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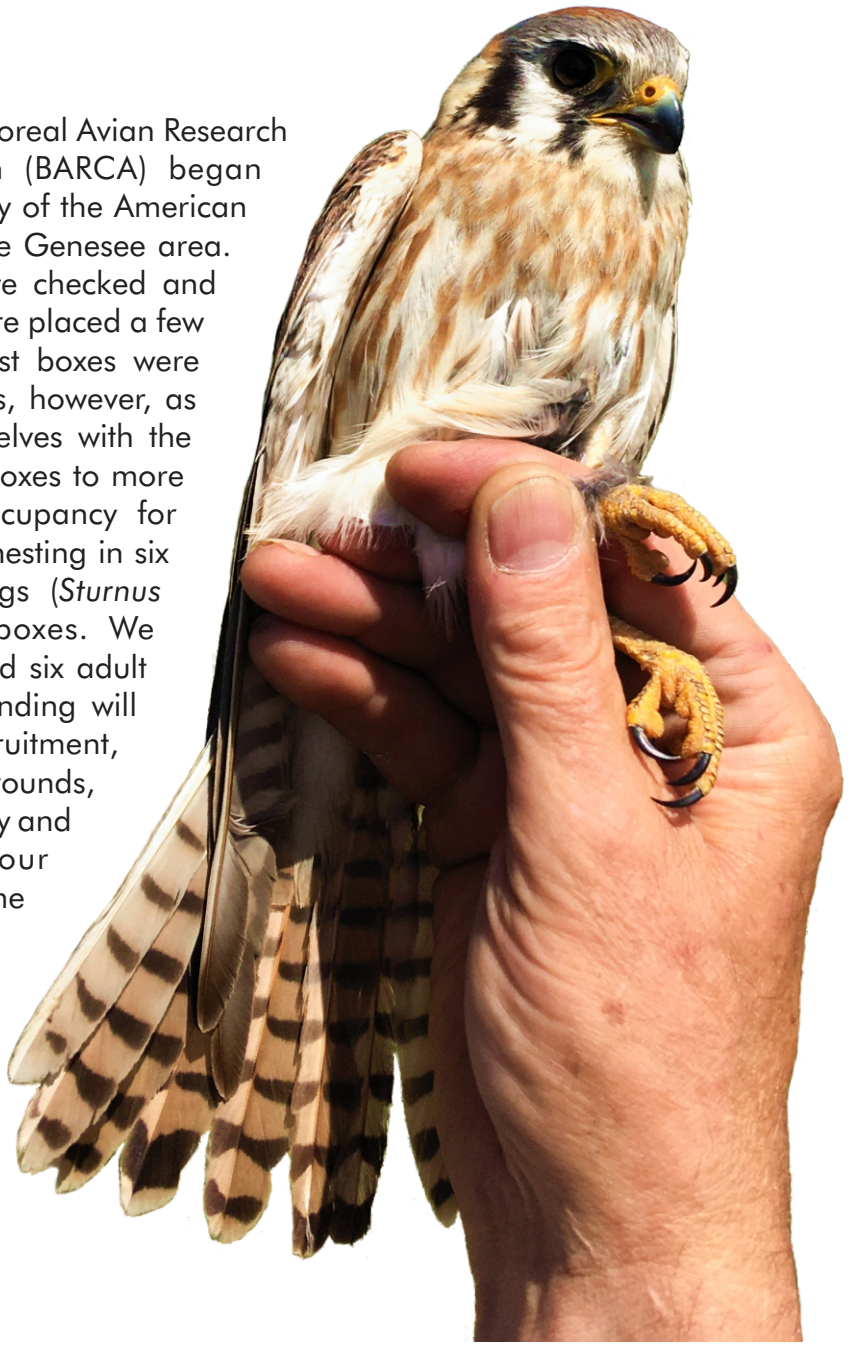
The breeding biology of the American kestrel (*Falco sparverius*) in the Genesee area

