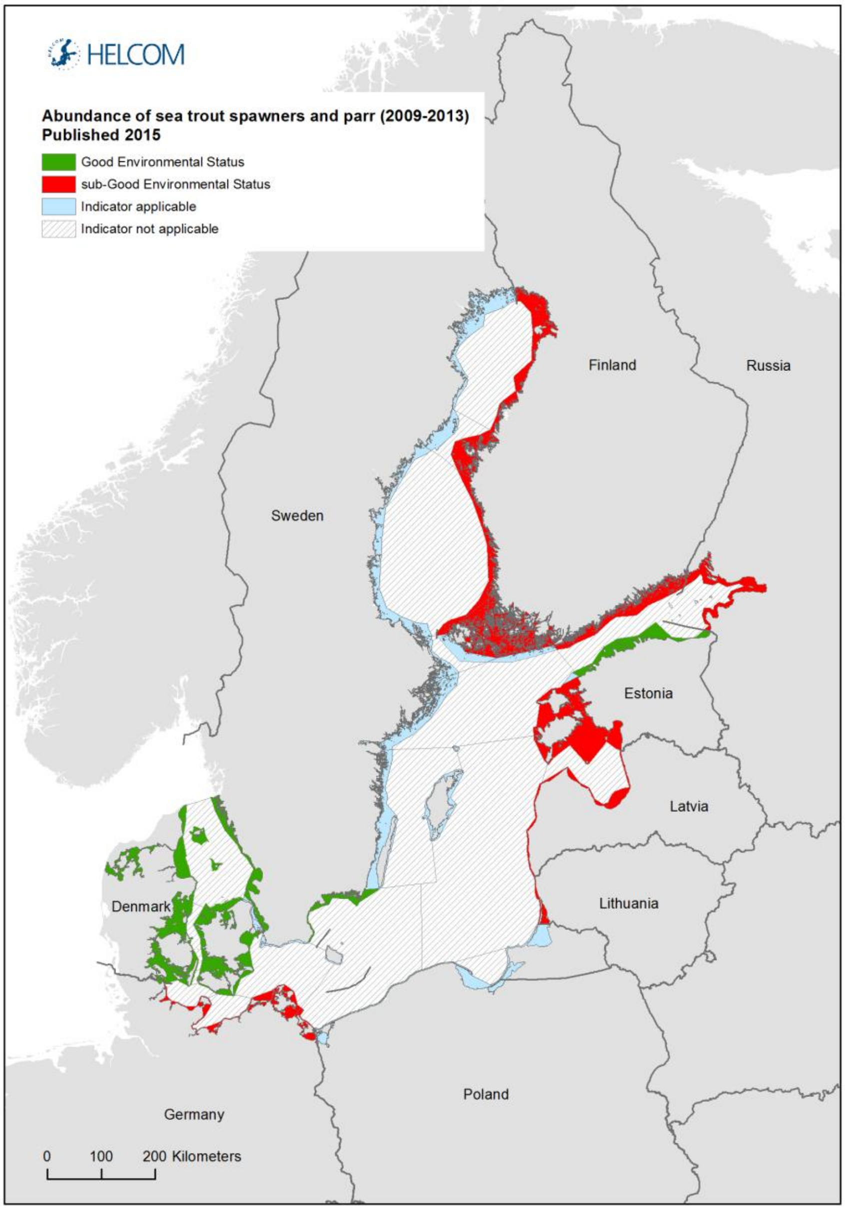
Abundance of sea trout spawners and parr

Key message



The present status of populations of sea trout is below GES in the most of the Baltic Sea area and the status is alarming in some areas. The current evaluation is based mainly on data and expert evaluations from 2014. Due to capture of young age classes of sea trout as by-catch in fisheries targeting other species, sea trout populations in the Bothnian Bay are considered to be threatened and populations in the Bothnian Sea and Gulf of Finland are considered to be in poor status. However, a positive development in parr densities have been observed in some Finnish rivers since 2012 (Gulf of Finland) and Estonia (Gulf of Finland) and Sweden (Bothnian Sea), reflecting management improvements in these countries.

In the Baltic Proper the status of sea trout stocks is better in south-western sub-basins where majority of stocks reach the production level reflecting good environmental status.

Relevance of the core indicator

The densities of parr measured in the rearing areas in rivers reflect the abundance of the adult sea trout spawners and success of recruitment. Adult sea trout carry out feeding migrations in the Baltic Sea where they are top predatory fish.

Sea trout abundance is affected by commercial and recreational fishing at sea and in rivers. The parr densities measured in rivers are also affected by migration barriers to reproduction areas, habitat quality in reproduction areas. Thus the indicator reflects good environmental status as it is sensitive to river connectivity (effect of dams) and the quality of spawning and rearing habitats.

The level of confidence of the assessment is moderate to high.

The indicator is applicable in the rivers of all HELCOM member states.

