Nest Site Activity and Reproductive Success of the Ferruginous Hawk in New Mexico, 2002 Annual Report

Prepared for:

Bureau of Land Management Farmington and Socorro Field Offices and the Rocky Mountain Bird Observatory

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Introduction:

The Ferruginous Hawk *(Buteo regalis)* is the largest buteo found in western North America. They prefer open grasslands and shrub-steppe communities. Ferruginous Hawks breed from northeastern Washington, southern Alberta and southern Saskatchewan, south to eastern Oregon, western Nevada, southern California, and northern Arizona, and east through northern Texas, western Oklahoma, and eastern North Dakota (National Geographic Society 1987; Bechard 1995). Although it occurs sympatrically with other buteos throughout its range, the Ferruginous Hawk generally shows the strongest preference for grassland habitats (Gilmer 1983; Schmutz 1987). Ferruginous Hawks also appear to choose breeding territories that are more remote from human activities than do Swainson's Hawks (*Buteo swainsoni),* and Red-tailed Hawks *(Buteo jamaicensis)* (Bechard 1990). Many studies have demonstrated that their choice of nest substrate is substantially lower (typically less than 10 meters) than those of other species (Wolfe. 1976; Blair 1982; Green 1983; Woffinden 1983; Bechard 1990; Restani 1991). Substrates chosen include power poles, juniper trees, rock or clay outcrops, willows and deciduous trees. Ferruginous Hawks are also known to nest on the ground.

In terms of diet, Ferruginous Hawks are mammal specialists. Species typically found in pellets and prey remains of breeding pairs include ground squirrel (*Spermophilus spp*), Pocket Gopher (*Thomomys spp*), Black-tailed jackrabbit (*Lepus californicus*), Gunnison's prairie dog (*Cynomus gunnisoni*), and cottontail (*Sylvilagus spp*) (Howard R.P. 1976; Wolfe. 1976; Wakely 1978; Hawks Aloft 2000). In addition, prairie dogs are thought to be important in terms of winter resources (Cully 1991).

Declines in Ferruginous Hawk populations have been documented throughout much of its historic range (Woffinden 1977; Houston 1984; Woffinden 1989; Kirk 1998). As a result of this observed decline, the species was petitioned for listing under the Federal Endangered Species Act in 1991. This petition was rejected and the species is currently listed as a Species of Concern by the U.S. Fish and Wildlife Service, and a Sensitive Species by the Bureau of Land Management (Bechard 1995). Proposed reasons for population declines include loss of suitable nesting habitat to cultivation, loss of prey density, and various human-related disturbances. In Alberta, J.K. Schmutz documented that Ferruginous Hawks avoided areas that were over 50% cultivated (Schmutz 1984) and that they will cluster in good habitat rather than move to less suitable habitat (Schmutz 1989). Many studies have shown that populations of breeding Ferruginous Hawks are dependent on the density of their dominant prey items (Woffinden 1977; Smith 1981; Steenhof 1985; Schmutz 1989; Woffinden 1989). In recent studies human activities such as mineral and resource extraction have also been documented to cause reduced productivity or nest abandonment (Olendorff 1993; Zelanak 1997).

Ferruginous Hawks were documented in New Mexico as being densely populated in the Plains of St. Agustin (Bailey 1928). (Ligon 1961) also stated that Ferruginous Hawks were present in this area and documented their use of prairie dogs as an important food source. In the times of Ligon's surveys, shooting of the Ferruginous Hawk was prevalent and already a significant cause for a decline in numbers. Since that time, prairie dogs have largely been extirpated from the Plains of St. Agustin. Surveys conducted in 2000

found only five active prairie dog towns with an average size of 248,949 square meters. The five prairie dog towns ranged in size from 21,455 square meters to 858,307 square meters, and Ferruginous Hawk nests were not found to be located in close proximity to these towns, unlike in other areas of New Mexico (Hawks Aloft 2000). Although the number of active nests on the Plains of St. Agustin at the time of Ligon and Bailey's surveys is unknown, it appears from the language of their reports that there has been a significant decline in the number of Ferruginous Hawks for that area.

Another area in New Mexico that was historically known to support larger numbers of breeding Ferruginous Hawks is the badlands of San Juan County (Ramakka 1993). In surveys conducted between 1981 and 1988, active nests ranged from three to seven annually on Bureau of Land Management (BLM) lands and five to nineteen nests annually on Navajo Nation lands in the same region. The number of active nests located on BLM lands from 1998-2002 has remained relatively stable since the surveys began.

