

## The ecology and effects of the Great cormorant on fish and fishing

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### Summary

This report summarises the current knowledge about the Great cormorant *Phalacrocorax carbo sinensis* in Sweden. Except for a presentation of the cormorant, and its distribution and history, this work emphasises on the ecology of the cormorant and the man-bird conflict.

In Sweden the cormorant is found as a breeding species in lakes and shallow coastal areas up to around latitude 60°N (1995). A few small colonies or single pairs breed north of latitude 60°N in the Baltic Sea. The core-area of distribution of Swedish cormorants is the southern part of Kalmar sound, where the cormorant became established in the late fifties after having been absent as breeding species for almost 50 years due to human persecution. Until around 1985 the number of cormorants in Sweden remained very low but during the following 10 years a rapid increase occurred. This rapid increase in numbers of cormorants is synchronous for most of Western Europe, and the causes are believed to have to do with several conservation measurements taken in the seventies and eightieth (most important being the EU Bird directive in 1979), and changes in the fish communities due to eutrophication.

The cormorant is a generalist feeder which means that the prey species are the most common and accessible ones. In Sweden, cormorants are found in shallow-brackish waters and inland lakes. In these water systems perch *Perca pluvialis* and roach *Rutilus rutilus* are the most common fish species and also important prey for the cormorants. In coastal waters, during the breeding season of the cormorants, herring *Clupea harengus* and eelpout *Zoarces viviparus* are important prey species.

The conflict between man and cormorants (when competing for the same resources) can be divided into direct and indirect effects. Bite marks on fish and bird consumption of fish in fishing gears can be regarded as direct effects. To indirect effects belongs long-trend changes in fish communities due to cormorant predation.

Bite marks on fish in fisherman's gears occurs locally in Sweden and at certain times of the year. In areas where a documentation and quantification has taken place (inland lakes in the landscape of Skåne and Östergötland, brackish water areas in northern Kalmar sound and certain areas of lake Vänern) the amount of injuries can at the moment be considered fairly low. Only in Lake Vänern and Lake Roxen (Ög), sometimes, a higher amount of the fishermen's landings are injured in such a way that fish cannot be sold. Large-scale changes of the fish populations due to cormorant predation has not been documented in Sweden but theoretical models support the idea that large seabird colonies possibly can affect fish densities close to breeding colonies. Changes in the behaviour and the distribution of fish is also a possible response of fish close to large cormorant colonies, where predation pressure can be extensive.

Some fishermen regard the cormorant predation on eel as a problem. The eel has a high economic value and is an important source of income for some fishermen in the south and middle parts of Sweden. The extent of cormorant predation on eel is unclear but, in relation to other prey-species, eel is not very important in the cormorant diet. The immigration of young eel to the Baltic has decreased during the last decades without satisfactory explanations. It can not be overseen that additional predation/withdrawal of eel can further lower the already small population of eel in the Baltic. The commercial fishery for eel is furthermore already dependent on 'catch and release'.

The substantial increase in numbers of cormorants during recent years has now partially come to halt. Reasons to the slowing up in population development could be competition for food, limiting factors in the wintering areas, lack of suitable breeding grounds and/or human persecution at the breeding colonies.

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