Nesting and Productivity of Golden Eagles in Northwestern and West-Central, New Mexico
2004 Annual Report

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EXECUTIVE SUMMARY

During the spring and summer of 2004, the Farmington (northwest study area) and Socorro (west-central study area) Field Offices of the Bureau of Land Management (BLM) contracted Hawks Aloft, Inc. (HAI) to continue a study of the distribution and reproductive success of Golden Eagles *(Aquila chrysaetos)*. A total of 29 territories (19 in the northwest area and 10 in the west-central area) were occupied by Golden Eagles, and 23 active nests (14 in the northwest area and 9 in the west-central area) were located in the two survey areas combined. In the northwest area two nest sites were either new or previously undocumented, and both were active. In the west-central area, one nest site was either new or previously undocumented and was inactive. For the two study areas combined, reproductive success was determined at 23 active nests (14 in the northwest area and 9 in the west-central area), with 16 (73%) of these nests fledging at least one young. Productivity was 0.9 young/breeding pair (n=14) in the northwestern study area and 1.0 young/breeding pair (n=9) in the west-central study area. In 2004, overall productivity for the two study areas combined was 1.0 young/breeding pair (n=23). Overall productivity for the two study areas combined was up from that observed in 2003 (0.7 young/breeding pair), and comparable to productivity documented in 2002 (0.9 young/breeding pair), 2001 (1.1 young/breeding pair) and 2000 (0.8 young/breeding pair).

In northwestern New Mexico, oil and gas development continues to represent a potential source of noise disturbance to nesting Golden Eagles. Noise levels from compressors and/or air exchangers were measured and extrapolated to determine the noise levels at active Golden Eagle

nests that were located within one kilometer of the noise source. No active Golden Eagle nest sites fell within the one-kilometer buffer zone; therefore, no noise levels were recorded during 2004. Our study to measure the impact of noise disturbance on nest site selection and/or reproductive success remains inconclusive due to the lack of an adequate sample size, since noise monitoring began in 2000.

INTRODUCTION

Since 1998, Hawks Aloft, Inc. has gathered information on the distribution, density, and productivity of Golden Eagles (*Aquila chrysaetos)* nesting in northwestern, and west-central New Mexico. Golden Eagles commonly nest on the ledges of sandstone cliffs and volcanic rock outcrops adjacent to open areas in New Mexico (Hawks Aloft 1999). Although the Golden Eagle breeding population appears to have remained stable in New Mexico, and elsewhere in the western states, the increase in human-related activities and land use practices could impact Golden Eagle nesting and reproductive success (Spofford 1964, 1988, Benson 1981, Boeker and Nickerson 1975, Glinski 1988, Hawks Aloft 2000).

The work conducted during 2004 is a continuation of surveys that were initiated in 1998. Noise monitoring efforts began during the 2000 breeding season, and continued as part of a long-term study to evaluate potential noise impacts on the nesting and productivity rates of Golden Eagle. Gas compressors and air exchangers used for the extraction of oil and natural gas often occur in close proximity to active Golden Eagle nests in the northwestern study area near Farmington, New Mexico. Oil and gas extraction facilities can create a noise disturbance, and the associated

human activity around oil and gas wells, could affect the reproductive success of the Golden Eagle at critical times during the breeding season.

STUDY AREAS

The northwestern study area is roughly centered around the town of Farmington, New Mexico and includes those lands administered by the Farmington Bureau of Land Management. The nesting areas mainly utilized by the Golden Eagle are located on the sandstone cliffs found in canyons, arroyos and mesas. The mesas in the study area are usually topped with pinyon-juniper woodland. At the base of the cliffs, the vegetation usually includes a narrow band of pinyon-juniper woodland bordered by desert scrubland or desert grassland, with a strong shrub component. The predominant land use is oil and gas extraction, but also includes cattle grazing and agriculture. A large number of unpaved roads, many of which are associated with oil and gas operations, allow access into the canyons, arroyos, and mesas of the study area.

The survey area located in west-central New Mexico includes areas east of Socorro to the Sierra Larga and west of Quemado to the Arizona border, and includes those lands administered by the Socorro Bureau of Land Management. The nesting areas are characterized by sandstone and basalt cliffs, along with mesas featuring pinyon-juniper woodlands scattered among a mix of desert scrubland, juniper savanna and desert grasslands. The dominant land use in these areas is cattle grazing.

