

LA-UR-15-22044

Approved for public release; distribution is unlimited.

Title: Raptor Use of the Rio Grande Gorge

Author(s): Ponton, David A.

Intended for: Historical Documentation

Issued: 2015-03-20

Disclaimer:

Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the Los Alamos National Security, LLC for the National Nuclear Security Administration of the U.S. Department of Energy under contract DE-AC52-06NA25396. By approving this article, the publisher recognizes that the U.S. Government retains nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.

RAPTOR USE OF THE RIO GRANDE GORGE

This report is a re-publication of Los Alamos National Laboratory memo report WX-1-80-390 originally published November 26, 1980 for a project done from 1978 through 1980 Under the Laboratory's former name of Los Alamos Scientific Laboratory.

DAVID A. PONTON
LOS ALAMOS NATIONAL LABORATORY
GROUP W-4
PO BOX 1663
LOS ALAMOS, NEW MEXICO 87545

WX-1-80-390

November 26, 1980

RAPTOR USE OF THE RIO GRANDE GORGE

David A. Ponton
Los Alamos Scientific Laboratory
P. O. Box 1663
Los Alamos, NM 87545

TABLE OF CONTENTS

	Page
Introduction	1
The Environment	2
Topography	2
Climate and Vegetation	5
Land Use	5
Winter Use by Birds of Prey	9
Nesting Birds of Prey	11
Methods	11
Results	11
Golden Eagle	13
Red-tailed Hawk	14
Prairie Falcon	15
Other Species	16
Endangered Species	17
Occupancy	17
Total Nesting Population	17
Maximum Nesting Population	18
Discussion	18
Impact of River Running and Other Recreation on Nesting Birds of Prey	22
Comments on Nest Locating and Modes of Travel	25
Conclusions and Recommendations	26
Acknowledgments	28
Literature Sighted	29
Appendixes	30

Introduction

The Rio Grande Gorge is a 115 km long river canyon located in Southern Colorado (15 km) and Northern New Mexico (100 km). The majority of the canyon is under the administration of the Bureau of Land Management (BLM), and 77 km of the canyon south of the Colorado/New Mexico border are designated Wild River under the National Wild and Scenic Rivers Act of 1968.

Visits I have made to the Rio Grande Gorge over the past 15 years disclosed some raptor utilization. As the Snake River Birds of Prey Natural Area gained publicity, its similarity to the Rio Grande Gorge became obvious, and I was intrigued by the possibility of a high raptor nesting density in the Gorge. A survey in 1979 of 20 km of the northern end of the canyon revealed a moderately high density of red-tailed hawks and prairie falcons. With the encouragement of that partial survey, and a need to assess the impact of river-running on nesting birds of prey, I made a more comprehensive survey in 1980. The results of my surveys, along with those of a 1978 helicopter survey by the BLM, are presented in this report, as well as general characterization of the area, winter use by raptors, and an assessment of factors influencing the raptor population.

The Environment

Topography

The Rio Grande Gorge cuts through the Taos Plateau, which lies 2200 m above sea level between prongs of the Southern Rocky Mountains. The canyon is part of the Rio Grande Rift and was formed in the late Cretaceous Period and early Tertiary Period. The walls of the canyon are composed mainly of basaltic lava. For assessment purposes, the canyon was divided into river units, each river unit containing 10 km of river, measured along its centerline. River units originate at the Colorado/New Mexico border, and are numbered consecutively north into Colorado, with the suffix CO, and consecutively south into New Mexico. The layout of the river units can be seen in Fig. 1, with some general topography. One unit, 1 CO, is only 5.3 km long due to the termination of the canyon. Cliffs suitable for raptor nesting occur throughout the canyon. Table 1 shows the canyon size and approximate cliff area for each river unit, determined from topographic maps and field observations. The size of the canyon increases dramatically from north to south. The largest cliff area occurs in unit 7 where the canyon is narrow and deep.

The Taos Plateau is generally flat. Large volcanic mountains are widely scattered, and hills are common on the western side of the Rio Grande Gorge. Large wooded hills approach the canyon from the east (Guadalupe Mountains), and a series of canyons and hills break the plain on the east between the Guadalupe Mountains and Arroyo Hondo. The Sangre de Cristo mountains have their foothills 13 km to the east of the gorge and rise to 4000 m above sea level, providing a natural eastern boundary. The Tusas Ridge, rising to 3000 m above sea level, is the principal topographic boundary to the west, approximately 30 km from the canyon. The land within these natural boundaries is called the Punche Valley.

Table 1

Canyon Characteristics

<u>River Unit</u>	<u>Mean Width (m)</u>	<u>Median Depth (m)</u>	<u>Cliff Area (10³ m²)</u>
2 C0	127	25	50
1 C0	141	37	400
1	156	41	375
2	126	47	400
3	195	59	400
4	391	128	800
5	914	192	900
6	496	156	750
7	347	143	1200
8	616	181	750
9	1110	220	750
10	2150	281	500

