INVENTORY OF GOLDEN EAGLE NESTS IN ELKO COUNTY, NEVADA

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Abstract. During 1972, an inventory revealed 88 active golden eagle (Aquila chrysaetos), nesting sites in Elko County, Nevada. It was found that 93% of the nests were on cliffs, 71% between elevations of 5,000 and 6,500 feet, and 43% faced east. Locations of 84% of the nests were within two miles of water with desert riparian habitat. The success per nesting attempt was determined from 50 of the 88 active nests with a success ratio of 1.1 young per nest.

INTRODUCTION

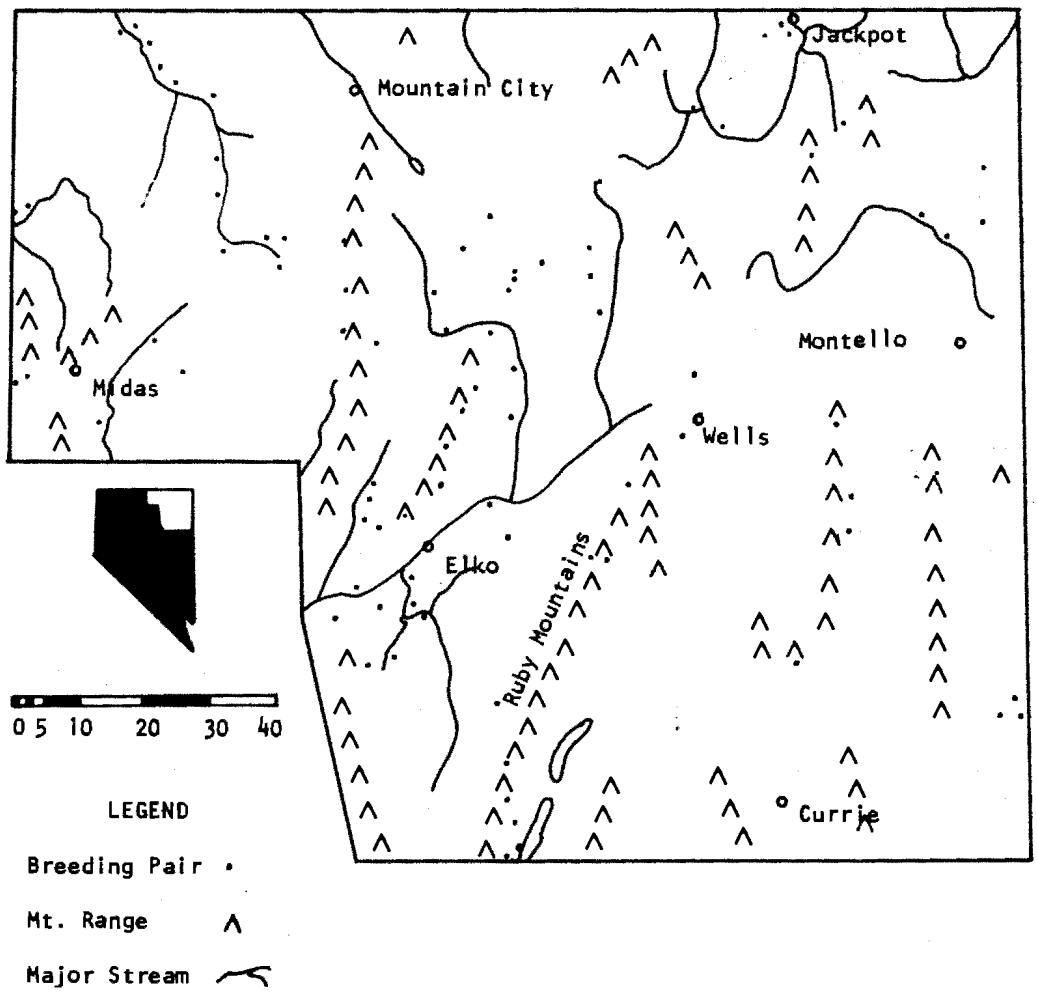
Populations of numerous raptors have decreased in North America in the last 25 years (Kochert 1972). Cahalane (1964), stated that man's encroachment into remote areas has endangered the future existence of some wild species. Craighead and Craighead (1956), concluded that man directly and indirectly represented the greatest factor in reducing nesting success of all raptors.