METHODS

Ground searches to determine occupied territories and reproductive success in the Farmington and Socorro resource areas began on 15 March 2004 and ended on 30 June 2004. We conducted aerial surveys to locate occupied territories and active Golden Eagle nests in west-central New Mexico on 28 March 2004. No aerial surveys were conducted for Golden Eagle in the northwest study area.

Cliffs that have suitable nesting habitat and historic nest sites were aerially surveyed with a crew of at least three observers, including the pilot, in a Cessna 205. The coordinates of the location of individual birds, nests, or signs of recent activity were recorded using a Garmin 92 Global Positioning System (GPS) unit especially designed for use in aircraft. Priority was given to historic nest sites that had documented nesting activity within the past three years. Where access was possible, Golden Eagle territories and nest sites that appeared to be occupied during aerial surveys were ground checked within 10-14 days after the initial survey. Also, where access was possible, historic nest locations were checked from the ground at least once to determine nesting activity from 15 March through 1 May 2004.

Active nests were revisited at least once when the young were within 7-10 days of fledging, to determine reproductive success. All active nest sites were visited a minimum of two to three times during the survey period to establish reproductive success.

Raptor nests were considered to be active if at least one of the following was observed; 1) eggs

were seen in the nest, 2) nestlings or young were observed in or near the nest or, 3) adult was observed on the nest in an incubating posture (Postupalsky 1974). Nest sites were determined to be inactive if no raptor activity was observed at or near the nest. A nest site was considered an occupied territory if raptors were found in or around the nest, and/or exhibited territorial behavior.

In northwestern New Mexico, Farmington Field Office (FFO), noise levels from compressors or air exchangers that were in close proximity to an active nest site were recorded. The distance between any active Golden Eagle nest and a nearby compressor and/or air exchanger was first determined using an electronic range finder (Bushnell Yardage Pro, model Laser 1000). Noise level was then recorded at a 20 m distance from the compressor or air exchanger using an impulse sound level meter (Quest, model 2700). Extrapolated noise levels that are less than 48.6 dB are considered to have no noise impacts by the Farmington Field Office of the BLM as documented in the Notice to Lessees and Operators (NTL 04-2 FFO).

No active Golden Eagle nests were located close enough to any compressor or air exchanger to have noise impacts (<48.6 dB) during 2004; therefore, no noise level data was collected.

Calculations to approximate the noise levels at nest sites used the following formula:

Change, dBA= 20 (log (distance 1/ distance 2))

Example: 20 (log (200/20) = 20 (log (10) = 20 (1) = 20 Change, dBA

70 dB – 20 dB = 50 dB

Where Change, dBA is sound attenuation (reduction) with change in distance from a point

source. By extrapolation, if the noise level is 70 dB at a 20 m distance from a compressor and the distance between the compressor and a nest is 200 m, there would be a 20 dBA noise attenuation at the nest and an overall noise level of 50 dB (see example) (J. Brennen, pers. com. 12/2000).

Table 1. Criteria used to evaluate the potential for human-related disturbance at active nest sites in northwestern New Mexico.

Disturbance Criteria	**Disturbance Score**		
	1	**2**	**3**
Noise level from compressor	No compressor near nest site	0-50 dBA	>50 dBA
Distance from road	>1 mile	1/4 mile – 1 mile	<1/4 mile
Road traffic level	Low (two-track)	Intermediate (un-paved road)	High (paved road)

The potential for human disturbance was evaluated at each active Golden Eagle nest site using criteria followed in 1999 (Table 1) with the addition of noise disturbance from compressors and air exchangers for the years thereafter.

Each active nest site received a score for each criterion depending on its location to noise sources. The total score provided an estimate of the potential for disturbance. A total score of three indicated minimum potential disturbance, while a total score of nine represented maximum potential for disturbance.

