

PEREGRINE FALCON BREEDING STATUS
IN BIG BEND NATIONAL PARK, 1984

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PROPERTY OF
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INTRODUCTION

This report documents the results of the 1984 productivity survey of peregrine falcons in Big Bend National Park (BBNP). The objective of the field work was to determine the occupancy and productivity at each of the five known eyrie sites within the park, the Rio Grande Wild and Scenic River and to look for new eyries.

The status of nesting peregrine falcons in BBNP has been monitored since 1975 (Sharp 1983). At that time the peregrine falcons in the Chihuahuan Desert, both United States and Mexico, were among the very few populations in the United States to be reproducing with some degree of stability (Cade 1982). The cause for the nearly worldwide decline of peregrine falcon populations is generally accepted to be the use of chlorinated hydrocarbon pesticides (Ratcliff 1980, Cade 1982, Hunt and Johnson 1982). This decline earned peregrines the status of an "endangered species" in Appendix I of the International Convention on Trade in Endangered Species of Wild Fauna and Flora, 1967. The Endangered Species Act of 1973 charges all federal agencies with conserving endangered species.

It is not only the threat of loosing a species that keeps hundreds of researchers out in the field; the health of the peregrine population is a good barometer for the well-being of our terrestrial ecosystem.

FIELD WORK AND METHODS

The field work began in February and terminated in late June. Each eyrie was visited at least four times (except the new eyrie) and some received as many as fourteen visits. Observations were made by myself, the primary investigator, and/or Mindy Morlock, field assistant and several volunteers. Binoculars and spotting scopes were used.

I searched for potential peregrine nesting habitat in Boquillas Canyon and the Lower Canyons from a small plane. Ground checks were made to promising sites.

RESULTS OF THE EYRIE SURVEY

SANTA ELENA EYRIE

An adult pair attempted to nest on the historic eyrie cliff. The nest failed during incubation or early brooding. The pair moved to the downstream mouth of Santa Elena Canyon.

I made four visits (8, 16, 28 February and 20 March) before I saw the falcons. On 31 March, I observed an adult pair copulating, but saw no evidence of a nest hole until 16 April. Mindy Morlock and I observed a probable incubation change on 30 April, and on 9 May I observed a falcon (probably both) fly in and out of the nest hole three times within twenty minutes, between 0640-0700 hours. No peregrines were seen or heard during the next three visits (17, 25 May and 2 June). On 12 June, M. Doll and I watched the pair from Terlingua Creek. They flew from the canyon mouth to the eyrie site

and back. The female gave a begging vocalization several times, there was no evidence of young, or an active nest.

It is difficult to say when the nesting attempt failed. I optimistically interpreted the behavior on 9 May as feeding young in the nest, though I did not definitely see prey being brought in. It is possible that the falcons were in a state of confusion due to recently broken eggs. I am not aware of any human or climatic disturbances that would have caused the eyrie to fail.

Comments

After the nesting attempt failed the pair began to spend time at the canyon mouth at Terlingua Creek. L. Int-Hout (NPS park ranger) reported three peregrines at Terlingua Creek on 30 May. I was unable to substantiate that report on 2 or 12 June. It puzzles me where a third peregrine could have come from. I am certain that I did not miss a successful nesting (we made fourteen visits to the eyrie), and I do not believe the pair would be flying with another falcon.

A visitor reported a pair of falcons flying in and out of a hole in the cliff above the nature trail at the mouth of Santa Elena Canyon on 17 March. The observation card said that the visitor had heard "food begging by young". On 29 and 31 March I found a pair of kestrels using a hole in the canyon wall above the nature trail. I believe the report was a case of mistaken identity.

MARISCAL

An adult pair attempted to nest on the Texas side of Mariscal Canyon. The nesting was unsuccessful.

The falcons were courting when J. Morlock and I visited on 21 and 22 March, we observed a prey transfer and possible copulation. They appeared to have chosen a nest hole on 18 April. During our observations, one or the other of the pair, flew in and out of the hole four times in two hours. We were unable to be sure if the pair had eggs or young. On 30 and 31 May J. and M. Morlock observed the pair actively flying around and downstream of the eyrie area. The falcons were very vocal and did not appear to have any young or an active nest.