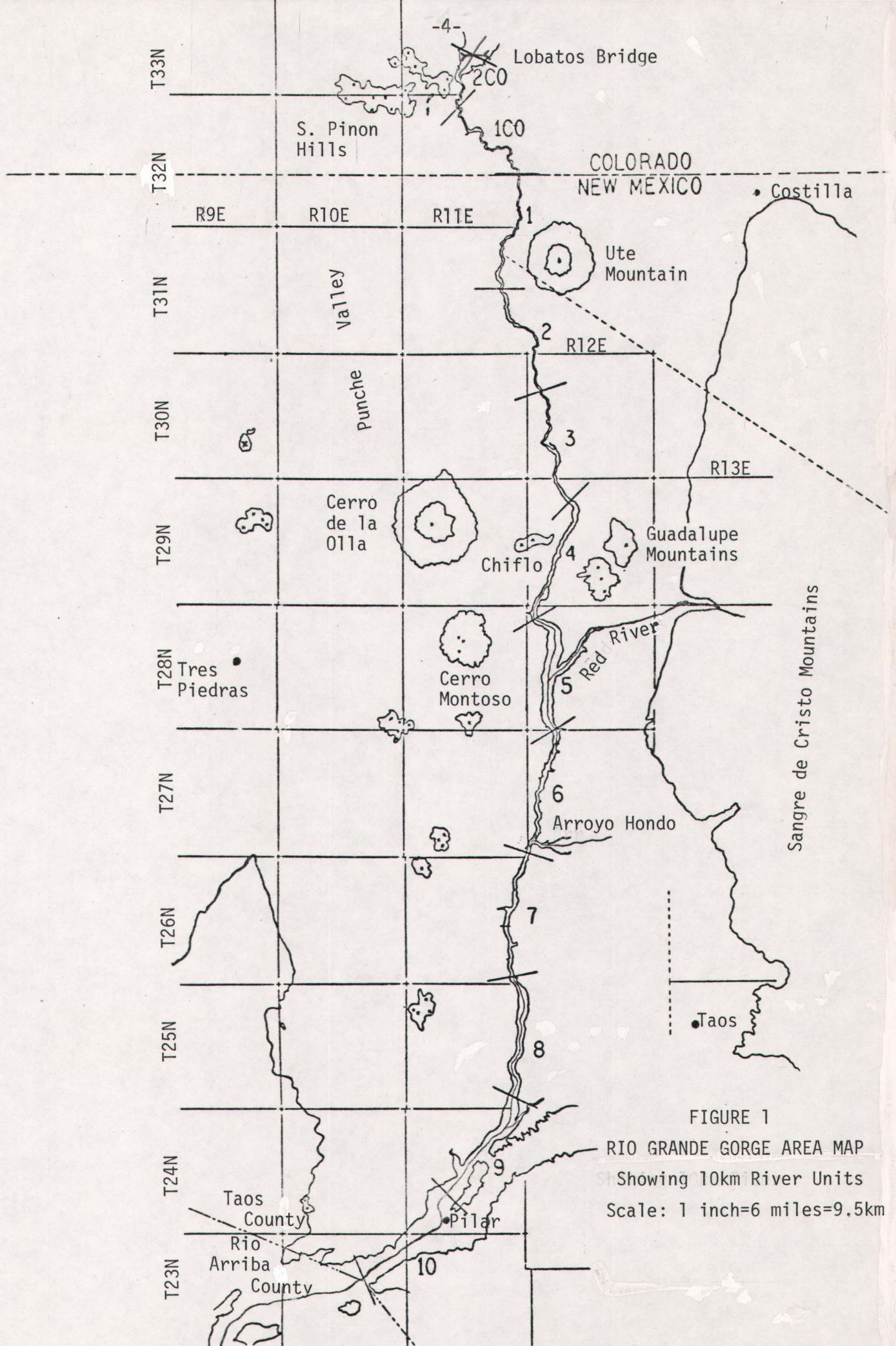


FIGURE 1
 RIO GRANDE GORGE AREA MAP
 Showing 10km River Units
 Scale: 1 inch=6 miles=9.5km

Climate and Vegetation

The Taos Plateau is in the Upper Sonoran life zone. The vegetation in the late 1800s was characterized as grassland north of the Guadalupe Mountains, and woodland savanna south.¹ Today the grassland areas show the typical pattern of overgrazing followed by shrub succession. As a result, the plains are characterized by extensive areas of sagebrush, and sparsely vegetated areas of grasses and herbs. Exposed soil is common. The woodland portions are generally pinon/juniper with some ponderosa pine/douglas fir forest. Fig. 2 shows the general pattern of the forest as it exists today.

Annual precipitation averages 30 cm. Summers are hot, with a modest rainy season beginning in July after the nesting period for raptors. Winters are cold with snow accumulation. Average monthly temperatures and precipitation for Taos, NM during the 1978-1980 breeding season are presented in Appendix A.

Land Use

While much of the canyon is protected by its Wild River Status, the plains are broken up into private land, state land, and federal land administered by the Bureau of Land Management (BLM). This is shown in Fig. 3. The BLM is conducting a land acquisition program in the area of the gorge, and a large tract near Ute Mountain will be acquired soon. The BLM is also considering adding the 12.5 km of canyon in Colorado to the Wild River Area.

The land in the gorge area is used for agriculture, fuel wood gathering, recreation, and mining. The agricultural uses include some modern farms with sprinkler system irrigation in the northeastern portion of the valley. Small farms surround most of the communities. Livestock grazing is practiced throughout the area. Fuel wood gathering takes place in the pinon/juniper woodland. Recreation in the form of camping, picknicking, and hiking takes place mainly in the improved area along the east rim north of La Junta. Fishing is popular wherever the river is accessible. River running is popular below Arroyo Hondo. An active perlite mine is in the hills west of the canyon.

A rural community, Pilar, is located in the canyon near its south end. Roads follow the canyon bottom as far north as Taos Junction, and a dirt road descends into the canyon at Arroyo Hondo. Highway number 111 crosses the canyon at rim level near Taos. The plains around the gorge are crisscrossed by jeep roads, some coming close to the canyon rim.

