

# BALTIC SALMON AND TROUT ASSESSMENT WORKING GROUP (WGBAST)

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## BALTIC SALMON AND TROUT ASSESSMENT WORKING GROUP (WGBAST)

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## i Executive summary

The Baltic Salmon and Trout Assessment Working Group (WGBAST) was mandated to assess the status of salmon in Gulf of Bothnia and Main Basin (subdivisions 22–31), Gulf of Finland (Subdivision 32) and sea trout in subdivisions 22–32, and to propose consequent management advices for fisheries in 2026. Salmon in assessment units (AU) 1–4, covering subdivisions (SD) 30–31 and parts of SD 22–29, were assessed using Bayesian methodology and a stock projection model (based on data up to 2024) to evaluate the effects of different catch options on wild river stocks. In contrast, the status of wild stocks in AU 5 (eastern Main Basin) and AU 6 (Gulf of Finland, SD 32) was assessed using expert-based elicitation.

Section 2 of the report covers catches and other data on salmon in the sea and summarizes information affecting salmon fisheries and management. Section 3 reviews data from salmon spawning rivers, stocking statistics and health issues. Status of salmon stocks in the Baltic Sea and catch options are evaluated in Section 4. The same section also covers methodological issues of the assessment as well as sampling protocols and data needs for assessment. Section 5 presents data and assessed stock status for sea trout in the Baltic Sea.

- Total salmon catches have decreased continuously since the 1990s. Since 2022, commercial salmon fishing has been restricted to Gulf of Bothnia, Åland Sea, and Gulf of Finland.
- The production of salmon smolts gradually increased from mid-1990s to early 2010s in Gulf of Bothnia and Gulf of Finland. Production has since then levelled out. Long-term trends for smolt production in Main Basin rivers have remained relatively stable, but at a generally low level and with large inter-annual fluctuations.
- The current (2024) total wild salmon production in all wild Baltic Sea rivers was about 2.9 million smolts, corresponding to about 85% of overall potential smolt production capacity (3.4 million smolts). In addition, about 3.5 million hatchery-reared smolts were released into the Baltic Sea in 2024.
- Survival of wild post-smolts has varied between 10% and 20% since the mid-2000s, but declined to lower levels from 2020 to 2024, with the 2021 estimate being the lowest (a median of 6.0%) in the entire time-series. Post-smolt survival is an important factor affecting stock development, pre-fishery abundance, and fishing possibilities. It is currently not known if the recent decline reflects a temporal drop or a more persistent change in sea survival.
- All of the 17 analytically assessed wild salmon stocks in AU 1-4 were likely above  $R_{lim}$ , and 15 were assessed to be at or above  $R_{MSY}$  in 2024.
- In the eastern Main Basin (AU 5), most salmon stocks are weak and have not responded positively to previous reductions in exploitation rate.
- In the Gulf of Finland (AU 6), all three wild Estonian river stocks are at or above  $R_{MSY}$ . One of the wild stocks was assessed to be below  $R_{MSY}$  in 2023, but was above in 2024.
- Most stocks for which analytical projections are available are predicted to maintain present status or recover under the current, historically low exploitation rate at sea. However, differences in post-smolt survival among stocks have become increasingly evident in recent years. This is not accounted for in the assessment model, which introduces uncertainties in status evaluations and stock projections. River stocks with uncertain statuses and/or recent negative trends may therefore require additional precautionary measures. Also, due to local environmental issues, some weak stocks are not expected to recover without longer term stock-specific rebuilding measures, including fisheries restrictions in estuaries and rivers, habitat restoration and removal of potential migration obstacles. In particular, nearly all stocks in AU 5 require such measures.

- Following a temporary and modest increase in M74 between 2016 and 2018, this mortality factor for Baltic salmon has since returned to historically low levels. However, predicting future levels of M74 remains challenging. Recent disease outbreaks, along with observations of fish showing signs of energy depletion – leading to large numbers of dead spawners and low parr densities in some wild rivers – also raise concerns about the potential for similar events to recur.
- Sea trout populations around the Baltic are in general considered stable and, in most areas, within safe limits. While the situation is still worrying in some places and variable in others, there is little or no change in the situation for most populations' recent years. It should, however, be remembered that many uncertainties remain. Stocks in the northern parts of the Gulf of Bothnia are particularly weak, although spawner numbers and parr densities show signs of improvement. Populations in Lithuania and Germany remain weak, however, probably in part due to natural causes, but they are also affected by coastal fishing.
- In general, exploitation rates in most fisheries that catch sea trout in the Baltic Sea area should be reduced. This also holds for fisheries of other species where sea trout is caught as bycatch. In regions where stock status is good, existing fishing restrictions should be maintained in order to retain the present situation.

## ii Expert group information

<b>Expert group name</b>	Baltic Salmon and Trout Assessment Working Group (WGBAST)
<b>Expert group cycle</b>	Annual
<b>Year cycle started</b>	2025
<b>Reporting year in cycle</b>	1/1
<b>Chair(s)</b>	Katarina Magnusson (SE) Katarzyna Nadolna-Ałtyn (PL)
<b>Meeting venue(s) and dates</b>	25-26 March 2025, online (30 participants) 01-08 April 2025, Pärnu, Estonia and online (30 participants)

# 1 Introduction

## 1.1 Presentation of the working group and report

The Baltic Salmon and Trout Assessment Working Group (WGBAST) contains around 29 experts from eight countries (Russia excluded) surrounding the Baltic Sea. The group is mandated to assess status and propose management advice for salmon in Baltic Main Basin and Gulf of Bothnia (ICES subdivisions 22–31), Gulf of Finland (Subdivision 32), and sea trout in subdivisions 22–32. Compilation of data (biological and fisheries related) and stock assessment is performed annually in relation to a working group meeting. The working group report is externally reviewed before publication, and the status assessment constitutes the basis for ICES advice on fishing possibilities.

The present report contains updated dataserries and results from the last meeting in 2024. Section 1 contains background information, whereas Section 2 of covers catches and other data on salmon in the sea and summarizes information affecting the salmon fisheries and management. Section 3 reviews data from salmon spawning rivers, stocking statistics and health issues. Status of salmon stocks in the Baltic Sea is evaluated in Section 4. The same section also covers methodological issues of assessment as well as sampling protocols and data needs for assessment. Section 5 presents data and stock status for sea trout.

In addition to the above sections mainly focused on recent results and long-term trends, various important information of more static nature is presented in the so-called “Stock Annex” (ICES, 2025). The Stock Annex contains background descriptions of Baltic salmon biology, rivers and assessment units, fisheries, data collection, and estimation methods and models used for status assessment. The Stock Annex is only updated when needed, for example following larger changes to the assessment methodology that have been reviewed separately by external experts (during so-called “benchmarks”).

## 1.2 Terms of reference

2023/AT/FRSG07 The Baltic Salmon and Trout Assessment Working Group (WGBAST), Katarina Magnusson\* (Sweden) and Katarzyna Nadolna-Ałtyn\* (Poland) will meet 1–8 April 2025 in Pärnu, Estonia to:

- a ) Address relevant points in the Generic ToRs for Regional and Species Working Groups;

Material and data relevant for the meeting must be available to the group on the dates specified for the 2025 ICES data call. WGBAST will report by 29 April 2025 for the attention of ACOM.

## 1.3 Participants

The following experts participated at WGBAST in 2025:

Name		Country
Adam Lejk	(in person)	Poland
Anders Kagervall	(in person)	Sweden
Anne Cooper	(online)	ICES secretariat
Antanas Kontautas	(in person)	Lithuania
Antoine Kopp	(online)	DG MARE
Antti Rätty	(in person)	Finland
Armin Steibli	(in person)	Germany
Atso Romakkaniemi	(in person)	Finland
Caroline Ek	(online)	Sweden
Edgaras Ivanauskas	(in person)	Lithuania
Elin Dahlgren	(online)	Sweden
Hans Jakob Olesen	(in person)	Denmark
Henni Pulkkinen	(in person)	Finland
Jānis Bajinskis	(in person)	Latvia
Jenni Prokkola	(in person)	Finland
Johan Dannewitz	(in person)	Sweden
Katarina Magnusson	(in person)	Sweden
Katarzyna Nadolna-Ałtyn	(in person)	Poland
Marc Simon Weltersbach	(in person)	Germany
Martin Kesler	(in person)	Estonia
Pauliina Louhi	(online)	Finland
Piotr Dębowski	(in person)	Poland
Rafał Bernaś	(online)	Poland
Rebecca Whitlock	(in person)	Sweden
Stefan Palm	(in person)	Sweden
Stefan Stridsman	(in person)	Sweden
Stig Pedersen	(in person)	Denmark

Name		Country
Tapani Pakarinen	(online)	Finland
Tuomas Leinonen	(in person)	Finland
Viktor Thunell	(online)	Sweden

## 1.4 Code of conduct

In 2018, ICES introduced a Code of Conduct that provides guidelines to its expert groups on identifying and handling actual, potential or perceived Conflicts of Interest. It further defines the standard for behaviours of experts contributing to ICES science. The aim is to safeguard the reputation of ICES as an impartial knowledge provider by ensuring the credibility, salience, legitimacy, transparency, and accountability in ICES work. Therefore, all contributors to ICES work are required to abide by the ICES Code of Conduct.

At the beginning of the 2025 WGBAST meeting, the chair raised the ICES Code of Conduct with all attending member experts. In particular, they were asked if they would identify and disclose an actual, potential or perceived Conflict of Interest as described in the Code of Conduct. After reflection, none of the members identified a conflict of interest that challenged the scientific independence, integrity, and impartiality of ICES.

## 1.5 Ecosystem considerations

### 1.5.1 Salmon and sea trout in the Baltic ecosystem

Salmon (*Salmo salar*) and sea trout (*Salmo trutta*) are among the top fish predators in the Baltic Sea. Together with European eel (*Anguilla anguilla*) and migratory whitefish (*Coregonus lavaretus/Coregonus maraena*), they form the group of keystone diadromous species in the Baltic Sea. The Stock Annex contains background descriptions related to ecosystem aspects for Baltic salmon, including basic biology, ecological functioning, environmental pressures, disease outbreaks, effects of climate change, and fisheries impacts, whereof most are common for both species. At the beginning of Section 5, a short description is also given on how the life history and ecology of sea trout differs from that of salmon.

## 2 Salmon fisheries

### 2.1 Overview of Baltic salmon fisheries

The fishery for Baltic salmon is heterogeneous. Commercial and recreational fisheries occur in the sea and in rivers, using a variety of gears. Below follows a brief overview of the most important fisheries and gears. A more comprehensive description of various fisheries including descriptions of gears and methods used is given in ICES (2021c) (Stock Annex: Salmon (*Salmo salar*) in subdivisions 22–31 (Main Basin and Gulf of Bothnia) and Subdivision 32 (Gulf of Finland). ICES Stock Annexes. Report. <https://doi.org/10.17895/ices.pub.18623147.v1>).

With a historical perspective, more extensive descriptions of this, as well as more on gear development in Baltic salmon fisheries, are also available in ICES (2003). Information on catches, effort, discards, unreporting, and misreporting is provided in this report in sections 2.2–2.4.

#### Commercial fisheries

Coastal commercial fisheries targeting salmon occur mainly in Gulf of Bothnia and Gulf of Finland, along the coasts of Sweden and Finland, but to some extent also in Estonia and Latvia. During the latest years, most of the commercial landings has come from the coastal fishery. Gears that are used include different types of trapnets. The fishery occurs during spring and summer and targets salmon on their spawning migration. Some commercial fisheries also exist in fresh water, often close to river mouths, such as in a few Swedish rivers with reared salmon and in River Daugava, Latvia.

Offshore commercial salmon fishing has mainly been carried out in Southern Baltic Sea (Main Basin), although it has periodically occurred also in Southern Gulf of Bothnia. In 2022, the commercial offshore mixed-stock fishery targeting salmon was closed to protect the stocks that currently are assessed as weak. The offshore fishery took place mainly during the period November to March, and targeted non-mature salmon in their feeding areas. Historically, driftnets were the most important gear in the open sea. However, after the driftnet ban was enforced in the Baltic Sea in 2008, the commercial offshore fisheries have mainly consisted of longlining and to some extent anchored floating gillnets. In 2021, the longlining fisheries was limited to vessels from Denmark, Poland, Latvia, and Lithuania, whereas earlier several other countries were also involved.

#### Recreational fisheries

Recreational trolling is a popular fishing method to catch salmon in the Baltic Sea. So far, the trolling fishery is most developed in Sweden, Denmark, Germany, and Poland. Also, in the remaining countries trolling fishery is developing. The trolling season varies between different sea areas and depends on the feeding and spawning migration of salmon and/or seasonal closures. In the south-western Baltic Sea and Main Basin, it typically starts in late autumn and ends in the middle of May. In the Åland Sea and Gulf of Bothnia, the season starts in the end of May and continues until late summer. Over the past few decades, the trolling fishery has increased but effort have levelled off in recent years and decreased substantially since 2022 where a ban on retaining wild salmon came into force. On the other hand, the commercial offshore catches have declined. Thus, the relative importance of the recreational fishery has in a longer perspective increased over time and only in most recent years decreased

The river fishing for salmon in the Baltic Sea region has a very long history. Until the mid-1990s, nets and weirs were used in many rivers throughout the Baltic Sea region. Currently, the river fishery for wild salmon is entirely recreational and to a major part restricted to angling (rod and

reel fishing). The most productive wild Baltic salmon rivers are by far the large Finnish and Swedish rivers flowing into the Bothnian Bay (SD 31). The main fishing season is between May–September, during the spawning run. Rod fishing for salmon in these rivers is very popular, attracting several thousands of anglers every year. The recreational river fishing for salmon in other countries surrounding the Baltic Sea is more limited, although salmon, to some extent, is caught in Estonian, Lithuanian, Latvian, and Polish rivers. No Baltic salmon rivers exist in Denmark and Germany. In Russia, there has not been any recreational salmon fishery in their rivers feeding into the Baltic Sea, according to previous information.

While the recreational salmon fisheries are largely dominated by angling (offshore trolling and rod fishing in rivers) other types of recreational fisheries using passive gear exist in some countries. The passive gears (i.e. trapnets, gillnets, and longlines) are being used in both coastal and riverine recreational fisheries, where salmon is targeted or caught as bycatch. These catches are generally estimated to be of minor importance in terms of impact on the stocks (i.e. removals).

### **Brood stock fisheries**

Brood stock fisheries are aimed at collecting mature individuals for breeding purposes. Either within sea-ranching programmes, where mature breeders are caught annually to produce salmon for stocking, or to renew closed brood stocks kept in captivity during the whole life cycle. Brood stock fisheries usually occur in rivers with reared salmon, but adult salmon are also caught for breeding purposes in some wild salmon rivers. Catches for breeding purposes are, however, rather limited and occur in Estonia, Finland, Latvia, Lithuania, Poland, Sweden, and earlier in Russia.

## **2.2 Catches**

This section contains information on commercial and recreational Baltic salmon catches from sea, coast and rivers in 2023–2024 and over time. The catches presented are, unless otherwise stated, landed (retained) salmon.

Commercial catch statistics provided for WGBAST are based on EU logbooks, national reporting system for vessels not obliged carrying logbook, and/or sales notes. As described in more detail in the Stock Annex, recreational catches are typically estimated by a combination of different types of national surveys targeting various recreational fisheries, e.g. using access-point surveys, questionnaires, camera surveillance, etc. Also, expert evaluations and guesstimates are used in estimating recreational catches. Further details on the collection of salmon catch data in the Baltic Sea (in total and by country) are given in ICES (2021c) (Stock Annex: Salmon (*Salmo salar*) in subdivisions 22–31 (Main Basin and Gulf of Bothnia) and Subdivision 32 (Gulf of Finland). ICES Stock Annexes. Report. <https://doi.org/10.17895/ices.pub.18623147.v1>).

Due to the increasing share of recreational fishermen practicing catch-and-release, voluntarily or due to regulations, there is a need for separate time-series including released salmon. Further, since the effects of catch-and-release on the management of the stocks largely are unknown, reliable data on survival rates and other effects on fish that have been caught and released are needed.

The 2024 data presented are principally data delivered in the ICES WGBAST 2025 data call and the separate WGBAST 2025 data call when parts of the data were still preliminary. Quality checks during the meeting resulted in a few changes in the dataset. Besides changes in conjunction with further quality checks, any future revision of data over time may be due to additional landings reported in the commercial fisheries or adjustments of catch estimates in the recreational fisheries.

The following seven tables with salmon catches divided in various ways (as described below) are annually updated and referred to in this report:

- Table 2.2.1.1: nominal reported and total salmon catches in *weight* by country for the years 2015–2024 (including discarded, unreported and misreported fish). Estimates of discards and unreported and misreported catches are presented separately.
- Table 2.2.1.2: corresponding annual catch data as in Table 2.2.1.1 in *numbers*.
- Table 2.2.1.3: nominal reported catches in *weight* from sea, coast and rivers divided by region (SD 22–29, 30–31 and 32) and country for the years 2015–2024.
- Table 2.2.1.4: corresponding annual catch data as in Table 2.2.1.3 in *numbers*.
- Table 2.2.1.5: nominal catches from last year (2024) in *weight* and *numbers* from sea, coast and river, divided by country and by SD.
- Table 2.2.1.6: nominal *commercial landings in numbers* (2015–2024) from sea and coast compared to TAC, divided by fishing nation and region (SD 22–31 and 32).
- Table 2.2.1.7: nominal *recreational (non-commercial) catches in numbers* from sea and coast (pooled) and rivers, divided by country and region (SD 22–31 and 32) in 2015–2024.

