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The importance of the Bay of Torslandaviken as bird habitat in southwestern Sweden

This bay is situated in a migration corridor passing the Swedish west coast from the the central Swedish lakes in a north east - south west direction towards northern Denmark indicating importance to birds from northern Fennoscandia (i.e. the isolated Swedish population of Smew *Mergus albellus*). On the Swedish west coast, this species has its most frequented resting and wintering site in Torsviken. Adjacent parallel migration corridors are passing the Swedish west coast across the northernmost part (the Strömstad region) towards the Norwegian south coast and across the southern part of the West coast (from Getterön and southwards) in a more east - west direction. This means that most bird species do not migrate along - but across - the Swedish west coast. And because of this, resting places in the three different migration corridors can not substitute each other. But at the same time, coastal resting areas representing considerably different climatic conditions along a migration route are of great importance.

In the central migration corridor, three important coastal resting areas were identified in studies performed from the early 60's at the University of Göteborg (organized by the author): (1) along the southern coast of the island Orust, (2) Nordre älvs Fjord, and (3) Torsviken. No. 1 was most important during autumn and no. 2 during spring migration. However, considerable displacements in the utilization of the areas were noted in the early 70's, when Nordre älvs fjord began to lose its importance to benthos-feeding diving ducks. Later investigations at the end of the 80's also showed that no. 1, the Orust area, had lost its importance to several resting species. At the same time, the importance of Torsviken had increased. These changes demonstrate clearly, how important different alternating resting places are in a migration corridor in relation to both short-term and long-term environmental changes.

The long-term changes in habitat utilization can be related to changed treatment of waste water. The benthic fauna of invertebrates in the shallow marine *Macoma*-community, which earlier formed the principal food of diving ducks, declined when waste water purifying plants reduced the outflow of coarse organic material in the estuaries in the early 70's. This especially affected the Tufted duck *Aythya fuligula*. In this way Nordre älvs fjord has lost its importance even to other ducks like the Golden-Eye *Bucephala clangula*.

During the 80's, the reduction of coarse organic material to solute nutrients of especially nitrogen proved to further affect the marine resting areas negatively. Since nitrogen is a limiting nutrient in the marine environment, increased outflow of this matter has increased the primary production of especially green algae. The resulting overgrowth of this production has strangled the meadows of especially eelgrass *Zostera marina*, of which both vegetative parts

and seeds has earlier been favoured food of swans, coot and diving ducks. In this way area No. 1 has lost its earlier importance.

The areas No. 2 (Nordre älvs fjord) and 3 (Torsviken) are situated in the two estuaries of the two branches of the river Göta älv. Because of the location of a large purifying plant (> half a million people) in the river mouth of the estuary of Torsviken, solute nutrients, especially of nitrogen, from the whole Göteborg region are passing the Bay of Torsviken. The nutrient-rich low-salinity water in Torsviken has favoured a high production of several species of submerged seed-plants, like *Potamogeton pectinatus*, *P. filiformis*, *Ruppia maritima* and *R. cirrhosa*, together with some species of Characeae. The high production of seeds and fruits in this brackish environment has attracted seed-eating diving ducks like Golde-Eyes and Pochards *Aythya ferina*. In this way the largest moulting site of Golden-Eyes on the Swedish west coast has been removed from area No. 1 to area No. 3 (Torsviken). This bird habitat is unique on the Swedish west coast and explains why so many bird species visit this site.

The local authority (Länsstyrelsen i Västra Götaland) argues that only one estuary, No. 2, - which is not threatened by exploitation interests - needs protection, in contrary to the ecologically more valuable Torsviken, where the Harbour company wants to deposit contaminated mud, and which is thus not considered to have sufficient high ornithological values. To support this remarkable evaluation, the occurrence of species like Ruff *Philomachus pugnax* and Whooper Swan *Cygnus cygnus* have falsely been transferred from Torsviken to Nordre älvs fjord. It is also asserted that a locality does not need protection if an occurring bird species is found in another protected place. Finally, the local authority considers that the conditions of the birds are favoured if one fourth of their productive aquatic habitat is filled and eliminated with toxic mud.

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