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Nest Site Selection by the Eastern Imperial Eagle in the North-west part of its Range

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INTRODUCTION

The Eastern Imperial Eagle *Aquila heliaca* is regarded as a rare raptor species (Meyburg 1986, 1994). Its total world population has been estimated at 2,000 pairs (Meyburg in del Hoyo *et al.* 1994). Today, the European population comprises some 350-550 breeding pairs (Danko & Haraszthy 1997) with 80-110 pairs in Hungary and Slovakia (Danko *et al.* 2002; Horváth *et al.* 2003). Originally itt was, and in some parts of its breeding range still is, an inhabitant of steppe habitat. Here, however, it does not nest on the ground like its close relative, the Steppe Eagle *Aquila nipalensis*, with which it shares part of its distribution area but in relatively low trees or shrubs (e.g. saxaul, tamarisk, pine, Gavrin *et al.* 1962; Kowshar 1988; Bragin 1987). Breeding sites known in south-eastern Europe in the past (Macedonia: 1938-1944) were also predominantly situated in lowland plains of steppe or transitional woodland-steppe character, where forest stands were neither extensive nor compact. Imperial Eagles nested here either in solitary trees or in tall trees standing in groups (e.g. poplar, oak, pear, elm, Makatch 1950). Since approximately 1930-1940 this species has expanded further west or north-west, apparently from south-eastern Europe (the Balkans) and occupied new territories as far as Central Europe (Hungary – bred perhaps in 1930, some 3 pairs in 1949, 4 pairs in 1950, Pátkai in Mosansky 1956; Slovakia – probably some time before 1867, 1949 and 1952 first confirmed breedings, Mosansky 1956, Konrád in Sládek 1959, Danko & Chavko 1996). Instead of steppe, breeding habitat here was forests in foothills of relatively low mountains (e.g. Zemplén Hills, Bükk, Vértes, Slanské Mountains, Malé Karpaty, Tríbec, Povazsky Inovec, Slovakian Karst -- Tonhauzer 1954, Mosansky 1956, Pátkai in Mosansky 1956, Sládek 1959, Spacek & Kovái 1965). The eagles nested here usually at the forest edge, always in tall trees (beech, oak, larch, pine, spruce etc., Spacek & Kovái 1965,

Danko 1973, Mrlík unpublished data). The Imperial Eagle population in Slovakia has grown from a few pairs in 1949-1953 to at least 35-40 in 2000 (Mosansky 1956; Tonhauzer 1954; Danko *et al.* 2002). The situation in Hungary was even more pronounced, because the population grew from some first breedings in 1930-1950 to 52 pairs in 1998 (Tapfer 1973; Szitta *et al.* 1999;. Horváth *et al.* 1999, 2003). Approximately since 1990 we can speak (to some extent) of continuing expansion further west; however, this phenomenon is much slower and less pronounced than earlier (Berg & Lauermann 1987; Horváth *et al.* 2003; Ranner 2003). One pair has bred successfully in the Czech Republic in 1998 and 1–2 pairs still breed there (Horák 1998; Horák & Horal, *pers. comm.*). Another pair first bred in Austria in 1999, where the eagles continue to do so, and in addition three immature pairs were formed in 2003 (Ranner 2003). However, continuing expansion of the species' distribution further west brings about many problems (Horal *et al.* 2003). Above all, it is the high level of landscape exploitation by man. This undoubtedly differs between individual countries and appears higher in the states situated more to the west. We can assume that neither ecological conditions nor the level of landscape exploitation will substantially change, at least in the near future. The behaviour of the eagles could change to some extent, especially with regard to their ability to adapt to the ever-changing living conditions.

Fundamental questions which I have tried to answer during my long-term study of the Eastern Imperial Eagle were as follows: a) whether the long-term process of adaptation is successful and to what extent, b) which habitat was preferred as the traditional breeding site earlier and today, and c) what trend of population development can approximately be expected in the nearest future.