In addition to these tables, several figures on salmon catch data are also presented that illustrate catch development over time.

Since 2022, EU regulation allowed to retain only one fin-clipped salmon per angler per day in the open sea recreational trolling fishery. The total retained trolling catch in the Main Basin was estimated by the national agencies and experts to have been 4 946 (90% probability interval (PI) 4 148 – 5 949) salmon in 2024. Furthermore, it was reported by countries that ca. 7 774 (6 458–9 409) salmon with adipose fin were released back to sea. A 25% post-release mortality rate was applied to the reported number of released salmon. Due to a lack of species- and fishery-specific information on post-release mortality for Baltic salmon, experts estimated this number based on a literature review of studies conducted primarily on Pacific salmon (ICES, 2017b). The number of dead salmon (due to post-release mortality) was estimated to 1 944 (1 615 – 2 352) which was used in the scenarios 13-19 (Section 4). However, in 2023 and 2024, Sweden and Germany conducted a study to assess post-release mortality of Baltic salmon in the recreational trolling fishery (see Section 2.5.3 for details). In total, 44 salmon were tagged with pop-up satellite archival tags to monitor their survival and behavior up to 45 days after release. Preliminary findings showed a post-release mortality rate of 13.8%, significantly lower than the 25% rate currently assumed in the stock assessment. The proportion of adipose fin-clipped salmon in the Polish biological sampling (special research fishing with long-lines) was about 35% in 2023. Also, the Full Life History Model (FLHM) estimates that ca. 30% of the salmon in the Main Basin is reared. However, in the catch estimate the 45% of reared salmon in the total catch indicates that part of the retained catch was potentially non-fin clipped in all offshore trolling fishery.

The estimated discards, unreported, and misreported catches are not included in the nominal reported catches but presented separately. The estimated catches are calculated using conversion factors and reported in terms of the most likely value with a 90% probability interval. More details on the estimating procedures are given in Section 2.3 (see also ICES (2021c) Stock Annex: Salmon (*Salmo salar*) in subdivisions 22–31 (Main Basin and Gulf of Bothnia) and Subdivision 32 (Gulf of Finland). ICES Stock Annexes. Report. <https://doi.org/10.17895/ices.pub.18623147.v1>). In the Stock Annex, an overview of management areas (regions) and rivers is also presented.

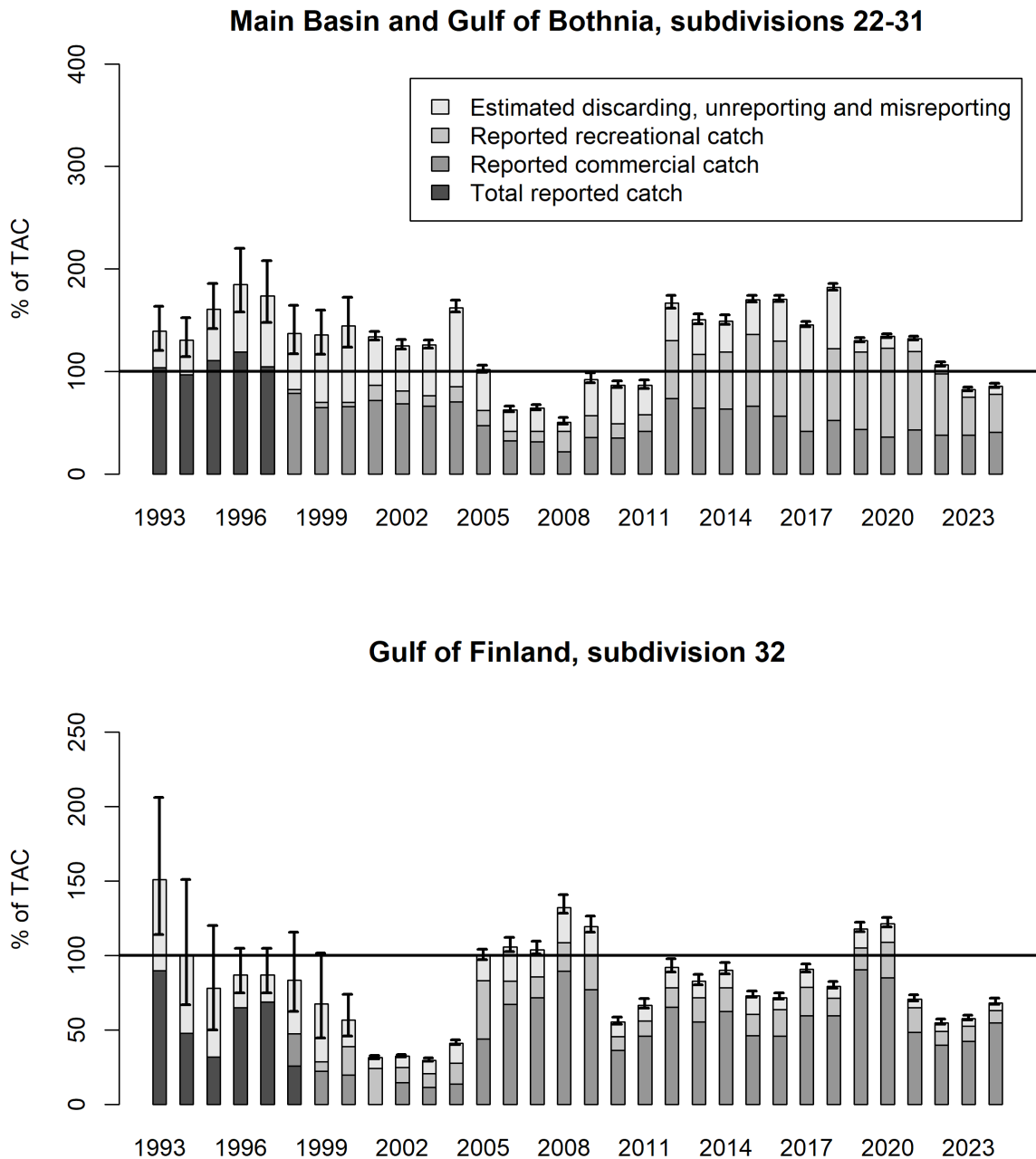
## 2.2.1 Catch development over time

There has been a long-term decline of the total nominal catches in the Baltic Sea, starting from 5 636 tonnes in 1990 down to just 960 tonnes in 2010. After that, the catches have remained rather stable up to 2017 when the historically lowest total nominal catch was registered: 713 tonnes. In 2018, catches increased again and in 2020, the total nominal catch was 867 tonnes or 140 888 salmon. In 2021, the total nominal catch was 872 tonnes or 142 972 salmon. In 2022, a fishing ban was introduced, where commercial fisheries targeting salmon was prohibited in the southern Baltic Sea (SD 22-29), thus the total nominal catch decreased to 554 tonnes or 79 747 salmon. The fishing ban was also in place in 2023 and 2024, where catches further declined to 54 729 salmon (Table 2.2.1.2) in 2024 weighing 344 tonnes (Table 2.2.1.1).

After the driftnet ban was enforced in 2008, the percentage of the total commercial offshore catch by this gear has been zero. At the same time, commercial catches with trapnets along the coast increased their share. Consequently, the proportion of the coastal catch has gradually increased over time. In 2022, there was a ban of commercial catches of salmon in the southern Baltic Sea. In 2023 and 2024, the coastal catch was close to 90% (89% and 88%) out of the nominal total catch at sea (in weight) (Table 2.2.1.3).

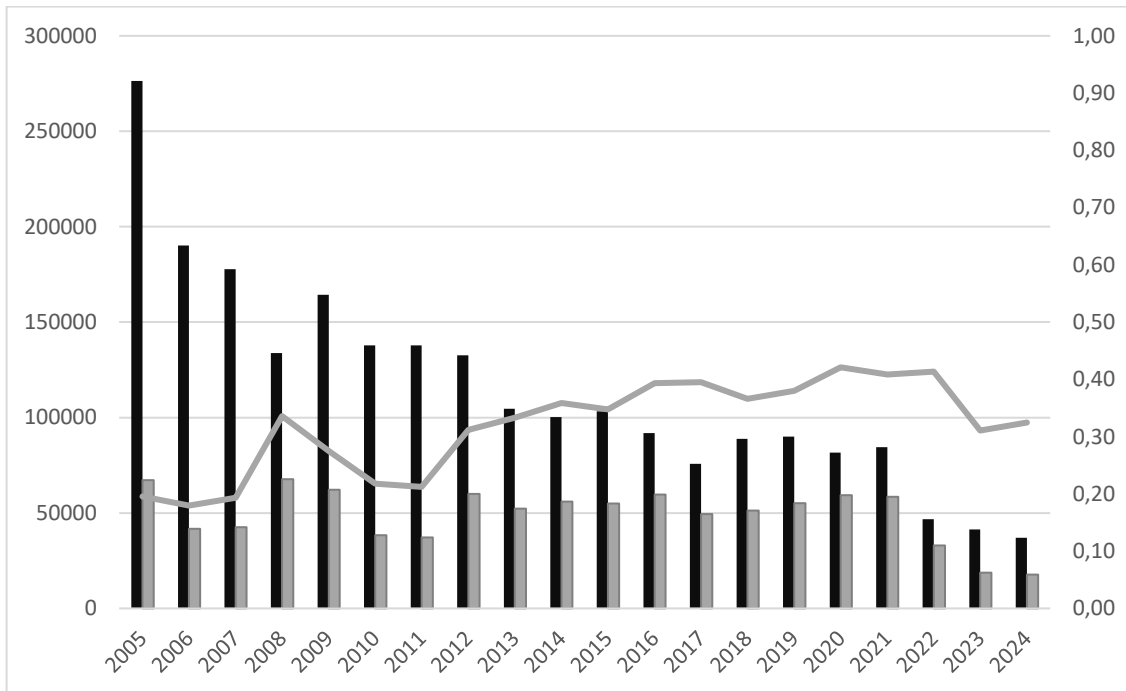
Over the years, the total share represented by river catches has been fluctuating. However, in the latest years they have remained rather stable, being approximately 30% of the total (in weight). In Table 2.2.1.3, the distribution of total catches (in weight) from offshore, coastal, and riverine fisheries are presented (see Table 2.2.1.4 for corresponding catches in numbers). The distribution of nominal catches in 2024 by country, per SD, offshore, coast, and river are presented in Table 2.2.1.5.

A comparison of landings (coastal and offshore) per country compared to the EU TAC in 2024 is presented in Section 2.2.3. Compiled information on landings versus TAC is also presented in Table 2.2.1.6. Note that data presented in Section 2.2.3 are the latest available. Discards, unreported, and misreported catches are not included in the utilization of the TAC but in Figure 2.2.1.1, total catches of salmon are presented (as a percentage of TAC) where such catches have been added. In this figure, the recreational landed catches are also included.



**Figure 2.2.1.1. Catches of salmon in % of TAC in 1993-2024. For years 1993–1997 (1993–1998 for Gulf of Finland), it is not possible to divide the total reported catch into commercial and recreational catches. Estimates of discards and unreported catches are presented separately in Table 2.2.1.2.**

A notable change in the catch distribution occurring in the past few decades is that the proportion of non-commercial catches has grown in relation to the commercial catches. The development for the proportion of non-commercial catches (including river catches and expert trolling estimates) from 2001 and onwards is illustrated in Figure 2.2.1.2. In 1994, non-commercial catches comprised just 10% of the total nominal catches (in weight), whereas since 2013 the share has fluctuated between 40 and 50%. Nominal recreational (non-commercial) catches in numbers from sea and coast (pooled) and rivers in 2015–2024, divided by country and regions (SD 22–31 and 32), are presented in Table 2.2.1.7.



**Figure 2.2.1.2. Commercial (black columns) and recreational (grey columns) catches of salmon in numbers in years 2005 – 2024 for subdivisions 22-32. The recreational catch proportion of the total catch (commercial and recreational) is shown for the same time period (grey line). The recreational catches include all components (river, coastal and sea), also the expert opinion trolling estimates depicted in Figure 2.2.1.3.**

In 2024, WGBAST continued the work initiated in 2017 to pay extra attention to the recreational salmon fisheries that are becoming proportionally more important. Time-series of trolling catches from an expert elicitation initiated in 2017 (ICES, 2017a; 2017b) was updated (Figure 2.2.1.3). The estimates were partly updated until 2024, to take into account new information from earlier years received from new surveys. The update resulted in a slightly modified time-series compared to in previous years, with lower annual estimates for some years. The estimates are, however, still more than 20 000 salmon larger than previously assumed (i.e. for the 2010–2016 assessments). Trolling catches from the Main Basin (SD 22–28) are dominating and are only to a lesser degree taken in SD 29–32. Catches in the Main Basin have been declining since 2019. The 2024 Main Basin estimate was lower than 10 000 salmon caught and retained, including estimated post-release mortality (Figure 2.2.1.3). In contrast to 2017, when the assessment model for salmon in AU 1–4 did not perform, the new updated trolling catch estimates have been included in later years’ stock assessments (Section 4).

In SD 22–31, the total recreational river catch in 2020 was noticeably bigger than in previous years; since then, however, a declining trend is observed with 11 288 salmon retained in 2024. There is a strong downward trend in the SD 32 recreational river catches since the beginning of the 2000s (Figure 2.2.1.4) but after 2018, catches have stayed comparatively stable. No further analysis of the recreational river catches has been made. In Section 3.1, details on specific river catches are presented.

### 2.2.2 Catches by country (2023-2024)

**Denmark:** The Danish salmon fishery is an open sea fishery. The total commercial and recreational catches (excluding discards and seal damaged salmon estimates) in 2024 were 2 151 salmon, which is less than in the previous year. There was no long-line fishery in 2024 and reported commercial salmon landings as bycatch were only one salmon (0,007 tonnes). However, there exist no or poor information on the magnitude of bycatch in other fisheries (e.g. pelagic fisheries). The recreational fishery is mainly trolling, but some recreational passive gear fishing, (i.e. longlining) also takes place in waters close to Bornholm. It is likely that the effort in this fishery has decreased in recent years with the increasing number of seals around Bornholm. It is guesstimated that catches are very small (<100 salmon per year), but with the restrictions now enforced this fishery targeting salmon directly cannot be carried out. An estimate resulting from an internet-based recall survey in 2024 targeting annual licence holders yielded a result of 2 150 salmon landed for trolling. However, the result is believed to be an overestimate due to recall and avidity bias as respondents participating in such surveys often are the most avid anglers and the recall period is long (6 month). The number of salmon caught has steadily decreased over the five years. In 2022, the fishing intensity was strongly reduced as a result of the new restrictions (fin-clipped salmon per angler per day) and because of adverse weather conditions, with many days with strong wind. Fishing intensity was reduced to 78 days with actively fishing boats, compared to 90 – 111 in previous years. This pattern was also evident in 2024 where the number of days where the weather conditions allowed fishing around Bornholm was 60 days with active fishing boats. This is less than in previous years. In addition, the fishing efficiency was reduced due to high water temperatures during the autumn.

**Estonia:** There is no specific Estonian salmon fishery. In the coastal fishery, salmon is a bycatch and the main targeted species are sprat, flounder, and perch. The share of salmon in the total coastal catch is less than 1%. In 2024, small scale salmon fishery only existed at the coast in Gulf of Finland. The coastal catch (commercial and recreational) was 6.8 tonnes, which is less than in previous years. The vast majority of salmon (90%) was caught in the Gulf of Finland (SD 32). There are about 570 commercial fishermen in Gulf of Finland, and in addition up to 6 433 monthly gillnet licences are distributed annually (standard length of a net is 70 meters). The commercial fishery takes 71% of the total catch (in weight). The vast majority of the salmon (55%) is caught in trapnets. Nearly all caught salmon are spawners.

**Finland:** In 2024, Finnish fishers caught a total of 23 232 salmon (149 tonnes) in the Baltic Sea, which was 5% less than in 2023. The landed commercial catch was 17 977 salmon (111 tonnes). The recreational catch (including river catches) was 5 255 salmon (38 tonnes). Practically all commercial catch was taken in the coastal fishery mainly by trapnets and there was no salmon fishing in the southern Baltic Sea by the Finnish vessels. Commercial catch data for 2024 are preliminary. Catch estimate of the recreational fishery in sea in 2024 was partly based on the results of the 2022 Finnish Recreational Fishing Survey (675 salmon, 3 tonnes, high uncertainty). National surveys are carried out every second year and for years with missing data, the same sea catch estimates as the latest survey is assumed. River catch (commercial and recreational) was 5 690 salmon (40 tonnes) being 17% less than in 2023. Since 2018, some commercial fishing has developed in the rivers Iijoki and Kemijoki in rather short areas between river mouth and the lowest dam.

Finnish professional fishers mainly use trapnets. In 2024, 119 coastal fishers caught salmon with 256 trapnets, and total effort in the trapnet fishery was 9 145 gear-days, being 12% less than in previous year. Reported discards of seal damages were 784 salmon (4 tonnes) being about 5% less than in previous year and comprising about 4% of the total commercial catch. No open sea salmon fishing took place by the Finnish vessels in 2024.

