

POPULATION TRENDS AND BREEDING SUCCESS OF THE WHITE-TAILED SEA EAGLE *HALIAEETUS ALBICILLA* IN FINLAND, 1970–2005

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The productivity of the Sea Eagle in Finland began to deteriorate in the 1950s, reaching its lowest level during the 1970s. The breeding population diminished, from approximately 55 pairs in 1960 to ca. 40 pairs in 1970, many of them incapable to reproduce. Associated with active protective measures, breeding success improved, and the population increased to about 50 pairs in 1980, 80 pairs in 1990, 200 pairs in 2000 and 300 pairs in 2005. The number of occupied territories increased from 37 in 1980, to 75 in 1990, 167 in 2000, and 255 in 2005, including 4, 14, 21 and 34 fresh water or inland territories in northern Finland, respectively. The total annual number of nestlings in the early 1970s varied between 4 and 10. It was 17 in 1980, 62 in 1990, 172 in 2000, and 256 in 2005. Nestlings per occupied territory was <0.3 in the 1970s, slightly higher in the early 1980s, and increased during the 1980s and 1990s to about 0.94 in 2000–2004. The improvement of the breeding success started some years earlier on the Åland Islands than in other sub-regions. During the period 2000–2004 about 60% of the nesting attempts were successful compared to only about 20% (16–23%) in 1970–1974. The average brood size increased as well, e.g. on the Åland Islands from 1.21 nestlings 1976–1979 to 1.65 in 2000–2004. Considering the high productivity and low mortality among juveniles and sub-adults since the 1990s, the population should continue to increase.

Key words: White-tailed Sea Eagle, population trends, breeding success, brood size.

ТЕНДЕНЦИИ В СОСТОЯНИИ ПОПУЛЯЦИИ И УСПЕХЕ ВОСПРОИЗВОДСТВА ОРЛАНА-БЕЛОХВОСТА (*HALIAEETUS ALBICILLA* L.) В ФИНЛЯНДИИ, 1970–2005 гг. Т. Стернберг, Я. Койвусаари, Я. Хёгмандер, Т. Оллила, Х. Экблом. Музей национальной истории Финляндии, Университет Хельсинки; Региональный центр окружающей среды Западной Финляндии, Васаса; Служба лесов и парков Финляндии, Турку, Рованиеми.

Продуктивность орлана-белохвоста *Haliaeetus albicilla* в Финляндии начала снижаться с 1950-х гг. и достигла самого низкого уровня в 70-е годы. Гнездовая популяция сократилась с примерно с 55 в 1960 г. до 40 пар в 1970 г., многие из которых оказались неспособны к размножению. Активная реализация охранных мер позволила повысить успешность гнездования, и популяция выросла примерно до 50 пар в 1980 г., 80 – в 1990 г., 200 – в 2000 г. и 300 – в 2005 г. Число занятых гнездовых территорий увеличилось с 37 в 1980 г. до 75 в 1990 г., 167 – в 2000 г. и 255 – в 2005 г., из которых соответственно 4, 14, 21 и 34 находились на пресноводных водоемах или во внутренних районах Лапландии. В целом, в начале 1970-х гг. рождалось от 4 до 10 птенцов в год, в 1980 г. – 17, в 1990 г. – 62, в 2000 г. – 172, в 2005 г. – 256. На одну занятую территорию приходилось <0.3 птенца в 70-е гг., чуть больше – в начале 1980-х гг., а к 2000–2004 г. этот показатель вырос до 0.94. На Аландских островах рост успешности гнездования начался несколькими годами раньше, чем в других районах. В 2000–2004 гг. успешными были около 60% попыток гнездования, по сравнению с 20% (16–23%) в 1970–1974 годах. Средний размер выводка увеличился на Аландских островах с 1,21 птенца в 1976–1979 гг. до 1,65 – в 2000–2004 гг. Учитывая высокую продуктивность и низкую смертность молодых птиц, наблюдаемые с 1990-х гг., следует ожидать дальнейшего роста популяции.

Ключевые слова: орлан-белохвост, *Haliaeetus albicilla*, динамика популяции, успешность гнездования, размер выводка.

INTRODUCTION

The White-tailed Sea Eagle population in Finland, as well as in other countries around the Baltic, decreased rapidly in the 1960s and 1970s. Human persecution, poisoned bait, loss of breeding biotopes, disturbance and, especially from the 1950s onwards, toxic chemicals were the main threats for Sea Eagles. Surveys and research started in the 1960s, some already in the 1940s.

