Ferruginous hawk and prairie falcon reproductive and behavioral responses to human activity near the Kevin Rim, Montana
by Russell Carl Van Horn

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Fish and Wildlife Management
Montana State University

Abstract:
The reproductive and behavioral responses of nesting ferruginous hawks (Buteo regalis) and prairie falcons (Falco mexicanus) and the behavioral responses of roadside foraging raptors to human activity and artifacts were studied on a 148 km2 study area near Kevin, Montana during the 1991 and 1992 nesting seasons. Thirty-four ferruginous hawk and 24 prairie falcon breeding sites were occupied during the study. Ferruginous hawk and prairie falcon site occupancy was not significantly influenced by the presence of powerlines, roads, or active oil wells. Ferruginous hawks nested primarily on outcrops and cliffs (54%) or elevated ground sites (42%) and were clumped along the Kevin Rim, a prominent sandstone escarpment. Ferruginous hawk nesting density (8.4 km2 /pair) was among the highest reported in the literature, but productivity was relatively low (47% success, 1.1 fledglings/occupied nest). The primary cause of ferruginous hawk pre-dispersal mortality was wet weather, which caused 37% of all losses. The local ferruginous hawk population may not be able to sustain itself at current levels if wet weather patterns continue to destroy nests and young. Prairie falcon productivity was also relatively low (71% success, 1.9 fledglings/occupied nest) but appeared sufficient to maintain the population. There was no significant difference between ferruginous hawk or prairie falcon reactions to intrusion in areas with petroleum development. Ferruginous hawks in the Kevin Rim area were quicker to respond to human activity than ferruginous hawks in other studies, which may have been due to past human activity levels or reduced prey availability. Foraging ferruginous hawks avoided humans more than Swainson's hawks (Buteo swainsoni), northern harriers (Circus cyaneus), or red-tailed hawks (Buteo iamaicensis). In spite of this, ferruginous hawks still foraged along secondary roads in oilfields more than expected. Human activity in the area affected only a fraction of the local ferruginous hawk and prairie falcon breeding populations.

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Master of Science

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Fish and Wildlife Management

MONTANA STATE UNIVERSITY
Bozeman, Montana

September 1993

APPROVAL

of a thesis submitted by

Russell Carl Van Horn

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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Signature Russell C. Van Horn

Date 20 September 1993

ACKNOWLEDGEMENTS

I would like to acknowledge the assistance, advice, and guidance of Dr. L.R. Irby and Dr. A. R. Harmata during all phases of this study. Dr. T.E. McMahon critically reviewed the manuscript and Dr. H.D. Picton critically reviewed my capabilities. Dr. A.R. Harmata generously loaned radio-telemetry and trapping equipment.

Dr. D. L. Gustafson made the map included in this thesis. I thank K.R. Bousquet and M. Restani for assistance and advice during field work.

Several Kevin Rim area ranchers and petroleum lease operators permitted research activities on their land. T. Day of the U.S. Bureau of Land Management, and D. Flath, Nongame Program of the Montana Department of Fish, Wildlife and Parks, arranged logistical support and research vehicles. Lastly, I would like to thank my wife, T.L. Ruggles, for her patience, humor, and support during this study.

Funding for the project was provided by the U.S. Bureau of Land Management and the Nongame Program of the Montana Department of Fish, Wildlife and Parks.