Commercial salmon catch in SD 29–31 was 12 673 salmon (79 tonnes, includes also catch of “scientific salmon fishing” that is described below) of which 1 110 salmon (6 tonnes) was caught in the rivers Kemijoki and Iijoki. Recreational catch was 4 828 salmon (36 tonnes) of which 4 578 salmon was caught from rivers (most from the River Tornionjoki). Recreational fishing of wild salmon was forbidden in SD 29-SD30 because of the EU regulation. In the coastal fishery, 119 fishers caught salmon with 256 trapnets. The total fishing effort was 9 145 trapnet days, being 12% less than in year (preliminary data). In the Åland Islands, 929 salmon (6.9 tonnes) were caught with anchored floating nets. The total fishing quota was 16 661 salmon (= 13 945 + 1 716 salmon transferred unutilized quota from previous year) in management unit 22-31. The quota was utilized to 69%.

In 2024, Finland executed “scientific salmon fishing” in sub-divisions 29N-30 where the salmon fishing was forbidden by the EU regulation. Fishing was started on 27 May, which affected probably only marginally to the productive part of the fishing season with fixed gears in the Archipelago Sea and the Bothnian Sea. In the Åland Sea, where fishing is mainly conducted with anchored nets, the productive fishing season was slightly shorter than regularly. However, quantitative evaluations of how the catch volume was affected by the delayed start of fishing compared to the regular regulation are still lacking. The total catch was 3 167 salmon (2 390 of these were self-sampled by fishers). In all, 42 fishers participated in the “scientific fishing”.

Commercial salmon catch in Subdivision 32 was 5 304 salmon (32 tonnes) and it was taken in the coastal fishery. Recreational catch in the area was 427 salmon (2 tonnes). River catch (all recreational) was two salmon (15 kg) and almost all of it was taken from the River Kymijoki. Practically all commercial salmon catch in the area was taken by trapnets. In all, 28 fishers fished salmon with 85 trapnets with the effort of 4 994 trapnet days, being 26% less than in 2023. Discards of the seal damaged salmon were 228 fish (1 tonne), being 4% of the total commercial catch in the area. The fishing quota was utilized to 53% of total 10 046 salmon (= 9 104 salmon + 937 salmon of transferred unutilized quota from previous year).

The official catch estimates of recreational fishery in the Finnish sea area are based partly on the national survey. The last survey covers 2022 and the 2024 survey is in the pipeline. Salmon (and sea trout) catch estimates are highly uncertain because these fishers are rare in the total population. In the 2022 survey of trolling skippers, the Finnish Recreational Fishers Association received 145 responses. The median value of total catch was 850 salmon (380-1 500 salmon). Boats were fishing 7.4 days per year (median) and they caught 0.3 salmon per fishing day. Expert evaluated number of active vessels was 290 and occasionally fishing another 290 vessels (i.e. in total 580 vessels).

Results of both 2017 and 2022 questionnaires suggest a similar magnitude for the trolling catch in the Finnish sea area. The catch estimates of the national survey are completely different magnitude. A closer review of national survey data showed that estimates consist mostly of trolling and rod fishing catch (about 80-90%, 5 000 – 13 000 salmon depending on the year). Such a magnitude is unrealistic high taking into a consideration the observed median catch per fishing day and number of sea days per boat and year. Therefore, the estimates of national survey were abandoned regarding the share of rod catch in the estimates and only the catch estimated for other gears were used.

Estimates of trolling catch (AN) and other gears (MIS) are now given separately for 2012-2024. Trolling catch estimates are based on questionnaires in 2017 and 2022 (by the Finnish Recreational Fishers' Association). For other years, trolling catch estimates are based on expert evaluation. Catch estimates for other gears could not be evaluated because of missing reference studies. These catches are potentially overestimated. Catch estimates of other gears are probably still exaggerated.

**Germany:** The total reported commercial salmon catch in 2024 (SD 22–24) in numbers was 181 with a total estimated weight of 0.9 tonnes (weight calculated by using 5 kg mean weight per salmon). 92.3% (167 salmon) of the commercial catch originated from fishing grounds in SD 24. In recent years, virtually no German commercial fishery has directly targeted salmon; hence, most of the salmon are caught as bycatch in other fisheries (mainly passive gear fisheries). In 2024, no direct commercial salmon fishery was allowed.

Recreational salmon fishing occurs almost exclusively from trolling boats in the waters off the island of Rügen (SD 24) in Germany. Since 2017, a regular survey has been established to monitor the recreational salmon trolling fishery. Recreational salmon boat fishing effort is evaluated by trolling boat trip counting via remote cameras in three relevant marinas on the island of Rügen (covering >65% of the total fishing effort) during the salmon trolling season from December until May (see Hartill *et al.* (2020) and Weltersbach *et al.* (2024) for details). Salmon trolling effort from marinas not monitored by cameras ( $n = 4$ ) is extrapolated using biweekly instantaneous trolling boat counts covering all marinas and the proportions of boats that went out for fishing derived from the marinas with camera monitoring. The camera monitoring is complemented by random on-site interviews of trolling anglers in four relevant marinas (including the marinas where the trolling boat trip counting was conducted) to determine catch-per-unit-effort in order to estimate catches and collect biological catch data and socio-economic information. In 2024, trolling fishing effort was estimated at 1 991 salmon trolling trips (fishing days). A total of 42 random on-site samplings were conducted and 109 trolling boats with 245 anglers targeting salmon were interviewed. The total number of retained salmon was estimated to be 675 (95% CI: 349–1 007) salmon in 2024. In addition, 919 (95% CI: 379–1 471) salmon have been released, resulting in a release rate of 58%.

There is only limited information available on freshwater salmon catches. However, commercial and recreational salmon freshwater catches are most likely insignificant as there are no rivers with significant salmon spawning migration and fishery along the German Baltic coast. A nationwide recreational fisheries telephone diary survey running from 2020–2022 revealed no recreational freshwater catches of salmon in the German Baltic Sea catchment.

**Latvia:** The Latvian salmon landing statistics are based on the logbooks (mostly electronic) from the offshore, coastal, and inland fisheries. Landing data from licensed angling in the Salaca, Gauja, and Venta rivers are based on licensed angling reports. In 2024, the total number of Latvian salmon landed (in commercial, recreational, and broodstock fisheries) was 1 056 salmon (3.8 tonnes).

Given the salmon fishing restrictions in the Baltic Sea, there were no commercial salmon fisheries at open sea waters for 2024. The total number of salmon caught as bycatch in the commercial landings at coastal waters was 600 salmon (1.8 tonnes). Vast majority of salmon was caught in gillnets and to a lesser extent in trapnets. Only one specimen landed as a bycatch in SD 26.

Small-scale commercial fishery exists in River Daugava up to Rigas HPP and in Daugava connection with Lielupe river mouth called River Bullupe (both with reared salmon). Due to large number of grey seals in the Daugava River mouth, catches in this fishery are low. In 2024, a total of 42 salmon (0.18 tonnes) were landed in commercial fishery in River Daugava.

In 2024, total salmon landings in recreational fisheries were 301 salmon (1.5 tonnes). Recreational sea fishing in Latvia includes coastal self-consumption fisheries (without rights to sell the fish) and trolling in the open sea. It was estimated that there was a total of nine active trolling boats that were fishing for salmonids at the open sea (SD 26–28). In 2024, they were operating from February until end of November and total estimated landings were 123 salmon (0.8 tonnes). In the rivers where natural reproduction of salmon occurs, all angling and fishing for salmon is prohibited with exception of licensed angling for salmon kelts during the spring season in the

River Salaca and its tributaries – Jaunupe and Svētupe. In 2024, a total of 760 salmon kelts were reported in licensed angling, but only 82 were retained.

**Lithuania:** Lithuanian salmon catch statistics are based on logbooks. In the 2024, Lithuania reported salmon sea catch was only 1 742 salmon (0.19 tonnes) caught as a bycatch in coastal fisheries. Due to a change in fishing regulations in 2021, all salmon and sea trout commercial catches in the Curonian Lagoon must be immediately released despite their viability, as a result these catches are not reflected in the logbooks.

Commercial salmon fishery is banned in all Lithuanian rivers. Recreational river fishery for salmon (together with sea trout) is allowed only in designated rivers on licence basis. In 2024, the number of licences sold for salmon (and sea trout) was 14 134, which is less than in previous years. Total recreational catch in 2024 was 1 750 salmon, of which 87 638 were released back alive. Four hundred ninety-three fin-clipped salmon were caught in trolling. Because only part of the anglers was checked, and there are no rules obliging anglers to report the catch or taken/released catch at sea estimation does not fully reflect the total catch of anglers.

**Poland:** In 2024, the total sea, coastal, and river commercial catch in Poland was 164 salmon (0.76 tonnes) and most of the catch (87%) was taken from SD 26. Targeted commercial salmon fishery in the sea waters was closed and salmon was caught only as a bycatch in coastal fisheries (148 salmon; 0.7 tonnes), mostly in coastal gillnets. Commercial coastal catch statistics are based on e-logbooks of vessels longer than 12 meters and on monthly reports of vessels smaller than 12 meters.

Until the year 2019, the most important factor to distinguish the coastal vs offshore catches in Polish EEZ was the length of the fishing vessels: coastal if vessels were smaller than 10 m, offshore if vessels were 10 meters long or longer. Such a rule does not reflect the reality, because small boats nowadays are able to operate in offshore waters (more than four miles from the coastline) and vessels longer than 10 meters might operate in coastal waters (up to four miles from the coastline). Therefore, it was decided to use the fishing location (statistical fishing squares) as the main factor to distinguish coastal vs offshore catches since 2019.

A pilot study relating to salmon and sea trout recreational fisheries was conducted in 2017–2019. More details of this work were described in Polish National Report for 2017. Based on the results of the pilot study, a sampling programme was included into regular sampling since 2020. In 2023, trolling boats have been observed in ten harbours, i.e. Władysławowo, Kuźnica, Jastarnia, Hel, Gdańsk Górki Zachodnie, Gdynia, Ustka, Darłowo, Kołobrzeg, Mrzeżyno, and Dziwnów, with particular importance in the Hel, Gdynia, Gdańsk Górki Zachodnie, and Kołobrzeg harbours. A total of 100 different active trolling boats had been inventoried in 2024. The number of active trolling boats varied between autumn/winter (57–64) and spring (65–84) seasons, with a higher number of trolling boats in spring. The CPUE of trolling catch is expressed as number of fish per boat per day. The reliable information about CPUE depends on season and total number of trolling operations (boat-days) per year. The mean CPUE for 2024 was similar to 2022 and 2023 and was 1.1 salmon per trolling trip/day. The preliminary trolling catch estimates for 2024 are 1 404 landed (retained) salmon and 797 salmon released (adipose fin present). In addition, 88 released salmon (below minimum landing size fish). The estimated bycatch of sea trout during salmon trolling trips was 61. These values are calculated based on site questionnaire survey and on-board observations.

A pilot study of estimation of Polish river recreational catches has begun in 2017 and was continued in next three years. First on three rivers: Ina (SD 24), Rega, and Słupia (SD 25); and from 2018, also on Parsęta River (SD 25). In 2020, three new rivers were added to the survey: Łeba, Reda (SD 25), and Drwęca River (SD 26). The method used is based on catch records provided by fishing users supplemented with data from on-site surveys of anglers carried out according

to the same schedule on the rivers studied. The data obtained from the catch records are delayed by two years, which results from the fishing fee system.

The results obtained with the method developed in the pilot study indicate that in 2022, 2 274 sea trout were caught in the seven analysed rivers, which, assuming an average weight of 3 kg of sea trout, gives about 6.8 tonnes. There are about 10 rivers with similar intensity of sea trout/salmon fishing in Poland, so taking into consideration under-estimation of registers, recreational catch in Polish rivers can be roughly estimated for 40-80 specimens of salmon and 5-10 tons of sea trout yearly. As a result of pilot study, a method for catches estimation on main sea trout rivers was developed.

**Russia:** For several years, the Russian Federation reported zero salmon catches in the Main Basin (SD 26) and the Gulf of Finland (SD 32). However, since 2021, no data from Russia have been available on either fisheries or biological parameters. If Russian salmon catches at sea have occurred, this would introduce additional uncertainty into the assessment. In particular, unnoticed catches in SD 26 could bias estimates of natural post-smolt and/or adult survival for the AU 1–4 stocks included in the analytical life-cycle model.

**Sweden:** The total salmon catch in 2024 was 24 337 salmon (157 tonnes). In 2023, the total number of salmon in the commercial sea fishery was 15 265 (94 tonnes). Coastal fishery with trap- and fykenets made up nearly 100% of the commercial coast and sea salmon catches. In addition, 1 948 salmon (14.2 tonnes) were landed in the commercial riverine trapnet fishery. The major part, 1 553 salmon (11.6 tonnes), was caught in Luleälven (SD 31) and the remaining part was caught in Ångermanälven and Indalsälven (SD 30).

The Swedish recreational fisheries data include both catches from angling and subsistence fishing with seines, gillnets, and other gears, and brood stock fisheries (for reared stocks). River catches are estimated using catch reports from anglers combined with expert evaluations of unreported catch (using local experts). The quality of the data varies a lot and in rivers with developed fishing tourism and active management nearly all the catch is reported. In other rivers, most of the catch numbers are based on the expert evaluation. The 2023 catch of recreational fishers in rivers was 6 714 salmon (46.6 tonnes).

For the trolling survey, Swedish landings of salmon on boats returning to harbours Simrishamn and Ystad were surveyed during spring of 2020, 2023, and 2024, and during autumn of 2019 and 2022. These two harbours are believed to be the most important for the Swedish trolling fishing.

A fixed number of weekdays, weekends, and holidays were randomly assigned for surveying within a given time period. Five GLM models were fitted in JAGS through R, with response variables including the number of fishing occasions (i.e. observed boats per survey day), number of interviews, number of caught salmon, number of caught wild salmon, and number of harvested salmon. All five models had the same explanatory variables: Harbour (Simrishamn or Ystad), year (2019, 2020, 2022, 2023, and 2024), day type (weekday or weekend/holiday), wind speed (daily average), and a three-degree polynomial of day of the year (0-365). Catch per unit effort (CPUE) was calculated by dividing the number of caught salmon by the number of interviews. The number of caught salmon was then calculated by multiplying the number of boats by the CPUE. These calculations were made based on predictions from the five models. Predictions were made for every day during the yearly survey period for Simrishamn harbour, while no predictions were made for Ystad due to the low number of observations there. Great yearly and seasonal variations were found in catches and fishing occasions.

### 2.2.3 EU TAC and national quotas versus landings (2024)

The fishing opportunity or total allowable catch (TAC) for Baltic salmon in 2024 was stated in COUNCIL REGULATION (EU) 2023/2638 (EU Council, 2023). From 1993 and onwards, the Baltic salmon TAC is given in numbers. Until 1992, it was given in tonnes.

In Table 2.2.3.1, the EU TAC for SD 22-31 and SD 32 respectively is presented in total and divided by country (according to the applied distribution keys; Russia is not included). Also in this table, the landings per country and in total are presented (no information from Russia available).

Since no fishery targeting salmon was permitted in 2024, with an exception for coastal fisheries in Bothnian Bay (SD 31) during the salmon spawning migration, only Finland and Sweden could use their quotas in practice. The quotas of the other member states were exclusively allocated for bycatches. For more details on management measures, see Section 2.7.1.

Note that the national quotas presented in Table 2.2.3.1 are the original set ones. A country has the possibility to increase its national quota a specific year. Either by saving a share of its quota from the year before or transfer it to the next (if it was not possible to utilize it or by choice). Or by exchanging/swapping quotas from different stocks between countries.

In 2024, the Swedish share of the EU quota for SD 22-31 of 53 967 salmon was 15 116 salmon (EU Council, 2023). After adding an unutilized part of the quota from the previous year (1 509 salmon), the Swedish fishing opportunities for salmon in SD 22-31 could be increased rendering a national quota of 16 625 salmon in 2024.

The Finnish fishing opportunities in 2024 in SD 22-31 could also be increased to in total 17 537 salmon (EU share of 13 945 salmon plus unutilized part of the 2023 national quota 3 592 salmon). Also in SD 32, the 2024 Finnish fishing opportunities could be increased to in total 13 950 salmon (Finnish EU share 9 104 salmon plus unutilized part of the 2022 national quota of 4 846 salmon).

**Table 2.2.3.1. Baltic salmon EU TAC and national quota per country (in number of salmon) compared with the total commercial landings in the sea (i.e. in coastal waters and offshore) in SD 22-31 and SD 32 respectively in 2024. Note that only the original set quotas are presented. As in previous years, a part of the Estonian quota in SD 22-31 was possible to utilize in SD 32. In the total landings (according to data delivered in the ICES WGBAST 2024 data call), legally sized catch (LSC) and below minimum size landings (BMS) are included. No information available from Russia.**

Country	<i>SD 22-31</i>		<i>SD 32</i>	
	2024		2024	
	Quota (No.)	Landings (No.)	Quota (No.)	Landings (No.)
Denmark	11 183	1		
Germany	1 244	181		
Estonia	1 137	161	1 040	843
Finland	13 945	12 673	9 104	5 304
Latvia	7 113	496		
Lithuania	836	43		
Poland	3 393	134		
Sweden	15 116	17 213		
EU TAC	53 967	30 902	10 144	6 147

Moreover, the coastal and offshore commercial official landings in numbers (excluding river catches) by country and in total in 2015-2024 compared to the EU TAC in SD 22-31 and SD 32 respectively are presented in Table 2.2.1.6. See ICES (2024) for catches before 2015 and ICES (2018) for catches before 2001.

