ICES SGBALANST Report 2007

ICES Diadromous Fish Committee

ICES CM 2008/DFC:01

Ref. WGBAST & ACOM

Report of the Study Group on data requirements and assessment needs for Baltic Sea trout [SGBALANST]

By Correspondence

December 2007–February 2008

ICES International Council for the Exploration of the Sea

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Recommended format for purposes of citation:

ICES. 2008. Report of the Study Group on data requirements and assessment needs for Baltic Sea trout [SGBALANST], By Correspondence, December 2007 - February 2008. ICES CM 2008/DFC:01. 74 pp.

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Executive summary

The Study Group on data requirements and assessment needs for Baltic Sea trout (SGBALANST) was established by ICES at the 2007 Annual Science Conference, and has worked by correspondence between December 2007 and February 2008.

Information on methods used in monitoring recruitment in trout populations and catches of sea trout populations in individual countries was collected.

Together with Terms of Reference for a possible follow up meeting the group identified and suggests a number of possible improvements in monitoring.

Monitored sea trout populations at the parr stage in nursery streams is common to all countries, however with large variations in the intensity and frequency of monitoring both between and within countries. The necessity for monitoring is not recognised in all countries since some countries do not have a regular monitoring program, or finances to carry out monitoring. Parts of the monitoring of sea trout takes place as monitoring salmon populations, and the group finds that this will result in less precise estimates of sea trout recruitment, because of differences in habitat between the two species. The need for a common standardized method of monitoring is emphasised.

The importance of establishing Index Streams in all ICES subdivisions is stressed by the group. This would allow stock-recruit parameters to be followed precisely. At the moment only one index river with precise count of both smolts and spawners, but in additionally two streams some information on the number of spawners is available and smolt numbers are collected by smolt traps in a number of rivers.

Furthermore, a number of improvements are suggested. They include increased focus on streams with higher production, cooperation between countries with similar habitat characteristics, focused studies improving knowledge on survival from parr to smolt.

In two countries ongoing projects are expected to provide information on the importance of habitat availability in spawning and nursery areas to the production of smolt, and it is suggested that a model is developed.

Finally, the group finds that better knowledge on the sea-phase of the sea trout is needed, taking into account the varying life history of different strains of sea trout in the Baltic Sea.

The sea trout is only in a few areas being targeted directly by a commercial fishery. The species is caught in many different types of fishery in almost the entire Baltic area, either directly or as a bycatch in other fisheries. Only Russia has no fishery for sea trout, because the species is protected.

Information on catches is available from the larger part of the fishery with varying certainty and resolution in time. The group estimates information on catches coming from the commercial fishery to be most precise, together with information on river catches in some of the countries.

It is suggested that knowledge on catches in the non-commercial coastal fishery is improved, possibly by inquiries supplemented with field observations or voluntary reporting. Knowledge on catches as bycatch in other fisheries needs to be increased as well as knowledge on river catches and age distribution of spawners. It is suggested

that cooperation between countries and between fishermen and institutions monitoring the fishery is promoted.

The group suggests the following Terms of Reference for a possible follow up meeting:

- decide if the state of the trout populations justifies a need for assessment and advice on possible extended regulations
- assess the present status of the sea trout rivers related to the potential level of recruitment (e.g. on the basis of the highest documented parr densities (wild or reared 0+ parr) in each river).
- determine at what level of precision and on what populations (or ICES subdivisions) assessment is needed.
- determine what type of assessment tool (standard or Bayesian as with salmon) should be aimed for if appropriate taking into account both methods that may be used outside the Baltic and the assessment method used on salmon in the Baltic.
- Stock-recruit relations: select representative areas and types of river representing geographical area, i.e. index rivers
- determine what type of s-r relationship will be appropriate
- standardize data between s-r rivers
- identify and standardize variables needed to extrapolate results from index populations to remaining systems and populations
- assess the influence from resident trout.
- assess the importance of stocked trout
- assess the influence from different fisheries
- draft proposals on additional regulatory measures, if appropriate

1 Introduction

Salmo trutta or sea trout is the sea migrating form of brown trout. The species is naturally distributed in North and Western Europe from the White Sea to Northern Spain, including the entire Baltic Sea area.

Sea trout spawn in gravel in their home river or stream, often in the upper reaches or in smaller tributaries, where the nursery areas of trout are also found as opposed to salmon more frequently found in larger parts of the rivers (Figure 1).

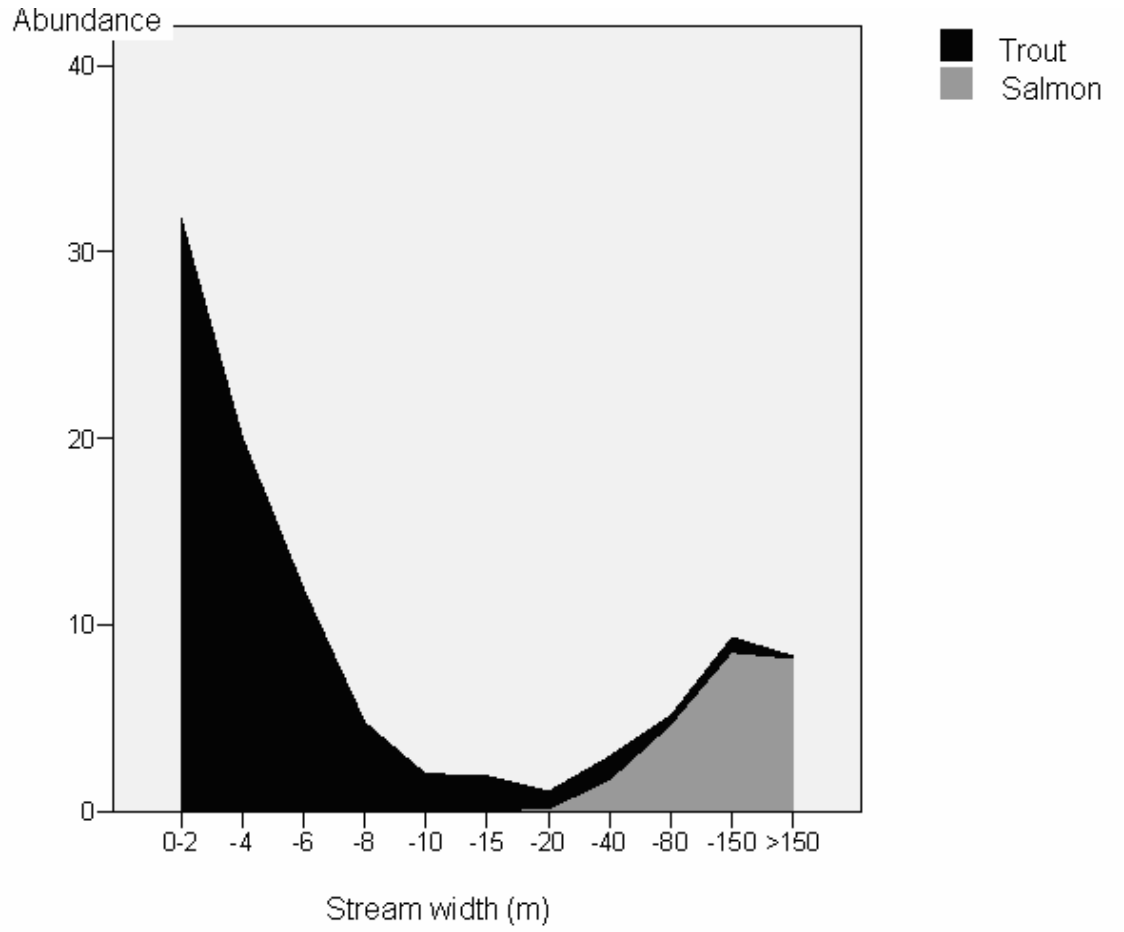

Figure 1. Median abundance (ind/100 m²) of trout and salmon versus stream width (m) in Swedish rivers in ICES Subdivision 30 and 31 (in 1990–2006) (Data from the Swedish Electrofishing RegiSter (SERS)).

Spawning takes place in autumn – winter depending on latitude and the fry emerges from the gravel during the spring or early summer also depending on latitude. After 1–5 years the young sea trout undergoes smoltification and migrates from the streams as smolts to grow up in the sea, either in coastal areas close to the home stream, along the coastline in a larger area or as long migrating trout in the open Baltic Sea. The trout reaches sexual maturity and returns the home stream to spawn after between 6 months and 5 years (Muus and Dahlstrøm, 1978).

In a Workshop on Baltic Sea trout in Kotka 31 May–2 June 2006 it was recognised that natural sea trout stocks have declined dramatically from their original abundance (Heinimaa *et al.*, 2007).

Trout populations have declined especially in the Finnish coastal area and wild populations are nowadays extremely endangered. At the same time also returns from sea trout stockings have declined and they have reached a level where they are not profitable. The phenomenon seems to be enlarging from the Finnish coast to different areas of the Baltic Sea.

In other areas of the Baltic Sea the natural stocks are in better condition. This is the case along the coast of the Main Basin in Denmark and Sweden.

At the First International Sea Trout Symposium in Cardiff, Wales in 2004 it was declared that immediate action should be taken to protect and conserve sea trout stocks throughout their geographical range (Harris and Milner, 2006). It was also recognized that more detailed research information is needed as the exceptional variety of trout life histories and habitat use adds significantly to the biodiversity of many types of waters. In the case of sea trout this includes rivers, lakes, estuaries, coastal waters and a huge network of otherwise neglected small coastal streams. Sea trout populations are thus particularly valuable in assessing ecosystem health in the context of the Water Framework Directive.

In the Gulf of Bothnia area the production potential and status of 51 populations in Swedish rivers is very uncertain, while it is at a low level in 3 of only 5 Finnish rivers with sea trout populations (ICES, 2007). The available knowledge indicates that in many rivers only a few spawners enter the rivers and electrofishing surveys in the rivers indicates considerable decreases in parr densities.

ICES 2007 concludes that the main reason for the decline is a too intensive fishery, poor habitat quality in rearing streams and restricted access to spawning areas. In the fishery, the trout are caught largely as bycatch in gillnet fishing for whitefish.

In the Gulf of Finland there are 100 rivers and streams with trout populations. The situation is reported to be similar to that in the Gulf of Bothnia. Also in this area habitat degradation and over exploitation are key factors, especially in the Finnish fishery for whitefish and pikeperch. In addition to this, part of the fish is caught in the off-shore fishery before reaching maturity (ICES, 2007).

In the main Basin there are 773 rivers and streams with trout populations, about half of them being wild. The status of the sea trout populations is known only in some countries. In general, the production is much lower than the estimated potential production in a large majority of the streams. While the naturally produced smolt numbers in some areas have increased somewhat in recent years, probably due to improvements in water quality, habitat conditions and reduction in the number of dams and other obstacles in the streams, in several areas restrict populations.

While the populations of sea trout are under varying but in some areas certainly a heavy pressure, especially in the northern parts of the Baltic, a considerable professional fishery is still carried out. The total sea trout catch in the Baltic Sea was 826 tonnes in 2006. Except for the years 1996–1997 and 2005, catches have been at a level of 1,000–1,300 tonnes (ICES, 2007).

The Main Basin is the most important area for sea trout catches where approx. 80% has in recent years been caught by Poland.

1.1 Terms of Reference

At the 2007 Statutory Meeting, ICES made a resolution (Res. 2007/2/DFC01) that the Study Group on data requirements and assessment needs for Baltic Sea trout [SGBALANST] (Chair: Stig Pedersen, Denmark) will be established and will work by correspondence from November 2007 to February 2008 to:

a) review data availability and quality of data being used in the framework and methodology for the assessment of wild and mixed Baltic Sea trout stocks and their fisheries;

b) review monitoring methods of wild and mixed sea trout stocks in each Baltic country;

c) develop ToRs for a possible follow-up meeting to expand on issues identified at the SGBALANST, with the aim of developing a quality control process for future inputs to a framework and methodology for the assessment of Baltic Sea trout stocks and associated fisheries.

The Study Group consisted of 16 participants, who met by correspondence between December 2007 and February 2008. A full address list for the participants is provided in Annex 1.

2 Approach

Formation of the study group was completed with at least one member from each country around the Baltic Sea, while no members were found outside the area.

After identification and general agreement on the objectives and method to reach these, members from each country provided information on item a) of the ToR, from their country to the group. The national information was compiled, tabulated and discussed to fulfil item b) of the ToR.

While the report was being processed, opinions on the relevance of a possible follow up meeting were collected, together with suggestions for ToRs for this group. This was finally discussed and the result of the discussion added to the report.

2.1 Process

A common understanding of the precise meaning of the task was reached. Suggestions on the understanding of the task were discussed within the group, as were methods on how to cooperate and distribute responsibilities. After agreement on these matters national information was collected by all members.

Due to structural differences and associated difficulties, the collection of information was from one country was available only at a rather advanced state of the report, limiting the possibilities for discussing part of the monitoring.

For the final review of the report the Swedish member of the study group had to be replaced by another representative from Sweden.

At an advanced state in the process it was realized that it was necessary to obtain additional information from the Åland Islands. This was achieved by a member of the group from Finland.

Likewise it was realised that monitoring in the Kaliningrad area of Russia was not identical to monitoring in the St. Petersburg area of Russia. The Russian member of the study group tried to contact authorities in the Kaliningrad area, and retrieved some information. However, it is likely that information from this area is incomplete.

Suggestions on a possible framework for future assessment of sea trout populations, including a list of adjustments needed, which in turn would need completion by a possible follow up meeting, was formulated.

3 Results

3.1 Recruitment

Information on methods used and level of monitoring recruitment of sea trout smolts in the Baltic area was reported by the participants of the study group, together with information on the streams monitored. The information provided on streams was in most cases on individual streams but in some cases, when information was not available, information was given on groups of streams within a certain land area.

The information asked for, from each participant on individual streams is presented in Table 1 and information asked for regarding a number of streams in a given area of land in Table 2.

Table 1. Information asked for on individual streams from each country.

RECUITMENT INFORMATION AVAILABLE FOR INDIVIDUAL RIVERS/STREAMS
Country
Name of river
National identification number (if appropriate)
Position of outlet (longitude)
Position of outlet (lattitude)
Outlet into ICES Subdivision
Outlet into ICES Square
Single system (S) or tributary (T)
If tributary, what is main stream (name / ID)
Size of river (Flow (F) avg. m3s-1 / Land area (La) (km2)/ Length (Len) (km))
Productive area (accessible to sea trout) (ha)
Productive area covered by monitoring (ha)
Length of river accessible to sea trout (km)
Number of sites monitored
Method of monitoring *
Method of monitoring *
Method of monitoring *
Frequency of monitoring (annual (1), biannual (2), other (write number))
Level of precision in estimated smolt number available (Yes/No)
Level of precision estimated (E), measured (M)
Avg. River width (m)
Avg. Slope of river (%)
Time period with available data (Year – year)
Estimated smolt age
Estimated winter mortality (parr to smolt)
Number of sampling occasions
Remarks

Note: * options given for methods of monitoring: 1. Complete count of smolts, 2. Sampling of smolts and estimate of total smolt run size (smolt trap), 3. Estimate of smolt run from parr production (e-fishing) by relation developed in the same river, 4. Estimate of smolt run from parr production (e-fishing) by relation developed in another river, 5. Inference of smolt production from data derived from similar rivers in the region, 6. Count of spawners, 7. Estimate inferred from stocking of reared fish in the river, 8. Trout catch, exploitation and survival estimate, 9. Density of wild 0+ (no smolt estimate) (electrofishing), 10. Density of wild >0+ (no smolt estimate) (electrofishing), 11. Density of reared 0+ (no smolt estimate) (electrofishing), 12. Density of reared >0+(no smolt estimate) (electrofishing), 13. Other: state how.

