Ad Hoc Review Group

IP(06)12 FINAL

Implementation Plan

European Union (Denmark)

1. Introduction

1.1 The National management Plan for Salmon in Denmark

In 2004 the Danish Forest and Nature Agency in co-operation with the Danish Institute for Fisheries Research introduced/published the National Management Plan for Salmon (in Danish, ISBN:87-7279-589-1, **http://www.skovognatur.dk/Udgivelser/Tidligere/2004/laks.htm**).

The objectives of the management plan is: 1) to re-establish the number of wild salmon spawners in the present rivers with wild salmon to at least 1,000 spawners in each river; 2) in the near future to re-establish wild salmon in the other rivers where salmon today are extinct. But, no time limits are set.

1.2 The salmon resource

Original there were nine river-systems with wild salmon in Denmark: the rivers Gudenå, Storå, Skjern Å, Varde Å, Sneum Å, Kongeå, Ribe Å, Brede Å and Vidå.
River Gudenå goes to the Kattegat and the other rivers go to the North Sea.

To day there are only original, wild salmon in rivers Storå (catchment area 1,100 km2, mean annual flow 16 m3/sec), Skjern Å (catchment area 2,490 km2, mean annual flow 37 m3/sec), Varde Å (catchment area 1,090 km2, mean annual flow 16 m3/sec) and Ribe Å (catchment area 960 km2, mean annual flow 12 m3/sec), confirmed by comparing genetics from old scale samples with present fry from the rivers. Very little is known about the sizes of the spawning stocks at present, but it is estimated that there are less of 1,000 spawners in each river.

Very little is known about the original status of salmon in Danish rivers, but fisheries, bad spawning and degrading of growth-up areas (e.g. straightening, sand transport and acid/ochre water in combination with obstacles (mostly fish farms and hydro plans) is considered to be reasons for the reduce and destructions of the salmon stocks. But, the impact from fisheries is difficult to evaluate.

In Ringkøbing Fjord and the tributary Skjern Å an estimated spawning run in 1907 was 1,162 mature salmon of which 583 were caught (mean weight 8.45 kg). In 1980 and 1981 the estimated minimum spawning run was only 18 individuals.

In Randers Fjord and the tributary Gudenå (catchment area 2,600 km2, mean annual flow 32 m3/sec) there are some sporadic catch data from 1793 – 1831 with mean annual catches of 14½ tonnes and 2,500 specimens with a mean weight of 5.8 kg. From 1853 to 1913 we have annual catches from the only left catch facility at Frisenvold, about 10 km upstream the river outlet into the fjord. The annual catches decreased from about 1,000 to about 390 spawners (years 1903 to 1913 when Frisenvold was closed). A few years after the establishment of the Tange Power Station in 1920 the salmon in river Gudenå stopped existing. The last salmon was caught in 1928. We don't have information about fishing mortalities at that time in the fjord and river; the fjord was navigable, and in the river the catch facilities were forced to let smaller boats pass the facilities. Therefore, it is reasonable to state that the un-fished spawning population was several thousand specimens.

The first salmon rehabilitation plan in corporation with anglers was issued in 1993 to release salmon from exogenous sources in Sweden, Scotland and Ireland. Foreign strains were

stocked in all original salmon rivers except in the river Skjern Å which was considered to be the only salmon river in Denmark with wild salmon. However, later genetic survey of all Danish west coast salmon populations demonstrated the occurrence in small numbers of indigenous salmon in rivers Storå, Varde Å and Ribe Å.

Therefore, the next step was to get rid of the exogenous genetic material from rivers Storå, Varde Å and Ribe Å.