See also Figure 2.2.1.1, where the total catch of salmon (including estimated discarding, unreporting, and misreporting) in 1993-2024 are presented as a percentage of TAC.

## 2.3 Discards, unreporting and misreporting of catches

Data on discards in the **commercial fisheries** are to some extent reported in the official statistics, and the latest country specific information on this is presented in Section 2.3.2. However, the quality of these data is very unsure. Therefore, additional estimates are made (see below). For obvious reasons, there are no official reports of unreported and misreported catches. However, for some countries, information collected from diverse sources is still available. In Section 2.3.3, the issue of misreporting is elaborated on further.

Data for the period 1981–2000 on discards and unreporting of salmon from different commercial fisheries in the Baltic Sea are incomplete and fragmentary. For years 2001–2024, the estimates for discards and unreporting have been computed with a method based on expert evaluations

(adopted in WGBAST 2013). The resulting parameter values for the elicited priors and pooled (average) probability distributions for different conversion factors are given in Table 2.3.1. Mostly the same parameter values were used for 2021–2024 fisheries as for previous years fisheries, since the rates of discarding, unreporting, proportions of BMS salmon and seal damages remained unchanged. Only the rate of unreporting in the Swedish coastal and river fisheries was updated with lower estimates in WGBAST 2023 (for 2022). The update was also made retroactively for years 2018–2021. For detailed information about estimation procedures for these conversion factors, see ICES (2021c) (Stock Annex: Salmon (*Salmo salar*) in subdivisions 22–31 (Main Basin and Gulf of Bothnia) and Subdivision 32 (Gulf of Finland). ICES Stock Annexes. Report. <https://doi.org/10.17895/ices.pub.18623147.v1>).

A main part of discards is seal-damaged salmon, which occurs in the coastal trapnet and gillnet fishery, but also in the offshore longline fishery before 2022 (Table 2.3.2.). In the offshore fishery, it is small amounts of undersized salmon that are estimated to be discarded. Since 2015, there has been a landing obligation for the longline fishery; however, it has not been fully implemented since little reporting of such landings have occurred. In 2022–2024, there has been no commercial salmon fishery in the Main Basin and consequently estimated discards were small in the area. Estimates for discards, unreporting, and misreporting by management area are presented in Table 2.3.3. The estimates are uncertain and should be interpreted with caution.

The catches of **recreational fisheries** at sea are estimated by surveys and outcome often include estimates for both retained and released catch (catch and release). The uncertainty of these estimates is generally considered high. When catch estimates of recreational river fishery are based on river-side recordings, a certain unreporting rate is applied by WGBAST (see Table 2.3.1).

### 2.3.1 Estimated discards

In 2024, approximately 2 600 salmon were estimated to have been discarded due to seal damages in the Baltic Sea. Salmon fishery has been closed in the Baltic Sea Main Basin in 2022–2024 and consequently most of discarding of seal-damaged salmon took place in the coastal fisheries in the northern Baltic Sea. About 25% of seal damages were reported from the bycatches in the Main Basin. Discards of seal-damaged salmon have decreased by about 5 700 salmon since 2021 (Table 2.3.2). Estimates were based on the observed proportion of seal-damaged catch in subsamples that has been extrapolated to the total catch. In this calculation, potential misreporting and unreporting were accounted in the total catch. The amount of discarded seal-damaged catch in the Main Basin increased gradually to significant rates from around 2013 until 2021, because of an increasing grey seal population in the area.

In the northern Baltic Sea, seal damages started to escalate gradually from 1993, but since the introduction of ‘seal safe’ trapnets, the catch losses in coastal fisheries have levelled off. In 2024, the total seal-damaged discards were 1 780 salmon in the Gulf of Bothnia and 230 salmon in the Gulf of Finland.

The reporting rate of the seal-damaged catch is assumed to be the same as for the undamaged catch in the coastal fishery. For the time being, logbook-based data on numbers of sea-damaged salmon is available from Finland, Sweden, and from Denmark and Poland in 2016–2024. However, the reported amounts of sea-damaged salmon are minimum estimates, and true volumes are potentially higher. In other countries, estimates are based on proportional damage rates derived from either logbook or expert evaluation.

Dead discards of undersized salmon in 2024 were estimated to about 360 salmon in the whole Baltic Sea (Table 2.3.2). Proportions of undersized salmon in the catches of different fisheries are

mainly based on sampling data (Table 2.3.1) and are considered rather accurate. Mortality estimates of the discarded undersized salmon released back to the sea are based on expert opinions. Mortality of the undersized salmon released from longline hooks back to sea is currently assumed to be high (around 80%), but few studies have been carried out on this issue and the true rate is uncertain. In the trapnet fishery, post-release mortality is estimated to be lower (20-25%, Ruokonen *et al.*, 2021).

Post-smolts and adult salmon are frequently caught as bycatch in pelagic commercial trawling for sprat (mostly for supplying fish for production of fishmeal and oil) but are probably often not reported in logbooks because the relative number of salmon in these catches is low and can be identified only during unloading (ICES, 2011). Because of insufficient data, however, estimates of these potential removals are so uncertain that they are not considered in the present assessment. Only the reported catch from the trawls is accounted for in the catch data, although it has been very low over the years.

### 2.3.2 Reported information by country (2023-2024)

Below follows country specific information on reported discards (seal-damaged fish or fish allowed to discard), and for some countries, short general information on seal interactions is also included. If available, any records on eventual unreporting and misreporting of catches are provided.

**Denmark** has not information from which it is possible to estimate trustworthy discard percentages. There is a ban for commercial fisheries targeting salmon since 2022 in the southern Baltic Sea.

The bycatch of salmon in other fisheries has been observed to be quite low. Observers from DTU-Aqua participated in the herring and sprat fishery in the Baltic in the winter 2007/2008 for about 50 days, and bycatches of salmon were insignificant in this fishery.

In **Estonia**, the seal damages are serious problem in salmon (and sea trout) gillnet fishery. According to the personal communications of fishers, damages are very common. Quantitative assessment of damages is not available as fishers in most cases did not present claims for gear compensation.

In **Finland**, discards of seal-damaged salmon in the sea area were 784 salmon (4 tonnes), being about 5% less than in previous year. Seals caused damages to commercial salmon fisheries in the whole coastal area where seal damages comprised about 4% of the total commercial catch. The rate of seal damages has been lower than average in the last two years. Reason for this is unknown. Other reported discards (e.g. damages by birds + BMS) were insignificant (12 salmon).

The rate of unreporting of catches is considered to have decrease to a very low magnitude as a consequence of the recent developments in the fishing regulations. In 2017, an individual quota system was initiated and since then, all landed salmon have had to carry a landing mark which probably steers to a careful catch reporting. There are no available records of misreporting.

In **Germany**, there are no data available on predation by seals. In general, seal populations are increasing along the German Baltic coast and damages due to seals in the coastal fishery are increasing too. No seal-damaged salmon have been reported to the authorities in 2024, but there was also no targeted fishery on salmon. However, German commercial fishers reported increased predation rates on salmon longline catches around the island of Bornholm in previous years, which has led to the cessation of the directed salmon fishery by German vessels in 2016.

Furthermore, some recreational trolling anglers have reported seal attacks on salmon during the capture process.

In **Latvia**, only some information on seal predation of salmon (and sea trout) is available from coastal fishery logbook statistics as it is not mandatory. Therefore, this information is annually collected from several contract fishers along the entire coast of Latvia – these fishers mostly fish with gillnets. In 2024, in the coastal commercial fisheries, 284 salmon or 41.6% from all the reported salmon bycatch were reported as damaged by the seals and one salmon in recreational fisheries for self-consumption.

In **Lithuania**, reported data of seal damages, discards, unreporting, and misreporting are not available. However, seal damage remains a serious problem in salmon and sea trout gillnet fisheries. In the personal communications of fishers, damages are common. Quantitative assessment of damages is not available as fishers often do not present data.

In **Poland**, seal predation of 159 salmon (and 303 sea trout) were recorded in logbooks in 2024 and reported to Fishery Monitoring Centre (MC) in comparison to 2023, when it was 113 salmon (and 121 sea trout). In addition, 226 salmon, 194 sea trout, and 556 salmonid fish (both salmon and sea trout) have been reported to the Ministry of Maritime Economy and Inland Waterways in 2024, while in 2023, 66 salmon, 18 sea trout, and 501 salmonid fish were reported. Based on Regulation (EU) No 508/2014 of the European Parliament and the European Council, on the European Maritime and Fisheries Fund, this Regulation gives the possibility to EU Member States to finance compensation from EMFF funds for losses caused by birds and mammals in sea areas (EU, 2014). Most of the reports came from the Gulf of Gdańsk.

In **Russia**, no information on seal damages, discard, unreporting, and misreporting is available.

**Sweden** urgently needs to do an evaluation of the status of seal damages in commercial fisheries. Earlier estimates of the seal damages in the commercial coastal (and open sea) fisheries are still the best available data, (ICES, 2021a).

Data on seal damages in the Swedish official catch statistics from the commercial coastal (and open sea) fisheries do not include a quantitative measure of injured fish. Instead, the information requested is whether fishers have caught any seal-damaged fish or if their gear has been seal damaged during a fishing trip. A trip with seal damages is then tagged with a specific “reason code”. No information on seal damages is collected from the commercial river fisheries.

Besides, it is possible, but not mandatory, to record seal-damaged fish in the official catch statistics. If a fisher reports seal-damaged fish, they are saved as a special catch category in the official statistics. Seal-damaged fish are not counted into the quota and in fisheries where the landing obligation is put in practice, seal-damaged salmon do not have to be landed.

In 2024, a total of 1 227 salmon (two in SD 29, 22 in SD 30, and 1 203 in SD 31) were reported as seal-damaged in the commercial coastal trapnet fisheries and one salmon in the set gillnet fisheries (in SD 30). Since the possibility to record number of seal-damaged fish was initiated, the reported number has been fluctuating and the latest years a positive trend is seen. If this is due to an actual increase in the damage rate or if the willingness of the fishers to report seal-damaged fish has increased is unclear. Further analysis is needed to evaluate these data. In the commercial river fisheries, no information on eventual seal damages is requested.

### 2.3.3 Misreporting of salmon as sea trout

Misreporting of salmon as sea trout was considered to take place in the southern Baltic Sea (ICES, 2021a). As a consequence of implied management measures in the open sea, fishing in the area from 2019, and a ban for salmon fishing in 2022-2024, the misreporting is estimated to be

insignificant low in the last five years. WGBAST does not estimate misreporting in the coastal fisheries.

## 2.4 Fishing effort

In the **commercial fisheries**, data on effort are reported in the official catch statistics. Further analyses are needed to evaluate the overall quality and accuracy of available effort data. The total fishing effort by gears in the Main Basin, and in the three main assessment units for the coastal commercial salmon fishery (AU 1–3), excluding Gulf of Finland, is presented in Table 2.4.1. This table includes Baltic salmon fishery catches offshore and along the coasts in 1987–2024. The coastal fishing effort on AU 1 stocks refers to the total Finnish coastal fishing effort and partly to the Swedish effort in SD 31. The coastal fishing effort on AU 2 stocks refers to the Finnish coastal fishing effort in SD 30 and partly to the Swedish coastal fishing effort in SD 31. The coastal fishing effort on stocks of AU 3 refers to the Finnish and Swedish coastal fishing effort in SD 30. Because sea trout in Poland is targeted with the same gear type as salmon, effort from the Polish fishery targeting sea trout was included in the table before 2003.

The development over time in fishing effort for the commercial offshore fishery is presented in Figure 2.4.1. When the driftnet fishery was closed 2008, the effort in the longline fishery consequently increased. However, in later years the total effort in the longline fishery has levelled off and in last two years the effort (i.e. number of fishing days times number of hooks) decreased to 353 469 hook-days in 2019 and 292 746 in 2020, to be compared with 2 639 116 hook-days in 2010 (Figure 2.4.1 and Table 2.4.1). In 2021, the total effort in the longline fishery significantly increased to 941 908 hook-days then decreased to zero in 2022 and 2023 due to Council Regulation (EU) 2021/1888 (EU Council, 2021).

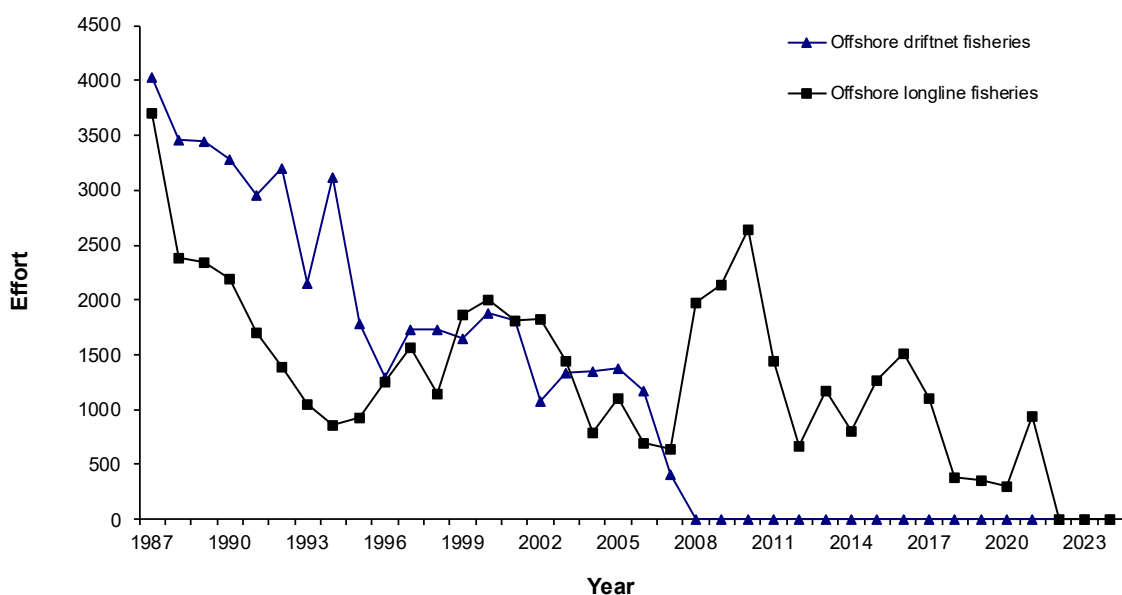


Figure 2.4.1. Fishing effort in Main Basin offshore fisheries (x 1000 gear-days) in 1987-2024.

An overview of the longline offshore fishery for salmon in SD 22–32 during the latest eight years (2014–2023) is presented in Table 2.4.2. Catch per unit effort (CPUE) by country is also presented in this table. For equivalent information for the years 1999–2013, see WGBAST 2018 report (ICES, 2018). The total effort decreased in 2019 and 2020 to less than one-third compared to the effort in 2018. This is mainly explained by changes in the fishing activity of the Polish offshore fleet. In Section 2.3.3, reasons for the changes in the Polish fisheries in 2019 and 2020 are described. Besides Poland, also Denmark and Lithuania had active vessels in the longline fisheries in 2021. It is not possible to draw any conclusions on the overall number of vessels that were active due to that data on this are only available from Poland. In 2022, the total effort in longline fishery has been reduced to zero and this was also maintained in 2023–2024.

Unit of effort in the coastal trapnet fisheries is gear-days (number of fishing days times the number of gears). Seen in a longer perspective, effort in the coastal commercial fisheries has decreased markedly. In more recent years this trend has levelled off (Figure 2.4.2, Table 2.4.1) and remains stable. In 2022 and 2023, the trapnet effort in AU 1, 2, and 3 was 23 356 gear-days and 25 374 gear-days, respectively. In last year, the trapnet fishing effort decreased to 13 444 gear-days.

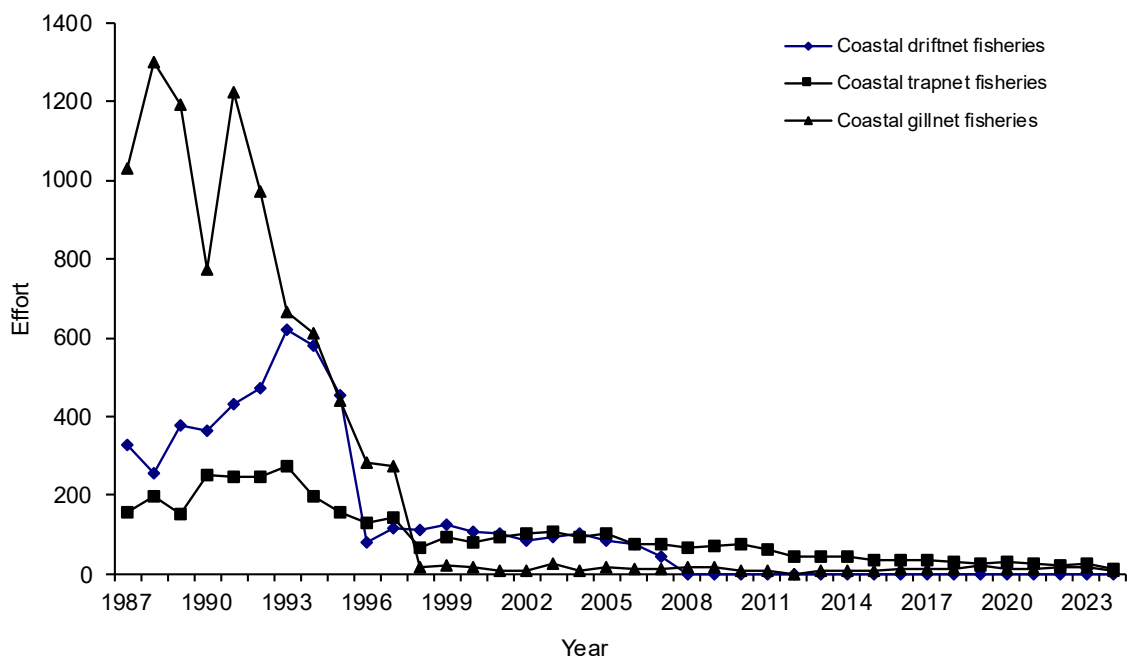


Figure 2.4.2. Effort in Main Basin and Gulf of Bothnia coastal fisheries (x 1 000 gear-days) in 1987–2024

Table 2.4.3 shows effort and CPUE (number of salmon caught per gear-day) over time (2001–2024) in the Finnish trapnet fishery in Subdivision 32. Data for 1988–2000 are available in previous WGBAST reports. In 2019 and 2020, CPUE in this fishery was higher (1.64 and 1.51 salmon per gear and day, respectively) than in the nine preceding years (average 0.86). In 2021 and 2022, CPUE decreased again to 0.93 and 0.68, respectively. In 2023, CPUE in Finnish trapnet fishery increased to 0.9 and this trend was observed also in 2024 (CPUE 1.22). Substantial differences can be seen when comparing CPUE in the Finnish and Swedish Gulf of Bothnia (SD 30–31) trapnet fisheries. Further analyses are needed to evaluate these differences and the quality of current and past effort data in Finnish and Swedish official catch statistics.

