IP(08)25

Fisheries Management Focus Area Report

European Union - Sweden

Focus Area Reports on Management of Salmon Fisheries – Sweden

1. Introduction

Several national authorities including the Swedish Board of Fisheries, the Environment protection Agency and the concerned County Administrations participate in the ongoing management and monitoring of rivers with wild salmon production on the Swedish west coast. In addition several local organisations and NGOs take active part in the ongoing rehabilitation and management of the rivers.

The status of the rivers with Atlantic Salmon populations has been described in detail in a report from 1999 (Fiskeriverket information 9:1999), in the revised Swedish national implementation plan for the period 2007 - 2011 and in our Focus Area Reports (fisheries management and habitat restoration) to NASCO in may 2009 .

Specific measurements for each individual river with natural production of wild salmon have been recommended and a comprehensive long term national programme has been developed and has started to be implemented.

A prerequisite for local organisations to receive governmental funding for habitat protection and restoration in a river is that the estimated potential should at least be 1000 wild salmon smolt per year. Many of the smallest rivers are being biologically restored in conjunction with the support of ongoing long term liming programmes. A lot of voluntary work and funding from various non - governmental funds are also important for many local projects. These ongoing project and planned work is mainly related to habitat restoration, construction of fish ladders and buying out of various hydro-power stations and dams.

A significant part of the Swedish rivers on the west coast are utilized for both hydro-power and for agriculture. The water quality is heavily affected by acidification but the ph in most of the rivers has been kept on an acceptable level through various liming programmes. In addition the water quality is also affected by discharges from industries and some river areas have been destroyed because of various physical constructions used for water canals to supply important agriculture areas.

One of the most serious threats to some of the smallest wild salmon populations is the parasite *Gyrodactylus salaries* which has been spread in most of the Swedish Atlantic salmon rivers. Some problems for the juvenile salmon have been created by deforestation and cleaning up of old water canals which especially have had a negative effect for the smallest rivers during dry periods.

Regulation of the fisheries has since the 1970s gone from a relative high amount of mixed stock fishing until the situation today with nearly no mixed stock fishing.

2. Description of the salmon stocks

There are 23 rivers producing wild salmon on the Swedish west coast. The total yearly production has 1999 been estimated to about 200.000 smolts per year and the maximum potential has been assessed to be in the range of 300.000. The present production is lower than the estimated from 1999, see FAR - Habitatrestoration.

Many of the rivers are very small and it is only 12 of them with a yearly potential production of more than 5000 smolt. Some of these rivers is especially interesting in relation to the increased development of tourism based on various fishing activities.

In the three of the rivers; river Lagan, Nissan and Göta älv comprehensive stocking program is ongoing in order to compensate for the damage from water-power stations on the earlier natural smolt production. The total amount of released salmon smolt is 150 000 per year, 90 000 in river Lagan, 30 000 in river Nissan and 30 000 in river Göta älv.

Figure1. Present distribution of salmon in rivers at the Swedish west coast. The map also shows where infection of G. salaris had been observed in October 2006.

