

Relationships between Peregrine and Lanner in the Marches (Central Italy)

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ABSTRACT

A study of the populations of Peregrine *Falco peregrinus* and Lanner *Falco biarmicus* has been carried out since 1986 in an area of Central Italy (Marches: latitude between 42.58° & 42.41° N), of particular biogeographic and ecological interest, being one of the northernmost where the two species are sympatric.

Analysis of the breeding sites, classified by a "quality index", has shown competition between the two species, with dominance of the Peregrine. As this is a very populated area, we have also considered the effect of human disturbance on the Peregrine, to which the bird seems to have adapted itself.

INTRODUCTION

Knowledge about the biology of the Peregrine and the Lanner in Mediterranean areas, though recently increasing (Ciaccio *et al.* 1987; Massa *et al.* 1991; Schenk *et al.* 1983; Siracusa *et al.* 1991), is still inadequate. We therefore decided to begin a comparative study of the two species, since this area is among the northernmost where they are sympatric.

In the past six years there has been a large increase of the Peregrine population, with interesting consequences on its relationship with the Lanner.

In order to compare the two species we had somehow to classify the breeding sites. For want of information over a long period of time, we have not been able to use the existing methods (Hickey 1969; Ratcliffe 1980), which considered fidelity to the breeding site. Therefore we worked out an index (Site Quality Index, SQI) that, considering the Peregrine's preference (Hunt 1988; Mearns & Newton 188; Newton 1988), enabled us to distinguish the sites in "quality" classes.

STUDY AREA

The study has been carried out in part of the Central Apennines (Marches). The area, defined with the method proposed by Ratcliffe (1980), is 4,000km² in area.

It is characterised by a series of parallel calcareous chains running NW to SE; the average height being 1,000/1,500m a.s.l., with a maximum of 2,476m. The presence of rivers running from west to east has determined the formation of several gorges that provide the two species with a large

number of nesting sites.

The climate ranges from sub-Mediterranean to “axerico temperato” (UNESCO-FAO 1963), with an average annual temperature ranging from 14°C to 11°C with an average annual rainfall from 769mm to over 1,500mm.

The remaining territory of the Marches is hilly, with a widespread human presence.

METHODS

Each year from January to June all pairs were counted regardless of whether they reared young or not, and an index drawn up in order to classify all controlled sites. For this index, three main features of the localities were considered: maximum height of cliffs., complexity of site, and maximum dominance.

For each feature three classes were specified, each with a score from 0 to 2.

The classes for the maximum height of cliffs are: less than 30m (score 0), between 30 and 70m (score 1) and over 70m (score 2).

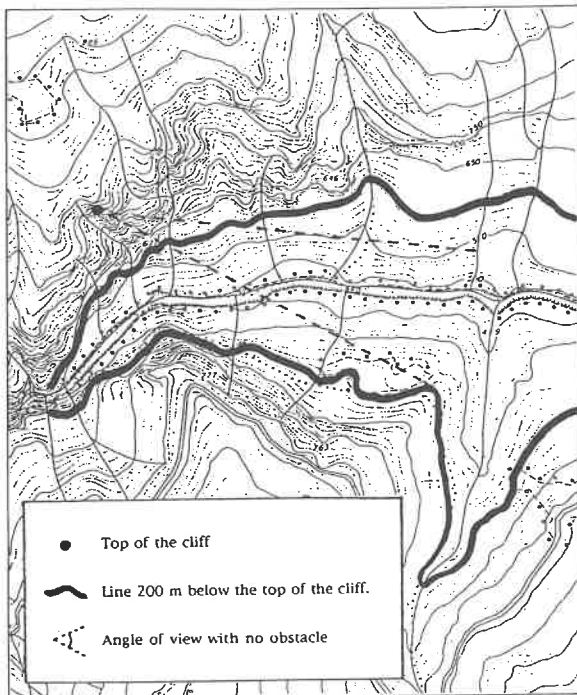
To quantify the complexity of the site the number of cliffs and the number of different aspects were considered. The localities were divided into three classes: single cliff (0), group of cliffs with just one aspect (1), and group of cliffs with more than one aspect (2).

For dominance (Fig. 1) the angle of view with no intervening obstacle for at least one km was considered (obstacle reliefs 200m lower than the cliff were not included). The three classes are: less than 30° (0), between 30° and 90° (1), and more than 90° (2).

