

PEREGRINE FALCON MONITORING PROGRAM
HISTORIC EYRIE SURVEY:
BIG BEND NATIONAL PARK
and
RIO GRANDE WILD AND SCENIC RIVER

1988 FINAL REPORT

by:

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PROPERTY OF
Science and Resources Management
Big Bend National Park, Texas

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This report summarizes survey efforts conducted at fourteen historic Peregrine Falcon (*Falco peregrinus anatum*) territories in Big Bend National Park (BIBE) and along the Rio Grande Wild and Scenic River (RIGR). Occupancy, nesting success, and breeding chronology are discussed along with maps and photographs of occupied territories.

Due in part to the sensitive nature of the peregrine in the region, care must be exercised in disseminating information in this report related to eyrie location. This is of particular importance for territories in areas which regularly receive high visitor usage.

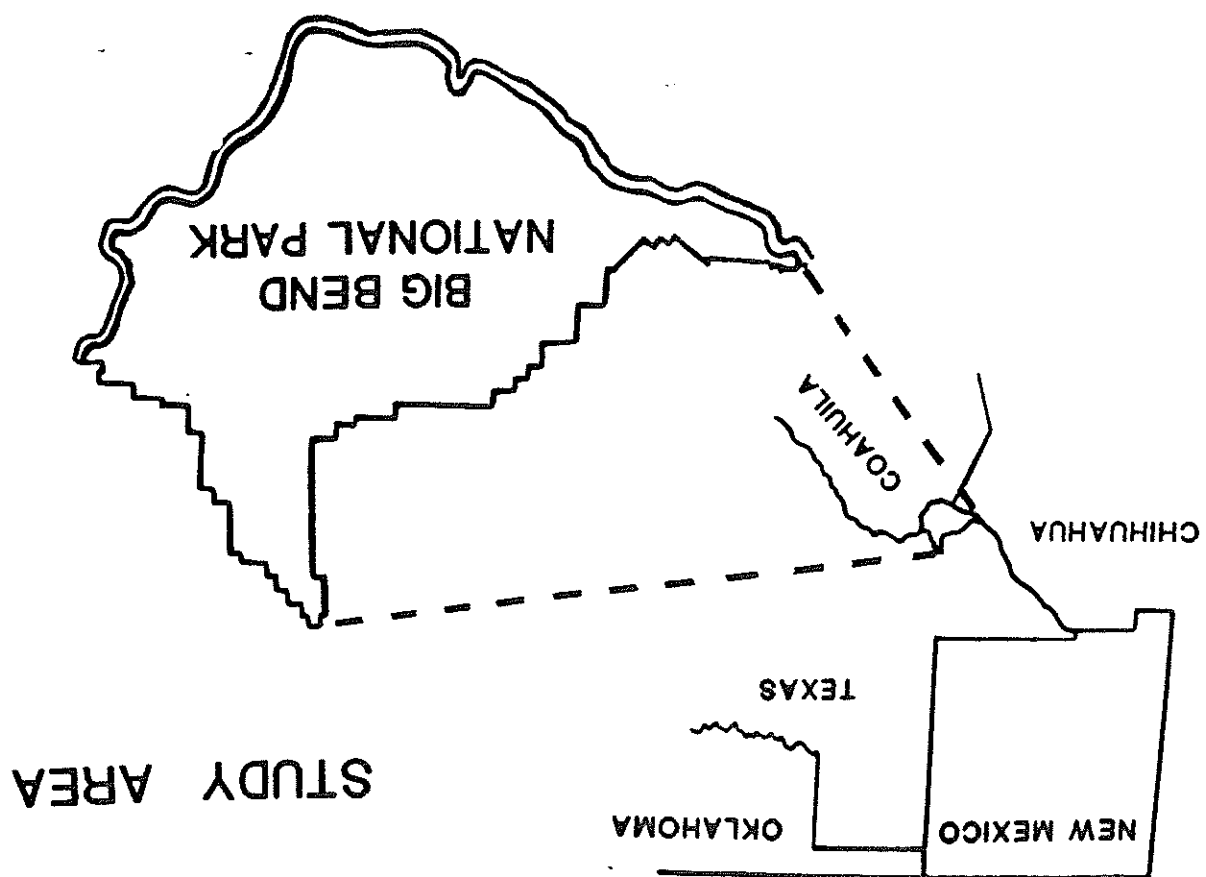
Study Area:

Big Bend National Park (Figure 1) is located in Brewster County, Texas at approximately 28° 58' North by 102° 48' 30" West. Bordered on the south by the Rio Grande and the Mexican states of Coahuila and Chihuahua, BIBE encompasses approximately 708,343 acres of diverse Chihuahuan Desert habitats (Henrickson and Johnston 1986). Elevation within the park ranges from 592.7m along the Rio Grande to 2385.1m at Emory Peak in the Chisos Mountains.

Methods:

Access to peregrine territories along the RIGR was accomplished using a six or eight foot Avon Raft as part of scheduled NPS River Patrols, or a sixteen foot Mohawk canoe for solo trips. Mountain territories, such as Crown Mountain, Casa Grande and the Southeast Rim, were reached by road, via a 1979

Figure 1: The study area, Big Bend National Park.



Suburban, and/or hiking.

Due to the endangered status of the Anatium Peregrine, all status determinations were based on behavioral observations primarily following the methods of Nelson (1977) and Ratcliffe (1980). Behavioral observations were made with a variety of optical equipment, including 10 X 25 power Zeiss binoculars, 15X-60X tripod-mounted Bausch and Lomb spotting scope, and a Celestron telescope with a 7mm ocular (which also doubled as a 1250 mm telephoto lens). Photographic documentation was obtained using a Minolta SRL X700 camera.

Behavioral notes and miscellaneous observations were recorded on a standard 5 X 8 field notebook, or recorded on a Panasonic Microcassette recorder. Observations were summarized weekly for comparison with historic data and preparation of interim reports.

Terminology used in this report, which relates to nesting activity, follows Court (1986), and is summarized below:

(1) Territory - an area containing one or more nests (eyries) within the range of a known or inferred pair of actual or potential breeders (Postupalsky 1974, cited in Court 1986).

(2) Eyrie Site - the actual location of the eyrie within the territory. More than one eyrie site may be present within the territory, but used in different years.

(3) Occupied territory - a territory where one pair of birds is present at some period during the breeding season.

Although eggs or young may or may not be present, the presence of the falcons is made obvious by defense behavior towards conspecifics and potential predators, including humans.

Santa Elena, Site #44: Partially in response to the special considerations afforded this territory in the 1988 Peregrine Falcon Action Plan (BBNP 1988), this site was visited fourteen

Occupied River Territories:

discussed for future reference.

their proximity to the RIGR. Deserted territories are also grouped as either "River" or "Mountain" territories depending on To facilitate discussion, occupied territories have been with a total production of seven young.

territories. Five of these occupied territories were productive, peregrine territories were surveyed resulting in six occupied the Big Bend Region. Within the region, fourteen historic spent documenting the reproductive ecology of the peregrine in 1988 and ended June 30, 1988. A total of 104 field days were Field studies on the Peregrine Falcon began on February 12, Results:

- per occupied territory.
- (6) Productivity - expressed as the mean number of young territories.
- raised to an advanced stage of development from all productive
- (5) Production - the total number of young fledged or actually observed, to have fledged.
- raised to an advanced stage of development and is assumed, or is occupied by a pair of birds in which a minimum of one chick is
- (4) Productive territory or eyrie - a territory or eyrie

