

Tree-nesting Peregrines *Falco p. peregrinus* in Europe did not recover

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ABSTRACT

Following the pesticide crash Peregrines have almost completely recovered in western and middle Europe, nesting there on cliffs and buildings. Contrarily, the area of tree-nesting Peregrines, where they became extinct, has remained vacant up to now. This area of wooded diluvial lowlands formerly contained some thousands of pairs, a large portion of all Peregrines in Europe. As became known recently through complete individual marking in eastern Germany, tree-nesting is never adopted by the offspring of neighbouring building- and cliff-nesters. Instead tree-nesting was initiated there again by imprinting reared young on this type of nesting during releases. To date six new tree-nesting pairs have been reestablished, which are the only ones known between Berlin and Moskow. Their offspring settle not only on trees, but also partly on buildings and cliffs, whereas there is zero backflow to tree-nesting. Thus tree-nesters form an isolated subpopulation. From this new knowledge these conclusions follow:

- In Peregrines tree-nesting is based on imprinting and spreads by tradition.
- Offspring from cliffs or buildings will not adopt tree-nesting.
- Surviving tree-nesters must be saved to enable spontaneous resettling of their huge vacant area.
- By releases of young imprinted on tree-nesting a new tradition in areas within completely extinct tree-nesters' range can be initiated.

INTRODUCTION

Before the pesticide crash between the 1950s and 1970s of the last century tree-nesting Peregrines *Falco peregrinus* formed a large portion of the European Peregrine population. They occupied the lowland forested region extending from northern Germany east to the taiga plains west of the Ural mountains. Within this vast tree-nesting range they could cover their habitat

coherently because suitable nests of other birds of prey, ravens, herons etc. are available across the whole wooded surface in contrast to cliff-nesting, which is possible only locally. Tree-nesting always occurred in a clumped manner unmixed with and well separated from cliff-nesting areas. Only three regions existed where tree-nesting of Peregrines became a habit. The former size of the European tree-nesting population must have held some thousands of pairs, since the better-known small western part of this population in Germany and Poland together contained about 1300 pairs. This western tree-nesting population suffered complete extinction from Germany east to the Moscow region due to reproduction failure caused by pesticide intoxication. And it remains extinct up to the present in contrast to the well-recovering Peregrines all over Europe nesting on cliffs, buildings and, in the northern marshes, on the ground.

What is the present situation of Peregrines in Europe and what is the reason for tree-nesters failing to recover?

PRESENT STATE OF THE POPULATION

The following comprehensive overview includes only those European countries which share the tree-nesters' range and from which actual information is available. Beginning at the western part of this area, no spontaneous restitution of the tree-nesting habit has occurred so far although the neighbouring cliff- and building-nesters are recovering well.

In Germany there now exists again a total of about 700 pairs, mainly cliff-nesters but including an increasing proportion of about 20% nesting on buildings (Rockenbach 1998, 2002; Schilling *et al.* 2001). Six new tree-nesting pairs could be reestablished only by imprinting captive-reared young on this mode of nesting in a special reintroduction project (Saar 1999, 2000; Köhler 1999, 2000; Sömmer 1999, 2000). In comparison, the former German tree-nesting range contained about 50% of all Peregrines in the country (Altenkamp *et al.* 2001; Kirmse 2001; Kirmse *et al.* 2003 in press; Kleinstäuber *et al.* 2001).

In Poland, where about 90% of the country is tree-nesting territory, several programmes for the reintroduction of tree-nesters have been run since 1990. These activities resulted in five new pairs nesting on buildings, but up to now no tree-nesting pair has been found in spite of respective observations of adults in suitable habitat (Trommer *et al.* 1999; Brzuski *et al.* 1999).

Belarus was formerly settled by tree-nesters in the southern part, and they also inhabited northern Ukraine. In the north of Belarus ground-nesting was prevalent. There is no present breeding record at all in those areas (Ivanovski 1995).

In Sweden tree-nesting formerly occurred in the southern part. Before the population crash there were 4% tree-nesters, 3% ground-nesters and all others were cliff-nesters. Today there are ca. 115 pairs, among them no tree-nesters but 10% ground-nesters and two pairs nesting on buildings (Lindberg, pers. comm.).