Table 2. Information asked for from each country on one or more groups of streams in a given area of land.

RECUITMENT INFORMATION AVAILABLE FOR INDIVIDUAL RIVERS/STREAMS
Country
Name of river
National identification number (if appropriate)
Position of outlet (longitude)
Position of outlet (lattitude)
Outlet into ICES Subdivision
Outlet into ICES Square
Single system (S) or tributary (T)
If tributary, what is main stream (name / ID)
Size of river (Flow (F) avg. m3s-1 / Land area (La) (km2)/ Length (Len) (km))
Productive area (accessible to sea trout) (ha)
Productive area covered by monitoring (ha)
Length of river accessible to sea trout (km)
Number of sites monitored
Method of monitoring *
Method of monitoring *
Method of monitoring *
Frequency of monitoring (annual (1), biannual (2), other (write number))
Level of precision in estimated smolt number available (Yes/No)
Level of precision estimated (E), measured (M)
Avg. River width (m)
Avg. Slope of river (%)
Time period with available data (Year – year)
Estimated smolt age
Estimated winter mortality (parr to smolt)
Number of sampling occasions
Remarks

Note: Options given for method of monitoring as above.

3.1.1 General overview

In total more than 850 streams are monitored more or less regularly. Of these nearly 700 are single systems, while the rest are tributaries to main streams.

There is a tremendous difference in the sizes of the streams where catchments varies between thousands of km^2 and less than one km^2, lengths between several hundred km and a few hundred meters. These large differences make it difficult to compare directly between countries.

Reported information from all countries is in part summarised in Table 3. Reported information by each country is found in Annex 2.

Table 3. Summary of information on methods and extent of monitoring around the Baltic.

	Country									
Number of streams / rivers	Sweden	Finland	Russia	Estonia	Latvia	Lithuania	Poland	Germany[10]	Denmark	Total[12]
Monitored	124[1]	23	36	62	15	69	13	26	499[11]	856
Not monitored	several hundred	10	11	5	18	8	13		0	65
Single systems	75	15	10	62	7	3	12	9	499	698
Tributaries monitored	49	8	5	0	8	66[7]	1	17	0	137
Tributaries not monitored					44		10		0	54
With smolt counts	1[2]	2	1	1	2	3			0	10
With estimation of parr density	124	23	15	62	6	69	6		499	819
With known smolt age	1	some								
With count of spawners (trap)	3									1
With count of spawners (fish counters)	11						1			12
With count of spawning redds						14	5			19
With estimation of spawning run				14						14
With monitoring of parr-smolt survival					15	1				16
Total number of sites (minimum)	567	210[3]	72[4]	33[5]	10[6]	104	12	na	2219	3215
Catchment of streams monitored (km^2)	182876.2	95252		6989.7	19619	60547.4	16004.6[8]			471263.9
Catchment of streams not monitored (km^2)		9192		1284	5064		318674[9]			334214
Flow of streams monitored (m^3)		897.1				599.31				1496.41
Length of streams monitored (km)		1517	422.5	592		3604.3	1174.6[9]	400.7	4481.4	11791.8
Frequency af monitoring (years)	1,4 (3)	1 (2,3,5)	1	1,2 (5)	1	1,3	1	1,3,4,5,6	7	

Notes: 1) Only streams with monitoring over extended time period 2) In addition two smolt traps with unknown efficiency, 3) minimum number, 4) minimum number, 5) reported number for individual rivers only, 6) in one river, 7) approximate value, 8) minimum number, 9) minimum number, 10) Mecklenburg-Western Pomerania only, information from Schleswig-Holstein was not available 11) 208 streams with wild or reared trout 12) minimum number, see other notes.

Monitoring the production of sea trout smolts is carried out based on a national program in some of the countries: Sweden, Lithuania, Estonia, Latvia and Denmark. In Sweden and Latvia this program is either completely (Sweden) or partly (Latvia) part of a national salmon action plan, and in Denmark it is within the national program on fish enhancement. In Germany (Mecklenburg-Western Pomerania) data are collected as part of a stocking program. Information from Schleswig –Holstein was not available for the study group.

In Finland the Finnish Game and Fisheries Research Institute is monitoring annually those wild sea trout stocks which are maintained in its own hatcheries as hatchery brood stocks. There is no national program in Russia or Poland.

The responsibility for gathering information on trout populations and for reporting it relies within one institution in four countries (Russia, Estonia, Latvia, Denmark), while it is distributed on more institutions in Sweden, Finland and Lithuania. In Poland there is no formulated responsibility on this, only to do research within the area.

The primary purpose of sampling data, where monitoring is on density of parr, is in five countries monitoring trout densities (Finland, Russia, Estonia, Lithuania, Denmark), while it in the rest of the countries appears to be either environmental monitoring or a combination of environmental monitoring and monitoring trout populations, or – data are gathered from different sources where knowledge on trout densities are collected in various projects.

Precise information on the method of monitoring was not available for the Kaliningrad area of the Russian Federation, but some monitoring seems to be going on.

3.1.2 Methods of monitoring

In all countries the monitoring carried out is on densities of parr in the nursery streams. This is in a couple of countries used to calculate the smolt production by a relation of parr to smolt survival either developed in the same stream or in different streams.

In Finland an approach towards a relative production of smolts (relative to an observed maximum) is considered as an alternative to calculating absolute numbers.

In most countries (not in Denmark or Poland) this is supplemented with monitoring of smolt escapement by trapping and counting smolt numbers in one or more streams.

In only three rivers (all in Sweden) the number of spawners is monitored by trapping and inspection of the ascending sea trout. In another 12 rivers (one in Poland and the remaining in Sweden) the number of spawners is monitored by automatic fish counters, where accurate determination of species, size, sex etc. is not possible.

An indication on spawning intensity is collected in Poland and Lithuania by counting redds in a number of streams.

3.1.3 Frequency of monitoring

In most countries monitoring of all sites are carried out annually, bi-annually or more rarely every 3–5 years. In Denmark, where a large number of sites in practically all streams are monitored, monitoring is done only every seven years. This is presently compensated for by following a number of representative sites every year.

3.1.4 Quality of monitoring

In general, it is estimated that the quality of data obtained when monitoring parr densities on sites in the nursery areas are adequate. However, the knowledge on survival from parr to smolt and the relation from parr to actual smolt numbers seems to be much less well established, also considering the fact that part of the parr will remain in the stream as resident, stream dwelling brown trout.

The intensity of monitoring varies greatly between the countries, both in the absolute number of sites and relative number (relative to the magnitude of streams).

In some countries the establishment of a monitoring programme with reasonable coverage seems to be a relatively recent event, while it in some countries has been going on for a longer period of time.

3.1.5 Limitations in monitoring

The limitations mentioned by the members of the study group are in general, that there is no approved national program for monitoring sea trout populations and that both funding and available man-hours are limited.

Additionally, in most of the salmon streams focus is on monitoring salmon populations. This results in relatively poor estimates of the trout populations because of the difference in distribution of the species, salmon mainly found in the larger parts of the streams as opposed to trout which is mainly found in tributaries and upper reaches (Figure 1).

3.1.6 Suggested improvements

A number of suggestions on how to improve knowledge on recruitment have been put forward.

The suggestions were:

- Several members of the group have, as the most important subject, mentioned the establishment of and recognition of the necessity for a standardized national monitoring programme, including funding of such a programme.
- In addition it is suggested that Index Rivers are established ensuring geographical coverage in at least all ICES subdivisions, where Stock-Recruit relationships may be established. This would provide much needed information on smolt production, spawning population, parr densities, parr-smolt survival and influence from environmental variables.
- Increased quality in existing monitoring programmes, either by improving the knowledge on age distribution, winter mortality, increased number of sampling sites and knowledge on the quality of nursery areas are also suggested.
- Relatively simple improvements, such as increased cooperation between authorities, changed focus towards more 'important' streams (i.e. streams with larger sea trout populations), change from one type of monitoring to another (parr density to actual smolt number) are also suggested.
- The issue of possibly establishing a regional cooperation, where comparative conditions prevail, was put forward.
- Very fundamentally it was suggested to work towards establishing a model to predict smolt output from habitat quality.

- Finally it was suggested to ensure that knowledge on the sea-phase of the life of sea trout is improved, including knowledge on especially migration of different strains of sea trout, but also on mortality, growth, feeding, etc.

In the following some of the suggestions forwarded by the group are discussed in more detail. The aim of the discussion in this section is to use today's data in a more efficient way by standardization and cooperation, as well as proposing future improvements in stock monitoring.

3.1.7 Standardization of present monitoring of parr densities and resulting smolt number through electrofishing

The information assembled by SGBALANST has revealed that the main focus in monitoring is on determining parr densities through electrofishing in streams. The number of parr is used as an indication of recruitment and stock status. The study group considers parr densities to be a valid index of recruitment and to a large extent also of stock status. However, this information will only be useable for a joint assessment with satisfactory precision if electrofishing data are collected in a standardized manner and if knowledge on the resulting smolt output is available.

It is to be expected that the parr-smolt survival will be highly variable, and knowledge on this variation is essential.

A comparison and standardization could be initiated on:

- sampling routines (e.g. season, area of stream covered, number of runs required, equipment used, number of sites per stream),
- biological data sampled (e.g. for age analysis),
- quality assurance (e.g. routines for estimation of total population, data processing) and
- environmental information recorded, e.g. site habitat characteristics and meteorological influences;

thus enabling future comparisons and a joint annual assessment within the Baltic region (see item 2).

3.1.7.1 Establishing criteria for good parr densities

The study group has identified a need to establish common procedures on how recruitment status, i.e. abundance of parr, should be evaluated. The question is what parr densities are to be expected at a site of good environmental quality in a population of good status. To achieve this information, ideally data from stocks with known high status are preferred.

Such information could be established through stock-recruitment models in streams with monitoring of ascending spawners, juvenile densities and smolt production is in general lacking for the Baltic stocks. In the future such data needs to be gathered (see item 4 below).

Since precise information on the expected natural high abundances is lacking, this would need to be established from existing electrofishing data, possibly through expert judgement used to identify streams with high habitat quality and abundances. Expert judgement can be assisted with already present data on stock characteristics as growth of underyearlings as compared to density of parr, the shape of length distributions of individual cohorts, stocking experiments, historical data, regional comparisons etc. It may be that several of the countries have established the

ecological status of their waters according to the EU Water Framework Directive (WFD). This means that waters with poor quality (ecological status) could be identified and omitted.

It would be possible to:

- present data from waters and stocks nationally judged to be of good status
- present evidence of good macro-habitat quality (according to standards agreed upon in task 1)
- present information on essential mesohabitat data (climate, water discharge, nutrient level, catchment area, distance to sea, stream average width, slope) allowing a joint model to be constructed using all available data.
- this model will be adjusted according to expert judgement and later tested against an individual set of streams provided by each member (with nationally judged status).

A model established in this way would be a joint indicator of recruitment status of parr, allowing status to be estimated in a similar way throughout the Baltic.

3.1.7.2 Estimating smolt production from electrofishing data

If items 1 and 2 are achieved, focus could be directed towards requirements for estimating smolt production from available information on parr densities. Information on ascending spawners/egg production is scarce.

A national model is under development to assess smolt production from data on parr densities, in combination with estimated winter mortalities. An approach also deals with in-stream mortalities due to predation. These national approaches could be compared and a joint manual or agreement on the development of this type of relationships could be formulated.

This would encompass:

- review and compilation of information about existing methods of monitoring (also outside the Baltic region)
- establishing data requirements for the methods
- sharing information on winter mortalities, in-stream mortalities and classification of habitats
- development of a joint recommended manual for this work.

Eventually a joint approach may be established, especially if data from items 4 and 5 are available.

3.1.7.3 Stock-recruit relationship in trout populations

In three streams both quantitative smolt traps and either complete or inferred number of spawners are found. In Åvaån and Sävarån in Sweden complete count of spawners are available together with either complete or partial count of smolt. In Pirita in Estonia smolts are counted and number of spawners may be estimated indirectly. In all these streams parr densities are also followed. Together this provides the basic information needed to establish Stock-recruit relationships in different parts of the Baltic as a start.

Combined with information on habitat quality and areas, climate and nutrient levels, this could provide valuable information. In addition it might be possible to find

relationships from outside the Baltic area through international cooperation a span of river systems may be included in the analysis.

Data from these streams needs urgently to be improved by:

- quantifying the efficiency of traps
- assess the precision in the number of spawners estimated indirectly
- evaluating existing electrofishing monitoring
- estimating winter mortalities
- compile data on in-stream mortalities (often due to predation, power plants, water intakes)
- compare to any existing stock-recruit relationships in comparable environments.

In addition it should be considered if smolt counts could be obtained from streams where the number of spawners is estimated or vice versa.

Through this work a relation between spawners and optimal parr densities/smolt production.

In the literature few relationships have been described but in Sweden it has previously been estimated that approx. one 3 kg female per 100 m^2 spawning area in streams to the Baltic proper is needed to maintain population equilibrium (Alm, 1950).

3.1.7.4 National index rivers

The crucial situation for trout stocks in parts of the Baltic (see ICES, 2007) and the work of SGBALANST has shown that monitoring of trout stocks needs improvement. Electrofishing data are present for several streams, but data on spawners and smolt production are rare.

To improve the situation in depleted trout populations and increase fishery yield more detailed data are required, and preferably in longer time series.

For each ICES subdivision preferably at least one index river representative of the area should be established. These rivers should be treated similar to salmon index rivers. As trout rivers are smaller the cost should be lower. Information from the existing programme for salmon is in general insufficient.

- Each country should propose at least one sea-trout index river per ICES subdivision.

3.1.7.5 Post-smolt movements and mortality

Post-smolt movements, food and survival are poorly known compared to salmon. Both for long-migrating strains of the Sound and the Main Baltic and for the short-migrating stocks northern stocks of Bothnian Bay, Bothnian Sea and the Gulf of Finland, mortality of smolts and postsmolts are considered to be high, but information is scarce. Apart from natural mortality loss of post-smolts are also due to bycatches and targeted catches in the fishery.

Bycatches are considered to be a major problem for trout stock marine survival. However, estimates on the magnitude of bycatches seem insufficient and needs further evaluation, especially on a larger scale.

Studies in Sweden using whitefish-nets indicate locally high bycatches of trout. Finnish tagging experiments reveal a similar pattern with the majority of trout being

caught during their first marine year, i.e. before maturing. The study group recommends a joint project is considered to address the problem. This could be by evaluation of existing tagging programmes and by electronic tracking studies of postsmolts in combination with test-fishing with nets used in commercial/non-commercial fishing.

It is suggested that:

- existing data are compiled
- joint research projects are initiated or promoted on post-smolt movement and survival
- bycatch rates are establish nationally through test-fishing with gear commonly used

This would provide an estimate of magnitude of the bycatch, post-smolt movement in different strains and post-smolt survival in relation to fishing intensity under different fishery management measures in the Baltic.

3.2 Catch

Sea trout are caught in many different types of fishery in almost the entire Baltic area, either directly or as a bycatch in other fisheries. Only Russia has no fishery for sea trout, because the species is protected.

The main group of fishermen having sea trout as a primary target (possibly together with salmon) is recreational anglers, where it is a popular species, being targeted especially in streams but also in coastal areas and to a limited extent in offshore trolling.

Apart from this, sea trout is targeted as the primary species only in local areas, such as in the Finnish part in the eastern part of the Gulf of Finland, in some of Pomeranian rivers and in the Vistula River in Poland, mainly near the outlet of this river, where it is caught on commercial scale.

A large number of sea trout are caught in the Polish off-shore fishery together with salmon.