As with the Santa Elena eyrie, I was optimistic that the behavior observed on 18 April would lead to a successful nesting. There is no apparent reason for the nest to have failed. The pothole that the falcons were using faced NNE, and appeared to provide shade for much of the day. It is in a deeply overhung area, disjunct from the main canyon rim, and I would guess it to be inaccessible from above or below, and not disturbed by traffic on the Mariscal Rim Trail.

Comments

Two interesting incidents involving human disturbance occurred on 21 March. At 1330 hours a plane flew about 500 feet above the canyon rim where the falcons were courting. They did not show any signs of being disturbed. At dusk,

1850 hours the same day, three pistol shots were fired about a quarter of a mile downstream of the historic eyrie area. When the first shot reported the male acted as if he was shot from a cannon. He flew up river and out of sight. The female did not fly from her perch. The shot was fired by boaters in distress.

The falcons have chosen a high visibility site. Almost all boaters stop and look at the rapid beneath the nesting area. Many boaters see the falcons, but I do not regard that as a disturbance.

The Mariscal Rim Trail is another potential source of human disturbance, that I believe has not reached a disturbance level. The trail does not lead hikers directly over the historic nesting area, and it is unlikely that many would cross the broken terrain when a good view of the canyon is half to three-quarters of a mile down the trail. The most serious threat the trail poses is the unlikely event of a falconer who uses the trail to access the eyrie to steal the eyasis. That type of criminal is highly motivated, and likely to meet their goal with or without the trail. I don't believe even the most motivated person could access the eyrie hole used this year.

BOQUILLAS

An adult pair nested on the historic eyrie cliff. The nesting failed during late incubation or early brooding.

On 26 and 27 March J. and M. Morlock and I found the

nest ledge, observed several prey exchanges and an incubation change. The falcons appeared to be doing fine on 20 and 21 April, when J. and M. Morlock observed more prey exchanges, incubation changes and territorial behavior toward another falcon. Their best guess was that the pair still had eggs in the nest. On 22 May the pair were in the vicinity of the eyrie, but did not show any sign of having young in, or out of the nest. The male did a hovering flight, and gave a chupping-call. The female begged incessantly for hours with a visibly full crop. M. Morlock visited the eyrie on 8 and 9 June, the falcons were in the area, but not involved in any phase of nesting.

The behavior observed on 22 May is typical of a pair that has failed in a nesting attempt (Hunt and Johnson (eds) 1977, Ratcliff 1980). We saw no evidence of renesting, or any disturbance, human or climatological, that would cause the eyrie to fail.

CHISOS MOUNTAINS BASIN

A pair of adult peregrine falcons spent the spring in the Chisos Basin focusing their attention on Casa Grande. There was no indication of an attempt to nest. No courtship behavior was observed.

Mindy Morlock and/or I made ten visits to the Basin between 10 April and 6 June. On each occasion we observed one or both peregrines, but no specific nesting activity. We varied our observation posts using the Lost Mine Trail,

Kibbe Spring Trail, and the Pinnacles Trail to provide us with different views of Casa Grande.

The lack of courtship behavior suggests that the pair did not attempt to nest. To my knowledge there were no human or climatological disturbances that would have discouraged the falcons from nesting.

Comments

The Chisos Basin provides a seemingly ideal nesting site for peregrine falcons; a sheer cliff with a commanding view, fresh water nearby and a good prey base. There is a considerable amount of human activity in the Basin Area, but it is restricted to below the cliff, and it is mostly in the form of a constant hum and buzz, rather than loud unexpected noises.

Peregrine falcons can tolerate some human activity. They have historically nested on buildings (Ratcliff 1980). In recent times, last year, there were two pair of peregrines that successfully nested on bridges in New York City. One nested beneath the Verazano-Narrows Bridge which connects Brooklyn and Staten Island; the second on the Throg's Neck Bridge connecting Queens and the Bronx. Both pairs nested beneath a constant stream of traffic.

BURRO BLUFF

An adult pair was seen flying in the eyrie cliff area on several occasions. There may have been an attempt to nest, no young were produced.