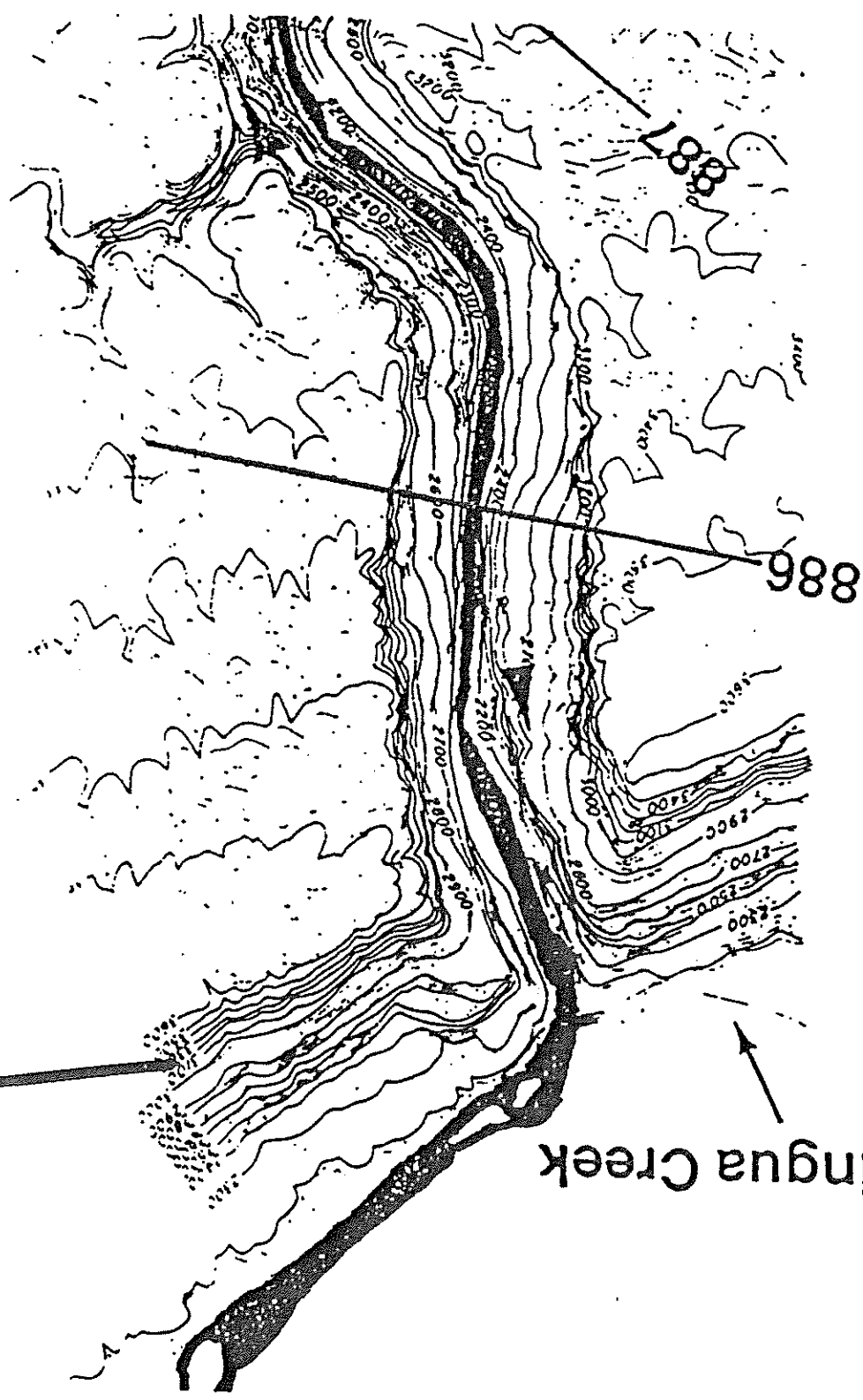
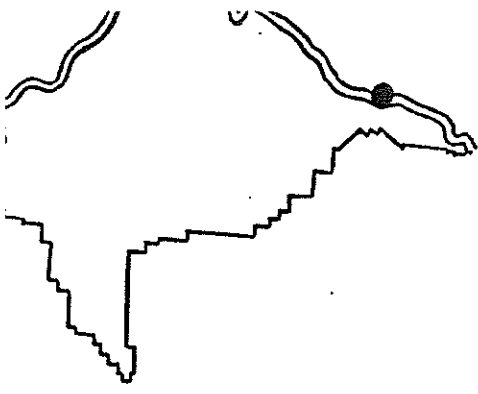
times during the study period. In addition, Ms. Bonnie McKinney was employed on 22 February to verify observations at the eyrie. The Santa Elena eyrie is located approximately 2.5 km downstream from the mouth of Santa Elena Canyon (Figure 2). This eyrie (Figure 3) is the historic site documented by Netherton et al. (1978).

Peregrines were observed in the Santa Elena eyrie on 17 February. However the earliest documented incubation switches at this eyrie did not occur until 22 February. Based on a mean incubation period of 33 days (Porter and White 1973), estimated hatching dates ranged from 21 - 26 March. With anticipated fledgling of young occurring in 42 - 44 days of age (Sherrod 1983), or approximately 9 May. Observations on 20 - 21 May and 6 June supported this conclusion with the discovery of a single immature female successfully fledged from the nest.

Mariscal Territory, Site #11: Except for the lower canyons of the RIGR, the Mariscal territory proved to be logistically the most difficult to monitor. The territory was visited five times during this study and fledged one young, sex undetermined. The eyrie (Figure 4) is located 4.8km downstream from the Tally boat launch on the Mexican side of the RIGR (Figure 5). This year's eyrie was located directly over the scouting point for the "tight squeeze" rapids.

Breeding chronology at Mariscal was considerably later than that observed at Santa Elena. Incubation began on or about 1 March with hatching around 2 - 3 April. Observations on both 8 - 9 and 15 - 16 April determined that young were in the eyrie.

Figure 2: Location of the Santa Elena Eyrie.

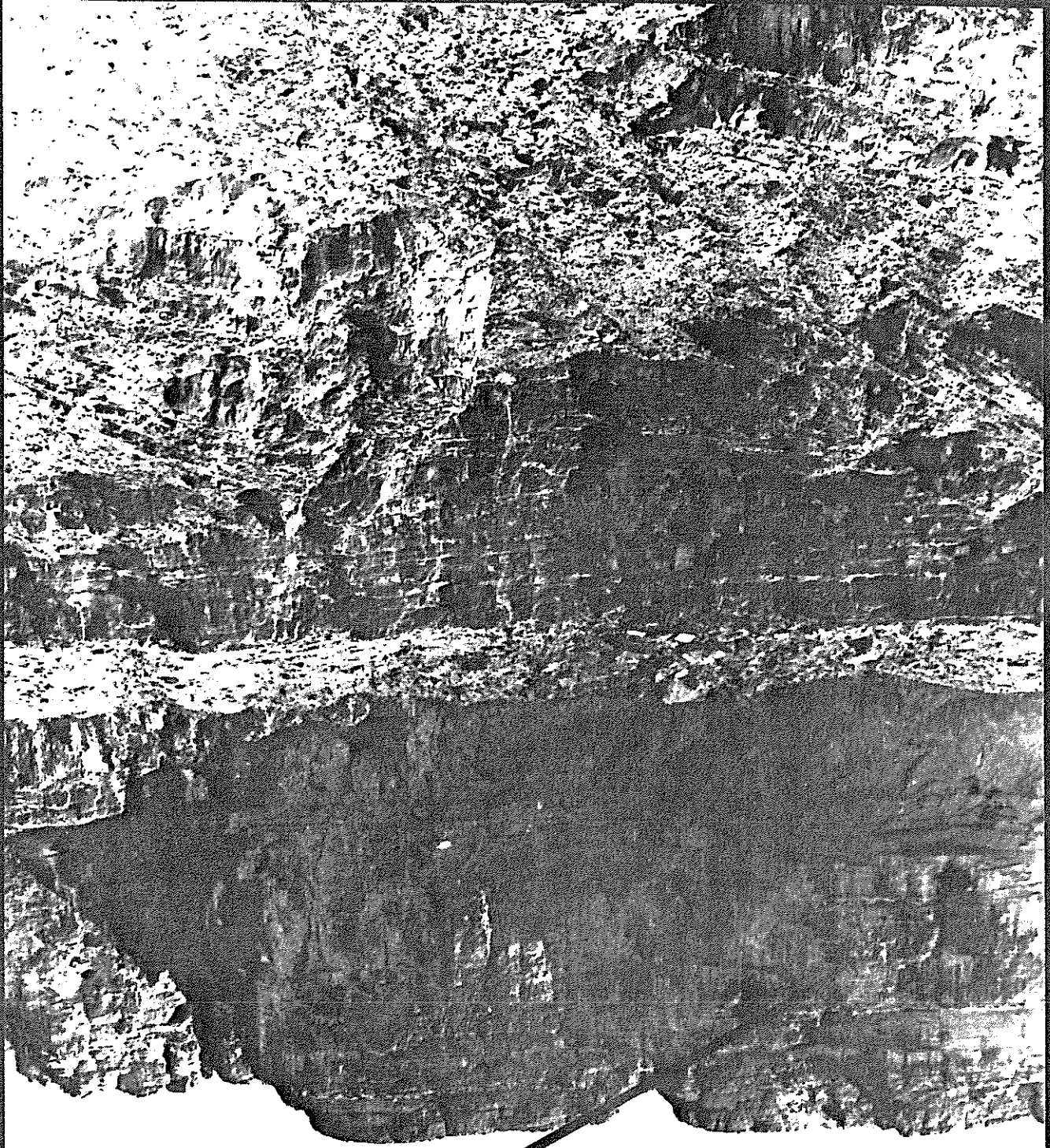


1988 EYRIE

Aringua Creek

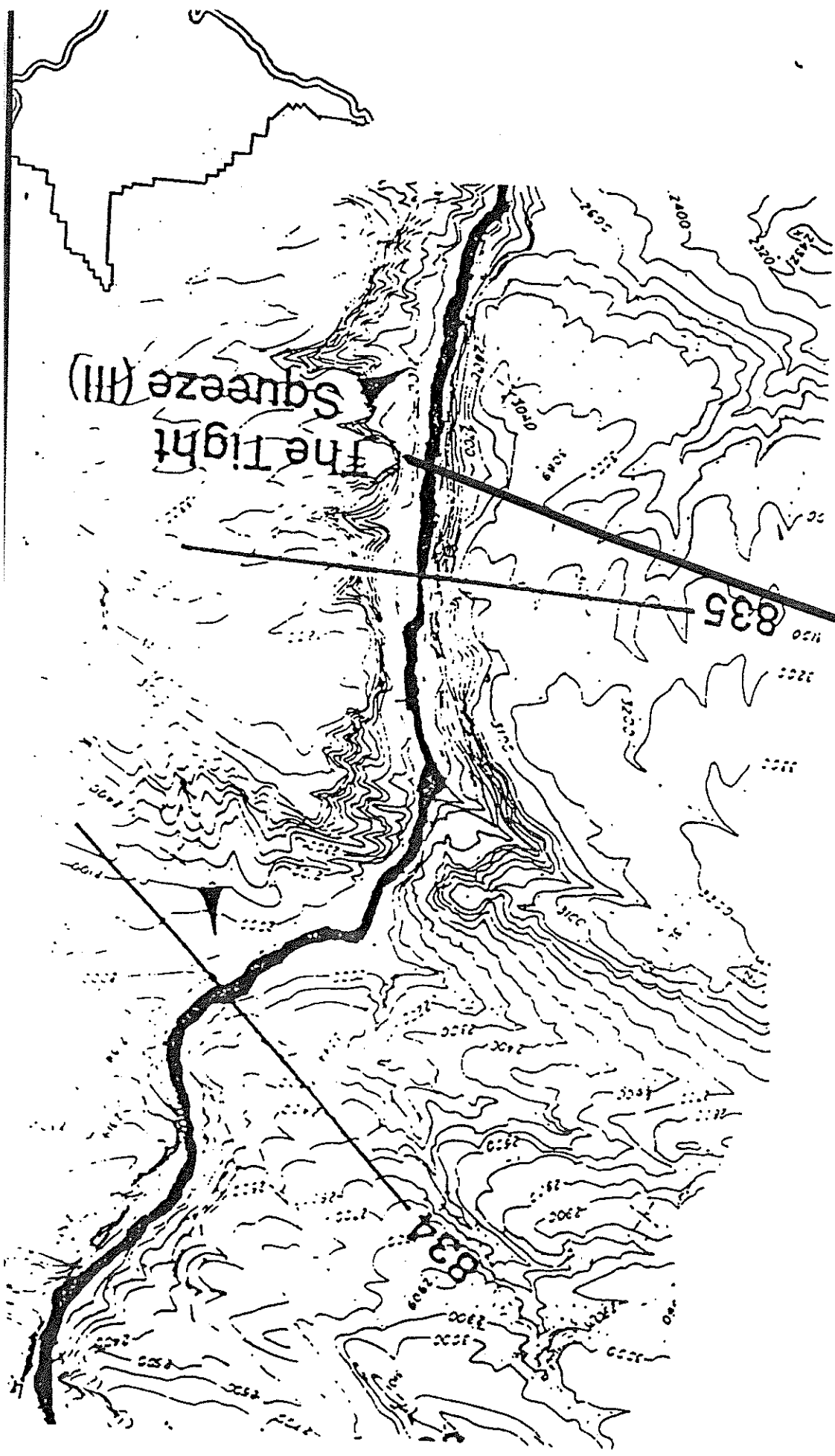
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Figure 3: Photograph of the Santa Elena Fyrle.