The sum of the scores gives the SQI for each site, so that they can be placed in seven categories, from the least (SQI 0) to the most suitable (SQI 6).

Even though conditioned by a margin of subjectivity the SQI, considering the results, has proved sufficiently correct for the purpose for which it was designed.

Figure 1. Method to determine dominance.



RESULTS

1. STATUS OF THE POPULATIONS

Peregrine

Twenty-four sites have been found; two of them (8.3%) held by single adult males. This last datum coincides with the European average (Ratcliffe 1984; Mearns & Newton 1988; Boudet & Migot 1989). In the six years only one pair with an immature adult (a female) was observed.

The density was 181.8 km²/pair. The average Nearest Neighbour Distance (NND) was 7.97 km; the minimum distance between two pairs 2.5 km, while between one site held by a pair and another held by a single adult male it was 1.5 km.

To show the real average NND between two sites held at the same time, two areas with a high concentration of pairs were chosen. In the first (5 pairs) the average NND was 4.6 km, while in the other (7 pairs and a single adult male) the average NND was 4.10 km, which reduces to 3.54 km if the single-male territory is also considered. In the second area, 350 km², there was a density of one breeding pair every 50 km².

In the period 1987-1991 the population increased considerably. The number of occupied sites rose from 10 to 22. The increase partly reflects a greater covering of the territory - five sites not controlled in the previous census proved to be positive whereas for seven others it can certainly be stated that they are new colonizations. On the minimum hypothesis, that the five first-mentioned sites were all previously occupied, there should have been a change, in four years, from 15 to 22 pairs, with an increase of 47%.

Lanner

The Lanner population is confined mainly to the eastern (warmer) side of the Apennine chain. To-date six pairs have been found. The average NND is 15.9 km; Excluding one more isolated pair, it then reduces to 11.80 km. In 1987, four pairs were found; only one of them is still present.

2. BREEDING SITES

Peregrine

The breeding sites are distributed as follows: three below 500 m a.s.l. (13.6%), 13 between 500 and 1,000 m (59.1%), six above 1,000 m (27.3%). The highest site is at an altitude of 1,300 m a.s.l.

We found 10 eyries, half on ledges and the other half in holes; no pair has laid in disused eyries, partly because of the absence of the Raven *Corvus corax*, extirpated in the area around the 1950s (Manzi & Perna 1991a), whose nests are the most used by the Peregrine in Europe (Ratcliffe 1980; Fasce & Fasce 1988).

The eyries are on cliffs ranging from 30 to 100 m in height. Their aspect is conditioned by the prevalence of cliffs facing north or south.

Lanner

The Lanner also nested on cliffs. In two cases the breeding sites are above 500 m a.s.l. (950 and 930 m respectively), and in the other four below 500 m a.s.l. We found four eyries, all in holes. Only one of the four nesting cliffs exceeds 50 m in height; the lowest is only 20 m.

DISCUSSION

The observed increase cannot be explained as a natural fluctuation, which should not exceed 10% of the population size (Newton 1988). It is similar to that of some European populations which most suffered the crash of the 1950s-60s, and testifies that in the Marches also the population was well below the carrying capacity of the area.

The causes of the former decline are not clear, but probably due, as in other parts of Italy, to human persecution (Chiavetta 1981). In the Marches there are seven hunters/km² and the shooting season lasts until 10th March, when all pairs (both Peregrine and Lanner) have started breeding. A greater respect for the legal protection and the recent creation of some protected areas could partly explain the recovery.

Food availability is important for the regulation of the Peregrine population (Newton 1979;

Ratcliffe 1980; Thiollay 1982, 1988) and an increase of this is among the causes of the high level reached by the British population (Ratcliffe 1988). But that is not the case in the Marches, where a greater availability of natural prey has not yet been demonstrated, and where pigeon breeding, traditional to the farms, has suffered from the depopulation of the countryside.