To gain insight into the possible interactions of populations (i.e. levels and causes of hybridisation or lack of same) samples of fry and adult Atlantic salmon have been collected since 1999. Microsatellite data from these samples is compared to genetic data from baseline samples consisting of old scale samples of the indigenous populations collected in the beginning of the 19th century, and with samples from the exogenous populations from the Danish hatchery producing stocking material to the rivers. Frequency of occurrence and proportion of hybridisation among fry and adults is estimated and used to make inferences about the mechanisms responsible for reproductive isolation among salmon populations. Each year and autumn the local anglers fish for mature salmon in the four rivers by electric fishing. The salmon are tagged, kept in tanks and tissue samples are sent to DIFRES and analyzed. Indigenous salmon are used for offspring and stocking (i.e. half- and one year old parr, and none-indigenous salmon are discarded.

1.3 Present stockings and fisheries

In the river Gudenå stocking with smolt takes place with fish from the Swedish river Ætran (on the west coast to the Kattegat) since the beginning of the 1990ies, but in the near future only salmon from river Storå shall be liberated, but no time limit is set. This is more urgent if/when a solution concerning the power station has been implemented. In 2006 a total of 120,000 smolts were liberated and this figure is the normal stocking number. These stockings can be considered as a sea-ranching project, and some thousand salmon a caught in Kattegat, the fjord and river, but no detailed statistic is available. A very little but insignificant spawning take place in the river below the power station and in some tributaries, but the outcome is very uncertain. Some sporadic salmon pass the present fish ladder and there are indications of some spawning in tributaries, but in very little number and the present results indicate hybridization with sea trout.

In the other rivers only F1 off-springs are liberated; in 2006 165,000 half-yearlings and 226,000 one year old salmon.

In all rivers only sport fishing take place, in two rivers (Storå and Ribe Å) all caught salmon must released back to the river and the other rivers there are certain limits in numbers to take. In the estuaries (i.e. Nissun fjord and Ringkøbing fjord; Storå and Skjern Å) no salmon fishing is allowed and there is no legal fishing for salmon in the Wadden Sea (i.e. North Sea) on salmon from the four rivers going to the Wadden Sea. In the long estuary (river Gudenå) there is a certain but unknown commercial and recreational fishing for salmon.

1.4 Authorities in connection with the salmon management plan

The Ministry of Food, Agriculture and Fisheries and the Ministry of Environmental Protection (I.e. the Danish Forest and Nature Agency) are responsible for the implementation of the management plan for salmon in Denmark in co-operation with the local water authorities. The plan describes what should be done, but no time limits are set.

2. Status of present stocks

Every river is monitored every 7'th year by electric fishing in connection with monitoring of sea trout stocks, but only in smaller streams up to about 5-7 m wide and therefore not at stretches where most of the salmon are spawning. In connection with NOVANA (The national programme for surveillance of the Aquatic Environment) the spawning run in river Skjern å has been estimated since 1993 by the local water authority, but this activity stopped in 2005. In river Skjern Å and river Storå the smolt and sea trout production has been evaluated in some years (by help of rotary screw traps). The smolt production in Skjern Å in 2002 was about 26,000, and in 2005 the smolt production was about 27,000 smolts (8,000 wild smolts and 19,000 F1 smolt stocked as parr). The present spawning run in river Skjern å is about 1,100 spawners of which about 370 are wild. In 2007 the salmon smolt production (e.g. wild smolt and smolt output from parr stockings) in river Storå was about 4,600 wild smolts and 13,200 F1 smolts stocked as parr. The wild spawning run in this river and in the rivers Varde å and Ribe å is unknown.

At present there is no intention to estimate the spawning run in all rivers in the future.

3. Threats to stocks and current management measures

3.1 Predators

Cormorants (and some other fish eating birds) feeding on smolt in rivers and estuaries are considered to be a real threat for the management plan.
In river Skjern Å the mortality of the smolt in the river was 9 % and the mortality in the fjord 49 %; primarily because of predation from cormorants and secondarily some other fish eating birds, so that the total mortality of migrating smolt in the river system and fjord is about 53 %. The smolts were tagged by radio and acoustic tags in the surveys.