EYRIE

Figure 5: Location of the Mariscal Eyrle.



835

1988 EYRIE

The Tight Squeeze (III)

Upper Boquillas Canyon Eyrie, Site #66: This site is located approximately 4 km downstream from the head of Boquillas Canyon and the end of the Boquillas Canyon trail (Figure 6). The territory was visited a total of eight times during the study period. The exact location of the eyrie (Figure 7) was upstream from the 1987 eyrie location in a scrape utilized in 1986 (McKinney pers. com.).

Considerable data were gathered on both pairs of falcons in Boquillas Canyon due in part to the ease of observation in the canyon. Incubation was initiated between 24 - 26 March with hatching estimate to be between 24 - 26 April. Observations on 6 - 7 May indicated that young were in the eyrie. This assumption was based on the behavior of the adult falcons, i.e., delivering prey to the eyrie, etc.

Observations on 21 - 22 May revealed a single immature female in the eyrie at approximately three to four weeks of age. Subsequent observations on 21 - 22 June also revealed that a single immature female had fledged and was actively flying and chasing the adults. Based on these observations, I calculated the date of first flight to have occurred between 7 - 9 June.

Lower Boquillas Canyon Territory (Black George's Territory), Site #69: Hunt (1982) commented on the possibility of a second pair of peregrines at the downstream end of Boquillas Canyon. In addition, numerous reports by Park Service River Rangers and Bonnie McKinney (pers. com.) have reinforced this possibility.

Fledging occurred on or about 17 May.

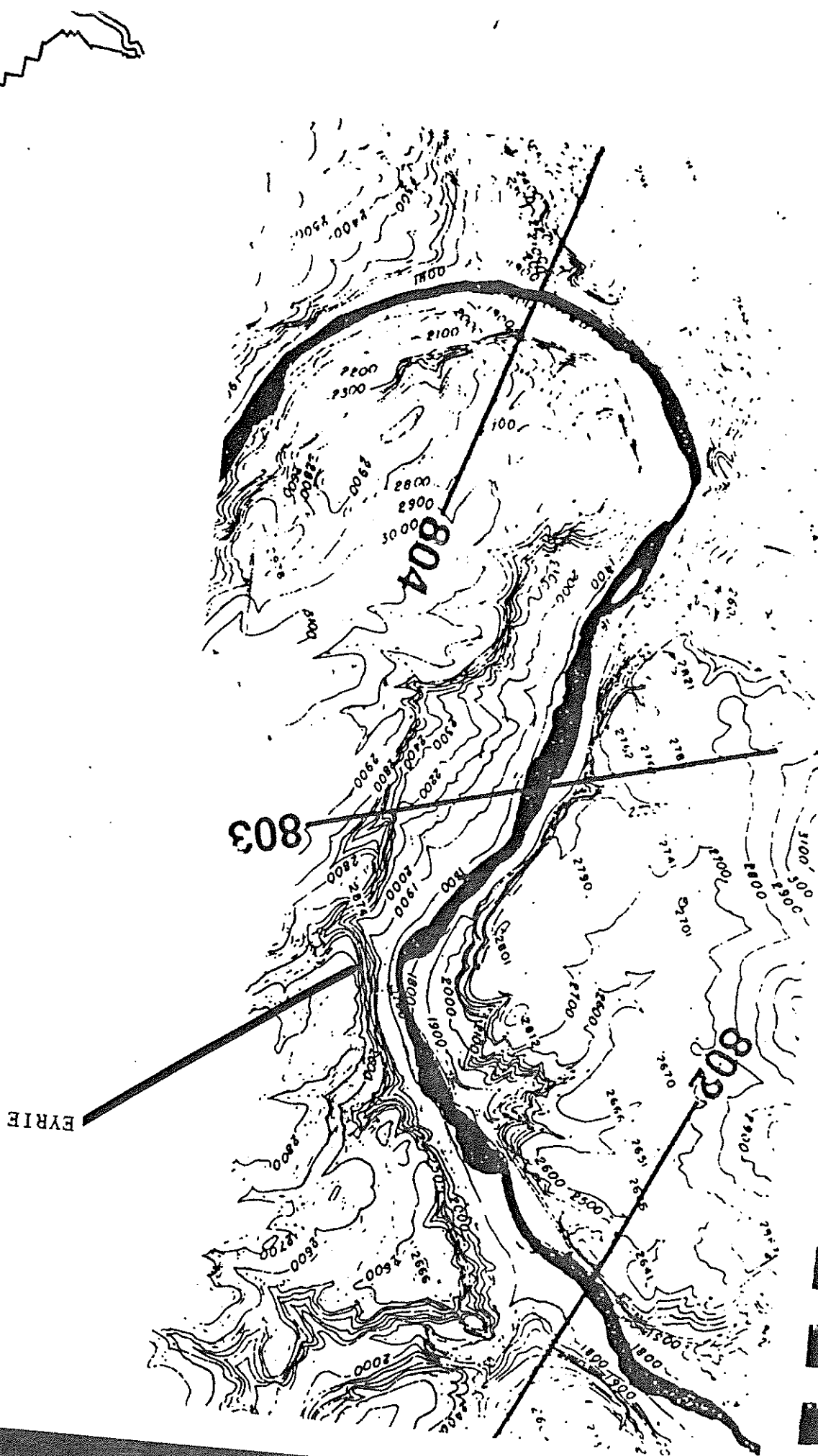
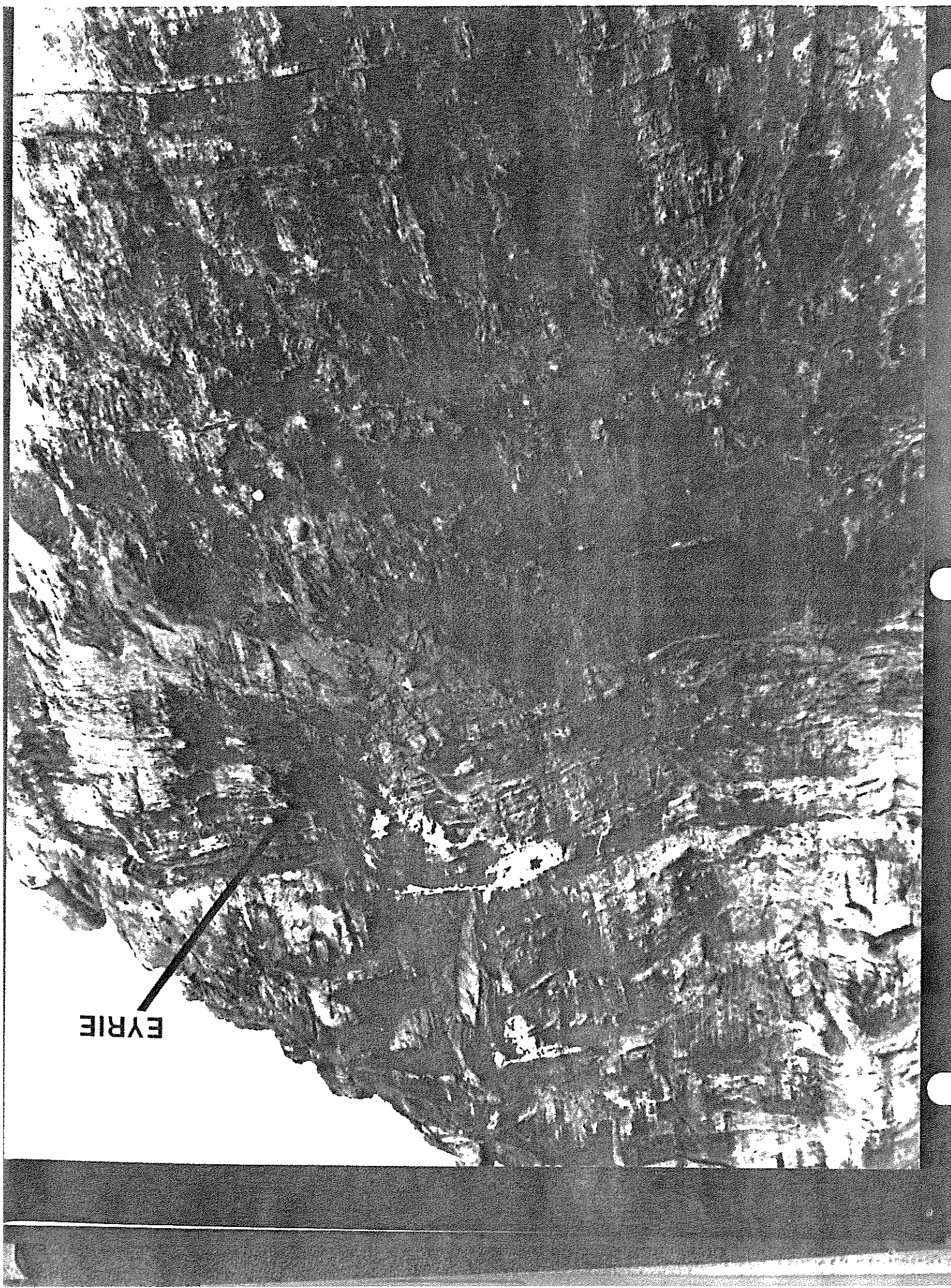


Figure 7: Photograph of the upper Boquillaas Eyrie.