Policy relevance of the core indicator

	BSAP **Segment and Objective**	**MSFD** **Descriptors and Criteria**
Primary link	Biodiversity and nature conservation • Thriving and balanced communities of plants and animals • Viable populations of species	D1 Biodiversity 1.1 Species distribution 1.2 Population size 1.3 Population condition 1.5 Habitat extent
Secondary link		D4 Food-web 4.3 Abundance/distribution of key trophic groups and species D3 Commercial fish and shellfish 3.1 Level of pressure of the fishing activity 3.2 Reproductive capacity of the stock
Other relevant legislation: In some Contracting Parties potentially also EU Water Framework Directive		

Cite this indicator

[Author's name(s)], [2015]. [Indicator name]**.** HELCOM core indicator report. Online. [Date Viewed], [Web link].

Indicator concept

Good Environmental State

Evaluation of the good environmental status (GES) is based on the comparison of the observed parr densities in rearing habitats with the reference potential parr densities in the specified habitats that can be based on model estimations or expert judgement. Parr is a young sea trout living in the river before the smoltification and start of feeding migration to the sea. Depending on the river, sea trout parr spend 1-3 years in the river before the sea run.

The site specific reference parr densities exhibit a rather large natural variation between years. In rivers where the abundance of spawners has been estimated to continuously meet the conservation limits, and are thus considered as reflecting good environmental status, the parr densities have varied between 60-100% of the estimated reference potential densities. Consequently, the GES boundary is a moving average of parr densities over 4-5 years, and based on the present data GES is achieved when the moving parr density average remains above 50% of the reference parr densities. It should be noted that only rivers accessible to spawners and containing suitable good quality spawning habitat should evaluated.

The reference potential parr densities can be estimated by a rigid Baltic assessment model for each river that takes into account the physical characteristics of the river habitat (see e.g. ICES WGBAST 2015). The present model is applicable for rivers where the parr density is estimated to have reached the full production level at least once in the available time series. Rivers in Denmark and some other areas in the Southern Baltic Sea meet this requirement. For the northern rivers the Baltic assessment model indicates a sub-GES in accordance with other data, however, there is still some uncertainty as to the precision of the model in this area. The uncertainty is due to the amount of data that do not include full production level conditions, and to the natural conditions differing significantly from other parts of the Baltic implying that the production levels from the southern areas cannot be used as reference values in the northern areas. Rivers in the northern areas are presumed to have a naturally lower overall productivity due to a lower temperature and other environmental factors. In these areas the maximum potential parr densities can be provided by expert evaluations. So far a list of river specific reference values is not available.

In addition to parr density data, evaluations of GES can be supported by direct counts of ascending spawners in a few rivers. This is possible by means of video counting with allows the distinction of seat trout from salmon. Also smolt counting is carried out in a couple of rivers. Both spawner and smolt counting data gives an elaborating input to the estimation of the state of the stock based on the parr densities. However, the electrofishing surveys to measure the parr densities are carried out in all countries and make the data source used for determination of baseline in the monitoring of the state of the sea trout stock in the Baltic Sea area.

The GES boundary has mainly been defined based on expert judgement, and long-term data on the reference conditions and therefore the confidence of the target is considered to be moderate to high.

Anthropogenic pressures linked to the indicator

The main reason for the poor state of sea trout populations in the northern areas is too high fishing pressure and particularly by-catch of post smolts in the gillnet fishery.

	General	MSFD Annex III, Table 2
Strong link	Fishing of sea trout as well as habitat quality degradation are the main pressures on sea trout	Biological disturbance selective extraction of species
Weak link		

In the Bothnian Bay, Bothnian Sea and the Gulf of Finland young age classes of sea trout are also by-catch in sea fisheries targeting other species, often whitefish. In the Gulf of Finland the by-catch occurs mainly in gillnets targeted at pikeperch. Sea trout is also reported as being by-catch along the Swedish coast in the Bothnian Sea and Bothnian Bay in the commercial coastal salmon trapnet fishery.

The total reported sea trout catch in the Baltic Sea marine area was 308 tonnes in 2014, which is about the same as in 2013 but is about 70% less than in 2004 when the decrease of catch begun (ICES 2015) (Figure 1). In 2014 around 60% of the total Baltic catch (marine + river) was taken by the coastal fishery, equally from the Gulf of Bothnia and the Main Basin. The 2014 the marine catch in the Gulf of Bothnia of 101 tonnes was close to the ten year average catch. In the Gulf of Finland, marine catches have been many years on a level of 80–100 tonnes annually, until the year 2010 when the catch dropped to below 50 tonnes (ICES 2014). The Swedish and Finnish offshore fishery in the Baltic Proper targeting salmon and sea trout was phased out in 2013.

River catch was 81 tonnes in 2014 (Figure 1). The largest part (43 tonnes) was reported from Swedish rivers flowing to the Gulf of Bothnia, mainly as anglers’ catch, and from Polish rivers (28 tonnes) partly as commercial catch in lower Vistula and partly as broodstock fishery in Vistula and Pomeranian rivers.