RESULTS

Numbers, distribution, and reproductive success of nesting Golden Eagles (See Tables 2)

Table 2. Productivity (average number of young produced per nesting pair where outcome is known) of Golden Eagles for northwestern and west-central NM, 2000 – 2004. (*Due to contracting delays in 2002, surveys were not started until May)

	Total # of Active Nests					# of Nests with Outcome Known					# of Successful Nests and Percentage Successful (%)					Total # of Young Fledged					Productivity per Breeding Pair				
Study Area	00	01	02	03	04	00	01	02	03	04	00	01	02	03	04	00	01	02	03	04	00	01	02	03	04
Northwestern	14	11	11	10	14	9	4	11	10	14	7 (78)	3 (75)	9 (82)	6 (60)	10 (71)	6	4	9	8	13	0.7	1.0	0.8	0.8	0.9
West-Central	8	10	2*	10	9	6	9	2*	10	9	4 (66)	8 (89)	2 (100)*	4 (40)	6 (67)	6	10	3*	5	9	1.0	1.1	1.5*	0.5	1.0
Study Areas Combined	22	21	13	20	23	15	13	13	20	23	11 (73)	11 (85)	11 (85)	10 (50)	16 (70)	12	14	12	13	22	0.8	1.1	0.9	0.7	1.0

Farmington Field Office

In the northwest study area, 44 Golden Eagle nest sites, including alternates, were checked. Of those, two new or previously undocumented nests were located. A total of 19 sites were occupied territories and, of those, 14 active nests were documented. Four nests failed for reasons that were not determined.

In the Farmington area, in 2004, the reproductive outcome was determined for all 14 of the active nests. Ten of these nests were successful, fledging a total of 13 young (71% success rate). Four nests failed for reasons that were not determined. The mean number of young fledged per active nest was 0.9. The success rate for active nests in the Farmington area was 60% in 2003, and 82% in 2002, 75% in 2001, and 78% in 2000.

Socorro Field Office

In the west-central area, 47 Golden Eagle nest sites, including alternates, were checked. Ten sites were occupied territories. Of those, nine sites had active nests. Three nests failed for reasons that were not determined.

In the Socorro area, the reproductive outcome was determined for all nine active nests. Six nests were successful (67% success rate). A total of nine young fledged, yielding an average productivity of 1.0 young per active nest. Nest success rates were 40% in 2003, 100% in 2002, 88% in 2001, and 66% in 2000.

Study Areas Combined

For both study areas combined, reproductive outcome was determined at 23 nests. Of these, 16 were successful (70% success rate). Seven nests failed for reasons that were not determined. A total of 22 young were fledged. The mean number of young fledged per nest was 1.0. Nest success rates were 50% in 2003, 85% in 2002, 85% in 2001, and 73% in 2000.

Distribution and productivity of nesting Golden Eagles as a function of noise disturbance

In 2004, no active Golden Eagle nests were located close enough to a compressor or air exchanger to have a measurable noise impact (<48.6 dB); therefore, no noise level data for 2004 are presented in this report.

Over the past five years, the reproductive outcome of Golden Eagles cannot be positively or negatively correlated to nest success due to the small sample size. Although the sample size

continues to be small, the data seem to indicate that the current location of noise sources and the associated noise levels, do not significantly impact the reproductive outcome of breeding pairs of Golden Eagles.

Estimated potential for human-related disturbance based on noise level and accessibility

From 2000 through 2004, the noise monitoring and disturbance data were used to evaluate the potential for human-related disturbance at all the active nest sites visited on the ground using the criteria listed in Table 1 (See Table 3).

Table 3. Average disturbance score of successful vs. unsuccessful nests for west-central and northwestern New Mexico combined, 2000-2004.

	Number of Active Nests					Average Disturbance Score				
Nest Outcome	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**
Nesting Success	6	10	11	10	16	4.8	5.4	5.5	5.7	5.1
Nesting Failure	3	2	2	10	7	5.3	4.5	6.0	5.6	5.4

During the 2000 survey, our data indicated that, on average, successful nests had a lower disturbance score than unsuccessful nests. In 2001, the successful nests had a higher disturbance score than failed nests. In 2002, successful nests had a slightly lower disturbance score than the failed nests. In 2003, successful nests had a slightly higher disturbance score than the failed nests. In 2004, successful nest sites had a lower disturbance score than the failed nests. The nest disturbance scores and results continue to remain inconclusive, and do not seem to indicate any direct correlation between ambient noise levels, proximity of roads, and reproductive success. More specific and intensive nest monitoring needs to be conducted to collect adequate data for

statistical analysis. Disturbances created by the installation, operation, and maintenance of oil and gas wells should also be studied to better understand what types of disturbance warrant concern.