There is a great need for information on the status of raptors, such as the golden eagle in North America (Spofford 1969). Only by determining the present population and habitat of the golden eagle, can any reduction in population be recognized early and the possible causes isolated and evaluated (McGahan 1968, Spofford 1969).

Nesting information has been compiled in western Montana by McGahan (1965), and in Idaho by Kochert (1972). However, no nesting study or habitat evaluation has been conducted in northeastern Nevada.

Because of the need to determine the present nesting population and to identify the present habitat distribution of golden eagles in northeastern Nevada, the U. S. Bureau of Sports Fisheries and Wildlife and the U. S. Bureau of Land Management, in cooperation with the

Figure 1. Map of Elko County, Nevada, and study area showing distribution of breeding pairs.



Nevada Department of Fish and Game and the U. S. Forest Service, initiated a study in Elko County, Nevada, to: (1) Provide an indication of the present golden eagle nesting population and nesting success; and (2) provide a fast, inexpensive inventory of the habitat being used by nesting golden eagles.

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STUDY AREA

This study area was Elko County, Nevada, which is approximately 17,000 square miles (Figure 1). Elevations range from 4,000 to 11,000 feet.

Elko County has a wide temperature variation. The temperatures in the summer are around 90 degrees F., and in the winter are around -20 degrees F. Temperatures may vary 35 degrees during a 24-hour period. Average annual precipitation varies from under eight inches to over 25 inches, owing to elevation and proximity of mountains (U. S. Department of Commerce, Weather Bureau 1970, 1971).

The lower basins are from 4,000 to 5,000 feet and occupy less than five percent of the county. The major vegetation species are greasewood (Sarcobatus spp.), and saltbrush (Atriplex spp.).

The hilly, intermediate areas encompass 75% of the county. The elevation ranges from 5,000 to 7,000 feet. The vegetative species are big sagebrush (Artemisia tridentata), black sagebrush (A. nova), and rabbitbrush (Chrysothamus spp.).

The highest elevations, ranging from 7,000 to 11,000 feet, comprise about 20% of the county. These are steep-rising mountain ranges, generally running in a north-south direction. The vegetation varies greatly with the elevation, however, the major vegetative types are: (1) mountain browse type consisting of mountain mahogany (Cercocarpus spp.), bitterbrush (Purshia spp.), snowberry (Symphoricarpos spp.), serviceberry (Amelachier spp.); (2) sagebrush-grass type consisting of sagebrush with various grasses; (3) pinyon-juniper type consisting of pinyon (Pinus spp.), juniper (Juniperus spp.); and (4) on favorable sites, broadleaf and conifer types consisting of aspen (Populus spp.) and fir (Abies spp.). There are also small areas of bristlecone pine (Pinus aristata), on the major mountain ranges in the southeastern part of the county.

Throughout the county, desert riparian vegetation occurs between 5,000 and 9,000 feet elevations in a narrow strip along the streams. The major vegetation species included are willow (Salix spp.), rose (Rosa spp.), cottonwood (Populus spp.), and at the higher elevations, aspen.

Agricultural practices have eliminated large areas of native vegetation on the flood plains of the major water courses. Cultivated hay meadows have replaced 10% of the native sagebrush-grass type. An additional 10% of the sagebrush-grass type has been either seeded to crested wheatgrass (Agropyron cristatus), or burned, thus being converted to cheatgrass (Bromus tectorum), or, in some cases, other native grasses (Bureau of Land Management, Elko District Economic Profile, unpublished).

Figure 2. Form used to record active eagle nest information.