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ABSTRACT

The reproductive and behavioral responses of nesting ferruginous hawks (Buteo regalis) and prairie falcons (Falco mexicanus) and the behavioral responses of roadside foraging raptors to human activity and artifacts were studied on a 148 km² study area near Kevin, Montana during the 1991 and 1992 nesting seasons. Thirty-four ferruginous hawk and 24 prairie falcon breeding sites were occupied during the study. Ferruginous hawk and prairie falcon site occupancy was not significantly influenced by the presence of powerlines, roads, or active oil wells. Ferruginous hawks nested primarily on outcrops and cliffs (54%) or elevated ground sites (42%) and were clumped along the Kevin Rim, a prominent sandstone escarpment. Ferruginous hawk nesting density (8.4 km²/pair) was among the highest reported in the literature, but productivity was relatively low (47% success, 1.1 fledglings/occupied nest). The primary cause of ferruginous hawk pre-dispersal mortality was wet weather, which caused 37% of all losses. The local ferruginous hawk population may not be able to sustain itself at current levels if wet weather patterns continue to destroy nests and young. Prairie falcon productivity was also relatively low (71% success, 1.9 fledglings/occupied nest) but appeared sufficient to maintain the population. There was no significant difference between ferruginous hawk or prairie falcon reactions to intrusion in areas with petroleum development. Ferruginous hawks in the Kevin Rim area were quicker to respond to human activity than ferruginous hawks in other studies, which may have been due to past human activity levels or reduced prey availability. Foraging ferruginous hawks avoided humans more than Swainson's hawks (Buteo swainsoni), northern harriers (Circus cyaneus), or red-tailed hawks (Buteo jamaicensis). In spite of this, ferruginous hawks still foraged along secondary roads in oilfields more than expected. Human activity in the area affected only a fraction of the local ferruginous hawk and prairie falcon breeding populations.

INTRODUCTION

The Kevin Rim, a sandstone escarpment in north-central Montana, supports one of the highest nesting densities of grassland raptors in western North America (Dubois 1988, Harmata et al. 1991). The Kevin Rim Special Management Area has been declared a Key Raptor Area by the Bureau of Land Management (BLM), where "unusually high nesting populations occur resulting from special habitat features" (Olendorff et al. 1989:21). Ferruginous hawks (Buteo regalis) and prairie falcons (Falco mexicanus) are common breeders in the area and golden eagles (Aquila chrysaetos) and burrowing owls (Athene cunicularia) also nest in the area. These raptors are considered Species of Special Concern in Montana (Flath 1984). Nesting ferruginous hawks may be especially sensitive to disturbance (Fyfe and Olendorff 1976). In addition, the ferruginous hawk is classed as a Category II species (species of high national concern) by the U.S. Fish and Wildlife Service (USFWS) and was on the Audubon Society's Blue List (declining species vulnerable to extinction) from 1971 to 1986 and has since been a Species of Special Concern to that organization (Tate 1986). Some researchers believe populations have increased since 1980 (Warkentin and James 1985, Gossett and Bechard 1992), but others disagree (National Audubon Society 1992, A.R. Harmata pers. commun.).

Petroleum extraction and agricultural activities have occurred on and around the Kevin Rim for decades (Perry 1953) and may affect local raptor populations. I had 6 primary objectives regarding raptors nesting in the Kevin Rim area but emphasized breeding ferruginous hawks and prairie

falcons. The objectives were: 1) locate all occupied ferruginous hawk and prairie falcon breeding sites and monitor their productivity, 2) determine impact of human activities on site occupancy and productivity, 3) document reaction to humans of breeding ferruginous hawks and prairie falcons, 4) evaluate use of surrounding areas by foraging ferruginous hawks and prairie falcons, 5) measure reaction to humans of foraging ferruginous hawks and prairie falcons, and 6) develop management recommendations for the Kevin Rim area.

STUDY AREA

Location and Land Ownership

The 148 km^2 study area was located northwest of the town of Kevin in Toole County, Montana (Fig. 1). Elevations ranged from 1013 m to 1310 m above sea level. Topography varied from alkali flats in the southeast to hills and ravines in the north and sandstone escarpments in the west. Several springs, numerous ephemeral wetlands, scattered livestock reservoirs, and 2 freshwater ponds (< 0.5 km^2) were the only freshwater sources.

I divided the study area into 3 units for this study (Fig. 1). The northern badlands and the adjacent section of the Kevin Rim were designated as the "reference unit" (43.8 km^2). This unit corresponded to the Badlands control area of Harmata et al. (1991). The alkali flats, the southern portion of the Kevin Rim and rolling areas immediately west of the cliffs were designated as the "developed unit" (88.1 km^2). This approximately corresponded to the experimental area of Harmata et al. (1991). Rolling grasslands and low (< 20 m) rock outcrops adjacent to the southwest end of the Kevin Rim were designated as the study area "extension" (16.0 km^2).

Geology

The Kevin Rim is composed of Eagle (Virgelle) sandstone, an Upper Cretaceous sediment overlaying petroleum-bearing Lower Cretaceous and