It has been estimated that about 4.1 % of the smolt return as mature fish from the sea to the fjord.
Without predation from cormorants the spawning run from 27,000 smolts would have been about 1,100 potential spawners, of which 330 derives from natural spawning and 780 derives from stocked F1 salmon parr. With predation from cormorants the present spawning run is about 525 spawners of which about 155 derives from natural spawning and 370 from stocked F1 salmon parr. Therefore we are long from the goal of 1,000 wild spawners in this river.

In 2007 the salmon smolt production (e.g. wild smolt and smolt output from parr stockings) in river Storå was about 4,600 wild smolts and 13,200 F1 smolts stocked as parr. The mortality of the smolts in the river was 9 % and the mortality in the fjord 60 %; primarily because of predation, so that the total mortality of migrating smolt in the river system and fjord is about 64 %. The present spawning run (4.1 % return rate) from the production of 17,800 smolts is about 256 spawners of which 66 derives from natural spawning and 190 from stocked F1 salmon parr. Therefore we are long from the goal of 1,000 wild spawners in this river.

Nothing is known about the mortality from cormorant in the other salmon rivers and no projects will be initiated in the future.

The predation from cormorants therefore represents a major problem for fulfilling the management plan. The cormorant is a protected species (i.e. Bird Directive) and the national management plan for cormorants in Denmark only describes that the present numbers of breeding birds shall not increase in the future and when and where there is a documented

problems for salmon (and trout) controlled licenses for shooting the cormorant and reducing there breeding possibilities in special areas can be given.

3.2 Habitats
Bad spawning and growth-up areas (e.g. straightening, sand transport and acid/ochre water in Danish rivers in combination with obstacles (mostly fish farms and hydro plans) are considered to be a general problem and a real threat for the salmon management plan. At present there is no detailed plan to meet this problem but local action is taken in many smaller streams.

3.3 Other Threats
Poaching in estuaries and rivers presumably takes place but the size is unknown and no action will be taken in the future.

4. Management approach

4.1 Management of fisheries
The present management of fisheries is described in 1.3 and will continue at the same level.

4.2 Protect and restore salmon habitat
The national management plan for salmon in Denmark recommends the following:
1) In the four rivers with wild salmon proposals of projects shall be implemented to secure at least 1,000 wild spawners annually in each river; this has not been achieved and no time limits has been set;
2) In the other four rivers (no wild salmon today) proposals of projects shall be considered to re-establish wild stocks using off-springs from the other four wild salmon rivers; this has not been achieved and no time limit has been set;
3) In the river Gudenå going to the Kattegat a solution (e.g. removing the dam or constructing a by pass) concerning the biggest hydro power station in Denmark has to be found in the future; The Parliament has recently stated that the present situation with no solution shall continue until year 2012 and a solution shall be found before year 2015 when implementing the Water Directive;
4) In the eight rivers going to the North Sea detailed projects shall be set up to physical restore the rivers but concentrate in the four rivers with wild salmon; in many streams weirs, mostly connected with fish farms, have been removed, and in river Varde å a hydro power plan shall stop in the coming years (no details) and the water send back to the original river stretch. A
All the actions taken in all rivers derive from implementing the Water Directive in year 2015;
5) Other threats to the salmon shall be identified, effects from fish farming shall be minimized in the future; i.e. reducing the number of fish farms (a slowly process) and reducing grid size at water intake (from 10 to 7 mm in year 2005) and reducing the amount of intake of water (e.g. nearly re-circulating fish farms) and removal of obstacles or/and establishment of by passes, but no details at present, and;
6) The effects from the projects shall be implemented, but no time limit has been set.

4.3 Management of aquaculture, introduction and transfers
In Denmark there is no salmon production in cages and all freshwater fish farms in streams produce only rainbow trout and a very little number of trout for stocking. Fish disease from fish farming might represent a potential problem for wild salmon but at present there is no recognized problems.

Effects from fish farming shall be minimized in the future; i.e. reducing the number of fish farms and reducing grid size at water intake and reducing the amount of intake of water (e.g. nearly re-circulating fish farms) and removal of obstacles and establishment of by passes, but no time limit has been set.

4.4 Further actions to be taken
Nothing