

PROJECT TITLE:

Dispersal Characteristics of American Kestrels from Artificial
Nest Boxes in Urban and Suburban Habitats of Rogers County, Oklahoma

PRINCIPLE INVESTIGATOR:

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ABSTRACT:

The American Kestrel is a small falcon that inhabits most habitats from the Arctic Circle to most of the South American continent. It is a raptor of some importance relative to its carnivory on rodent populations. Declines in populations of American Kestrels have been attributed to competition for appropriate nesting habitat availability with non-endemic species of House Sparrows and European Starlings. These species are all cavity-nesting birds requiring natural cavities in anthropogenic structures, artificial nest-boxes, or natural cavities typically excavated by various woodpecker types. A propensity to roost and forage in urban and suburban habitats presuppose this species to population declines due to competition with non-endemics and to urban sprawl that consumes suitable forage areas. This study attempts to compare fledgling dispersal characteristics of Kestrels from artificial nestboxes in urban/suburban and rural habitats. Objectives of this project should also provide data on the importance of "green belts" or corridors of suitable foraging habitat in urban/suburban areas.

INTRODUCTION

The American Kestrel (*Falco sparverius*) is commonly known as the Sparrow Hawk. It is a small falcon about the size of a Blue Jay and is the smallest of all North American raptors. Their range occupies nearly all of North, Central and South America from the northern tree line in Canada to the southern tip of South America. It is a common winter resident throughout the state of Oklahoma and uncommon in summer (Baumgartner and Baumgartner 1992). Typical habitats are grasslands, arid and semi-arid rangelands, cultivated regions, and even suburban and urban habitats. Kestrel populations in more northern parts of the species' range migrate in winter and summer, but in more temperate regions Kestrel populations are less migratory (Varland 1992).

During breeding, Kestrels are monogamous with females selecting a single male from several 'suitors'. In Rogers County, Oklahoma nesting typically begins in mid-April and culminates with 4-6 young fledging by mid-June 28-30 days after hatching. They nest in abandoned woodpecker holes excavated in decaying trees, bank or cliff cavities, and anthropogenic structures in rural and suburban areas. Recent attempts to enhance nesting habitat has involved erecting artificial nest boxes especially in areas where Kestrels compete for nesting habitat with Starlings and House Sparrows. A scarcity of suitable nesting habitat is suspected as a limiting population factor for North American populations of American Kestrels (Cade 1982). Artificial nest-boxes have been noted to enhance breeding densities of other raptors (Newton 1979).

Kestrels require open country such as meadows, glades, hayfields, and pastures with short ground vegetation for foraging (Wargo and Smallwood 1997). The effects of a perceived loss of suitable nesting and foraging habitat to urban development and

sprawl are poorly studied. In this study I will attempt to evaluate dispersal characteristics of fledging young Kestrels in urban and suburban habitats in Rogers County, Oklahoma. Twenty-two artificial nest boxes are presently placed throughout Rogers County with 6 locations deemed as suburban or urban habitat. Four additional boxes will be placed in similar habitat to encourage nesting during the 2002 breeding season. It is not fully understood if dispersal from nest boxes by kestrels in urban and suburban habitats differ from dispersal in more open or rural habitats. Dispersal is defined by Wyllie (1985) as the movement of a fledged bird farther than 1 km from its nest without return. The intent of this study is to compare dispersal characteristics of fledglings from these contrasting habitats.

OBJECTIVES:

- 1) It is hypothesized that those individuals foraging in urban/suburban areas have to travel farther distances to locate suitable foraging habitat. Using radio transmitters we will determine if early dispersal flights during foraging bouts by fledglings from nest boxes in urban/suburban habitats, differs from individuals from nest boxes in rural habitats.
- 2) Competition for cavity nests between kestrels and introduced birds such as European starlings and House Sparrows is a limiting factor in kestrel populations. However, they still persist in small numbers in urban/suburban habitats. Most kestrel activity persists along corridors or “green belts” provided by railroad grades, trails, parks, and other recreational areas within

municipalities. Using radio transmitters we will determine if dispersal from nests in urban/suburban habitats require such corridors. This objective can ultimately provide pertinent information to city planners and developers who are sensitive to environmental impacts of urban sprawl.

- 3) Employers in the environmental/ecological market consistently pursue applicants with experience in field techniques including radiotelemetry. Methods conducted during this project will provide crucial field experience for students in Rogers State University's bachelor degree in Biology with an Environmental Conservation emphasis.