These activities were consolidated in December 1972 when WWF Finland appointed a special Sea Eagle working group to work out a rescue and research programme and to implement it. Regional voluntary Sea Eagle working groups have since then been responsible for the monitoring of the population and the nesting success. They have also conducted a comprehensive winter-feeding programme, built artificial nests, and taken other protective measures. This paper aims to elucidate population trends and breeding success for the White-tailed Sea Eagle in Finland 1970–2005. It is an update of two earlier papers (Stjernberg et al. 2003, 2005). The data for 2005 are preliminary.

MATERIAL AND METHODS

The White-tailed Sea Eagle population in Finland is not evenly distributed (fig. 1). Since the map was produced in the late 1990s, the Sea Eagle in Finland has settled in three further grid squares: one in the archipelago east of Helsinki, one in eastern Finland (Pohjois-Karjala), and one on the fringe of the Bothnian Bay at the Oulu latitude. Three of the sub-populations are on the brackish Baltic fringe: (1) the Åland Islands (Ahvenanmaa) between Finland and Sweden, (2) southwestern Finland, comprising the two former counties of Turku and Pori, and Uusimaa, and (3) western Finland, i.e. the Quark (Merenkurkku), comprising the former county of Vaasa. The fresh water population breeds in northern Finland (Lapland and Koillismaa). In recent years a few fresh water pairs have also settled in sub-regions 2 and 3, as well as in eastern Finland.

The regional Sea Eagle working groups have annually checked every known territory and nest, and breeding production has been established by visits to nests in late May or in June to ring nestlings with coloured rings. New territories and nests and "lost" pairs are located, often using information got from the public. Since 1980, aircraft have been used to check nests in western and northern Finland during incubation in April, and occasionally to search for new nests in June. Productivity was calculated as the number of half-grown nestlings/occupied territory/year, brood size as nestlings/successful nesting attempt, and breeding success as successful nesting attempts (%). These calculations were made for the whole population and separately for the different sub-regions.

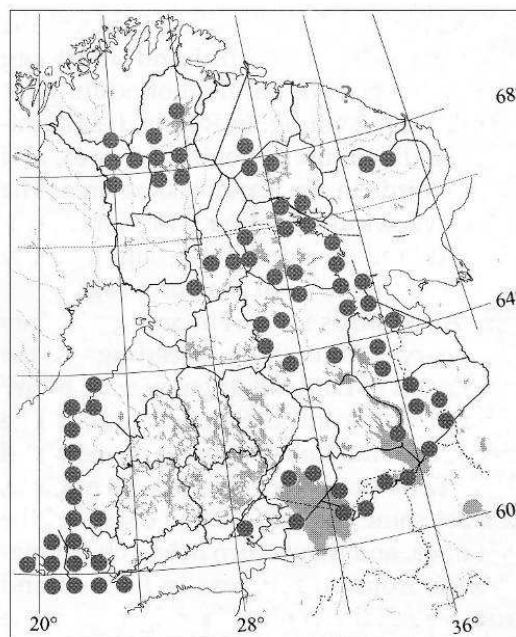


Figure 1. The distribution of the White-tailed Sea Eagle in Finland in the late 1990s (from Stjernberg et al. 1998).

RESULTS AND DISCUSSION

Population trends

The breeding population of the White-tailed Sea Eagle in Finland was estimated to comprise approximately 55 pairs in 1960 and ca. 40 pairs in 1970 (cf. Stjernberg et al. 1990, 2003). The population reached its lowest level during the late 1960s and early 1970s. The number of occupied territories (= at least one decorated nest known) in the early 1970s varied between 11 and 23, in the early 1980s between 37 and 50, in the early 1990s between 75 and 100, and in the early 2000s between 167 and 255 (fig. 2).

The annual increase of occupied territories in 1990–2000 averaged 8.9% – in calculation 1989 was used as starting point – and from 2000 to 2005 7.5%. (The figure for 1990–2000 has been recalculated, cf. Stjernberg et al. (2003), where the presented figure is lower.) The recorded numbers of occupied territories started to increase from the mid-1980s, earliest on the Åland Islands and latest in western Finland ten years later (fig. 2).

Nesting success

The productivity of the White-tailed Sea Eagle in Finland began to deteriorate in the 1950s and reached its lowest in the late 1960s and early 1970s (Stjernberg et al. 1990, 2003). In the early 1970s only 4–10 nestlings were recorded annually. At that time, all but one pair in Lapland nested on the Baltic fringe. In 2005 256 nestlings were recorded, out of which 35 in Northern Finland (fig. 3).