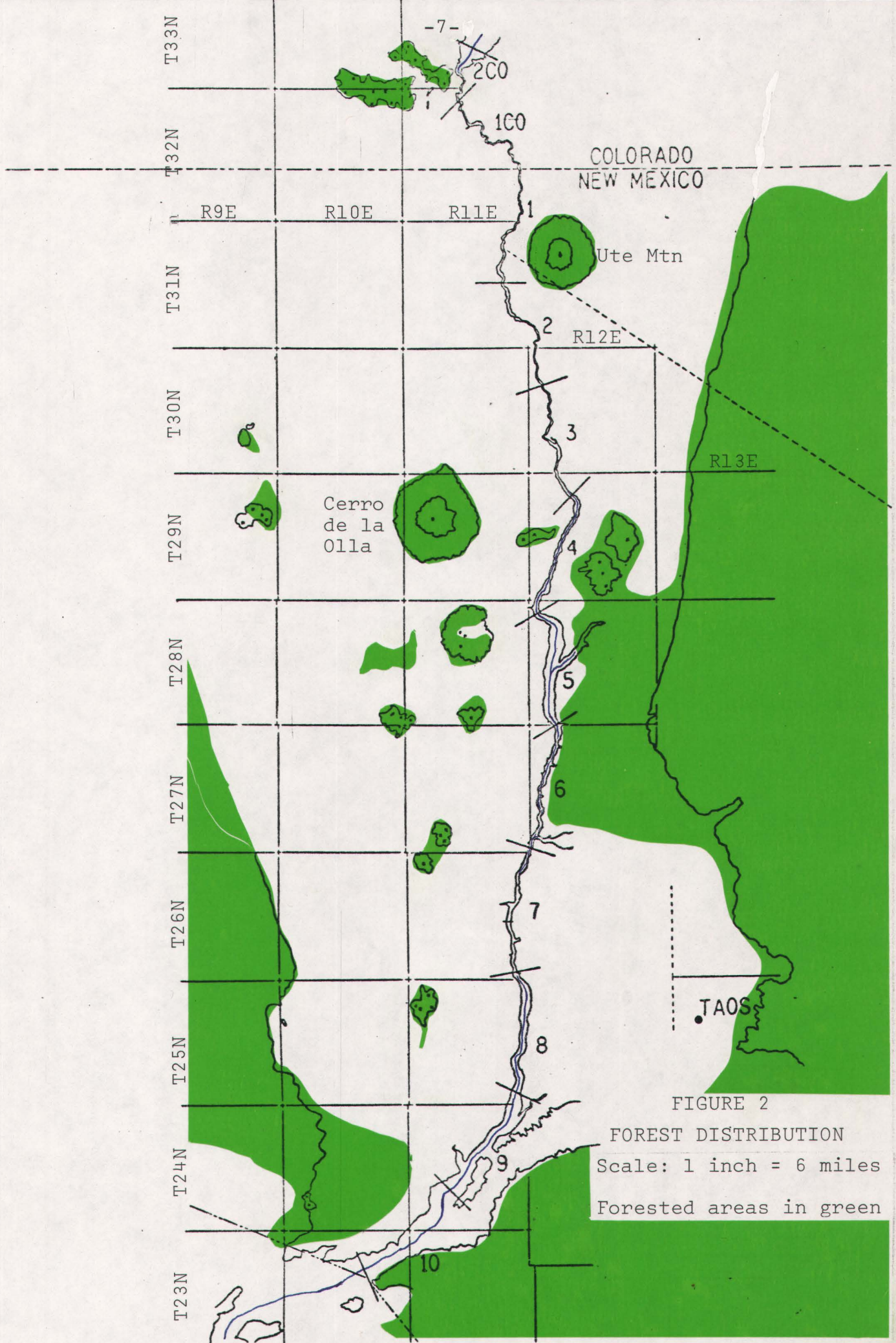


FIGURE 2

FOREST DISTRIBUTION
 Scale: 1 inch = 6 miles
 Forested areas in green

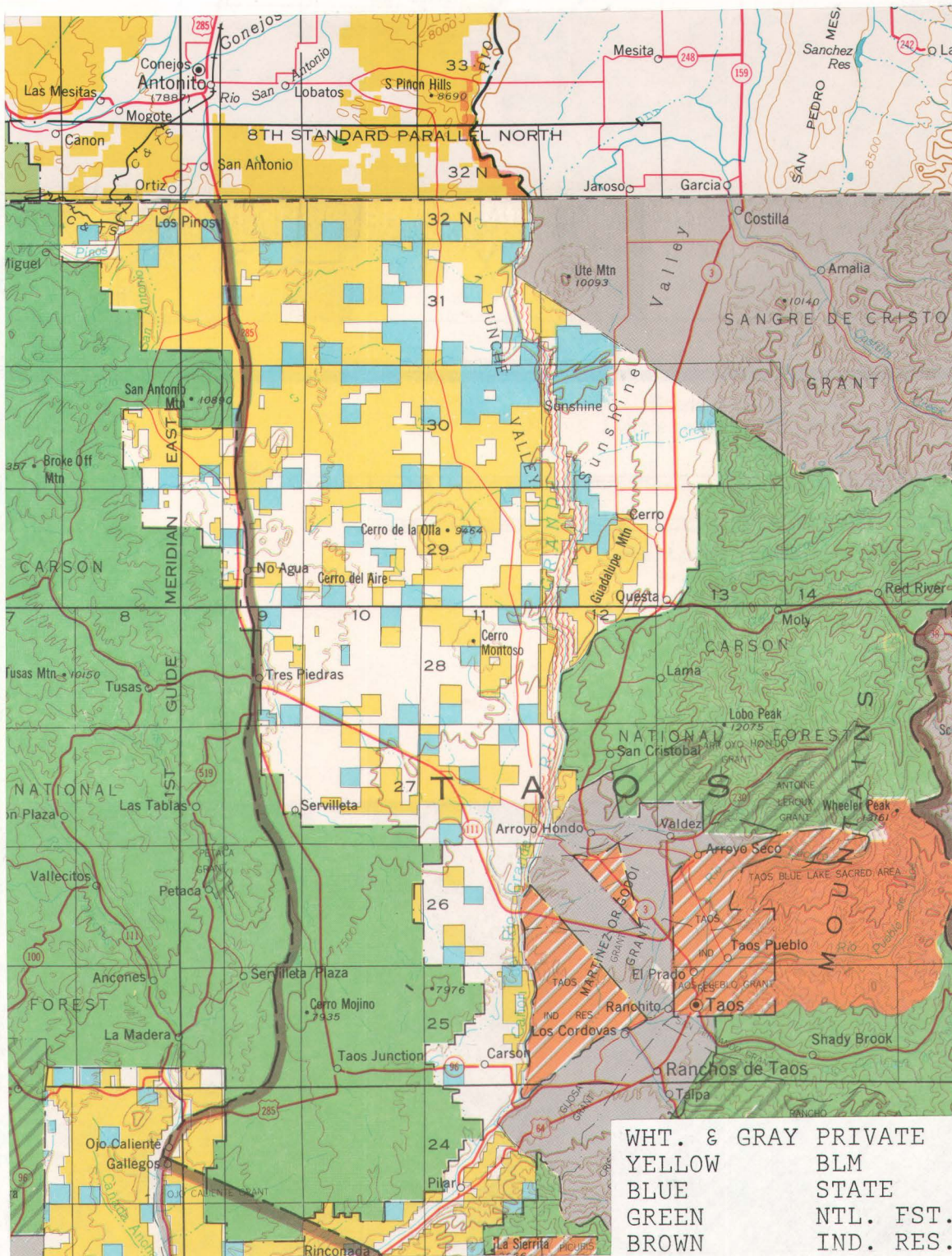


FIGURE 3
LAND USE
RIO GRANDE GORGE
Scale: 1 inch = 8 miles

Winter Use by Birds of Prey

A few bald eagles usually spend the winter along the gorge, hunting waterfowl and fish along the Rio Grande. Appendix B lists sightings of bald eagles by BLM personnel and me. The distribution of sightings is probably a reflection of areas most commonly visited by or accessible to humans in winter.