EYRIE

This year, an adult pair was observed defending the area on 20 - 21 February. Flight surveys of the area throughout the study revealed that a pair was nesting in lower Boquillas Canyon. The eyrie (Figure 8) is located approximately 18.84 km upstream from the Gerstaecker Bridge in La Linda, Mexico. This eyrie is the only river eyrie located on the United States side of the RGR (Figure 9). Breeding chronology of this pair is remarkably similar to that observed at the upper Boquillas eyrie. Incubation began on or about 27 - 29 March with hatching around 29 - 30 April. Fledging occurred between 11 - 13 June. On 23 May, a cliff adjacent to the eyrie was climbed in order to photograph the young in the eyrie. Two young females, based on size in comparison with the adults, were observed in the eyrie. Visitation to the site on 22 - 23 June documented that both young had successfully fledged.

Occupied Mountain Territories

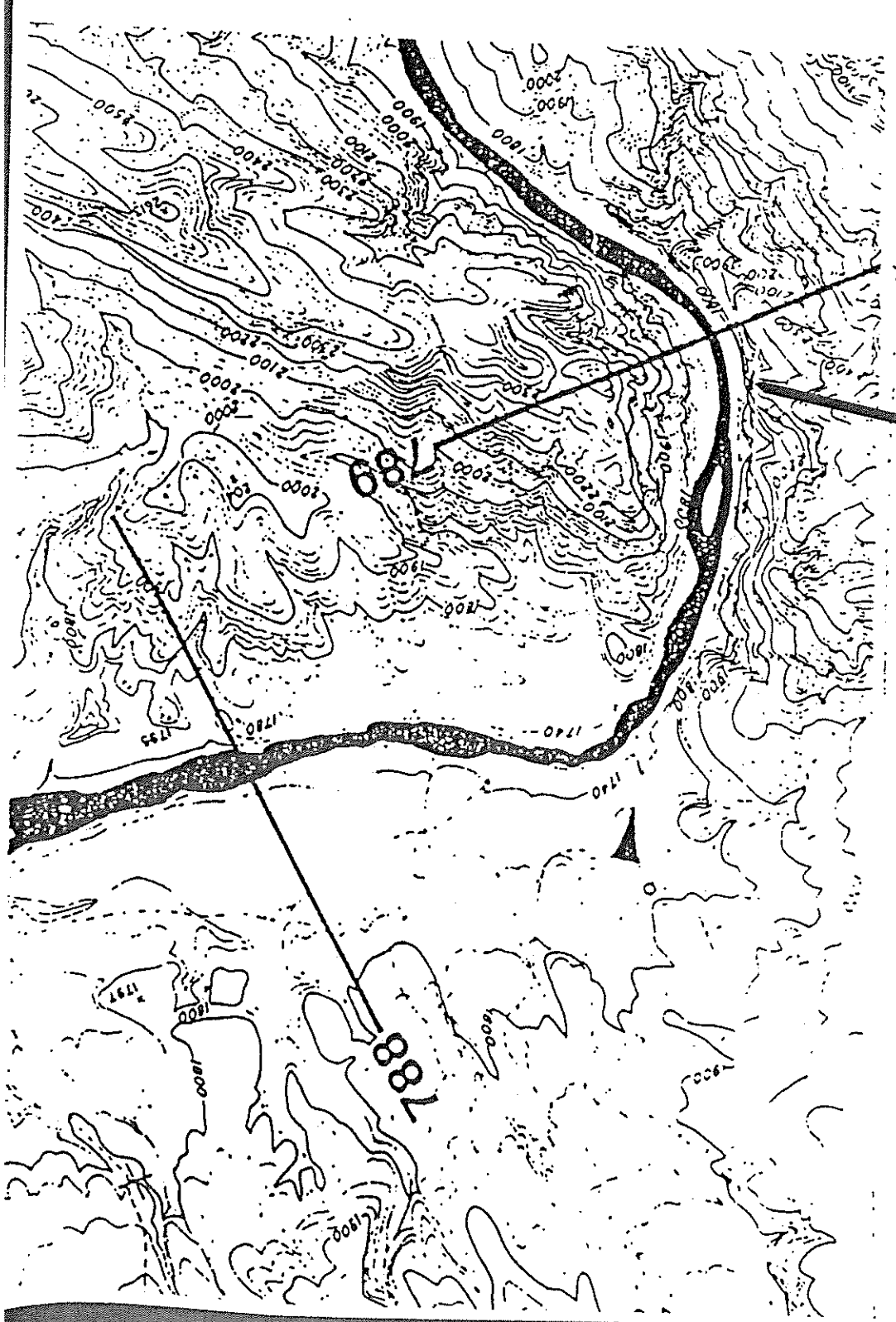
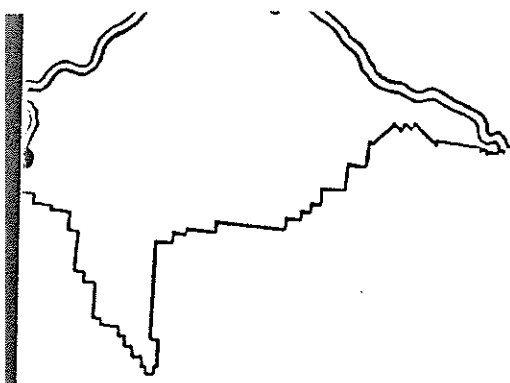
Mountain territories within the BIBE were intensively monitored this year as part of a pilot project to evaluate the impact of disturbance in areas of high visitor usage. It is therefore necessary to note that some of the data presented in this portion of the report are a synthesis of information gathered by myself, and members of the Peregrine Fund Inc. In particular, Harlan Doty, Penny Myers, and Chuck Kilpatrick, did a sizeable portion of the work in these areas, and the conclusions expressed in this report may or may not be those of my colleagues or the Peregrine Fund Inc.

Figure 8: Photograph of the lower Boquillas Eyrle.

Figure 9: Location of the lower Boquillas Eyrle.

EYRIE





EYRIE

Casa Grande Territory/Pinnacles Eyrie Site # 111: The Pinnacles eyrie was discovered on 9 May by Chuck Kilpatrick approximately 2.3 km up the Pinnacles trail from the NPCI warehouse (Figure 10). This pair of falcons is believed to be the same pair which occupied the historic Casa Grande site for several months prior to the discovery of the Pinnacles eyrie. I suggested that this eyrie represents a new eyrie within the existing Casa Grande territory. This assumption is subjective and based on my interpretation of the available data.

Nine visits were made to the Pinnacles eyrie (Figure 11) between 15 May and 3 June. On my initial visit to the eyrie with Tom and Betty Alex (BIBE, Office of Resource Management), normal reproductive behavior was observed, i.e., incubation switches, etc. It was apparent at this time that the falcons were in the process of incubation. Data collected by Chuck Kilpatrick suggested that incubation began at the eyrie around 9 May. Observations were again made at the eyrie on 19 May with Raymond Skiles, Office of Resource Management BIBE, and the falcons were observed at the eyrie only briefly. 19 May was the last time falcons were observed at the eyrie. Subsequent visitation to the eyrie on 28, 29 and 30 May, as well as 1 - 2 June, failed to produce any evidence that the eyrie was still active. Observations on 29 - 30 May, and 1 - 2 June were conducted from dawn to dusk to maximize observation time. On 3 June, after receiving authorization from BIBE and the U.S. Fish and Wildlife Service in Fort Worth, Texas, I entered the Pinnacles eyrie and removed a single egg. Preliminary