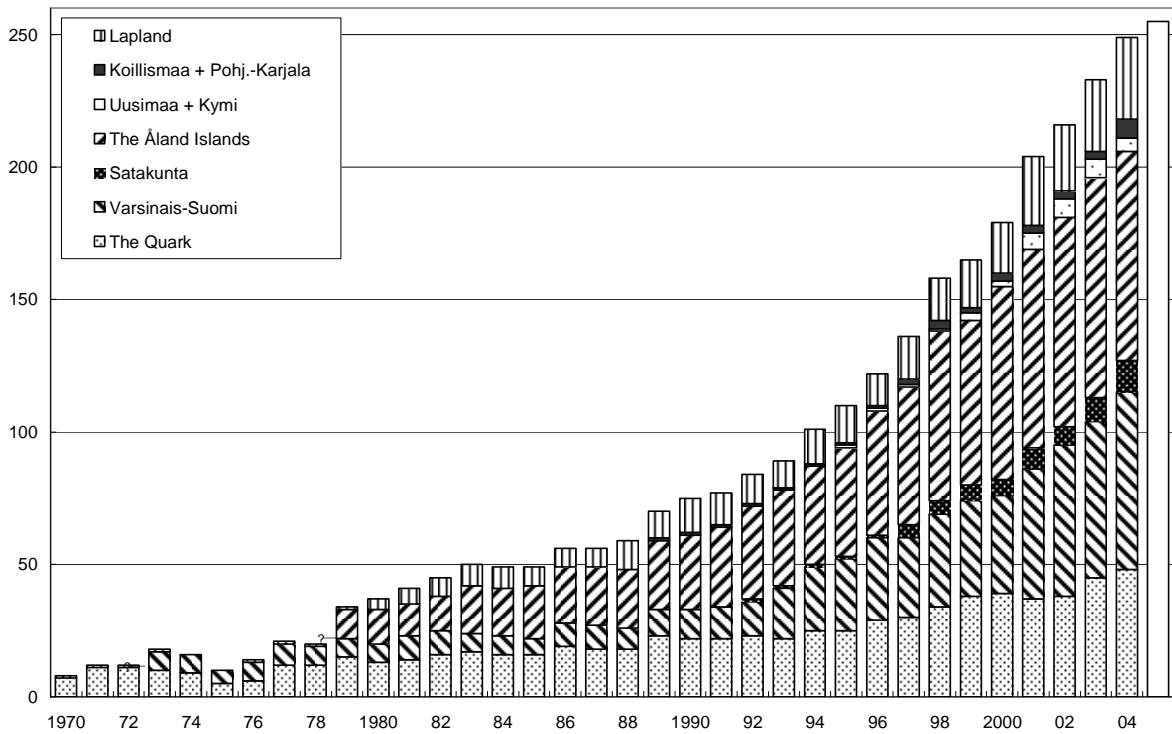


Figure 2. The numbers of occupied territories of the White-tailed Sea Eagle in different regions in Finland in 1970–2005. The numbers for the Åland Islands in 1970–1978 are not as complete as later ones, neither the figures for the other regions in 1970–1972. Koillismaa = the inner (freshwater) parts of the province of Oulu, Pohj.-Karljal = the province of Pohjois-Karljal, Uusimaa = the province of Uusimaa, Kymi = the province of Kymi, Satakunta = the county of Satakunta, Varsinais-Suomi = the county of Varsinais-Suomi (Satakunta and Varsinais-Suomi = the former province of Turku and Porj). The figure for 2005 is preliminary.