Hawks Aloft, Inc. was contracted by the BLM in the Socorro and Farmington resource areas to conduct surveys to determine the demographics and reproductive success of the Ferruginous Hawk in the northwestern and west-central parts of New Mexico. These areas contain important habitat for nesting Ferruginous Hawks. In addition to these areas, Hawks Aloft included the Estancia Valley in 1998 and the Northeast Plains in 2001. Both of these additional areas were observed to support a relatively high density of Ferruginous Hawks. The main objective of these studies is to determine the population trends of the Ferruginous Hawk in regions where they breed. By documenting important breeding areas and identifying any significant population declines, important data can be provided to resource managers to help them make effective and timely decisions.

Study Areas:

Estancia Valley

The Estancia Valley is a closed basin in central New Mexico east of the Sandia and Manzano mountains and west of the Pedernal Hills. The area extends north to the Galisteo Valley and south to the Chupadera Mesa. It is a closed basin of approximately 5,120 square kilometers. The dominant vegetation types are Juniper Savanna, Plains-Mesa Grassland, Closed Basin Scrub, and cultivated agricultural fields (Dick-Peddie 1993). The dominant grass in the area is blue grama (*Bouteloua gracilis*). Widely scattered juniper trees are common (*Juniperus monosperma*) and some exotic trees also occur that are associated with abandoned homesteads . Ownership in the valley is largely private with land use including livestock grazing and agriculture. Much of the land has been divided into small fenced pastures. The survey area is located in Torrance County, which has been experiencing a large increase in human population growth in recent years.

Farmington Resource Area - Northwestern Badlands

This study area is located in the northwestern portion of New Mexico south of Farmington and north of Chaco Canyon. The Navajo Nation borders the survey area to the west and U.S. Highway 550 constitutes the eastern border. The dominant vegetation

types are Great Basin Desert Scrub and Desert Grassland (Dick-Peddie 1993). Black grama (*Bouteloua eriopoda*) is the most common grass and big sagebrush (*Artemesia tridentata*) is a common shrub throughout the area. The nesting sites mainly occur on sandstone hoodoos, cliffs or pinnacles. Land ownership in the study area is mainly Bureau of Land Management with a patchwork of state, native, and private lands occurring in some areas. Two important areas (the Bisti and De-Na-Zin) have been designated as BLM wilderness areas.

Socorro Resource Area - Plains of St. Agustin

The Plains of St. Agustin are a topographically closed basin in Socorro and Catron Counties. The study area is north of the Luera Mountains, west of the town Magdalena, south of the Gallinas, Datil, and Mangas Mountains, and east of the Tularosa Mountains. Dominant vegetation types include Plains-Mesa Grassland, Desert Grassland, Juniper Savanna and Coniferous and Mixed Woodland (Dick-Peddie 1993). Dominant grasses include blue grama and black grama, with juniper and pinyon pine (*Pinus edulis*) being the most common trees. For this report, we have included isolated patches of grassland found west of the town of Quemado in Catron County. The vegetation in these areas is similar to that found in the Plains of St. Agustin. Land ownership in this study area is a mix of private, state, United States Forest Service, and Bureau of Land Management. The dominant land use is livestock grazing, and resource extraction.

Northeast Plains

The Northeast Plains study area includes the grasslands of Union, Harding and Colfax counties, east of Interstate 25. Dominant vegetation types are typical to those found in Plains-Mesa Grassland along with cultivated agricultural areas (Dick-Peddie 1993). The dominant grass species is blue grama. Land ownership is mostly private, with the exception of Kiowa National Grassland, which is managed by the U.S. Forest Service. The area has largely been divided into smaller fenced pastures with livestock grazing being the dominant land use.

Methods:

Aerial Surveys

In 1998, aerial surveys were added to the methods for finding nests and determining nest activity. Aerial surveys were conducted from May 2 – 5, 2002 in a Cessna 205 with a pilot and two or three observers. Air speed during surveys was approximately 160 km/hour and the average elevation during the nest searches was 150 meters above ground. Transects (150 to 250 km apart) were conducted in areas of suitable habitat or in areas with known high densities of nests. Point checks were done on previously documented nests. New or previously undocumented nests found while conducting aerial surveys were recorded using a Garmin 92 Global Positioning System receiver designed for use in aircraft.

The primary purpose of the aerial surveys was to document activity at known nest sites during the incubation stage. Studies on disturbance have shown that Ferruginous Hawks are particularly sensitive to on-the-ground disturbance during this time period and may abandon their nests, while overhead aircraft seem to have a minimal disturbance effect. Nests to which ground access was denied by private landowners were also checked via aerial surveys.

A nest was considered to be "active" if one or more of the following was observed: 1) a bird was observed in the incubating position, 2) eggs were observed in the nest, or 3) young were observed in the nest. A territory was considered "occupied" if birds were observed in the vicinity of the nest and/or exhibited territorial behavior. A nest was considered "inactive" if no birds were observed in the area.

