Fish Migration in the Transition Between Salt and Freshwater

Zwanette Jager,
RIKZ Haren, NL

Introduction

The fish that migrates between salt and fresh water is summarized by the term diadromous fish. These include the anadromous species, which migrate from the sea to fresh water for spawning, and the catadromous species, which spawn in the ocean or at sea and migrate towards freshwater as a juvenile. Four out of 11 diadromous fish species have already disappeared from the Dutch fish fauna (a.o. sturgeon and allis shad), and 5 others are on the red list of the Trilateral Wadden Sea with the status vulnerable or susceptible (a.o. sea trout and twaite shad). The access to the spawning areas and habitat loss are at present the main bottlenecks in the life cycle of these species. However, pollution (especially in freshwater) may also be a relevant factor.

Statement of Affairs in the Northern Netherlands

Fish migration between salt and freshwater was studied as part of the RIKZ-project "Gradiënten" (the restoration of estuarine gradients). The report "Visintrek Noord-Nederlandse kustzone" (Jager, 1999) presents an overview of the issue, concentrating on the coastal area of the northern Netherlands. The report attempts to approach the fish migration in the context of the entire catchment basin.

There are a total of 55 transitions between salt and freshwater along the northern coast of the Netherlands, of which only one is still relatively undisturbed, namely the Ems-Dollard. The others are separated by dikes, dams, sluices or pumping stations, through which fish cannot pass. Coming from the sea, the barrier between salt and freshwater forms the first bottleneck. A considerable improvement in the passage between the water bodies may be realized with relatively simple measures. Following this, attention should be given to the adjoining fresh waters: are there suitable habitats present, can they be reached by the fish, and is the water quality adequate? The eventual aim is that the life cycle of these fish can be completed without problems.

The hinterland is not suitable for all diadromous fish species at every fresh-saltwater transition. The report indicates which transition point has a potential for the relevant species. This is merely based on expert judgement, as the historic knowledge of the presence of these fish is mostly limited.

Some of the diadromous species that have disappeared will not return, even if the situation is improved, because the populations have become extinct in northern Europe. However, the declining populations of other species may be preserved if the proper measures are taken.

Diadromous Fish Inventories

Two other fish-issues ('fish-ues') were addressed as a part of the project of "Gradiënten" in 1999:

1. the sampling of glass-eel and sticklebacks at the outside and inside of the sluice at Nieuwe Statenzijl. The results of 1999 indicated very unambiguously that the sluice is a firm barrier for these species, and further sampling in 2000 is therefore not required. The next step will be to open the communication with the Water Board, responsible for the management of the sluice, to decide on measures that can be taken.
2. the occurrence of diadromous fish in the Ems-Dollard. Monthly surveys were carried out in 1999 at one location in the Dollard. The most interesting result of these surveys was the catch of twaite shad (*Alosa fallax*) of less than 10 cm length from August to November. Were they born in the Ems estuary? We don't know, but are eager to start a pilot study to find out.

In 2000, the Dollard survey will be continued. Other data-sources will also be explored. The results and combination of all items should eventually lead to a monitoring design that can be applied to the whole (Dutch) Wadden Sea.

Fish Migration Forum

In the mean time, a working group with participants from a diversity of Dutch organizations was formed which discusses several fish-migration projects in the northern part of the Netherlands. One construction, allowing stickleback and glasseel to migrate toward fresh water, is already operative on the island of Texel and a new one of similar design will be constructed on the mainland in the Delta dike at Roptazijl near Harlingen in 2000. At the

same time, adaptations will be made in the hinterland waters to facilitate the transit from migrating fish from the Roptazijl catchment to the entire Frisian catchment.

Integrated Water Policy and Management Context

The attention for and awareness of the fish-migration problem is still increasing and is very much supported by the recent embedding of the estuarine restoration theme in growing numbers of management documents, e.g. 4th Water Policy Report, Quality Status Report Wadden Sea, Management Plan Wadden Sea. It also deserves attention at the next Trilateral Governmental Conference in 2001.

Reference

Jager, Z., 1999. Visintrek Noord-Nederlandse kustzone. Report RIKZ-99.022 (in Dutch).

Dr. Zwanette Jager
Project leader "Gradiënten"
National Institute for Coastal and Marine Management/ RIKZ
Postbus 207
9750 AE Haren
z.jager@rikz.rws.minvenw.nl