Otherwise it seems to be mainly caught as bycatch especially in the coastal fishery.

However information on catches from this fishery, which is often performed by recreational fishermen, seems to be limited and imprecise.

The importance of the different types of fishing was not investigated by the group, because actual figures on the catch were not collected. It appears that in most cases, precise information is scarce, but in the reports given some information on the relative importance of the different types of fishery is available. Large variations are found between the countries.

It is only in Sweden, that the larger part of the catch is in general taken by anglers, although regional differences are large. About 90% of the catch in The Sound between Denmark and Sweden was taken by angling, while only about half of the catch was by angling in the Bothnian Bay and Bothnian Sea. In contrast to this, in Finland, sea trout are mainly caught as a by catch in the recreational fishery for whitefish and pike perch. Here it is estimated that only a few percent are caught in streams by angling.

In Poland a large off shore fishery for sea trout has existed side-by-side with the commercial salmon fishery, the sea trout being caught in the same gear as salmon in ICES Subdivision 24–26. Previously the most important gear type in this fishery was

drift net, but after 1 January 2008 the use of drift nets is not allowed, and it is uncertain to what extent this gear can be replaced by long lines.

As far as information is available from the remaining countries, sea trout are mostly caught in the coastal areas in a recreational fishery using gill nets, traps, fyke nets with the exception of Poland, where sea trout is a very important target species in coastal commercial fisheries.

Members of the study group were asked to provide information in tabular format on types of fisheries catching trout in different areas and on what knowledge is available on catches of trout. The information asked for is presented in Table 4.

Table 4. Table with information asked for from each country.

CATCH INFORMATION
Country
Fishing area I (Sea (S), Coast (C), River (R), Sea/coast (SC))
Fishing area II (ICES Subdivision)
Fishing area III (ICES Square)
Fishing area IV (long - lat, long - lat, …)
Fishing area V (Name)
Time period (Month (MON), quarter of year (QTR), half of year (HYR), year (YR))
Type of fishing (commercial (COMM), recreational (RECR), recreational angling (ANGL), discard (DISC), unreported (UNRP))
Gear (driftnet (DN), longline (LL), trawls (TR), seine (SE), gill net (GN), trap (TP), fykenet (FN), hook&line (HL))
Effort (number of days x number of gear) - Known Y/N
Catch by weight - Known Y/N
Origin of catch information (logbook (LOG), catch reports (REP), extrapolated (EXT), estimated (EST), guestimate (GST))
Catch by number - Known Y/N
Origin of catch information (logbook (LOG), catch reports (REP), extrapolated (EXT), estimated (EST), guestimate (GST))
Information on size of caught fish (average weight, individual weights, age, …) - Known Y/N

In addition to this, members were asked to describe in words the fishery and what information is available on catches as part of their national reports.

The reported information on the catches of trout is summarized in Table 5.

Table 5. Overview of available information on catches reported by members of the SGBALANST. Abbreviations used: COMM Commercial, RECR Recreational, ANGL Angling, BROODST Brood stock fishery, EXT Extrapolated, REP Reports, LOG Logbooks, MON Month, YR Year, DN Drift net, LL, Longline, SE Seine, GN Gill net, TP Trap, HL Hook and line, TR Trawl, EFISH Electrofishing.

Country	Area	No of rivers	ICES subdiv.	Fishery Type	Effort known	Catch in weight	W –info origin	Time resolution	Catch in number	Number i nfo origin	Time resolution	Addit. info (size, age)	Fishing gear
Sweden	S		23–31	COMM	Y	Y	EXT	MON	Y	LOG	MON	Y	DN, LL
Sweden	C		23–31	COMM	Y	Y	EXT	MON	Y	LOG	MON	Y	DN, LL
Sweden	R	1	25	RECR	N	Y	REP	YR	Y	REP	YR	Y	SE, GN, TP, HL
Sweden	R	1	27	RECR	N	Y	REP	YR	Y	REP	YR	Y	SE, GN, TP, HL
Sweden	R	7	30	RECR	N	Y	REP	YR	Y	REP	YR	Y	SE, GN, TP, HL
Sweden	R	16	31	RECR	N	Y	REP	YR	Y	REP	YR	Y	SE, GN, TP, HL
Finland	S		29–32	COMM	Y	Y	LOG	MON	N		MON	N	GN, TP, FN
Finland	R	1	31	RECR, ANGL	Y	Y	REP	YR	Y	REP	YR	Y	SE,HL
Finland	R	1	32	ANGL	Y	Y	REP	YR	Y	REP	YR	Y	HL
Russia[1]													
Estonia	C		28,29,32	COMM, RECR	Y	Y	REP	MON	Y	REP	MON	N	TP, FN
Estonia	R	4	32	ANGL	N	Y	REP	MON	N			N	
Latvia	C		26,28	COMM	Y	Y	LOG	MON	Y	LOG, EST	MON	Y	GN, TP
Latvia	C		28	COMM, BROODST	Y	Y	LOG	MON	Y	LOG, EST	MON	Y	TP
Latvia	R	2	28	ANGL	Y		REP	YR	Y	LOG, EST	MON	Y	HL
Lithuania[2]	SC		26	COMM	N	Y	LOG	YR	Y	LOG	YR	N	LL, GN
Lithuania	R	4	26	BROODST	N	Y	LOG	MON	Y	REP	MON	Y	EFISH
Lithuania	R	10	26	ANGL	N	N	EXT	MON	Y	EXT	MON	N	HL
Poland	S		24	COMM	Y	N	EXT	MON,YR	Y	LOG	MON,YR	N	GN,TR,SE
Poland	S		25,26	COMM	Y	N	EXT	MON,YR	Y	LOG	MON,YR	Y	GN,DN,LL
Poland	C		24	COMM	Y	N	EXT	MON,YR	Y	LOG	MON,YR	N	TP,GN,SE
Poland	C		25	COMM	Y	N	EXT	MON,YR	Y	LOG	MON,YR	Y	GN,LL
Poland	C		26	COMM	Y	N	EXT	MON,YR	Y	LOG	MON,YR	Y	TP,GN,LL
Poland	R	4	24	ANGL	N	Y	EXT	YR	Y	EXT	YR	Y,N	HL
Poland	R		25	COMM	N	Y	REP	MON	Y	EXT	MON	N	FN,GN
Poland	R	6	25	BROODST	Y	Y	REP	MON	Y	REP	MON	Y,N	FN,TP,EFISH

Country	Area	No of rivers	ICES subdiv.	Fishery Type	Effort known	Catch in weight	W –info origin	Time resolution	Catch in number	Number i nfo origin	Time resolution	Addit. info (size, age)	Fishing gear
Poland	R	6	25	ANGL	N	Y	EXT	YR	Y	EXT	YR	Y,N	HL
Poland	R	1	26	COMM	N	Y	REP	MON	Y	REP	MON	N	GN,DN
Poland	R	2	26	BROODST	N	Y	REP	MON	Y	REP	MON	N	GN,TP
Poland	R	2	26	ANGL	N	Y	EXT	YR	Y	EXT	YR	Y,N	HL
Germany	S		22	COMM	Y	Y	LOG	MON	N			N	TR,GN
Germany	S		24	COMM	Y	Y	LOG	MON	N			N	TR,GN
Denmark	S		24,25	COMM	Y	Y	EXT	MON	Y	REP	MON	N	LL
Denmark	C		22–25	RECR, ANGL	N	N			N			N	GN, FN, HL
Denmark[3]	R	3	23	ANGL	N	N			Y	REP	YR	Y	HL

Notes: 1) Fishing trout is prohibited, 2) including Lagoon, 3) Reports not complete.

3.2.1 Catches in number and in weight

Information on the number of trout caught, and to a certain extent also on the weight, is available from the larger part of the fisheries in the Baltic. The information is available with variable (estimated) certainty and with variable resolution in time.

Even though log books may not always be filled in correctly, it is in general considered that the most precise information comes from the commercial fishery, being obliged to fill in log books. This information may be cross checked with first hand sales notes.

Also the river catch by angling in large rivers where salmon fishing is also performed in Sweden is considered to be relatively precise. In these rivers reporting catch is mandatory. Even though reporting is also mandatory in the recreational coastal fishery in Estonia and in rivers in Poland, the knowledge on the rest of the recreational fishery is considered to be known with a variable, but in general much lower accuracy.

Information from catches in rivers is available from relatively few rivers, given the number of rivers with trout.

The best record on catches seems to be in the Swedish salmon rivers, where reporting catch is mandatory. Some information is available from Finland and Lithuania, while only little information is available from Poland and Denmark.

In Poland and Lithuania it appears that poaching of sea trout in the rivers may be substantial. Poaching near river outlets have also been reported from Denmark.

3.2.2 Types of gear and effort

A large variety of different types of gear are used, depending on the general area of fishing and probably the primary target species. Gear types are either commercial, similar to commercial but used by recreational fishermen, dedicated to angling (hook and line) or specialised, such as electrofishing gear that may be used in the brood stock fishery (to provide eggs for hatchery culture of fish to release).

In general information on types of gear used is known. However, knowledge on the effort in the fishery is available mainly from the commercial fishery.

An exception to this is the brood stock fishery, where effort in most cases is known as well.

3.2.3 Responsibility on collection of data and on reporting data

In most countries the responsibilities on collecting and reporting catch data are joined in one institution. However, this is not the case in Lithuania and Poland. Furthermore, in Poland fishery rights owners in freshwater are obliged to report the income from the fishery for taxation, but not catches and effort for fishery statistics.

In four countries (Finland, Estonia, Latvia and Denmark) numbers from sea and coastal fishery and freshwater fishery are collected by the same institution, while in the rest of the countries are collected by different institutions.

3.2.4 Additional information collected

Collection of information on age and detailed size from catches is variable. In some countries genetic samples are taken in the rivers, either as regularly taken general(?) samples, sporadically or from fish caught in the brood stock fishery.

Biological samples according to EU regulations from commercial catches are only taken in three countries.

3.2.5 Suggestions for improvements

It is suggested that knowledge on catches in the non-commercial coastal fishery is improved. This could be achieved either by inquiries supplemented with field observations or as voluntary reporting.

Also knowledge on catches as bycatch in other fisheries needs to be increased; and one way to do this could be by conducting a test fishing programme.

It is being put forward that knowledge on river catches and age distribution of spawners needs to be improved.

Cooperation between countries and between fishermen and institutions monitoring the fishery is suggested.

3.3 Management measures

Information on management measures was asked for in the national reports from the members of the study group.

The information is only briefly summarized in the following section, as it was not a primary subject for the study group. Detailed information from each country is found in the national reports (Annex 2).

Management measures vary considerably between countries and even within countries substantial differences are found. Management practices are reported to depend considerably on local traditions more than biological facts and needs.

All countries reporting on this have a minimum landing size. Overall the minimal landing size varies between 35 cm (in streams in Poland) and 60 cm (in Lithuania). Within several countries variations are reported in minimum legal sizes between different sea areas.

Application of a closed season was reported from all countries. However, again with large regional differences on both time and duration of this season. Even within countries different closing seasons are applied. Application of closed areas, especially near outlets of rivers is also found in all countries. Restrictions in types of gear permitted are found in most countries, while restrictions in the number of gears used or in for example mesh sizes is found only in few countries.

3.4 Tagging experiments

Information on tagging experiments conducted in the different countries was asked for in the national reports from the members of the study group.

Tagging experiments, where smolts are tagged with external tags (Carlin type) before or during sea migration, are carried out on a regular basis in almost all countries (not in Denmark). Trout tagged are almost exclusively reared smolt. Some countries have long time series with tagging experiments.

To distinguish between trout of reared and wild origin adipose fin-clipping is performed. Since 2005 fin-clipping of released sea trout (and salmon) is obligatory in Sweden. Fin-clipping is also in use in Poland, Latvia and Estonia.

3.5 Other relevant studies

In Sweden an ongoing study is expected to provide information on smolt mortalities and provide input for a smolt production model. Also in Sweden the manual inspection and count of returning spawners at weirs in some streams is gradually being replaced by automatic fish counters. This is expected to result in reduced certainty on numbers, ages, sex distribution etc.

4 Summary and Conclusions

Information on methods and extension of monitoring of sea trout populations in all countries around the Baltic were collected together with information on monitoring on the catch of sea trout.

Common to all countries is monitoring of the parr populations (most often 0+ parr) in streams, where the young trout are sampled by electrofishing. The intensity and variation between countries in the sampling is however quite large.

Information is in some countries collected only sporadically as a spin off from other investigations, while it in some countries follows a regular sampling routine. Routine collection of information occurs often when focus is on salmon. It is pointed out that this may be a problem because trout are more often found in smaller streams than are salmon, thus not being sufficiently well monitored.

It is found important that standardised national monitoring programmes are recognised as important and are funded sufficiently.

It is suggested that Index Streams are established in all ICES Subdivisions, ensuring geographical coverage of the Baltic area, providing the basis for essential stock-recruit relations.

Increased quality may be attained from existing programmes by collecting additional information, for example on age distribution, winter mortality, from a larger number of sites and on habitat quality. It was found important that work on establishing a model to predict smolt output from knowledge on habitat quality is promoted. Likewise increased cooperation between authorities, or changed focus on more 'important' (productive) streams may increase the quality of monitoring. Also between countries within geographically similar regions, increased cooperation was suggested.

Finally it was suggested to ensure that knowledge on the sea-phase of the life of sea trout is improved, including knowledge on especially migration of different strains of sea trout.

The commercial fishery, together with angling in rivers in some of the countries, is considered to provide the most precise information on catches of sea trout. Contrary to this, knowledge on catches in the non-commercial coastal fishery needs to be improved as well as knowledge on catches as bycatch in other fisheries. Also knowledge on river catches (in some countries) and on age distribution of spawners needs improvement.

5 Recommendations

The SGBALANST suggests monitoring be improved in accordance with the above mentioned suggestions.

The Study Group agreed on the following items for possible future activities:

RECOMMENDATION	FOR FOLLOW UP BY:
1. decide if the state of the trout populations justifies a need for assessment and advice on possible extended regulations	Diadromous Fish Committee
2. assess the present status of the sea trout rivers related to the potential level of recruitment (e.g. on the basis of the highest documented parr densities (wild or reared 0+ parr) in each river, or by using expert judgements combined with knowledge on total reproductive area).	Diadromous Fish Committee
3. determine at what level of precision and on what populations (or ICES subdivisions) assessment is needed.	Diadromous Fish Committee
4. determine what type of assessment tool (standard or Bayesian as with salmon) should be aimed for if appropriate taking into account both methods that may be used outside the Baltic and the assessment method used on salmon in the Baltic.	Diadromous Fish Committee
5. Stock-recruit relations: select representative areas and types of river representing geographical area, i.e. index rivers.	Diadromous Fish Committee
6. determine what type of s-r relationship will be appropriate	Diadromous Fish Committee
7. standardize data between s-r rivers	Diadromous Fish Committee
8. identify and standardize variables needed to extrapolate results from index populations to remaining systems and populations	Diadromous Fish Committee
9. assess the influence from resident trout.	Diadromous Fish Committee
10. assess the importance of stocked trout	Diadromous Fish Committee
11. assess the influence from different fisheries	Diadromous Fish Committee
12. draft proposals on additional regulatory measures, if appropriate	Diadromous Fish Committee

Annex 1: List of participants

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Annex 2: Working Documents submitted to the Study Group

Available Swedish data on Sea trout stock recruitment and catches in the Baltic Sea – National report to SGBALANST, ICES – 2008.

