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The otter population in Sweden ; decline and a possible recovery

par
Sam ERLINGE[1]

SUMMARY

Habitat deterioration and overexploitation of otters in Sweden during the 19th and 20th centuries caused a continuous, severe decline in its population. The contamination of food with pollutants was probably a major reason for a final collapse of many local otter populations in late 1950s and 1960s. Also, the fragmented and sparse population was sensitive to various hazards, such as fish-traps and motor vehicle traffic. During the 1980s water quality improved in many systems in Sweden, and piscivorous predators generally increased in numbers, in some cases very conspicuously, e.g. the American mink, the cormorant and the harbour seal. The absence of a general recovery of the protected otter population is probably due to the fact that many water systems completely lacked otters. In systems where a few otters were left there are indications that recolonization is under way. In suitable areas well planned reintroduction programmes can speed up the recovery. It is important that we reduce all sources of mortality due to humans as much as possible.

RESUME : la population de loutres en Suède : déclin et restauration possible.

Au cours des XIX^{e} et XX^{e} siècles, la détérioration des habitats et la surexploitation des loutres en Suède a provoqué un déclin sévère et continu des populations. La contamination des proies par des polluants a probablement été une des raisons majeures de l'extinction de nombreuses populations locales de loutres à la fin des années cinquante et soixante. La population subsistant en noyaux fragmentés et isolés s'est révélée sensible à différents facteurs de risque comme les nasses à poissons et le trafic automobile. Au cours de la décennie 80, la qualité des eaux de surface s'est améliorée dans de nombreux systèmes hydrographiques de Suède. Par ailleurs, les prédateurs piscivores ont généralement vu leurs effectifs augmenter, parfois dans des proportions remarquables, comme chez le vison américain, le grand cormoran et le phoque veau-marin. Le fait que les populations de loutre, espèce protégée, ne se soient pas reconstituées est probablement la conséquence du fait que l'espèce avait disparu de nombreux cours d'eau. Dans les systèmes hydrographiques où ont subsisté quelques loutres, il semblerait qu'une recolonisation soit en cours. Dans des zones convenables, des programmes bien conçus de réintroduction pourraient accélérer la reprise mais il est important que nous réduisions le plus possible les sources de mortalité d'origine anthropique.

[1] Department of Ecology, Ecology building, Sölvcq. 27, Lund University, S 22 362 Lund, Sweden.

According to game records kept by the Swedish Sportsmen's Association there has been a continuous decline in otter populations in Sweden during the 20th century. From the southernmost province of Sweden (Skåne) hunting statistics is available based on annual reports from the estates. During the first decade of the 20th century an average of 11.2 otters were shot annually. During the following decade numbers decreased to 5.7 and in the 1930s the annual figure averaged 2.3 (Skånska Jägarsällskapets årsbok 1936). At various times people voiced their concern regarding the decline. Between 1938 and 1941 the otter was protected around inland waters apart from fish-rearing ponds (**fig. 1**). However, notes soon appeared in local fishery journals claiming that otters harmed the fishery, especially in trout waters and in fish-rearing ponds (e.g. SKOGLUND, 1941 ; TÄGTSTRÖM, 1943). Strong demands to shoot otters were subsequently made. The protective legislation was repealed, and after the second World War a considerable number of otters were killed every year. From 1950 onwards, the numbers killed steadily decreased and restrictions in the hunting season imposed at different times (**fig. 1**). Nevertheless there were signs of a catastrophic decline beginning in the 1950s.

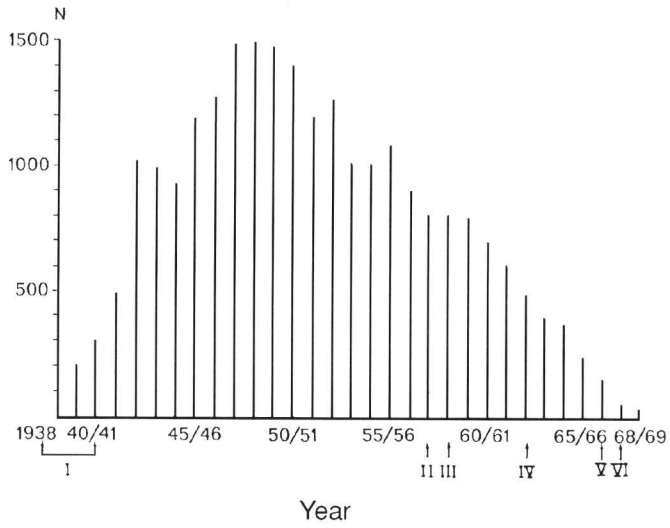

Fig. 1. Number of otters killed during the hunting seasons 1938/39 - 1968/69. The Roman numerals denote times when restrictions in hunting were imposed. Data are from the game records of the Swedish Sportsmen's Association (from ERLINGE, 1972a).
Nombre de loutres tuées à la chasse de 1938/39 à 1968/69. Les chiffres romains indiquent les époques où des restrictions ont été imposées aux chasseurs (données de l'association des sportifs suédois, d'après ERLINGE, 1972a).