Table 2 shows the rate of my bald eagle sightings, where a correlation to "observer days" is possible. The data are too scanty to be significant, but the lowest sightings per observer day occurred in the winters of 78-79 and 79-80, when snow accumulation and ice cover were greatest, reflecting the generally harder winters. Bald eagles may have wintered elsewhere those years.

The concentration of wintering bald eagles appears sparse compared to certain rivers, such as the Chama River below El Vado dam, or to reservoirs, such as Cochiti Lake or Conchas Lake. The main reason is probably food availability, the narrowness of certain parts of the gorge obscuring sunlight, thus causing increased ice cover relative to the other mentioned bodies of water. Also, the Chama River below El Vado dam is very different, having a varying flow, moderated temperature, and some fish kill from the outlet works.

Bald eagles have been shown to be highly selective in the use of winter night roosts, preferring trees (not rock ledges) with wind shelter.² Therefore, bald eagles would roost in the forested areas of the canyon, river units 5 and 6. Hunting areas would probably center around the roost areas. Early morning or late afternoon observations, when eagles are leaving or returning to roosts, would reveal more about the population.

Golden eagles and rough-legged hawks are regularly observed on the plains surrounding the gorge throughout the winter. They do not seem to have a specific use for the canyon. Sharpshinned hawks and kestrels are seen occasionally.

The only detrimental impact from man envisioned for wintering birds of prey is shooting. The low level of visitation in the winter certainly minimizes such interaction.

Table 2

Rate of Bald Eagle Sightings

<u>Winter of</u>	<u>No. of Days</u>	<u>No. of Sightings</u>	<u>Sightings/Observer Day</u>
74 - 75	2	1	.5
75 - 76	2	1	.5
76 - 77	2	2	1.0
77 - 78	0	-	-
78 - 79	3	0	0
79 - 80	1	0	0

Nesting Birds of Prey

Methods

In April, May, and June, 1980, I spent a total of 14 days traveling the canyon by canoe, on foot, and in a four wheel drive vehicle. Activity of adult birds of prey was noted, and cliffs were searched with binoculars for fresh whitewash and nests. These were examined for occupancy with a telescope.

Limited time translated to a limited survey. In the lower portion of the canyon, only the east rim was traveled; therefore, the west wall was almost completely surveyed, but the east wall could be examined only at bends in the canyon. Territorial activity of adult raptors sometimes indicated nesting on the east, where the nest could not be seen. The completeness of the survey is described for each river unit in Table 3.

My information about the historical use of the area by raptors was supplemented by contacting people and agencies that might have such information. A 1978 helicopter survey of the canyon was conducted by the BLM, and the data are included in this report.

Results

Nests of golden eagle, red-tailed hawk, prairie falcon, great horned owl, and raven were found in the canyon. Kestrels and turkey vultures are common in the nesting season, although no nests were found. Ferruginous hawks, Swainson's hawks, Cooper's hawks, sharpshinned hawks, marsh hawks, longeared owls, and burrowing owls were sighted in the area during the nesting season.

TABLE 3

Completeness of Search

<u>River Unit</u>	<u>% Surveyed</u>
2 CO	100
1 CO	100
1	100
2	100
3	67
4	67
5	48
6	37
7	33
8	80
9	50
10	10

Golden Eagles

Active nests of golden eagles are shown in Table 4.

Table 4
Active Golden Eagle Nests

River Unit	Number of Active Nests		
	1978	1979	1980
2 CO	1 [†]	0	1
1	1	1	1
3	2	NS	0
6	1	NS	1
TOTAL	5	1*	3

NS, not surveyed; *incomplete data,

†Colorado Division of Wildlife Data

At least one young was produced in 1978, one young reached fledging age in 1979, and none of the nests produced young in 1980. Adults at one nest in 1980 were known to be incubating eggs, but no young were produced.

Human disturbance is a possible factor in nest failure. Cartridges from a 30-30 rifle were found opposite the nest in river unit 1 in 1979, probably left there in 1978, and two hang-bait trap set-ups were found near the nest in 1980, probably intended for coyotes.

Observations from a blind (8 mornings) in 1979 at the nest in river unit 1 NM indicate cottontail rabbits are the main prey. Only one small mammal (ground squirrel sized) was brought in, and no jackrabbits. Blacktail jackrabbits are probably utilized by the eagles, as they are common in the area, and are easily taken by golden eagles. Interestingly, in 1980, the leg of a young pronghorn antelope was found below the nest in unit 2 CO.

A nest that fledged 2 young in 1972 but was not used in subsequent years may still be active, as an adult on a nest "north of the bridge" was reported in 1979 (J. Hubbard, pers. comm.).

Red-tailed Hawks

Red-tailed hawks were the most commonly encountered species. Active nests are reported by river unit for 1979 and 1980 in Table 5.

Table 5
Red-tailed Hawk Nests

River Unit	Number of Occupied Sites			Number of Sites w/young in Nest 1980
	1978	1979	1980	
2 CO	NS	0	0	
1 CO	NS	2	3	3
1	0	2	2	2
2	0	1	3	2
3	0	NS	2	1
4	1	NS	2	2
5	0	NS	0	
6	1	1 [†]	0	
7	1	1	0	
8	0	NS	0	
9	0	NS	0	
10	NS	NS	NS	
TOTAL	3*	7*	12	10

NS, not surveyed; *incomplete data; [†]reported by J. Bednarz through J. Hubbard.

Observations of some of the active red-tailed hawk nests in 1979 and 1980 indicate cottontail rabbits to be major prey. Red-tailed hawks generally have a diverse diet, and other prey are probably utilized.

Of the 12 nests active in 1980, one failed to hatch eggs, one could not be seen, seven contained two young, three contained at least 1 young.

Prairie Falcons

Prairie falcons are found nesting mostly in the northern portions of the canyon, as shown in Table 6.