DISCUSSION

In the northwest study area (Farmington Field Office), 2004 nest success rates (71%) improved from 2003 (60%), which was the lowest recorded nest success rate over the past six years. The average productivity per breeding pair also improved over the previous two years (Table 4).

Table 4. Summary of nest success and productivity for northwestern and west-central New Mexico from 1999-2004.

	Breeding Pairs (outcome determined)						Nest Success (%)						Average Productivity (young per breeding pair)					
Study Areas	**99**	**00**	**01**	**02**	**03**	**04**	**99**	**00**	**01**	**02**	**03**	**04**	**99**	**00**	**01**	**02**	**03**	**04**
Northwestern	14	9	4	11	10	14	78	78	75	82	60	71	1.1	0.7	1.0	0.8	0.8	0.9
West-Central	4	6	9	2	10	9	75	66	89	100	40	67	0.7	1.0	1.1	1.5	0.5	1.0
Areas Combined	18	15	13	13	20	23	77	73	85	85	50	70	1.1	0.8	1.1	0.9	0.7	1.0

The reason for the increase in nest activity and reproductive success from the previous two years may be attributable to the increase in precipitation that the region experienced during the late winter and early spring of 2004. This would seem to further support the belief that the severe drought affecting much of the interior western United States has reduced prey abundance, increased raptor mortality, and reduced nest productivity (Hoffman and Smith 2003).

In the west-central study area (Socorro Field Office) nest success rates increased in 2004 (67%) from 2003 (40%), which was the lowest nest success rate recorded since 1999. The average

productivity per breeding pair also increased in 2004, from 0.5 young/breeding pair in 2003 to 1.0 young/breeding pair in 2004 (Table 4). Here too, the increase in precipitation may be an important factor for the increase in nest productivity.

In the northwest study area, this was the fifth year of the ambient noise level study. Although the sample size continues to be too small for statistical analysis, our field observations seem to indicate that those pairs of Golden Eagles that nest near compressors and air exchangers have adapted to moderate levels of unnatural (e.g. compressor, air exchanger etc.) background noise. Of greater concern is the occurrence of human activity that is associated with oil and gas development near active nest sites of Golden Eagles. Since oil and gas development is expected to increase by approximately 10,000 new wells in the next 20 years, the potential for human disturbances to active nests will likely increase. Currently, in much of the Farmington study area, it is already difficult for nesting pairs of Golden Eagles to find suitable nest sites that are more than one kilometer from active oil and gas wells. If oil and gas activities increase significantly, the establishment of buffer zones may become critical for the long-term health of Golden Eagle populations in areas of intensive oil and gas development. Because Golden Eagles are particularly sensitive to human disturbance during the nesting season (Fyfe and Olendorff 1976; Watson and Dennis 1992), it will be critical not to allow the drilling of new wells within a one-kilometer buffer zone of any potentially active nests.

For both the Socorro and Farmington Field Offices, from 2000-2004, active nest sites were evaluated using the generalized disturbance criteria summarized in Table 1. With the exception

of the measured noise levels conducted in the Farmington Resource Area, these criteria are subjective to varying degrees because they depend on the observational skills and descriptive accounts of field technicians. In both areas, successful nests have occurred in close proximity to un-paved roads (< ¼ mile). These roads typically receive little traffic. It is very uncommon to find Golden Eagles nesting within ¼ mile of a paved road that receives fairly constant traffic; however, it does appear from field observations that Golden Eagles are selecting nest sites that are relatively remote, and in areas where the likelihood of human disturbance is minimal. Watson and Dennis (1992) found that Golden Eagle pairs that used highly inaccessible nest sites were significantly more likely to fledge young than pairs that nested in easily accessible areas (i.e. close to roads and trails). Looking at the average disturbance scores that we recorded since 2000 (Table 3), there is no apparent correlation between the disturbance score and nesting success. The results are inconclusive, with the successful nests for 2000, 2002, and 2004 having lower disturbance scores, and the successful nests in 2001 and 2003 having higher disturbance scores.

