COLOUR-RINGING OF WHITE-TAILED SEA EAGLES IN NORTHERN EUROPE

BJÖRN HELANDER

SNF/Swedish Society for the Conservation of Nature, Box 6400, S-113 82, Stockholm, Sweden

ABSTRACT

A colour-ringing programme for White-tailed Sea Eagle nestlings was started in northern Europe in 1976. 557 nestlings were colour-ringed in six countries in the period 1976–81, with one colour-eloxated aluminium ring on each leg: one indicating geographic origin, the other indicating year of birth. Details on ring types and colouration are included.

Of 121 reports of observed colour-ringed eagles, 68 percent were complete sightings. Among the colours used, blue and green were those most frequently confused by observers. Most winter observations were made at eagle feeding stations. The numbers of colour-ringed eagles from different areas observed during winter in Sweden, in relation to the numbers ringed in each area, showed that southern and central Sweden is an important wintering area for Sea Eagles from the Swedish and Finnish Baltic Sea populations, and also for birds from Swedish and Finnish Lapland.

Reporting rates of colour-ringed Sea Eagles are high and important information was obtained in a short time. To obtain more data over an extended period, the programme will be continued for another 20 years.

INTRODUCTION

Although ringing of White-tailed Sea Eagles (*Haliaeetus albicilla*) has been conducted since the early twentieth century, only 523 birds were ringed in northern Europe before 1976 (EURING Data Bank yearly totals; from Saurola 1981). The information from recoveries of these birds is limited, and concerns mainly the migration routes and wintering areas of young birds (Helander 1975; Saurola 1981).

Since the White-tailed Sea Eagle is regarded as vulnerable in its entire European range (IUCN *Red Data Book*, King 1981), more information on migration routes and wintering areas, as well as on survival rates, homing tenacity, population, age structure, ages of breeding birds, and causes of death are badly needed for use in management. With this in mind, an international colour-ringing programme for Sea Eagles in northern Europe was organized by the Swedish 'Project Sea Eagle' and started in 1976.

MATERIAL AND METHODS

The following ringing areas are recognized at present: the Norwegian breeding range; Swedish Lapland; Finnish Lapland; the Swedish Baltic coast; the Finnish Baltic coast (subdivided into three areas); Poland; East Germany; West Germany.

The programme is restricted to nestlings, which are ringed with one colour-eloxated aluminium ring on each leg. On the right leg is the ordinary, numbered ring; its colour indicates the geographic origin of the bird. The colour of the left ring (un-numbered) indicates the year of birth. Ringing is recommended to take place when the nestlings are between four and eight weeks old.

The rings measure 1.5mm thick, 15mm high, 25mm inner diameter, and weigh about 5 grams. Two-coloured rings (see below) measure 18mm high. The material is pure aluminium (99.5% Al; Swedish code SIS 40 07), or an aluminium alloy (97.2% Al, 2.5% Mg, 0.3% Mn; Swedish code SIS 41 20), depending on ring type. The type of locking mechanism varies between the participating countries. The frequency of ring loss appears to vary with ring type. In four out of five observed birds (1st–3rd year of life) with only one ring still in place, it was possible to identify the ring type being lost: they were all flange-type lock-on rings. To minimize ring losses, rivet-type rings are now used on the majority of birds.

To limit confusion of the colours on birds observed in the field, only a few clearly distinguishable colours have been used. All rings are coloured at the same factory (Danielssons, Box 30, S-194 21 Upplands Väsby, Sweden) to avoid differences in colouration. The aluminium rings are anodized, coloured with 'Aluminium Farbstoffe' (manufactured by Sandoz, Basel), and sealed. The following colours are now used (colour code, pigment concentration, and light fastness according to an eight-degree scale): black (Sanodal Black MLW; 10g/l; >8), bright blue (Sanodal Turkis PLW; 5g/l; >8); dull green (Aluminium Green LWN; 0.2g/l; 7–8); light orange (Aluminium Gold Orange RLW; 3g/l; 7–8); bright red (Aluminium 'Brandrot' ML; 5g/l; 6–7); white (anodized and sealed; no pigment; >8).