Table 6

River Unit	Prairie Falcon Eyries			Total Number of Sites
	Occupied Sites			
	1978	1979	1980	
2 CO	0 [†]	0	0	0
1 CO	3 [†]	2	1	3
1	3	1	3	4
2	2	1	2	3
3	0	NS	0	
4	0	NS	0	
5	0	NS	0	
6	0	NS	0	
7	0	NS	0	
8	0	NS	1	1
9	0	NS	0	
10	NS	NS	NS	
TOTAL	8	4*	7	11

NS, not surveyed; *incomplete data; [†]Colorado Division of Wildlife data.

Historical activity and production for the prairie falcon eyries in Colorado is given in Appendix C.

Three sites in 1980 were confirmed to have young. The other four sites were suspected to be nonproducing. Nest cavities were not always located when adults were discovered defending a territory, and potential nest sites could not always be viewed with a telescope, thus the uncertainty of actual production. In larger portions of the canyon, the time allotted for the survey did not allow for long observations of cliffs that would be necessary to determine prairie falcon use. Some fresh falcon type whitewash exists in several areas, and more eyries are likely to be active than herein reported.

Other Species

Two nests of great horned owls were located in 1980, 1 in unit 2C0 and 1 in unit 1 NM. Each had 2 young in the nest. Prey remains were mostly small mammals, with 1 nest having a significant number of feathers from ducks and other birds. Kestrels are seen throughout the canyon, and certainly nest successfully. Cooper's hawks and sharpshinned hawks probably nest in the forests in units 5 and 6.

Turkey vultures have a large communal roost in unit 9; 15 individuals were counted soaring in the vicinity and landing in the roost. Nesting probably occurs in this area. One likely nest site was reported in 1974 in unit 1C0 (Craig, pers. comm.), another south of unit 10 (P. Schultz through J. Hubbard, pers. comm.).

Ravens, although not a raptor, have similar nesting habits to raptors. They are seen commonly throughout the canyon, and nests were located in the northern portion in 1979 and 1980. Many more nests probably exist throughout the canyon.

Table 7 summarizes the number of active sites found in 1980, and the number of nests that were confirmed to have young.

Table 7

1980 Nesting Summary

Species	Number of Active Nests	Number of Nests w/young
Golden Eagle	3	0
Red-Tailed Hawk	12	10
Prairie Falcon	7	3
Raven	5	3
Great Horned Owl	2	2

Endangered Species

The only raptor currently on the endangered species list that potentially nests in the Rio Grande Gorge is the peregrine falcon. While several sightings of peregrines have been made in or near the canyon (listed in Appendix D) none were in the nesting season. As peregrines are attracted to large cliffs, the middle and lower portions of the canyon have greater potential for peregrine use. A greater abundance of passerines, together with a more open canyon for hunting, favors the middle portion of the gorge, north of La Junta (river unit 5). This a popular recreation area, increasing the likelihood of discovery of any peregrines, so "no peregrines" is suggested. Only a careful, patient search would confirm the negative suspicion.

Occupancy

In 1980, 21 empty nests were found. Two of these were alternate nests for active red-tailed hawk nests, eight were paired as alternates for each other on the basis of proximity, making 15 abandoned sites. Six of these had evidence of activity in 1980 (fresh whitewash, eggs, prey remains, freshly moulted feathers, or adults) and were included under active nest data where the species was known. Two active sites could not be connected to a particular species for certain but were probably red-tailed hawk's. Hence 9 sites were abandoned in 1980, vs. 17 sites of red-tailed hawk and golden eagle that were active. This is an occupancy of 65% of traditional sites. This figure is probably high, as the benefit of the doubt is given to the "activity" observed, and a mated pair may not have been present at any time in the season.

Total Nesting Population, 1980

The total number of nesting attempts of the four most common species using the canyon was estimated by extrapolating the known number of attempts by the search fraction reported under "methods", and, where data are lacking, adding an intuitive bonus for good habitat, sighting of adults, nests with fresh whitewash but no contents, or, in the case of prairie falcons, fresh falcon type whitewash. The total for each species is:

Golden Eagle	4
Red-tailed Hawk	21
Prairie Falcon	11
Raven	14

Maximum Nesting Population

Combining the data for all years, adding more generous intuitive bonus, as above, and keeping in mind the occupancy rate previously determined, the maximum number of nesting attempts in a hypothetical good year would be:

Golden Eagle	6
Red-tailed Hawk	28
Prairie Falcon	20
Raven	20

Discussion

A population sustaining production for golden eagles is 0.75 per pair per annum.³ This level could not have been achieved in 1980, even if one or two nests produced young without being discovered. The data suggests greater production in years past, with probably five nests producing young. The variation in number of active sites is puzzling, as a stable number of traditional eagle sites are occupied in the Snake River Birds of Prey Study Area (SRBPSA), and a mean of 45% of the pairs were successful from 1970 to 1978.³ While the small size of the population in the Rio Grande Gorge undoubtedly weakens the significance of the data, eagle nests located in the Pinon Hills northwest of the Rio Grande Gorge are reported to have cycles of no productivity that do not correlate with eagle production in other areas of Colorado (Jerry Craig, pers. comm.). This suggests a possible peculiarity of the eagles breeding in the Punche Valley.

Empty rifle shells and hang bait traps found near eagle eyries suggest local ranchers are disturbing the eagles. Being sensitive, eagles will desert their nests over this kind of activity, if they are not killed outright. My checking a nest during the incubation period in 1980 is a possible factor in its failure.

A long-term recruitment requirement for population stability of northern United States red-tailed hawks is 1.33 - 1.38 young fledged per breeding age female.⁴ In 1980, 1.42 young per pair, with most of these probably fledging, indicates a stable population. The SRBPSA averaged 1.50 young fledged per pair from 1973-1978.³ The small number of red-tailed hawk nests reported in 1978 is believed to be due to helicopter observations detecting only a fraction of the total occupied nests.

The lumped golden eagle and red-tailed hawk occupancy rate of 65% of traditional sites in 1980 is below the SRBPSA occupancy of 83 to 96% for red-tailed hawks, and 89 to 100% for golden eagles.³ This suggests a lower population in recent years, eagles probably accounting for the majority of the decline.

Production data is available for only three of the seven active prairie falcon eyries in 1980; the other pairs did not seem to be producing, thus 43% were successful. In the SRBPSA, a mean of 73% of breeding attempts from 1974 to 1978 were successful.³ The known production of prairie falcons in the gorge in 1980 is 1.29 young of fledging age per active nest. A level of 2.56 young fledged per pair would sustain the population.³ The SRBPSA fledged an average of 2.59 young per pair from 1974 to 1978.³ Occupancy in the gorge was 64% of traditional sites, compared to a range of 76 to 97% for the SRBPSA.³ The apparently low productivity and the low occupancy suggest a declining population, although the small size of the population weakens any conclusion that might be drawn. No cause for the decline is apparent, and better data would be required to determine for certain the status of the population.

