	—	—	1	1
Olive-sided Flycatcher (<i>Contopus borealis</i>)	1	—	—	—	—	—	—	1	1	—
Tree Swallow (<i>Tachycineta bicolor</i>)	2	—	—	—	—	—	—	2	2	2
House Wren (<i>Troglodytes aedon</i>)	2	—	—	—	—	—	1	2	1	2
Robin (<i>Turdus migratorius</i>)	—	—	—	—	—	—	—	—	—	1
Mountain Bluebird (<i>Sialia currucoides</i>)	1	—	—	—	—	—	2	2	2	2
European Starling (<i>Sturnus vulgaris</i>)	—	8	10	10	10	12	—	—	—	—
House Sparrow (<i>Passer domesticus</i>)	2	—	—	—	—	—	2	3	2	3
House Finch (<i>Carpodacus mexicanus</i>)	2	—	—	—	—	—	1	—	2	2
Total pairs	14	8	10	10	10	12	8	15	14	17

nesting in the cottonwoods and failed to breed on the property (Table 1). By 1983 nesting pairs of starlings increased to 12 (Fig. 1), while the total number of starlings on the property increased to 38 (Fig. 2).

Interestingly in 1983, four pairs of the native species (Olive-sided Flycatcher, House Wren, Mountain Bluebird, and House Finch) began nest building under my eaves, in the carports, and in the open spaces between the barn ceiling joints. However, starlings again displaced these native species and two of these nest sites were utilized by starling pairs. The starling population had prevented any native species from breeding on my property for five successive years.

In February 1984, I began a systematic extermination of the starling population on my property by shooting individuals with a 20 gauge shotgun. In 1984, 29 starlings were removed. The shooting continued through September 1987, with a total of 47 starlings removed. Consequently native species resumed nesting and gradually rose to a total of 17 pairs in 1987 (Table 1).

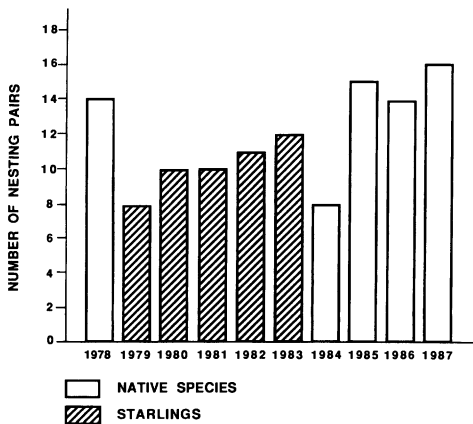


FIGURE 1. Number of native species and European Starlings nesting on the study area, 1978–1987.

DISCUSSION

In my study area the starling population had a profound detrimental impact on the nesting and breeding of native species of birds; specifically, nest-site competition was dominated by starlings. The surrounding pinyon-juniper-sagebrush offered few, if any, alternate nest sites, and to the best of my knowledge, these native birds did not nest from 1979 to 1983. Brush (1983) observed flycatchers, starlings, and other species competing for nest cavities, but the starlings had no effect on other species because abundant alternate nest sites were available. However, the potential for interference competition seems greatest in habitats where nest sites are limited, as was the case on my property. Smith (1975) found that starlings tolerated House Sparrows and yet displaced other species. Bent (1950) reported starlings to be serious competitors for certain native birds and yet sometimes nested near other species, with no appearance of antagonism. He also reported a starling nest 3 m from an American Kestrel's nest. However, in my study the starlings did not tolerate Amer-

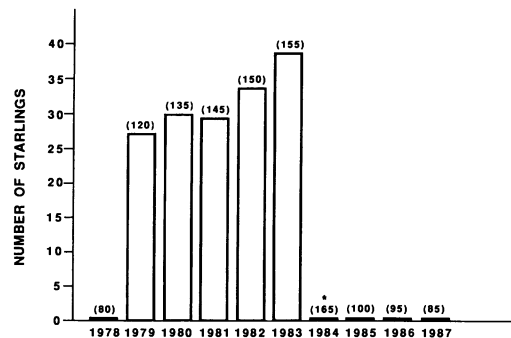


FIGURE 2. Maximum annual population counts on European Starlings living on my property, 1978–1987. (n) = no. of censuses. * = extermination of European Starlings began.

ican Kestrels. Kessel (1979) suggested that as starlings increase in interior Alaska, there will be some competition with local birds, primarily for nest sites. My study supports that suggestion.

In my study area, when starlings invaded a habitat with limited nest sites, all of the native species were displaced. This displacement continued for 5 years during which native species did not nest and were seldom seen. After extermination of the starling population, native birds returned to my property and resumed nesting as in years prior to the starling invasion.

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