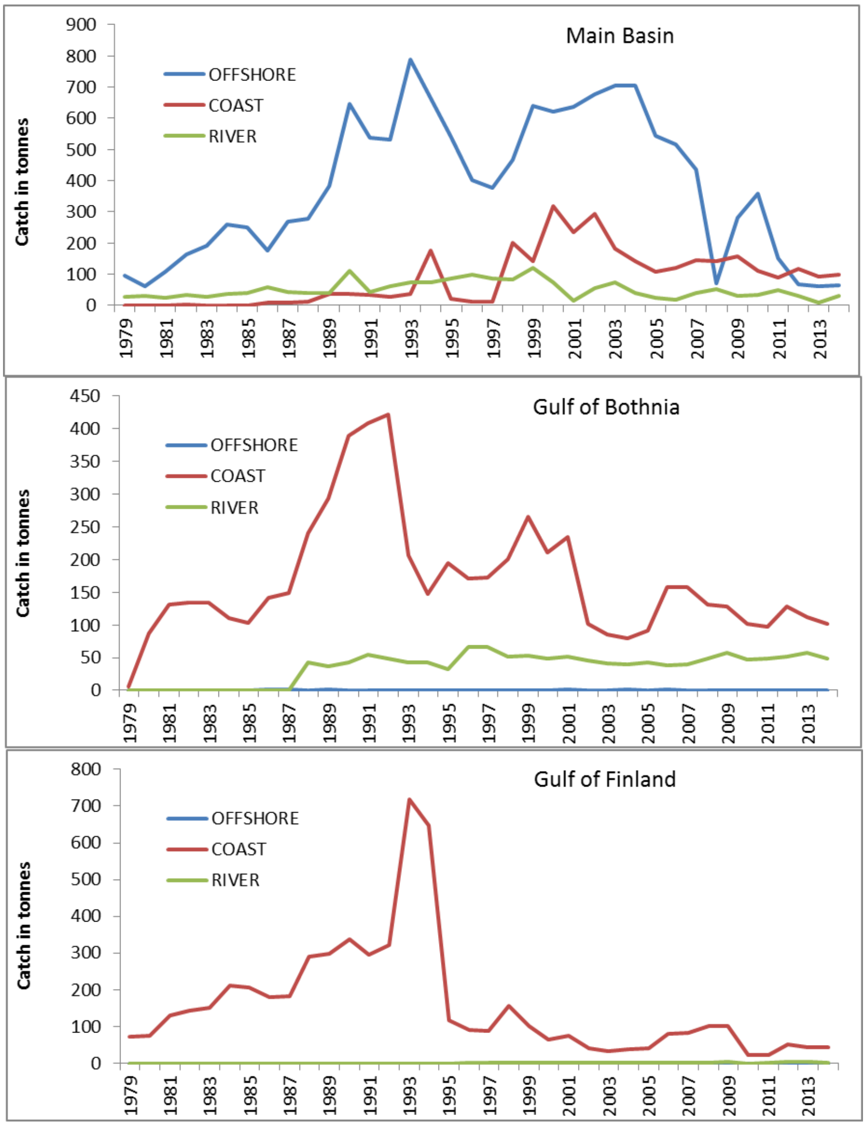


Figure 1. Fishery catches of sea trout in Main Basin, Gulf of Bothnia and Gulf of Finland. Note that offshore catches include in some countries and years also coastal catches and riverine catches have not been reported from all countries (ICES 2015).

In addition to the effects of fisheries on sea trout, the deterioration of habitat quality and damming of rivers affects the populations. Channelizing of rivers has altered the spawning habitats which decreases the number of spawners (ICES 2009). The state is poorest in the Bothnian Bay and Bothnian Sea (ICES 2015).

Also dredging, pollution, acidification and siltation of rivers affect negatively the sea trout populations. The magnitude of the different factors influencing sea trout varies locally within a sub-basin.

In many countries an increase in the population size of cormorants has been observed. Cormorants predate on the sea trout, and influence survival both locally and in larger areas (Dieperink et al 2001, 2002). The predation can be severe in rivers, at river mouths and in coastal areas (Jepsen et al 2014). The sea trout stock size may have decreased in areas where large cormorant colonies are present, but this should be further investigated (Bzoma 2004, Leopold et al. 1998).

Assessment protocol

The Baltic assessment model uses electrofishing data of the individual sea trout populations together with habitat information collected at the same sites (focusing on the state of recruitment defined as the observed recruitment i.e. observed densities, compared to the potential reference recruitment i.e. maximal densities that could be expected under the given habitat conditions), and the trend in population development over time. The examination of the data is site specific (several sites can exist in one river) but the evaluation of the state of the stock can be concluded on the river level and also in a sub-area level. Average values of recruitment state are calculated for assessment areas, Sub Divisions, and, where more countries have streams in one subdivision, for each individual countries (ICES 2011 and ICES 2015).

In the annual meetings of ICES WGBAST all available data on estimated abundance of sea trout parr (per 100 m^2) from individual sites are compiled from the Baltic countries. In 2014, data was available from a total of 237 sites in about 120 streams, which reflects a general situation of data availability. For the evaluation, parr abundance are divided into young of the year (0+) and older trout (>0+). If there is an issue with lack of data, young of the year (0+) and older trout (>0+) can be aggregated and not analysed separately.

