

BIO 801 Scientific Literature and Writing - Biology

Example of a Research Proposal

In general, the introduction of a research proposal should:

- 1) Summarize the current state of knowledge
- 2) Identify the gap, question, or problem that motivates study
- 3) Provide the objective(s) of study

In the Methods section of a research proposal:

- Describe methods in future tense NOT past tense
 - Provide:
 - dates & location(s) of study (&, perhaps, why these dates and locations were chosen)
 - information about materials and equipment needed to conduct the study
 - duration & timing (e.g., morning or evening) of observation periods
 - sample size(s)
 - information about statistical analyses to be used when analyzing results
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Here's a 'sample' research proposal:

Hunting Behavior, Territory Quality, and Individual Quality of American Kestrels (*Falco sparverius*)

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Introduction

American Kestrels (*Falco sparverius*) are widely distributed throughout North America. In Kentucky, these falcons are permanent residents and are most abundant in rural farmland where they hunt over fields and pastures (Palmer-Ball 1996). Although primarily sit-and-wait predators, hunting from elevated perches and scanning the surrounding areas for prey, kestrels also hunt while hovering (Balgooyen 1976). Kellner (1985) reported that nearly 20% of all attacks observed in central Kentucky were made while kestrels were hovering. Habitats used by hunting kestrels in central Kentucky include mowed and unmowed fields, cropland, pastures, and plowed fields (Kellner 1985).

Several investigators have suggested that male and female American Kestrels may exhibit differences in habitat use during the non-breeding period, with males typically found in areas with greater numbers of trees, such as wooded pastures, and females in open fields and pastures (Stinson et al. 1981, Bohall-Wood and Collopy 1986). However, Smallwood (1988) suggested that, when available, male and female kestrels in southcentral Florida established winter territories in the same type of habitat. Differential habitat use occurred only because migratory female kestrels usually arrived on wintering areas before males and, therefore, were more likely to establish territories in the better quality,

more open habitats before males arrived (Smallwood 1988).

In central Kentucky, many American Kestrels are residents. As a result, male and female kestrels would likely have equal opportunity to establish winter territories in the higher quality, open habitats. If so, habitat segregation should be less apparent in central Kentucky than in areas further south where wintering populations of kestrels are largely migratory. In addition, territory quality should be correlated with individual quality because higher quality resident kestrels should be able to defend higher quality territories.

The objectives of my proposed study of American Kestrels will be to examine possible relationships among and between hunting behavior, territory quality, and individual quality in male and female American Kestrels. The results of this study will provide important information about habitat and perch selection by American Kestrels in central Kentucky in addition to the possible role of individual quality on hunting behavior and habitat use.

Methods

Field work will take place from 15 October 2000 through 15 May 2001 at the Blue Grass Army Depot, Madison Co., Kentucky. During the study period, I will search for American Kestrels throughout accessible portions of the depot. Searches will be conducted on foot as well by automobile.

An attempt will be made to capture all kestrels observed using bal-chatri traps baited with mice. Once captured, kestrels will be banded with a number aluminum band plus a unique combination of colored, plastic bands to permit individual identification. For each captured individual, I will take standard morphological measurements (wing chord, tarsus length, tail length, and mass). In addition, 8 - 10 feathers will be plucked from the head, breast, back, and wing, respectively. Plumage in these areas is either reddish or bluish, and the quality of such colors is known to be correlated with individual quality (Hill 1991, 1992; Keyser 1998). Variation in the color and intensity of plumage will be determined using a reflectance spectrometer (Ocean Optics S2000 fiber optic spectrometer, Dunedin, FL) and these values will be used as a measure of individual quality. To confirm that plumage color and intensity is dependent on condition, we will use tail feather growth rates as a measure of nutritional condition during molt. At the time of capture, the outermost tail feathers will be removed and the mean width of daily growth bars, which is correlated with nutritional condition (Hill and Montgomerie 1994), will be determined.