BREEDING HABITAT OF THE STUDIED PAIRS

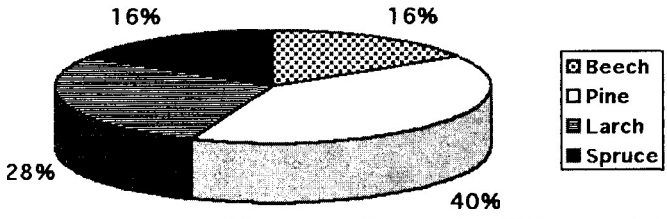
Observations were done in the forested mountain range Povazsky Inovec (broad-leaved deciduous forests at medium elevations in the Western Carpathians, SW Slovakia), i.e. at the north-western limit of the species´ geographical distribution (48°35´-48°50´N, 17°53´-18°08´E), during the years 1976-2002. Two breeding sites were studied. At locality "A" (the nest site situated northward in the hills), five different pairs bred subsequently and occupied 11 different nest platforms, while at locality "B" (about 15km south-east of the former nest site) two pairs occupied 14 nest platforms. At "A" the eagles bred several years in succession at the same nest platform (1-4 years, x = 1.9) more often than at "B" (1-3 years, x = 1.1).

RESULTS

Nest tree.

Although the overwhelming majority of the mountain range is covered with broad-leaved deciduous forest, the eagles built their nests at both localities mainly in coniferous trees - pine (*Pinus sylvestris*), spruce (*Picea abies*), larch (*Larix decidua*). Broad-leaved trees were scarcely used for the building of nests (16 % beech only, *Fagus sylvatica*, n = 25, Fig.1).

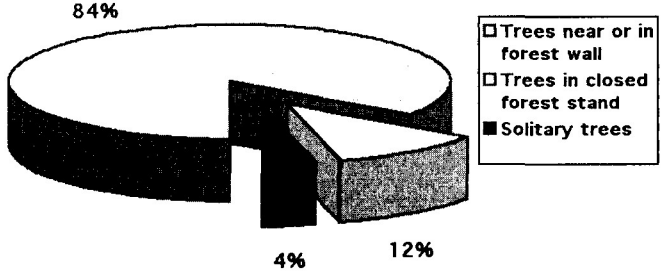
Figure 1. Breeding tree (n = 25).



Placement of nest platform.

The nest platforms were built directly in forest wall or 20-30m from forest edge in a marginal tree (in both A and B localities). Only few nest platforms were inside forest in closed stand or solitary tree (Fig.2).

Figure 2. Type of nest platform placement (n = 26)



Selection of breeding habitat.

The eagles built new nests in both habitats relatively often. In locality A, which was first occupied in 1945 (Varga 1962), the eagles built 11 nests during 1977-2003, at locality B they built 14 nests in 1983-1998. There was considerable nest site fidelity. When the eagles changed the nest, then the new nest was usually built near the old one. At the locality A, 60 % of new nests were built within 1km of the previous year's nest (nest changes, n = 10, Fig. 3). At locality B fidelity was even more pronounced since 54 % of nests were built within 500m of the nest previously occupied (n = 13, Fig. 4).

Figure 3. Distance in nest change inside A breeding area.

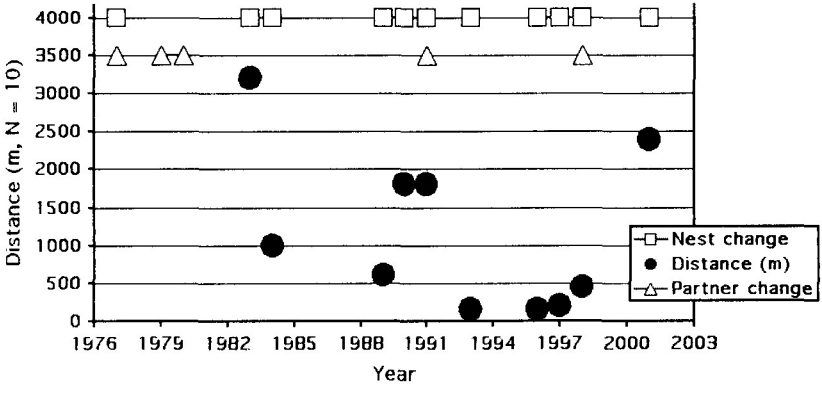
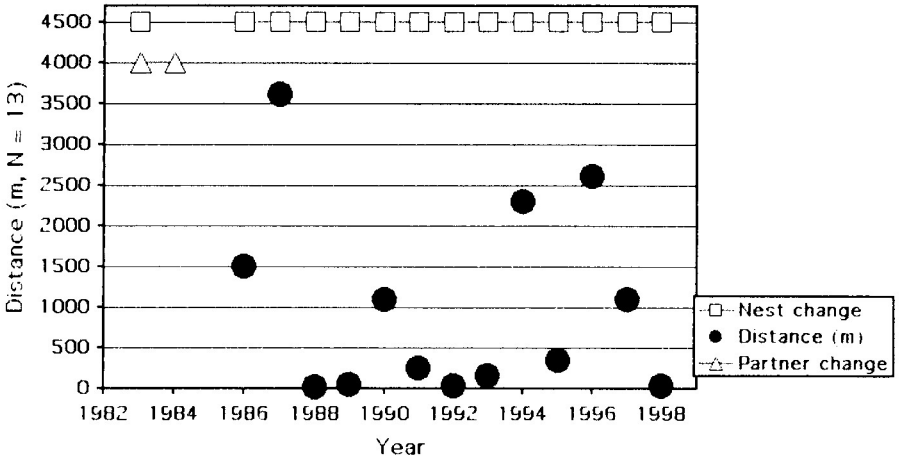