For **recreational fisheries** designated data collection of effort data is not yet implemented on any larger scale, and WGBAST is not currently analysing the sparse data that are available.

## 2.5 Biological sampling of salmon

General information on the structure of data collection in different fisheries, including length of time-series, is presented in the Stock Annex (ICES. 2024b. Salmon (*Salmo salar*) in subdivisions 22–31 (Main Basin and Gulf of Bothnia) and Subdivision 32 (Gulf of Finland). (ICES Stock Annexes. 72 pp. <https://doi.org/10.17895/ices.pub.18623147.v1>) . General and future perspectives on sampling is further elaborated on in Section 4.7.

The national work plans under the DCF (EU-MAP) include data collection in rivers, along the coasts and offshore and biological sampling is conducted both in commercial, recreational, and brood stock fisheries. Biological sampling is also included in surveys targeting parr and smolts. In the biological sampling, a set of individual information is typically collected, e.g. scales for age and/or genetic analysis, length, weight, sex, and wild/reared origin.

Below information on DCF catch samples collected in both commercial and recreational fisheries in 2024 is presented. In addition, information on other types of DCF samples that also were collected in these years is (partly) included.

### 2.5.1 Biological sampling by country (2024)

An overview of the number of sampled salmons in 2024 within the framework of DCF (EU-MAP) is presented in Table 2.5.1.1. The number of salmon where scales for age reading have been collected has been compiled per country and SD, if possible, divided per WGBAST Fishery (river, coast, or offshore), gear, and time period (months). But it is not divided into commercial and recreational fisheries respectively.

**Table 2.5.1.1 Number of salmon from which scales for age have been collected in 2024 within the framework of DCF (EU-MAP). Presented by country and SD (SD 22-28 pooled) and when information available, divided per WGBAST Fishery (river, coast or offshore), gear and period (months). But not divided into commercial and recreational fisheries respectively.**

Country	Remark	Month (No.)	Fishery	Gear(s)	2024 - Number of age sampled salmon by SD					Total
					22 - 28	29	30	31	32	
Estonia		5–10	coastal	trap- & gillnets	10				88	98
Finland		5–9	coastal	trapnets		89	205	656	290	1240
Finland		5–8	river	various				126		126
Denmark	N.A	na	na	na	na	na	na	na	na	na
Germany		1–12	offshore	trolling	42					42
Latvia		4–11	offshore	longlines	57					57
Latvia		3–11	offshore	trolling	25					25
Latvia		3–11	coastal	gillnets	83					83
Latvia	Kelts	3–11	river	various	44					44
Lithuania		1-11	coastal	gillnets	25					25
Poland		1–12	offshore	longlines	91					91
Russia	N.A									
Sweden	Smolts	4–10	river	various	77		407	236		720

Below is a summary of the 2024 sampling country by country:

**Denmark:** In 2024, as in previous years, there was no biological sampling. In recent years, the age composition of the Danish catch has not been available. Previously catches were dominated by age 2+ (52 – 64%) and 3+ and older salmon.

**Estonia:** In 2024, a total of 98 salmon were age sampled, as in previous years the majority (88) were sampled in SD 32.

**Finland:** In all, 1 240 catch samples were collected and aged from the coastal salmon fishery in 2024. All samples were genotyped. In addition, 2 096 samples from the subdivisions 29N-30 accumulated as a part of “scientific salmon fishing” and all these were genotyped (all wild i.e. non fin clipped; national funding).

**Germany:** In the commercial fishery, only three commercially caught salmon have been sampled in 2024. Catch sampling of salmon from the commercial fishery is very challenging as salmon is only bycatch; total catch is low and in most cases, only very few individuals are caught per trip preventing specific sampling. Sampling of biological (mainly length but recently also scale and tissue samples) data from the recreational trolling fishery off the island of Ruegen has started in 2016. In 2024, the mean total length of retained salmon was 88.3 cm (n = 29) and of released salmon 70.0 cm (n = 35) in the recreational trolling fishery.

**Latvia:** 2024 was the last year with sampling scheme based on contracting fishers to do sampling, where the highest proportion of salmon biological data with research permits was collected during a fisheries closure (related to spawning migration). A new sampling plan is approved for 2025 with purely opportunistic (random lottery based) sampling scheme to better characterize the salmon bycatch in different types of coastal fishing. It is possible that the new sampling system will have high rate of non-response and refusals to take observers onboard.

In 2024, in coastal gillnet fisheries, salmon biological sampling was done from March until November in multiple locations along the coast of Main Baltic Sea and Gulf of Riga (similar in proportion). In total, 83 salmon caught as a bycatch in the coastal fisheries have been sampled. From all the salmon caught, length and weight measurements were taken, sex and origin was determined (wild or reared based on adipose fin), and scale samples were collected for age reading. Average length of analysed salmon was 65.6 cm, weight – 3.4 kg. Samples were dominated by salmon who spent two years in the fresh water (66.1%) and two years at the sea (41.9%). 12% of the salmon were adipose fin clipped. Females accounted for 57.3% of all analysed salmon.

Given the fishing ban, there was no sampling from the longline salmon fishery in Latvian EEZ. However, in 2024 the Institute BIOR got permission from the Minister of Agriculture to collect biological samples from a maximum of 250 salmon caught in the Latvian EEZ. Two fishing vessels using a longlines and two trolling boats were contracted. Eighty-five biological samples were collected using longlines (SD 26 and SD 28) and 25 in trolling (SD 26). In addition to the biological measurements mentioned in the previous paragraph, tissue samples were collected from dorsal fins for mixed stocks genetic analyses.

**Lithuania:** Specialized survey of salmon and sea trout using gillnets is not carried out; however, during monthly ichthyological surveys in the coastal area, salmon and sea trout occurs in the catches as bycatch. However, in 2024, no salmon were caught in the Curonian Lagoon.

**Poland:** In 2024, the National Marine Fisheries Research Institute (NMFRI) obtained permission from the Minister of Agriculture and Rural Development RP to collect the biological data from a maximum of 400 salmon caught in the Polish EEZ. For this purpose, NMFRI observers attended three fishing trips on a chartered vessel fishing with a longlines, during which 91 salmon were sampled.

**Russia:** No information available.

**Sweden:** In the Swedish EU-MAP work plan 2022-2024 (SwAM. 2021), no sampling of commercial salmon fisheries is included and which has been approved by COM. This is due to WGBAST not using these data in the stock assessment. A reason for resuming the commercial sampling could be that data are needed as a basis in the ICES advisory process. Under the former DCF and DCR, commercial sampling of salmon was included in the Swedish National Programme.

## 2.5.2 Growth of salmon

Below a short summary of an ongoing study on growth of Baltic salmon in relation to composition of the overall fish community is presented.

The average weight of salmon by age group increased around 1990, simultaneously with an increase in sprat abundance (Figure 2.5.2.1). Despite some annual variation, the level of growth has remained rather stable. In 2016–2022, catch samples indicate an increase in mean weights by age in the MSW age group 3, which is potentially a result of improved feeding conditions (whereas the mean weights of younger returning salmon have been more stable and the mean weights in the MSW age group 4, which constitutes a smaller proportion of the total returning

sampled salmon, show more variation). Growth has decreased in age groups 1-3 after 2022, which potentially indicates weakened feeding conditions. Despite that salmon shares feeding areas with cod in the southern Baltic Main Basin, there is not such a reduction in the growth rate of salmon as has been observed for cod. The estimated post-smolt survival decreased strongly from the mid-1990s until 2005 (Figure 4.2.3.1), but this cannot be recognized in the growth data. Mortality mechanisms seem to affect salmon populations in such a way that survived individuals grow approximately as large in periods of high mortality as in periods of low mortality.

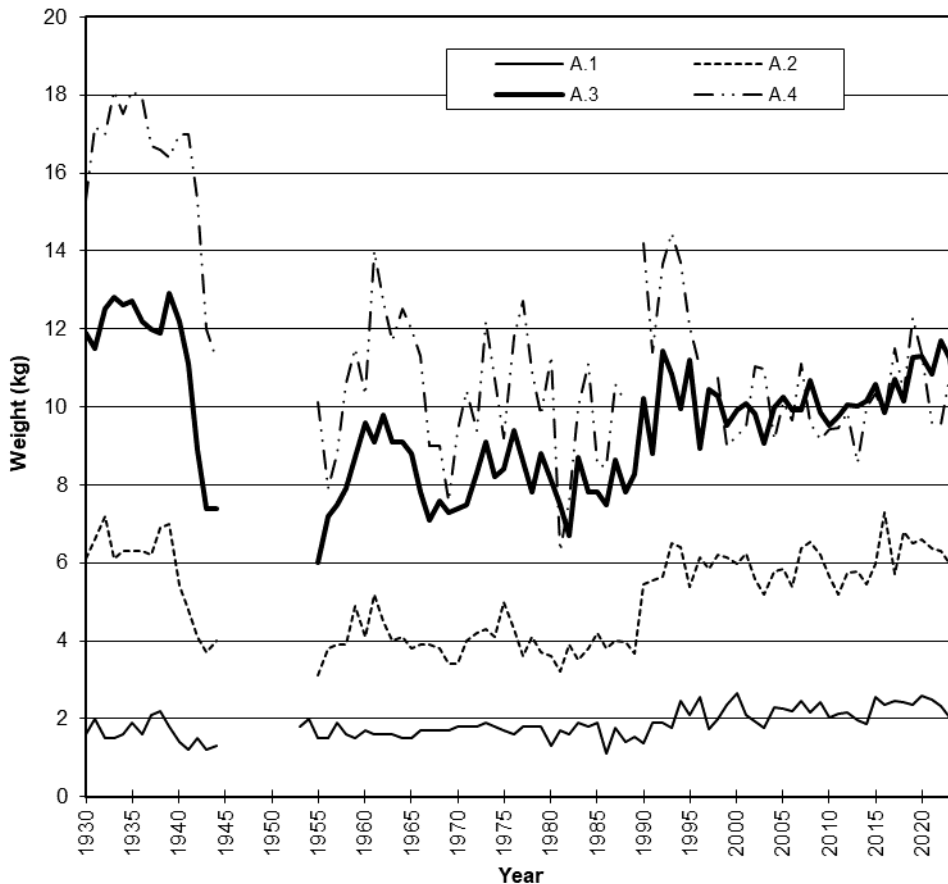


Figure 2.5.2.1. Mean weight of spawners in the Gulf of Bothnia by year. Values in 1930-1944 from catch statistics in the rivers Oulu and Torne. Values in 1953-1985 are from Swedish tagging records and in 1986-2024 from the Finnish catch sampling data. Weights of A.4 salmon based on sampling performed 1953-2024 (sample size is small in some years).

### 2.5.3 Post-release mortality in Baltic recreational trolling fisheries

In 2023 and 2024, Sweden and Germany conducted a post-release mortality study on salmon (*Salmo salar*) caught in the Baltic recreational trolling fishery. The primary aim of the study was to investigate post-release mortality rates in the open-sea salmon trolling fishery. The rationale behind this study was the general lack of data on post-release mortality of Baltic salmon in marine recreational trolling fisheries. Due to this information, the Baltic salmon stock assessment has, to date, used an estimated post-release mortality rate of 25%, which is based on a literature review of mainly Pacific salmon (*Oncorhynchus* spp.) caught and released in trolling fisheries (ICES, 2017a).

For the study, Baltic salmon were caught under realistic conditions by Swedish and German trolling anglers and then tagged with pop-up satellite tags (PSATs). These PSATs monitored depth, light, and water temperature for up to 45 days. Using this data, the fate of the fish after release will be evaluated. Additionally, some data on behavioral aspects (e.g. vertical and horizontal migration) will be analysed. A total of 44 salmon were tagged (16 in Germany and 28 in Sweden), and data from 41 fish were successfully retrieved. Most of the fish were caught and released in the southern Baltic Sea (ICES SDs 24 & 25) during April and May 2023 and 2024, covering the main salmon trolling season in this region.

Preliminary results indicate that four out of 29 fish died after being caught and released within 10 days of observation, resulting in a post-release mortality rate of 13.8% (95% CI: 0.0-28.8%), and that 25 salmon survived. The remaining 12 fish showed unexpected depth curves, and further analyses are ongoing to determine whether they survived or not. However, there are indications that most of these 12 fish survived for at least 24 hours, suggesting a lower short-term post-release mortality rate. Several studies on other species have shown that the majority of post-release mortality in recreational fishing occurs within the first 24 hours after capture (Muoneke & Childress, 1994; Weltersbach & Strehlow, 2013; Gale *et al.*, 2014; Lewin *et al.*, 2018). This implies that the actual post-release mortality could be even lower than the 13.8% mentioned above, but this requires further analysis. Additionally, anecdotal evidence suggests that at least some of the tagged fish showed little sublethal impairments. For instance, one tagged fish was recaptured nine days after tagging in the same sea area, indicating normal feeding behavior. Furthermore, one fish was detected by a fish counter device and subsequently recaptured by an angler in River Byskeälven, Sweden, during the summer of 2024, suggesting it successfully carried out its spawning migration.

Overall, the preliminary results of this study suggest that post-release mortality of Baltic salmon in the recreational trolling fishery is significantly lower than the 25% currently assumed in the assessment model.

## 2.6 Genetic composition of Baltic salmon catches

In Section 2.6.1, results from recent analyses of stock proportions in catches are presented. Description of the genetic methodology used and how results are applied can be found in the Stock Annex (ICES, 2025). In Section 2.6.2, previously collected samples from Finnish and Swedish commercial coastal fisheries were analysed in further detail with respect to when and where individuals from different rivers have been harvested, with particular focus on salmon from Råneälven.

### 2.6.1 Salmon stock and stock group proportions in Baltic salmon catches in the Bothnian Bay based on DNA data, and freshwater age information

Proportions of salmon from different stocks in the Baltic salmon catches from the Bothnian Bay and the Gulf of Finland based on genetic data and scale reading information

Methods and the baseline data used for estimating stock proportions in catches were updated in 2024. Up to 2024, proportions of individual stocks and stock groups in Baltic Sea salmon catches were estimated using a Bayesian method (Pella and Masuda, 2001), which combines DNA-microsatellite data and smolt-age data (Koljonen, 2006, Koljonen *et al.*, 2021, ICES, 2019). The updated method is based on definition of baseline stocks with 19 000 SNP (single-nucleotide

polymorphism) markers, and the assignment of the catches to the baseline stocks is based on 1 015 SNPs. These are a subset of the 19 000 SNPs that proved to have the highest power of discriminating the stocks and that were distributed equally along the genome (approximately 30-35 SNPs from each chromosome). The method used to estimate the stock proportions and the origin of individual salmon in the catches was also changed to a method based on leave-one-out cross validation, which has been shown to be more accurate for a large number of genetic markers (Anderson *et al.*, 2008).

As in the previous years, the Finnish salmon catches from the Gulf of Bothnia were analysed separately for the advanced fishing season and the normal fishing season. This was done to ensure that the stock proportion estimates would be comparable also to the years prior to 2017, when temporal regulations of the Finnish salmon fishing in the Gulf of Bothnia were changed, and an earlier start of fishing (advanced starting date) was allowed than in the previous years. The regular starting date results correspond to the pre-2017 stock proportion estimates. Details of the genetic methods and how the results are applied can be found in the Stock Annex.

For this report, Finnish coastal salmon catches from only two fishing regulation zones –the Quark area and the northernmost Bothnian Bay – with different temporal regulations were analysed, contrary to the previous years when salmon catches from three of the four regulation zones were analysed. In 2024, there was no commercial salmon fishing in the Bothnian Sea. Salmon fishing opening dates before 2017 were 15 June for the Quark area and 25 June for the northernmost Bothnian Bay. Since 2017, the opening date for both the Quark area and for the northernmost Bothnian Bay has been 21 May. For this report, Finnish commercial catches from the Gulf of Finland for the years 2019-2024 were also analysed. Samples from 2022 Gulf of Finland catches have been analysed before with the previous methods and were used to assess the comparability of the results from the updated stock proportion estimation method and the previously used method.