Ground Surveys and Nest Monitoring

Ground surveys began on May 2, 2002 and ended July 14, 2002. During the incubation period, visits to the nest area were short and monitoring took place at a minimum of 250 meters from the nest (White 1985). Observations were made using 8 or 10x binoculars and 20-60x field spotting scopes. Once nest activity was determined at the known nests, ground searches were conducted to identify previously undocumented or new nests. Active nests were visited at least three times during the survey period. Observations were made to include the number and age (Moritsch 1985) of chicks present in the nest, prey items delivered by adults, and a general assessment of potential disturbance factors (i.e. proximity to roads and human habitation).

Banding

Because continuing drought conditions appeared to be making it a very difficult nesting season for the Ferruginous Hawk, there was no banding conducted during the 2002 field season. This decision was made in order to keep nest disturbance and the concomitant stress to the young hawks at an absolute minimum.

Fledgling Number

A nestling was considered to have fledged if it reached the age of 40+ days even if it was still physically present in the nest. Nests were checked periodically until that time at which all the chicks were fledged. Nests were checked for fresh prey remains after all the nestlings had fledged. A successful nest was one that fledged at least one chick.

Results:

Nest Site Selection

For this report, nests were only included if they had been active Ferruginous Hawk nests during one or more years between 1998-2002. Although other nests were located that were most likely constructed by Ferruginous Hawks, differences in survey intensity and documentation prohibited their inclusion as inactive nests for this study.

In all five years, a total of 118 Ferruginous Hawk nests with a history of activity were found in the four study areas combined. The nest substrates used by Ferruginous Hawk and the relative occurrence of each in the study areas are shown in Table 1.

Table 1: Nest substrate selection and relative occurrence in the Farmington, Estancia, Socorro, and NE Plains study areas, New Mexico.

Study areas	Deciduous Tree	Juniper Tree	Rock Cliff/Spire	Snag	Manmade Structure	Pinyon Pine	Ponderosa Pine	Total
Farmington	0	0	11 (100%)	0	0	0	0	11
Estancia	18 (44%)	17 (41%)	0	2 (5%)	3 (7%)	0	1 (3%)	41
Socorro	1 (3%)	23 (72%)	0	2 (6%)	1 (3%)	5 (16%)	0	32
NE Plains	25 (73%)	3 (9%)	1 (3%)	4 (12%)	1 (3%)	0	0	34
Totals for All Areas	44 (37%)	43 (36%)	12 (11%)	8 (7%)	5 (4%)	5 (4%)	1 (1%)	118

The average height for the nest substrate (n=78 for this analysis) was 6.1 meters (1.8-18.5 meter range) and average nest height was 4.7 meters (n=78, 1.5-18.5 meter range).

Reproductive Success

Appendix A shows all the nests documented within the study areas, the history of reproductive activity, the current year's outcome, and the current year's number of chicks fledged. Table 2 gives a summary of the reproductive success of the 2002 season from all the study areas.

In 2002, 67.1% of the total known nesting attempts for all areas combined, resulted in the successful fledging of at least one chick. The total average number of chicks per nesting attempt was 1.26+, and the average number of chicks per successful nesting attempt was 1.87+.

In order to compare productivity, we compiled the results from 1998-2002 in the Estancia, Farmington, and Socorro study areas. These results are depicted in Figures A-C. After three years of productivity data are collected from the northeast plains, the results will be incorporated with the other study areas for comparison.

Table 2: Summary of Ferruginous Hawk nesting activity and reproductive success, New Mexico, 2002.

Study Area	Confirmed Nesting Attempts	Number of Successful Nests	Total # of chicks produced	Ave.# of Chicks per nesting attempt	Ave. # of Chicks per successful nesting attempt
Farmington Resource Area	4	0	0	0	0
Socorro Resource Area	13	8	14+	1.08	1.75
Estancia Valley	16	9	18	1.1	2.0
Northeast Plains	15	14	26+	1.7	1.8

Figure A: Total number of active Ferruginous Hawk nests in the Estancia, Farmington, and Socorro study areas, New Mexico, 1998-2002.

