

THE MONITORING PROJECT OF THE GOLDEN EAGLE *AQUILA CHRYSAETOS* IN FINLAND

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All territories and nest-sites of the Golden Eagle have been controlled in Finland since the 1990s. There are comparable data from part of them also since the mid-1900s. In total, 416 territories are known, and 370 of them have been occupied by Golden Eagles during the last five years. Four fifths of the pairs breed in Lapland. The number of pairs has increased slightly thanks mostly to lessened persecution. The average number of "old" (over 50 days) young per occupied territory was 0.57 in 1980–2005, and the number per successful nest 1.20, respectively

Key words: Golden Eagle, monitoring, methods, Finland, distribution, breeding success.

ПРОЕКТ ПО МОНИТОРИНГУ БЕРКУТА (*AQUILA CHRYSAETOS*) В ФИНЛЯНДИИ. Т. Оллила. Служба лесов и парков Финляндии, Рованиеми, Финляндия.

Контроль всех гнездовых территорий и участков беркута *Aquila chrysaetos* в Финляндии ведется с 1990-х годов. Начиная с середины прошлого века, по некоторым из них существуют также сравнительные данные. Всего известно 416 территорий, из которых беркут в последние пять лет занимал 370. Пятая часть всех пар гнездится в Лапландии. Число пар несколько выросло благодаря, прежде всего, снижению преследования. В период с 1980 по 2005 г. на одну занятую территорию в среднем приходилось 0,57 «подросших» (старше 50 дней) птенцов, а на одну успешно гнездящуюся пару – 1,20.

Ключевые слова: беркут, мониторинг, методы, Финляндия, распространение, успешность размножения.

INTRODUCTION

Information on the distribution, numbers and breeding productivity of the Finnish Golden Eagle *Aquila chrysaetos* population has been collected in a systematic way since the 1950s by the Finnish Nature Conservation Society (e.g. Linkola 1962, Sulka 1968). The coverage of the field work, and the quality of data, has increased during decades. Since the 1990s all known nests have been controlled annually.

In this report I describe shortly the survey methods of our monitoring project, as well as the present breeding range, population size and productivity of the Golden Eagle population in Finland. The Golden Eagle has been classified as vulnerable (VU) in the national Red Data Book (Rassi et al. 2001). The species is also listed in the Annex I (species in need of special protection) of the EU birds directive.

The reason for these classifications is the marked decrease in numbers of the Golden Eagle in Finland in the first half of the 20th century, due to persecution and fragmentation of large forest areas in southern and central parts of the country. At present persecution is illegal, and the very few cases of shooting of a bird or destroying its nest have practically no effect on the level of population. Actually, the population has increased during the last decades due to various conservation measures.

Environmental administrators started a more comprehensive monitoring project of the Golden Eagle population in the year 1980, and nowadays Metsähallitus takes care of the field work and analysis of results, as well as practical conservation. In addition to the monitoring of the Golden Eagle, Metsähallitus is responsible also for monitoring the populations of the Peregrine *Falco peregrinus* and the Gyrfalcon *F. rusticolus*.

MATERIAL AND METHODS

Voluntary ringers and other bird-watchers have collected the majority of the Golden Eagle material in the field during recent decades. Nowadays about 40 volunteers participate in the monitoring project. The Golden Eagles kill and eat reindeers, and especially calves. Compensatory system for these losses to the reindeer husbandry by the state of Finland is based on the annual number of territories and young raised, and that is why every nest must be controlled annually.

All known territories are visited at least once a year during the breeding season, normally from 15 June to 15 July. Some territories are visited also in April to check whether the pair has started to nest or not.

The continuous mapping of new and previously unknown territories and nests is a prerequisite for

successful monitoring of the Golden Eagle. The efficiency of this task has varied between years. At present both new and alternative nests as well as new territories are sought after with a stable and high efficiency. I estimate that we know now about 90% of all the territories in Finland.

Nests have been checked usually by climbing to assess traces of occupancy and the number of young, as well as to ring them. Since the year 1995 Finland has participated in the Nordic colour-ringing programme for the Golden Eagle. From 70 to 80% of all known young are ringed yearly.

A territory has been classified as occupied if successful breeding or breeding attempt was observed, or if recently built, repaired or decorated nest was found. A young older than 50 days is classified as "old". The terms used follow Postupalsky (1974) and Steenhof (1986), and they are specified in more detail by Ekenstedt et al. (2006).

RESULTS AND DISCUSSION

Numbers and distribution

The total number of territories known to the project is 416, of which about 80% lie in Lapland (fig. 1). The southernmost territories have been found in Ostrobothnia and Central Finland, with a lone marginal one in Southwest Finland. The range has remained the same since the 1960s. In the first half of the 20th century many pairs were found further south especially in the east. During the last five years, in total 370 territories have been occupied by Golden Eagles.