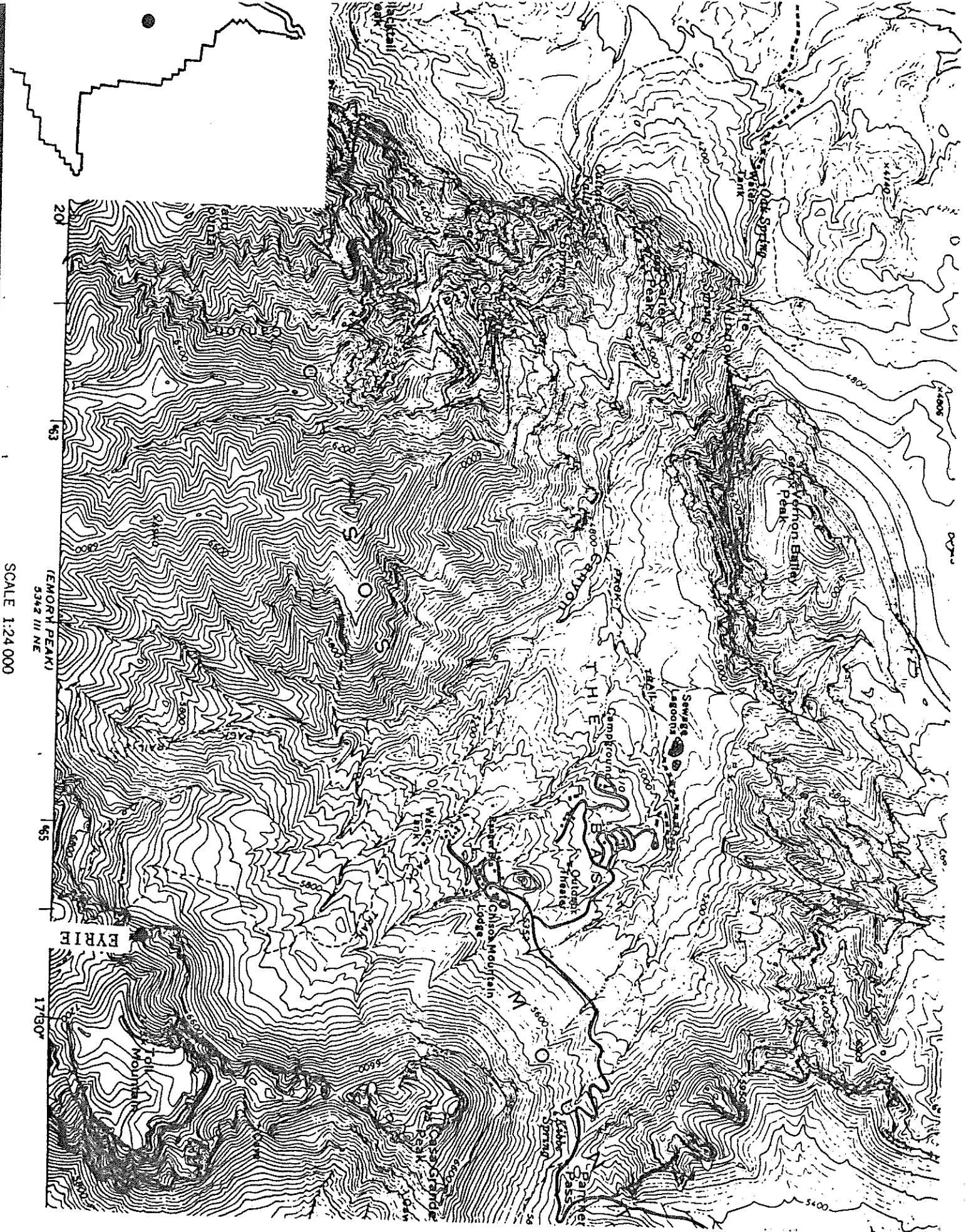


Figure 11: Photograph of the Pinnacles Eyrle.



examination of the egg suggested that it had been fertile, but the embryo was dead and beginning to decay. Eggshell fragments were sent to Jim Enderson, Colorado College, Colorado Springs, Colorado, for analysis.

Indications are that the falcons abandoned the eyrie on or about 20 May. Unfortunately, intensive site monitoring was terminated 17 May with the departure of Chuck Kilpatrick, thereby eliminating the chance for any conclusive information as to the cause of abandonment.

Southeast Rim Territory, Site #88: The Southeast Rim Territory was also intensively monitored this year by members of the Peregrine Fund Inc., between 18 February and 17 May, 1988. Prior to the initiation of intensive site monitoring, I determined that a pair of falcons was defending the territory on 13 February. During the course of this investigation, I made eight visits to the top of the rim and two additional visits to the base. The eyrie (Figure 12 and 13) was first located on 16 - 17 May. During this time a number of incubation switches were documented. Data gathered by Kilpatrick (pers. com.) suggested that incubation probably began between 8 - 10 May. Based on a mean incubation period of 33 days hatching occurred between 11 - 13 June. Data collected on 25 June supported this chronology. Two young, one male and one female, based on size in proportion to the adults, were photographed standing at the edge of the eyrie. Based on calculated fledging time for young falcons mentioned previously, young at this eyrie fledged between 23 - 25 July.

Figure 12: Location of the Southeast Rim Eyrle.

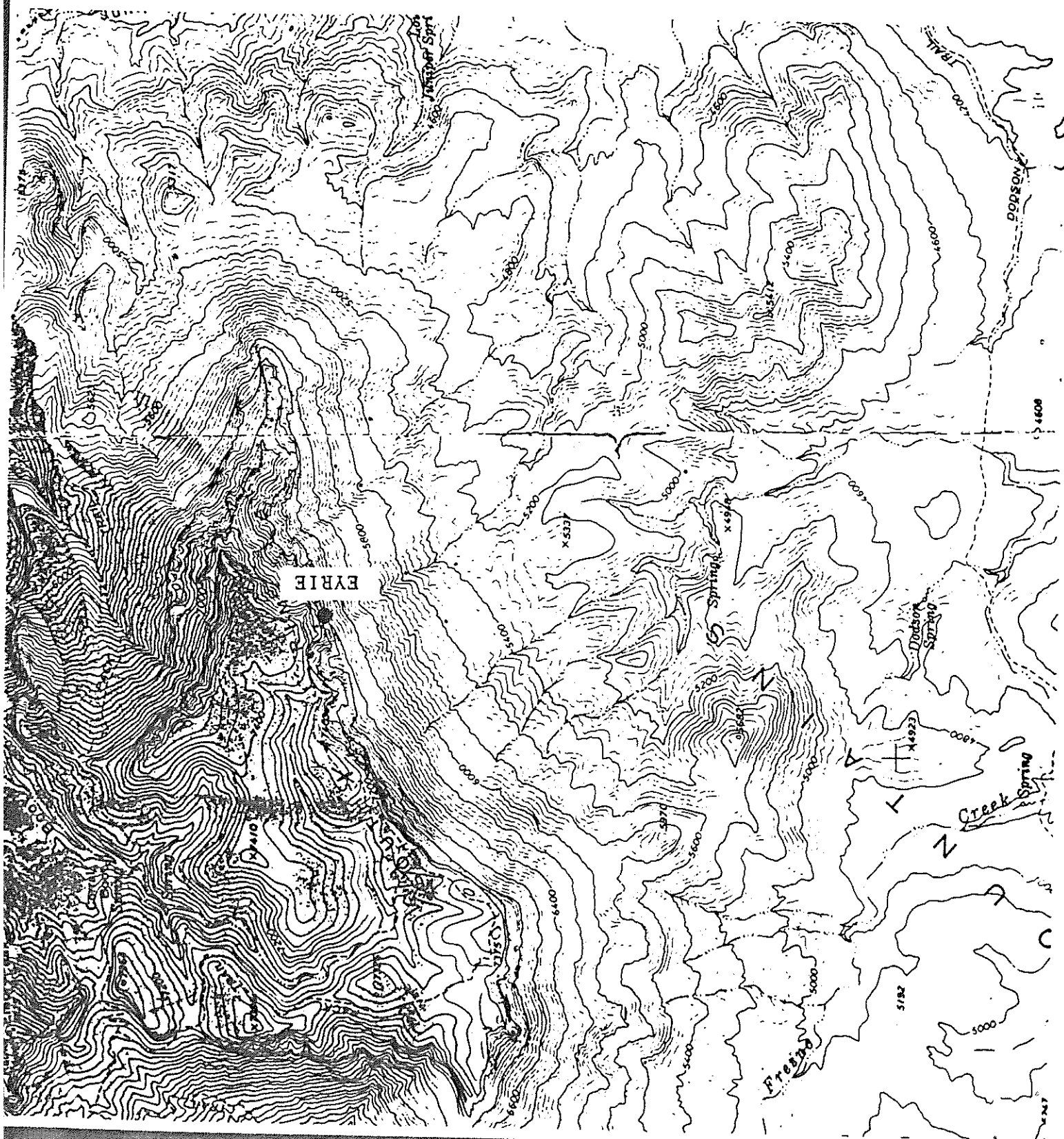
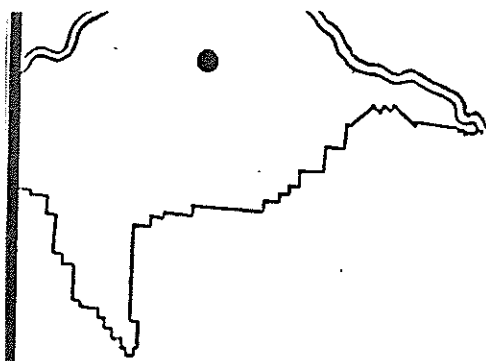


Figure 13: Photograph of the Southeast Rim Eyrle.

EYRIE



Successful production at the Southeast Rim Territory is encouraging. This territory has failed to produce young since 1985 (McKinney 1986, McKinney 1987) and may reflect the positive benefits of trail closures in the area.

