

Pre-1954 Breeding Success and Productivity of White-Tailed Sea Eagles *Haliaeetus albicilla* in Sweden

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INTRODUCTION

Depressed reproductive ability caused by one or more environmental contaminants has been a common feature among several raptor species in recent decades. Typically, reduced hatchability of the eggs results in both a decrease in the proportion of successfully breeding pairs and a decrease in the number of young reared per successfully breeding pair. The product of these parameters gives the overall productivity of the population, or of the individual pair over a number of years.

In evaluating the status of a species, it is essential to know what these parameters are in a healthy population. Since differences in climate, food supply, etc., may change these parameters within the same species among areas, comparisons should preferably be made using data from the same or an ecologically similar area.

In this note, data given by Helander (1985) on the breeding success of White-tailed Sea Eagles on the Baltic Sea coast in Sweden in the first half of this century are scrutinized and used in combination with historical brood size data to produce an estimate of the average productivity of the population at that time.

MATERIALS AND METHODS

Data on the breeding success of individual pairs before 1954 and of brood sizes were taken from Helander (1985). The data on breeding success were obtained from banders and other ornithologists and from the literature. Only data which could be combined into sets of 3 or more consecutive years for each locality were used. This is important; scattered data from single years would almost certainly give an overrepresentation of successful breeding attempts.

The 91 brood size records used to estimate the average brood size included 63 obtained mainly from ornithologists' notes made upon the inspection of nests and 28 from banding records (Swedish Bird Ringing Office). In those days, it was not the routine in Sweden to include in the banding records data on the total number of nestlings and eggs - only the banded birds were recorded. By interviewing the banders I know that in at least two cases nests contained one nestling in addition to the ones banded (one was too small to band, the other was inaccessible). For this reason, a possible difference between the brood records obtained from the banding records and those obtained directly from ornithologists was investigated.

RESULTS AND DISCUSSION

The distribution of broods containing 1, 2, and 3 young was not significantly different between the banding records and the ornithologists' notes (chisquare = 0.683, d.f. = 2, $P > 0.70$). The brood size distribution of the whole sample was 24 x 1, 58 x 2, and 9 x 3 young. The average brood size was 1.84.

The sets of breeding success data, comprising between 3 and 10 years in succession, are given in Table 1. Of 43 recorded breeding attempts within these sets of data, 31 were successful and 12 unsuccessful, producing an estimate of the average breeding success of the Swedish Baltic Sea eagles before 1954 of 72%.

These data sets comprise a total of 53 potential breeding years; thus, for most of the sets, data were lacking for one or a few years. Such lack of data may or may not have an influence on the estimated average breeding success, depending on whether the areas were actually visited or not by the observers during those years. Eagles that fail early in the breeding season, especially if they have also built a new nest in the area, would be much more likely to have been overlooked at the time when these areas were usually checked, which was during the nestling period, than would a successful pair. Theoretically, in a study like this based on assembled material from other observers, a failure by an observer to locate his eagles in a certain year could easily lead to a „lack of data“ for that year. This would tend to produce an underestimate of the number of unsuccessful breeding attempts. On the other hand, if the areas were actually not checked by the observer during those years, there would be no reason to assume that the breeding success would have been different (on average) during the years for which data are lacking, as compared to the others.

The lack of data for some years in this study was mostly due to the fact that the areas were not visited by the observers during those years. In some cases, however, it was not possible to assess whether this was the case or whether no young were found. This factor provides a small positive bias to the estimate of breeding success, for the reasons given above.

Since the purpose of this investigation is to obtain a good estimate of the natural reproduction of sea eagles in this area, another factor that must be considered is the possible impact of human interference. Persecution of the eagles was more common during the first half of this century than it is today. The cases of nest sabotage that are known to have affected the pairs in this study occurred during the nestling period and were easily recognized. The possibility of sabotage of some nests earlier in the breeding cycle cannot, however, be excluded. Such cases would then tend to bias the estimate of natural breeding success downwards, working in the opposite direction from the factor discussed above.

From an estimated average breeding success of 72% and a mean brood size of 1.84, the average productivity is estimated to be 1.32 young per pair for the pre DDT-era in this population.

The range in estimated average breeding success, calculated for all 53 years within the sets of data by assuming that all „lack of data“-years represented either all unsuccessful or all successful breeding attempts is 58 - 77%. The corresponding range in productivity is 1.07-1.42.

It should be noted that the figures given here represent a non-saturated population, which increased from the mid 1920s to the early 1950s (Helander 1988). Thus, no density-dependent, negative influence on the breeding success would be expected in this case. In a saturated population, the overall breeding success might be lower due to more frequent aggressive encounters between individuals in competition for nest-sites and food.

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Table 1. Number of years with successful and unsuccessful breeding attempts among 9 pairs of White-tailed Sea Eagles, recorded before 1954 on the Swedish Baltic coast. Data from Helander (1985).

Territory	Period	Successful	Unsuccessful	No-data
1	1936-1938	2	1	0
2	1943-1952	7	2	1
3	1946-1950	3	1	1
4	1915-1924	6	3	1
5	1944-1948	1	3	1
6	1938-1947	5	2	3
7	1945-1950	4	0	2
8	1950-1953	3	0	1
		31	12	10