RECOMMENDATIONS

- Continue survey efforts and nest monitoring to determine reproductive success and the effect of human disturbance.

- Discontinue conducting noise disturbance and general disturbance measurements in the Farmington and Socorro Field Office resource areas due to the continuing small sample size and/or lack of statistically useful data.

- Continue to closely monitor the outcome of active Golden Eagle nests within the proximity of a noise source, including those nests where noise level data has already been collected.

- With the proposed increases in oil and gas development for the Farmington area, establish buffer zones around potentially active nests.

PERSONNEL

This report was written by Ron Kellermueller, Raptor Projects Coordinator and edited by Gail Garber, Executive Director and Sarah Young. Ground surveys and field observations were conducted by Ron Kellermueller, Seamus Breslin, Will Keeley, and Eric Harrold. Aerial surveys for the Socorro Field Office were conducted by Will Keeley, Lorraine McInnes, and Jerry Hoogerwerf (Socorro Air Taxi). Some Golden Eagle nests for the Farmington Field Office were checked for activity by David Mikesic (Navajo Natural Heritage Program) and Dale Stahlecker. All maps were created by Lorraine McInnes, GIS Technician.

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APPENDIX 1: Status of Golden Eagle breeding territories, Farmington Resource Area, northwestern New Mexico, 2004.

HAI GE Nest Number (BLM Number)	2004 - Farmington Territory /Nest Status (reproductive outcome)	Previous history of activity	Disturbance Score
AD-01 (78)	Inactive	03-occupied territory 02-occupied territory 99-active (s) 98-occupied territory	
AD-02 (107)	**Occupied territory**	03-occupied territory 01-occupied territory 99-active (s) 98-occupied territory	
AE-01 (35)	Nest no longer exists	98-active (s)	
AN-01 (144) new	Inactive		
AR-01 (82a, **b**)	**(82b) Active – Successful** Fledged two young	03-active (s) 01-active (ND) 99-active (s) 98-active (ND)	(82a)7-compressor 41.9 dB (82b)- 6
AR-02 (83)	Inactive	00-active (ND) 99-active (ND) 98-active (s)	6–compressor 28.7 dB
AR-03 (84)	**Active – Successful** Fledged one young	03-active (f) 02-occupied territory 00-active (f) 99-active (s) 98-active (ND)	5--compressor (no noise data collected)
AR-04 (104)	Inactive		
AR-05 (120)	Inactive	99-active (ND) 02-occupied territory	
AR-06 (106)	**Active-Failed**	02-occupied territory	5
AZ-01 (81)	Inactive		
BF-01 (109)	Inactive	98-active (s)	
BF-02 (99)	Inactive	03-active (s) 02-active (s) 00-active (s)	6
CC-10 (127)	**Occupied territory**	00-active (f)	6

HAI GE Nest Number (BLM Number)	2004 - Farmington Territory /Nest Status (reproductive outcome)	Previous history of activity	Disturbance Score
CC-11 (140)	**Occupied territory**	03-occupied territory	
CD-01 (135)	**Active-Failed**	03-occupied territory 01-active (s) 98-occupied territory	6-compressor 56.9dB
CD-02 (121)	Inactive	02-occupied territory 00-active (s) 99-active (s) 98-occupied territory	5-compressor* Compressor=57.4 dB Air exch. =54.4 dB
CR-01 (71)	Inactive	03-occupied territory 01-active (s) 00-active (s) 99-active (s) 98-active (ND)	5
FC-01 (112)	Inactive	01-active (ND) 99-active (f) 98-active (s)	
FC-10 (128)	Inactive	00-active (ND) 99-active (f) 98-active (s)	3-compressor 53.02 dB
FN-01 (103**a**,b,c)	**(103a) Active-Failed**	03-occupied territory 02-active (f) 01-active (ND) 99-active (s) 98-active (s)	(103b)- 6 (103a)- 5
FN-02 (77)	Inactive		
GM-01 (113)	**Active-Successful** Fledged one young	99-active (f) 98-active (s)	5
GP-01 (116)	Nest no longer exists	99-active (s) 98-active (ND)	
GP-02 (141)	Inactive	03-active (f)	6
HC-01 (111)	Inactive	02-active (s) 01-active (ND) 99-active (s)	6
HT-01 (122) Tribal	**Active – Successful** Fledged one young	03-active (f) 02-occupied territory 01-occupied territory 99-active (f) 98-occupied territory	4