Figure 4. Distance in nest change in B breeding area.



Trends in breeding habitat selection.

At locality A, the trends in breeding habitat selection indicated a very slow shift from a higher to a lower altitude a.s.l. (Fig. 6) and from the vicinity of the mountain crest to the periphery of the mountain range and the forest edge, in the vicinity of open spaces (fields, pastures, meadows). At present, the nest site is still situated 2.7km from the fields (Fig. 5). At locality B, the same trend is much more marked. The change occurred relatively abruptly in two waves in 1987 and 1996 (Fig. 5, Fig. 6). The breeding site now lies in the immediate vicinity of an open area (fields).

Figure 5. Nest platform distance to open areas.

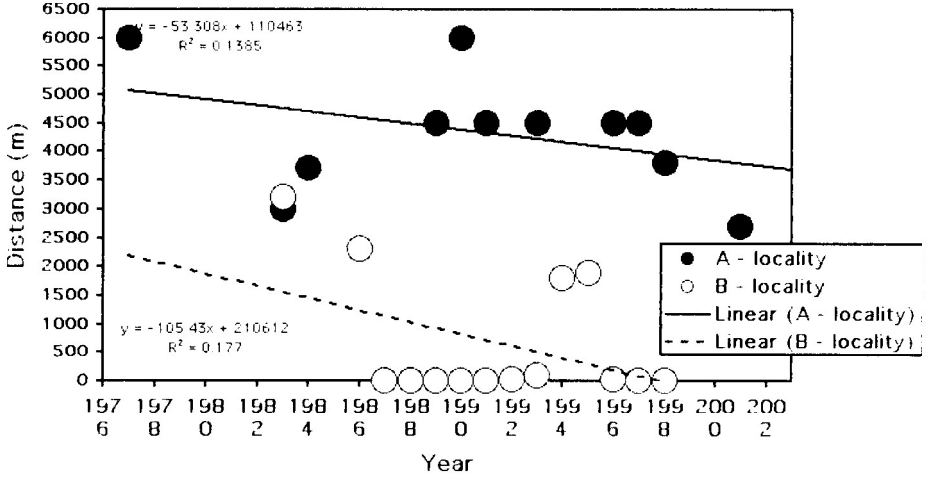
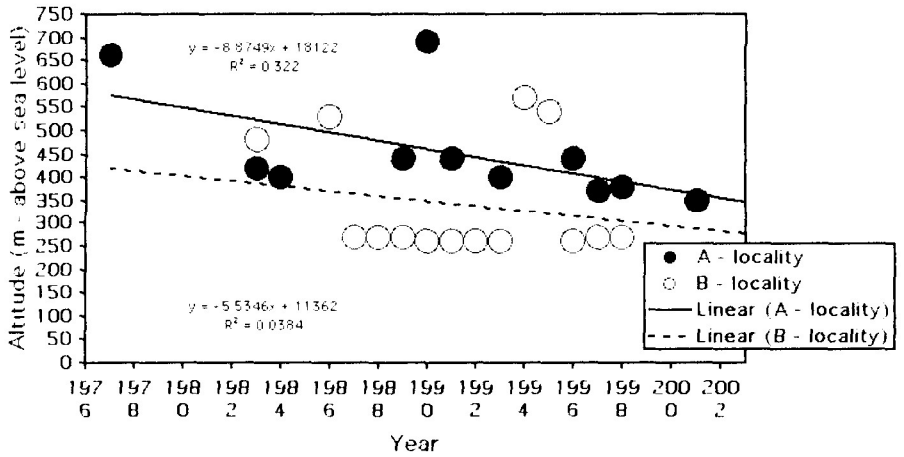


Figure 6. Nest platform altitude.