Erik Degerman, Swedish Board of Fisheries

Streams with Sea trout in the Baltic Sea

Sweden has a long coast line with several streams with sea trout. Andreasson *et al*. (1985) reported of 145 single streams (with tributaries) emptying into the Baltic Sea (Subdivisions 27, 29, 30, 31). If also Subdivisions 23–25 would have been included the estimated numbers of streams would have been around 200. Karlsson (1994) reports of 124 Baltic streams with sea trout (Subdivisions 23, 24, 25, 27, 29, 30, 31), omitting the smallest streams with low production.

If also small streams emptying directly into the Baltic Sea was considered the number of sea trout populations would increase considerably to several hundreds (Dahl 2007), but most populations are small. Karlsson (1994) reports of only 61 Baltic streams with an estimated smolt production above 1000 smolts annually. The largest production is estimated in southern larger streams as River Emån and River Mörrumsån. The production in the northern populations is low, especially in the Bothnian Bay (Subdivision 31).

In this report only streams with long monitoring programmes are included, in total 124 streams. Of these 49 are tributaries. This means that 75 main streams are included (Table 1). The number of tributaries increases with latitude as the larger salmon rivers are situated in subdivision 30 and 31. Here sea trout is mainly found in higher densities in the smaller tributaries.

Table 1. Number of streams with sea trout and long term monitoring (electrofishing) included in this report.

		Number of streams	
ICES Subdivision	Area	Main streams	Tributaries
23	The Sound	6	0
24	Main Baltic	3	0
25	Main Baltic	13	4
27	Main Baltic	20	0
30	Bothnian Sea	23	23
31	Bothnian Bay	10	22
Total	Baltic Sea	75	49

On recruitment

Methods used in data collection

Electrofishing is the main method used for investigations of trout recruitment. Annually 567 (min 405 – max 689) electrofishing sites were visited in sea trout streams and rivers in the Baltic basin the period 2000–006. Many of the fishing occasions were performed in salmon rivers or were a part of regional environmental monitoring in smaller streams. Although an extensive coverage of streams with

electrofishing several important sea trout streams remain unchecked and the regional programmes are not focussed on smolt production estimates.

Only three smolt traps are operating (River Kävlingeån in The Sound, River Åvaån in the Main Basin and River Sävarån in the Bothnian Sea). (The smolt production is also estimated in Tornijokki by our Finnish colleagues.) Of these three streams, two are part of regional monitoring, and no estimates of efficiency of the smolt traps are present. Ageing of smolt is done from length frequencies. In River Åvaån the trap has been operated in periods since the 1930s (Figure 1, Alm, 1950). In the River Kävlingeån the trap has been operated since the 1948, with some years without operation (Figure 2).

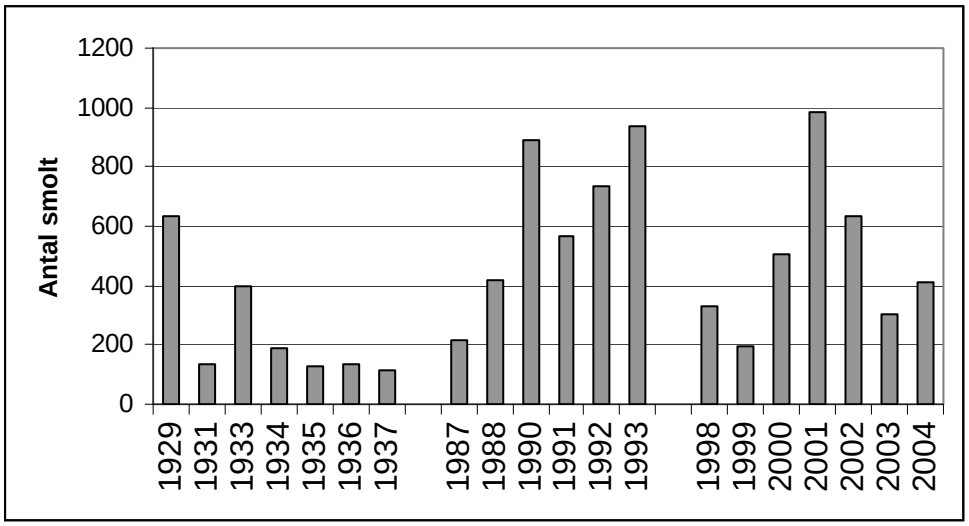

Figure 1. Number of sea trout smolts caught in the trap in River Åvaån, subdivision 27; Main Baltic.

In River Åvaån data is present both for smolt, spawners and juveniles. Application of a stock-recruitment model is possible. The stream is small, catchment area 16 km^2, average stream width 2.4 m, and the parr population is high (>100 per 100 m^2). The number of spawners is high for the small rearing habitat and a negative density-dependent effect is often noted (e.g. Alm, 1950).

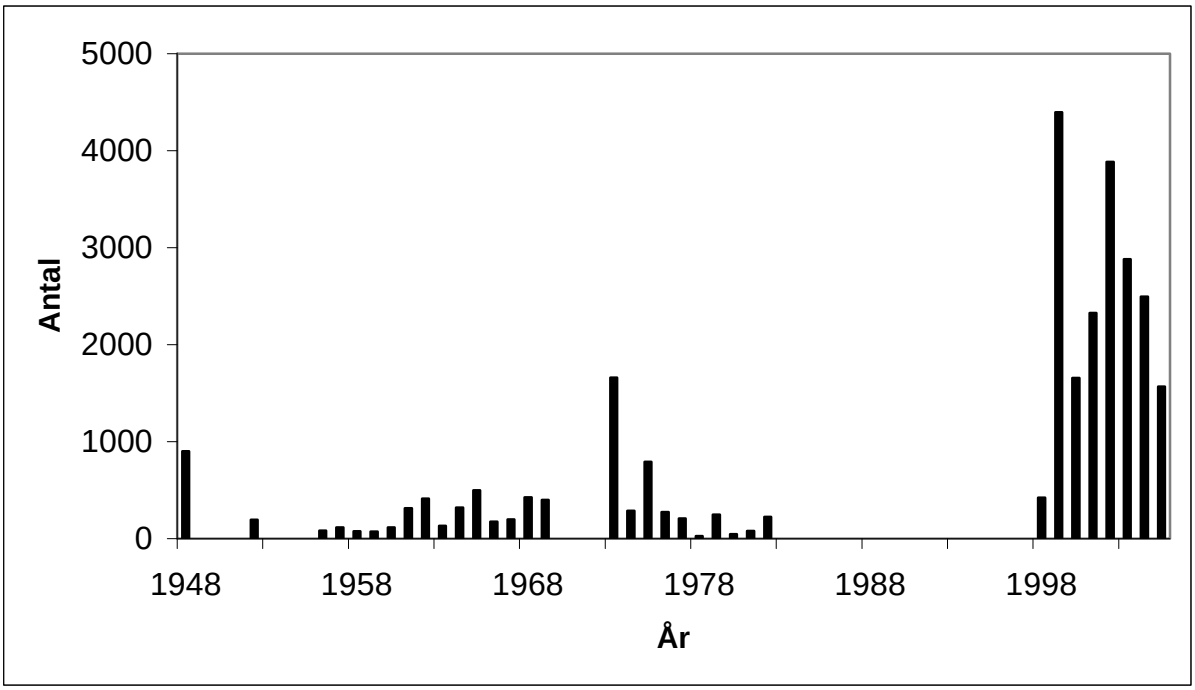

Figure 2. Number of sea trout smolts caught in the trap in River Kävlingeån, Subdivision 23; The Sound. The increase in the number of smolts is mainly due to improved water quality.

In the River Sävarån, north of Umeå in Subdivision 30, a smolt sampling programme was initiated in 2005. This is part of the SAP (Salmon Action Plan). The efficiency of the smolt trap is estimated and smolts are aged.

Institution responsible for collection of data (field sampling)

Electrofishing is used for environmental monitoring by regional authorities in several streams with sea trout. National sea trout sampling is mainly carried out in salmon rivers as a part of the Salmon Action Plan. Responsible institutions are the Swedish Board of Fisheries in collaboration with regional authorities (Counties).

All data are stored and quality assured in SERS (Swedish Electrofishing RegiSter) at the Institute of Freshwater Research at the Swedish Board of Fisheries. SERS today contains 37 000 fishing occasions from all over Sweden. Field data along with individual fish lengths are recorded.

Smolt data is only collected from River Sävarån within the Salmon Action Plan. The responsible Institute is the Institute of Freshwater Research at Swedish Board of Fisheries in cooperation with Swedish University of Agricultural Sciences, Umeå. Data from the two regionally operated smolt traps are available on request.

Institution responsible for compiling and reporting recruitment data

The Institute of Freshwater Research at the Swedish Board of Fisheries.

Main purpose of data collection

The major part of the trout data is collected for environmental monitoring, either as a follow up of liming of acidified streams or as a mean to establish ecological status according to the Water Framework Directive or national goals. Ecological status is determined according to Beier *et al.*, 2007 (formerly according to Appelberg *et al.*, 1999).

The larger rivers with salmon also have extensive electrofishing programmes as a part of Salmon Action Plan. In the 75 main streams presented with monitoring in this report SAP funds monitoring in 15. They are generally large (>1100 km² catchment area).

Level of sampling

In the 124 streams and rivers with long-term monitoring (Table 1) the average number of sites per stream was 4 (Figure 3). Naturally, the number of sites increases with stream size. In the smallest streams only 1–4 sites were visited annually, whereas 10–24 sites were visited in the larger salmon rivers. In total 498 sites are available.

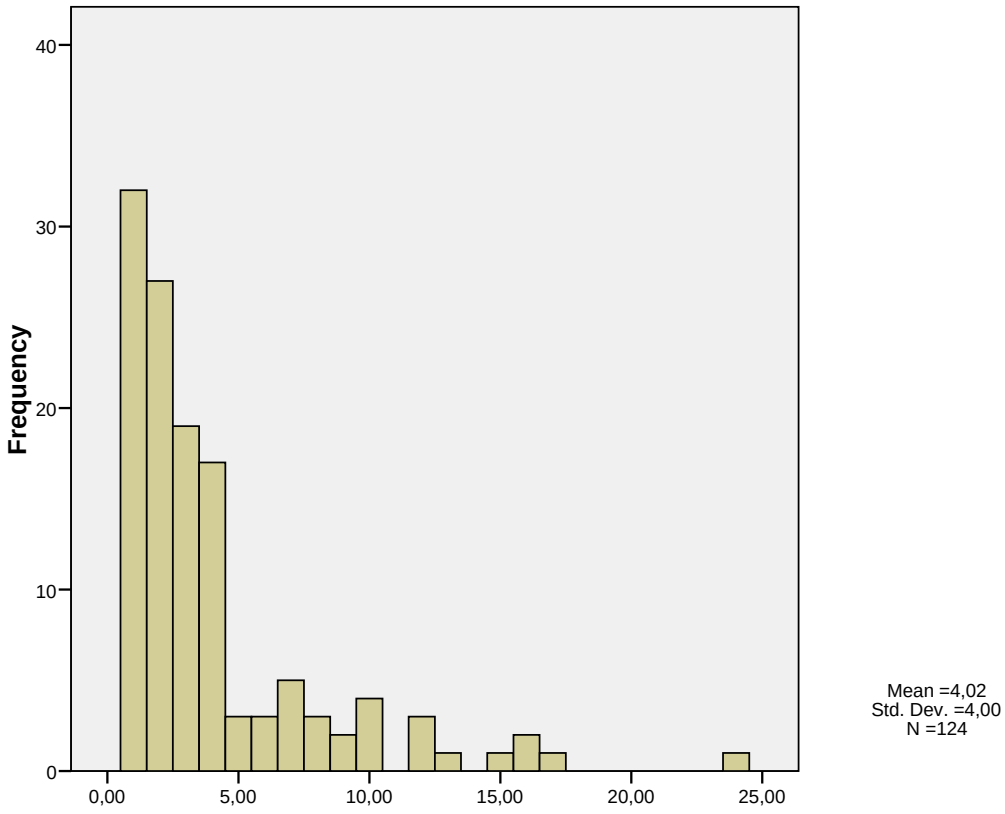

Figure 3. Number of sites with long-term monitoring per stream in the 124 streams presented.

Only data for the period 1990–2007 were included in this report. Totally for the 124 streams there were 5083 fishing occasions registered.

Sampling is not done to facilitate production estimates; instead focus in regional programmes is on environmental monitoring. For the national part of the sampling programme the focus is mainly on Atlantic salmon and important tributaries for trout are not sampled. Following, the coverage of the productive area of sea trout is low in certain areas.

Level of precision

Referring to electrofishing the precision, sampling accuracy and performance of field crews are generally according to Swedish standards. This means that electrofishing data generally are of good quality. A single run (one pass) was used at 45% of fishing

occasions, whereas multiple (2–4) runs was used at 55%. The average sampled area was 440 m^2.

When electrofishing, fish are measured to nearest mm, but not weighed or sexed. Extensive data are collected regarding the fishing procedures, stream characteristics and the surrounding riparian area.

Separation of underyearlings (0+) and older fish (>0+) is done from length frequencies.

Only one (of three smolt-traps) has an adequate programme for checking efficiency.

Practical limitations

There is no national programme strictly for sampling of trout production, neither through electrofishing or smolt sampling. So there are large limitations in respect of available resources at the national level. Cooperation with regional authorities is good regarding reporting of data and planning.

Suggestions for improvements

A national sampling programme for sea trout recruitment has to be established in cooperation with regional authorities. Focus should be on securing and enhancing the long-term monitoring programmes in streams presently operated regionally, e.g. by ageing of older parr, adding sites to cover the whole productive area. Further smolt production estimates need to be improved in the two streams with regional programmes (e.g. by ageing of smolt, extensive electrofishing, and efficiency estimates of the traps). Additional streams with smolt traps needs to be established to get an adequate coverage of the coast line, preferably one in each ICES subdivision. When possible the use of stock-recruitment modelling should be used, but this requires data on ascending spawners which is lacking in two out of three presently operated smolt traps.

It is suggested that Index rivers for sea trout is established in the same manner as has been done for salmon rivers. As the sea trout streams are much smaller and regional programmes are already operating this could be done at a comparatively low cost.

A smolt production model is under development for lake trout. This could be extended to sea trout but requires data on actual smolt production for field validation.

It is suspected that mortality in the Bothnian Sea and Bay is large due to bycatches, especially in the net-fishing for whitefish (Degerman and Petersson, 2007). Data on movements, feeding and mortality of post-smolts and sea trout in the sea are generally low. Tagging experiments are generally only carried out with reared smolts, and may be of limited value. To address the problem with high sea mortality research is required and long-term monitoring and tagging of catches in coastal traps is suggested.

On catches

There is a low interest in sea trout from the commercial fishery, whereas sport fishing and non-commercial net fishing are more popular. A national survey (Svenskt Fiske 2005) of 7000 fishermen (non-commercial) showed that recreational fishing (rod) was the main source of Swedish catches in 2004 (Table 2). National catch statistics is aimed at the commercial fishery (7% of total sea trout fishery). From the sport fishing and non-commercial fishery annual catch statistics is present only from some of the larger rivers.

Table 2. Estimated catch of sea trout in Sweden (including also the west coast) in 2004 (in tons) according to a national survey and catch statistics from commercial fishery.

SPORT FISHING (ROD)	336 TONS (68%)
Non-commercial (nets & traps)	124 tons (25%)
Commercial fishery	33 tons (7%).

The amount of the catch of sea trout taken by nets and traps increases in the northern parts of the Baltic Sea (Table 3). The higher the proportion of non-commercial catch with nets and traps the weaker the stock status.

Table 3. Proportion (%) of the total Swedish catch of sea trout in the Baltic Sea taken by non-commercial fishery in 2004 according to a national survey.