## Methods

The updated genetic baseline included 1 624 individual salmon, 53 stocks from rivers and hatcheries around the Baltic Sea. Based on the SNP genotypes, the salmon stocks were divided into 23 genetically distinct clusters, some consisting of salmon from a single river, others of salmon from up to nine rivers (Table 2.6.1.1; Figure 2.6.1.1). For individual salmon that were assigned to the genetic clusters including both wild and hatchery origin salmon, the origin (wild vs hatchery) of the individual salmon were determined using smolt age and scale reading information. All the hatchery released smolts are younger than three years, meaning that salmon with smolt age of more than two years must be of a wild origin, while salmon with smolt age less than three years can either originate in the wild or in a hatchery. For the salmon with smolt age less than three years, growth patterns on the scales were used to determine the origin.

The 2024 commercial catch sample from the Gulf of Bothnia consisted of 636 individual salmon, 194 salmon from the advanced fishing season and 442 salmon from regular fishing season. The 2024 commercial catch sample from the Gulf of Finland consisted of 285 individual salmon, and the 2019-2023 sample from the Gulf of Finland of 1 498 individual salmon.

## Results

In the Finnish **Gulf of Bothnia** salmon catch samples from the regular fishing season, the proportion of salmon from the wild stocks was close (68%) to the mean (69%) from the measured years 2009-2023 (Table 2.6.1.3). In the advanced season catches, the proportion of salmon from the wild stocks was slightly higher (78%) than the mean of 2017-2023 (75%). The proportion of Finnish hatchery origin salmon in the advanced season catches from the Gulf of Bothnia was

slightly lower (17%) than in the previous years. Consequently, the proportion of Swedish hatchery origin salmon was higher (5%) than the mean of the previous seven years, but close to the proportion from last year (Table 2.6.1. and Table 2.6.1.3). There was no commercial salmon fishing in the **Bothnian Sea** in 2024.

In the 2024 catches from the **advanced fishing season** from the **Quark area**, the proportion of salmon from the wild Bothnian Bay stocks was similar (75%) to the mean of 2017-2023 (74%). There was a decrease in the proportion of Finnish Bothnian Bay hatchery stocks, and an increase in the proportion of Swedish Bothnian Bay hatchery stocks (Table 2.6.1.2 and Table 2.6.1.3; Figure 2.6.1.3). In the advanced fishing season catches from the **Bothnian Bay**, the proportion of salmon from the wild Bothnian Bay stocks was slightly higher (82%) than the 2017-2023 mean (78%). As in the Quark area, the proportion of Swedish Bothnian Bay hatchery stocks had increased at an expense of the Finnish Bothnian Bay hatchery stocks, which had decreased (Table 2.6.1.3; Figure 2.6.1.3).

In the 2024 catches from the **regular fishing season**, the proportion of wild Bothnian Bay salmon stocks in the **Bothnian Bay** catches was higher (78%) than the mean of 2017-2023 (64%). The proportion of wild Bothnian Bay salmon stocks in the **Quark area** 2024 catches (65%) was close to the mean of 2017-2023 (63%). Like in the advanced season catches, the proportion of Finnish Bothnian Bay hatchery stocks decreased, while the proportion of Swedish Bothnian Bay hatchery stocks increased (Table 2.6.1.2 and Table 2.6.1.3; Figure 2.6.1.3).

The **Gulf of Finland** catches from 2019-2024 show a lot of yearly variation, especially between the proportions of salmon from wild stocks of the Gulf of Bothnia and the proportions of Kymijoki-Neva hatchery stock (Table 2.6.1.3; Figure 2.6.1.2). The proportion of salmon from the wild Gulf of Bothnia stocks was higher (51%) than the long-term mean (31%), similar to the previous high in the 2011 Finnish commercial catch (Table 2.6.1.3). The baseline sample for the Kymijoki-Neva hatchery stock was updated with 2023 broodstock. In the updated genetic stock identification method, the SNP-genotype information is first used to assign the individual samples to their stock of origin, and then for the stocks that are genetically indistinguishable with good confidence, wild/hatchery origin is determined based on combining smolt age and growth read from scales. This has likely led to slightly higher proportion of wild origin salmon assigned to the Kymijoki-Neva stock than with the previously used method combining DNA-microsatellites with smolt age class in the same genetic stock identification model.

The main change in the proportions of individual stocks in the Gulf of Bothnia catches are the higher proportions of the Swedish wild stocks from the northern Bothnian Bay (Table 2.6.1.; Figure 2.6.1.4), which can be explained by the Kalixälven and Tornionjoki stocks being considered the same stock in the updated baseline. The work on genetic identification of the Swedish northern Bothnian Bay is still ongoing, which is why the group including Piteälven and Rickleå salmon are presented as a stock group (Bothnian Bay, SE, W; Table 2.6.1.4; Figure 2.6.1.4). Previously, most of the wild salmon from the Swedish northern Bothnian Bay rivers have been assigned to Kalixälven. The present data, along with other genetic studies of the salmon stocks of the Tornionjoki-Kalixälven river system show that there are no significant genetic differences between the salmon stocks of the two rivers (Miettinen *et al.*, 2021). The same trend can be seen in the Finnish catches from the Gulf of Finland (Table 2.6.1.4; Figure 2.6.1.4).

## 2.6.2 Exploitation patterns of early-migrating salmon stocks in Åland Sea and Gulf of Bothnia, with particular focus on river Råneälven

### Background

Several rivers in Gulf of Bothnia have experienced weak salmon runs in 2023 and 2024 (sections 3.1.1-2). In particular, spawner counts and parr densities indicate a marked decline of the Råneälven stock in recent years. Also, in several other smaller “forest rivers”, such as Åbyälven and Kågeälven, from which spawner counts are missing or of uncertain representativeness, declining densities of 0+ parr in 2024 indicate a drop in spawner abundances in 2023. In general, the accumulated harvest rates in the coastal fisheries are comparably high for northern stocks as they are exploited along significant stretches of coastline during the spawning migration, from Åland Sea and northward (Whitlock *et al.*, 2021). The worrying situation with declining spawner abundances and reduced recruitment in some of these northern (AU 1-2) rivers warrants more detailed studies of the exploitation patterns during the spawning migration in Åland Sea and Gulf of Bothnia. The present analysis focuses mainly on the Råneälven stock (AU 1) because of its relatively dramatic decline in abundance in recent years and uncertain current status, which may require precautionary measures to reduce fishing mortality.

### Material and methods

Catch samples from commercial fisheries have been collected and genetically analysed regularly within the work of WGBAST (e.g. ICES, 2021a). Here, previously collected and analysed samples from Finnish and Swedish commercial coastal fisheries were analysed in further detail with respect to when and where individuals from different rivers have been harvested. Samples collected annually from the Finnish coastal fishery during the period 2013-2022, and Swedish catch samples from 2013-2014 and 2020-2022 were included, comprising more than 9 000 individuals in total (Figure 2.6.2.1).

All individuals have been analysed previously for genetic variation at 17 microsatellite loci (see e.g. ICES [2021; 2025] for more information). Probabilistic assignment analyses were performed using a genetic baseline including samples from all wild and reared stocks in Gulf of Bothnia and southern Sweden as well as samples from a few rivers in AU 5 and 6, using the software ONCOR (Kalinowski *et al.*, 2007). Following initial mixed-stock analyses, individuals were assigned to the most likely river stock of origin (based on the highest probability value). Some river stocks are more genetically similar than others, and the precision and uncertainty of assignment results therefore vary depending on the origin.

### Results and conclusions

Out of 9 002 analysed individuals, 8 688 had information on catch date and were possible to assign to wild or reared salmon stocks in Gulf of Bothnia. Assignment probabilities varied depending on estimated origin. Wild salmon from Kalixälven and Tornionjoki were not possible to separate due to genetic similarities (Miettinen *et al.*, 2021) and were treated as one single stock. Stocks that are largely genetically deviant from other stocks often show high assignment probabilities, an example being Råneälven for which probabilities varied between 0.91 and 1.00 with an average of 0.99. For stocks that are more genetically similar to other stocks, assignment probabilities were lower which introduce uncertainties. For example, salmon most likely originating from Åbyälven, a stock that is genetically similar to the one in neighbouring Byskeälven, had assignment probabilities ranging from 0.33 to 1.00 with an average of 0.67.

To investigate temporal differences in exploitation pattern between stocks, assigned individuals from catch samples were arbitrarily divided into an “early” (April-May) and a “late” (June and onwards) exploitation period depending on catch date. Figure 2.6.2.2 shows the proportion of

individuals in the early vs late exploitation periods for all Åland Sea and Gulf of Bothnia catch samples combined. Stocks that have been identified as early migrating in previous studies (Whitlock *et al.*, 2018; 2021) were to a larger extent exploited in April and May, as compared to stocks with a late migration timing. The Råneälven stock stands out as particularly early with more than 60% of the assigned individuals caught in May. Other stocks with an early migration timing according to earlier results, such as Åbyälven, Byskeälven and Lögdeälven, were to a relatively large extent also exploited early in the season (Figure 2.6.2.2). Salmon stocks with a late migration timing, such as the wild Ljungan stock and reared salmon, are typically exploited mainly in June and onwards, which is in line with results from earlier studies (Whitlock *et al.*, 2021).

A closer examination of individuals assigned to Råneälven shows that a majority (79%, 23 of 29) were caught in Åland Sea fisheries (Figure 2.6.2.1). Of those 23 individuals, 13 had no information on catch date and were omitted from further analyses. Among the remaining 10 individuals, eight (80%) were caught early in the season (May). The proportion of assigned Råneälven salmon in the combined catch samples from Åland Sea was 2.3% in the early exploitation period and 0.4% in the late period. Note that, while these proportions may appear low, it is not the relative proportion in the total catch that determines the impact of the fishery on a specific stock, but rather the number of individuals caught in relation to the potential number of spawners for that particular stock.

In the Bothnian Sea (SD 30) catch locations, the numbers (0-2) and proportions (0-0.6%) of assigned Råneälven salmon were lower, but the early exploitation pattern (May) for this stock seems to persist also in this area (Figure 2.6.2.1). Further north, in the Bothnian Bay (SD 31), only a few (four) salmon were assigned to Råneälven, all caught in June. In the catch locations closest to the river mouth, the proportion of Råneälven salmon were somewhat higher (0.7%), which is expected as the relative abundance of any local stock generally increases closer to its natal river. Note, however, that this estimate is based on a sample collected at some distance from the river mouth (Figure 2.6.2.1) and relatively late (18 June-04 July), which may indicate that a majority of the early migrating Råneälven salmon had already passed the area when the fishing started.

The catch samples used for this analysis are not representative for the fishing efforts in different coastal areas; effort is generally much higher in the northern part of the Bothnian Bay compared to further south, which is not reflected in the spatio-temporal collection of the analysed catch samples. Hence, a low proportion of Råneälven salmon in catch samples (and total catches) in the northern part of Gulf of Bothnia may still reflect a significant harvest rate for this stock, because of the comparably intense fishing in this area. The modelling tool for utilizing genetic data to learn about spatial and temporal stock abundances developed by Whitlock *et al.* (2018; 2021), which includes an observation model for reported catches in the coastal trapnet fisheries, allows for estimation of stock-specific catches and harvest rates in time and space. Preliminary results from a recent model run, which includes part of the genetic data used in the present assignment analyses, indicate that the exploitation of Råneälven salmon is indeed mainly concentrated in Åland Sea and the area outside the river mouth (Dannewitz *et al.*, 2025).

To conclude, salmon from Råneälven (and likely other early migrating wild salmon stocks) are to a relatively large extent exploited early in Åland Sea. The proportion of Råneälven salmon is lower in catches further north, but the higher fishing pressure in northern areas may still result in comparably high total catches of this stock, particularly in fisheries situated close to the river mouth. A delayed fishing start in Åland Sea, in combination with measures to reduce the fishing mortality in the area outside Råneälven, is expected to reduce the total harvest rate on this stock, and likely other early migrating wild stocks.

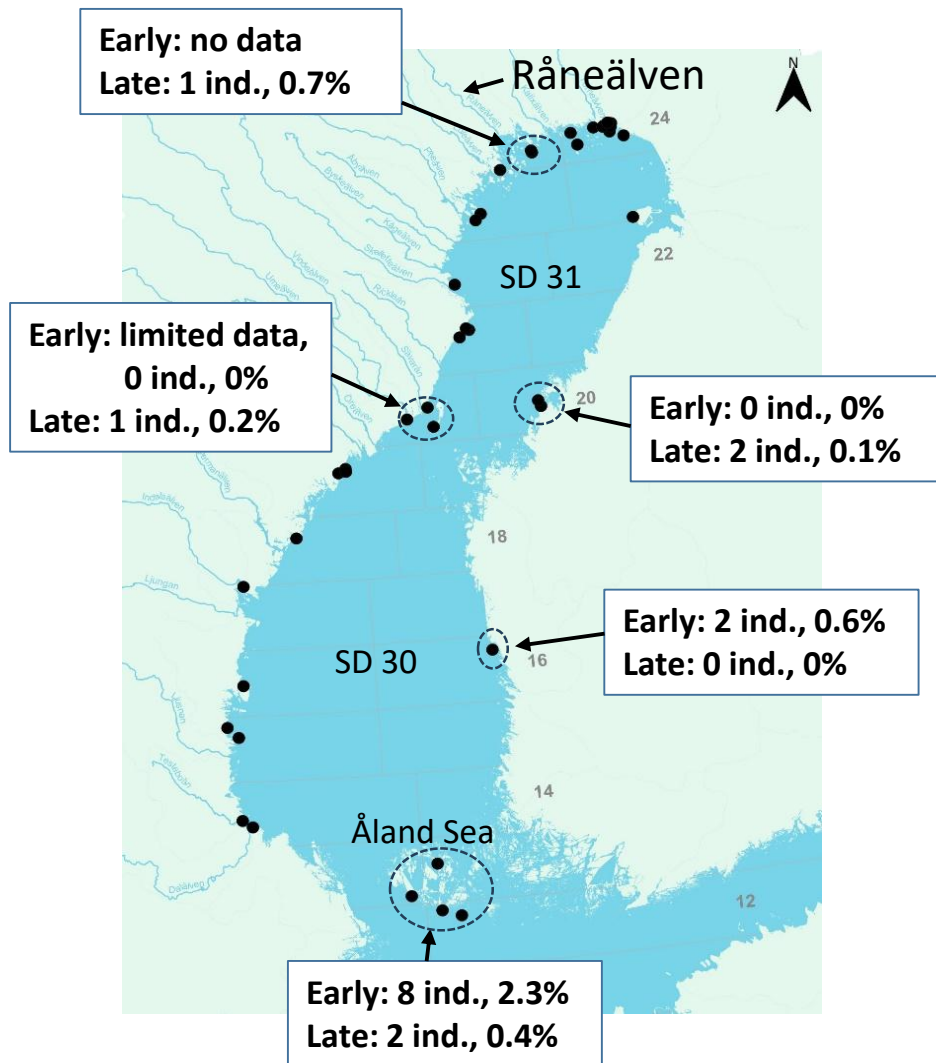
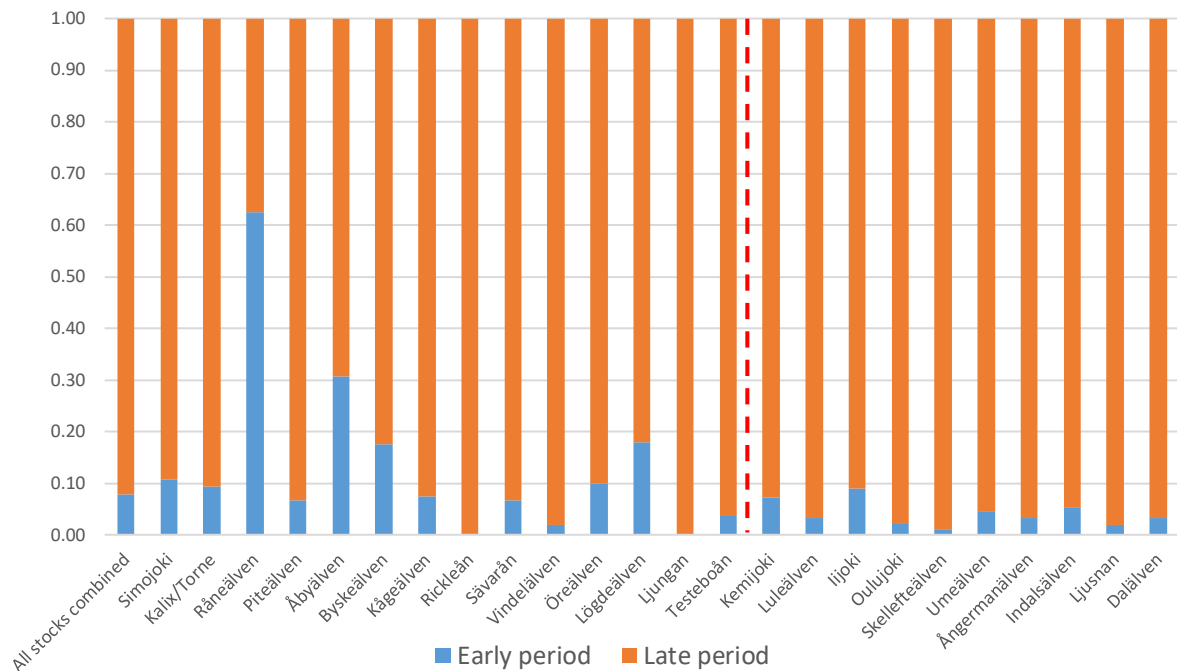


Figure 2.6.2.1. Black dots indicate locations where catch samples for genetic analyses of stock composition have been collected from commercial fisheries in one or several years between 2013 and 2022. Text boxes present results on the number and proportion of salmon assigned to the Råneälven stock, divided into an early (April-May) or late (June and onwards) period depending on catch date. All individuals assigned to Råneälven were caught in May or June. Dots without a box represent locations with no assigned Råneälven salmon. On the Swedish side of the Bothnian Bay (SD 31), the commercial salmon fishery starts 17 June except for an earlier start for a very limited fishery in southern SD 31, which means that no or limited data are available from the early fishing period. See text for more details.