By Zoltan Domahidi and Rick Morse

Summary

In the 2021 field season, the Boreal Avian Research & Conservation Association (BARCA) began studies of the breeding biology of the American kestrel (*Falco sparverius*) in the Genesee area. Before the kestrels arrived, we checked and cleaned 20 nest boxes that were placed a few years ago. Most of these nest boxes were previously placed along roads, however, as we began to familiarize ourselves with the landscape, we moved some boxes to more suitable areas. Nest box occupancy for 2021 was 68%, with kestrels nesting in six boxes and European starlings (*Sturnus vulgaris*) occupying seven boxes. We managed to capture and band six adult kestrels and 15 nestlings. Banding will help us track longevity, recruitment, migration routes, wintering grounds, and other aspects of the biology and ecology of the kestrels. Four BARCA members dedicated time and expertise, performing 48 box checks during 100 volunteer hours. The first year results are very promising as the breeding kestrel population increased from two previously known breeding attempts to six.



Introduction

The American kestrel is a small falcon found throughout North America. Kestrels are primarily aerial hunters and require access to open grasslands or farmland with short vegetation and sparse trees. In these locations, they typically feed on large insects such as grasshoppers and dragonflies, however, kestrels will also prey on small mammals and birds (Ferguson-Lees and Christie 2001). As secondary cavity nesters, they often use abandoned woodpecker cavities to lay their eggs and raise young.

Although kestrels are considered to be one of the most abundant falconiform species in North America, research suggests that many populations are declining (Smallwood et al. 2009). One of the limiting factors for these birds is the availability of nesting sites (Smallwood and Bird 2002). Fortunately, kestrels readily accept fabricated wooden nest boxes (Breen and Parrish 1997). Placed in suitable foraging habitats which may lack nest sites, nest boxes can increase the breeding population size and be an effective conservation tool (Steenhof and Peterson 2009, Smallwood et al. 2009). Nest boxes also allow us to learn about the breeding biology of these birds: we can check trends in laying dates, clutch size, and nesting success. Additionally, by marking adults and nestlings with bands issued by Environment Canada's Bird Banding Office, we can track longevity, nest site fidelity, recruitment, migration routes, wintering grounds, and other aspects of the biology and ecology of this species.

Methods

Study Area

Situated in the footprint of the Capital Power Genesee Generating Station, the study area of approximately 100 km2 is a mosaic of agricultural land, forest patches, and surface disturbance created by the mining industry. The agricultural land consists of natural cattle pastures, annual crops, and hayfields (Figure 1). There is a considerable network of roads, although public access is limited to some areas.

Field Sampling

We checked 20 nest boxes suitable for American kestrels, placed mainly along roads. The boxes are made of 2 cm thick plywood with dimensions of 43 x 23 x 25 cm (height x width x depth). The entrance holes are 7.5 cm in diameter and placed 4 cm from the top of the front panel. Boxes were erected in 2016, but not checked regularly. Between March 19 and April 2, 2021, we visited each box location, cleaned the boxes, and moved those we considered to be in an unsuitable location for kestrels. We placed a 5 cm layer of wood shavings in the bottom of each cleaned box. For the 2021 breeding season, we monitored 19 nest boxes. Of these, 18 boxes were mounted on live trees and one box was placed on a disabled utility pole. We did not follow any pattern in hole orientation, but avoided the direction of the predominant WNW winds of the region. The average distance between boxes was 7.5 km, with the closest boxes being only 0.5 km apart.

Figure 1. Typical landscape of the Genesee area, selected for placement of nest boxes suitable for American kestrel (*Falco sparverius*).

From May to the end of July, we visited nest boxes to document the number of eggs and young. Boxes occupied by kestrels were visited at least three times. For broods with incomplete clutches at the first visit, we estimated laying dates based on a two-day laying interval. For complete clutches, we used the age of nestlings to estimate laying date based on a 28-day incubating period.

At each box, we attempted to capture the brooding adults. When successful, we marked each captured individual with a standard aluminum band issued by the Bird Banding Office, and we aged, weighed, and checked birds for molt pattern. We fitted all kestrel nestlings with aluminum bands and considered them fledged at 18 days or older. Nests were considered successful if at least one kestrel fledged. We aged young kestrels following information developed by Kulcsarits and Rushbuldt (2007). We measured reproductive success by collecting data on nesting effort (number of eggs laid), hatching success (number of eggs hatched), and fledging success (number of nestlings reaching 18 days).