To obtain more information about the status of the otter population and the effect of protection, surveys were carried out in the winter of 1966/67 and ten years later (1976/77). The findings of the 66/67 inquiries confirmed earlier observations. The otter population was very sparse and fragmented with many otter habitats unoccupied (**table I**). The proportion of reports noting otter presence gave an unrealistically positive picture since many people did not return their records when no signs of otters were observed. The survey of 76/77 gave

even more depressing findings. In spite of protection, numbers had continued to decrease. Several areas with otters ten years earlier now lacked them, and the proportion of examined otter habitats with otters was much lower in 76/77 (**table I**). Another depressing observation was the reduced proportion of females with cubs, suggesting that recruitment was low.

Table I. Total number of otters and number of female otters with cubs reported from the country-wide surveys in 1966/67 and 1976/77 (from ERLINGE and NILSSON, 1978). *Nombres totaux de loutres et de loutres femelles suitées mentionnées lors des recensements nationaux de 1966/67 et 1976/77 (d'après ERLINGE et NILSSON, 1978).*

	Number of otters reported	Females with cubs	Positive reports (%)
1966/67	699	65	75
1976/77	580	26	38

Otter surveys of different water systems in Sweden in the 1980s showed that the population was still very sparse with no obvious signs of recovery (OLSSON *et al.* 1988, and own observations). Viable, breeding populations occurred only in a few water systems.

Two important questions arise : What caused the decline and what is the reason for the lack of recovery ? Some obvious causes of the decline include the deterioration and destruction of otter habitats owing to the draining of wetlands and lakes, especially during the 19th and the early part of the 20th century, and the negative effect of damming rivers in connection with hydro power production. The food base for the otter has been reduced owing to crayfish disease and acidification. In addition the contamination of food with various chemicals, such as heavy metals and other pollutants, probably contributed importantly to the marked decline since the 50s (ERLINGE, 1972a). A corresponding catastrophic decline of the otter population in Britain was found to closely coincide with the use of certain pesticides (CHANIN and JEFFERIES, 1978). Several recent studies have lent further support to the opinion that food contamination has been a major cause of the recent catastrophic otter decline in many parts of Europe (MASON, 1989). Also, in the aquatic systems examined in Britain the distribution of otters has been found to be inversely correlated with mean concentrations of organochlorine pesticides and PCBs in otter scats (MASON, 1993).

We do not know which of these factors have been important in causing the decline in the Swedish otter populations. Most probably habitat deterioration, intense hunting and contamination of food with pollutants have been the main factors. They are also considered to have been the major causes of the otter population decline in Britain (JEFFERIES, 1989).

Why has there been no recovery ? If food contamination and habitat destruction are two of the main causes of the decline, these problems must be alleviated before a recovery can take place. In fact, water quality has been improved in several areas in Sweden owing to the efficient treatment of sewage and industrial pollutants (OLSSON and REUTERGÅRD, 1986 ; BLOMQVIST *et al.*, 1992). Fish-eating predators seem to be responding positively by these improvements. The American mink, *Mustela vison*, established in Sweden during the 1930s, showed

an exponential increase in the 1940s and 1950s (GERELL, 1967). The population increase then levelled off, and numbers stayed at a fairly stable level for about 20 years (**fig. 2**). In the 1980s the population increased again very significantly, most probably, as a result of an increase in the supply and quality (i.e. less contamination) of food. Records of migrating ospreys, *Pandion haliaetus*, in autumn also show that this population has remained stable or increased in the 1980s (**fig. 3**) in spite of the increased disturbance associated with human recreation. Furthermore, the breeding population of the cormorant, *Phalacrocorax carbo sinensis*, has increased very remarkably in the Baltic Sea with some inland waters recently being colonized as well (Annual reports in « Vår Fågelvärld, the Swedish Ornithological Society »)