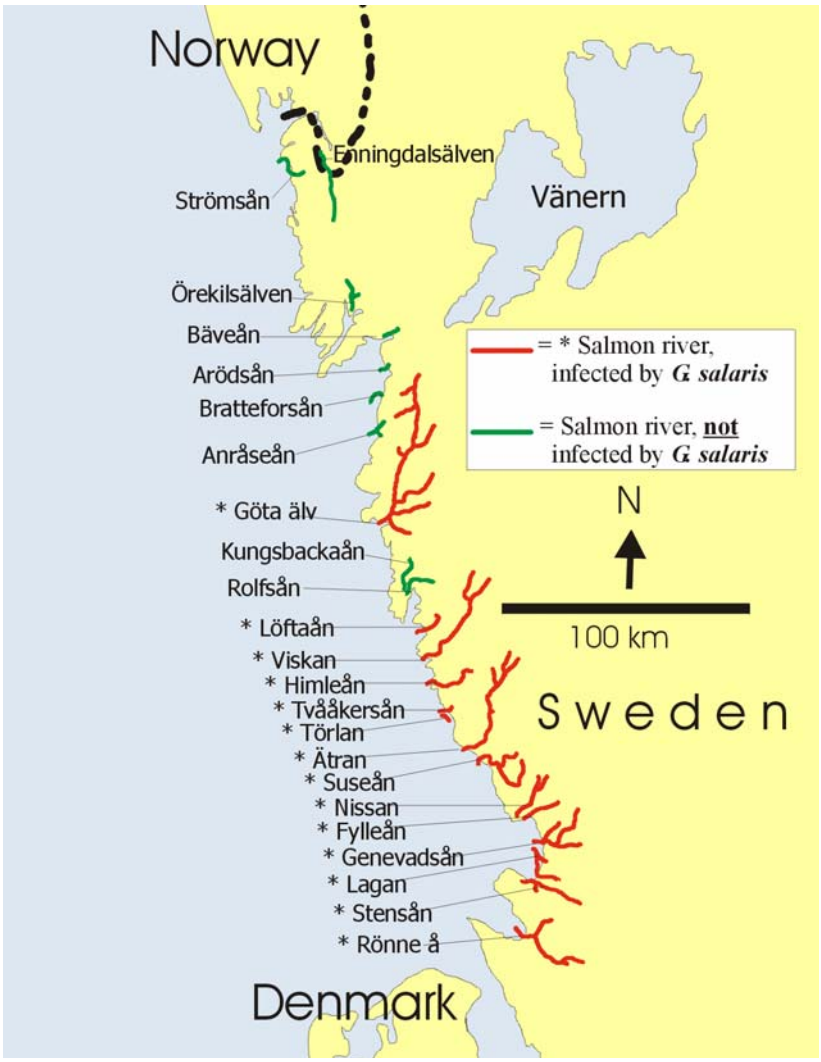
Norway
Enningdalsälven
Strömsån
Vänern
Örekilsälven
Bäveån
Arödsån
Bratteforsån
Anråseån
* Göta älv
Kungsbackaån
Rolfsån
* Löftaån
* Viskan
* Himleån
* Tvåkersån
* Törlan
* Ätran
* Suseån
* Nissan
* Fylleån
* Genevadsån
* Lagan
* Stensån
* Rönne å
= * Salmon river, infected by G. salaris
= Salmon river, not infected by G. salaris
N
100 km
Sweden
Denmark

Table1. Present distribution of salmon in rivers at the Swedish west coast. Estimated natural smolt production 1999 and the amount of reared and released smolt.

Rivers	**Natural Production 1999 1) Smolt**	**Area** (ha)	**Smolt/100** M^2	**Compre-hensive Reared smolt**	**Total smolt Natural + reared**
Enningdalsälven	**300**	1,7	1,8		**300**
Strömsån	**300**	1,1	2,9		**300**
Örekilsälven	**21200**	23,0	9,2		**21200**
Bäveån	**200**	0,5	4,0		**200**
Arödsån	**500**	1,0	5,3		**500**
Bratteforsån	**600**	2,1	2,9		**600**
Anråse å	**300**	2,2	1,4		**300**
Göta älv	**14900**	17,2	8,6	**30 000**	**44900**
Kungsbackaån	**5100**	4,4	11,6		**5100**
Rolfsån	**3000**	3,1	9,7		**3000**
Löftaån	**2500**	1,0	25,0		**2500**
Viskan	**23000**	16,1	14,3		**23000**
Himleån	**4300**	3,6	11,9		**4300**
Tvååkersån	**1400**	1,2	11,7		**1400**
Törlan	**100**	0,9	1,1		**100**
Ätran	**37600**	54,9	6,9		**37600**
Suseån	**9600**	9,5	10,1		**9600**
Nissan	**8100**	10,9	7,4	**30000**	**38100**
Fylleån	**9500**	17,8	5,3		**9500**
Genevadsån	**17600**	13,9	12,7		**17600**
Lagan	**5000**	8,8	5,7	**90000**	**95000**
Stensån	**21300**	12,4	17,1		**21300**
Rönneå	**20000**	27,0	7,4		**20000**
Total	**206400**	234		**150000**	**356400**
Medium			8,8		

1) The estimated natural production 1999 has decreased – see the Swedish FAR-report regarding habitat protection and restoration

3. Fisheries, regulation and conservation limits

A few commercial fisheries occurs along the coast, while angling in the main method of fishing and nearly total concentrated to fishing in rivers. The fisheries on the Sweden west coast is not a mixed stock fisheries problem

The recorded coastal catch is made by commercial fishermen who are operating near the shore trap nets. The number of trapnets has decreased almost continually for a long period and only four gear were operating in 2008, one up from 2007 (Figure 2). Even though a number of commercial fishermen still have permits to use trap nets it is expected that they will disappear within a few years unless the catch levels and economy improves.