AREA	SPORT FISHING	NETS AND TRAPS
The Sound	90%	10%
Main Basin	68%	32%
Bothnian Bay and Bothnian Sea	52%	48%

Types of fishery

In the open sea only commercial fishing is carried out and catch statistics is available. In the coastal area the catch of commercial fishermen is reported, whereas non-commercial catches are unknown. The latter are presumed to be larger than the commercial catch (Table 2). Professional gear as salmon traps are widely used by non-commercial fishermen (fishing-right owners), but their use is regulated both in numbers and fishing season. Non-commercial trolling is mainly carried out in the Main Baltic, both in the open sea and on the coast. The extent is unknown, but inquiries have been sent out to trollers participating in larger tournaments in 2002 and 2006 (Hammargren and Carlsson, 2007). The average catch (all species, mainly salmon and to a lesser extent trout) of a troller was 62 kg annually (an average of 200 fishing hours per year).

Bycatches of trout are largely unknown but it has been suggested that they may be high, especially in the net-fishery for whitefish. Bycatches are not reported in any extent from the commercial fishery. A compilation of data from commercial coast fishing with whitefish nets in 2002–2003 showed extensive bycatches (Figure 4).

Aside of whitefish 18 other fish species as well as sea birds and seals were caught. Two percent of the catch weight was sea trout.

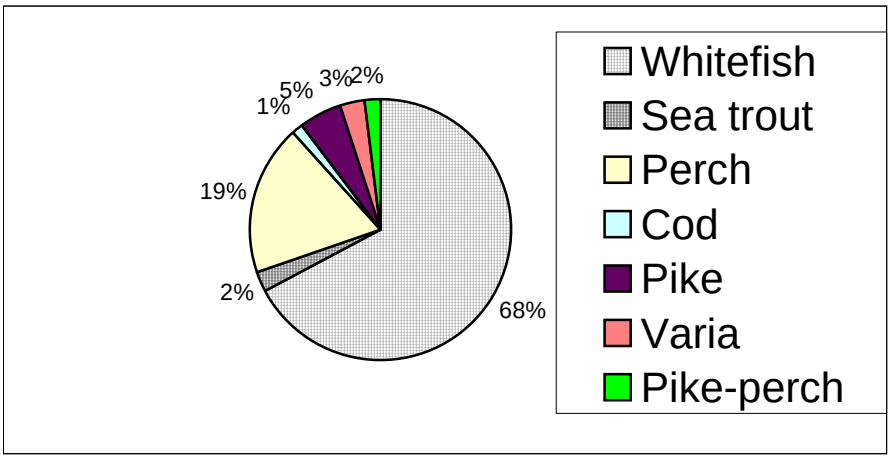

Figure 4. Catches (by weight) in commercial fishing with whitefish nets during 2002–2003 according to log books in Swedish coastal fisheries (Degerman and Petersson 2007).

In streams and rivers recreational angling is important. Catch statistics is available from the larger rivers with salmon. Some of the smallest streams are not used for fishing. The Swedish Board of Fisheries is at present investigating the possibilities for expanding the catch statistics to some of the medium-sized rivers (Stridsman, 2007).

Types of gear used

In the open sea drift-nets were formerly used together with long-lines. On the coast net-fishing for whitefish, perch, pike-perch and trout (Figure 4) is carried out by both commercial and non-commercial fishermen. The main catch in the former category are taken with salmon traps. Recreational trolling is mainly carried out in the Main Baltic.

In freshwater angling with rod is important, but net-fishing is allowed in a few of the larger rivers.

Fishing effort

Fishing effort is only monitored for the commercial fishery (traps, long-lines, nets). It might be possible to get detailed data from the rod-and-line fishing in some of the non-salmon rivers (Stridsman, 2007).

Origin of data

Catch statistics are collected by the Swedish Board of Fisheries for commercial fishermen. For the larger salmon streams total catches of salmon and trout, separated, are gathered annually often in cooperation with local fishing associations or fishing-right owner associations. For streams without salmon no catch statistics are collected annually. Neither is catch statistics present for the non-commercial fishery on the coast (trolling, traps, nets, rod-and-line etc), but the magnitude of the trap-fishery is estimated from average catch in the commercial fishery and surveys of the number of traps used.

Institution responsible for data collection

Swedish Board of Fisheries for commercial catches. The Institute of Freshwater Research at the Swedish Board of Fisheries compiles data from freshwater catches in the larger salmon streams.

Institution responsible for compiling and reporting catch data

As above.

Level of precision

The precision is largely unknown, but suggested to be adequate for freshwater catches in the larger salmon rivers. Otherwise no annual data is available for non-commercial catches. The catch in traps on the coast is estimated from the number of traps in use. National inquiries are performed every fifth year to estimate non-commercial fishery. Regionally also inquiries are undertaken at irregular intervals to estimate non-commercial fishing. Generally these inquiries have large uncertainties in catch figures.

Fish size/age

Fish size is only available as average weight and only in some fisheries. There is a good opportunity to improve this data set using data from fish ladders, breeding stations and sport fishery.

Other biological sampling

No monitoring programme on genetics or diseases is operating.

Practical limitations

Catches and efforts from the recreational fishery is generally not gathered in Sweden, although non-commercial fishing can be of great importance, especially for a species like sea trout (Tables 2 and 3). During 2008 a test will be run on the Swedish west coast (Subdivision IIIa) with voluntary fishing statistics reported by non-commercial fishermen.

Suggestions for improvements

A programme for improved catch statistics from the non-commercial fishery must be initiated covering all coast areas. As it is not realistic to allocate resources to this each year an inquiry program with a 3-year interval could be run. The reporting should be validated with field observations.

An improvement of bycatch reporting would also be important, but these data are difficult to achieve and are often of uncertain quality. A mean of gathering such data are test-fishing with appropriate gear. This will not have to be done annually.

Management measures

The management of sea trout has large regional differences, not reflecting differences in biology of trout, but rather regional traditions and the focus of dominating fisheries, e.g. with increasing fishing for salmon in the northern parts.

Recently the minimal size of sea trout was raised from 40 to 50 cm in the Bothnian Bay (ICES Subdivision 31). Presently the minimum size therefore is 50 cm in whole Swedish part of the Baltic Sea, except in Bothnian Sea (ICES Subdivision 30) where it

remains 40 cm. The latter has no biological ground as trout at first spawning generally are 50 cm or longer.

In the Main Baltic (Subdivisions 23–29) closed areas are frequent in the estuaries during spawning. In the Bothnian sea (30) and Bothnian Bay (31) normally only larger salmon rivers have closed areas. Instead all rivers and stream have an area 200 m from the mouth were fishing is prohibited during 1 September to 31 December.

Closed season in Subdivisions 23–25 is 15 September to 31 December. In subdivision 31 it is from 1 October to 31 December. In Subdivision 30 (Bothnian Sea) no closed season is present.

To protect the weak stocks in the Bothnian Bay a ban on net fishing in shallow water (0–3 m) is present since 2006 during 1 April – 1 June and 1 October – 31 December.

Long lines (and driftnets) are not permitted in the coastal fishery in the Swedish fishing zone.

In the rivers and streams regulation differs among rivers, but generally fishing is prohibited during the spawning period in fall.

Other information

Tagging experiments or monitoring programmes

Tagging with Carling tags is almost only carried out with reared trout used in order to check stocking outcome. However, tagging of wild smolts is carried out in River Sävarån. The return rates of reared smolts have declined over several decades and are now low.

Smolt migration loss in streams and lakes is studied in River Kävlingeån (The sound, Subdivision 23) in the years 2006–2009. The result will, amongst other things, be used to improve a smolt production model for lake trout under development. The model combines electrofishing data, estimated winter mortalities and estimated migration mortalities with a simple habitat description. A similar work is carried out in River Sävarån.

Ascending spawners

Ascending spawners are registered in 14 streams (Table 4). At present more and more of manual handling is left to ladders with photo-cells. This means that data on the spawners becomes less accurate over time, regarding e.g. species, sex, injuries, tags. A programme for quality assurance of spawner data needs to be established.

Table 4. Rivers and streams with counting of ascending spawners of trout and salmon in Sweden.

River	ICES Div	Method	Distance from mouth (km)	Place	Tributaries downstream	Stocked/Wild
Råån	23	Procounter	3.2 km	Skönarps-dammen	Yes, 2 small	Wild
Höje å	23	Procounter	20 km	Kornheddinge	Yes, several	Wild
Nybroån	25	Procounter	?	?	No	Wild
Mörrumsån	25	Vaci	13 km	Marieberg	No	Wild
Emån	27	?	5 km	Mouth	No	Wild
Själsöån	27	Manual	0 km	Mouth	No	Wild
Åvaån	27	Manual	0 km	Mouth	No	Wild
Selångersån	30	Manual	12 km	Sättna	Yes, 1 small	Wild
Vindelälven/Umeälven	30		16 km	Stornorrfors	No	Stocked/Wild
Sävarån	30	Vaci		Sävar	No	Wild
Byske älv	31	Procounter	38 km	Fällfors	Yes	Wild
Åby älv	31	Vaci	39 km	Hednäs	Yes	Wild
Pite älv	31		40 km	Sikfors	Yes	Wild
Kalix älv	31	Vaci	110 km	Jockfall	Yes	Wild

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National report Finland – 14.02.2008 – SBALANST

Eero Jutila, Ari Saura and Ville Vähä

Finnish Game and Fisheries Research Institute

On recruitment:

Methods used in data collection

For estimating the recruitment from the sea trout rivers, smolt trapping and mark-recapture method has been annually used only in the Tornionjoki river and in some years in its tributaries Pakajoki and Äkäsjoki. Some trials of smolt trapping have been done also in the Isojoki river. As a smolt trap can be put in the river just after the breaking up of ice when the highest spring flood is over, the early part of the migration has commonly been lost and cannot be estimated. There are no trapping data or other data on the characteristics of the smolts in other rivers.

In estimating the recruitment, the parr density (0+ and >0+ parr) based on electrofishing (Jutila *et al.*, 2006) and the total area of spawning and nursery areas are available for each river. The precise smolt age is available only for very few rivers, but can be roughly estimated on the basis of the neighbouring rivers or sea areas or based on the age structure of >0+ parr found in the river. There are no direct data on the survival from parr to smolt. There are results on survival of reared 0+ parr to 1+ sea trout parr (mean 21%) from the Vantaanjoki River, southern Finland. In salmon, the survival from parr to smolt among reared parr in the Simojoki and Tornionjoki rivers was about 6% among one summer old parr and 12–19% among 1 yr old parr. On the other hand, preliminary data from the trapping of sea trout smolts in the Äkäsjoki have shown much lower survival than observed by reared salmon. However, the survival of wild parr may be higher than among reared parr. Estimates of the recruitment can thus be given very roughly.

Another way to estimate the level of recruitment is to take the highest documented parr densities (wild or reared 0+ parr in a rapid) as the potential level, which the rivers could maintain. Thus the observed mean parr density can be presented as a percentage of the potential and assess in that way the present status. Both ways allow only estimating a rough level of the recruitment. The present parr densities anyway show a very low level of recruitment, which may be sufficient to assess the present status of the sea trout stocks.

Institution responsible for collection of data (field sampling)

Finnish Game and Fisheries Research Institute, Regional Environment Centres, Employment and Economic Development Centres

Institution responsible for compiling and reporting recruitment data

Finnish Game and Fisheries Research Institute

Main purpose of data collection

The main purpose of the data collection is monitoring of trout densities in sea trout rivers.

Level of sampling

The number of sampling sites is sufficient in relation to the productive area. In the Gulf of Bothnia Rivers the data are collected annually in the remaining sea trout rivers. In the Gulf of Finland rivers the data are collected annually in most of the rivers, but in some smaller rivers only every third year since the 2000.

Level of precision

The level of precision is commonly adequate for the purpose. In rainy years when the water level is high the level of precision has been lower than normally.

Practical limitations

The annual monitoring of the rivers running into the Gulf of Finland has been limited only in the most important ones due to shortage of financial resources and available manpower. Other rivers have mostly been monitored only every third year in turn. The monitoring of the potential rivers along the coast has also been limited by the shortage of financial resources and manpower.

Suggestions for improvements

Despite of the Tornionjoki river system, the absence of smolt trapping is a big problem in assessing the smolt production of the sea trout rivers in Finland. Therefore, one index river should be established in each ICES Sub basin for monitoring the status in the wild sea trout populations and for assessing their annual smolt output. The monitoring should include electrofishing, smolt trapping, counting of ascending spawners and, when needed, also environmental monitoring. Due to the short migration patterns and differences in fishing of sea trout, index rivers are needed in all the Baltic Sea countries.

On catches:

Types of fishery

Almost all sea trout are caught as bycatch of whitefish, pikeperch and other fish species. Only in the eastern part of the Gulf of Finland exists such fishing (with bottom gill nets) which is targeted solely on sea trout.

Depending on the sea area, 70–90% of catches are taken by non-professional fishing, including recreational fishing and unreported catch (“grey fishing”), in the sea and on the coast. The rest is caught in commercial fishing. Only few percents of the catch is caught in rivers with angling in recreational fishing. Just in some few rivers, like the Tornionjoki and Kymijoki, the proportion of the river catch has been larger, especially in those years when the sea catches have been poor.

Types of gear used

About 75% of the fish are caught with the bottom gill nets. Secondly important gears in the Gulf of Finland and in the Archipelago Sea are rod and line and in the Gulf of Bothnia fyke nets and bag nets. River fishing of sea trout is almost totally performed by rod fishing (Jutila *et al.*, 2006).

Fishing effort

Monthly fishing effort by gear and by ICES sub divisions is available in the commercial sea fishing. The recreational fishing statistics report the annual total number of fishing days by gear types in each sea area. However, because a great majority of sea trout are taken as a bycatch in fisheries targeted on other fish species, these statistics describe only the overall development of fishing effort in the sea fishery, not necessarily that of sea trout. Fishing effort in the river fishing is also available from the Tornionjoki and Kymijoki rivers.

Origin of data

Monitoring of catches and fishing effort in commercial fishing in the sea is based on the logbooks kept by the commercial fishermen. Delivery of logbook data is obligatory for commercial fishermen. The recreational fishing statistics are based on a national sampling survey performed every second year since 1998. In addition, sea trout catch have been surveyed annually in the Tornionjoki River and some catch data from the Kymijoki River have been received from voluntary logs kept by fishermen.

Institution responsible for data collection

Finnish Game and Fisheries Research Institute, for fisheries control data Ministry of agriculture and forestry

Institution responsible for compiling and reporting catch data

Finnish Game and Fisheries Research Institute

Level of precision

In catch statistics, the level of precision is probably rather good in commercial fishing based on logbooks. However, especially regarding the undersized trout, the proportion of nonreported "grey" catch may be higher than among fish of legal size. Also trout damaged or eaten by seals in the gill nets and fyke nets may be missing in the catch statistics. In the sampling survey of recreational fishing, the proportion of those households, which have caught sea trout is mostly so low that the catch estimates are not very reliable, including depending on the sea area, a great variation (often >50%).

In Carlin-tagging, the recoveries of undersized fish may be reported less than those of legal size both among professional and recreational fishermen.

Fish size / age

The main source of information on fish size/age is recovery data from Carlin-tagged fish. Some data have also been collected in EU data collection programme from the commercial sea fishery and in the Tornionjoki river system from the river fishing.

Other biological sampling

Genetic samples has been taken from parr in rivers and from ascending spawners used for egg production for establishing brood stocks in the hatchery.

Practical limitations

To improve the reliability of the estimates on catch taken in recreational fishing the proportion of sampled households in the survey should be increased but is impossible for financial limitations. Catch statistics in many rivers in southern Finland, like in the Isojoki ja Vantaanjoki are very poor, imperfect or missing due to shortage of money.