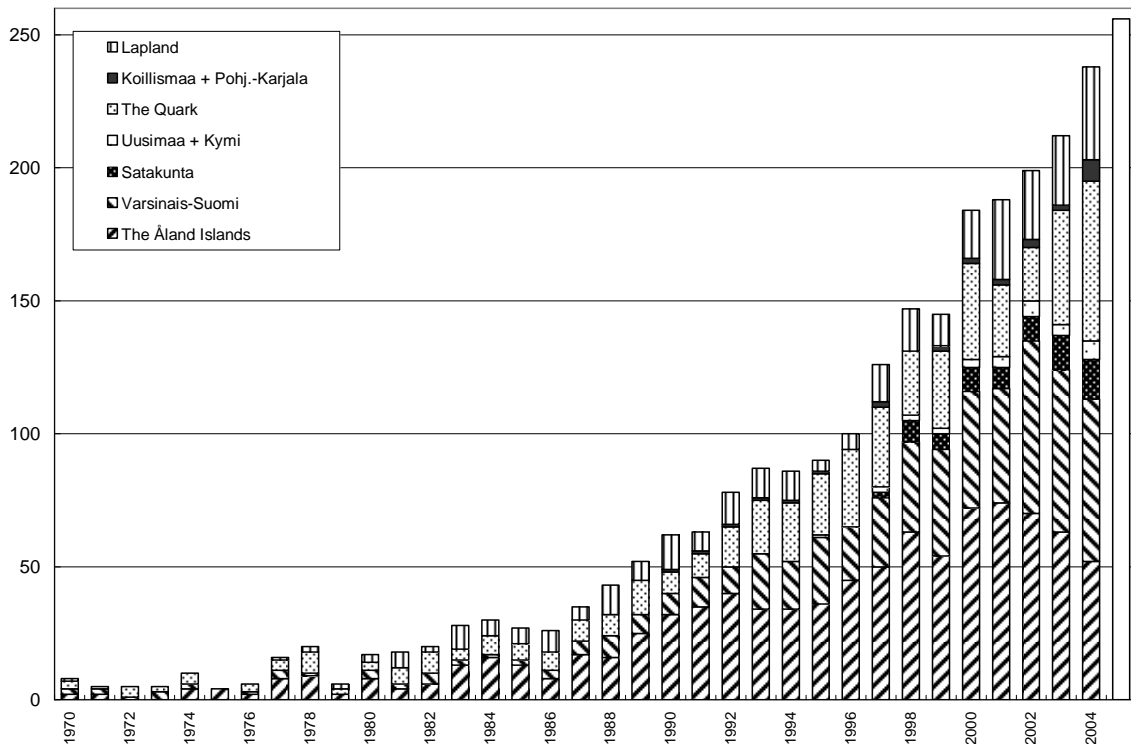


Figure 3. The numbers of half-grown White-tailed Sea Eagle nestlings in different regions in Finland in 1970–2005. For regions, see fig. 2. The figure for 2005 is preliminary.

Nestlings/occupied territory and successful nesting attempts

The productivity of the White-tailed Sea Eagle – measured as nestlings/occupied territory and percent successful nesting attempts – in Finland during the last 36 surveyed years, as well as in other countries around the Baltic, has improved (e.g. Stjernberg et al. 2003). In the early 1970s 16–24% of the nesting attempts were successful (figs. 4, 7) and <0.3 nestlings/occupied territory were recorded (figs. 5, 6, 7). In 2000–2004 ca. 0.94 nestlings/occupied territory were recorded (fig. 7), and ca. 60% of the nesting attempts were successful (fig. 7). In Lapland the average productivity during the whole period 1980–2005 was of the same (good) magnitude as the productivity on the Baltic fringe during the early 2000s, although the annual fluctuations in Lapland were much stronger than further south, especially in the 1980s and 1990s (figs. 4, 5).

The improvement in nesting success started earlier on the Åland Islands than in the neighbouring sub-region southwestern Finland, and even later in western Finland.

Brood size

Not only the breeding success, but also the brood size were depressed in the 1970s and averaged 1.26 in the 1970s in western Finland (tab. 1). Since then the average brood size gradually increased, and it was 1.67 in the latter part of the 1990s and 1.73 in 2000–2004. The recent brood size on the Åland Islands was similar – 1.65 in 2000–2004 (tab. 2). Recent average brood size of the Baltic populations in Finland and Sweden is similar and only slightly below the 1.84 under undisturbed conditions (Helander 1994, 2000, tab 2).

Table 1. Brood size of *Haliaeetus albicilla* in Western Finland (The Quark) in 1965–2004. Only nests inspected by climbing included.

Years	Brood size 1	Brood size 2	Brood size 3	Broods	Mean
1965–1969	2	1	0	3	1.33
1970–1974	6	1	0	7	1.14
1975–1979	8	4	0	12	1.33
1980–1984	8	9	0	17	1.53
1985–1989	15	12	0	27	1.44
1990–1994	24	19	2	45	1.51
1995–1999	27	43	3	73	1.67
2000–2004	36	56	9	101	1.73

Table 2. Brood size of *Haliaeetus albicilla* on the Åland Islands 1976–2004.

