FLIGHTS OF NESTING PEREGRINE FALCONS RECORDED BY TELEMETRY

by
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Abstract

Both adult Peregrine Falcons (*Falco peregrinus*) were radio-tagged to determine foraging behavior and other movements at an eyrie containing young in Sonoma County, California, April-June 1979. Equipment failure and terrain prevented a complete record of hunting flights by triangulation, but tracking data coupled with visual observations made near the eyrie permitted analysis of 139 flights by the female and 40 by the male. The adults tended to use corridors along ridges when arriving or departing the eyrie. When the female remained within 1 km of the eyrie 74% of her flights were along the ridge behind the eyrie, and often included perching. About 47% of all the female's flights were known to be farther than 1 km from the eyrie and these were generally made in all directions. The male seldom remained near the eyrie; at least 65% of his flights were farther than 1 km, and about one-third of these were along a single ridge extending several kilometers towards a broad valley. In 20 cases the adults were tracked to distances between about 3 and 8 km from the eyrie, and the average was about 5 km. Prey was apparently taken fairly uniformly in most directions from the eyrie.

Introduction

Despite the potential of radio telemetry for revealing movements of wide-ranging birds there are no published reports of telemetry studies on peregrines. The present work sought to describe the extent and direction of foraging flights of a pair of peregrines with young. The plan was to obtain bearings on the transmitter signal simultaneously from two receiver stations so that the position of the bird could be plotted by triangulation. Sets of bearings obtained at short intervals would allow the tracking of the flying bird. These data, combined with those from a full-time observer near the eyrie were to reveal the pattern of habitat use.

A good deal of information was gathered. However, equipment difficulties and problems of interpretation encountered are also of interest to those who may be considering similar studies on raptors.

Methods

Telemetry receivers were AVM Instrument RB-4 single-channel units with three sub-channels. The receiver antennas were four-element yagis mounted on a three-meter-long rotating mast equipped with a bearing disc. Transmitters were AVM SM-1 single stage units operated at 148.1 MHz and weighed about 12 g when potted in dental acrylic. The transmitter antenna was 0.28 mm diameter guitar wire. The transmitter was sewn to the underside of a center tail feather and the antenna tied with nylon thread to the feather four places along its length (Craighead and Dunstan, 1976).

Several tests established bearing error on a test transmitter 8 km from a receiver. The error averaged ± 5°, but one 8° error was obtained. Maximum line-of-sight range exceeded 15 km, but intervening terrain interrupted transmission.

When possible, bearings of instrumented birds were taken simultaneously by both tracking stations at 30 second intervals. The stations were in contact by two-way radio.

The two adults were trapped, hooded, instrumented, and immediately released. The female was trapped on 21 April and her transmitter operated until 1 June. The male was trapped on 2 June and his transmitter failed on 6 June. Both birds behaved normally after release and eventually fledged a brood of young in late June.

The field data, consisting of synchronous bearings taken by tracking stations, bearings taken by a single station, and notes taken by station operators and a full-time observer in view of the eyrie were collated in the following way. First, bearings were drawn for each day from the tracking stations on an overlay of a USGS 7.5 minute topographical map, and the time of the bearing was noted. Remarks from notes of station operators were included on the overlays. The notes of the eyrie observer, who kept detailed accounts of falcon movements, were included on the overlays for flights for which telemetry data were available. Last, the general routes of flights made each day were traced on overlays integrating telemetry bearings by triangulation, direction of transmitter signal when only one station received a signal, observer notes relating to signal strength, and departure and arrival at the eyrie as seen by the eyrie observer. The resulting routes did not represent the exact track of each flight by the two adults, but only its general course and distance. Often only a portion of a flight could be followed.

The routes taken by the adults were assigned one of seven corridors around the eyrie (Fig. 1). These corridors were used on nearly all flights to or from the eyrie and correspond to topographical features and landmarks often referenced in the field notes. If a bird departed on one corridor and returned on another, a flight was shown for each. All flights were placed in one of three groups: those that 1) did not range beyond 1 km of the eyrie, 2) exceeded 1 km, and 3) flights of uncertain distance.

Results

Figure 1 shows the distribution of flights along the corridors by the adults. Data plotted near the focus are for round-trip flights, simetimes interrupted by perching, which did not exceed 1 km from the eyrie. Some of these included hunting or defense. Data plotted away from the focus represent round-trip flights, or separate arrivals and departures, where the flight exceeded 1 km from the eyrie. These flights were presumably foraging flights. When a falcon returned to a corridor left earlier in the same flight another datum was recorded. Numbers along corridors show how many flights were of uncertain distance, they may or may not have exceeded 1 km.