Differences in habitat qualities (suitability for trout) influences trout abundance. Selected monitoring sites are situated in small rivers, focused on typical habitats of sea trout. To be able to compare trout abundances between sites with different habitat quality, a sub-model has been proposed: the Trout Habitat Score (THS). The THS is calculated by first assigning values (scores) for each habitat parameter for 0+ trout: average/dominating depth, water velocity, dominating substrate, stream wetted width, slope (where available) and shade. Values (scores) are assigned between 0 for sites with poor conditions and 2 for best conditions from suitability curves and in part by expert judgement (ICES 2011). All scores are then summed resulting in a THS between 0 (zero) for sites with very poor conditions and 12 (10 if slope is omitted) for sites with very good conditions for sea trout parr. The THS scores obtained are then combined into Habitat Classes (HC) that range between 0 (poorest) and 3 (best).

Due to the significant climatic (e.g. temperature and precipitation), and geological differences found across the Baltic Sea region, the densities of sea trout parr varies between areas. The predicted reference potential densities for sites across the Baltic at full recruitment are determined through a multiple linear regression analysis on the parameters stream wetted width, climate (average air temperature), latitude (proxy for productivity due to climate), longitude (proxy for the gradient from oceanic to continental climate) and the habitat score (0-1-2-3 according to SGBALANST 2011) with log (0+ trout density + 1) as dependent variable. For this analysis only sites with the best quality and highest observed densities are used.

Sites judged to have good to intermediate water quality (a prerequisite for trout to fulfil their life cycle) are selected for assessment irrespective of the habitat quality class (HC) of the site.

Recruitment trend over time is calculated for each site through linear regression of parr density versus years (currently 2000 – 2014) as Pearson r correlation coefficient, resulting in values from -1 to +1. Values close to -1 indicate a high correlation to a straight line indicating a negative development.

Assessment units

Sea trout migrates between the fresh water river systems and the marine area. The assessment units most applicable for evaluating GES using sea trout are the coastal units, as the fish mainly utilize a rather short range of the coastal area (<100 km from the home river) while feeding in the Baltic Sea. Because all the Baltic sub-basins have naturally reproducing stocks, the indicator is relevant in the entire Baltic Sea.

Sea trout is not as mobile a species as salmon, and prefers to stay in coastal waters and within the same sub-basins as their natal river. Migration patterns are currently known for only a few populations of sea trout. While it appears that most populations make relatively short feeding migrations (distances being a few hundred kilometers), it is known that all sea areas have populations with long migration patterns where the sea trout spread into neighbouring coastal areas. Fish tagged in Finland in the Gulf of Finland are found in Estonia and Russia and vice versa. Similarly, tagged fish from the Finnish side of Gulf of Bothnia are found from Sweden and vice versa.

For the HELCOM core indicator work the sea trout indicator follows the sub-basin division used in HELCOM and evaluates the environmental status of the coastal areas. Some sub-basins can be combined if necessary in evaluations at a later stage when the migration patterns of the sea trout populations have become better known. Through the previous work of SGBALANST (ICES 2008, 2009) the sea trout populations in the Bothnian Sea, Bothnian Bay and Gulf of Finland (ICES subdivisions 30, 31 and 32) have been pointed out as highly separated units with respect to state of the stock and migration patterns.

Relevance of the indicator

Policy Relevance

The proposed core indicator of the Baltic sea trout addresses the Baltic Sea Action Plan’s Biodiversity and nature conservation Segment ecological objectives ‘Thriving and balanced communities of plants and animals’ and ‘Viable populations of species’ (HELCOM 2007).

Also, the indicator has relevance to the BSAP actions of:

- ’Classification and inventorying of rivers with historic and existing migratory fish species no later than by 2012’,
- ’Development of restoration plans (including restoration of spawning sites and migration routes) in suitable rivers to reinstate migratory fish species, by 2010‘.

The core indicator also addresses the following the qualitative descriptors of the MSFD for determining good environmental status (Anon. 2008):

- Descriptor 1: ‘Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions‘; and

- Descriptor 3: ’Populations of commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock‘;

- Descriptor 4: ’All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity’.

and the following criteria of the Commission Decision (Anon. 2010):
- Criterion 1.1 (species distribution),
- Criterion 1.2 (population size),
- Criterion 1.3 (population condition, particularly the genetic structure)
- Criterion 1.5 (habitat extent),
- Criterion 3.1 (level of pressure of the fishing activity),
- Criterion 3.2 (reproductive capacity of the stock), and
- Criterion 4.3 (abundance/distribution of key trophic species).

Role of sea trout in the ecosystem

There are around 1000 sea trout rivers and streams in the Baltic Sea (HELCOM 2011). And an estimated 395 populations of wild sea trout (and 77 mixed populations) in the Main Basin; 28 populations of wild sea trout (and 28 mixed populations) in the Gulf of Bothnia; 85 wild populations in the Gulf of Finland (and 16 mixed population). Altogether this makes up to 508 wild and 121 mixed sea trout populations in brooks/rivers in the Baltic Sea area (ICES 2015).

The definition of parr in this indicator and the ICES SGBALANST work is ’young trout that have dispersed from the redd until the smolt stage’ (Allan & Ritter 1977). The parr stage is sometimes subdivided according to age, where parr 0+ are young fish less than one year old etc.

Densities of sea trout parr depend on several factors, including climate, the size of the river and habitat characteristics (ICES 2009, ICES 2011). The ICES study group on data requirements and assessment needs for Baltic Sea trout (SGBALANST) has introduced a common classification system of the habitats. The mapping of trout parr habitat has been conducted at electrofishing sites (ICES 2009).