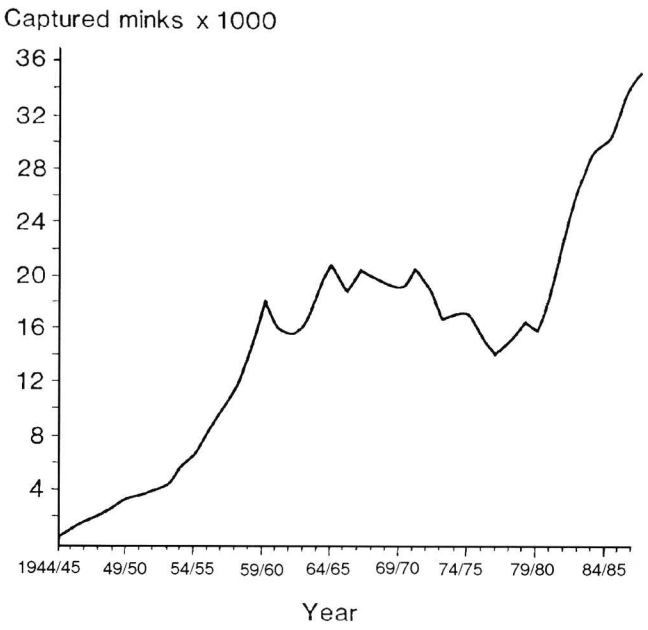

Fig. 2. Temporal variation in the Swedish mink population from the middle of the 1940s to late 1980s, as indicated by game records from the Swedish Sportsmen's Association.
Variations de la population suédoise de vison depuis le milieu des années 40 jusqu'à la fin des années '80 (données de l'association des sportifs suédois).

Population change in the harbour seal (*Phoca vitulina*) along the western coast of Sweden shows a similar pattern (**fig. 4**). Up to the middle of the 1960s there was a continuous decline owing to intense hunting (HÄRKÖNEN, 1987). After protection was introduced in 1965, the population recovered and the increase soon became exponential. The increase lasted until the outbreak of seal disease in 1988 (HÄRKÖNEN, 1987).

Why hasn't the otter reacted like these other piscivorous predators ? Is the lack of a recovery due to competition with mink ? Recent studies in Scotland suggest that in oligotrophic waters food shortage is the major cause of otter

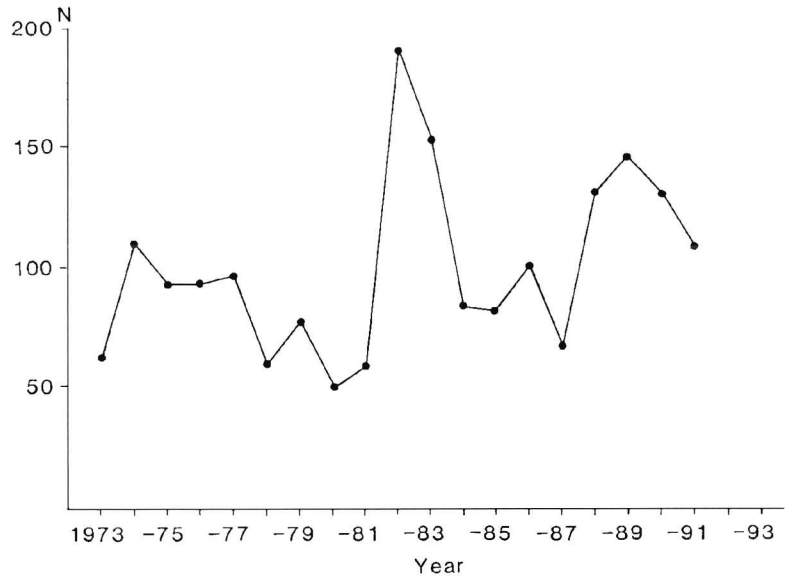

Fig. 3. Number of ospreys observed migrating during autumn on the Falsterbo peninsula in southwestern Sweden. Data from ROOS (1991).
Nombre de balbuzards observés en migration d'automne à Falsterbo (S.W. de la Suède, d'après ROOS, 1991).