In Finland ground-nesting was and still is by far the most prevalent mode of nesting and is leading the process of recovery, whereas cliff-nesters are fewer

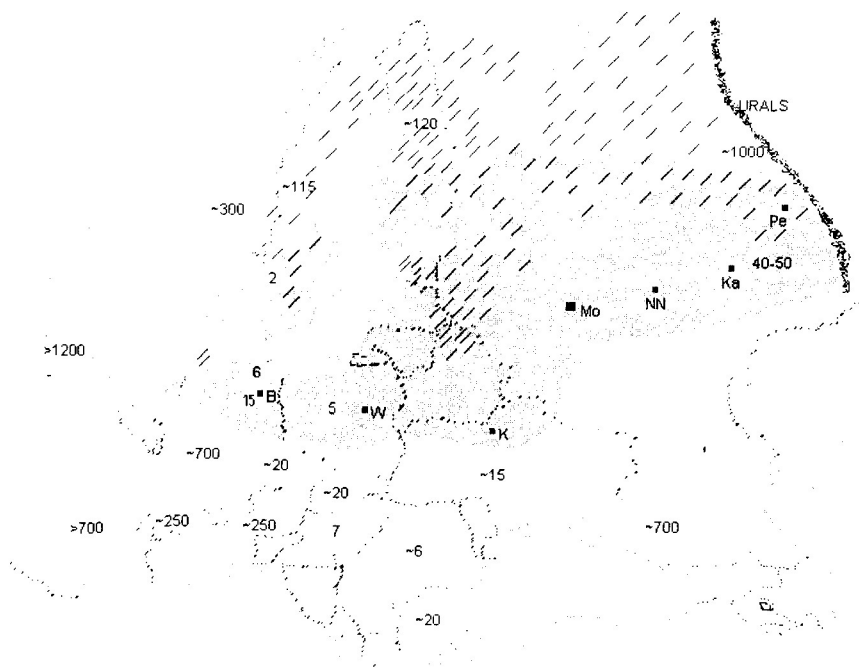
and tree-nesting is found only singly in contact with ground-nesters (Wikman, pers. comm.).

In Russia the western part of the huge tree-nesting range up to the Moscow region is without any known recovery (Galushin 1995). In the eastern part, the Volga-Ural region, a strong and rapid population increase is currently reported by Karyakin (1998 a, b, & recent pers. comm.) and by Sotnikov (1999). Karyakin estimates 1100 to 1200 pairs in that region, about 88% of them on cliffs, mainly in the Ural mountains, and well apart from them in the marshy plains an increasing proportion of 7% nesting on the ground, while the remaining 4% are tree-nesters, which indeed have survived the crash and are now dwelling partly among the spreading ground-nesters.

Concerning the tree-nesters it is now confirmed that:

- their European range extends to the west of the Ural mountains (Fig. 1),
- only there did very few pairs survive,
- they live in contact with and possibly exchange with ground-nesters.

Figure 1. Tree-nesting range of the Peregrine in Europe.



Dark area: former tree-nesting range, now almost completely vacant.

Figures at encircled plots within that area: indicate current tree-nesting pairs.

Figures on bright squares: pairs on buildings within tree-nesters' range.

Figures in the respective countries: total numbers of pairs, dominantly cliff-nesters, in Finland ground-nesters.

Hatched fields: ground-nesting area, overlapping with that of tree-nesters.

Black squares: location of some towns with their initials.

WHY DON'T PEREGRINES RESETTLE THE FORMER TREE-NESTERS' RANGE?

There are two significant features of tree-nesting in Peregrines:

1. Tree-nesting has become a habit in very few areas within the worldwide distribution of the species and always apart from cliff-nesting. A majority of suitable wooded habitats bare of cliffs has always remained unoccupied, although Peregrines could well have settled there by tree-nesting.
2. Where tree-nesters became completely extinct in Europe after the pesticide crash there is no spontaneous reoccupation of the former tree-nesting habitat by the neighbouring Peregrines nesting on cliffs and buildings, in spite of their increasing numbers.

The reason for these peculiarities was already concluded by Newton (1979) based on feature 1 above, and now has been confirmed by telescopic identification of ringed birds in eastern Germany (Kirmse *et al.* 2003 in press): It is **imprinting** of the young on this mode of nesting that enables tree-nesting to become a habit and tradition. This tradition became completely extinct throughout almost the entire European tree-nesters' range and will not re-establish itself, because cases of spontaneous tree-nesting amongst cliff-nesters are extremely rare and normally only ephemeral (Ratcliffe 1984).

METHODOLOGICAL REMARKS

The new Peregrine population in eastern Germany is completely ringed, enabling individual identification by means of a number/letter combination on the right ring, with the left ring signalling by colour the nest-site type from which they originated: from cliffs red, from buildings yellow and from trees green. The markings are readable by means of high-resolving telescopes. The pairs are controlled annually at their breeding sites.