Each focal American Kestrel (N = at least 14; 7 males and 7 females) will be observed at least once a week. Observations will be made at various times during the day, with observation periods typically 1 - 3 hours in duration. During focal bird observations, individuals will be monitored using binoculars and spotting scopes. Information will be recorded on a portable tape recorder for later transcription. During each observation, I will record all attacks and whether attacks were initiated from a perch or while hovering. For perches, I will note the time a kestrel lands on a perch and the time until the kestrel either initiates an attack or leaves for another perch (i.e., giving up time). If an attack is made, I will note attack distances (the distance from a perch to the point where a prey item was attacked) and outcome (successful or not). If successful, an attempt will be made to identify the prey (to the lowest taxonomic category possible).

The activity budgets of kestrels will also be determined by observing the frequency and duration of kestrel behaviors during randomly-selected 20-min observation periods (i.e., a randomly-selected period during the 1 - 3 hour observation period). During these 20-min periods, the frequency of occurrence of each of the following behaviors will be recorded: capturing prey, preening, engaging in nonpreening comfort movements (including scratching, stretching wing or tail, shaking body plumage, cleaning foot with bill, and yawning), vocalizing, and flying. The context in which flight occurs, including pounces on prey, and the duration of flights and of preening bouts will also be recorded.

Territories will be delineated by noting the locations of focal kestrels and the vegetation in each kestrel's winter territory will be characterized following the methods of Smallwood (1987). Possible relationships among hunting behavior (mode of attack, perch time, attack distance and outcome [successful or unsuccessful], and type of prey attacked), territory vegetation, time budgets, sex, and individual quality will be examined. All analyses will be conducted using the Statistical Analysis System (SAS Institute 1989).

Literature Cited

Balgooyen, T. G. 1976. Behavior and ecology of the American Kestrel in the Sierra Nevada of California. Univ. Calif. Publ. Zool. 103:1-83.

- Bohall-Wood, P. and M. W. Collopy. 1986. Abundance and habitat selection of two American Kestrel subspecies in north-central Florida. *Auk* 103:557-563.
- Craighead, J.J. and F.C. Craighead, Jr. 1956. Hawks, owls, and wildlife. Stackpole Co., Harrisburg, PA.
- Hill, G.E. 1991. Plumage coloration is a sexually selected indicator of male quality. *Nature* 350:337-339.
- Hill, G.E., 1992. Proximate basis of variation in carotenoid pigmentation in male House Finches. *Auk* 109:1-12.
- Hill, G.E. and R. Montgomerie. 1994. Plumage colour signals nutritional condition in the House Finch. *Proc. R. Soc. Lond. B Biol. Sci.* 258:47-52.
- Kellner, C.J. 1985. A comparative analysis of the foraging behavior of male and female American Kestrels in central Kentucky. M.S. thesis, Eastern Kentucky University, Richmond.
- Keyser, A.J. 1998. Is structural color a reliable signal of quality in Blue Grosbeaks? M.S. thesis, Auburn University, Auburn, AL.
- Mengel, R.M. 1965. The birds of Kentucky. American Ornithologists' Union Monograph No. 3. Allen Press, Lawrence, Kansas.
- Palmer-Ball, B. 1996. The Kentucky breeding bird atlas. Univ. Press of Kentucky, Lexington.
- SAS Institute. 1989. SAS user's guide: statistics. SAS Institute Inc., Cary, North Carolina.
- Smallwood, J.A. 1987. Sexual segregation by habitat in American Kestrels wintering in southcentral Florida: vegetative structure and responses of differential prey availability. *Condor* 89:842-849.
- Smallwood, J.A. 1988. The relationship of vegetative cover to daily rhythms of prey consumption by American Kestrels wintering in southcentral Florida. *J. Raptor Res.* 22:77-80.
- Stinson, C.H., D. L. Crawford, and J. Lauthner. 1981. Sex differences in winter habitat of American Kestrels in Georgia. *J. Field Ornithol.* 52:29-35.

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