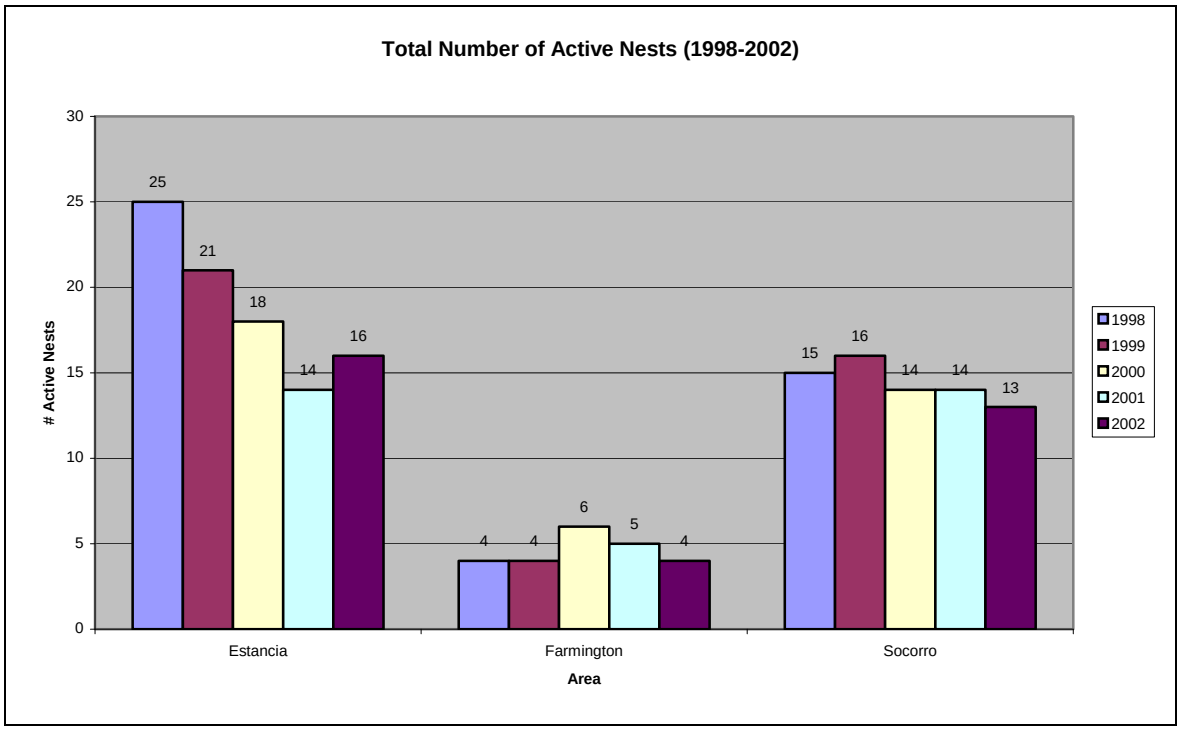


Figure B: Percentage of active nests that produced young, New Mexico, 1998-2002.