The habitat quality (Trout Habitat Score) is determined by addition of score values (indicating habitat quality for the variable) for physical conditions (water velocity, substrate, depth, slope, shade, stream wetted width), and also temperature is incorporated. Only sites with good or intermediate water quality (oxygen, nutrients, suspended solids, pH and iron) are used for the assessment. The optima (preference curves) for 0+ parr for these variables were used to apply habitat score values for the model. The spatial niche in the winter parr habitat can be narrower than in the summer (ICES 2011).

Results and confidence

Current status and trends in the Baltic sea trout

The present status of sea trout populations is in some areas very alarming: in only 26% wild and mixed sea trout river populations the smolt production was estimated in expert evaluations to be above the 50% GES boundary in the Baltic Sea during 2014 (ICES 2015). Of the 629 river populations, 185 were evaluated to reflect good environmental status (GES), while 144 were evaluated as sub-GES and 320 were not evaluated.

The status of sea trout populations in the Main Basin (all sub-basins south to the Gulf of Bothnia and Gulf of Finland) was partially revised in 2014 and is known in 177 and unknown in 218 rivers with wild populations. Status of 26 (wild and mixed including tributaries in large systems) populations is sub-GES (below 5% of the potential smolt production), mainly due to habitat degradation, dam building and overexploitation.

The sea trout populations in the Main Basin (all sub-basins south to the Gulfs of Bothnia and Finland) generally achieve, or are close to, GES. In several sub-basins in the Main Basin, however, a worrying decline of parr densities has been found, but the densities are still on a reasonable level (ICES 2015). In ICES sub-divisions 22 and 26, however, the parr densities are on a low level.

The densities of parr in Swedish rivers in the Sound, Arkona Basin and Bornholm Basin (ICES SD 23–25) have remained stable during 1990–2014 (ICES 2015). In the Western Gotland Basin, Bothnian Sea and Bothnian Bay (ICES SD 27, 30, 31) the densities have increased during the period but the densities in Bothnian Bay are very low.

Parr densities in Estonian rivers in the Gulf of Finland, Northern Baltic Proper and Gulf of Riga have increased since 2001 in all the spawning rivers with good or very good habitat quality (Pedersen et al. 2011). However, the Northern Baltic Proper stocks on the islands of Saaremaa and Hiiumaa are on low levels.

In Finland the parr densities have been far below the reference production level in all rivers for several years. Annual fluctuations are high in the observed densities and most of the rivers show densities of less than 1–5 parr per 100 m2 (Pedersen et al. 2011). In the Gulf of Finland, the river Ingarskila had parr density of over 80 per 100 m2 in 2009, but the annual variance is very high. There has been an improvement in the state of the stock in several rivers in the last years probably as a result of implementation of new management measures.

In Russian part of the Gulf of Finland, the parr densities are estimated to be on the level of 5–10 parr per 100m2, which is considered low and below optimal (Pedersen et al. 2011).

In Latvia, the rivers Salaca, Gauja and Venta are the three most important sea trout rivers in terms of wild smolt production (Pedersen et al. 2011). In Salaca, the parr density was on average 6.3 parr (0+ and older) per 100 m2, which is below average for previous years. In Gauja the average density was 5.3 parr pr 100 m2 in 2010, which is less than average in previous years. No recent data are available for the river Venta but in the period from 2007–2009 average varied between less than one to 2.2 parr per100 m2. Sea trout in Latvian rivers seems not to be improving, but very recent data are not available, and consequently there is much uncertainty.

In Lithuania, almost all spawning rivers are not in the good state. The average density of juveniles (0+ – 2+) in rivers are fluctuating, in last years – from very high number to very low (Pedersen et al. 2011). Surveys were done in 75 sites, average mean density in the rivers of juveniles varied from 2.9 to 28.2 (mean – 12 ind./100 m2). The main reason for the present decline is too high fishing pressure in the sea and coastal fishery and illegal fishing in rivers during spawning migration and spawning period. Majority of sea trout are caught in coastal areas as a by-catch by gillnets for other species.

In Poland, there is only one stream with a wild sea trout stock and 16 mixed and 8 reared stocks (Pedersen e al. 2011). The average density of 0+ parr on monitored spawning grounds usually is around 50 per 100 m^2, but on some sites can exceed 150 ind/100m2 (Pedersen et al. 2011). There are not great changes in the densities within the last 6 years. The main problem with the poor state sea trout stocks is the lack of suitable spawning habitats due to dams, water discharge times and gravel extractions. However, also poaching, by-catch of smolts in the coastal herring fishery and diseases affect negatively the stocks.

In Germany, there are nine rivers with natural reproduction (eight of them initiated with stocking). The numbers of parr have increased during the recent 11 years. The status of the stocks is mostly sub-GES.

In Denmark, a recent status report showed that approx. 26% of the streams (either small entire streams or parts of larger streams) with original populations of trout produce less than 50% of stream capacity (HELCOM 2011). The reason for this is in most cases poor habitat conditions (including heavy sand transport) or barriers, including newly established artificial lakes in the lower parts of the streams. The wild trout smolt production has, however, increased in the entire country and not least in the streams inside the Baltic area, where wild smolt production has increased more than twofold over the last decade.