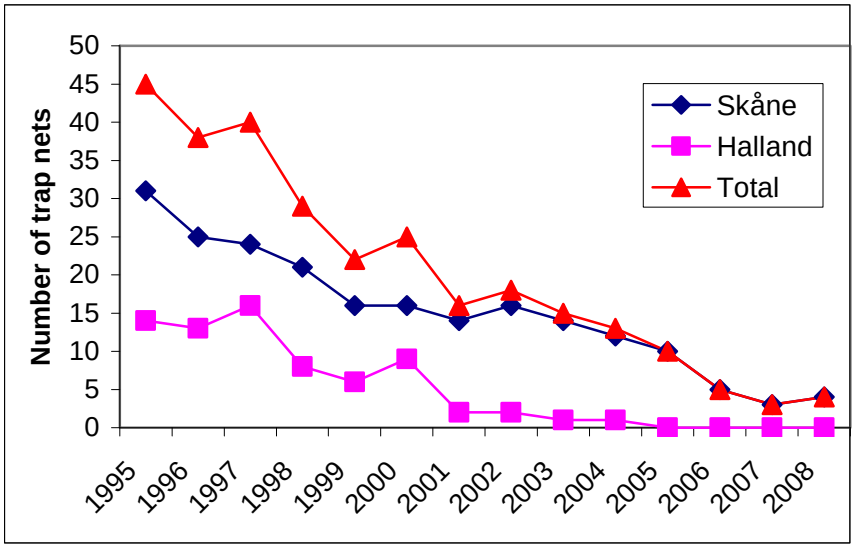

Figure 2. Development of the number of trap nets at the Swedish west coast in 1995 - 2008.

In three rivers a kind of traditional fishery with traps or net fishery for salmon is operating. One of this traps, Tullgrens mill in river Fylleån, was bought out by the local government in late 2008. No catch data are available from these small scale fisheries so they represent an unreported catch.

Angling in rivers has gradually increased its proportion of the total catch. From the beginning of 2003 the salmon fishery in rivers (National regulation) is closed in the period from 1 October to 31 March (earlier 1 October- 28 February).

To protect wild salmon populations and enhance production extensive measures have been undertaken to improve habitat and water quality in the rivers. The extent of protected areas has gradually been increased. In the year 1871 only one area existed on the west coast, and this area only extended 30 m out in the sea from the river mouth. In 1977 all of the salmon river mouths and estuaries were protected from fishing. Gradually the PA's have increased in extent. Today 91 protected areas exist on the Swedish west coast and the largest includes the effluents of three adjoining salmon rivers, a protected area comprising a length of 15 km along the

coast. The smallest protected area of a salmon river is 1 km along the coast. It has been shown that these protected areas at river mouths are effective in maintaining salmon population status (Degerman 2004).

No new regulations of the fishery have been implemented in the last few years. The last changes were introduced in the fishery in 2002. Fifteen new protected areas were established outside small sea trout rivers. In addition a number of existing protected areas outside individual salmon rivers were merged into larger units. For some of these larger protected areas, greater responsibility was given to county administrations to provide establishment of trap net fishery and net fishery in other parts of the areas.

No progress has been made regarding the setting of conservation limits. But in many rivers the organized owners of the fishing rights or the leasing organisation, often sport-fishing organisation, has more restricted regulations than the national rules and related to the actual stock size and ecology.

4. Catches of salmon

The salmon catch in 2008 was 18.4 tonnes and 3949 salmon. This catch weight was 11 % higher than that in 2008 of 16.4 tonnes and the catch in number was 8 % higher than the catch in 2007 of 3670 salmon. When compared to the five-year-average the catch level in 2008 was 1% higher in weight and 12% lower in numbers.

Catch composition

The proportion of 1 SW and MSW in the catches are given in the text table below. The proportion of grilse in numbers in the catch in 2008, 30%, was even slightly lower than the very low proportion in 2007 of 33%. This is lower than in any of recent years, Table 1 and Figure 2. Grilse weight have increased in 2008 in comparison to 2007 and in particularly when compared to 2006 when the mean weight of them was very low. Furthermore reared grilse with a higher weight than that of wild grilse make up a higher proportion in 2008 than previous years. Since a few years it has been decided to define fish with a weight of less than 3.6 kg as 1 SW fish. It is possible that this limit will have to be changed if the growth of salmon continue to be impaired compared to earlier.

Table 2. Number of 1 SW and MSW salmon caught in 2002-08.