Probable reasons for the lower density of nesting raptors in the Rio Grande Gorge relative to the Snake River Birds of Prey Natural Area are a smaller prey base, and more surrounding nest sites. Up to four pairs of golden eagles nest in the Pinon Hills northwest of the gorge, (J. Craig, pers. comm.) two pairs of golden eagles nest in the foothills of the Sangre de Cristo Mountains east of the gorge, (J. Hubbard, pers. comm.) and one red-tailed hawk nest has been located east of the gorge. (J. Bednarz through J. Hubbard, pers. comm.)

A contributing reason is the smaller area of unforested plains for hunting. The reduction of the size of the unforested plain going from north to south, as shown in Fig. 2, also explains some of the reduced nesting density in the southern portions of the canyon.

Cliff area for each river unit is plotted opposite the number of active nests in each river unit in Fig. 4. Cliff area does not correspond to raptor density, converse to the Snake River Birds of Prey Study Area.³

A possible relation exists between fledging success in the small upper portions of the canyon and the flow rate of the Rio Grande. The extreme variation of the flow of the Rio Grande is shown in Appendix D. When the river is at the 6000 ft³/sec level, very little shore line is left in many portions of the upper gorge (river units 2 CO, 1 CO, 1, 2 and 3), and the current may be as fast as 8 km/hr in the center of the channel. Under these conditions a fledging on its first flight has a greater risk of landing in the river and being carried out of touch with its parents before floundering to shore.

This report contains numerous references to the Snake River Birds of Prey Study Area and Natural Area. Reference 3 should be consulted for specific information. For convenience in making comparisons, Table 8 summarizes data from the SRBPSA and the Rio Grande Gorge.

Table 8
Comparison of the SRBPSA to the Rio Grande Gorge

	Snake River Canyon	Rio Grande Gorge
Temp., °C March Average	6	3
June Average	20	17
Annual Precipitation, cm	20	30
Elevation, m	920	2200
Latitude, °N	43	36
Cliff Area per 10 km, 10 ³ m ²	40-1000	50-1200
Nests per km, average	3.7	0.3
Occupancy, percent	76-100	65

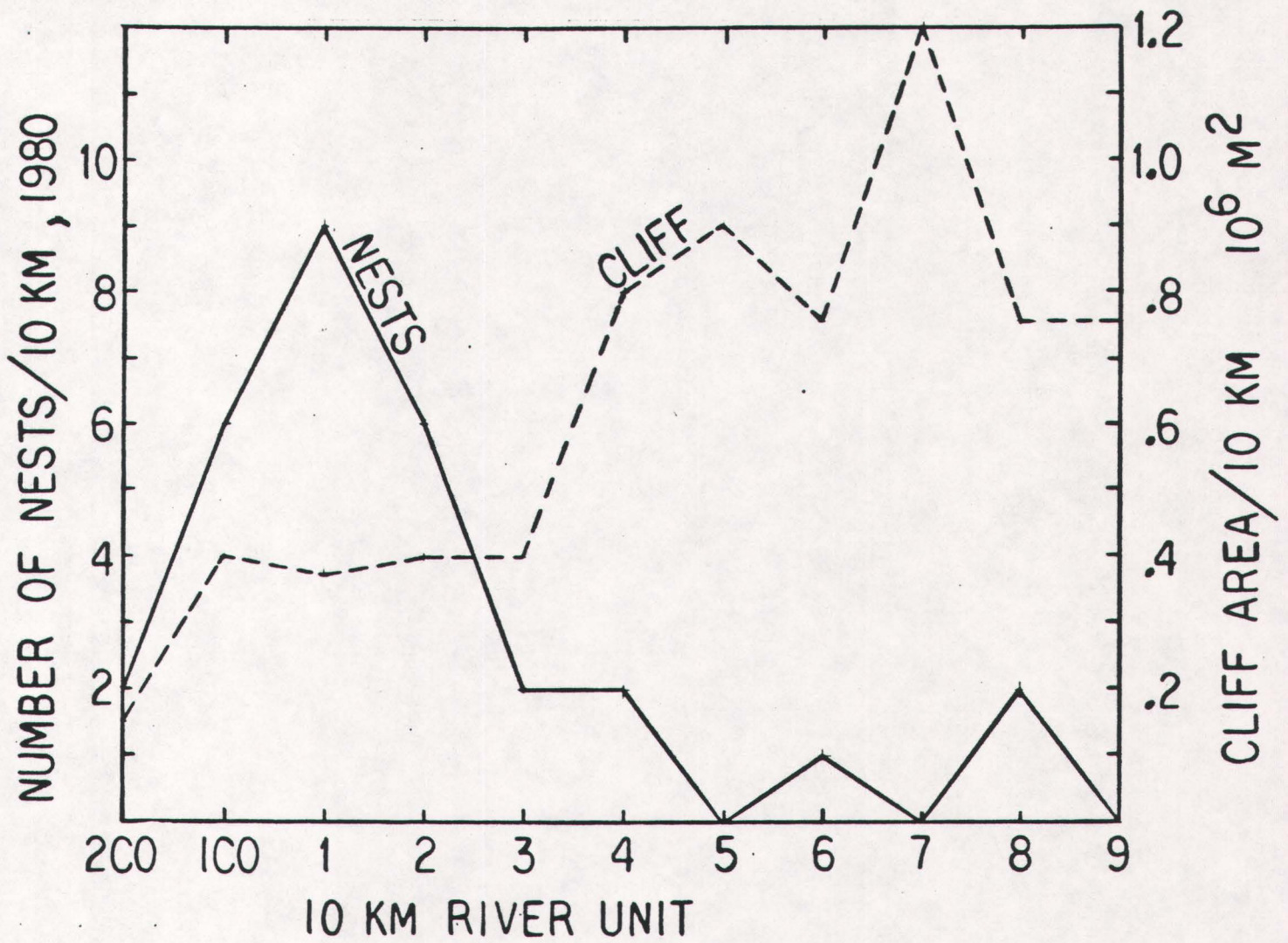


FIGURE 4
NEST DENSITY VS. CLIFF AREA

Impact of River Running and Other
Recreation on Nesting Birds of Prey

The popularity of river running has increased dramatically in the seventies. The lower section of the Rio Grande Gorge, from Dunn Bridge to Taos Junction (river units 7 and 8) offers challenging whitewater and a wilderness experience. While it was boated by virtually a handful of people in the 60s and early 70s, use increased through the offering of commercial float trips. BLM figures show that 32 people went down the lower gorge in 1970, 4577 in 1980, more than a hundred-fold increase.⁵

A potential disturbance problem exists, as the spring runoff that allows boating coincides with the nesting season for birds of prey. The large size of the canyon in the lower section minimizes contact between river runners and nesting raptors, and the dramatic increase in recreational boating probably has not affected the raptors. However, it serves as an example of potential recreational growth for other sections of the canyon, and points to the need for assessment of this kind of use on nesting birds of prey.

