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CRITERIA FOR GOLDEN EAGLE, FERRUGINOUS HAWK, AND PRAIRIE FALCON NEST SITE PROTECTION*

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Methods

Raptor field studies of the effect of disturbance routinely represent 74 months later elicit a reaction high variance bird. Because as threatened species because will frequent workshop or tion meeting the formulation

Abstract

Establishment of buffer zones around raptor nest sites has become an important management tool in areas undergoing energy development or increasing recreational pressure. We conducted a survey of field researchers who had distributed Golden Eagle, Ferruginous Hawk, and Prairie Falcon during their research. Bases for and limitations of the use of buffer zones to protect nesting raptors are discussed.

Introduction

Energy development and other human activities can diminish raptor populations by altering habitat and by disturbing nesting activities. Disturbance of nesting raptors can result in complete desertion of nests, eggs, or young. Temporary departure by adults can cause overheating, chilling, or desiccation of eggs or young, predation on eggs or young, or missed feedings. Three studies of the Golden Eagle (*Aquila chrysaetos*) found that 46, 71, and 85 percent of nesting failures were due to human disturbance (Boeker and Ray 1971, Camenzind 1969, D'Ostilio 1954). The effects of such disturbance range from loss of a year's reproduction to long-term loss of the nest site if the disturbance is chronic. Raptor researchers found that by disturbing birds they can jeopardize the reproductive activity being studied (Fyfe and Olendorff 1976).

Concern over disturbance has resulted in the establishment of spatial or temporal buffers (restriction of activity within an area or period of time) between some energy developments and raptor nest sites. Geothermal development proposals for sites in Utah and Idaho resulted in recommendations for buffers by federal agencies (ERDA 1977, Fisher 1978, USGS 1977). Buffer zones were established to protect raptor nest sites along the Trans-Alaska pipeline (Olendorff and Zeedyk 1978) and were recommended for the proposed Mackenzie gas pipeline (Jacobson 1974). These recommendations were based primarily on the experience of the individuals involved because of the absence of a body of scientific responses of the birds to these disturbances or any consensus of the raptor management community concerning control of disturbance. This study summarizes and expands the bases for such decisions relative to the Golden Eagle, Ferruginous Hawk (*Buteo lineatus*), and Prairie Falcon (*Falco mexicanus*).

Results

Twenty-five additional responses table 1. Since median proportion than the magnitude con and high were not statistically

Factors of important independent variable balance to within nest, and within these species in table 2.

Discussion

The objective of the entire study is to determine the effect of disturbance from areas of development. Olendorff's raptor project (1969) found that in Utah, and Prairie Falcon al. Smith as primarily to semiarid wetland relative

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Table 2. Recommended Buffer Zones for Golden Eagle, Ferruginous Hawk, or Prairie Falcon Nest Sites.

Distance	Species	Development type	Restriction	Source
1 km (0.6 mile)	Golden Eagle Prairie Falcon	Geothermal drilling	No drilling	ERDA 1977
0.5 mile (0.8 km) all year and 1 mile (1.6 km) March 1-July 15	Ferruginous Hawk	Geothermal drilling	No surface disturbance	Fisher 1978
1 mile (1.6 km)	All eagles	Pipeline		Olendorf and Zeedyk 1978
2 miles (3.2 km) all year	Golden Eagle	Pipeline	No construction	Jacobson 1974
2 miles (3.2 km) March 1-Sept. 1	Golden Eagle	Pipeline	No ground activity	Jacobson 1974
0.25-0.5 mile (0.4-0.8 km)	Golden Eagle	General		M. R. Fuller ^a
200-500 m	All three species	General		N. Woffinden ^a
0.5 mile (0.8 km)	Grassland raptors	General		R. P. Howard ^a
1 mile (1.6 km) line of sight	Golden Eagle	General		R. P. Howard ^a

^aSuggestions received in response to the raptor disturbance survey.

sites. Ferruginous Hawks are more versatile, but most require a tree or rock outcropping. This use of elevated nest sites contrasts sharply with the open-land hunting habit of these species. The importance of nest sites is confirmed by Fyfe and Armbruster's (1976) and Anderson and Follet's (1978) success in increasing the productivity of Prairie Falcons and Ferruginous Hawks, respectively, by nest-site creation and manipulation (see also Howard and Hilliard 1980, White 1974).

Nest-site protection is only advantageous if the prey base remains adequate following development. Many types of development such as oil, gas, and geothermal exploitation, pipeline and road construction, and development of campgrounds and interpretive facilities on public lands remove vegetation from small areas. If important prey concentrations such as ground squirrel colonies are avoided, raptors should be able to coexist with these developments provided nesting sites are undisturbed. The responses to survey question 5 indicate that development should be kept at least 400 m from such prey concentrations.

Another objection to nest-site protection was that disturbance might occur because of the establishment of buffer zones. This disturbance could be caused by irate supporters of the development that would be restricted or by nest robbers, varmint shooters, amateur naturalists, or photographers who are attracted to identified nest sites. The location of nest sites should be revealed only to those who are directly involved in facility siting. Developers should be reminded that the nest site, not the individual birds, is being protected. Shooting the birds would not eliminate the need to restrict development near the site.

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