Years	Brood size 1	Brood size 2	Brood size 3	Broods	Mean	Notes
1976–1979	(11	3	0	14	1.21)	1)
1980–1984	(24	9	1	34	1.32)	1)
1980–1984	15	7	1	23	1.39	2)
1985–1989	27	24	1	52	1.50	3)
1990–1994	47	55	4	106	1.59	3)
1995–1999	55	79	5	139	1.64	3)
2000–2004	66	105	5	176	1.65	3)

Notes: 1) Numbers of nestlings established from the ground.
 2) Nests inspected by climbing the tree (nestlings ringed).
 3) Only nests inspected by climbing included.

Helander 1994: Brood size <1954 in Sweden, Baltic (undisturbed):

Pre-1954	24	58	9	91	1.84
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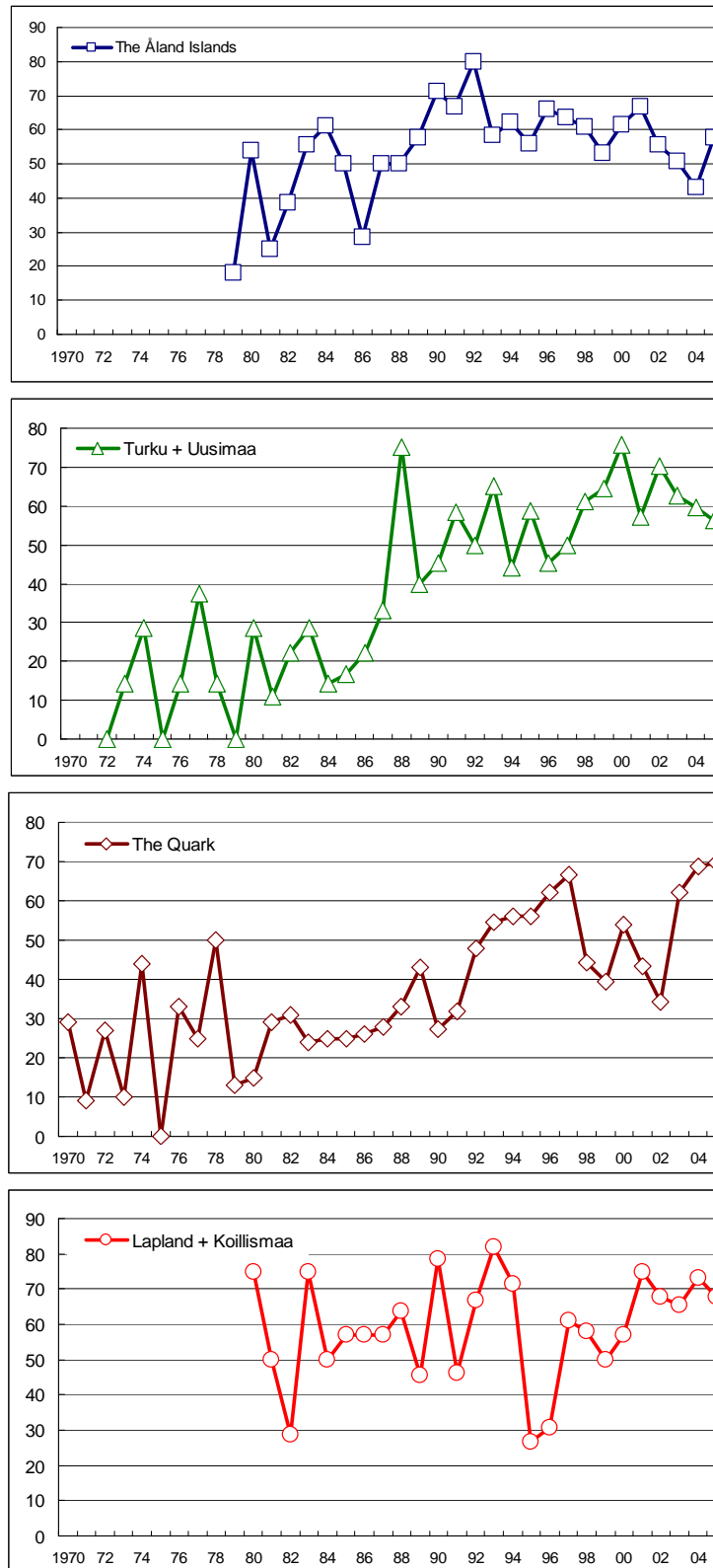


Figure 4. Successful nesting attempts (%) of the White-tailed Sea Eagle in different regions in Finland in 1970–2005. For regions, see fig. 2. Turku = the former province Turku and Pori comprises the county of Varsinais-Suomi and the county of Satakunta; here it also includes data from the provinces of Uusimaa and Kymi. Lappi + Koillismaa also include data from the county of Pohjois-Karjala. The figure for 2005 is preliminary.