MAIN RESULTS

Of all falcons ringed as nestlings on cliffs were found as breeding birds 114 on cliffs, 4 on buildings and 0 on trees.

From those ringed in nests on buildings, mainly within the tree-nesting range, were found settled: 39 on buildings, 2 on cliffs and 0 on trees

Of Peregrines imprinted on tree-nesting in the release project and of the young fledged from wild broods in tree-nests were found settled 16 on trees, 9 on buildings and 4 on cliffs.

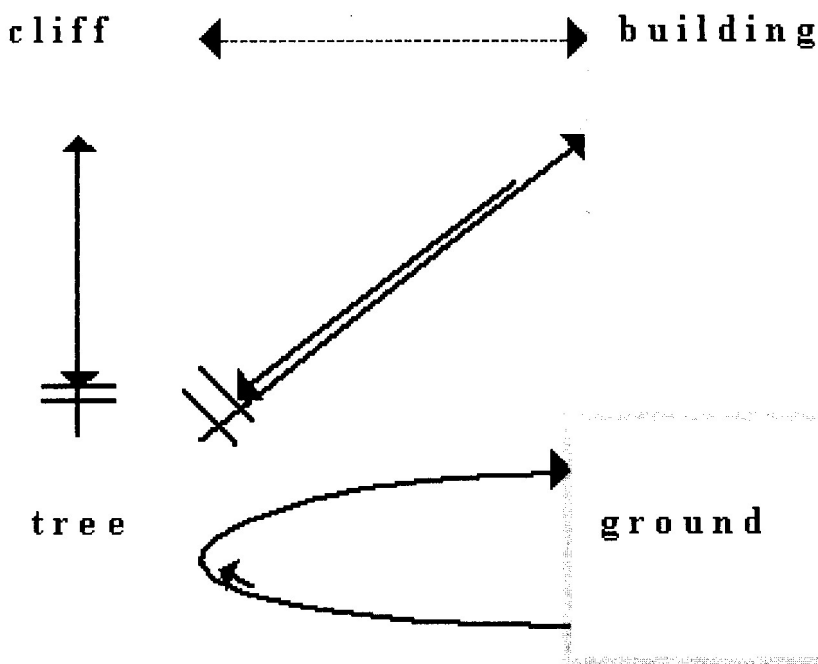
CONCLUSIONS

Peregrines fledged from cliffs and buildings do not settle on trees for nesting. Even the exchange between cliff- and building-nesters was unexpectedly found to be rather restricted. Only Peregrines themselves fledged from tree-nests can choose tree-nests again, nevertheless imprinting does not preclude the inborn nesting instinct but merely effects its modification. Consequently Peregrines imprinted on tree-nesting may also use other nest-sites depending on the situation. This decision of some tree-nesters in favour of other nest-sites weakens small founder populations of tree-nesters. In

general tree-nesting Peregrines are isolated subpopulations receiving no inflow from other nest-site types, except possibly from ground-nesters (Fig. 2).

Figure 2. Proved transitions of young to nest-site types other than they themselves fledged from.

Symbols: —————→ free transition;
 - - - - -→ restricted transition
 |||←————→ one way transition, the reverse
 direction is blocked



Once chosen, the type for breeding is used for the whole life-span, except with ground-nesters: the transition of the same adult birds to tree-nest and back to ground-nest again is reported.

Protection and Management

The European tree-nesting range is a habitat of high capacity for Peregrines. It would be a tremendous loss if this huge area remained unsettled. To induce tree-nesting to become a habit again the following points should be considered:

1. Special attention must be paid and protection given to any surviving tree-nesters, because these are the genuine source for a possible restitution of the tree-nesting tradition.
2. In those parts of Europe where tree-nesting became completely extinct, reintroduction by special release management based on imprinting is a viable but long-term.

3. Artificial nesting support on buildings within the tree-nesters' range should be withheld, because this weakens the formation of a tree-nesting tradition.
4. Concerning exchange between ground-and tree-nesting there are some observations (e.g. Thomasson 1947, cited in Mebs 2001), but thorough knowledge is lacking. The question whether tree-nesting may be reestablished by ground-nesters spreading into the forest zone could well be answered by a ringing and identification programme at contact sites between both types of nesting.

The wonderful comeback of the Peregrine in Europe will not be completed until the extended range of tree-nesting is resettled. This remains a big challenge for the near future.

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