ELKO COUNTY
EAGLE NEST SITE INFORMATION

1. Species of eagle (golden or bald):_____
2. Elevation:_____
3. Date of observation:_____
4. Estimated size of young (small, large or eggs):_____
5. Was adult on nest:_____
6. Number of young or eggs:_____
7. Structure nest was on:_____
8. Direction nest was facing:_____
9. Habitat:

   Distance to nearest stream or water:_____

   Average width of stream:_____

   Vegetation along stream:_____

   Quality of riparian vegetation:_____ Good_____ Bad
10. Describe how to find nest:_____

    _____

    _____

    _____
11. Township:_____, Range:_____, Section:_____
12. Fledging count:_____

Observer:_____

METHOD

Eagles are characteristically extremely nervous when approached by man. During the incubation stage, they will fly off the nest when a human intruder comes near. Eagles are also known to abandon their nests during incubation stage after being visited by man (Kochert 1972). Boeker and Ray (1971), reported that human disturbance accounted for 85% of all known nest losses in their study in Wyoming, Colorado and New Mexico. Therefore, most active golden eagle nests were originally located and rechecked for nesting success with a Piper Super-cub airplane.

The remaining active nests were located by field personnel, on the ground, and later checked from the air.

The white coloration from excretion helped to point out possible nest sites from the air. Nests were checked by flying approximately 50 feet from the nest at an approximate air speed of 50 m.p.h. The approach and distance to the nest depended upon wind direction, downdrafts and terrain.

Each active nest was plotted on a U. S. Geological Survey map, scale 1:250,000, and registered on an Elko County Eagle Nest Site Information Form (Figure 2). Nest elevations and exposures were recorded using the aircraft instruments.

A nest was considered to be active if it contained eggs, young or an incubating adult.

Ground field personnel began inventorying active eagle nests about March 15, 1972. On this date, the first eagles were observed incubating eggs. Aerial searching for active nests in selected sites began on April 15, 1972, and ended June 15, 1972.

Main areas of aerial inventory were along rock escarpments adjacent to or near water courses or along mountain ranges where active eagle nest sites were expected. Other areas inventoried had tall fir, pine or cottonwood stands.

A sample of 50 nests were later rechecked from the air between May 28 and June 7, 1972, to determine average success per nesting attempt. Between these dates, the youngest nestlings had some of their primary plumage, but the oldest nestlings had not fledged. All nestlings within these nests were recorded, totaled and divided by the sample number of nests. The resulting ratio was considered the average success per nesting attempt.

RESULTS AND DISCUSSION

About one-half of Elko County, Nevada, was inventoried for golden eagle nests. The average success per nesting attempt was determined for 50 of the 88 nests. The ratio for the success per nesting attempt was 1.1 nestlings, or 55 young for the sample of 50 nests (Table 1). Kochert (1972), in Idaho, obtained an average of 1.18 young-fledged, over a six-year study.

Nearly all pairs of eagles maintain more than one nest in this study. McGahan (1968), reported 56% of the nesting pairs in Montana maintained supernumerary nests.

Dead sagebrush was the principal nesting material used in nest construction of two nests. Green juniper boughs and rabbitbrush were also commonly used in nest construction. Hinman (1960), reported that sagebrush was the major material used in nest construction in southwestern Utah.

We observed eagles continually bring building materials to their nests prior to laying their eggs and after the eggs had hatched. This habit helped to cover uneaten and decaying food. One particular nest, situated on the ground, accumulated approximately six inches of litter in a five-week period after the young hatched. Another large nest fell off a rock archway destroying two eggs, apparently due to the next becoming too high and too large during the previous years.

Table 1. Average success per nesting attempt recorded May 28 through June 7, 1972.

Number Nests	Number Nestlings Observed	Average/Nest
50	55	1.1

Table 2. Number and percent active golden eagle nests in various sites.

Nest Sites	Number	Percent
Ground	1	1
Tree	5	6
Cliff	82	93
TOTAL	88	100

Table 3. Elevation of active nests.