**Figure 2.6.2.2. Results from genetic assignment analyses of catch samples from commercial fisheries in Åland Sea and Gulf of Bothnia, collected between 2013 and 2022. Bars indicate proportion of assigned individuals (from all catch samples and years combined) that were caught in April-May (Early period) or June and onwards (Late period), for all stocks combined and for each stock separately. Stocks to the left of the dashed vertical line are wild, while those to the right are reared. See text for more information.**

## 2.7 Management measures influencing the salmon fishery

Within the common fisheries policy (CFP), the EU Council adopt measures on the fixing and allocation of fishing opportunities for the commercial EU fleet in the sea. For Baltic Salmon, a total allowable catch (TAC) for the commercial fisheries is annually established for SD 22-31 and SD 32 respectively, see Section 2.7.1. (EU, 2013). In the latest years, management measures for the recreational fisheries in the open sea have also been included.

More information including a historically overview of the international regulatory measures affecting Baltic salmon is presented in the Stock Annex in ICES (2021c). (Stock Annex: Salmon (*Salmo salar*) in subdivisions 22–31 (Main Basin and Gulf of Bothnia) and Subdivision 32 (Gulf of Finland). ICES Stock Annexes. Report. <https://doi.org/10.17895/ices.pub.18623147.v1>).

Whereas future alternative management strategies are elaborated on in Section 4.5. Supplementary national regulatory measures are, unlike the comprehensive international regulatory measures, updated more often, at times on a yearly basis, and therefore they are presented in Section 2.7.2 and not in the Stock Annex. All freshwater fisheries are managed nationally, whereas the sea fisheries are managed at the EU level with possible supplementary national legislation. Effects of national management measures on stock development are generally not evaluated by WGBAST.

### 2.7.1 International regulatory measures

Similar to 2023, the EU quota for salmon in 2024 in SD 22-31 was exclusively allocated for by-catches and no fishery targeting salmon was permitted, with an exception for union fishing

vessels north of latitude 63°30'N in areas within four nautical miles measured from the baselines during the period from 01 May to 31 August (EU, 2013). Due to low status of the stock in River Ljungan, the area where fishing was allowed was further reduced to areas north of 63°30'N. Hence, in 2024, fishing targeting salmon was only allowed along the Swedish and Finnish coasts in SD 31 during the salmon spawning migration. The main aim of the change in spatial fishing pattern was to protect weak river stocks in AU 5 and the Ljungan stock for being exploited in the mixed stock fishery in the Main Basin. In the Gulf of Finland (SD 32), fishing targeting salmon was possible. The 2024 EU TACs and national quotas versus landings are presented in Section 2.2.3.

In 2022, catch restrictions for recreational salmon fisheries were included in the EU legislation (EU Council, 2022). According to these, it is allowed to retain only one fin-clipped salmon per angler per day in areas where commercial fishing targeting salmon is not allowed. This applies to the trolling fishery in the Main Basin where mixed salmon stocks are caught. Further, to avoid misreporting, all specimens of any fish species retained should be landed whole to be able to unequivocally identify the origin (both species and finclipping). North of latitude 59° 30' N, recreational fisheries of salmon shall be allowed from 01 May to 31 August in areas within four nautical miles measured from the baselines.

Moreover, EU management measures include a minimum conservation reference sizes (MRCS) of 60 cm in the Baltic Sea, except SD 31 where MRCS is 50 cm (EU, 2019).

A discard ban or landing obligation for quota-regulated species in the Baltic Sea was implemented by EU on 01 January 2015. The obligation means that all salmon and other quota-regulated species caught in fisheries targeting salmon must be landed and registered. Likewise, all salmon taken as bycatch in fisheries targeting other species must be landed and registered.

The landing obligation does not apply to salmon that are caught with gears that are exempt from the regulation. For the period 2021-2023, push-up traps with an enclosed net bag that facilitates gentle handling of the fish were exempted from the landing obligation (EC, 2021). A new supplementing delegated regulation concerning an exemption from the application of the landing obligation as regards salmon in the Baltic Sea for 2024-2026 was adopted on 28 February 2024. Adjustments made for the period 2024-2026 include a new exemption for push-up traps that are combined with a water hold in the fishing vessel where salmon directly are placed (EU, 2024)

The maximum number of salmon that may be discarded (discard quota) from gears that are exempt from the landing obligation corresponds to 8% of the landed number of salmon in each country. The possibility to discard salmon enables some gears to be used to target other species outside the salmon fishing season, or when the salmon quota has been filled, even though salmon may be bycaught, as long as the discards of salmon do not exceed the discard quota.

## 2.7.2 National regulatory measures

Here contains a brief summary of current national management measures by country:

In **Denmark**, the offshore fishery has been regulated both by EU and national regulations. Since 2022, the commercial fishery targeting salmon was prohibited in the Main Basin, only allowing bycatch of salmon in other fisheries.

In 2022, a bag-limit of one adipose fin-clipped salmon per angler per day was introduced in the recreational fishery (trolling) thereby only allowing anglers to retain one salmon, which should be kept as a whole fish during the entire fishing trip. Since 2023, the rule was further limiting the recreational fishery as fishing should be terminated when the bag-limit has been reached.

When salmon can be targeted according to regulations BEK No. 2513 of 13/12/2021, the following rules must be followed:

- All commercial vessels fishing salmon must be registered as salmon fishing boats and have a specific permission for the fishery.
- Discard is not allowed, but seal damaged salmon can be discarded without deduction from the quota.
- Vessels with a catch of 10 or more salmon must notify the Fisheries Inspection before entering the harbour.

Further restrictions (with a focus on sea trout): Throughout the year, all streams with outlets wider than two meters are protected by closed areas within 500 m from the mouth. Otherwise, the closure period is four months at the time of spawning run. Estuaries are usually protected by an extended zone. Gillnetting is not permitted within 100 m of the low waterline. A national closed period for salmonids has been established from 16 November to 15 January in freshwater. In the sea, this only applies for sexually mature fish in spawning dress (coloured). A maximum of three gillnets and three fykenets/sets of hooks are allowed per fisher.

Around Bornholm, a maximum of six sets of gear (nets or hooks) are permitted per fisher. Fishing with hooks is permitted only between 01 October – 01 May. For each set of hooks, a maximum of 100 hooks is allowed. Maximum length of the six nets allowed is 270 m in total. Between 16 September and the last day in February, nets may be combined as follows: either (A) up to six bottom gillnets; (B) up to five bottom gillnets and one floating net (maximum 45 m length, maximum height three meters, minimum mesh size (total) 157 mm (called 'Salmon nets') OR five bottom gillnets and one floating net 45 m length and height 12 m with minimum mesh size (total) 57 mm (called 'Bornholmer nets'); or (C) up to four bottom gillnets and one floating gillnet maximum 45 length and three meters height, and one 'salmon net'. Between 01 March and 15 September, maximum three of the six gillnets allowed can be floating (maximum length 135 m).

Further restrictions around Bornholm:

- On water with less than 30 m depth, a maximum of three gillnets is allowed (all year).
- Use of floating gillnets is prohibited from 16 September to the last day of February.
- Between 01 March and 30 April, maximum mesh size (total) is 60 mm in floating gillnets.
- All year, the use of both 'Bornholmer nets' and 'Salmon nets' is prohibited.
- On water with more than 30 m depth, use of 'Bornholmer nets' is prohibited between 01 December and 31 May.
- All year only one 'Salmon net' is permitted.
- Harvest of sea trout is limited to maximum three fish per fisher per day (and maximum three per boat per day).

In **Estonia**, the latest update of the national regulatory measures was made in 2023 when salmon fishing was prohibited in River Pärnu.

In general, since 2011, the following restrictions are in practice:

- No commercial fishery in salmon (and sea trout) spawning rivers is permitted, except for lamprey fishing.
- Only licensed angling is permitted.

Changes made in 2019 concerned the recreational fisheries:

- In rivers Pühajõgi, Loobu, Selja, Pirita, Vääna, and Purtse, recreational fishery for salmon (and sea trout) is closed from 20 October – 30 November
- Recreational salmon fishing was banned in Valgejõgi.

Some specific management regulations are also in place on a river basis regarding closure periods for angling. A closed period for salmon (and sea trout) angling is established in rivers Narva, Purtse, Kunda, Selja Loobu, Valgejõgi, Jägala, Pirita, Keila, and Vasalemma from 01 September–30 November, and in other rivers from 01 September–31 October. Exceptions for these closures are allowed by decree of the Minister of Environment in rivers with a reared (Narva) or mixed salmon stock (Purtse, Selja, Valgejõgi, Jägala, Pirita, and Vääna). Below dams and waterfalls, all kind of fishing is prohibited at a distance of 100 m.

Furthermore, there is an all-year-round closed area of 1 000 m radius at the river mouths of the present or potential salmon spawning rivers Purtse, Kunda, Selja, Loobu, Valgejõgi, Jägala, Pirita, Keila, and Vasalemma, and at the river mouths of the sea trout spawning rivers Punapea, Öngu, and Pidula. Since 2011, the closed area for fishing around the river mouth was extended from 1000–1 500 m for the period 01 September–31 October for rivers Kunda, Selja, Loobu, Valgejõe, Pirita, Keila, Vääna, Vasalemma, and Purtse. In rivers Selja, Valgejõgi, Pirita, Vääna, and Purtse, recreational fishery for salmon (and sea trout) is banned from 15 October to 15 November. In the case of the most important Estonian sea trout spawning rivers (Pada, Toolse, Vainupea, Mustoja, Altja, Vösu, Pudisoo, Loo, Vääna, Vihterpadu, Nõva, Riguldi, Kolga, Ranametsa, Vanajõgi, and Jämaja), a closed area of 500 m is established from 15 August to 01 December. In most of the salmon (and sea trout) rivers, angling with natural bait is prohibited.

Fisheries in the sea is managed in accordance with EU regulations.

In **Finland**, the national coastal salmon fishing regulation for the Gulf of Bothnia was renewed in 2017 and in the same year, individual quota system was also implemented in salmon fishery (as well as in the Baltic herring and sprat fishery). In the Åland Islands, a separate regulation prevails (only total, non-individual quotas, no temporal regulation).

Years when the coastal salmon fisheries are allowed to fish in the whole area within SD 29N-31, the following rules are applicable in the Finnish coastal commercial fisheries:

Fishers targeting salmon are allowed to start with one trapnet in these four zones and dates respectively (if they have a turnover that is above 10 000 €):

- Bothnian Sea (60°45'N-62°30'N) – 01 May
- Quark (62°30'N-64°N) – 06 May
- Southern Bothnian Bay (64°00'N-65°30'N) – 11 May
- Northern Bothnian Bay (65°30'N ->) – 16 May

Thereafter they can set one more trapnet in the following dates:

- Bothnian Sea (60°45'N-62°30'N) – 10 June
- Quark (62°30'N-64°N) – 15 June
- Southern Bothnian Bay (64°00'N-65°30'N) – 20 June
- Northern Bothnian Bay (65°30'N ->) – 25 June

Then, one week later, a maximum of four trapnets per fisher are allowed.

In 2024, Finland executed “scientific salmon fishing” in subdivisions 29N-30 where the salmon fishing was forbidden by the EU regulation. Fishing was started on 27 May which shortened probably only marginally the productive part of the fishing season with fixed gears in the Archipelago Sea, Bothnian Sea, and in part of Quark area.

Since 2017, there are also restrictions in the terminal fishing areas regarding number of trapnets and fishing period. Earlier in terminal fishing areas, the number of trapnets was unlimited and only in Kemi terminal area there was a closure in the early summer. The regulation in terminal areas became more similar to the rest of the region. Fishing with one trapnet is allowed to start

at the same time as outside the areas, but the number of trapnets can be raised up to three on 17 June and up to eight on 25 June (for fishers with a turnover less than equal to 10 000 € up to two and four for respectively).

In the restricted area outside River Simojoki, salmon fishing may start on 16 July and outside the mouth of River Tornionjoki on 17 June.

All salmon have to be marked with a coded landing mark. In the first period of the season (when one trapnet is allowed), fishers are allowed to utilize at maximum 25% of their individual quota. Large trapnets (higher than 1.5 m) are allowed only for commercial fishers.

Salmon fishing with longlines and gillnets is forbidden in the Bothnian Bay, Quark area, and Bothnian Sea (including Archipelago Sea, excluding Åland Islands) from 01 April to 16 June – 01 July depending on the specific area.

Since 2013, salmon fishing has been forbidden in the Main Basin (south from 59°26'N and west from 23° 00'S) for the Finnish vessels, even though the open sea fisheries targeting salmon have been opened to the EU fleet.

There are commercial fisheries in short stretches from the river mouth to the lowest hydropower dam in rivers Iijoki and Kemijoki. Landed catch must be marked with coded landing marks. There are no time or quota limitations for salmon fisheries in these river areas.

In recreational fisheries at sea, there is national regulation for bag limit of two salmon per fisher per day (when the EU legislation is not stricter). Minimum landing size is 60 cm except north from latitude 63°30'N minimum size is 50 cm. In rivers, there are river specific regulations specifying weekly closures, bag limits (usually one salmon/day), and minimum landing sizes (50 or 60 cm). Landing of kelt is forbidden.

In and directly outside river Tornionjoki, the management of fisheries is handled through an agreement between Finland and Sweden (more information below in the section on Swedish regulatory measures).

In **Germany**, recreational fishing is under the jurisdiction of the German federal states and there are two federal states bordering the Baltic coast: Schleswig-Holstein (SH) and Mecklenburg-Western Pomerania (MV). Consequently, fishing is managed by the federal states with partially different legislation. In both states it applies that recreational fishery is allowed on a licence basis. The minimum landing size for salmon is 60 cm both in SH and MV, respectively.

The fishing season for salmonids is closed for marine recreational fisheries during autumn, in SH 01 October – 31 December (applies only to coloured fish) and in MV 15 September – 14 December (no fishing for salmonids at all). Closed areas in both federal states include protected spawning grounds in coastal waters, 300–400 m around spawning streams/rivers. In MV, trolling fisheries is permitted at a distance >1 km from the coastline between 15 September and 15 March, and there is a rod limit of three rods per angler in place.

Regarding commercial fishing, only a bycatch quota has been allocated to the German fishing fleet since 2016, i.e. no German vessels have been engaged in commercial fisheries targeting salmon since then. For commercial fisheries, there is also a 200 m gillnet ban in front of the coastline in some areas which may have an effect on bycatches of salmonids.

In **Latvia**, salmon angling is license-based angling for salmon (also sea trout) kelts in spring time. It is organized in the Salaca River catchment. In other rivers, it is prohibited all year round (except for the Daugava River with reared stock). Measures are being implemented to protect the

weak salmon stock in the Gauja and Venta rivers. In 2022, changes were made to the licensed angling regulations. Starting in 2023, anglers have a daily bag limit of one sea trout that does not exceed 70 cm in length to avoid keeping salmon by misidentifying the species (the rule is based on that salmon in most cases exceed 70 cm). Licensed angling regulations in Salaca and in two of its tributaries do not prohibit the retention of one salmon per day, but length limits are in place allowing for retention of sea trout between 50 and 70 cm and salmon under 70 cm in size, meaning that most descending salmon kelts must be released.

When the recreational salmon fishing has been allowed in the sea, various methods have been used in Latvia (angling, fishing for self-consumption with different gears, and underwater hunting) and then, since 2022, it is allowed to keep one reared, adipose fin-clipped, salmon only. Further, in accordance with the regulations of the Latvian Cabinet of Ministers, the harvesting of salmon (and sea trout) in the coastal recreational fisheries is generally prohibited from 01 October to 15 November.

For commercial vessels targeting salmon being active beyond the coastal waters until 2022, the Latvian Ministry of Agriculture allowed them to carry out specialized sea trout fishing in 2024 with a permit for bycatching also salmon. This fishery was permitted in waters located up to four nautical miles from the baseline, but not closer than 100 m to the shore. Types of gear that were allowed were longlines with a limited amount of hooks (no more than 1 000 pieces per fishing vessel) and/or anchored gillnets (no more than 4 km of nets per fishing vessel, mesh size 140-180 mm and a net height not exceeding 10 m).

In **Lithuania**, most national regulatory measures have remained the same in the latest years. In 2022, there were some changes for the fishing zones in the Nemunas River and a new requirement for commercial fishery in the Curonian Lagoon where all salmon (and sea trout) caught (dead or alive) with fykenets now must be released.