The beacon of the adult female provided useful information on her position for 14 days in the period 27 April-31 May 1979. Flights less than 1 km centered on corridors C1 and C7, both included favored perches in view of the nest-cliff. Corridor C5 passes an apparent perching area southeast of the eyrie, but often the female's position there was uncertain because a ridge blocked radio reception. Flights exceeding 1 km are distributed asymetrically bo corridor. Of 64 such flights for the female on Fig. 1, 36% were on C5 to the southeast and only one flight was eastward from the eyrie over the deepest part of the east valley. Flights of uncertain distance also predominate on C5.

The adult male was instrumented in the period 3-6 June 1979. Of the 29 flights recorded, only 3 were less than 1 km. The remaining 26 flights were generally along all corridors except he made 9 flights on C2 southwest from the eyrie over the deepest part of the west valley (Fig. 1).

Twenty long flights by the adults were tracked beyond about 3 km from the eyrie (Fig. 2). Most of these flights were southward and four, including a 7 km flight, were substantiated by triangulation. The others were inferred by signal strength and flight duration. The average distance of these 20 flights was about 5 km and the most distant was about 8 km.

Foraging

In 92 instances, 20 for the female and 72 for the male, the observer near the eyrie saw inbound flights with prey. These flights suggest the regions of hunting success because adults carrying prey probably return directly to the eyrie from the site of the kill. The sightings, by corridor C1 to C7 were 16, 21, 13, 15, 8, 3, and 16 when the data for the adults are combined. Except for C5 and C6, inbound flights with prey used all corridors generally and prey was apparently obtained in most directions from the eyrie.

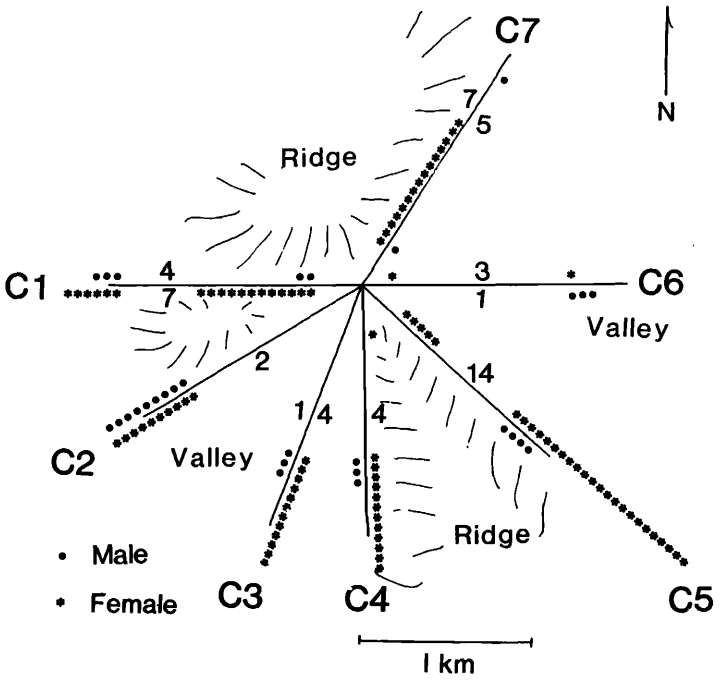

Figure 1. Distribution of flights about the eyrie by adult peregrines. The eyrie is at the focus of lines representing generalized corridors used by the birds. Data points near the focus are for flights shorter than 1 km, distal points are for flights exceeding 1 km, and numbers indicate flights that may or may not have exceeded 1 km.

Telemetry Problems

We experienced several problems with the telemetry system used that greatly curtailed the amount of information we obtained and reduced its precision:

1) Both transmitters failed long before the batteries would have been exhausted. The guitar-wire antenna on the female broke after about one month and thereafter only a weak, useless, signal could be obtained. The antenna on the male was sharply bent on the second day and no signal could be obtained after five days. Guitar-wire antennas may not be satisfactory on tail-mounted transmitters on active raptors.
2) A ± 5° error in bearing determination may be excessive for accurate tracking. In this study the receiver stations were about 3 km apart. Such an error could lead to a 2 km mis-location of the transmitter if it were lateral to a line between the receiver stations. A mis-location of up to about 5 km is possible if the transmitter were far away but near a line passing through the stations. Double yagi receiver antennas would reduce this error.
3) Where temporary receiver stations are set up and dismantled daily, equipment is subject to great wear. Transceivers for station-to-station communication, battery packs, and antennas, and their fittings, are especially prone to failure.
4) Transmissions in the telemetry bands normally used are useful only on a line-of-sight basis. Telemetry is not practical in hilly or mountainous country.