DISCUSSION

After their expansion to Central Europe, the Imperial Eagles first occupied forest habitats in the foothills of low mountain ranges within the Carpathians. Among the first confirmed breedings were nests in western and eastern Slovakia in the mountain ranges of Tríbec (1949), Slánské Mountains (1952), Malé Karpaty (1953) and Povazsky Inovec (Tonhauzer 1954; Mosansky 1956; Sládek 1959). The mountains in western Slovakia represented the north-western limit of the distribution area of this species at that time. This remained unchanged for the next 30 years and more. Only after many years has it been observed that the eagles gradually changed their breeding habitats and moved from the Carpathian slopes to breed in the open lowland landscape, exchanging their forest nesting sites for sites in open agricultural land. They thus returned to breed in steppe-like sites, i.e. habitats characteristic of this "steppe species" of eagle in south-eastern Europe or Asia (Makatsch 1950; Gavrin *et al.* 1962). Within Central Europe, this trend was probably first observed in Hungary - "steppisation" between 1975-1989 (Szitta *et al.* 1999). In Eastern Slovakia the eagles began to nest in open agricultural land after 1986. At present, nearly 50 % of the local population breeds in agricultural land (Danko & Chavko 1996; Danko *et al.* 2002). In western Slovakia, we recorded the shift of one pair of eagles from a mountain breeding site to agricultural land as early as in 1987. Several additional pairs apparently moved later. About four pairs nested directly within their hunting territories in agricultural land, apparently not long before 2000 (Danko *et al.* 2002).

Our observations in the PovazskY Inovec Mountains suggest that the eagles began to breed near open landscape (agricultural land) at the same time both in eastern and western Slovakia. These long-term observations also made it possible to study the course of this still continuing process. It seems that only certain pairs living and nesting together for some time are capable of changing t nest site. A more radical shift in nest location occurred only after three years of common life as partners in the studied localities. Moreover, during this interval each of these pairs built 1-2 new nests of which the last was situated

most closely to agricultural land. Although changes of behaviour, in the sense of adaptations to changing environmental conditions, are associated with the experience of an individual with mutual communication and are certainly to some extent an expression of relative longevity, a more frequent exchange of partners can also be of major importance. Thanks to long-term field work, I found out that partner exchange occurred several times at the studied sites. Each change of partner of itself brings in also different behaviour, including behavioural-ecological adaptations to present conditions. I presume that this may be one of the causes influencing the rate of similar behavioural changes in the studied population of Eastern Imperial Eagles. This cause can be both important and positive for the population living at the limits of its area of distribution.

CONCLUSION

The behaviour of the eagles aimed at nest tree selection and at its placement in the forest, and particularly the changes in breeding habitat selection, can be viewed as positive, since they document a certain ability of the eagles to adapt to the ever-increasing human exploitation of the landscape. In the current breeding situation (i. e. breeding density and success) and in the case of the present trend in breeding habitat selection continuing, we can expect the eagles to perhaps breed at previously avoided sites. For these reasons the expansion of the species´ breeding area further west or north-west cannot be strictly excluded.

REFERENCES

BERG, H.-M. & H. LAUERMANN 1987. Neue Nachweise des Keiseradlers (*Aquila heliaca*) aus Österreich. *Egretta 30 (2)*: 81-85.

BRAGIN, E.A. 1987. Eagles. Rare and more declining animals of Kazakhstan. *Alma-Ata, Kainar* (in Russian).

DANKO, S. & J. CHAVKO 1996. Breeding of the Imperial Eagle *Aquila heliaca* in Slovakia. *In:* Meyburg, B.-U. & R.D. Chancellor (Eds.) . *Eagle Studies. WWGBP, Berlin, London & Paris*: 415-423.

DANKO, S. 1973. Najnovsie poznatky o hnízdení orlov královskych (*Aquila heliaca*) na vychodnom Slovensku (New knowledge about Imperial Eagles breeding in Eastern Slovakia). *Ziva 4*: 153-155 (in Slovak).

DANKO, S. & L. HARASZTHY 1997. Imperial Eagle *Aquila heliaca. In:* Hagemaijer, W.J.M. & M..J. Blair (Eds.). *The EBCC Atlas of European Breeding Birds: Their Distribution and Abundance.* T.& A.D. Poyser, London.