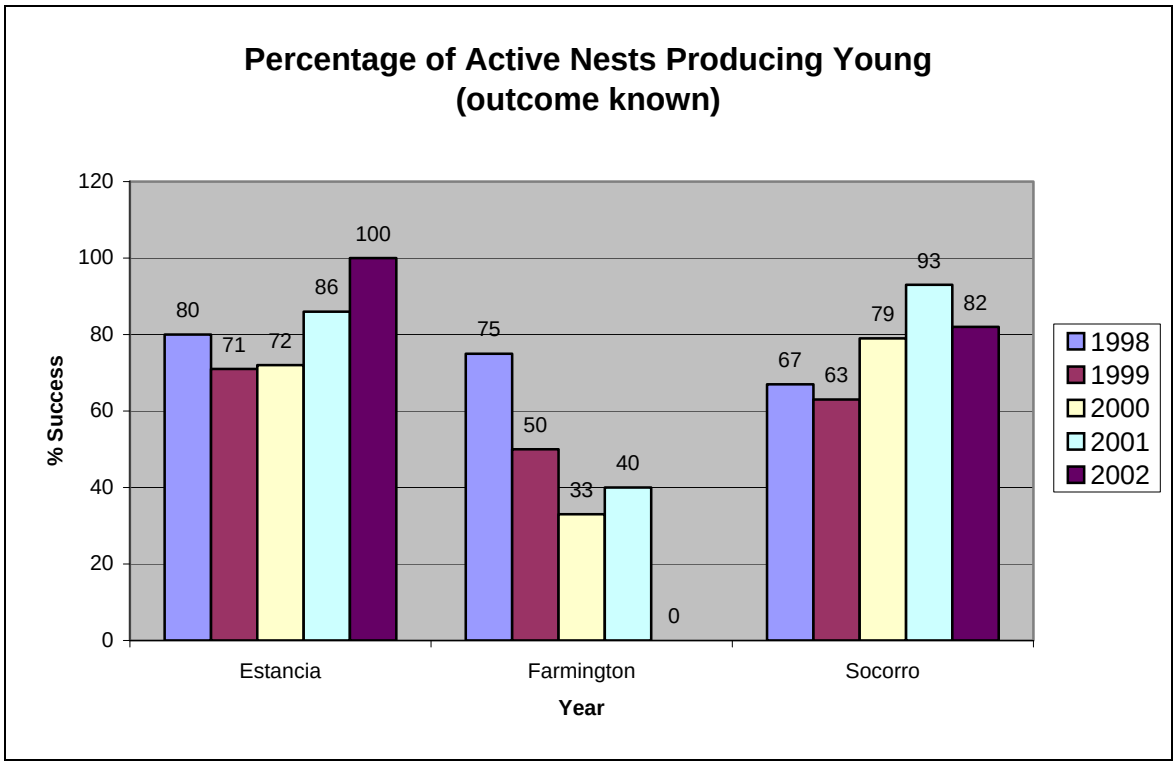
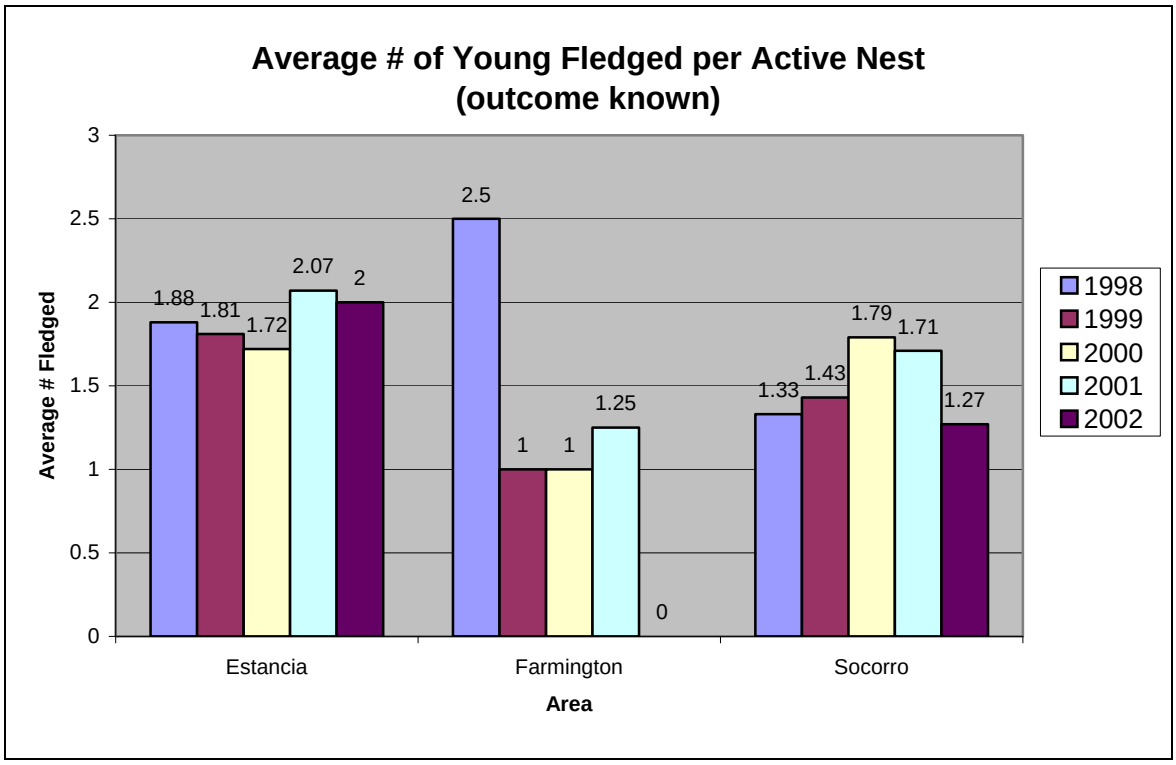
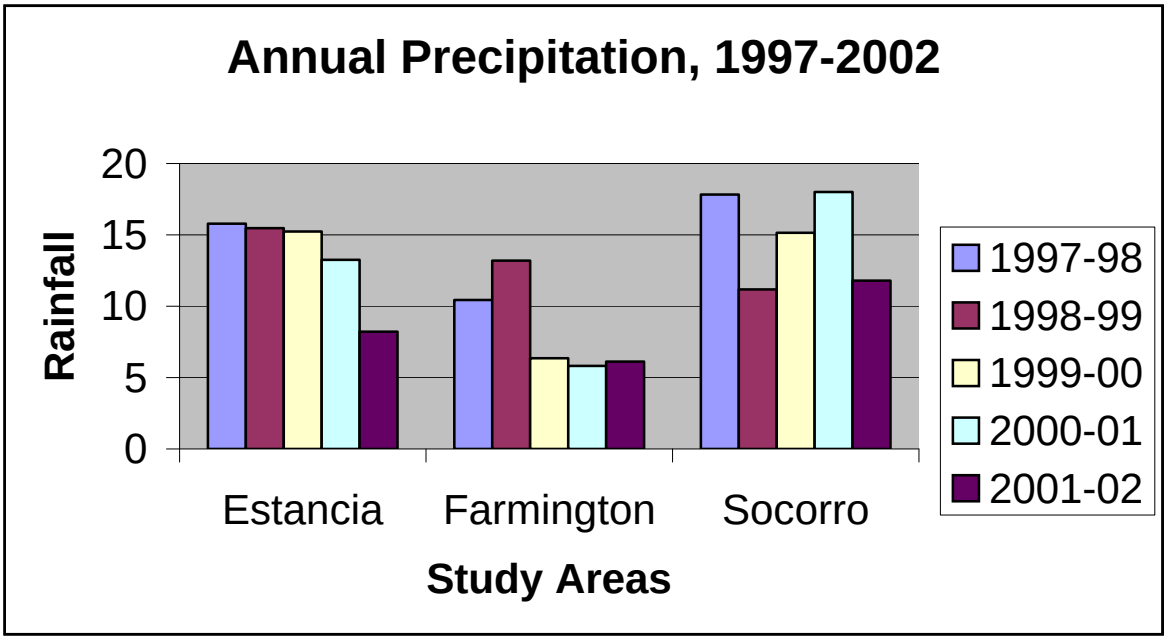