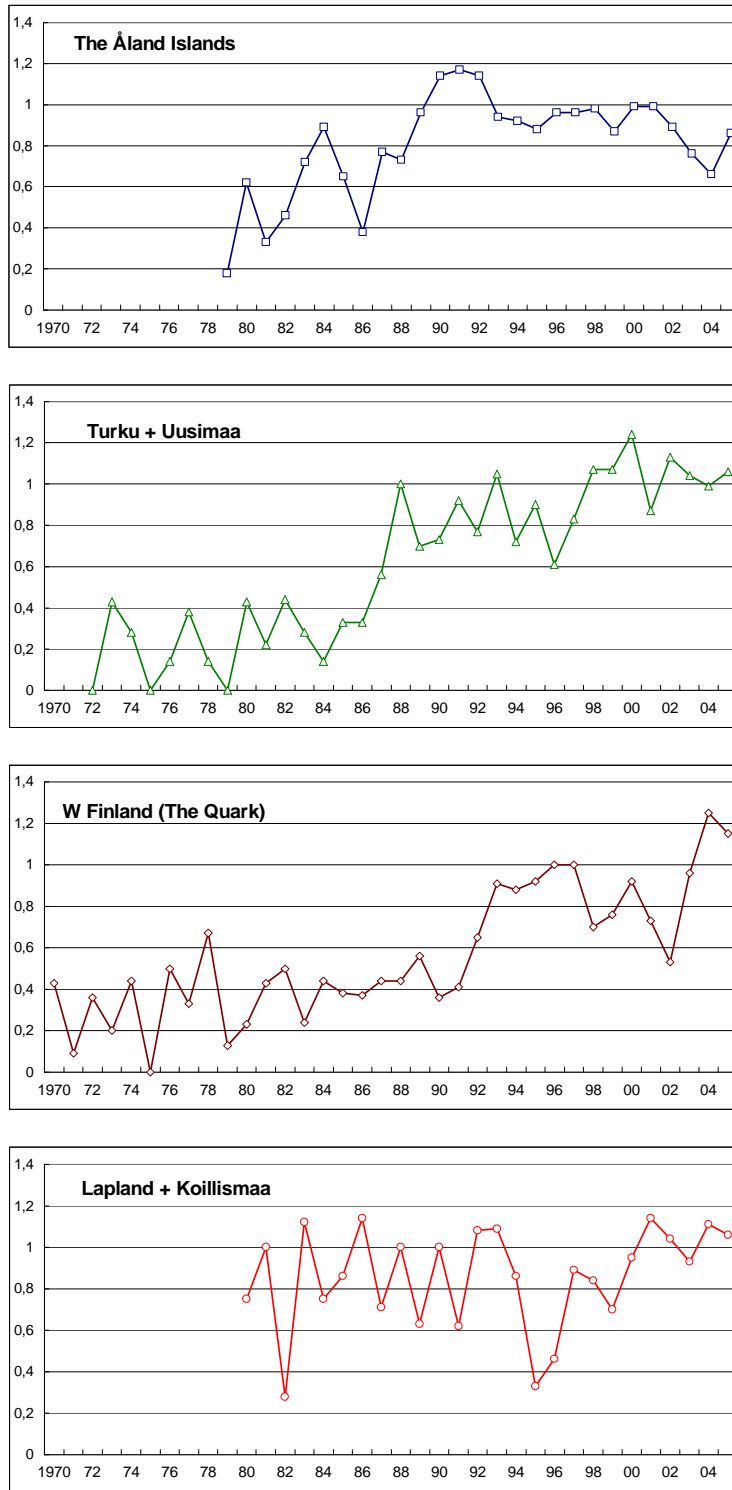


Figure 5. The average number of nestlings/occupied territory/year of the White-tailed Sea Eagle in different regions in Finland in 1970–2005. For regions, see figs. 2 and 4. The figure for 2005 is preliminary.