Altitude (Feet)	Number of Nests
4,000 - 5,000 1/	0
5,000-5,500	21
5,500-6,000	20
6,000-6,500	22
6,500-7,000	8
7,000-7,500	10
7,500-8,000	6
8,000-8,500	1
8,500-11,000	0

1/ Occupied less than 5% of Elko County and was flat bottom land.

Table 4. Exposure of occupied cliff nests.

North		East		South		West	
Number	Percent	Number	Percent	Number	Percent	Number	Percent
10	12	35	43	20	24	17	21

Total active nests located were 88, of which, 93% were on cliffs (Table 2). McGahan (1968), found in Montana 62% of the nests were located on cliffs. Wellein and Ray (1964), found 87% of the occupied and unoccupied nests were on cliffs in Wyoming, Colorado and New Mexico. In Alaska, 100% of the nests were on cliffs (Murie 1944).

In the Elko County study, 71% of the total active nests ranged in elevation from 5,000 to 6,500 feet (Table 3). The mean nesting altitude was 6,100 feet. McGahan (1968), reported in the Montana study that 81% of all nests (occupied and unoccupied), were at altitudes between 4,000 and 6,000 feet. Beecham (1970), reported the mean nesting altitude for active golden eagle nests in southwestern Idaho was 3,700 feet. The highest active eagle nest site in the Elko County study was located at 8,400 feet.

Exposure of nests seemed to be of importance. Of the nests located, 43% faced east and 24% faced south (Table 4). McGahan (1968), working in central Montana, reported that 50% of the nests studied had a southern exposure. His data suggested that nest-site preference was influenced by the directions of the sun's rays because of temperature. At the same elevations, the more northern the latitude, the cooler the temperatures. Thus, to make use of all available heat, in McGahan's (1968) study, the eagles preferred the southern exposure. In the Elko study, the average daily temperature was higher, therefore, the eagles apparently preferred nesting sites with eastern exposures.

One nest, situated on the ground, was located on the west side of a power pole. As soon as the nestling was able to move about, it left the nest and spent its remaining days (before it was eaten by a coyote), on the east side of the power pole, shading out the afternoon sun. Some nests with westerly exposures had rock crevices used by the eaglet as shade from the hot afternoon sun. Kochert (1972), reported that eight eaglets apparently died during his study from heat prostration in nests with a western and southern exposure.

Water with desert riparian habitat, consisting of widely-scattered willows, rose and other shrubs, as well as a mixture of forbs and grasses, were located within two miles of 84% of all active eagle nests. The remaining 16% of the nests considered to have been more than 2 miles from water, could be closer due to lack of adequate information on water locality.

Along the South Fork Humboldt River, South Fork Owyhee River, Salmon Falls Creek and Susie Creek, where water with desert riparian habitat and suitable cliffs were present, most active nests occurred within two miles of each other. In two cases along two different streams, active nests were recorded within three-quarters of a mile from their neighbor. In areas where suitable cliffs were present, but water was lacking, active nests were absent or were several miles apart.

Other studies (Kochert 1972, McGahan 1968, Wellein and Ray 1964), mentioned the use of cliffs for nesting, but do not stress the need of water and/or desert riparian habitat.

During the inventories, only one eagle left the nest when passed with the Piper Super-cub, but before the plane turned and flew back, the eagle had returned to the nest and was again incubating the eggs. Boeker (1970), reported that aircrafts do not seem to disturb the nesting activity of golden eagles.

In this study, the aerial inventory technique had considerable advantage over ground inventory technique in obtaining general information as to nest location, habitat type, and nesting trend. The aerial method does not seem to disturb the nesting eagle. Also, the remoteness of most eagle nests makes inventory a long process when done on the ground, while by air, several nests can be visited in a very short period of time. An aerial inventory can also be conducted periodically over the same area to establish golden eagle nesting trends, similar to the eagle trend counts conducted by the U. S. Bureau of Sports Fisheries and Wildlife Research Center (Boeker and Ray 1971). Hickman (1972), reported that a Super-cub was the most efficient method of locating cliff nests.

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