Figure C: Average number of young fledged per active nest, New Mexico, 1998-2002.



One of the factors that may be a possible contributor to raptor reproductive success is precipitation and its effect on prey population densities (Steenhof 1997). To compare annual precipitation with the reproductive success of Ferruginous Hawk, precipitation data was collected from the Western Regional Climate Center website found at: www.wrcc.dri.edu/cgi-bin/cliMAIN. Weather stations were chosen based on their proximity to centers of nest densities and the consistency of the data collected (i.e. least number of missed days). The weather stations used were; Chaco Canyon National Monument, Augustine 2E, Estancia, and Pasamonte. The amount of precipitation for each year includes the monthly totals from July of the preceding year through June of the nesting year. Figure D depicts the annual precipitation data obtained for 1998-2002.

Figure D: Annual precipitation for Estancia, Farmington, and Socorro study areas, New Mexico, 1997-2002.



Annual precipitation data was also obtained for the northeast plains, but was not used for comparison. Annual precipitation for 2001-2002 was 9.98 inches, almost half the precipitation that fell in 2000-2001 (17.89 inches). After three years of data collection, northeast area precipitation amounts will also be compared with the other areas.

Discussion:

Nest site selection depends on the available substrates and the surrounding habitat characteristics and land use. In the grassland habitat of the Estancia Valley and northeastern plains juniper and deciduous trees are the most common substrates used. In the west-central area juniper trees are the most utilized nest substrate. In the northwest area Ferruginous Hawks prefer to nest in the badland areas where typically no trees occur, and nests are built almost exclusively atop rock pinnacles and hoodoos.

Annual rates of precipitation and its effects on Ferruginous Hawk nesting success remain unclear. The year 2002 was another particularly dry one statewide and nest activity, along with nest success, did appear to be down. The northwest study area is typically the driest and has been experiencing back to back drought years. This area also had four active nests, all of which failed. A number of Ferruginous Hawk nests in the northwest study area are on Navajo Nation land and are monitored by David Mikesic of the Navajo Natural Heritage Program. Reduced nest activity and success on Navajo Nation land appeared to be similar to what was found on BLM lands (D. Mikesic, pers. comm.). In general, all study areas had reduced nesting activity when compared with the previous years data (1998-2001).

Studies showing a 66% first year mortality in Ferruginous Hawks and a 25% adult mortality have estimated that in order to maintain a stable population, the number of chicks per nesting attempt must be at least 1.5 (Woffinden 1989). Based upon this estimate, only the northeast plains fledged the minimum recruitment number required to maintain a stable population during 2002. However, the number of chicks fledged per nest has likely been underestimated as a result of limited access to some of the nest sites which resulted in the outcome of those nests being unknown. This was particularly the case in the Estancia Valley where the outcome was not determined for seven of the 16 active nest sites.

The Estancia Valley has consistently had the most active nests along with the highest productivity rates of the areas studied since 1998. The northeast plains, based on the past two years may also be a highly productive area for Ferruginous Hawk. These two areas also provide the best habitat for Ferruginous Hawk.

A decline in the number of nesting attempts made by Ferruginous Hawks may be due to human disturbance and/or a decrease in prey density. In the two areas with the highest Ferruginous Hawk populations, active prairie dog towns appear to occur in greater numbers. Prey remains collected from Estancia Valley nests in 2000 indicate that prairie dogs may be a significant component in the diet of Ferruginous Hawks in that area (Hawks Aloft 2000).

Overall, nest failures seemed to be higher in 2002 when compared to previous years. This was particularly the case for the northwest study area where conditions were the driest. While human disturbance to nest sites is likely a factor, nest failures for 2002 seemed to be related more to environmental conditions and its effect on the prey base. In the Estancia Valley and northeast plains study areas, prairie dog control may also be having an adverse effect on Ferruginous Hawk populations.