Year	1 SW	1 SW	MSW	MSW
	No	Weight	No	Weight
2002	4733	12	2826	16
2003	2891	7	3214	18
2004	2494	6	2330	13
2005	2122	5	1770	10
2006	2211	4	1772	10
2007	1228	3	2442	13
2008	1197	3	2752	15

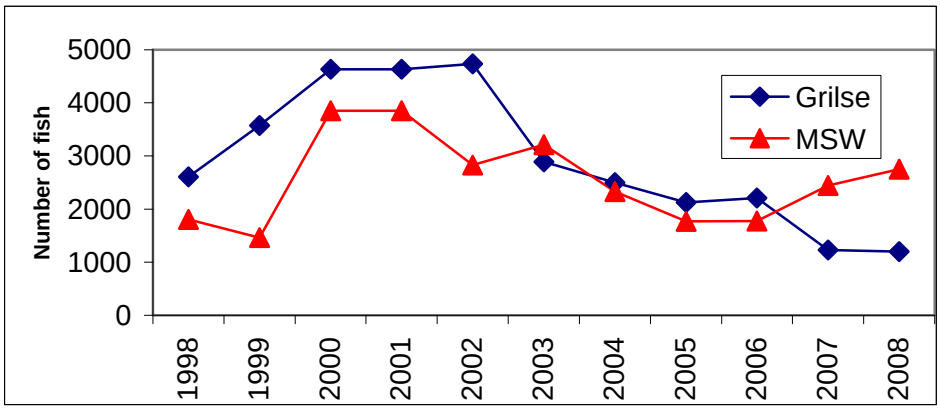

Figure 3. Number of grilse and MSW fish caught in 1998-2008.

Catch proportion Sea and rivers.

The proportion of the catch taken in rivers in 2008 was similar to that in 2007 and is now about 99%. The catch in rivers was 18 tonnes in 2008 and the coastal catch rounded off to 0 tonne (rounded off from 0.2 tonne). All coastal catch was recorded from commercial fishery with trap nets. In year 2007 the riverine catch was 16 tonnes and the coastal catch was 0 (0.2 tonnes). The estuarine catch is included in the coastal catch and the unreported catch in year 2008 was guesstimated to be 2.0 tonnes or about 10 % of the national catch.

Catch proportion, natural and reared smolts

Fish that originated from reared salmon smolts, released as a part of programmes to compensate for building of dams, made up as much as 78% of total catches in year 2008, this is higher than the level in previous years.

Table 3. Catch of salmon in tonnes by category of origin during 2002 to 2008.

Year	Wild	Tot. Far-med	Ranched	Total
2002	11	0	17	28
2003	6	0	19	25
2004	7	0	13	19
2005	7	0	8	15
2006	6	0	8	14
2007	5	0	11	16
2008	4	0	14	18

Tagging and marking
In total 153364 fish were tagged or marked during 2008. Starting in year 2005 all reared salmon and sea trout smolt must have their adipose fin removed before they are released. The same regulation has been implemented both in the Baltic and at the west coast.

5. Status of stocks

There are a number of substantial threats to the wild salmon in the area. The entire west coast area is acidified and mitigation through liming takes place in all rivers because the main streams of major rivers are not limed. There are only compensatory releases of salmon smolt in river Lagan, Nissan and Göta älv. The total amount of fish released in 2008 was 153 000 1 and 2-year-old smolt.

River Ätran has been established as the first index river on the Swedish west coast. The production of smolt is measured through the use of a smolt trap in the major tributary Högvadsån. The result from the investigations carried out during 2008 was a total number of 1775 salmon smolt. This amount was slightly lower than the level that was measured in 2007 (1836 smolt). Compared to the average in the preceding five-year-period it was an increase of 8 %.

The number of ascending adults at the trap in Högvadsån was only 159 grilse and 108 MSW salmon which mad up a total number of 268 fish. In 2007 the corresponding figures were 33 grilse and 132 MSW salmon. The very low proportion of grilse in 2007 was very unusual and a similar low level was has only been observed in 1978 when the Högvadsån was severely influenced by acidification and the freshwater survival that year was also extremely low which caused a low smolt migration to the sea in 1987.

Data on survival and exploitation rates are normally available from tagging experiments of reared salmon smolt in river Lagan, Nissan and to some extent also from Ätran. Unfortunately high quality data from the database are still not available but the quality of the collected data has improved during the last years.

Annual juvenile surveys by the use of standardised electro-fishing methods are carried out in most Swedish salmon rivers with a natural production of wild salmon. The data are collected in a national database (SERS) but these survey data has still not been used for our national contribution to the ICES Working Group.

The very high proportion (78 %, Tabel 3) of farmed salmon in the catches compared to the estimated proportion natural produced smolt (more than 60%, Table 1) compared to the total amount of smolt indicate important problems.

6. References

Degerman, E. 2004. Protection of Atlantic salmon (Salmo salar) by Marine Fishing Protected Areas (MFPA) in Sweden. Working report, OSPAR Commission for the protection of the marine environment of the Northeast Atlantic, 6 s.

Funegård. P. 2008 Swedish national implementation plan 2007-2011. Swedish Board of fisheries. 2008.

Karlsson, L. 2009. Salmon fisheries and status of salmon stocks in Sweden, National report to ICES. Swedish Board of fisheries.