Deserted Territories Surveyed

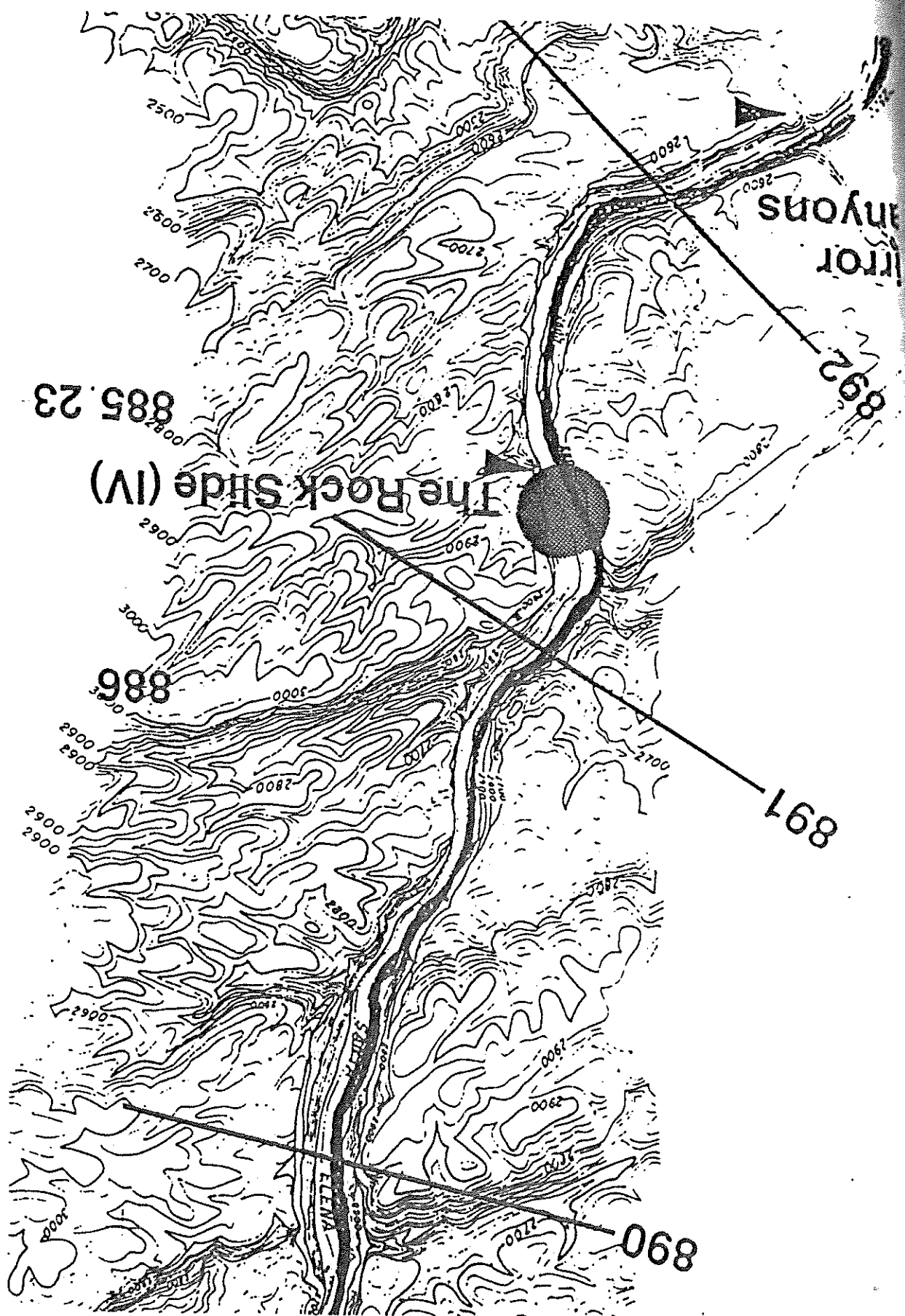
During this investigation a number of historic territories were determined to be deserted based on the criteria of Ratcliffe (1980). Essentially, a territory was considered deserted if it failed to produce a sighting of any peregrine activity during three visits spaced throughout the breeding season. While this method is by no means conclusive, it does provide an acknowledged method of assessment.

Following this method, eight historic territories were surveyed and determined deserted. Three of these were along the RGR and five were in the Chisos Mountains. Maps of these areas, as well as comments concerning the areas, are enclosed for future reference in the hope of stimulating additional interest in these areas.

Rockslide Territory, Site #99: Last active in 1985 (McKinney 1986), this territory (Figure 14) is located in an area of heavy human activity. Approximately seven trips were made to this area with no peregrine activity seen.

Sierra de Santa Elena, Site #222: Although this territory has never had a documented eyrie, it has had resident birds for the last three years. Unfortunately, this territory is several

Figure 14: Location of the historic Rockslide territory.



kilometers from the RIGR making observations difficult. Bonnie McKinney (pers. com.) documented a lone female in the area on the 22 February. However, six additional visits to the observation point for this territory in March, April, and May, failed to produce any additional sightings. Although I consider this territory deserted, several factors, including poor visibility, etc., could have rendered a false assessment of this site. Hopefully, future monitoring programs can be coordinated with Mexican officials to allow for access to this territory.

Lost

Lost Mine Territory, Site #33: Last active in 1986, the historic Lost Mine territory (Figure 15) was visited three times during the study period. On the third of April, I hiked to the base of the historic eyrie location with no success. Additional observations in May and June failed to produce any peregrine sightings.

Crown Mountain Territory, Site #N/A: Bonnie McKinney discovered falcons at this site on 17 April, 1987, and considered them to be the same birds from site #33 (McKinney 1987:18). The eyrie (Figure 16) successfully fledged one young in 1987. Surveys of the area on the 27 February, 29 March, and 16 April 1988, failed to produce a peregrine sighting.

Vernon Bailey Territory, Site #N/A: In response to the sudden disappearance of falcons from the Casa Grande Territory, Site #111, several investigators surveyed this area in April and again

Figure 15: Location of the historic Lost Mine territory.

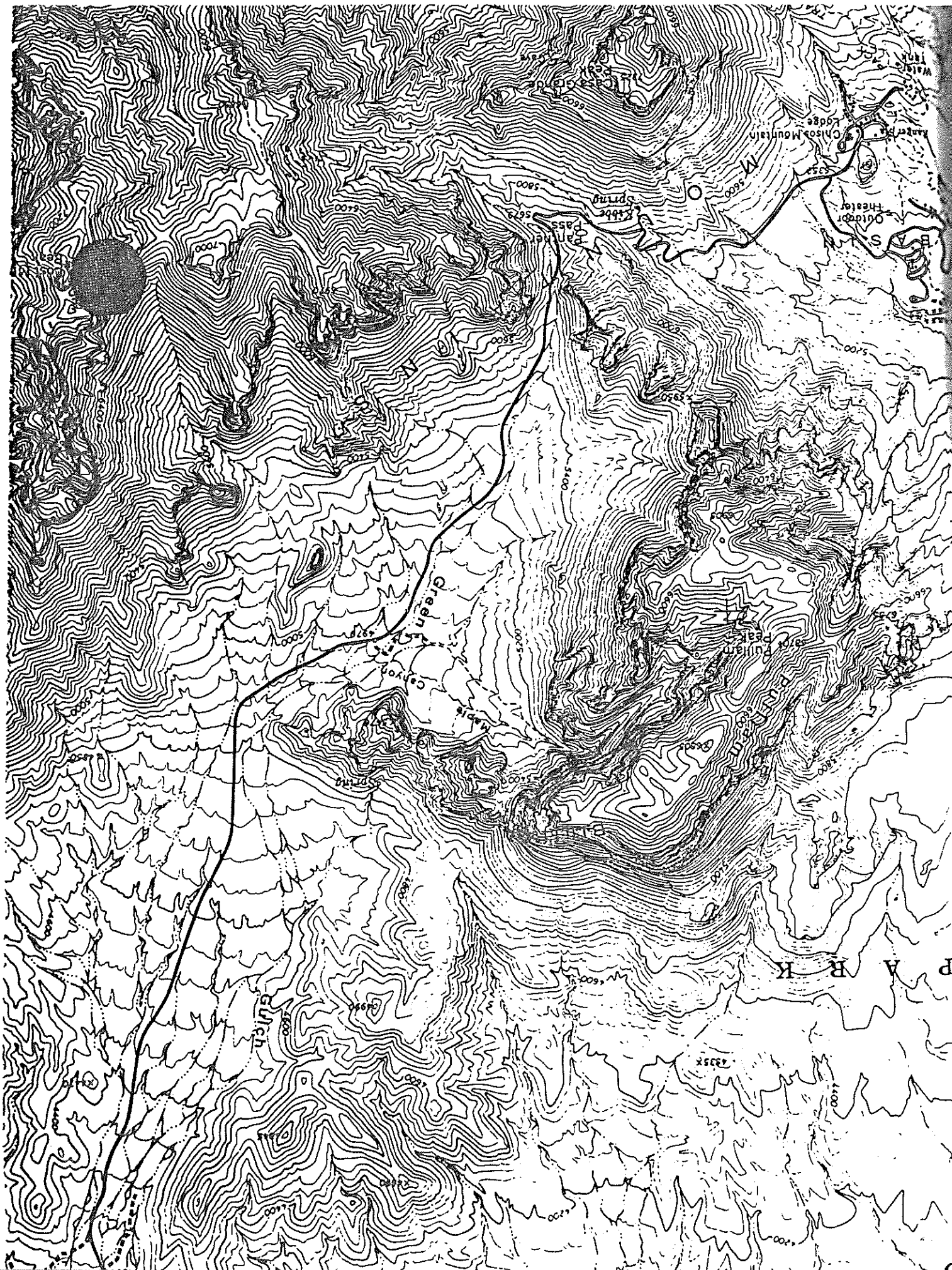
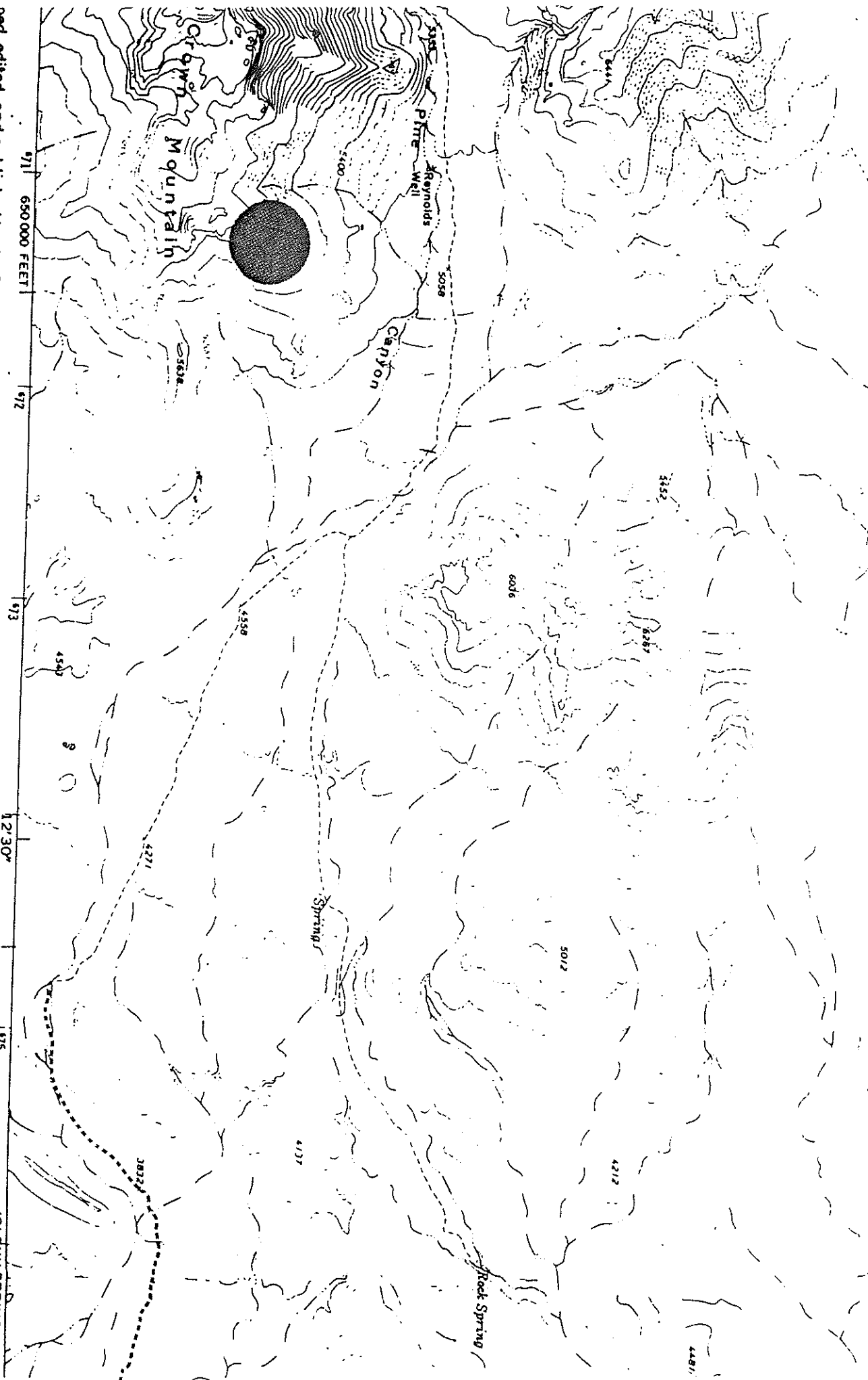