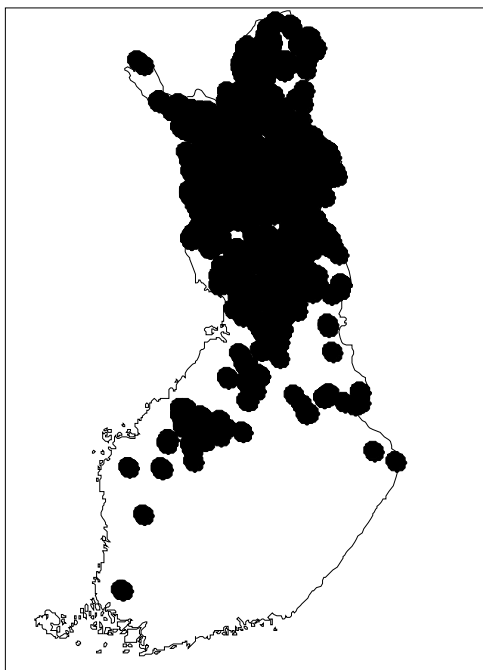


Figure 1. Breeding range of the Golden Eagle in Finland in 2005.

The number of known territories has increased considerably during the last ten years. Although the number of pairs has slightly increased in reality, the main reason for the increase of annual numbers is the more efficient search for previously unknown nest-sites, and improved knowledge on the species and its territories.

The Golden Eagle prefers remote and undisturbed forest and fjell areas, long away from main roads, villages and other human activity. More than 90% of all nests have been built in large pine trees (*Pinus sylvestris*), occasionally in aspen *Populus tremula*, or in Norway spruce *Picea abies*. In northern Lapland some nests have been built on abrupt cliffs.

The distance between nearest neighbours varies considerably. In East Lapland it is, on average, 14.1 kilometres, with a minimum of 5.9 kilometres. The mean area of territories has been estimated at 151 km² in East Lapland (Petri Piisilä, unpublished). These figures seem to be representative for the whole of Lapland.

Reproduction

On average, 73% of the territories have been occupied by Golden Eagles (65–83% annually, fig. 2). The proportion was higher in the beginning of the 1980s than later on; most probably field work in those early years was not as representative for the whole population as at present, with ringers concentrating their activity to nests with young in previous years.

Availability of food and weather conditions, especially during the early breeding period, have a marked influence on the reproductive output of the Golden Eagle, explaining a great part of the annual variation in breeding success. The most important prey species in Finland are the mountain hare *Lepus timidus*, Black Grouse *Tetrao tetrix* and Willow Grouse *Lagopus lagopus*, and calves of domestic reindeer *Rangifer tarandus tarandus*.

The number of "old" young per occupied territory has varied from 0.36 to 0.76 (average 0.57) in the period 1980–2005. The number of young per successful nesting has varied from 1.06 to 1.36 (average 1.20), respectively (fig. 3). The productivity of the population varies more in northern fjell regions than further south, but there are no marked spatial deviations in the mean number of young in different parts of the Finnish range.

REFERENCES

- Ekenstedt, J., Kålås, J. A. & Ollila, T. 2006: Criteria for monitoring and surveillance of Golden Eagles (*Aquila chrysaetos*) in Finland–Norway–Sweden. – In print.
- Linkola, P. 1962: Uusin tieto maakotkistamme (Summary: The latest news about the golden eagle in Finland). – Suomen Luonto 21: 36–58, 72.
- Ollila T. 2000: Suomen maakotkat 1990-luvulla (Summary: Population trends and breeding success of the Golden Eagle (*Aquila chrysaetos*) in Finland). – Linnutvuosikirja 1999: 4–7.