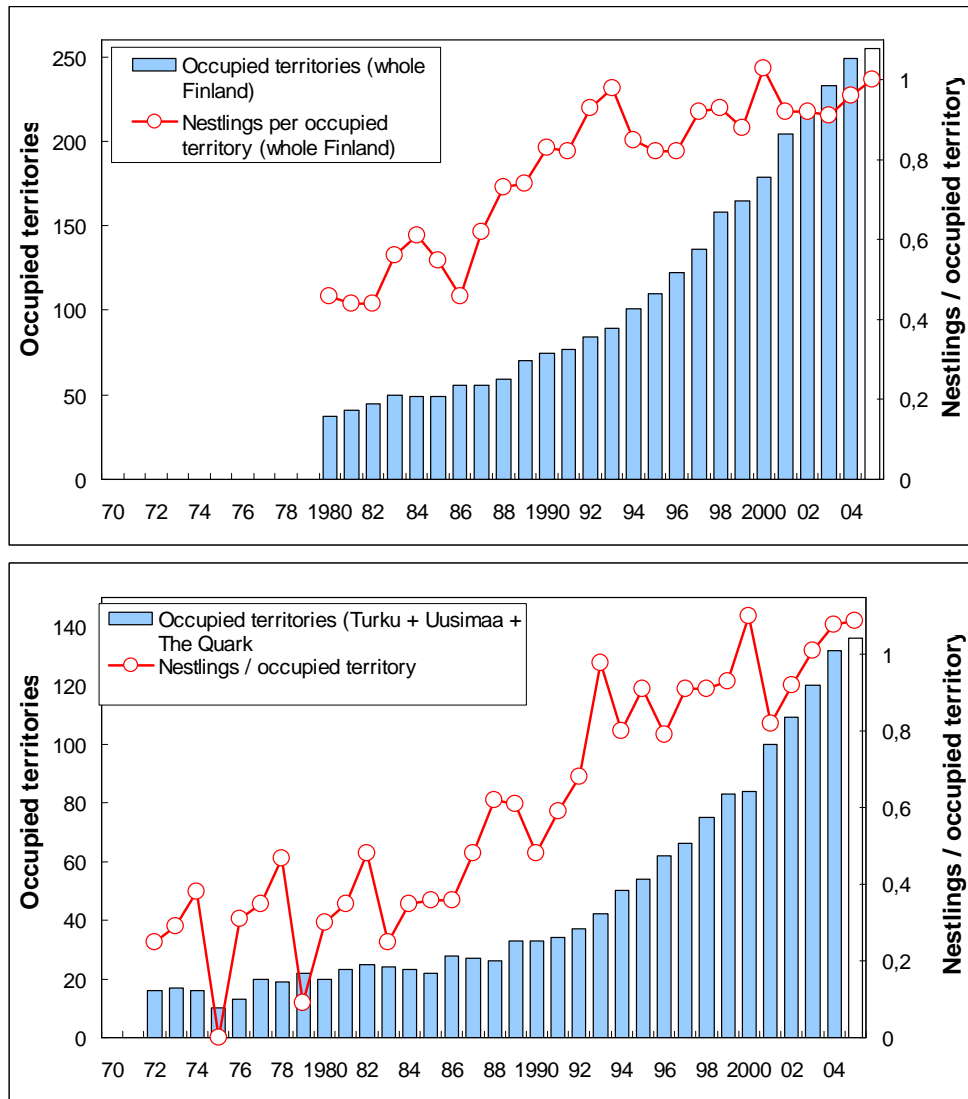


Figure 6. The average numbers of nestlings/occupied territory/year (curve) and the numbers of occupied territories/year of the White-tailed Sea Eagle in Finland in 1980–2005, and for the regions in southwestern Finland and the Quark in 1972–2005. The figure for 2005 is preliminary.

CONCLUDING COMMENTS

Winter-feeding, which was started from the very beginning of the Sea Eagle projects in Sweden and Finland (e.g. Hario 1981, Helander 1985) was perhaps, besides the general ban of use of DDT in the countries around the Baltic, the most important single protective measure for the Baltic populations in the 1970s. Winter-feeding especially lowered the mortality among yearlings and sub-adult birds.

In the 1990s, when the winter-feeding programme in Finland still was in force, the mortality among yearlings and sub-adults was very low. An analysis of comprehensive re-sighting data of White-tailed Sea Eagles ringed as nestlings in Finland 1991–1999 showed that the apparent minimum survival from fledging to the 1st winter, and

annually to the 4th winter, was in the range 0.86–0.96 (Saurola et al. 2003). The improved survival of the few eaglets hatched during the 1970s stopped the alarming decrease of the Sea Eagle population, and the ban of use of DDT gradually lowered the contaminant burden of the Baltic environment (e.g. Helander et al. 2002), thus resulting in a recovering population.