Recommendations:

In order to determine the effects of prey availability for Ferruginous Hawk, small mammal surveys should be conducted in areas of high nesting densities. A greater effort should be made to evaluate prey selection by nesting pairs. The use of nest cameras should be explored to gain better information on prey selection and nest failures.

Increased time and effort should be spent in each area to more accurately document reproductive success and occupied territories.

More time should be spent searching for nests in areas that contain isolated islands of suitable habitat to document their importance for the Ferruginous Hawk.

Geographic Information Systems (GIS) software should be used to conduct a spatial analysis of Ferruginous Hawk populations using a variety of different parameters (i.e. vegetation, human population distribution, etc.)

Personnel:

This report was prepared by Ron Kellermueller, Diurnal Raptor Project Coordinator and edited by Lynn Alterman, Songbird Project Coordinator. Field investigations were conducted by Seamus Breslin, Ron Kellermueller, and Will Keeley. Aerial surveys were conducted by Seamus Breslin, Gail Garber and Will Keeley. Jerry Hoogerwerf of Socorro Air Taxi piloted the Cessna 205 aircraft and assisted with observations for all aerial surveys. Cover photo by Ron Kellermueller.

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Appendix A: Estancia Valley, New Mexico.

HAI Nest #	BLM Nest #	Study Area	Substrate	Years Active	Outcome 2002	# of Young Fledged 2002
BD01aFH		Estancia	juniper	1998		
BD02aFH		Estancia	juniper	1998		
CH01aFH		Estancia	deciduous	2001, 02	Success	3
EG01aFH		Estancia	deciduous	2001, 02	Success	1
ES01aFH		Estancia	ponderosa pine	1998,99,00		
EW01aFH		Estancia	deciduous	1998		
EW02aFH		Estancia	snag	1998, 2000		
EW03aFH		Estancia	juniper	1998, 99, 00, 01, 02	Success	2
EW04bFH		Estancia	juniper	1998, 99, 00		
EW07aFH		Estancia	platform	1999		
EW10aFH		Estancia	juniper	2000, 02	Unknown	Unknown
GQ02aFH		Estancia	juniper	1998, 99, 00, 02	Unknown	Unknown
GQ03FH		Estancia	juniper	2002	Success	3
KD01aFH		Estancia	deciduous	1998, 99		
KD02aFH		Estancia	snag	2001, 02	Unknown	Unknown
LS01aFH		Estancia	windmill	2001, 02	Unknown	Unknown
ME01aFH		Estancia	deciduous	1998, 2000		
MN01aFH		Estancia	juniper	1998, 99		
MN02aFH		Estancia	deciduous	1998		
MN03aFH		Estancia	deciduous	1998, 99, 00, 01, 02	Success	3
MN05aFH		Estancia	deciduous	1999, 01		
MN06aFH		Estancia	deciduous	1999, 02	Success	1
MR01aFH		Estancia	deciduous	1998, 99		
MR02aFH		Estancia	deciduous	1998, 99, 00		
MR05aFH		Estancia	juniper	1999		
MS01aFH		Estancia	deciduous	1998, 99, 01, 02	Success	2
MS10aFH		Estancia	power pole	2000, 01, 02	Success	2
MT01aFH		Estancia	juniper	1998, 99, 00, 01		
MT03aFH		Estancia	deciduous	1998, 99, 00		
MT04aFH		Estancia	juniper	1998, 99		
MT07aFH		Estancia	juniper	1999, 2000		
MT11aFH		Estancia	deciduous	2000		
SD01aFH		Estancia	deciduous	1998, 02	Success	1
TE05FH		Estancia	juniper	2002	Unknown	Unknown
TR01aFH		Estancia	deciduous	1998, 99, 01		
TR01bFH		Estancia	deciduous	2002	Unknown	Unknown
TR02aFH		Estancia	juniper	1998, 99, 00		
TR03aFH		Estancia	juniper	1998, 00, 01		
TR04aFH		Estancia	juniper	1998		
TR07aFH		Estancia	deciduous	1999, 00, 01,02	Unknown	Unknown
WD01aFH		Estancia	juniper	1998, 00		

Appendix A continued: Farmington Resource Area and the Northeast Plains, New Mexico.