Figure 16: Location of the historic Crown Mountain territory.

U S O S
C H Smugglers Gap
Pummei Peak 6620



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of by USGS and USCGS

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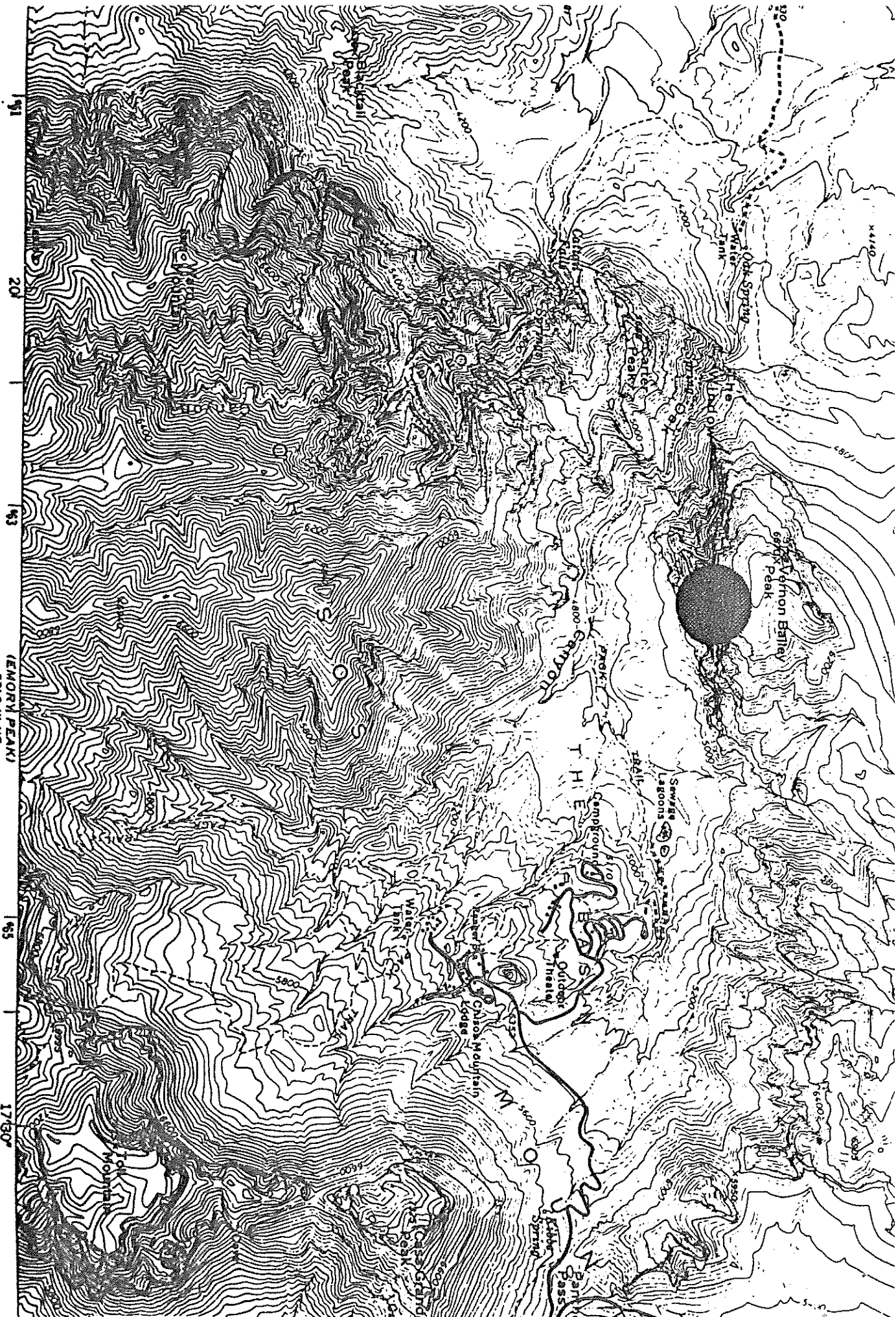
in early May. Although this territory has not had a documented eyrie since 1979 (Peter Scott 1979), and may merely represent an eyrie within the Casa Grande territory, its location (Figure 17) is included for future reference.

Maple Canyon, Site #N/A: At the request of the Office of Resource Management, the Maple Canyon area (Figure 18) was surveyed twice in April and May. Although no peregrine activity was noted, the canyon appears to afford adequate water and cliff resources to recruit an active eyrie and should be monitored when feasible.

Lower Canyon Territories, Site #'s 55 & 398: Logistically, the lower canyons of the RIGR are extremely difficult to monitor. For this reason, a paucity of information exists on the nature of the peregrine population in the area.

Surveys in the lower canyons, this year, were inconclusive. Only three visits to the canyons were made this season. No peregrine activity was observed. Since the nature of these data are limited it is currently difficult to assess the status of potentially new territories within the region. What was determined this year, is that neither site number 55, or 398, were active. Unfortunately, reports of possible nesting in other areas of the canyon (Bonnie McKinney pers. com.) could not be verified.

Figure 17: Location of the historic Vernon Bailey territory.