Results and Discussion

The BARCA volunteers performed 48 nest box checks, for a total of 100 volunteer hours. Overall, nest box occupancy in 2021 was 68%. American kestrels used six boxes, while European starlings occupied seven; the remaining six boxes were unused (Figure 2). In one case, starlings occupied a box initially, but the kestrels evicted them and laid their own eggs among the existing starling eggs (Figure 3). Kestrel box occupancy was three times higher than previously registered in the study area. It is not uncommon that the provision of nest boxes in areas lacking natural cavities will result in the initial increase of a kestrel breeding population (Smallwood et al. 2009). This increase, however, can mask the decline observed in many kestrel populations that might become apparent after two-eight years (Smallwood et al. 2009), therefore a long-term monitoring program is needed to accurately assess population trends.

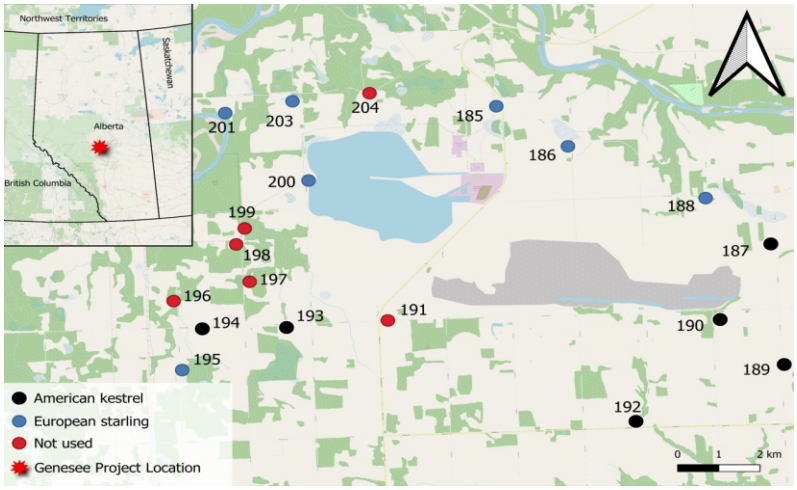


Figure 2. Next box (*n*=19) occupancy in the Genesee area in 2021. A box was considered occupied if at least one egg had been laid.

Figure 3. Eggs (blue) of European starling (*Sturnus vulgaris*), among those of American kestrels (*Falco sparverius*). The box was initially occupied by starlings and later taken over by kestrels.

The earliest date of nest initiation was May 19 and the latest was May 28. As laying intervals of one to three days can sometimes occur instead of the most frequent laying interval of two days (Sockman and Schwabl 2001), our estimates might vary by one or two days.

Kestrels laid a total of 28 eggs (4-5, n=6, average of 4.6 eggs/nest) and produced 15 young (Table 1), similar to numbers reported elsewhere (Strasser and Heath 2013).

TABLE 1. Breeding parameters at six nest boxes where at least one egg has been laid for American kestrel (*Falco sparverius*) at Genesee, Alberta, 2021.

Box Number	Nest initiation date	Fledging date	Eggs laid	Hatched young	Fledglings
187	23-May	9-July	5	5	5
189	19-May	9-July	5	3	3
190	19-May	NA	4	0	0
192	19-May	9-July	5	5	5
193	19-May	NA	4	0	0
194	28-May	24 July	5	2	2

Hatching success varied between pairs, with two pairs hatching all their eggs while another two pairs hatched none. Kestrels fledged all their young that hatched; all nest failures were in the incubation stage, consistent with results obtained in a nest box study conducted in Idaho, US (Strasser and Heath 2013). Human disturbance is one of the leading causes of nest failures (Strasser and Heath 2013), but it is too early to speculate on the cause of nest failures at the Genesee kestrel project.

On average, female nestlings (118.9 g) were slightly heavier than males (114.2 g) while the sex ratio between males and females was nearly 1:1. The closest distance between two occupied boxes was approximately 2 km. We recorded two such pairings, and in both cases only one of the boxes fledged young.

We captured and banded six adults at five boxes, and in one case managed to capture both the male and female. We also marked all 15 nestlings before they fledged. We will continue the monitoring and banding efforts to answer questions related to the breeding ecology of the Genesee kestrels.

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