HAI GE Nest Number (BLM Number)	2004 - Farmington Territory /Nest Status (reproductive outcome)	Previous history of activity	Disturbance Score
JT-01 (13**a**,b)	**(13a) Active-Successful** Fledged two young	02-occupied territory 01-active (f) 00-active (s)	5
KE-01 (117a,**b**)	**(117b) Active-Successful** Fledged one young	03-occupied territory 02-active (f) 98-occupied territory	(117a)-6-compressor 47.32 dB (117b)- 5
MB-01 (80)	Inactive	03-active-successful 02-active (s) 98-active (ND)	5
OE-01 (123)	**Occupied territory**	02-active (s) 01-active (ND) 99-active (ND)	5
RZ-01 (55a)	Inactive	02-active (s) 01-active (ND)	5
RZ-02 (55b, **c**) new	**(55c) Active – Successful** Fledged two young	03-active (s)	6
SM-01 (110)	**Active – Successful** Fledged one young	03-active (f) 02-active (s) 01-active (ND) 99-active (s) 98-active (s)	6
SM-02 (136)	Inactive	03-occupied territory 02-active (s)	5
TF-01 (142)	**Active – Failed**	03-active (s)	6
TN-01 (23a,b)	Inactive		
TN-02 (137a, **b**) new	**(137b) Active-Successful** Fledged one young	02-active (s)	5
TU-01a (102a)	Inactive	00-active (s) 99-active (s) 98-active (s)	6-compressor 61.43 dB
TU-01b (102b)	Inactive	02-active (s) 01-occupied territory	7-compressor 45.45 dB
TU-01c (102c)	Inactive	03-active (s)	5

HAI GE Nest Number (BLM Number)	2004 - Farmington Territory /Nest Status (reproductive outcome)	Previous history of activity	Disturbance Score
TU-02 (105)	**Occupied territory**	03-occupied territory 02-occupied territory 01-active (ND) 00-active (s) 99-active (s) 98 active (s)	7-compressor 56.6 dB
WR-01 (124a,b, **c**) Tribal	**(124c) Active-Successful**	03-occupied territory 02-occupied territory 99-active (ND)	4
YL-01 (28a,b,c)	Inactive	02-occupied territory 01-occupied territory 00-active (s) 98-active (ND)	
YL-02 (114)	Inactive	03-occupied territory 99-active (s) 98-active (f)	

*Distance from the noise source to nest was not determined during 2004, therefore, the distance from 2000, 2001, and 2003 data was used.

(s)=successful nest, (f)=failed nest, (ND)=outcome not determined.

Summary of Golden Eagle activity, Farmington Resource Area, northwestern New Mexico, 2004.

Number of nests including alternates checked	44
Occupied Territories	19
Active Nests	14
Active Nests- outcome confirmed	14 (10 successful, 4 failed) three nests new
Sites re-occupied	5 nests, 13 territories

APPENDIX 2: Status of Golden Eagle breeding territories, Socorro Resource Area, west-central New Mexico, 2004.

HAI GE Nest Number (BLM Number)	2004 - Socorro Territory /Nest Status (reproductive outcome)	Previous history of activity	Disturbance Score
AH-01	Not checked	01-occupied territory	
BE-01 (525,530)	Inactive	03-occupied territory 98-active (ND)	
BL-01 (?)	Inactive		
BL-02 (54)	Inactive	98-active (ND)	
BL-03 (48)	Inactive	01-occupied territory 99-active (s) 98-active (ND)	
BL-04 (54)	**Active-Failed**	01-active (f) 98-active (ND)	4
BL-05 (54a-d)	Inactive		
BL-06 (79)	**Active-Successful** Fledged two young	03-occupied territory 01-occupied territory 99-active (s) 98-active (ND)	5
BS-01	Inactive	03-occupied territory	5
BS-02	Nest no longer exists		
BS-03 (329)	Nest no longer exists		
BS-04	Inactive		
BS-05	Nest no longer exists		
BS-06	Inactive	01-occupied territory	
BS-07	**Occupied territory**		
BS-08	Inactive	03-occupied territory	
CA-10	Not checked	00-active (ND)	
CS-01	Inactive	98-active (ND)	
CP-04 (35)	**Active – Successful** Fledged one young	03-active (s) 02-occupied territory 01-active (s) 00-active (s)	5