STUDY AREA AND METHODS

Fieldwork will take place in urban and suburban areas in the city limits of Claremore, Rogers County, Oklahoma and rural habitats within the same county. Six artificial nest boxes are currently located in the city limits and all have fledged young during at least one breeding season in the past six years (Table 1). Four additional nest boxes will be erected in the city limits in February 2002 prior to the start of the breeding season. All nest boxes will be monitored on a weekly basis beginning in mid-April 2002. When young are encountered they will be banded with U.S. Fish and Wildlife Service leg bands. As fledging age approaches, at least one young per clutch will be fitted with a back-mounted radio-transmitter. Radio-marked individuals will be tracked using hand-held Yagi antennae and receivers on a three-day rotational basis until contact is lost. Global Positioning Satellite (GPS) coordinates will be recorded and used

to construct dispersal patterns relative to corridors of appropriate urban/suburban habitats. Data to be collected relative to dispersal (urban/suburban vs. rural) will include: 1) age at dispersal, 2) distance dispersed, 3) dispersal logistics (GPS coordinates), 4) gender-specific dispersal times, and 5) dispersal time relative to hatching order. Depending on sample size, an ANOVA will be used to compare dispersal parameters between urban/suburban and rural nest boxes.

INSTITUTIONAL SUPPORT:

The Division of Mathematics and Science at Rogers State University currently owns three Yagi antennae (\$95.00 ea.), two TRX-1000S radio receivers (\$770.00 ea.) and one Falcon Five radio receiver (\$1489.00) from Wildlife Materials Inc. (Carbondale, Ill.) that are required for tracking transmitter frequencies. Banding and marking permits for American Kestrels are issued to the principle investigator from the U.S. Fish and Wildlife Service, permit number 21138-C valid until 11/30/2002. The proposed research project will be incorporated into an ongoing banding research project that has monitored nesting success in artificial nest boxes in Rogers and Cimarron Counties, Oklahoma from 1993-2000 (Table 1).

PROJECT ITINERARY

February 2002	Place new nest-boxes in appropriate habitat
April-May 2002	Monitor nesting/incubating activity

June 2002	Band and attach transmitters to selected young
June-July 2002	Track movement and dispersal of fledged young
Sept.-Dec. 2002	Perform appropriate ANOVA tests
Spring 2003	Report findings to research committee, Rogers State University

PROPOSED BUDGET: MATERIALS

- SOPB 2070 Radio Transmitters (12) – Wildlife Materials Inc. Carbondale Ill. \$1,404.00
- 51500 two-way Radio (2) – Gemplers, Belleville, WI. \$399.90
- 53877 Radio Charger – (1) Gemplers, Belleville, WI. \$64.95
- 100711 Magellan GPS 330 – (1) Ben Meadows Inc., Chamblee, Ga. \$249.99
- 100711 PC Cable/Power Adapter – (1) Ben Meadows Inc., Chamblee, Ga. \$39.95
- Total Budget Request: (does not include shipping) \$2,158.79

LITERATURE CITED

- Baumgartner, F.M. and M.B. Baumgartner. 1992. Oklahoma Bird Life. University of Oklahoma Press. Norman, Oklahoma. 443 pp.
- Cade, T.J. 1982. The Falcons of the World. Cornell university Press, Ithaca, New York. 192 pp.
- Newton, I. 1976. Population limitation in diurnal raptors. Canadian Field Naturalists 90:274-300.

- Varland, D.E. 1992. Establishing a Nest Box Program for American Kestrels Along an Interstate Highway. Iowa Department of Natural Resources Nongame Wildlife Program, Boone, Iowa. 7 pp.
- Wargo, P.J. and J.A. Smallwood. 1997. Nest-site characteristics of American Kestrels in a fragmented landscape. *New Jersey Academy of Science* 42:20-21.
- Wyllie, I. 1985. Post-fledging period and dispersal of young Sparrowhawks *Accipiter nisus*. *Bird Study* 32:196-198.

Table 1. Results of nesting in artificial nest boxes by American Kestrels in Rogers (ROG) and Cimarron (CIM) Counties, Oklahoma from 1993-2000. (--- = No box available for nesting; K = nesting by American Kestrels; ST = nesting by European Starlings; SP = nesting by House Sparrows; 0 = no nesting activity regardless of species; no information indicates no monitoring).