DANKO, S., A. DAROLOVÁ & A. KRISTÍN (Eds.) 2002. Birds Distribution in Slovakia. *VEDA, Vydavatltvo Slovenskej akadémie vied* (in Slovak with a summary in English).

GAVRIN, V.F., I.A. DOLGUSHIN, M. N. KORELOV & M.A. KUZMIN 1962. *The Birds of Kazakhstan. Vol.II.* Academy of Sciences of Kazakhstan. (In Russian).

HORÁK, P. 1998. The successful nesting of Imperial Eagle (*Aquila heliaca*) in Moravia – Czech Republic. *Newsletter of the South Moravian Branch of the Czech Society for Ornithology, 12*: 27-28 (in Czech with summary in English).

HORAL, D., V MRLÍK & B. JAGOS 2003. The Eagles of *Aquila* Genus and Short-Toed Eagle (*Circaetus gallicus*) in Bílé Karpaty. *CREX – Newsletter of the South Moravian Branch of the Czech Society for Ornithology, 21*: 51-68. (in Czech with summary in English). .

HORVÁTH, M., A. KOVÁCS, I. DEMETER, L. HARASZTHY, T. SZITTA, G. FIRMÁNSZKY, L. VISZLÓ & J. BAGYURA 2003. Present conservation status of the Imperial Eagle *Aquila heliaca* in Hungary (LIFE Nature project). *6th World Conference on Birds of Prey and Owls - Abstracts, Budapest, Hungary, 18-23 May 2003,* :WWGBP/MME/BirdLife Huhngary.

HORVATH, M., T. SZITTA, G. FIRMANSZKY & C. MOSKAT 1999. Nest-site selection of the Eastern Imperial Eagle (*Aquila heliaca*). *BUTEO, Suppl.*: 51.

KOWSHAR, A.F. 1988. *The World of Birds of Kazakhstan.* Alma Ata. Mektep (in Russian).

MAKATSCH, W. 1950. *Die Vogelwelt Macedoniens.* Akademische Verlagsgesellschaft Geest & Portig K-G Leipzig.
MEYBURG, B.-U. 1986. Threatened and Near-Threatened Diurnal Birds of Prey of the World. *Birds of Prey Bull. No. 3*: 1-12.
MEYBURG, B.-U. 1994. Eastern Imperial Eagle *Aquila heliaca*. *In:* Del Hoyo, J., A. Elliott & J. Sargataal (Eds.). *Handbook of the Birds of the World.* Vol. 2. New World Vultures to Guineafowl. Lynx Edicions, Barcelona: 194-195.
MOSANSKY, A. 1956. Brutvorkommen des Kaiseradlers (*Aquila heliaca*) und des Bienenfressers (*Merops apiaster*) in der Ostslowakei. *Sborník KM v Trnave 2*: 31-48 (in Slovak with a summary in German and Russian).
RANNER, A. 2003. The current Situation of the Imperial Eagle in Austria. *Internet: www. club300.at.tf.*
SLÁDEK, J. 1959. Die Arealerweiterung des Kaiseradlers (*Aquila heliaca*) in Mitteleuropa und sein Brutvorkommen in der Slowakei. *Sylvia XVI*: 79-96 (in Czech with summary in German).
SZITTA, T., G. FIRMANSZKY & A. KOVACS 1999. Conservation and studies on breeding biology of the Eastern Imperial Eagle (*Aquila heliaca*) in north-east Hungary. *BUTEO, Suppl.*: 64.
SPACEK, M. & K. KOVÁR 1965. O hnízdení orla královského *Aquila heliaca* (On Imperial Eagle´s breeding). *Živa XIII*: 197-199 (in Czech).
TAPFER, D. 1973. Der Kaiseradler in Pannonien. *Falke 20*: 402-407.
TONHAUZER, P. 1954. Bocian cierny a orol královsky v Malych Karpatoch. (Black Stork and Imperial Eagle in Little Carpathians). *Myslivost 2*: 108 (in Slovak).
VARGA, J. 1962. Poznámky kochrane niektorych druhov vtákov v trencianskom okrese (Notices on protection of some bird species in Trencín district). *Sborník prác z ochrany prírody v západoslovenskom kraji. Krajské stredisko štátnej pamiatkovej starostlivosti a ochrany prírody, Bratislava*: 75-80 (in Slovak).

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