The lower middle section of the gorge, from La Junta to Dunn Bridge (river units 5 and 6) is boatable, but its popularity is limited by the necessity of carrying boats and equipment down the side of the canyon on one of several trails. Again, the canyon is large enough to preclude interaction between nesting birds of prey and river runners.

The upper middle gorge, from Lee Trail to La Junta (river units 3, 4, and 5) is seldom boated due to dangerous rapids and difficult access.

The upper gorge, from Lobatos Bridge to Lee Trail, (river units 2 CO, 1 CO, 1, 2, and 3) is used only by a handful of people at the present time, as no whitewater thrills are encountered, and boats and equipment must be carried up one of several trails, depending on the length of the trip. The small size of the canyon brings boaters and nesting raptors into closer proximity, and more potential for interaction exists.

Passing below prairie falcon and red-tailed hawk nests in a kayak or canoe, I have observed the adults to scold in response, and when passing closer, to fly out, circle, and scold. While typical, the response is not 100% reliable. Adult golden eagles will leave the nest and fly out of the canyon.

As word gets out about the wilderness and wildlife in the upper gorge, a greater number of boaters might be attracted to the canyon. If the falcons and red-tailed hawks choose to fly out and scold every boat that passed below their nests, detriment, in the form of energy waste, egg chilling, reduced hunting time, etc., would be proportional to the number of boats, and would be manifested in reduced productivity. The exact correlation would be difficult to establish, as a five minute disturbance might have an associated recovery time of 30 minutes, and weather, prey availability in a given year, etc., would enter in. Also, there is evidence of habituation to human disturbance in some raptors.⁶

Golden eagles are especially sensitive, and will sometimes desert their nests entirely if disturbed, especially while incubating eggs. Their recovery time after a disturbance seems to be longer than for red-tailed hawks or prairie falcons, so the comments made above about detrimental effects must be emphasized. Golden eagles have been reported as being tolerant of activity below their nests, but intolerant of activity above.⁷ This suggests greater problems where approach from above is possible. This is the case for two of the active eagle eyries.

If people (river runners or others) camp near nests, unintentioned disturbance is likely to be great, and if the birds are noticed, direct disturbance is possible in the form of taking young, causing young to jump from the nest prematurely, shooting, etc.

Fishing is popular in several portions of the gorge, but little direct interaction is expected between fishermen and raptors. Ravens probably benefit by feeding on the entrails left from fish cleaning.

Camping and hiking are popular in the Rio Grande Gorge Recreation Area (river units 4 and 5) but little interaction is expected. Red-tailed hawks nested 1/2 km from the Chiflo campground in 1980 with no apparent problem. It is possible that a nest site is occasionally chosen early in the season directly below a campground, and when campers appear later in the season, interaction causes failure. Relocation is possible in subsequent years, although preference for certain sites is often exhibited, to the dismay of humans who see problems with the site.

Comments on Nest Locating and Modes of Travel

Floating the river in the upper gorge in 1980 revealed one active red-tailed hawk nest where four had been active the previous year. This being suspicious, I rechecked this section from the rim, and found five active nests, the only difference being the accumulation of whitewash for several weeks. While the river affords an easy and pleasant method of travel, the necessity of paying attention to navigation, the whitewash behind the nest being obscured by the low angle of observation, and the lack of structure of some nests making them invisible on a quick pass make floating an unreliable method of survey for red-tailed hawks.

Prairie falcons usually will scold a passing boat, giving away their territory, and are highly visible against the sky from the low angle afforded an observer on the river. Their characteristic long vertical streaks of whitewash are visible from the river. Surveying from the rim might occasionally allow viewing into an eyrie, but overall, the rim and the river are comparable places to detect prairie falcon use.

Traditionally used eagle nests are detected easily by any mode of travel, including aircraft. A new eagle nest early in the season, before the whitewash has accumulated, might be hard to spot on a quick pass.

Raven nests are small, usually a hole with sticks in the bottom. Frequent visits by the adults, as well as calling of the young, reveal the location, thus an observer would have to spend some time to locate nests, a single scan probably missing most.

The helicopter survey conducted by the BLM in 1978 was efficient for locating golden eagle nests, and fairly efficient for prairie falcon eyries, but appears to have missed many red-tailed hawk nests. The reasons for this are uncertain.

Conclusions and Recommendations

Golden Eagles are reproducing poorly in the Rio Grande Gorge. Exact reasons are unknown, but human disturbance appears to be a major contributing factor. Red-tailed hawks are reproducing normally, although the population is probably reduced from a historical level. No major threat is foreseen for the population. Prairie falcons are reproducing at what appears to be a nonsustaining level, and several traditional eyries have been vacated in recent years. The population is possibly declining but no reasons are evident. Further study is recommended.

Many other raptor species use the Rio Grande Gorge and/or the surrounding plain. In most cases, their exact status is unknown.

Grazing has had a major effect on the ecosystem in the past 100 years. The overall productivity of the plains has been reduced, grasses being replaced by sagebrush in many areas, and the remaining grass reduced in density from the primeval grassland. The decline in productivity has been offset to some extent by the cover value of sagebrush for jackrabbits, which are potential eagle prey. Some grazing animals and a few pronghorn antelope are sustained on the plains. A possible major impact of grazing is the shooting or accidental trapping of raptors by livestock owners who are "improving the environment" for their animals through predator control. Ranchers should be educated or informed about the birds of prey.