Smolt production and post-smolt survival

The smolt production of the rivers in the Russian Kaliningrad region is estimated to be 3,500 smolts per year. In Lithuania, it was estimated that in 1999 the rivers produced 323,800 sea trout smolts annually, but in recent years that has dropped to 34–46,000 smolts (Figure 2) (Pedersen et al. 2012).

Table 1. Smolt production in Russia and Latvia. Source: Pedersen et al. 2012.

Region/Country	Smolt production	Potential
Kaliningrad region	3,500	200,000 – 250,000
St. Petersburg region –Northern part	6,000-8,000	
St. Petersburg region –Southern part	4,000	
Latvia	61,000	

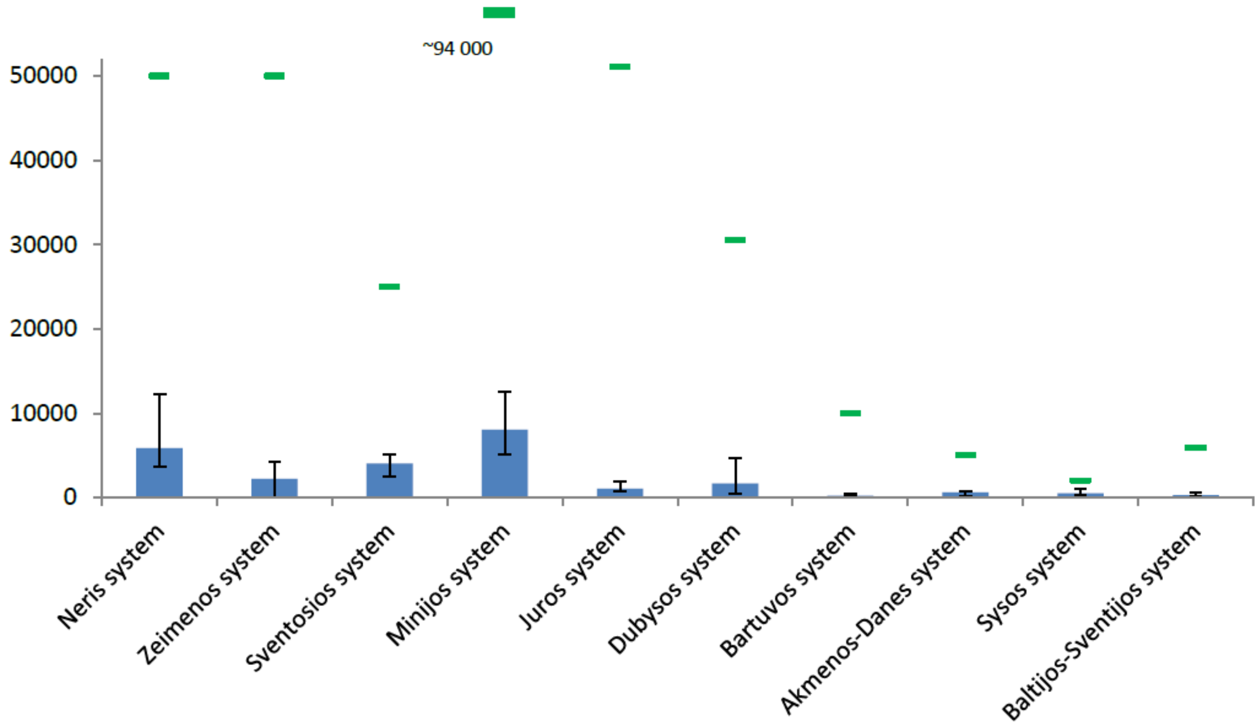


Figure 2. Average annual smolt production in Lithuanian river systems (mean and range) during 2005-2010 and the potential smolt production capacity (green lines). Average of the total annual smolt production was 24500 individuals. Source: Pedersen et al. 2012.

Tagging studies on post-smolts at the sea show a continuous decrease in returns (ICES 2015). Carlin tagging results in the Gulf of Bothnia and Gulf of Finland show a large and increasing proportion, often the majority, of the sea trout to be caught already during the first year in sea. Trout are caught as by-catch in the whitefish fishery by gillnets and fykenets. Based on tagging data, the proportion of fish caught as undersized during the first sea year still is increasing even though the total effort of gillnet fishery by professional fishermen has not changed during the past ten years. The recapture rate of sea trout shows a continued decreasing trend for more than 20 years in the Gulf of Bothnia, although it may have levelled off in recent years. In the Gulf of Bothnia, recapture rate in Sweden was similar to Finland in the period 1980–2002.