Suggestions for improvements

The voluntary reporting of sea trout catches in the sea and river fishing should be promoted among recreational fishermen. In sea trout rivers, reporting of the catch should be obligatory and provided when the fishing licence is paid.

Management measures

Legal catch size in the sea and rivers ≥40cm (total length), but in the county of Åland it is ≥50cm. In the sea, 1/3 of the main stream or legally marked fish passage must be kept open at the river mouth. There is 80 mm minimum mesh size (bar length) in surface gill nets targeted for sea trout. Off the private shore near waters in the Gulf of Finland, 65 mm is the minimum mesh size (bar length) in bottom gill nets targeted for sea trout, minimum length 50 cm. Many of the private water owners (so called fishery areas) have enforced 60 mm minimum mesh size for bottom gill nets in sea trout fishing in the Gulf of Finland, respectively. In the Gulf of Bothnia, some private water owners (fishery areas) have their own minimum mesh size in gill nets. At the mouth of a few sea trout rivers, private stakeholders have enforced a closed season for gill netting in summer and autumn. In the county of Åland, fishing from the shore by spin fishing is prohibited from 15 April to 15 June.

In the river, angling with worm is forbidden in rapids. Gill net fishing is forbidden in most of the sea trout rivers. 1/3 of the main stream must be kept open in gill netting or fishing with fixed gear. Fishing with gill nets is forbidden 1 September – 30 November. Rod fishing is forbidden 11 September – 31 November.

Other information

Tagging experiments or monitoring programmes.

At present, at least 2 000 Carlin-tagged smolts are annually released in each Sub basin by Finnish Game and Fisheries Research Institute including in EU data collection programme. In addition, annually varying numbers of Carlin-tagged smolts are released connected to compensatory releases and stocking experiments. In the county of Åland, 500–2 500 Carlin-tagged smolts have been released annually in the 2000s. Factors affecting the survival of the hatchery-reared sea trout are studied by Kallio-Nyberg *et al*. (2006, 2007).

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National report Russia – SGBALANST

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On recruitment:

Methods used in data collection.

The Luga River is the only river where the smolt trap is used. To estimate of total smolt run size annually the smolt sampling was carried out at 12 km from the mouth of Luga River. The local sea trout populations inhabits as minimum as 5 tributaries of the Luga River. To collect data on recruitment in those tributaries we use electrofishing of parr.

In all of the single systems of GF we use electrofishing also.

Institution responsible for collection of data (field sampling).

State Research Institute of Lake and River Fisheries (GosNIORKh); Lab. of Salmon Population Monitoring

Institution responsible for compiling and reporting recruitment data.

State Research Institute of Lake and River Fisheries (GosNIORKh)

Main purpose of data collection

The main purpose of data collection is the monitoring of trout densities. The data collection is used for genetic studies also.

Level of sampling

In the main single systems and in the tributaries of the Luga River the data are collected annually. In some of the small brooks the data are collected each two years.

For some of monitored rivers the number of sites examined is not sufficient.

Level of precision

The level of precision known is sufficiently well not always.

Practical limitations

Yes, the main practical limitation is financial. Because we have not got the National Monitoring. Program.

Suggestions for improvements.

A National Monitoring. A Program that would be financed is needed.

On catches:

The sea trout is a protected species in the Russian part of the Baltic Sea and that is why the fishing of spawners was not carried out at all. The only information about the sea trout adult is the information from the unreporting bycatch.

Types of fishery

Types of gear used.

Fishing effort.

Origin of data

Institution responsible for data collection.

Institution responsible for compiling and reporting catch data.

Level of precision

Fish size / age.

Other biological sampling

Practical limitations

Suggestions for improvements.

Management measures.

Other information.

Tagging experiments or monitoring programmes.

Other relevant information.

National Report Estonia – SGBALANST

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Estonia

On recruitment:

Methods used in data collection.

For parr density estimation, electro fishing in permanent monitoring stations is performed annually or in some cases biannually (111 sites in 58 rivers in 2007). The study group consists of three people and fieldworks usually begin in the middle of August and end in October (i.e. season lasts about 2.5 months). On the monitoring sites two sweeps with 30–40 minute interval are made; the site is not closed with nets. This method can be considered precise enough as rivers are small and catching efficiency is good. The total length (TL) is measured in all fish, scale sample is taken only from the larger (1+ or older) fish. Captured fish are released after sampling.

Smolt production is largely unknown, as nursery areas, winter mortality and the exact age composition of smolts are unclear. Smolt trapping in the river Pirita was initiated in 2006 and will continue in the future. The primary aim of trapping is to estimate the abundance of salmon smolts, but trout smolts are also caught. The trap covers about 1/3 of the river width. Caught smolts are sampled (TL, TW, scale sample), tagged (VIE tags) and released 2 km upstream. Total smolt abundance is calculated from recapture percentages.

A new project of measuring, mapping and estimating the quality of all spawning and nursery areas in all sea trout rivers and streams started in 2007. The project will last about 3–4 years.

Institution responsible for collection of data (field sampling).

Estonian Marine Institute, University of Tartu

Institution responsible for compiling and reporting recruitment data.

Estonian Marine Institute, University of Tartu

Main purpose of data collection

Main purpose for data collection is monitoring the state of salmon and sea trout populations. So far smolt abundance estimation is carried out only for salmon.

Level of sampling

Given the limited manpower available the amount of monitored stations is reasonably high and sufficient. Some rationalisation may be needed e.g. less important streams could be monitored biannually and more annual stations could be sampled at more important rivers.

Level of precision

For density estimation precision is adequate as rivers are small and catching ability is good.

Practical limitations

At the moment manpower would be the limiting factor; however, currently the set tasks are met.

Suggestions for improvements.

More information in needed about: the size and quality of the nursery areas, winter mortality and age composition of smolts.

On catches:

Types of fishery

Most of the sea trout is caught on the coast. Coastal fishery consists of recreational fishery using gillnets and commercial fishery (gillnets, trapnets). Most rivers are closed for fishery, recreational fishing only with special licences is allowed in seven rivers. There is no open sea fishery for sea trout and salmon in Estonia.

Types of gear used.

Fishing effort.

Origin of data

Commercial fishermen must report caches and summed fishing effort for different gear type on monthly basis. Recreational fishermen using professional gear must report total caches after licence expires; however, fishing effort is not reported. Recreational fishermen most report catches only when fishing sea trout or salmon in rivers.

Institution responsible for data collection.

Ministry of Agriculture (commercial catches),

Ministry of Environment (recreational catches)

Institution responsible for compiling and reporting catch data.

Ministry of Agriculture (commercial catches),

Ministry of Environment (recreational catches)

Level of precision

There is no information about the precision of reported catches, however misreporting is considered to be high.

Fish size / age.

Size and age information is available only in sampling program of Estonian Marine Institute (see next chapter).

Other biological sampling

For genetic studies samples are collected during electro fishing.

Estonian Marine Institute collects biological data from commercial fishermen since 2005 (gear type, TL, TW, scales, clipped adipose fin, seal damages etc.).

Practical limitations

Biological samples are relatively small, as coastal fishery is scattered and operates on small scale.

Suggestions for improvements.

More precise estimation of misreporting is needed.

Management measures.

Legal catch size in the sea and rivers in ≥50 cm (TL) or 45 cm (SL)

In the sea

- Limited number of gears.
- 2/3 of the strait must be kept open.
- 35 mm minimum mesh size (bar length) in gillnets.
- 24 mm minimum mesh size (bar length) in cod end in trapnets with leader net.
- A closed area and closed season for fishing is set at the mouth of the sea trout rivers as follows:

  1000 m in 11 rivers all year round

  500 m in 17 rivers and brooks from August 15th to December 31st

  500 m in 24 rivers and brooks from September 1st to November 30th

In the rivers

- Gillnets and trapnets are forbidden in all sea trout rivers.
- In salmon rivers, rod fishing for salmon and sea trout is forbidden from 1 October to 30 November.
- In sea trout rivers, rod fishing for sea trout forbidden from 1 September to 31 October.
- Wading is forbidden in salmonids' spawning rivers during the closed season.
- Fishing in 26 rivers and brooks is forbidden all year round.
- Fishing in 11 rivers is forbidden downstream from first definite migration obstacle.
- Fishing in fish ladders and 50 m upstream is forbidden.
- Fishing downstream from dams in distance of 100–500 m is forbidden.

Other information.

Tagging experiments or monitoring programmes

Small scale Carlin tagging of reared smolts is carried out annually.

Other relevant information.

National Report Latvia – SGBALANST

Janis Birzaks

Recruitiment (monitoring system)

The smolt trapping in the river Salaca was carried out since 1964 till now. Smolt number is calculated from mark– recapture results using streamer tags. Every year ~1000 sea trout smolt tagged (50–80% from caught smolts).

Trapping and tagging procedure:

- every day checking of trap;
- tagging carried out if at least 50 salmon and sea trout smolts caught;
- tagged fishes are transported ~2 km upstream and released in day time.

Institution responsible is Latvia Fish Resources Agency.

Smolt trapping in the river Salaca was including in State Biodiversity monitoring system as part of special (salmon) monitoring from 2005. Before that smolt trapping was provided in the framework of fisheries issues.

Electrofishing of sea trout parr densities (same with other species) has been carried out since 1992. In total 10 sites in riffle and 10 in pool areas were fished in the river Salaca every year. Number of stations seems to be sufficient in the main river. More effort would be necessary to cover the small brooks and rivers.

Range of monitoring is limited by 2 factors:

- financial;
- technical and human resources.

Effort and financing in river fish monitoring in Latvia (year 2006)

TYPE OF MONITORING	NUMBER OF RIVERS	NUMBER OF STATIONS	MAN–DAYS	FINANCING (EUR)
1.Special monitoring (salmon and sea trout)				18500
1.1.Electrofishing	10	48	60	
1.2.Smolt trapping	1	1	70	
2.Background monitoring	28	56	68	

All together in Latvia in 2007 2.4 ha electrofished, 1 ha in salmon and sea trout rivers (10 rivers).

Fisheries data collection

Sea trout data collection included in Latvia national DC programme since 2006.

"For herring, sprat, salmon (coastal fishery), sea trout and eel (coastal fishery) in the Baltic Sea area the collection of the random samples from unsorted catches for length and age will take place in fishing harbours."- DCP 2007.

Data collection organization

The Latvian sea trout landing statistics are based on the logbooks from coastal and river (Daugava) fisheries. Catch data from a small scale recreational fishing in the River Salaca and River Venta is based on questionnaires. This data are not included in catch statistics.

Logbooks were collected once per month by local inspectorates of State Environmental Service and transmiteed to LFRA. Logbooks data input carried out in LFRA and stored in database.

National fisheries data base are administrated by Latvian Board of Fisheries of Ministry of Agriculture.

Biological sampling

Sea trout sampling from 2006 organized by employing of fishermen's- observers. Biological data collected directly in the boat or immediately after comeback to the harbour.

Sampling carried out near the largest rivers outlets- the rivers Salaca, Daugava, Venta. Biological sampling of sea trot includes registration of fishing data (date, gear, location), fish data (length, weight, sex (in summer- autumn fisheries), scale sample. In total 300– 600 sea trout sampled every year, what exceeds DCP requirements.

To get the more detailed information samples from undersize sea trout bycatch collected too.

Responsible organization– LFRA.

Sea trout sampling in Latvia 2007.

ICES Subdivision	ICES square	Region	Number of sampled fish
28	44H4	Gulf of Riga (River Salaca outlet)	307
28	43H4	Gulf of Riga (River Daugava outlet)	160
28	43H1	Main Basin (River Venta outlet)	43

Lithuania National Report – 5.02.2008 – BALTIC SEA TROUT SGBALANST

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University of Klaipeda, Institute of Ecology of Vilnius University, Lithuania

Methods used in data collection and estimation of smolt numbers.

Collection of data on recruitment of sea trout have been carried out using the electrofishing and assessing of number of parr in the rivers. Additionally smolt trapping have been carried out in three rivers: Mera (Žeimena catchement area), Siesartis (Sventoji catchement area) and Veiviržas (Minija catchenment area). The number of smolts have been estimated from the 0 + parr number in two years before, the mortality coefficient - 0.4 and for corrections some times 1+ parr number in one year before, mortality coefficient – 0.6. Works on salmon and sea-trout assessment have been carried out in accordance with Lithuanian Salmon Action Plan, 1997 – 2010.

Collection of data on recruitment of sea trout. Methods and monitoring structure in Lithuania

REGULAR MONITORING	METHODS	RIVERS	SITES	RESPONSIBLE INSTITUTIONS
Monitoring of parr abundance of salmonids	Electrofishing	60	~100	Institute of Ecology, University of Klaipėda
Monitoring of smolt migration	Smolt traping	Mera, Siesartis and Veiviržas	3	Institute of Ecology, University of Klaipėda

Institutions responsible for collection of data (field sampling).

Two institutions are responsible for the collection of data: Southeast Lithuania – Institute of Ecology, Vilnius University and Western Lithuania – Klaipeda University.

Institution responsible for compiling and reporting recruitment data.

There is no such institution appointed. The data are collected in the universities performing field researches. Compiled data are collected in the Environmental Protection Agency.

Main purpose of data collection

The data are collected according to the unified monitoring system. Its main aim is to assess status of sea trout and its dynamics in the inland water bodies of Lithuania. These data are used for the environmental monitoring too.

Level of sampling

Number of field stations is minimum sufficient. Sites were chosen according to the size of rivers and the size of productive habitats. The status of sea trout stocks in some rivers could be estimated more precisely having additional sampling sites.

Level of precision

We think that precision is sufficient when assessing by electrofishing methods. Researchers involved in the monitoring works are well qualified and experienced in electrofishing equipment and methods. The precision may be influenced by natural dynamics of ecological factors – water level and clarity, flooding, water temperature and other factors.

Practical limitations

The works are financed by Environmental Protection Agency. Main problem is a lack of funds.

Suggestions for improvements.

The data base should be implemented and procedures of data input should be developed. The status of sea trout stocks in some rivers cud be estimated more precisely having additional sampling sites.

On catches:

Types of fishery

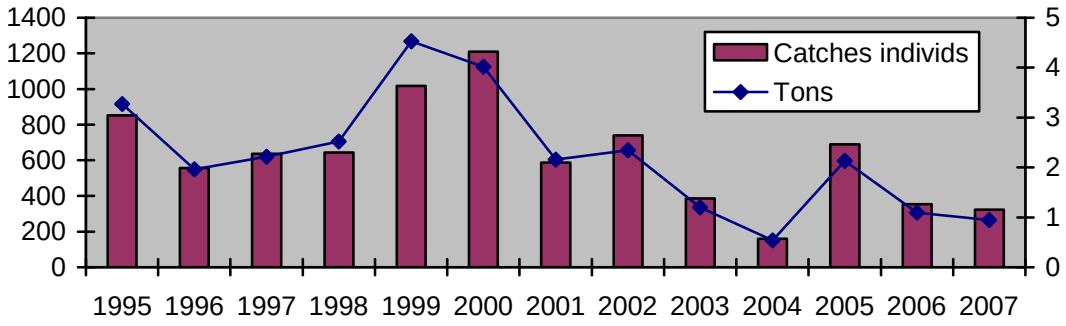

Figure 1. Commercial catches of sea trout in the Baltic Sea and Curonian lagoon.

A specialized fishery of sea trout in Lithuania is not carried out. Most often sea trout are caught in the coastal area and Curonian lagoon as a bycatch in the fishery of other species. Mean catches of Lithuanian fishermen there are 627 ind. of Sea trout, which weight approx. 2,224 tones. In 2007 Lithuanian fishermen caught 323 sea trout (0,948 t) in coastal fishery, majority of sea trout are caught together with salmon. Biggest share of sea trout was caught in Curonian lagoon - 253 (0,754 t) individuals. In the rivers 87 (0,259 t) were caught for artificial rearing. Angling is allowed in the rivers based on licenses. Fishing terms, allowed numbers and water bodies are established.