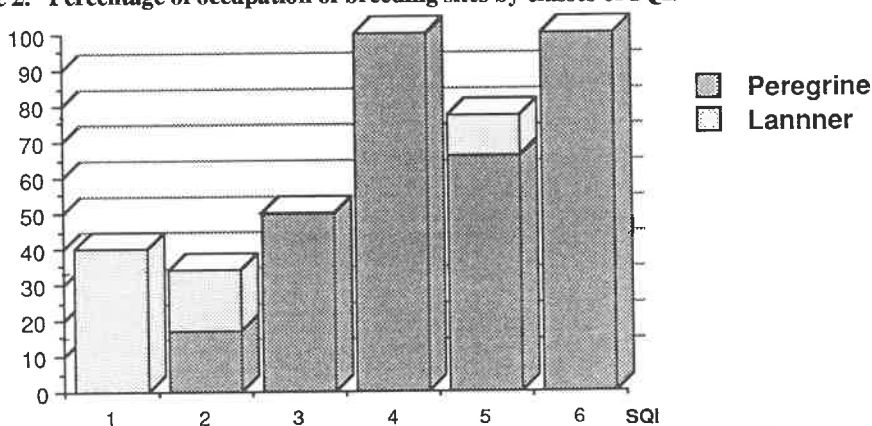
Thus it is quite difficult to understand the strong recovery of this population, though it has probably benefited from a better management of the environment.

Analysing the breeding sites of the new pairs by SQI, the preference for sites of better quality is confirmed; there are three with SQI 6, two with SQI 4 and two with SQI 3.

This tendency has involved relationships of the Peregrine with the Lanner and the Golden Eagle *Aquila chrysaetos*.

In 1987, the Lanner held four territories, two with SQI 6 and two with SQI 4; at present in all these sites it has been displaced by the Peregrine. It disappeared from three of the sites, while in the fourth it shifted to a small valley (SQI 2), 400m from the Peregrine eyrie. From this, the difference between the two species in the features of the breeding sites becomes obvious, as is illustrated by the SQI (Fig. 2).

Figure 2. Percentage of occupation of breeding sites by classes of SQI.



The Peregrine nests only in sites of good quality (SQI ≥ 3 except for one case), 74% of which are occupied by pairs. If we omit the Golden Eagle territories and consider the single male ones, then 92% of the sites are occupied.

Conversely, all Lanner haunts but one have a SQI < 3 . What is more interesting is that these low quality sites are chosen because of competition for better quality territories with the Peregrine.

The relationships between the Peregrine and the Golden Eagle are well known and the dominance of the eagle in the choice of the breeding site has been stressed (Thiollay 1967; Ratcliffe 1980; Donazar *et al.* 1989).

In the Marches as well, where there is the Golden Eagle the Peregrine is absent, except for two localities where since 1990 the two species have nested close together - 300m and 600m apart - (Manzi & Perna, 1981b). This is probably due to the high quality of the sites (SQI 6) and to the abundance of prey, mainly Jackdaws *Corvus monedula*, present in large colonies. Another site where the two species nest together has been found near the study area, in Umbria (Armentano & Magrini, pers. comm.)

Finally, the effects of human disturbance on the Peregrine were weighed (for the Lanner there were not enough sites), considering the presence of roads and villages.

Using the Wilcoxon test, first the mean distance was examined from the nearest road and village to the sites both occupied and unoccupied. In both cases no significant difference was found: the mean distance from the road was 524m for the occupied sites and 420m for the unoccupied ones; the mean distance from the village was 1,308m for the occupied sites and 1,059m for the unoccupied ones. Also the distances from the nearest road and village of old (pre-1987) and new breeding sites were compared. In this case, too, no difference was found: the mean distance from the road was 550m for the old sites and 525m for the new sites, while the mean distance from the village was 1,291m for the old sites and 1,383 for the new.

CONCLUSIONS

Five main points can be stressed:

- 1 - At the moment the Peregrine population in the Marches is in good health after a period of decline.
- 2 - In the same area there is a small population of Lanner that is one of the northernmost in the world, and the northernmost in Italy. It is present only on the eastern side of the Apennines, where the climate is warmer.
- 3 - There is competition between Peregrine and Lanner for breeding sites, with dominance of the Peregrine. The Lanner must breed in sites of lesser quality, where it might be more disturbed.
- 4 - The Peregrine, as in many other areas, avoids the presence of the Golden Eagle but when the environment is particularly favourable the two species can breed a few hundred metres apart.
- 5 - The Peregrine does not seem to suffer from the presence of man and some eyries are only a short distance from main roads.

UPDATE

In 1992 seven new pairs of Peregrine have been found. Two of them are present where last year single males were seen, whereas in one site (SQI 1) there has been another case of displacement of Lanner. The quality of the sites held by the Peregrine seems to keep decreasing with the increase of the population.

ACKNOWLEDGEMENTS

We would like to thank J. Angelini, L. Armentano, M. Magrini and M. Pandolfi for their valuable information.

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