mortality (KRUUK and CONROY, 1991). Moreover, in these areas reproductive success of otters fluctuates with food availability (KRUUK *et al.*, 1991). In most parts of Sweden, when lakes and some running waters freeze up in winter, otters face a shortage of food (ERLINGE, 1972c). The otter and the mink largely share the same food in winter (**fig. 5**). At that time the two mustelids compete for food, and most probably the introduction of the mink has had a negative effect on the otter (ERLINGE, 1972c). In direct confrontations between adult individuals, however, the smaller mink has to give way (GERELL, pers. comm.). In summer, the two predators differ substantially in their diet (**fig. 5**) and habitat preferences (ERLINGE, 1972c). Although a negative factor, the mink is probably not the cause of the failed recovery of the otter population. Instead the following scenario seems reasonable : As a result of intense hunting and reduced recruitment due to food contamination, the otter population as a whole became too sparse and too fragmented to respond positively to protection and improved water quality. Also, remaining fragments and local otter populations are exposed to various hazards such as fish traps, traffic and traps designed for mink (ERLINGE, 1972b and unpublished obs. MADSEN, 1990 ; BRAUN, 1986). The main problem might be that in many water systems in Sweden there are no otters left to repopulate the habitats. On the other hand in some areas with otters observations suggest that they are now recolonizing waters that were earlier unoccupied (own observation). It is important that efforts be made to reduce all source of otter mortality related to human activity. The use of a stop grid in fish traps (MADSEN, 1987) to prevent otters from entering the trap is highly commendable. Also, in water systems where conditions for otters are favourable, well planned and well performed reintroduction programmes can speed up a recovery.