In order to obtain reliable data on a long-lived, slowly reproducing raptor like the Sea Eagle, it is necessary to maintain a long-term ringing programme. Therefore, the plan is to continue this programme for another 20 years. Since all easily distinguishable colours were used by 1981, two colours must now be used on the leg, indicating year of birth from 1982 and onwards. Two metal rings on the same leg would be unacceptable, however, since such rings would wear strongly and could develop sharp edges. The use of metal rings was considered necessary since large raptors tend to remove plastic rings easily. A method for manufacturing anodized aluminium rings with two colours was therefore developed during 1980–81. Such colour-rings, covering the need for 'year-of-birth rings' for the next 20 years, were produced during 1981–82. This was made possible by a grant from the Swedish section of the World Wildlife Fund.

RESULTS AND DISCUSSION

The total number of ringed birds in all participating countries is greater than 1000 (*Table 1*). An earlier progress report included data on 44 observations of colour-ringed birds (Helander 1980). To date, well over 100 observations are reported, almost exclusively from the cold season. Of 121 reports (data from Norway incomplete and excluded here), 117 were direct observations in the field,

Table 1: Number of ringed White-tailed Sea Eagles in six European countries, (A) before and (B) after participation in the colour-ringing programme. (Years in brackets.) I = colour-ringed; II = others.

	(A)	(B)	
		I	II
Norway	202 (1914–75)	366+ (1976–81)	72+ (1976–81)
Sweden	126 (1918–75)	105 (1976–81)	—
Finland	50 (1913–75)	49 (1976–81)	5 (1976–81)
Poland	26 (1950–69)	7 (1977–81)	4 (1977–81)
East Germany	10 (1964–79)	9 (1981)	—
West Germany	35 (1909–75)	21 (1977–81)	—
	(449)	(557+)	(81+)

Table 2: Division of reports of colour-ringed White-tailed Sea Eagles. (For comments, see text.)

Category	Reports
1. Complete sighting	82
2. Only one leg visible	8
3. One ring lost	5
4. Colour confusion	21[1]
5. Incomplete reports[2]	5
6. Reported colour-combination not used in the project	1

Notes: 1. Includes one bird from category 2.
2. Observer not certain which colour was on right and which on left leg, etc.

Table 3: Incidences of colour confusion in White-tailed Sea Eagles observed in the field.

True colour	Called by observer	No.	Verified		Not verified
			By deduction	Other[1]	
Black	Black or dark blue	2	2		
Black	Black or uncoloured	1		1	
Black	Dark (black?)	3	3		
Black	Brown	1	1	1	
Blue	Green or light blue	1	1		
Blue	Light green or light blue	1	1		
Blue	Green or turquoise	1	1		
Blue	Green	2	2	1	
Green	Greyish green	1	1		
Green	Light green or light blue	1		1	
Green	Blue (or green)	1		1	
?	Green or light blue	1			1
?	Light green or light blue	1			1
?	Green or blue	1			1
Orange	Yellow or white	1	1		
Orange	Red	1	1	1	
Red	Red (possibly orange??)	1	1		
White over black	White over dark green	1	1		
White over black	Light (yellow?) over dark	1	1		

Note: 1. By repeated observation, from colour photograph, or from identified ring number.