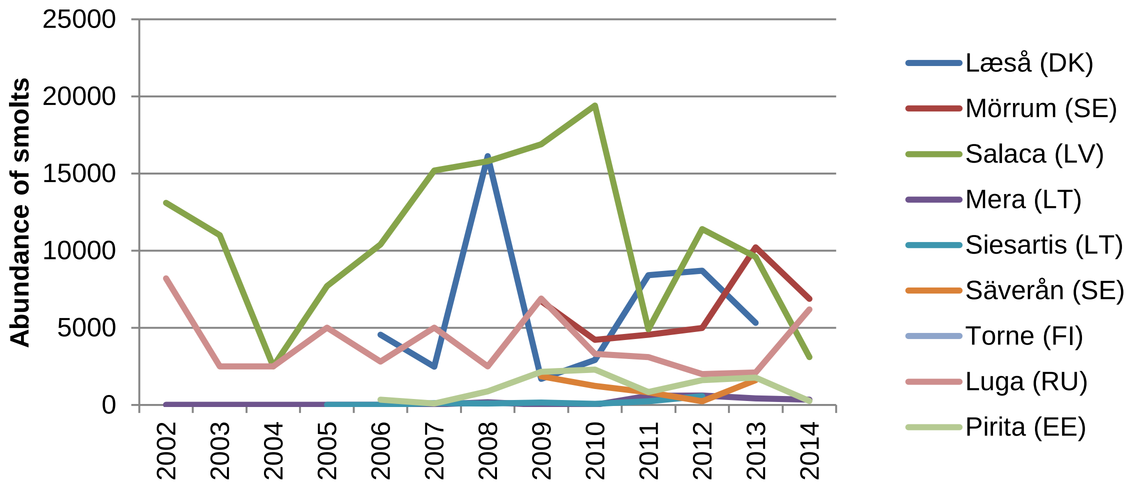


Figure 3. Abundance of sea trout smolts in nine rivers. Source: ICES 2015.

Number of sea trout spawners

The number of sea trout spawners ascending the rivers is followed in a few large rivers only. Five Swedish rivers in the Bothnian Sea and Bothnian Bay have automatic or manual counting. According to Pedersen et al. (2012) the number of spawners in the five Swedish rivers was too low to populate all available habitats. In River Piteälven the number has increased continuously (Figure 4), and for some years there was also an increase in Kalixälven, Vindelälven and Byskeälven. However, the number of spawners ascending Kalixälven and Byskeälven again declined between 2010 and 2011. The increase in the River Piteälven is likely due to the closing of salmon traps in the river estuary (Pedersen et al. 2012). In general the number of spawners has increased since 2012.

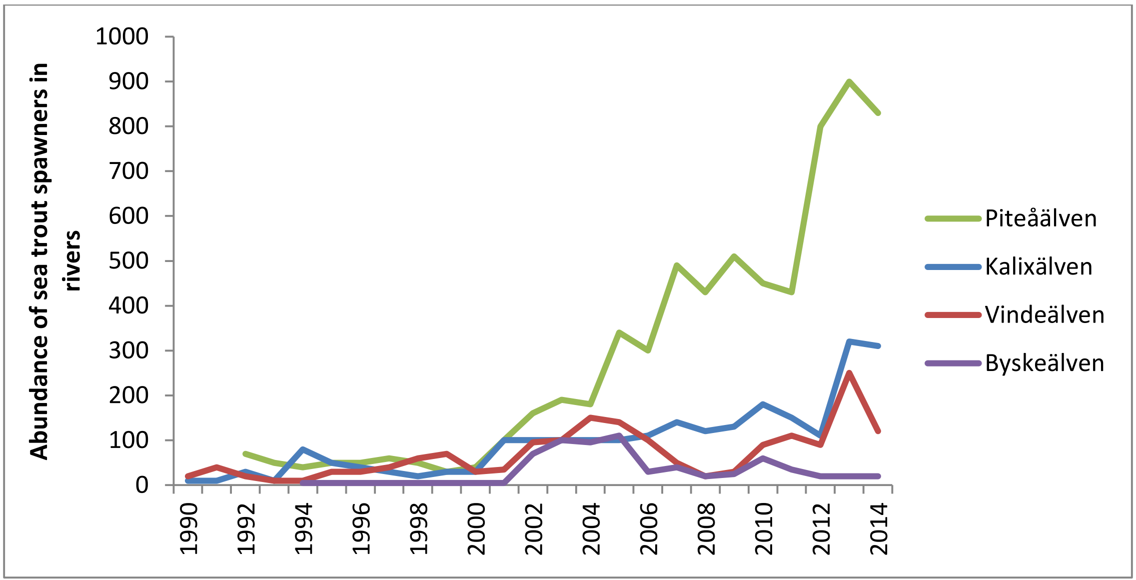


Figure 4 Abundance of sea trout spawners in four Swedish rivers. Source: ICES 2015.

Even though the number of spawners has increased in R. Piteälven during the period 2001–2012, compared to previous years, the number of spawners observed entering rivers in northern Sweden is extremely low, taking into account the size of the rivers. This is likely due to both low recruitment and elevated mortalities at sea. In addition, anglers' catch – indicating the number of spawners to some extent – does not suggest any progress in the number of spawners in this area either.

The estimated number of spawners migrating to the Lithuanian Nemunas catchment area varies between 11 500 individuals (1992) and 1 800 in 2003, but in average it is around 4 000 individuals each year (Pedersen et al. 2012).

In the German river Hellbach, a pilot counting of adult spawners accounted for nearly 1600 ascending fish in 2009 (Pedersen et al. 2012). In 2010, this number was 500, but that was considered an underestimate due to flood conditions.