HAI GE Nest Number (BLM Number)	2004 - Socorro Territory /Nest Status (reproductive outcome)	Previous history of activity	Disturbance Score
DS-01 (375,376)	Inactive	03-active (f)	6
GN-01	Inactive	01-active (s) 98-active (ND)	5
HE-01	Inactive		
HE-02 (374)	Inactive	03-active (f)	5
HW-01 (522A)	Inactive	98-active (ND)	
Indian Peak	Not checked	01-active (s)	4
KW-20a,b	Not checked		
LD-11/LD-01 (337)	Nest no longer exists		
LD- (?) (209)	Nest no longer exists		
LD-03	Nest no longer exists		
LD-04	Nest no longer exists		
LD-05 (208)	Inactive		
LD-06 (208A)	Inactive		
LD-07 (210)	Inactive		
LD-08 (211, 211a)	Inactive		
LD-16 (333)	Inactive		
LD-09 (335)	Inactive		
LD-10 (336)	Inactive	01-active (ND)	
LD-12 (394)	Inactive		
LD-15 (397)	Inactive		
LL-01 (131)	Inactive	03-active (s) 01-active (s)	6
LL-03 (562)	Inactive		
LL-05 (133G)	Nest no longer exists		
LM-01 new	**Active-Successful** Fledged two young		

HAI GE Nest Number (BLM Number)	2004 - Socorro Territory /Nest Status (reproductive outcome)	Previous history of activity	Disturbance Score
LP-01/LP-02 (539,540)	Inactive	03-occupied territory 01-active (s) 99-active (ND) 98-active (ND)	4
MA-01 (81a)	Inactive	01-occupied territory 99-active (ND) 98-occupied territory	
MA-02 (82**a**,b,c)	**(82a)Active – Successful** Fledged two young	03-active (s) 02-active (s)	5
MA-03 (61)	Nest no longer exists		
MC-01	Not checked		
MP-01 (563)	Nest no longer exists		
MY-01	Inactive		
MY-02	Inactive		
MY-03	Inactive		
MY-04	Inactive		
MY-10 (?)	Nest no longer exists	01-occupied territory 00-active (ND)	
MH-01 (16)	Nest no longer exists		
MH-02	Inactive		
MH 03	Nest no longer exists	99-active (f) 98-occupied territory	
PO-01	Inactive	02-occupied territory	
QM-01a,b (442a,b)	**(442a) Active – Successful** Fledged one young	03-active (s) 02-occupied territory 01-occupied territory	6
SA-01	Inactive	03-active (f)	5
SP-01	Not checked	03-occupied territory	
SV-01a (343,342)	Inactive	98-active (ND)	

HAI GE Nest Number (BLM Number)	2004 - Socorro Territory /Nest Status (reproductive outcome)	Previous history of activity	Disturbance Score
SV-01b	Inactive		
SG-01 (464,465)	Inactive	98-active (ND) 99-active (f)	
SS-20 (?)	Not checked	01-occupied territory	
SZ-01 (283)	Inactive	02-active (s) 01-active (s) 00-active (s)	6
SZ-02 (67)	Inactive	01- active (ND) 99-active (s) 98-occupied territory	
SZ-03 (284b)	Inactive		
SZ-04 (?)	Nest no longer exists		
TM-01 (15)	**Active - Failed**	03-active (f) 01-active (s) 00-active (s) 98-active (ND)	6
TM-02 (60)	**Active – Successful** Fledged one young	03-active (f) 02-occupied territory 01-occupied territory 00-active (f) 98-active (ND)	6
TM-03 (?)	Nest no longer exists		
TM-05 (73a,b)	Inactive	02-occupied territory 01-occupied territory	
ZL-01a,b (1,2)	**Active - Failed**	03-active (f) 01-active (s) 00-active (s) 99-active (s)	6

(s)=successful nest, (f)=failed nest, (ND)=outcome not determined.