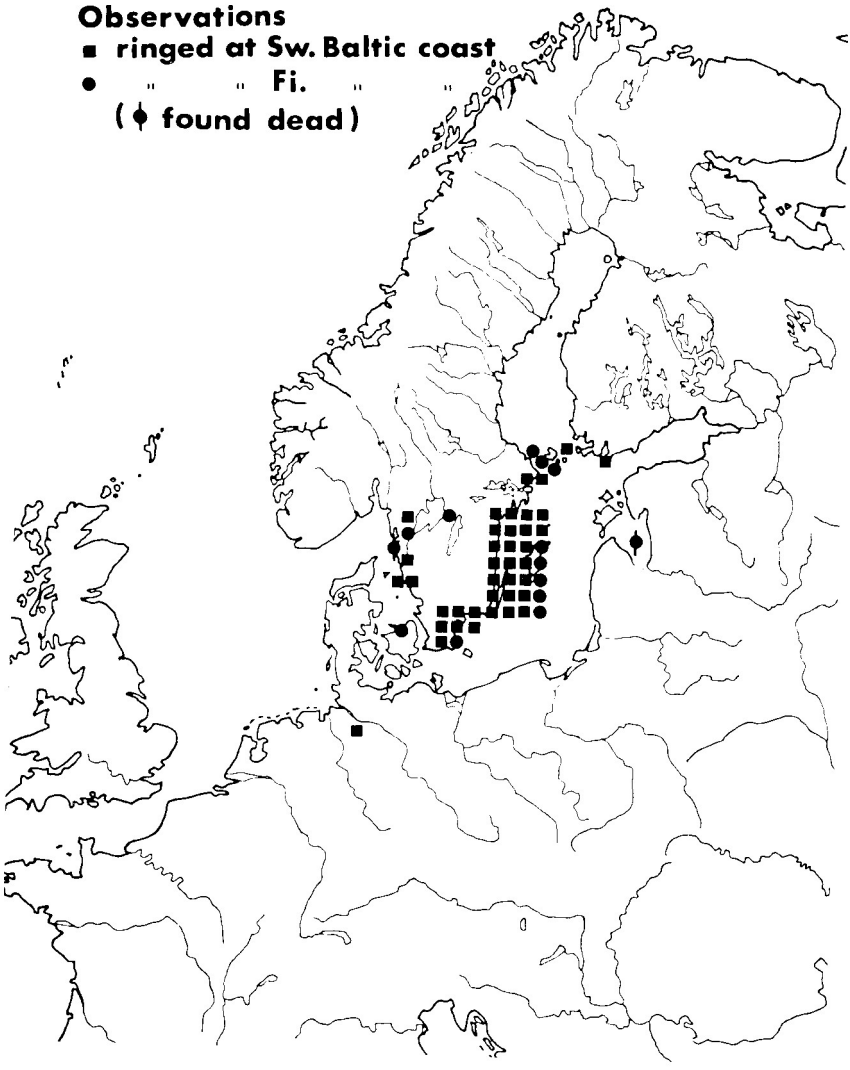

Figure 1: Observations and finds of White-tailed Sea Eagles, colour-ringed as nestlings at the Swedish and Finnish coasts of the Baltic Sea. Data from September through March, inclusive.

and in four cases the colours were identified only from photographs; the photographers did not observe the rings in the field (these four birds were in flight). In some reports, difficulties in identification occurred. The 121 reports were divided into six categories (*Table 2*). Eighty-two reports (68%) were complete sightings, where both colours were clearly read. Of the 39 reports in categories 2–6, complete identification was possible by deduction in 18 cases. The majority of these occurred in category 4, which includes all kinds of colour confusion in the