I did not see any falcons during my first visit to Burro Bluff on 11-12 March. On the morning of 17 March J. Morlock watched one falcon fly around and perch on the cliff. During the afternoon of 25 April C. and R. Simmons and J. McChristal (NPS rangers) observed a pair of falcons using a ledge (near Liles Ledge), that may have been used for a nesting attempt. After the initial sighting of the two falcons in the air, only one falcon was seen at a time, a possible indication of incubation. The falcons were seen on 19-20 May, but there was no evidence of any nesting activity. No falcons were seen on 21-22 June.

Burro Bluff appears to be a suitable nesting site; the cliff faces east, has many potholes and ledges and a seemingly ample prey base (there is a white-throated swift roost on the cliff). It is possible that the falcons are using an alternate cliff, but the frequency of sightings of both birds on and around Burro Bluff make that possibility seem less likely.

Although Burro Bluff is in a remote section of the river, with limited access, it has the potential to incur some human disturbance from above. There is a trail that starts from the camp on the Texas side and climbs up to the rim of Burro Bluff. I've been told that the view is spectacular.

John Morlock, NPS river ranger, has noticed that the trail use has increased markedly in the past two years. It is much more visible from the river than it had been in past years; there is also a great increase in multiple trailing at

the base of the trail. The use is from boaters, who do not realize, or choose to ignore, that the land is privately owned and that they are trespassing.

It is difficult to assess the amount of disturbance hikers create. A large noisy group, rolling boulders off the rim, directly over the eyrie ledge, could cause a nest to fail. Peregrines incubate with the egg tucked between their body and their toes; a loud noise could flush the incubating falcon, and the eggs too.

There is little the park can do in this situation. The land is privately owned, and although the landowner would like to keep people off the trail, he is not in the area often enough to keep the traffic down.

I think it is highly unlikely that the pair of peregrines at Burro Bluff are not reproducing due to human disturbance.

JOHN'S EYRIE

John's eyrie was found this year by John Morlock. It is located at river mile 745.7 (Pearson (ed) 1982), roughly the beginning of the Lower Canyons. The eyrie is on a cliff on the Texas side of the Rio Grande, facing SSW. The height of the cliff is approximately 700 feet from the river to the rim, the eyrie is about 200 feet below the rim.

The vegetation on the hillside below the eyrie typifies low Chihuahuan desert in a steep limestone substrate. Lechuguilla, prickly pear and candellia dot the hillside. There is an arroyo across the river, on the Mexican side,

which adds the diversity of the floodplain vegetation.

On 15 March J. Morlock and T. Pearson observed a falcon perch on a heavily whitewashed ledge, which turned out to be the eyrie ledge. On the next river patrol, 17 April, John located the eyrie and counted three young that were about five weeks old. On 18 June the young were in the eyrie vicinity and seemed to be hunting for themselves.

EYRIE SURVEY SUMMARY

Only one of the six eyries produced young this year. John's eyrie, located this year, fledged three young. Three sites (Santa Elena, Mariscal and Boquillas) attempted to nest and failed. Another pair (Burro Bluff) may have attempted to nest, we were unable to determine their status. The last pair (Chisos Basin) stayed in the vicinity of Casa Grande, but never showed any nesting behavior. Table 1 summarizes the nesting history of the Big Bend eyries since 1975.

The productivity (the number of young produced (3) divided by the number of territories in the area (6)), for the eyries covered in this survey was 0.5 young. A productivity rate of 1.5 young is necessary to maintain a stable population (Hickey and Anderson 1969). Last year's productivity rate was 0.2. This is a clear indication of a population in distress.

EYRIE SEARCH

I searched Boquillas Canyon, the South Rim of the Chisos Mountains and the Lower Canyons for new peregrine falcon eyries.

A new eyrie was located in the Lower Canyons by John Morlock.

Every year there are a few sightings of peregrine falcons at the downstream mouth of Boquillas Canyon. Hunt and Johnson (1982) make mention of the possibility of a second Boquillas eyrie. Although we were unable to locate the eyrie site, I believe there is an active territory somewhere in the Cow Canyon or Hubert Ridge area.