HAI Nest #	BLM Nest #	Study Area	Substrate	Years Active	Outcome 2002	# of Young Fledged 2002
AE01aFH		Farmington	Rock Spire	1998		
AE03aFH	32	Farmington	Rock Spire	2001,02	Failed	0
AE05aFH?	132	Farmington	Rock Spire	1999, 01		
AE10aFH		Farmington	Rock Spire	2000		
AE11aFH		Farmington	Rock Spire	2000		
AW01aFH	118	Farmington	Rock Spire	1998, 99		
AW09bFH?	125	Farmington	Rock Ledge	1999		
AW11aFH?	134	Farmington	Rock Spire	2000, 01		
BL10aFH		Farmington	Rock Spire	2000		
KE01aFH	41	Farmington	Rock Spire	1998		
PB04FH	21c	Farmington	Rock Spire	1998, 99, 00, 01, 02	Failed	0
PB11FH	6a,b,c	Farmington	Rock Spire	2000		
AA01aFH		NE Plains	deciduous	2001, 02	Success	1
AB01aFH		NE Plains	deciduous	2001, 02	Success	2
AI01aFH		NE Plains	deciduous	2001, 02	Success	1
AS01aFH		NE Plains	cliff	2001		
BB01aFH		NE Plains	deciduous	2001		
BG01aFH		NE Plains	deciduous	2001		
BU01aFH		NE Plains	snag	2001		
CL01aFH		NE Plains	deciduous	2001		
CU01aFH		NE Plains	deciduous	2001, 02	Success	2
CY01aFH		NE Plains	snag	2002	Success	1+
FA01aFH		NE Plains	deciduous	2001, 02	Failed	0
FA02aFH		NE Plains	snag	2002	Success	1
FO01aFH		NE Plains	deciduous	2001, 02	Success	1+
GR01aFH		NE Plains	deciduous	2001		
KI01aFH		NE Plains	deciduous	2001, 02	Success	2
KL01aFH		NE Plains	juniper snag	2001		
KL02aFH		NE Plains	deciduous	2002	Success	3
LI01aFH		NE Plains	juniper	2001		
LI02aFH		NE Plains	juniper	2001		
MI01aFH		NE Plains	deciduous	2001		
MO01aFH		NE Plains	deciduous	2002	Success	2
PA01aFH		NE Plains	deciduous	2001		
PH01FH		NE Plains	deciduous	2002	Success	1
RA01aFH		NE Plains	deciduous	2001		
RE01aFH		NE Plains	deciduous	2001, 02	Success	4
RO01aFH		NE Plains	old windmill	2001		
RX01aFH		NE Plains	deciduous	2001		
SE01aFH		NE Plains	deciduous	2001, 02	Success	2
SH01aFH		NE Plains	deciduous	2002	Success	3
SN01aFH		NE Plains	deciduous	2001		
TH01aFH		NE Plains	deciduous	2001		
TP01aFH		NE Plains	deciduous	2001		
TY01aFH		NE Plains	juniper	2001		
YA01aFH		NE Plains	deciduous	2001		

Appendix A continued: Socorro Resource Area, New Mexico.

HAI Nest #	BLM Nest #	Study Area	Substrate	Years Active	Outcome 2002	# of Young Fledged 2002
AG01FH	97-14	Socorro	juniper	97, 2002	Success	1
AG20aFH		Socorro	snag	2001, 02	Success	2
AH02aFH	435	Socorro	juniper	1998, 99, 00, 01, 02	Failed	0
AH03aFH	438	Socorro	deciduous	1998		
AH04aFH	599	Socorro	juniper	1998, 99		
AH05aFH	595-a	Socorro	juniper	1999, 00		
AH06aFH	595-f	Socorro	juniper	2001, 02	Success	2
AH10aFH		Socorro	pinyon	2000, 01		
AP01aFH	612,613	Socorro	juniper	1998, 02	Unknown	Unknown
CN01aFH		Socorro	juniper	1999, 02	Success	3
CN01bFH		Socorro	juniper	2000, 01		
CN03aFH		Socorro	juniper	1999, 00, 01, 02	Success	1
CW01aFH		Socorro	juniper	1998, 99, 00, 01		
HW01bFH		Socorro	juniper	1998, 00, 01,02	Success	2
HW02aFH		Socorro	pinyon	1999		
LN01aFH		Socorro	juniper	1999, 00, 01		
MA01FH		Socorro	juniper	2002	Success	2
MG10aFH		Socorro	juniper	2000, 02	Failed	0
OG01aFH		Socorro	pinyon	1999, 00, 02	Unknown	Unknown
OP01aFH	97-16	Socorro	platform	1998, 01, 02	Success	1+
OP20aFH		Socorro	pinyon	2001, 02	Failed	0
SG01aFH	97-21	Socorro	juniper snag	1999, 2001		
SG01bFH		Socorro	juniper	1998, 00		
SG02aFH	459	Socorro	juniper	1998, 99, 00		
TE01aFH		Socorro	juniper	1998, 00		
TE02aFH		Socorro	juniper	1998		
TE03aFH		Socorro	juniper	1998		
TE04aFH		Socorro	juniper	1999		
TJ01aFH		Socorro	pinyon	1998, 00,	Occupied Territory	
TJ01bFH		Socorro	juniper	1999, 01		
TS01aFH	597	Socorro	juniper	1998, 99		
TS02aFH	596	Socorro	juniper	1998, 99		