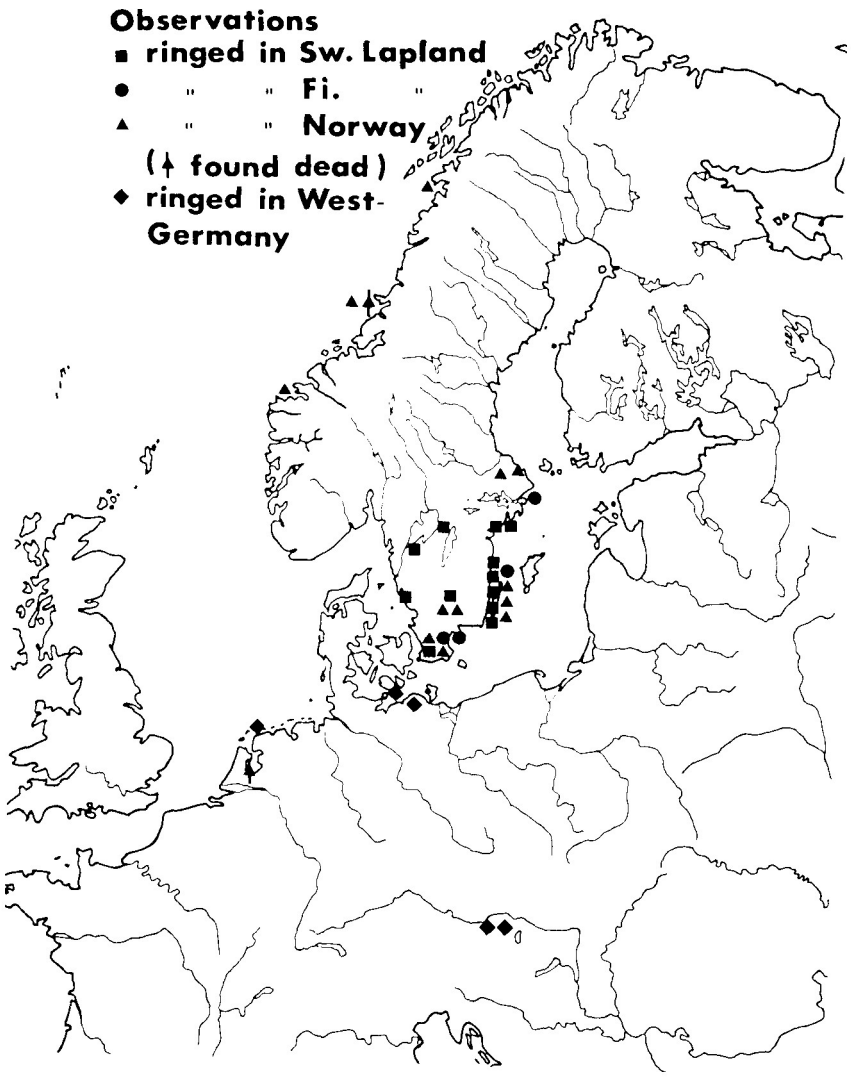

Figure 2: Observations and finds of White-tailed Sea Eagles, colour-ringed as nestlings in Norway, Swedish Lapland, Finnish Lapland and West Germany. Data from September through March, inclusive.

reports—also those cases where there was no doubt what the true colour was (black reported as 'black or dark blue', etc.). All incidences of colour confusion have been noted (*Table 3*). The high rate of verification by deduction depends primarily on two factors: the use of few colours, which makes exclusion of unreasonable alternatives easier, and data on the ages of the observed birds, which sometimes made exclusion of one colour possible. As the number of ringed adult birds in the population increases, the possibilities for this type of deduction

Table 4: Numbers of observations in the southern half of Sweden, of colour-ringed Sea Eagles from five breeding areas, and these numbers divided by the numbers of ringed birds in each area ('Index'). Observations from 1976 through April 1982.

Breeding area	No. of observations	Index
Norway	10	0.03
Swedish Lapland	12	0.3
Finnish Lapland	4	0.4
Swedish Baltic	41	0.6
Finnish Baltic	12[1]	0.3

Note: 1. Includes two birds observed south-west of Åland, Finland.

will decrease. Blue and green cause most confusion (*Table 3*). The blue and green colours used at the start of the project are about equally bright, so the colouration has therefore been altered recently (according to the colour codes and pigment concentrations given above). In at least one case (orange called 'yellow or white'), the confusion was probably caused by snow attached to the ring.

The distribution of observations of colour-ringed Sea Eagles (*Figures 1* and *2*) included several points represented by more than one observation during a continuous period. In most cases, such repeated observations in a restricted area were probably re-sightings of stationary birds, and these have been indicated as a single observation. A large number of the observations were made at feeding stations in the southern half of Sweden (cf. Helander, this volume). It is clear that this area, especially the coast-line, is an important wintering area for Sea Eagles originating from the Swedish Baltic coast, and also for several birds from the Finnish coasts (*Figure 1*). Several birds from Swedish and Finnish Lapland, and some from Norway, also spend the winter in the southern half of Sweden. Since the feeding stations are distributed over this entire area, the observations of colour-ringed birds at these stations should constitute an unbiased sample of birds that visit these areas. An index was derived from the number of observations in the southern half of Sweden of birds from different ringing areas, in relation to the number of birds ringed in each area (*Table 4*). This index gives a relative idea of the importance of the southern half of Sweden as a wintering area for Sea Eagles from these populations. With data on the winter population size in this area, and on productivity, population size and proportion of nestlings ringed in each breeding area, these indices can be used to estimate the proportions of Swedish, Finnish and Norwegian birds in the winter population in Sweden.

The colour-ringing programme has already given valuable information on the winter distribution of different populations. The observation rate is very much higher than the recovery rate: of 152 colour-ringed birds in Sweden and Finland in the period 1976–81, only four (2.6%) were recovered to date; this should be compared to the colour-ringing observations (*Figures 1* and *2*, and *Table 4*), including observation rates of up to 60 percent in southern Sweden alone. The very high observation rate is of course dependent primarily on the good opportunities provided by the feeding stations. The colour rings provide possibilities for identification in the field of age and geographic origin of individual birds, and will hopefully yield information on homing tenacity and age at first breeding in the years ahead. The colour-ringing programme has been in operation for six years and the birds from the first years are now maturing, and starting to enter the

breeding population. A Swedish bird, ringed as a nestling in 1975 (with a regular, uncoloured ring) was identified as a breeding bird in 1980 and 1981 (Helander 1982). The colour rings will make such identifications a lot easier. One colour-ringed Swedish-Baltic-bird from 1976 was observed with a non-ringed mate at a Finnish feeding station in early 1981, and another was observed together with a Norwegian bird from 1977 in southern Sweden in early 1982.

ACKNOWLEDGEMENTS

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