The South Rim of the Chisos Mountains is a sheer cliff that commands an impressive view; past the river, about 15 miles to the south. I searched the South, Southeast and Southwest Rims for nesting peregrines and saw none.

The Lower Canyons encompasses a vast river canyon wilderness area, with seemingly abundant peregrine falcon nesting habitat. I searched the area from a small plane. My criteria for a potential nesting site is a sheer cliff, with a commanding view, little source of human disturbance and the promise of an ample prey base. I identified several potential areas. Appendix 1 is a list of these locations.

TABLE 1. Reproductive History of Peregrine Falcons in Big Bend National Park. 1974-1984.

	Santa Elena	Mariscal	Boquillas	Chisos Basin	Burro Bluff	John's
1974	Apr	Apr	Apr			
1975	Apr	Apr	Am			
1976	Apr(nf)	Apr(nf)	2Y			
1977	3Y	2Y	Apr nf			
1978	3Y	1Y	3Y	Apr		
1979	Apr	Im	1Y	2Y	1Y*	
1980	Apr	1Y	3Y	Apr nf	I/D	
1981	Apr I/D	I/D	I/D	I/D	I/D	
1982	2Y	3Y	2Y	Apr(nf)	Apr nf	
1983	Apr nf	Apr nf	1Y	Apr	Apr	
1984	Apr nf	Apr nf	Apr nf	Apr	Apr	3Y*

Apr=Adult pair.

Apr nf=Adult pair, nest failed.

Apr(nf)=Adult pair, probable nest failure.

Y=Number of young.

I/D=Insufficient data, outcome unknown.

Im=Immature male at eyrie, only falcon at site.

Am=Adult male at eyrie, only falcon at site.

*=Year located.

DISCUSSION

The behavior observed both this year and last (Sharp 1983) indicates strongly that the peregrine falcons in Big Bend National Park are not reproducing normally due to pesticide contamination. Reduced productivity resulting from thin eggshells is an early symptom of pesticide malaise. A nesting attempt that fails during incubation, will in upcoming years be followed by no attempt to nest; then the disappearance of one or both of the adult falcons. The eyrie site will be abandoned.

The chance of a successful renesting is small. Ratcliff (1980) has observed that "the majority of peregrines known to have lost whole clutches by breakage have evidently not laid second sets of eggs". There are probably several factors contributing to the low incidence of renesting in pesticide contaminated birds. Field observations have led me to believe that the breakage of the eggs occurred more than ten days after the onset of incubation. At this point the likelihood of renesting is greatly reduced, probably due to the birds' inability to renew the physiological cycle leading to egg production (Ratcliff 1980).

In the past two years I have not observed an attempt to renest. After the nest failed the falcons reverted to some early courtship behavior patterns, such as visiting and scraping ledges, aerial displays and vocalizations. In most cases the pair remained in the vicinity of the eyrie.

There has been mounting evidence of pesticide use and contamination in the Trans-Pecos area (Applegate 1970, Hunt and Johnson 1982, Key 1980 and McDonnell 1984). The two peregrine eyries in the Guadalupe National Park and one in the adjacent Lincoln National Forest have been areproductive since 1978, 1979 and 1976, respectively. The DDE residues of putative peregrine prey samples collected by Hunt and Johnson from Reeves, Presidio and Hudspeth counties in 1982, were high for all species and extreme for others (Stegman 1982).

Presently there exists no concrete evidence of pesticide contamination in Big Bend National Park. This type of information is difficult, if not impossible, to obtain during an observational field study. The contents of the eyrie ledge, gathered by a person rappelling in, might provide enough evidence in the form of eggshells to measure, or an addled egg to analyze. Thin eggshells, or a heavily contaminated addled egg would tell the story.

It has never been ascertained where the peregrines in Big Bend spend the winter. Even if Big Bend National Park is free of pesticide contamination, a migratory population could pick up a critical pesticide burden from their wintering grounds.

The park resources management personnel have taken a great interest in the peregrines. Previous management recommendations have become policy (i.e. seasonal closure of

the river canyons to motorized boats and the closure of the Casa Grande Trail), and the peregrines are well buffered from the visitors. There needs to be a watchful eye kept out for possible human disturbance, but I regard the threat of pesticide contamination to be paramount.