Prey abundance and utilization were examined cursorily. Cottontail rabbits, the most frequently observed prey of golden eagles and red-tailed hawks, and jackrabbits are seen regularly in the area. Horned larks are the most common passerine, and are probably important prey for prairie falcons. Small mammals are certainly important prey for the major species of raptor nesting in the canyon. Further study is recommended.

Some agriculture is practiced on the plains. It has been shown that the high density of nesting birds of prey in the SRBPSA would be detrimentally affected by increasing agriculture.³ The lower density of birds of prey in the Rio Grande Gorge would probably be less sensitive to the expansion of agriculture, and expansion to the extent that would be detrimental is highly unlikely.

The Land Acquisition Program should be continued by the BLM. Incorporation of the Colorado portion of the canyon into Wild River status would protect nest sites, which occur in as high a density there as anywhere in the Rio Grande Gorge. Further study is recommended before any large scale alteration of the plains is carried out, as trade-offs exist among the various vegetation types in regards to raptor use. Leaving areas of sagebrush intact, even where not natural, may benefit jackrabbits and thus golden eagles.

Nesting birds of prey in the upper gorge should be monitored annually, and carefully watched in comparison to river use. Commercial permits for float trips in this section should not be issued until the potential impact has been assessed, as revoking permits once historical use and economic need are established would be difficult. Float trips should be discouraged prior to the hatching and development to two weeks old of golden eagle young (about mid-March), to reduce nest desertion. "Camping areas" or "no camping areas" should be established, based on nest locations.

More comprehensive monitoring of raptor use of the areas should be done to establish a baseline, reveal trends, and to manage and protect endangered or sensitive species that use the area.

ACKNOWLEDGMENTS

My thanks and appreciation are extended to the following individuals: Allen Schmiedicke for help with the field work; Brandon Grebence for compiling the data on the Colorado section; Jerry Craig for comments and information on the Colorado portion; John Hubbard for gathering records and commenting on the New Mexico portion; Dickey Spiegel for information on river use; Wayne Pilz for maps of the BLM helicopter survey; R. V. Ward for comments on the helicopter survey; Randy Legler for compiling raptor sightings by BLM personnel; Ben Kuykendall for encouragement and comments; Yolanda Garcia for typing and proofing; and Gary Lewis for reviewing the manuscript.

Literature Cited

1. Gross, F. A. and W. A. Dick-Peddie. A Map of Primeval Vegetation in New Mexico. *The Southwestern Naturalist* 24(1): 115-122 May 30, 1979.
2. Johnson, T.H. Bald Eagle Winter Habitat Study, 1978-1979. Unpublished report to the National Park Service, Southwest Region. July 1979.
3. Bureau of Land Management, Boise District. Snake River Birds of Prey Special Research Report. Published by the BLM June 30, 1979.
4. Henry, C. J. and H. M. Wight. Population Ecology and Environmental Pollution: Red-tailed and Cooper's Hawks. pp 229-250 in *Population Ecology of Migratory Birds: a symposium.* U.S. Dept. Inter. Wildl. Res. Rep. 2. 1972.
5. Mottl, T. River Management in New Mexico - Allocation of a Scarce Resource. Colloquium at Los Alamos Scientific Laboratory September 16, 1980.
6. Lee, J. A. Habituation to Human Disturbance in Nesting Accipiters. In press, 1980.
7. Snow, C. Habitat Management Series for Unique or Endangered Species, Report No. 7, Golden Eagle, published by the BLM December 1973.

Appendix A

Climatological Data for Taos, NM

Average Maximum Temperature, °F

	March	April	May	June
1978	54.0	66.0	66.1	82.4
1979	49.2	59.9	66.8	77.6
1980	49.5	58.3	66.4	84.8

Average Minimum Temperature, °F

1978	21.3	28.7	34.2	46.4
1979	22.9	29.4	37.2	42.6
1980	25.0	27.1	37.4	45.9

Maximum Temperature, °F

1978	69	74	82	91
1979	59	70	77	90
1980	62	75	77	94

Minimum Temperature, °F

1978	9	16	25	36
1979	8	3	27	33
1980	9	13	28	34

Precipitation, inches

1978	1.03	0.23	1.79	1.73
1979	0.54	0.85	2.09	2.27
1980	1.27	1.64	1.78	--

Appendix B

Bald Eagle Sightings

	<u>River Unit</u>	<u>Observer</u>	<u>Juv/Adult</u>	<u>Activity</u>
1/19/75	5	Ponton	Adult	Flying
12/26/75	5	Watts	N.R.	Roosting, Snag
1/2/76	5	Ponton	Adult	Flying
1/10/77	6	Murphy	N.R.	Flying
1/18/77	4	Adams	N.R.	N.R.
1/28/77	N.R.	Murphy	N.R.	N.R.
2/19/77	2	Ponton	Adult	Feeding, next to river
2/27/77	3	Ponton	Adult	Flying
2/21/78	4	Adams	N.R.	N.R.

N.R., not reported

Appendix C

Prairie Falcon Production and Activity in the
Colorado Portion of the Rio Grande Gorge

Data are courtesy of the Colorado Division of Wildlife (CDW) supplemented by my data (marked with *). N.D., no data

CDW Site Designation	Year					
	1975	1976	1977	1978	1979	1980
CN1	≥ 3 young	1 adult	2 adults*	≥ 2 young	inactive (active red-tailed hawk nest)	inactive (active red-tailed hawk nest)
CN2	3 young	nothing in 10 minutes observation	Adult female*	2 young	3 young	3 young
CN3	≥ 1 young	2 adults	N.D.	2 young	2 adults*	inactive

Appendix D

Peregrine Falcon Sightings
in the Rio Grande Gorge

<u>Date</u>	<u>River Unit</u>	<u>Observer</u>	<u>Activity</u>
9/6/66	7	Ponton	Perched
12/29/75	4	Watts	Flying
3/7/77	5	Adams	N. R.
2/2/78	6*	Adams/Padilla	N. R.
10/79	10	Kuykenda11	Flying

N. R., not recorded; *sighted 1 mile north of Arroyo Hondo
on State Road 3.

Appendix E

Average Flow in cubic ft per second of the
Rio Grande at Embudo, NM

	<u>April</u>	<u>May</u>	<u>June</u>
1977	360	265	185
1978	400	950	990
1979	1510	3850	6130
1980	1080	3550	3610