The population is increasing although density dependent mortality factors, e.g. fatal territorial fights, seem to be increasing, and also environmental contaminants like lead and mercury still constitute a risk in some areas (cf. Krone et al. 2006).

WWF Finland's Sea Eagle project can be considered as a success story which has surpassed beyond all expectations, at least according to the fieldworkers starting surveys already in the "dark 1960s".

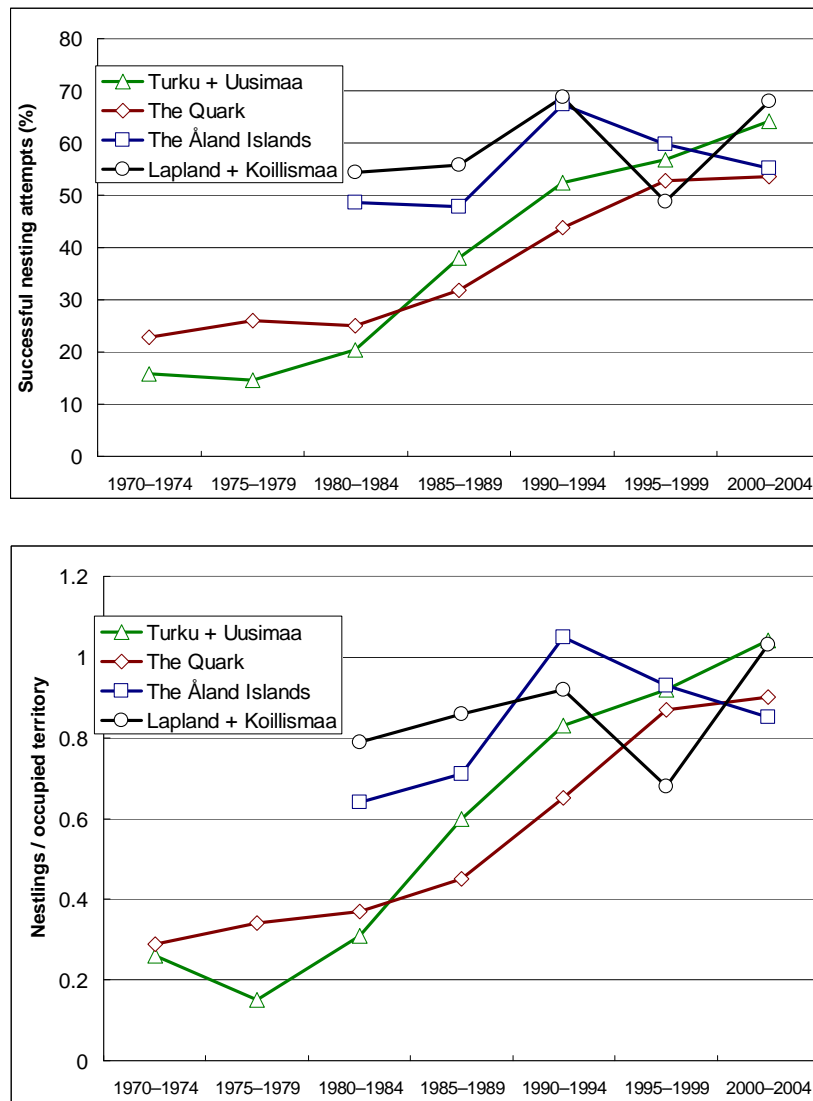


Figure 7. The average number of White-tailed Sea Eagle nestlings/occupied territory (below) and successful nesting attempts (%) in pentads in different regions in Finland in 1970–2004 (above). For regions, see figs. 2 and 4.

However, during the last years some other people, mostly hunters, have expressed as their opinion that there now might be too many White-tailed Sea Eagles in Finland. But, perhaps, also this opinion can be considered as a measure of success?

Acknowledgements. This report would have been impossible without the selfless work of the volunteers engaged in the White-tailed Sea Eagle project within the regime of WWF Finland over the last 35 years. The role of the regional sub-groups and the surveyors has been outstanding, as well as others that have used almost every winter weekend to provide eagles with uncontaminated food despite hard conditions. Pekka Routasuo drew the diagrams. We express our gratitude to all of them.

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