RECOMMENDATIONS

1. A site occupation and productivity survey should be conducted in 1984.
2. A research plan should be developed to ascertain where the peregrine falcons that breed in BBNP spend the non-breeding season.
3. The accessible eyries should be rappelled into, and the nest contents collected. Eggshell fragments should be measured, and addled eggs analyzed for pesticide residues. I consider Boquillas accessible, and Santa Elena marginally accessible.
4. A putative prey sample should be collected in the park, within the vicinity of the eyries.

ACKNOWLEDGMENTS

A mere thanks is not sufficient to express my gratitude to both Mindy and John Morlock. Their help and enthusiasm improved the quality of the field work. Mindy assisted me in the field and John kept his keen eyes out for peregrines while on river patrol.

I would like to thank Big Bend National Park employees for their unanimous support and interest in the peregrines, and this study. A special thanks is due to Jim Bellamy for his logistical support.

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LITERATURE CITED

- Applegate, H. G. 1970. Residues in fish, wildlife, and estuaries: insecticides in the Big Bend National Park. Pesticide Monitoring Journal 4(1):2-7.
- Cade, T. 1982. The Falcons of the World. London: Comstock/Cornell University Press.
- Hickey, J.J. and D. W. Anderson. 1969. The Peregrine Falcon: Life History and Population Literature. Hickey, J.J. (ed). Peregrine Falcon Populations. Madison: Univ. of Wisconsin Press.
- Hunt, W. G. and B. S. Johnson(eds). 1977. Nesting peregrine falcons in Texas, 1977. Chihuahuan Desert Research Institute Contribution No. 37.
- Hunt, W. G. and B. S. Johnson. 1982. Nesting peregrine falcons and pesticides in western Texas, 1982. Prepared for the National Park Service and U.S. Fish and Wildlife Service. Contract No. 14-16-0002-82-206.
- Key, L. J. 1980. Peregrine falcon breeding status in Texas national parks, 1980. Chihuahuan Desert Research Institute Contribution No. 97.
- McDonnell, P. 1984. Texas, N. M. probe DDT use. Dallas Times Herald 20 May 1984: 35A.
- Pearson, J. (ed). 1982. River Guide to the Rio Grande: the Lower Canyons. Big Bend Natural History Association.
- Ratcliff, D. 1980. The Peregrine Falcon. Carlton: T & D. Poyser LTD.
- Sharp, D. 1983. Peregrine falcon breeding status in Big Bend National Park, 1983. Big Bend National Park.
- Stegman, J. L. 1982. Contamination levels in songbirds occurring in Texas. Unpublished Memorandum from United States Fish and Wildlife Service.

APPENDIX 1

Notes from Lower Canyons and Boquillas Canyon flight. 17 April 1984.

Rm=River mile from River Guide to the Rio Grande: Lower Canyons

(Pearson ed. 1982).

TX=Texas (U.S.) side of Rio Grande

MEX=Mexican side of Rio Grande

Rm 791.9 (TX) The canyon upriver of Cow Canyon has a steep NE facing cliff.

Rm 773.5 (TX) Peregrines have been seen on the sheer cliff on the outside of a bend in the river.

Rm 773.5 (TX) Maravillas Creek, about a mile up Maravillas from Rio has good looking cliffs. A side canyon, on the south side of Maravillas, Dog Canyon, looks steep-walled.

RM 760 (MEX) El Barco has sheer cliff faces on all sides.
(TX) Outlaw Flats has several good looking cliffs, but are difficult to reach from Rio.

Rm 736.3 (MEX) Canyon San Rosendo, the side canyon at Hot Springs does not look promising.

Rm 734.5 (MEX) Canyon Caballo Blanco has steep cliffs above the pour off.

Rm 729-722 (Both sides) There are intermittent good cliffs in this area.

Rm 721.8 (TX) Burro Bluff is the best yet. The trail does not go to the rim.

Rm 718.5 (TX) A no name side canyon has steep cliffs.

Rm 716.8 (MEX) Across from Panther Canyon the cliff is two-tiered, but has potential.

The cliffs decrease in height shortly after Panther Canyon.