(EMORY PEAK)
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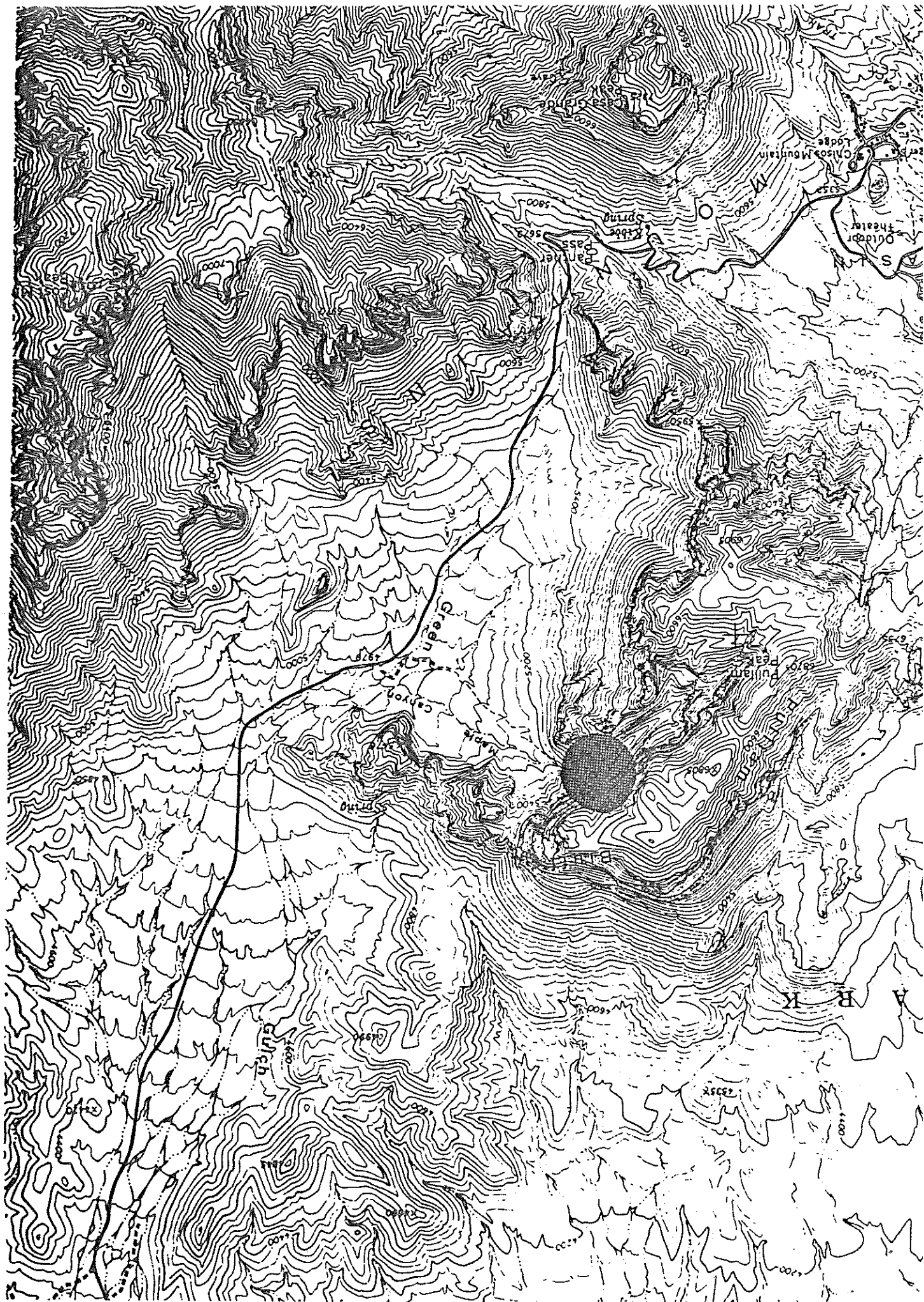
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Figure 18: Location of Maple Canyon.



Summary and Discussion

During this investigation a total of fourteen documented or known historic peregrine territories were surveyed. Of this number, six were determined to be occupied by pairs of peregrines. Five of these six occupied territories were productive, resulting in seven young falcons: five females, one male, and one undetermined.

Productivity of 1.17 young/occupied territory exceeded productivity recorded in 1987 of 0.77 young/occupied territory (McKinney 1987). While productivity is improved over 1987, it still remains below the accepted productivity level of 1.25 young/occupied territory necessary for population stability (USFWS 1984).

Productivity, however, was within the range of values recorded during the last eight years (Table 1). As Table 1 indicates, productivity has been quite variable over the past eight years. Factors causing this are currently unknown.

Breeding chronology throughout the region, was also highly variable in 1988. Tables 2, 3, and 4 list incubation, hatching, and fledging data for all occupied territories, respectively.

Data from 1980 to 1987 are presented for comparison. It is important to note, however, that many of these historic data are approximations based on calculations of mean incubation periods (i.e., 33 days) and mean fledging ages (i.e., 43 days). Considerable error could exist in direct comparisons.

Table 1: Productivity at peregrine eyries in Big Bend National Park and along the Rio Grande Wild and Scenic River from 1980 to 1988.

Productivity (= total # young / # occupied Territories)	
1988	1.17
1987	0.77
1986	1.25
1985	1.70
1984	0.50
1983	0.20
1982	1.40
1981	?
1980	1.00

Reference sources:
 87 - McKinney (1987)
 86 - McKinney (1986)
 85 - McKinney (1985)
 84 - Sharp (1984)
 83 - Sharp (1983)
 82 - Hunt and Johnson (1982)
 81 - Swepton (1981)
 80 - Key (1980)

Table 2: Incubation initiation dates at peregrine eyries in Big Bend National Park and along the Rio Grande Wild and Scenic River

Year	80	81	82	83	84	85	86	87	88
Rocksidge	--	--	--	F	--	3/20	F	F	D
Santa Elena	ID	ID	3/20	--	F	4/4	3/5	2/22	3/5
Mariscal	2/?	ND	3/17	F	F	F	4/1	3/1	3/5
Boquillas (Upper)	3/8	ID	ID	4/7	F	3/24	3/15	4/24	3/7
Boquillas (Lower)	--	--	--	--	--	--	--	4/27	--
John's	--	--	--	--	3/9	3/10	LF	D	D
Burro Bluff	ND	ND	FP	FP	D	ND	D	5/9	4/7
Casa Grande	F	D	FP	F	FP	5/9	4/3	5/9	4/7
Lost Mine	--	--	--	--	--	4/12	D	D	D
Crown Mtn	--	--	--	--	--	--	3/30	D	3/30
Southeast Rim	--	--	--	--	3/30	F	F	5/8	F

Legend:
(Month)/(day)
F = Failed eyrie
D = Deserted eyrie
ND = No data
FP = Falcons present
ID = Insufficient data
LF = Lone falcon

80	- Key (1980)
81	- Swepston (1981)
82	- Hunt and Johnson (1982)
83	- Sharp (1983)
84	- Sharp (1984)
85	- McKinney (1985)
86	- McKinney (1986)
87	- McKinney (1987)

Reference sources:

Table 3: Hatching dates at peregrine eyries in Big Bend National Park and along the Rio Grande Wild and Scenic River from 1980 to 1988.

Year										Eyrie
80	81	82	83	84	85	86	87	88		
--	--	--	--	--	--	F	F	D		Rockslide
F	ID	4/21	F	F	4/9	5/8	3/21	4/6		Santa Elena
ND	3/?	4/19	F	F	5/2	4/6	4/2	4/26		Mariscal
4/10	ID	ID	5/10	F	4/26	4/15	4/29	4/26		Boquillas (Upper)
--	--	--	--	--	--	--	--	4/29		Boquillas (Lower)
--	--	--	--	--	3/13	4/11	LF	D		John's
ND	ND	FP	FP	FP	D	ND	D	D		Burro Bluff
F	D	FP	FP	FP	6/5	5/5	5/8	F		Casa Grande
--	--	--	--	--	--	5/13	D	D		Lost Mine
--	--	--	--	--	--	--	5/1	D		Crown Mtn
--	--	--	--	--	5/2	F	F	6/11		Southeast Rim

Reference sources:

- 87 - McKinney (1987)
- 86 - McKinney (1986)
- 85 - McKinney (1985)
- 84 - Sharp (1984)
- 83 - Sharp (1983)
- 82 - Hunt and Johnson (1982)
- 81 - Swepton (1981)
- 80 - Key (1980)

Legend:

- (Month)/(day)
- F = Failed eyrie
- D = Deserted eyrie
- ND = No data
- FP = Falcons present
- ID = Insufficient data
- LF = Lone falcon

Table 4: fledgling dates at peregrine eyries in Big Bend National Park and along the Rio Grande Wild and Scenic River from 1980 to 1988.

Eyrie	Year										
	88	87	86	85	84	83	82	81	80		
Rocksidge	D	F	F	6/3	--	--	--	--	--		
Santa Elena	5/9	5/19	6/23	5/27	F	F	6/4	ID	F		
Mariscal	5/17	5/20	6/15	F	F	F	5/24	ND	4/?		
Boquillas (Upper)	6/7	5/24	5/29	6/9	F	F	6/23	ID	5/24		
Boquillas (Lower)	6/11	--	--	--	--	--	--	--	--		
John's	D	LF	5/23	C	4/26	--	--	--	--		
Burro Bluff	D	D	ND	D	FP	FP	FP	ND	ND		
Casa Grande	F	6/24	6/17	7/21	FP	FP	FP	D	F		
Lost Mine	D	D	6/25	--	--	--	--	--	--		
Crown Mtn	D	6/14	--	--	--	--	--	--	--		
Southeast Rim	7/23	F	F	6/19	--	--	--	--	--		

Legend: (Month)/(day)

F = Failed eyrie

D = Deserted eyrie

ND = No data

FP = Falcons present

ID = Insufficient data

LF = Lone falcon

C = Captive

Reference sources:
 87 - McKinney (1987)
 86 - McKinney (1986)
 85 - McKinney (1985)
 84 - Sharp (1984)
 83 - Sharp (1983)
 82 - Hunt and Johnson (1982)
 81 - Swepston (1981)
 80 - Key (1980)

No attempts were made during this investigation to determine individual identities of each falcon in the study area. While it is known that, "... adults retain unique plumage patterns." (Endereson and Craig 1985), current methods of documenting these "unique" plumage patterns, short of actual photographic documentation, are subjective at best. In addition, no attempts were made to identify individual birds on behavior criteria, as I am currently unaware of any method for testing assumptions of identity using behavioral criteria.

I do, however, strongly suggest that future peregrine studies concentrate on assessing population dynamics as well as productivity in the region. Many questions remain unanswered with respect to peregrines in the Trans-Pecos. Among the most crucial, is the determination of the year-round ecology of the species. While the literature is replete with accounts of eyrie locations and production, little is known concerning the actual habitat requirements of the species including territory size, wintering ranges, etc.

In the hope of stimulating interest in future research on the peregrine in the Big Bend Region, I suggest the following management recommendations:

1. Increase Funding.
2. Develop a long-range plan for researching various aspects of peregrine ecology each year (i.e., year one concentrate on banding and marking studies, year two concentrate on determining territory size, etc.).

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areas, especially in the Lower Canyons region.

5. Initiate helicopter surveys of previously unsurveyed

monitored closely in 1989.

visitor use along the Mariscal Rim Trail. This area should be

addition, a potential for eyrie disturbance exists with excessive

4. Continue the trail closures implemented in 1988. In

occupied territories surveyed were in Mexico.

work with peregrine territories in Mexico. Four of the six

3. Develop better relations with Mexican officials to

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