Summary of Golden Eagle activity, Socorro Resource Area, west-central New Mexico, 2004.

Number of nests including alternates checked	47
Occupied territories	10
Active nests	9
Active nests – outcome confirmed	9 (6 successful, 3 failed) one nest new
Sites re-occupied	7 nests, 7 territories

APPENDIX 3: Golden Eagle nest status and corresponding noise levels, Farmington Resource Area, northwestern New Mexico, 2004.

BLM Nest Number (HAI#)	Nest Status in 2004	Nest distance from nearest noise source (m)	Noise level at 20 meters from compressor/ air exchanger (dB)	Extrapolated noise level at the nest* (dB)
82a (AR-01)	Inactive	404**	74 @ 10 meters**	74-32.1= **41.9**
83 (AR-02)	Inactive	464**	56**	56-27.31= **28.7**
135 (CD-01)	**Active-Failed**	322**	81**	81-24.14= **56.16** Noise source not present in 2004.
121 (CD-02)	Inactive	480**	85**@compressor 82**@air exchanger	85-27.6= **57.4** 82-27.6= **54.4**
117a (KE-01)	Inactive	966**	81**	81-33.68= **47.32**
128 (FC-10)	Inactive	563**	82**	82-28.98= **53.02**
102a,b,c (TU-01)	102a - Inactive 102b – Inactive 102c – Inactive	85** 535** >2000 meters	74** 74** N/A	74-12.57= **61.43** 74-28.55= **45.45** No noise impact
105 (TU-02)	**Occupied territory**	236**	78**	78-21.44= **56.56**

* Equation for changes in noise levels dBA= 20 (10 log (distance 1/distance 2)).
(Reference distance 2 = 20 meters, distance 1 = nest distance from noise source).

** Since the nest distance from compressor and air exchanger was not provided for 2004, it was assumed the locations and noise levels were the same as in 2000 - 2003, and this data was used in the equations.

APPENDIX 4: Comparison of nest status and noise levels for Golden Eagle nests, Farmington Resource Area, northwestern New Mexico, 2000 - 2004.

BLM # (HAI #)	Nest Status and Outcome					Extrapolated Noise Level at Nest (dB)				
	2000	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**
82a (AR-01)	Inactive	Active (ND)	Inactive	Active (S)	Inactive	No Data	58.87	58.87**	41.9	41.9**
83 (AR-02)	Active (ND)	Activity Unknown	Inactive	Inactive	Inactive	37.7 and 40.9	28.7	28.7**	28.7**	28.7**
135 (CD-01)	Inactive	Active (S)	Inactive	Occupied Territory	Active (F)	No Data	56.2	56.2**	56.2**	Noise source not present
121 (CD-02)	Active (S)	Inactive	Occupied Territory	Inactive	Inactive	47.9 and 46.5	57.5 and 54.4	57.5 and 54.4**	57.5 and 54.4**	57.5 and 54.4**
128 (FC-10)	Activity Unknown	Activity Unknown	Inactive	Inactive	Inactive	0.0	53.0	53.0**	53.0**	53.0**
117a (KE-01)	Inactive	Inactive	Active (F)	Occupied Territory	Inactive	No Data	47.3	47.3**	47.3**	47.3**
102a,b,c (TU-01)	102a Active (S)	Occupied Territory	102b Active (S)	102c Active (S)	Inactive	35.8 and 46.6	65.32	102a-61.4 102b-45.4	102a-61.4** 102b-45.4** 102c-0.0	102a-61.4** 102b-45.4** 102c-0.0
105 (TU-02)	Active (ND)	Active (ND)	Occupied Territory	Occupied Territory	Occupied Territory	51.3	56.56	56.56**	56.56**	56.56**

** Since the nest distance from compressor and/or air exchanger was not obtained, it was assumed the locations and noise levels were the same as when last taken.

(S) Successful
(F) Failed
(ND) Outcome Not Determined