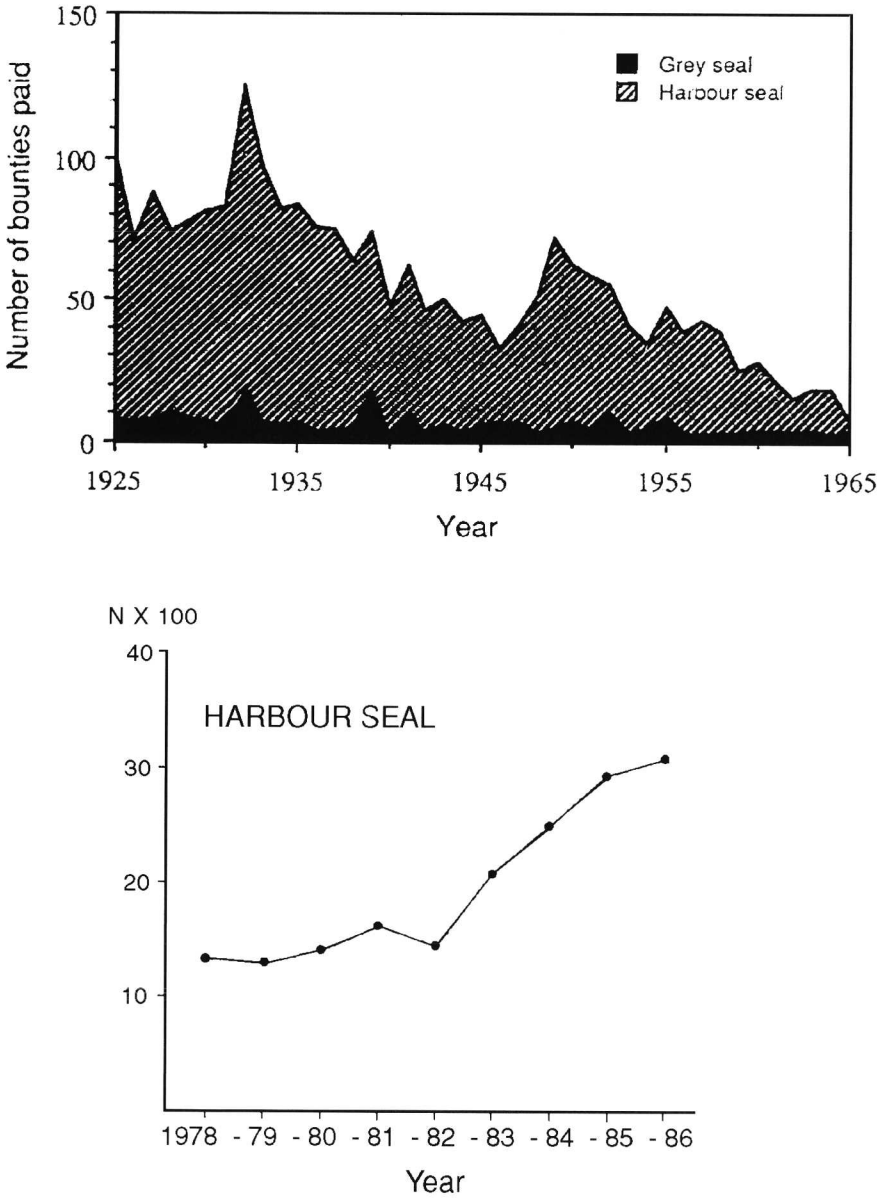

Fig. 4. Population dynamics of the gray and harbour seals from 1925 to 1965 as reflected by the number of bounties paid for killed seals (above). Increase of the harbour seal population along the coast of western Sweden from the late 70s to the middle of the 80s (below). Data from Härkönen (1987).
Dynamique des populations des phoques gris et des phoques veaux-marins de 1925 à 1965 appréciée au travers du nombre de primes accordées pour leur destruction (en haut). Augmentation de la population de phoques veaux-marins le long de la côte occidentale de la Suède de la fin des années '70 au milieu des années '80 (en bas) (données de HÄRKÖNEN, *1987).*

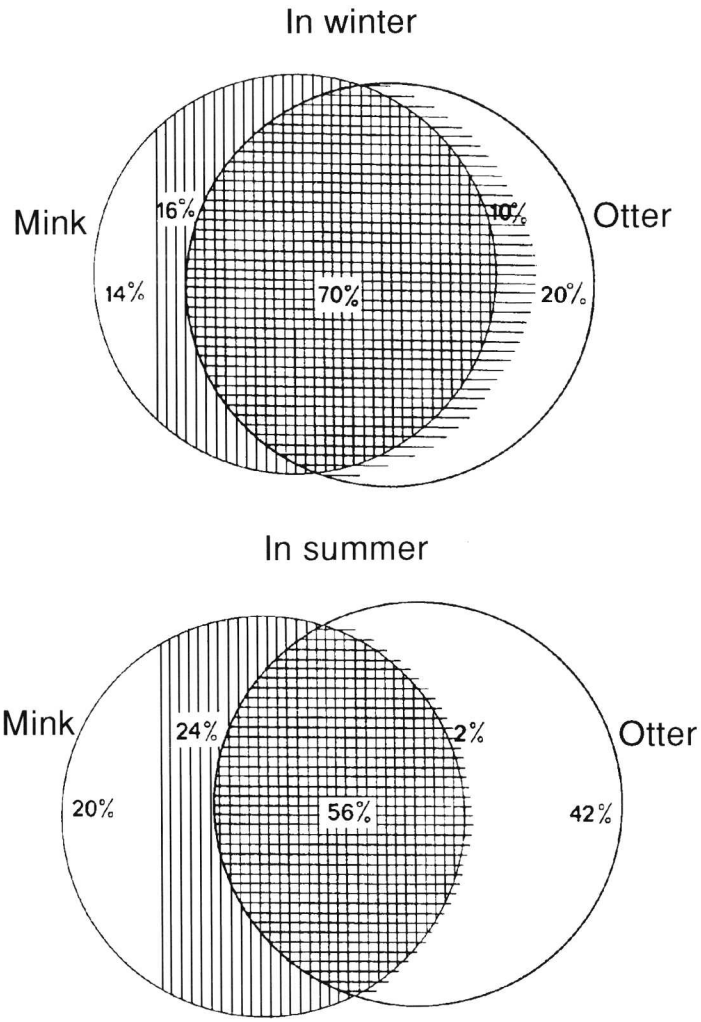

Fig. 5. Food relations between the otter and the mink in winter (above) and in summer (below) based on an analysis of 277 otter and 479 mink scats in summer and 432 otter and 264 mink scats in winter at freshwater lakes and streams in southern Sweden where the two mustelids coexist. Cross-hatched areas show the degree of food overlap ; open areas represent exclusive food and hatched areas unequal exploitation of shared food items ; vertically hatched areas indicate that minks dominate the shared food ; horizontally hatched areas indicate that otters dominate (from ERLINGE, 1972c).
Chevauchement alimentaire entre loutre et vison américain en hiver (haut) et en été (bas). Le régime est basé sur l'analyse de 277 épreintes de loutre et de 479 fèces de vison en été. Pour l'hiver, les nombres respectifs sont 432 et 264. La zone d'étude où coexistent les deux espèces est une région de lacs et de cours d'eau du Sud de la Suède. Les portions quadrillées indiquent le degré de chevauchement, les zones hachurées une exploitation inégale de ressources alimentaires partagées (traits verticaux : la part du vison est prépondérante ; traits horizontaux : celle de la loutre est dominante). Les zones vides correspondent à des ressources exclusives de l'une ou de l'autre espèce (d'après ERLINGE, 1972c).

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