Types of gear used.

Mainly is used gill nets and hook and line.

Fishing effort.

Fishing effort is not monitored due to the absence of commercial fishery of sea trout.

Origin of data

The catch data in Curonian lagoon and Baltic Sea coast (boats not bigger as 8 meters) is reported for the responsible institution from logbooks monthly. The catch data from the boats bigger as 8 meters is reported from EU vessel logbook during 48 hours after landing.

Institution responsible for data collection.

Ministry of Agriculture, Department of Fisheries and inspection are responsible for the control of sea trout fishery in the Baltic Sea.

Ministry of Environment and inspection are responsible for the fishery in the Curonian lagoon and inland waters (rivers too).

Institutions responsible for compiling and reporting catch data.

Department of Fishery, Ministry of Agriculture.

Level of precision

All catches are indicated in logbooks which are reviewed by the State inspection of environment protection. The level of precision is adequate. It is suggested that more sea trout are caught than indicated. Some of the catches might be cancelled. There are cases of poaching, especially during spawning migrations in the rivers. It is no discards of sea trout at all. The information on misreporting and unreporting is not known.

Fish size / age.

This information is collected only by researchers and also in the hatchery during artificial breeding when wild spawners are used. No data collection on commercial catches.

Other biological sampling (e.g. genetic).

Intensity of spawning in the rivers, initial genetic studies using microsatellite and mitochondrial DNA are carried out. The efficiency of hatchery fish releases also evaluated. Initial studies on migration using telemetry were carried out.

Practical limitations

Main limitation is limitations in funding.

Suggestions for improvements.

Closer cooperation with other Baltic countries in the field of assessment of sea trout stock status.

Management measures.

In Lithuania are carrying out improvement measures for water quality, construction of fish ways, recovery plans for potential sea trout rivers. Until now is not prohibited the coastal fishery during spawning migration to the rivers (only 3 km to the north and 5 km to the south form outlet of Klaipeda strait to the sea is closed for fishery from of 15 August until 31 October. The same regulation takes place in 0.5 km from

outlet of Sventoji River (Baltic Sea). The angling is prohibited from 1 of October until 1 of January in the rivers. Commercial fishery of sea trout is prohibited in Curonian lagoon and rivers at all.

Other information.

Tagging experiments or monitoring programmes.

Tagging programmes are entry level only. There is a lack of cooperation with other countries in this context.

The information on sea trout and salmon stock monitoring in Lithuania

REGULAR MONITORING	METHODS	RIVERS	SITES	RESPONSIBLE INSTITUTIONS
Monitoring of sea trout spawners migrating into the Nemunas river basin	CPUE	Nemunas River	1	Institute of Ecology
Monitoring of sea trout spawners migrating into the most important rivers	Electrofishing, Gil nets	13 rivers	15	Institute of Ecology, University of Klaipėda, Pisciculture and fisheries research centre of Lithuania
Monitoring of fish ladders	Visual observations, trap nets, radio tagging	Jūra, Siesartis, Šventoji(Neries), Vilnia,	5	Institute of Ecology, University of Klaipėda Pisciculture and fisheries research centre of Lithuania
Monitoring of parr abundance of salmonids	Electrofishing	60	~100	Institute of Ecology, University of Klaipėda
Monitoring of smolt migration	Smolt traping	Mera, Siesartis and Veiviržas	3	Institute of Ecology, University of Klaipėda
Monitoring of important spawning areas	Visual observations	Žeimena, Mera, Vilnia, Siesartis, Upper Minija, Veiviržas, Šalpė	8	Institute of Ecology, University of Klaipėda

Poland National Report– Inland – SGBALANST

Author name(s).

Piotr Dębowski, Inland Fisheries Institute (IFI)

Country name.

Poland – inland part

On recruitment:

Methods used in data collection.

Main method is an inventory of spawning grounds and redds counting. It's carry on annually on four rivers and on few others – from time to time. Because of poor visibility in many places some grounds stay unknown or counts of redds are uncertain. Overlapping of redds in some grounds, participation of brown trout and salmon also cause that accuracy of estimation of total spawning stock is difficult to estimate.

In one river, Slupia R., migrants are counted by automatic counters.

Densities of parr in some places are estimated on the basis of electrofishing. The sites are on the spawning grounds. There are only one-three sites for one river and three-four rivers fished annually. Relation between fished area and total nurse area is unknown, thus no relationship between estimated densities and total production.

So far there are no estimations of the smolts numbers.

Institution responsible for collection of data (field sampling).

There are no national program of monitoring and collection of data. Theoretically owners of fishing rights should do monitoring of their waters but in practice they don't do it at all.

Institution responsible for compiling and reporting recruitment data.

As there is no national program thus there is no responsible institution. Inland Fisheries Institute is obliged to carry on researches on migratory fish but in overall sense and has no means to monitor them in national scale.

Main purpose of data collection

A few institutions and other organisations carry on researches within the confines of their own scientific projects, supervision of protected areas or, simply, personal interests. It concerns mainly monitoring of spawning areas. IFI try to gather and compile the data. The basic information about sea trout rivers derives from inventory of rivers' ichthyofauna carried out by IFI.

Level of sampling

There are no accounts of entire productive areas but the level of sampling certainly is not sufficient.

Level of precision

As above.

Practical limitations

The main limitation is lack of officially approved national program and/or lack of means.

Suggestions for improvements.

There are two possible solutions: the first – to oblige local authorities or/and fishery rights owners to monitor sea trout recruitment under supervision of scientific institution (IFI in Polish conditions), or, the second – to equip IFI with financial and organizational tools for carrying on the monitoring.

On catches:

Types of fishery

There are three types of fishery in inland waters:

- Commercial fishery aimed exclusively or mainly at sea trout in lower Vistula R. and catching sea-trout as bycatch in a few lakes and Vistula Lagoon.
- Broodstock fishery in the most of sea trout rivers.
- Recreational angling.

Additionally massive poaching takes place in rivers.

Types of gear used.

Commercial fishermen use mainly stationary or drifting gill nets and fyke nets in some lakes and the lagoon.

Spawners for broodstock are caught usually in stationary traps at dams, also by electrofishing and gill nets (in Vistula).

In sea trout rivers only angling with artificial lures or flyfishing is allowed.

Fishing effort.

Broodstock fisheries realize plans of collecting eggs. There are no data about fishing effort of commercial and recreational fisheries.

Origin of data

Data on commercial catches are gathered by IFI on the base of annual reports from fishery rights owners; similarly broodstock fishery. The reports are sent voluntarily.

Every angler is obliged to report his annual catch to angling associations. The associations compile reports.

Institution responsible for data collection.

Every fishery rights owner has to report his input (catch) for fiscal purposes. They are not obliged to make it available for others.

Institution responsible for compiling and reporting catch data.

Data on broodstock fishery are compiled by a special council affiliated at appropriate ministry and personally closed to IFI. The rest of data is gathered by IFI.

Level of precision

Data on commercial fishery seems to be reliable; data from broodstock fishery are detailed and sure. Data from anglers' reports are fairly incomplete and are the base for rough estimates only.

Fish size / age.

The information is available for broodstock fishery in a few rivers.

Other biological sampling (e.g. genetic)

Sporadically.

Practical limitations

Weak supervision of authorities on fishery rights owners.

Suggestions for improvements.

Management measures.

Minimal size in rivers and lakes is 35 cm and in lagoons – 50 cm; closed season is between 1 October and 31 December with some local exceptions in Vistula R.

In the majority of rivers daily catch is limited to 2 fish.

Other information.

Tagging experiments or monitoring programmes.

Tagging experiments have been carried on since 1958. About 30–35 thousands smolts were tagged annually for few last years.

For two years all smolts released to Slupia R. and for one year – to the rest of Pomeranian rivers were adipose fin clipped.

Other relevant information.

National Report – Poland – Sea and coastal catches

Author: Wojciech Pelczarski, Sea Fisheries Institute, Gdynia, Poland

Types of fishery:

Sea trout is caught in coastal and off-shore fishery, as a commercial fishery (Tab1). There exists also commercial fishery in the mouth of river Vistula and in Szczecin Lagoon. In 2006 total numbers of vessels involved in sea trout fishery was 240, operating from 52 harbours and jetties. Recreational angling catches are made along the rivers, of which, Pomeranian rivers play main role.

Sea trout is the most important part (over 90%) of all salmonids coastal catches carried out by boats; however, majority of sea trout was usually caught in offshore fishing together with salmon. The main off-shore fishing grounds are located in Subdivision 26. Fishery in Subdivisions 24 and 25 gives only 16% of catch.

Usually offshore catches remained at reasonable high level during period of January–April in fishing grounds in ICES Subdivision 26. Sea trout is taken in that same operations as salmon so the fishing pattern follows the salmon one. The main fishing grounds are the same as for salmon. The bulk of fish is caught using driftnets in offshore operations and gillnets in coastal fishery. Fishing is carried out by cutters of length 15–26 metres, where class 17 metres is prevailing.

Some sea trout is caught as by catch in pelagic trawls in sprat fishery.

Table.1. Polish sea trout catch in 2007.

ICES SUB-DIV	SEA	SEA	COAST	COAST	RIVER	RIVER	TOTAL	
	(t)	(No)	(t)	(No)	(t)	(No)	(t)	(No)
24	0,5	122	6,1	1,519	0	0	6,6	1,641
25	37,0	9,255	23,6	5,904	14,0	7,155	74,4	22,244
26	319,4	79,846	100,3	25,077	24,5	7,978	444,2	112,901
Total	**356,9**	**89,223**	**129,7**	**32,430**	**38,5**	**15,133**	**525,1**	**136,786**

Types of gear used

In the off-shore fishery until 31.12.2008 sea trout was mainly (90% in numbers) caught with driftnets, the remaining 10% was caught with longlines.

Since 1.01.2008 on base of Council Regulations 812/2004 and 2187/2005 driftnets are not allowed for fishing in whole Baltic area and even having driftnets on deck is prohibited. Poland has asked several times for derogation, having scientifically documented lack of cetaceans in driftnet fishery, but EC sustained this regulation.

Presently, the only allowed gear for fishing sea trout is drifting longline but use of them as far was limited mainly to January–March. The bait is herring or sprat. The equipment namely: main rope, branch ropes, swivels and hooks are imported. The main rope is made of steelon rope "Z" twisted with diameter of 2.2 mm. Branch rope is made of colourless or green-blue nylon of diameter 0.7 mm. Each section consist of main rope with length of 15–17 meters and a branch rope of 4–5 m length with a

swivel, weight (45–50 g) and stainless hook 45–50 mm of height. A signal buoy is attached to every 50 hooks. At the start and end of longline there are flashing buoys and radar reflectors. An average 1000–1200 hooks are set per day per cutter, but the range can be of 900 – 2000 (as maximum limited). The gears can be set parallel in distance not closer than 0.5 Nm. Hauling is done by hydraulic line hauler or sometimes by hand.

In coastal fishery of sea trout the main gear used is anchored gillnet with one anchor, however, some anchored longlines are also in use. Coastal boats use longlines with up to 100 hooks per day of fishing. Length of boats is of 6–12 metres.

Gillnets are joined mostly in 5–6 pieces, so total length can be of 150 m. Minimum mesh size is 80 mm. Since 1990s most commonly used material is monofilament or "torlen" fibre. For the bottom line lead rope is used. Hauling the nets and longlines is done by hand or winch depending on size of boat.

No fyke or trap nets are in use directly for sea trout; however, some sea trout is caught during autumn in fykes set for other species. Such gears are in use mostly in coastal sheltered areas: bays, lagoons and those gears are of minor importance in sea trout fishery.

Fishing effort

Number and type of gears set, number of fishing days and catch are obligatory recorded in logbooks or supplied as monthly reports in commercial off-shore and coastal fishery. For off-shore fishing vessels of length over 15 metres, the Vessel Monitoring System (VMS) is used, which allows cross-checking data from logbook with real time and cruise track of vessels.

There is no separate fishery targeted for sea trout only and sea trout with salmon are taken together, thus the effort expressed in number of gears and days per trip (Table 2) has similar picture to the salmon fishery. In 2007 there was drastic decrease in use of longlines.

Table 2. Effort in Polish sea trout off-shore fisheries.

Year	Driftnets		Longlines		No. of sea trout caught by	
	No. of nets	Days	No. of hooks	Days	driftnets	longlines
2003	757 334	2 170	482 857	520	123 588	22 145
2004	986 331	4 564	575 615	544	153 328	25 349
2005	730 559	4 971	277 846	436	104 763	15 244
2006	718 635	2 553	223 225	188	100 404	10 763
2007	664 228	1 445	60 450	53	85 820	2 612

Origin of data

Logbooks and unloading declarations from commercial vessels over 10 metres of length and monthly reports from vessels below 10 metres of length are obligatory supplied to proper fishery inspectorates (Szczecin, Slupsk, Gdynia), where they are checked and further sent for checking, processing and input to fishery data base in VMS centre in Gdynia.

Catch and effort data for river angling are collected voluntarily by members of Polish Anglers Union.

Institution responsible for data collection

Sea Fisheries Institute in Gdynia is the officially authorised institution responsible for running the program of National Programme for Fishery Data Collection in the scope covered by EU Common Fishery Policy.

Sampling is conducted on board of vessels and on landed fish, both from offshore and coastal catch but every year number of collected samples much exceeds obligatory number of samples.

Institution responsible for compiling and reporting catch data

VMS centre is responsible for input catch and effort data into fishery data base. Management of fishery data base is under Department of Fisheries in Ministry of Agriculture and Rural Development in Warsaw. Limited access to database has Dept. of Fisheries Economy of Sea Fisheries Institute. Output of data from that database serves for all stock assessment and management purposes at different levels, including Ministry of Agriculture and Rural Development.

Level of precision

The precision of catch and effort data from logbooks when compared with documents of first sale and data from VMS is improving, however, is not fully satisfactory.

Monthly reports from vessels below 10 metres have also some errors but situation is continuously improving.

Possible uncertainties in reporting can develop mainly from errors in fulfilling the logbook/ monthly reports and not sufficient control system at sea and in shore. The most common in off-shore fishery is misreporting between salmon and sea trout, where TAC quoted salmon is reported as a sea trout but never in opposite way. Underreporting is mainly done in a form of lower amount of catch and number of gears used. Inspections at sea and shore confirm such problems. According to results of control, the number of sea trout caught sometimes can be 50% less then reported. Generally speaking, the existing control system, according to written law, should work well. The bottleneck is in controlling and obeying the rules but it depends on state fishery policy as well as on attitude of fishermen.

A pilot study conducted in 2007 show that number of discarded sea trout in off-shore is relatively small – up to 3% in numbers. In 2007 number of discarded fish caught in the vicinity of river mouths was extremely high – up to 80% of daily catch, due to skin diseases.

Fish size

Information on fish length, weight and age is collected by Sea Fisheries Institute according to Data Collection Regulation Determination. Reading of age is done mostly on scales reading. All data are kept in database in SFI and serves for assessment and management purposes.

Other biological sampling

Other sampling covers sex and in some years also stomach contents. Genetic samples were collected in year 2000 in order to distinguish strains of stocked sea trout. Research on this was conducted in SFI genetic laboratory.