Confidence of the indicator status evaluation

The estimation of the reference parr density is based on the assessment model in the Southern Baltic Sea and on the expert evaluation in the northern Baltic Sea. Both methods are considered to give an accurate enough estimate on the potential maximum parr density to allow the evaluation of the state of the stock i.e. there is no regional difference in the confidence of indicator status when it comes to the reference densities.

A counterpart for the reference densities in GES criteria is planned to be based on the 4-5 year moving average of parr densities. In some areas (e.g. in Denmark) there are too many river to be surveyed annually with available resources. However, the most of rivers are still surveyed in regular intervals and in these a different calculation for the average parr densities can be used. This does not decrease the rate of confidence in the evaluation of the state of the stock.

The coverage of the monitored rivers is good in the Southern Baltic and Estonian coast of the Gulf of Finland and satisfactory in the Finnish coast of Gulf of Finland and Bothnian Sea. In the Swedish and Finnish coasts at the Bothnian Bay as well as in the Russia more rivers are needed under the regular monitoring. However, the state of stocks in the Gulf of Bothnia and in the northern and eastern part of the Gulf of Finland can be concluded to fall with high probability into a sub-GES category. Even though the present data is sparse it indicates consistently low parr densities.

Sea trout rivers and brooks are also in the focus of EU Water Framework Directive (WPD) and all actions improving the habitat quality of these watersheds will benefit also the sea trout stocks accordingly. Quality improvement of the spawning and rearing habitats will affect also positively to the potential production capacities of the rivers. This means that regular monitoring of the selection of rivers and in addition more rigorous inventories in 5-10 years intervals would be suitable to be fitted as a part of the national WPD programs.

Monitoring requirements

Monitoring methodology

Monitoring practices for sea trout spawners and parr are described on a general level in the HELCOM Monitroing Manual in the Sub-programme: Migratory fish**.**

Specific guidelines are under development, with the aim to publish them in the manual during 2015.

Sea trout is monitored by all Baltic countries by electrofishing for parr in the natal streams, giving a good index measure of recruitment. Parr densities are measured by regular electrofishing surveys in the early autumn (August-September). One river can be surveyed annually or in 2-7 years intervals. Electrofishing takes place usually on the fixed sites to allow the comparison of the densities between years. There are usually several electrofishing sites in one river.

In a couple of countries sampling of parr densities is used to calculate the smolt production by a relation of parr to smolt survival either developed in the same stream or in different streams (ICES 2008). 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 total, smolt production estimates exist for nine rivers in the entire Baltic area, but the time-series are not complete for all years.

In only one river (Åvaån in Sweden) the number of spawners is monitored by trapping and inspection of the ascending sea trout. In Lithuania, the spawning run is estimated by test fishing in a couple of rivers. In nine rivers (eight in Sweden, one in Poland) the number of spawners is monitored by automatic fish counters. Determination of species is possible in these, but exact size, sex, etc. cannot always be determined. In three rivers the total run of salmonids is determined with an echo sounder. This technique does not allow discrimination between sea trout and salmon.

An indication of spawning intensity by count of redds is collected from a number of streams in Poland, Lithuania and Denmark (ICES 2008). In a couple of streams in Denmark the catch in sports fisheries has also been used to estimate the development in the spawning run. Catch numbers from the sports fishery in rivers are available from some Swedish rivers.

Tagging and marking are used as methods to obtain quantitative and qualitative information on trout populations.

Description of optimal monitoring

It is recommended that the monitoring of sea trout is carried on in the main stocks and expanded to stocks which are poorly known. The number of sea trout rivers and brooks are too many to monitor them all.

Current monitoring

HELCOM Contracting Parties currently carrying out monitoring activities relevant to the indicator are described in the HELCOM Monitoring Manual in the Monitoring Concepts table.

Sub-programme: Migratory fish
Monitoring Concepts table

The intensity and period during which monitoring has been going on, varies between countries (ICES 2008). Some countries started monitoring during recent years, while very long data series exist for a few streams.

Number of adult spawners ascending rivers is being monitored in five Swedish rivers in the Bothnian Bay.

The information of the sea trout spawning rivers originates from ICES WGBAST, ICES SGBALANST and the HELCOM project SALAR.

Description of data and up-dating

Metadata

In total, data was available from 240 sites in about 120 streams and rivers for period 2012-2014. ICES Subdivisions 21 to 32 were represented. At least ten sites were included from each of the ICES Subdivisions 25, 27, 30, 31 and 32.

Due to continuous concerns about the state and information available on sea trout in the Baltic Sea, a Study Group on Data Requirements and Assessment Needs for Baltic Sea Trout (SGBALANST) was established by ICES to work for a period of two years identifying a common classification system of habitats between countries (ICES 2011).

Part of the monitoring of sea trout parr takes place when monitoring salmon populations. This will result in less precise estimates of sea trout recruitment, because of differences in habitat between the two species. More electrofishing sites should be established in smaller rivers and streams, e.g. tributaries of salmon rivers, to ensure sufficient coverage of trout nursery areas.

Contributors, archive and references

Contributors

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Archive

2013 Indicator report

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