Box No.	1993	1994	1995	1996	1997	1998	1999	2000	County
1	ST	K	ST	K	ST	ST	ST	ST	ROG
2	K	K	K	K	K	0	ST	K	ROG
3	ST	ST	K	K	ST	0	ST	ST	ROG
4	K	K	K	K	K	K	ST	K	ROG
5	K	K	0	K	K	---	---	---	ROG
6	K	K	K	0	K	0	ST	K	ROG
7	SP	0	0	K	ST	0	ST	ST	ROG
8	---	K	K	0	0	K	K	K	CIM
9	---	ST	ST	ST	ST	0	0	0	ROG
10	---	ST	ST	---	---	---	---	---	ROG
11	---	ST	ST	ST	K	0	K	K	ROG
12	---	ST	K	K	K	---	---	---	ROG
13	---	ST	K	K	K	0	ST	ST	ROG
14	---	ST	---	---	---	---	---	---	ROG
15	---	ST	K	K	ST	K	K	K	ROG
16	---	K	K	K	K	K	K	K	ROG
17	---	ST	K	0	ST	ST	ST	K	ROG
18	---	ST	K	K	K	---	---	---	ROG
19	---	---	---	0	0	K	0	K	CIM
20	---	---	K	K		0		K	CIM
21	---	---	ST	K	K	0	K	K	ROG
22	---	---	K	K	K	K	K	K	ROG
23	---	---	ST	ST	ST	0	0	0	ROG
24	---	---	K	ST	ST	0	SP	0	ROG
25	---	---	---	---	---	---	---	---	ROG
26	---	---	---	---	---	---	---	---	ROG
27	---	---	ST	ST	---	---	---	---	ROG
28	---	---	K	K	K	K	K	K	ROG
29	---	---	K	ST	ST	0	K	ST	ROG
30	---	---	0	ST	ST	0	K	ST	ROG
31	---	---	ST	K	ST	0	ST	ST	ROG
32	---	---	K	K	K	K	K	0	ROG
33	---	---	ST	ST	0	---	---	---	ROG
34	---	---	---			K		K	CIM
35	---	---	---			K		K	CIM
36	---	---	---	ST	ST	ST	---	---	ROG
37	---	---	---	---		K		K	CIM
38	---	---	---	---					TUL
39	---	---	---	---	K	0	0	K	ROG
40	---	---	---	---	---	0	0	0	CIM
41	---	---	---	---	---	K		K	CIM
42	---	---	---	---	---	---		K	CIM
43	---	---	---	---	---	---		K	CIM
44	---	---	---	---	---	---	---	---	CIM

Personal Vita
for
Dr. Keith W. Martin

Education: Graduated from Claremore High School in Claremore, Oklahoma, in 1978; received a Bachelors in Science degree in Biology-Education from Northeastern State University in Tahlequah, Oklahoma, in May 1986; received Masters of Science degree in Biology-Higher Education from Northeastern State University in Tahlequah, Oklahoma, in 1991; completed requirements for the Doctor of Philosophy degree with a major in Wildlife and Fisheries Ecology at Oklahoma State University in December 2001.

Experience: Biology Instructor for Owasso Public Schools in Owasso, Oklahoma, from 1986-1990. Instructor of Biology at Rogers State University, Claremore, Oklahoma, 1990-2000 and Assistant Professor of Biology at Rogers State University, Claremore, Oklahoma, 2001.

Professional Memberships: American Society of Mammalogists, Oklahoma Academy of Sciences, Oklahoma Ornithological Society (President 2002-2002), The Wildlife Society, Southwestern Association of Naturalists.

Research/Grants:

Principle Investigator for Project E-22 (1993-present) of the Oklahoma Department of Wildlife entitled *Cave Protection and Management for the Ozark Big-eared Bat and the Gray Bat in Oklahoma*. The grant is funded by the U.S. Fish and Wildlife Service (\$10,000-\$18,000 annually) and the Oklahoma Department of Wildlife Conservation. Primary objectives for the project are to develop and coordinate management efforts at caves that are inhabited by endangered species of bats in eastern Oklahoma.

Principle Investigator for an Organized Research Grant funded by Rogers State University 2000-2001 entitled *Effects of Internal Gating Structures on Cave Microclimates and Management Implications for Endangered Species of Bats*. The grant totaled \$3,500.00 and was completed in December 2001.

Publications:

Comparative Numbers of Gray Bats (*Myotis grisescens*) at Four Maternity Caves in Northeastern Oklahoma in 1981 and 1991. *Proceedings of the Oklahoma Academy of Sciences* 73:35-37. (1993)

Internal Cave Gating as a Means of Protecting Cave-Dwelling Bat Populations in Eastern Oklahoma. *Proceedings of the Oklahoma Academy of Sciences* 80:133-138. (2000)