Practical limitations

The most limiting factor in collection of samples in off-shore fishery is cooperation with skippers, however, skipper are obliged by law to take scientist on board. In most cases skippers are refusing it and as an explanation have always different reasons, mainly lack of space for additional person on board, which is to some extent true, especially when the crew is 4 person and vessel has no extra bunks. On class 25-metres vessels there is more space for additional person. Limited number of technicians in SFI is limiting factor during winter and spring season where other fish species have to be sampled at sea at the same time.

Since 2006 the self-sampling by local trusted fisherman is conducted in order to obtain more representative samples from coastal fishery with less effort and costs. This is paid within National Data Collection Program. In such self-sampling all fish caught by fisher is recorded, measured, weighted and samples of scales are collected.

Limited access to the official fishery database in Ministry of Agriculture makes difficulties in obtaining catch and effort data for assessment purposes.

Suggestion for improvements

For the next years better cooperation and understanding between fishermen and scientists should be improved. Additional technicians in SFI would be an advantage. New methods for access to fishery data base should be established.

Management measures

There are regulatory measures for sea trout in off-shore fishery (outside 4 miles), which are common for all EU MS in Baltic Sea;

- minimum landing size 40 cm in Subdivisions 24–25 and 50 cm in Subdivision 26,
- minimum mesh size 80 mm,
- closed season from 1 June to 15 September,
- ban on use of driftnets,
- maximum number of hooks set – 2000,
- obligatory use of VMS for vessels above 15 metres of length,
- fishing vessel has to be registered and has valid fishing licence

Some regulatory measures applied to coastal waters within 4 miles:

- closed season from 15 September to 15 November, except Gulf of Gdansk and Vistula Lagoon,
- mile closed zone off mouth of the Vistula River,
- 250–500 metres closed zone off mouth of other rivers,

In most of rivers in northern part of Poland closed season is 1 October – 31 December.

In the Vistula River closed seasons are: 1 October – 31 December and from every Thursday to Sunday above Wloclawek Dam and 1 March – 31 December below Wloclawek Dam Minimum size in angling for sea trout in rivers is 35 cm. In majority of rivers managed by Anglers Union one angler can fish up to 2 fish per day, fishing can be done only with rod with artificial fly and minimum 50 metres outside dams.

Tagging experiments or monitoring programmes

During years 2002–2006 there were tagged yearly 11 4000 – 48 000 fish with Carlin tags. In addition increasing number of smolt was fin-clipped (98 000 in 2006).

In 2006 and 2007 experiments with acoustic fish counting devices in ladders in some of Pomeranian rivers were conducted.

National Report – Germany – State of Mecklenburg–Western Pomerania 26.02.2008 – SGBALANST

Author: Harry Hantke

Association Fish and Environment Mecklenburg- Western Pomerania

Available data on Sea trout stock recruitment and catches in the Baltic Sea - national report of the state of Mecklenburg-Western Pomerania to SGBALANST, ICES - 2008.

Remarks: This report contains only data from the state of Mecklenburg-Western Pomerania.

Besides catch data for the years 2005 and 2006 already reported earlier no other data from Schleswig-Holstein are available at present.

Recruitment and Monitoring

Beginning in the 1990s of the last millennium first investigations on biomass and stocking of sea trout have been carried out. The main goal was the stabilization of the different sea trout stocks in rivers of Mecklenburg-Western Pomerania.

The stocking material originated from rivers in Schleswig Holstein and from a remaining wild stock from the river Beke a tributary to the river Warnow.

Until 1999 approx 661,000 parrs and 81,000 smolts have been stocked into the river Hellbach, the main sea trout river in Mecklenburg-Western Pomerania. Financed from PESCA funds other 39,000 smolts were stocked into the river Wallensteingraben and 3,600 smolts in the Wismar Bight.

That means that first investigations and stocking measures were concentrated at rivers in the western part of Mecklenburg-Western Pomerania with access to ICES Subdivisions 22 and 24.

Beginning in 2000 investigations on sea trout rivers were extended to the entire state. The aim was to identify appropriate rivers for sea trout stocking. In the period 2000–2007 altogether 4,847,500 parrs were stocked into 32 rivers of Mecklenburg-Western Pomerania.

At present 9 rivers contains a self- recruiting wild sea trout stock, e.g. the rivers Beke, Hellbach, Kösterbeck, Peezer Bach, Köppernitz, Damshäger Bach, Tarnewitzer Bach, Ziese, and Hanshagener Bach.

Assessment of recruitment is based on electrical fishing only. No other methods have been used so far.

The monitoring is a part of the stocking programme. After stocking in spring a monitoring in autumn is directed to the development of the stocked parrs and smolts. Furthermore investigations on spawning sites and habitats, and catadroumus spawner have been carried out. After evaluating these parameters continuing of stocking will be decided.

Institution responsible for collection of data

Ministry of Agriculture, Environment and Consumer Protection Mecklenburg-Western Pomerania, 19061 Schwerin

Association Fish and Environment Mecklenburg- Western Pomerania

Institution responsible for compiling and reporting recruitment data

Ministry of Agriculture, Environment and Consumer Protection Mecklenburg-Western Pomerania, 19061 Schwerin

State research institute for Agriculture and Fishery Mecklenburg- Western Pomerania

Main purpose of data collection

The main goal is collecting data about stock and recruitment development of sea trout in Mecklenburg-Western Pomerania waters and the determination of the carrying capacity of these waters.

Level of sampling

All annually stocked sea trout rivers were monitored once

(see table ST_recruit_catch_MV.xls)

Level of precision

The level of precision is adequate for this purpose.

Practical limitations

The annual monitoring of the rivers is limited due to small financial budget and the manpower available.

Suggestions for improvements

Extending the scientific research and development of new methods for counting sea trout of smolts and adults (e.g. marking and registration using PIT tags).

Catches

Type of fishery

Catch data are only available from commercial fishermen based on log-book data. Catch data from recreational fishing are not available at present.

Gears used

Almost all sea trout were caught with gill nets. Only a small number occurred as bycatch of trawl fishery and other stationary gears like fish traps and fyke nets.

Fishing effort

Monthly effort data by gear and by ICES rectangles is available from the commercial fishery only.

Origin of data

Catch and effort statistic is available at the Federal Agency for Agriculture and Food Hamburg (BLE) based on log-book records. Delivery of these data is obligatory for commercial fishermen fishing with boats greater than 8 m.

Official fishing effort in rivers is unknown.

Institution responsible for data collection, compiling, and reporting catch data

Federal Agency for Agriculture and Food Hamburg (BLE).

Level of precision

Level of precision depends on the correctness of log-book records.

Fish size and age

Fish size determination is carried out during monitoring and tagging programmes. There is no regular length measurement for sea trout catches from the commercial fishery.

Other biological sampling

- None -

Practical limitations

In general collecting of more relevant data suffer from reduced financial funds.

Suggestion for improvements

Establishing a continuous sea trout research programme.

Management measures

Minimum landing size for seat trout in the Baltic Sea and in inland waters is 45 cm. The minimum mesh size for gill nets and trawls targeting sea trout is 120 mm. There is a closed season from 15 September to 14 December in the Baltic Sea and from 1 September to 31 March in inland waters. In some river mouths fishing of sea trout is forbidden from 1 August to 28 February 28 within a radius of 300 m.

Other information

Tagging experiments

Since 2004 a special research programme in the rivers Hellbach and Beke deals with investigations on the migration patterns of sea trout.

Furthermore these investigations are carried out in order to collect information about the duration of stay of smolts in the above-mentioned rivers.

Until spring 2007 tagging of sea trout was made with Carlin tags. Beginning at the end of 2007 a new tagging method was introduced (passive integrated transponder – PIT).

The following text table shows the number of tagged and recovered sea trout

YEAR	2004	2005	2006	2007/2008
No. tagged	226	305	215	292*/261**
No. recovered	13	18	30	4/41**

*** Total number of tagged sea trout**

**** Tagging with PIT**

References

Different annual reports (not published)

National report Denmark

Author's name.

Stig Pedersen and Gorm Rasmussen

Country name.

Denmark

On recruitment:

Methods used in data collection.

The density of wild trout 0+ (and older) trout is in principle monitored in all streams. Monitoring is done by inspection and electrofishing on predestined sites (totally about 7,000 in all water courses) in the streams in late summer and autumn. On all sites the physical habitat quality is estimated for different ages (sizes) of trout, including state of pollution and accessibility to the site. About 2/3 of the sites are electrofished (i.e. the rest of the sites are not evaluated as trout production areas), and the density of naturally produced 0+ and older parr is determined. If the stream during the years before the monitoring was stocked with trout releases of 0+ trout are delayed until after the monitoring visits, so that the wild production of 0+ can be estimated. All rivers and sites are visited approximately every seventh year.

Based on the densities found stocking schemes for the entire water system is produced. Stocking of trout is done if there is no or very limited wild production of trout. All releases are based on locally caught sea trout (and resident brown trout).

Depending on trout densities the sites monitored are usually between 15 and 50 m long (max 200–300 m^2). Depending on trout densities (number of trout caught) the site is fished only once (single pass) or twice. Densities are calculated based on the average observed efficiency in the stream or in neighbouring streams.

The production of smolts in the stream is calculated from observed densities, areas and relations between the density of 0+ trout in the autumn and subsequently found smolt numbers in a different streams (tributaries to river Gudenå outside the Baltic area).

Institution responsible for collection of data (field sampling).

Danish Technical University – Aqua (National Institute of Aquatic Resources)

Institution responsible for compiling and reporting recruitment data.

Danish Technical University – Aqua (National Institute of Aquatic Resources)

Main purpose of data collection

The primary purpose of data collection is to review trout stocking schemes.

In addition to this, some monitoring is done by the environmental monitoring agency on NOVANA sites. However, because of a wish for consistency in judging habitat quality as well as consistency in fishing this information is not used.

Level of sampling

Partly because time (man-hours and financial resources) limits the possibility to examine larger parts of the streams, the intensity of monitoring (number of sites visited and frequency of visiting the sites) could be better.

With 7 years between visits changes in production happening in shorter time spans will not be picked up. This problem is currently being addressed in an experiment where a number of trout populations in different types of streams are followed every year.

Level of precision

It is judged that the level of precision in estimating population densities is adequate.

However smolt numbers calculated from this have only been verified occasionally. The basic connection between population density of 0+ and resulting smolt number was established as an average over several years in only two stream. It is known from the same data that the relationship between density of 0+ and resulting smolt production is not linear.

Practical limitations

Finances (the monitoring is financed from the national rod licence) are limiting the available number of man-hours and consequently the number of sites + the frequency of monitoring.

Lack of cooperation with environmental authorities limits the use of data collected for this purpose.

Suggestions for improvements.

Cooperation with environmental authorities could make it possible to use data from environmental monitoring increasing the number of sites monitored and the frequency of monitoring.

A large number of streams not suitable for sea trout are monitored with the same intensity as more productive streams, because the primary purpose of monitoring is revision of trout stocking schemes. More emphasis could be directed towards the more productive streams or on different aspects such as verifying smolt production estimates, counting spawners etc.

There is no regular monitoring of smolt numbers, or of spawning run. Establishment of an index river would facilitate establishing stock/recruit relationship. Furthermore this could give updated information on parr-smolt survival and provide information on sea survival.

Regular tagging experiments in the area would provide information on migration and changes in the fishing pattern etc.

Cooperation between countries exchanging key variables from existing monitoring programmes would enhance the value of more scattered data, which are likely to be affected by the same e.g. climatic variables within a given region. Alternatively an adjusted programme coordinated between the countries combined for a common assessment could result in a more efficient monitoring.

Knowledge on migration patterns for local strains of trout is largely unknown, but essential information on the sea-phase for sea trout.

On catches:

Types of fishery

Sea trout is perhaps the most popular target species in the sports fishery, both in coastal area and streams. In recent years the sea trout is also caught from trolling boats.

Sea trout are caught in the coastal areas by recreational and professional fishermen in both fixed tackle such as pound nets, and in gill nets. From this fishery there are practically no data available.

The only catch with reliable statistics is from the professional fishery targeting salmon in the Baltic Sea. In this fishery trout must be considered a bycatch.

Around the island Bornholm some trout are probably caught also in the recreational fishery for salmon using fixed hook lines.

Types of gear used.

In the professional fishery in the Baltic only long lines are allowed after 1 January 2008.

Fishing effort.

Effort is available only from the professional fishery, reported in log books.

Origin of data

For the official catch statistics information from sales slips are used.

In a few streams in Jutland, with outlet to the southern part of Kattegat catches in the recreational fishery are available.

Institution responsible for data collection.

Danish Technical University – Aqua (National Institute of Aquatic Resources)

Institution responsible for compiling and reporting catch data.

Danish Technical University – Aqua (National Institute of Aquatic Resources)

Level of precision

No information.

Fish size / age.

No information available, except from anglers reports

Other biological sampling

No regular sampling.

Practical limitations

Suggestions for improvements.

In order to monitor changes in spawning populations it would be desirable to have catch statistics from streams with angling.

Knowledge on catches in coastal areas is insufficient as is knowledge on characteristics, such as migration patterns and age distribution in spawners, from separate populations.

Management measures.

(Brief description of national management measures taken to protect sea trout: minimal size, closed season, closed areas,…..)

Legal catch size in the sea and rivers ≥40cm (total length), mature and maturing trout may not be caught in the period 16 November – 15 January. In several rivers this period is extended on a voluntarily local basis.

Sea fishing

- No fishing is permitted within 500 m from river mouths with width ≥ 2 m. (some exceptions)
- No fishing permitted within 500 m from river mouth with width < 2 m during the period 16. September to 15. March (some exceptions)
- Stop nets or grids (75 mm) in first frame of fyke-nets (to prevent otter (*Lutra lutra*) from entering the gear).
- Pound nets: in many areas upper edge of net must be lowered 10 cm below water surface March – May.
- Recreational fishermen:
  - Illegal to sell catch – only for self-consumption.
  - Normally 300 m between fixed pound nets
  - Gill-nets, long-lines and fyke-nets: distance at least 150 m to professional gear and fixed pound nets
  - Gill-nets: distance at least 100 m from low-water line at shore, sailing channels and low water areas
  - Maximum number of gears is 6 of which:
    - Max. 3 gill-nets each with maximum length 45 m. Mesh size < 50 mm (knot to knot) or > 65 mm during period 1 July – 15. November.
    - Hooklines: max. number of hooks is 100
    - Only 1 fixed pound net each license
- Sports fishery:
  - No trolling (engine powered vessel) within 100 m from low-water line at shore
- Bornholm and various local areas: extended closed area around many streams irrespective of size of these

Rivers and lakes

- No fishing in fish ways at weirs etc. 50 m above and below these (some exceptions).
- No gill-nets, seines and trawls in rivers; gill-nets are not permitted in lakes in April and May.
- Use of fyke-nets only by land owner or long-time leaser.
- Fyke-nets may cover max 1/3 of stream and lake.

- Traps (e.g. for eel) covering the entire stream only where historical rights exist.
- Stop nets or grids (75 mm) in first frame of fyke-nets (to prevent otter from entering gear).
- In general gears blocking the river are prohibited – except on locations with historical rights.
- Closed season 16 November – 15 January; extended in many rivers.

Grids at fish farms and turbines

Water in- and outlet at freshwater fish farms must have grids with max. 6 mm and 10 mm openings, respectively. In many rivers there are small water electricity plants with 10 mm grids at inlet.

Other information.

Tagging experiments or monitoring programmes.

Occasionally tagging experiments with tagged smolts (mostly hatchery origin) are carried out.

Other relevant information.

Annex 2A: (Electronically) Working Documents: Database with information on monitoring trout populations in streams

SGBALANST Annex 2A Database with information on monitoring trout populations in streams.xls

Annex 2B: (Electronically) Working Documents: Database with information on catches

SGBALANST Annex 2B Database with information on catches.xls

Annex 3: References

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