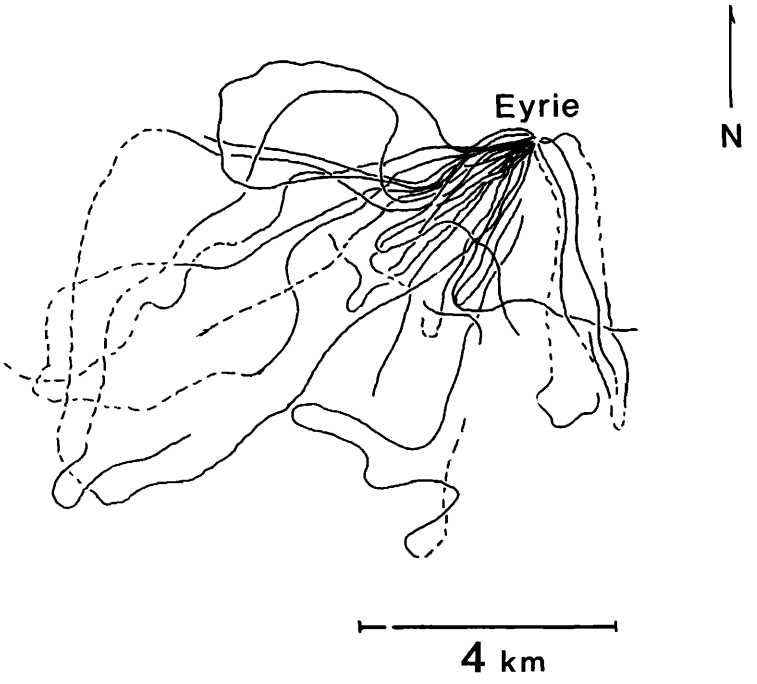

Figure 2. General orientations of 20 flights by adult peregrines that exceeded about 3 km from the eyrie. Dashed lines indicate uncertain flight paths.

Discussion

About 25% of the adult female's flights were within 1 km of the eyrie and centered on perching areas on the ridge behind the eyrie. When she flew over about 1 km from the eyrie, she favored corridors along ridges, especially one to the southeast. The adult male made very few short flights and hunted in nearly all directions from the eyrie, favoring a deep valley to the southwest. Of the 64 flights by the female definitely exceeding 1 km 12 exceeded about 3 km from the eyrie and two were about 8 km distant. Of 26 flights beyond 1 km for the male, 7 were beyond 3 km and two were about 7 km distant.

The pattern of use at this territory was one of foraging flights up to 7 km, and probably beyond, along most of the corridors around the eyrie. The female made proportionately fewer long foraging flights than the male, but when she left the vicinity of the eyrie she appeared to go as far as the male. In an earlier study, an instrumented adult female in Colorado showed a similar pattern of flights in all directions from an eyrie, but two long flights extended about 19 km from the eyrie (J. Enderson, unpublished data).

Long flights are harder to track than shorter flights and the equipment and system we used is inadequate for thorough tracking of such a wide-ranging species, especially in hilly terrain. Where there is a question of the use by peregrines of a specific area near an eyrie, we recommend a more direct approach: place radio-beacons on the adults and monitor the approaches of these birds with a receiver station at the specific area.

Acknowledgements

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POST-RELEASE FLIGHT AND FORAGING BEHAVIOR OF A BALD EAGLE HACKED IN WESTERN KENTUCKY

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Abstract

A Bald Eagle (*Haliaeetus leucocephalus*) hacked at Land Between the Lakes in the summer of 1981, was observed for 113 h from its release until its dispersal from the area. Eighty-three major flights were timed, with an average of one flight per 1.4 h. Longest flight time was nearly 25 minutes, and longest straight line distance covered during any single flight was approximately 3.0 km. Foraging success showed an improvement through time. The eagle exhibited many behaviors similar to other birds of the same age, but appeared to be advanced in the onset of soaring flight and capturing of live fish.

Introduction

Hacking is a technique of placing raptors on artifical nesting platforms remote from where they were hatched. They are fed and monitored with a minimum of human contact until capable of flight, when they are released into the wild. The biological premise is that when the birds are sexually mature they will return to the general area from which they were released to nest and raise young (Milburn 1979).

Bald Eagle (*Haliaeetus leucocephalus*) hacking was based on a successful Peregrine Falcon (*Falco peregrinus*) hacking program at Cornell University (Sherrod and Cade 1978). The state of New York pioneered Bald Eagle hacking in 1976 at Montezuma National Wildlife Refuge and has continued the program each year since. In 1980, the first two New York hacked eagles nested and successfully reared two eaglets (Nye 1980). This demonstrated that hacking is a promising means of reestablisng Bald Eagles in their former range.

The Tennessee Valley Authority (TVA) and the Tennessee Wildlife Resources Agency (TWRA) initiated a cooperative Bald Eagle hacking program during the summer of 1980. The goal was to reestablish a population of breeding Bald Eagles in western Kentucky and Tennessee. Bald Eagles formerly nested in this area, but the last documented successful

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