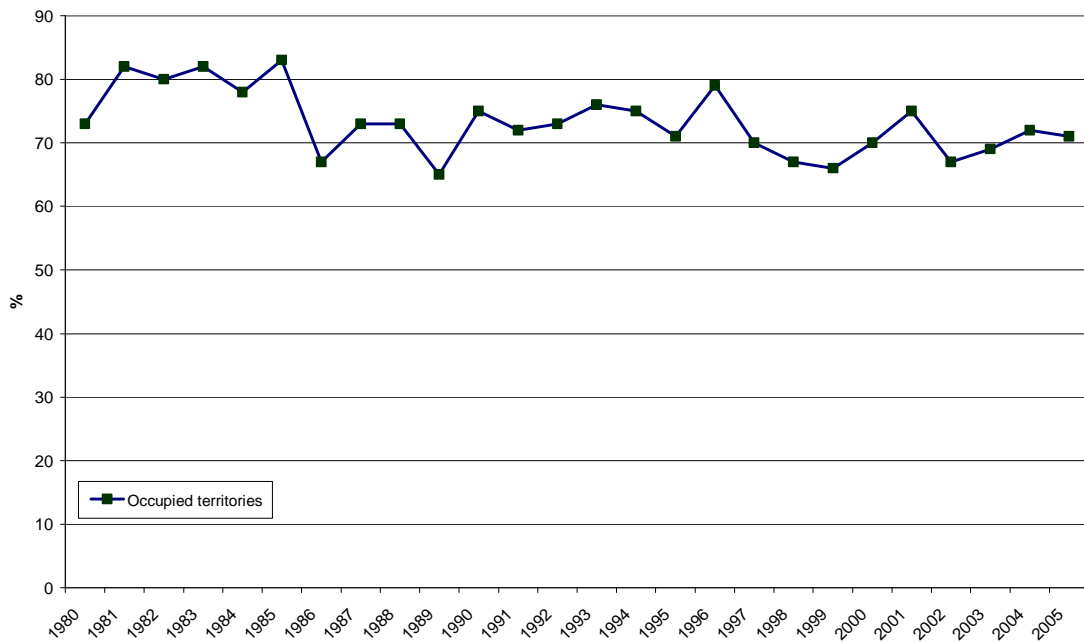


Figure 2. Percentage of occupied territories of the Golden Eagle in Finland in 1980–2005.

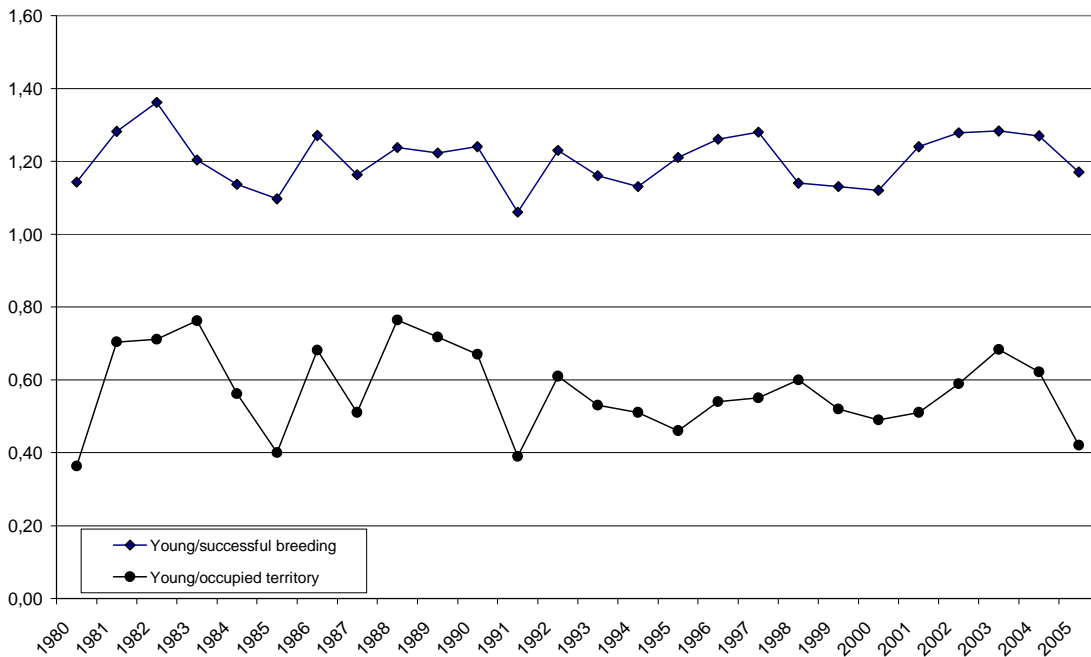


Figure 3. Breeding productivity of the Golden Eagle in Finland in 1980–2005.

Piisilä, P. 2006: Maakotkan reviirit Itä-Lapissa (Territories of the Golden Eagle in East Lapland, in Finnish). – Unpublished.
 Postupalsky, S. 1974: Raptor reproductive success: Some problems with methods, criteria and terminology. – In Hamerstrom, F. N., Harrel, B. E., & Olendorff, R. R. (eds.): Management of Raptors, pp. 21–31. Raptor Research Report, No. 2. Raptor Research Foundation, Vermilion.
 Rassi, P., Alanen A., Kanerva, T. & Mannerkoski, I. (eds.) 2001: Suomen lajien uhanalaisuus 2000 (Summary:

The threatened status of the species in Finland). – Ympäristöministeriö & Suomen ympäristökeskus.
 Steenhof, K. 1987: Assessing raptor reproductive success and productivity. – In Pendleton, B. A. G., Millsap, B. A., Cline, K. V. & Bird, D. M. (eds.): Raptor management techniques manual, pp 157–170. National Wildlife Federation, Washington DC.
 Sulkava P. 1968: Kotkien esiintyminen Suomessa 1960-luvulla (Summary: Occurrence of the golden eagle (*Aquila chrysaetos*) in Finland in the 1960's). – Suomen Luonto 27: 68–75, 96.