Recreational salmon (and sea trout) fisheries along the coast are (when allowed) regulated by one set of rules, whereas in inland waters another set of rules regulates the fisheries. For recreational fishing of salmon (and sea trout) in the Baltic Sea, one either needs to buy a fishing ticket or be entitled to special fishing rights to fish. In inland waters, you need a recreational fishing card for fishing. Both in the sea and in inland waters, there is a bag limit of one salmon or sea trout per angler and fishing day. In inland waters, the minimum size has been extended to 65 cm.

In the period 15 September to 31 October, recreational fishing is prohibited within a 0.5 km radius from the Šventoji and Rėkstyne river mouths, and from the southern and northern breakwaters of the Klaipėda Strait. During the same period, commercial fishing is prohibited within a 0.5 km radius from Šventoji River (Baltic Sea) mouth, and 3 km from the Curonian Lagoon and Baltic Sea confluence. From 01 October to 31 December, all types of fishing are prohibited in 161 streams, because of brown trout and sea trout spawning.

In larger rivers, such as Neris and Šventoji (with in total 12 rivers/tributaries), special protected zones have been selected where schooling of salmon (and sea trout) occurs. In these selected zones, licensed fishing is only permitted from 16 September until 15 October. Furthermore, the angling of salmon (and sea trout) in these selected river zones was limited by a 'catch and release' rule (from 01-15 October). From 16 October to 31 December any kind of fishing is prohibited in these areas. From 01 January, licensed salmon (and sea trout) kelt fishing is permitted in the Minija, Veiviržas, Skirvytė, Jūra, Atmata, Nemunas, Neris, Dubysa, Siesartis, and Šventoji rivers. Fishing with a licence is allowed from 01 January to 01 May in designated stretches of the listed rivers. In the inland waters, regulation of fishing is more complex. In case of retaining a salmon (or sea trout), a specific part of the recreational fishing card must be removed not later than

within five minutes. Such a marked recreational fishing card means that you are not allowed to continue fishing there and then.

Generally, sea fisheries are managed in accordance with EU regulations. The commercial fresh-water fishery that directly borders the sea is regulated during time of salmon (and sea trout) migration in the Klaipėda Strait and the Curonian Lagoon. Fishing is prohibited all year-round in a predefined part of the Klaipėda Strait. From 01 September – 31 October, during the salmon (and sea trout) migration, fishing with nets is prohibited on the eastern stretch of the Curonian Lagoon between Klaipėda and Skirvytė, at a 2 km distance from the eastern shore.

In **Poland**, the latest new national regulatory measure was implemented in 2020 when the protective period for salmon (and sea trout) for recreational fisheries beyond four nautical miles from the shore was shortened. Now the period is from 15 September to 15 November (previous the fishery was opened until 30 November). This regulation has been implemented to unify the legal acts related to the protective period for salmon (and sea trout), where the shortened protective period has been chosen.

Within territorial waters and managed by Regional Fisheries Inspectorate, seasonal closures and fixed protected areas are in force. When salmon fishing in the sea is allowed, it is closed between 15 September and 15 November within a predefined belt along the coastal zone (< 4 Nm). These general rules for closures in time and space currently only concern sea trout.

A new law for recreational salmon fishing in Polish EEZ was introduced in 2015 including: catch quotas (per day/per angler), minimum size limits (TL.), periods and areas for protected fish species and minimum distance between anglers. Rod fishing (coastal fishing, boat/belly boat fishing, and organized cruises on board fishing vessels) and spear fishing is allowed and there is a fishing licence system in place. Recreational fishing with nets is not allowed.

In rivers, angling for salmon (and sea trout) is forbidden between 01 October and 31 December. A fishing licence and permit is needed for fishing in the rivers and only rod fishing is allowed for fishing for salmon (and sea trout). In addition, in rivers Ina, Rega, Parsęta, and Śłupia, anglers must release all salmon that have been caught.

Commercial riverine fishery targeting salmon (and sea trout) is almost exclusively in the Vistula River. However, salmon are rare.

For latest information from **Russia**, see the 2021 WGBAST report (ICES, 2021a).

In **Sweden**, national management measures for the commercial salmon fisheries in 2024 allocated most of Sweden's TAC (17 011 salmon) to SD 31 and only a small part to SD 22-30 (4 000 salmon) to bycatch in the areas where targeted salmon fishing was not allowed. Fishing in SD 31 was allowed to start 17 June except in the area just outside Ume/Vindelälven where fishing was allowed to start 01 July. Up to and including 2021, the regional quota for SD 31 was further divided into smaller areas. A designated quota was allocated to the protection area outside River Umeälven in combination with a later start date, a measure that was implemented in 2019 to protect the weak salmon population in the Vindelälven tributary. Special fishing regulations in the terminal fishing areas outside Luleälven and Skellefteälven were also applied, with a prolonged fishing period for reared (fin-clipped) salmon but with the requirement that wild salmon should be released back. In 2022, the local quota for the protection area outside River Umeälven was removed (but the late start date of the fishery was kept as before), as were the special regulations outside the reared rivers Luleälven and Skellefteälven. Reasons behind the changes

applied in 2022 include, according to Swedish Agency for Marine and Water Management (SwAM), difficulties to control and follow up fishing if the salmon quota is divided between several smaller geographical areas, particularly if fishers have gears in several administrative areas making it difficult to check and follow up where the salmon have been caught. In addition to the regulations mentioned above, local fishery restrictions were implemented in 2019 in Ljungan in order to reduce exploitation on the local salmon population that has been severely affected by disease outbreaks in recent years. Restrictions in the river mouth area of Ljungan were reinforced in 2022.

Management measures for salmon also include seasonal partitioning of the quota. The general starting dates of the Swedish commercial coastal fishing season in 2023 were the same as in 2022. In SD 31, the fishing season started 17 June. As in recent years, exemptions from the seasonal regulation of the salmon fishery were allowed by the local county administrative board to professional fishers in the area north of latitude 62°55'N up to the border between the counties Västerbotten and Norrbotten, so that a limited fishery could start 12 June. In the protection area outside Umeälven, the starting date was set to 1 July. As in 2022, the fishing period in SD 31 in 2023 was divided into two time periods. The plan was to stop the fishery when at least 5 000 salmon remained of the quota, for use later in the season after a reopening of the salmon fishery. The main objective was to protect earlier migrating wild salmon populations by moving part of the exploitation later in the season when the share of reared salmon is higher along the coast. Furthermore, there is fishing with trapnets for other species (mainly whitefish) later in the season, when salmon can be bycaught. By reserving part of the salmon quota for fishing later in the season, the fisheries targeting other species can continue without exceeding the discard quota for salmon. However, because of the weak salmon run in 2023, the catch rate was extremely slow and the temporary stop of salmon fishing in SD 31 was never realized. In SD 30, commercial coastal fishing in 2023 was allowed from 01 May and was opened until the regional quota was filled, which did not happen here either due to the weak salmon run.

In 2012-2013, the Swedish offshore fishery targeting salmon and sea trout was phased out through national regulations. Hence, thereafter and when salmon fisheries have been allowed in the Main Basin, no Swedish vessels have been active in the salmon fisheries there.

In the Swedish legislation, minimum size for salmon is set at 60 cm in the whole of Gulf of Bothnia, although the EU management measures have a minimum conservation reference size (MRCS) of 50 cm in SD 31 (EU, 2019).

The management of fisheries in the border River Torneälven, including the coastal area directly outside the river mouth, is handled through an agreement between Sweden and Finland. The Swedish-Finnish agreement includes, for example, a specified period within which the commercial coastal fishery in the river mouth is allowed to start. Regulations targeting the river fishery are also handled in the agreement. Deviations from the agreed fishing regulations in this area are negotiated and decided upon on an annual basis by SwAM (according to a Government commission from the Swedish Ministry of Climate and Enterprise) and the Finnish Ministry of Agriculture and Forestry.

In 2023, recreational coastal trapnet fishing in the counties of Norrbotten, Västerbotten, and part of Västernorrland (north of latitude 62°55'N) was allowed from 01 July until the quota of salmon within the commercial fishery was fulfilled, with exception of the area outside the Torne River included in Swedish-Finnish agreement (see above), where recreational fishers could start fishing 17 June. South of latitude 62°55'N, recreational trapnet fishers have the same starting date as the commercial fishery. The recreational fishery using trapnets is small due to the ban for recreational fishers in the Baltic Sea to sell their catches; many recreational trapnet fishers have applied for a commercial licence and their catches are now included in the commercial landings.

Since 2022, there is a limit of maximum two trapnets per fisher for the recreational fishery targeting salmon. This applies to SD 30 and 31, north of latitude 60°30' N.

Fisheries in rivers are governed by national regulations. This applies to both commercial (in a few rivers with only reared salmon) and recreational riverine fisheries. In all rivers, there is a general bag limit of one salmon (and one trout) per fisher and day. In 2019, new river regulations were introduced in Vindelälven and Ljungan, including a maximum size limit of 65 cm in Vindelälven and a total ban for salmon fishing in Ljungan. These restrictions were introduced to protect the weak wild salmon populations in these rivers. Fishing periods are also regulated on a national level, and a few regulations were adjusted in 2023. In Bothnian Bay (SD 31) wild rivers, for example, angling for salmon is forbidden from 01 September until 31 December, whereas in Bothnian Sea (SD 30) wild rivers, salmon fishing is forbidden from 15 September to 31 December. The spring ban for salmon fishing in many rivers with wild salmon was removed in 2023, except for Åbyälven where salmon fishing was forbidden between 01 May and 16 June.

In addition to national regulations, local fishing and management organizations may stipulate more restrictive rules, an example being Ljungan where the local fishing organization has implemented restrictive gear rules in the river with the aim to reduce the risk of bycatching salmon when fishing for other species.

## 2.8 Other factors influencing the salmon fishery

The incitement to fish salmon is (as for other species) influenced by several factors, such as the possibilities for selling the fish and then at which market price, eventual opportunities to target and catch other species and problems with damages to the catches caused by seals and possibly birds.

Further, the possibility for selling the fish is evidently affected by co-factors such as levels of contaminants, e.g. dioxin. Detailed information about dioxin contents in Baltic salmon and how this affects the fishery is presented in ICES (2021c). (Stock Annex: Salmon (*Salmo salar*) in subdivisions 22–31 (Main Basin and Gulf of Bothnia) and Subdivision 32 (Gulf of Finland). ICES Stock Annexes. Report. <https://doi.org/10.17895/ices.pub.18623147.v1>). Also, the overall health status of the fish is of importance. See Section 3.4.4 for a summary of disease problems seen in several rivers and areas in later years.

## **2.9 Tables & Figures**

Table 2.2.1.1. Total catch: Nominal reported catches plus discards (including seal-damaged salmon), unreported, and misreported catches of Baltic salmon in tonnes round fresh weight, from sea, coast, and river by country in 2015-2024 in subdivisions 22-32. See ICES (2022) for catches before 2015.

Year	Country									Reported total catch	Estimated misreported catch	Estimated unreported catch		Estimated discarded catch		Total catch	
	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden			median	90% PI	median	90% PI	median	90% PI
2015	112	9	323	10	10	13	18	2	400	897	83	137	102-191	58	50-65	1120	1085-1175
2016	94	13	362	8	9	19	18	2	404	928	130	146	109-205	56	49-61	1208	1170-1267
2017	46	14	264	42	8	8	55	2	292	730	160	88	66-121	54	46-58	967	945-1000
2018	74	12	308	49	6	11	81	2	355	898	213	80	60-109	33	31-36	1175	1154-1205
2019	98	13	361	49	18	10	65	3	358	974	3	68	50-95	33	31-36	1052	1034-1080
2020	78	15	344	11	14	16	48	4	337	867	1	68	51-95	43	42-45	940	922-966
2021	60	11	364	19	16	17	96	na	291	874	0	66	48-92	47	46-50	945	927-971
2022	21	10	260	4	5	0	12	na	237	549	0	45	33-64	22	21-24	600	588-619
2023	13	11	173	4	3	2	12	na	186	403	0	32	23-45	19	17-20	438	430-451
2024	11	8	147	6	3	3	8	na	157	344	0	26	19-37	17	16-18	372	365-383

Table 2.2.1.2. Total catch: Nominal reported catches plus discards (including seal-damaged salmon), unreported, and misreported catches of Baltic salmon in numbers from sea, coast, and river by country in 2015-2024 in subdivisions 22-32. See ICES (2022) for catches before 2014.

Year	Country									Reported total catch	Estimated misreported catch	Estimated unreported catch		Estimated discarded catch		Total catch	
	DK	EE	FI	DE	LV	LT	PL	RU	SE			median	90% PI	median	90% PI	median	90% PI
2015	26 433	2 597	54 586	2 009	2 572	2 580	3 745	406	63 431	158 359	16 600	21821	16405-30345	10107	8768-11345	198267	192683-206668
2016	18 106	3 180	54 860	1 623	2 881	3 803	3 659	419	62 989	151 520	26 000	22753	17240-31828	6959	6136-7663	201787	196285-210993
2017	5 893	3 005	44 188	5 632	2 478	1 702	10 760	380	51 210	125 248	32 000	16427	12195-22416	5662	5262-6177	175142	171019-181239
2018	9 783	2 534	46 055	6 586	1 531	2 223	13 896	458	57 172	140 238	42 600	12852	9755-17828	5998	5579-6631	197535	194423-202441
2019	13 809	2 773	53 445	6 464	3 789	1 837	11 434	602	51 010	145 163	600	10133	7466-14062	7277	7050-7645	156838	154153-160813
2020	11 065	2 680	52 237	1 599	3 185	2 825	8 653	752	57 892	140 888	200	11150	8268-15519	7708	7519-7986	153032	150131-157439
2021	11 333	1 922	54 865	2 542	3 681	3 007	16 330	0	49 292	142 972	0	10674	7804-14792	9354	9134-9697	154700	151840-158872
2022	5 395	1 939	34 491	634	1 235	26	1 803	0	34 224	79 747	0	6143	4537-8760	3977	3785-4273	86490	84882-89131
2023	2 564	1 691	24 403	574	956	364	2 016	0	27 522	60 090	0	4588	3373-6381	3043	2888-3275	65152	63921-67050
2024	2 151	1 460	23 108	856	797	572	1 537	0	24 248	54 729	0	4041	2906-5679	2967	2833-3153	59120	58024-60802

Table 2.2.1.3. Nominal catches of Baltic salmon in tonnes round fresh weight, from offshore, coast, and river by country and region in 2015-2024. O = offshore, C = coast, R = river. See ICES (2023) for catches before 2015.

Year	Main Basin (subdivisions 22-29)																											
	Denmark		Estonia		Finland			Germany		Latvia			Lithuania			Poland			Russia			Sweden			Total			
	O	C	O	C	O	C	R	O	C	O	C	R	O	C	R	O	C	R	O	C	R	O	C	R	O	C	R	GT
2015	148	0	0	3	2	24	0	10	0	1	6	3	3	0	9	15	3	0	0	0	0	16	1	2	194	37	15	246
2016	94	0	0	3	1	24	0	8	0	0	7	1	8	0	11	15	3	0	0	0	0	16	3	1	142	42	13	196
2017	29	0	0	3	0	21	0	42	0	0	5	3	5	0	3	49	6	0	0	0	0	16	2	0	140	36	7	183
2018	50	0	0	3	0	26	0	49	0	2	3	1	6	1	4	74	7	0	0	0	0	16	2	0	196	41	6	243
2019	98	0	0	3	0	32	0	49	0	12	4	2	7	1	2	45	20	0	0	0	0	16	1	1	226	60	5	291
2020	78	0	0	3	0	21	0	11	0	8	4	3	10	1	6	38	10	0	0	0	0	16	1	1	160	39	10	210
2021	60	0	0	2	0	22	0	19	0	6	6	3	16	0	0	85	12	0	na	na	na	16	0	1	202	42	4	249
2022	27	0	0	1	0	25	0	4	0	1	4	0	0	0	0	11	0	0	na	na	na	16	0	0	59	30	1	91
2023	13	0	0	1	0	17	0	2	1	0	2	0	2	0	0	11	1	0	na	na	na	1	0	0	28	23	1	52
2024	11	0	0	1	0	13	0	5	1	1	2	1	3	0	0	8	1	0	na	na	na	1	0	0	28	17	1	46

Table 2.2.1.3. continued.

Year	Gulf of Bothnia (subdivisions 30-31)										Main Basin + Gulf of Bothnia (subdivisions 22-31)			
	Finland			Sweden			Total				Total			
	O	C	R	O	C	R	O	C	R	GT	O	C	R	GT
2015	0	142	112	0	191	191	0	332	303	635	194	369	318	881
2016	0	140	149	0	197	188	0	337	337	674	142	379	350	871
2017	0	118	87	0	158	116	0	276	203	480	140	312	210	663
2018	0	157	91	0	195	142	0	353	233	586	196	394	239	829
2019	0	157	119	0	173	167	0	330	286	616	226	389	291	907
2020	0	128	134	0	149	170	0	277	304	581	160	316	314	791
2021	0	145	159	0	149	126	0	294	285	578	202	336	289	827
2022	0	110	99	0	130	91	0	240	189	430	59	270	191	520
2023	0	79	52	0	109	72	0	188	124	312	28	211	125	364
2024	0	62	38	0	93	61	0	155	99	254	28	172	100	300

Table 2.2.1.3. continued.

Year	Gulf of Finland (Subdivision 32)										Subdivisions 22-32					
	Estonia			Finland			Russia		Total				Total			
	O	C	R	O	C	R	C	R	O	C	R	GT	O	C	R	GT
2015	0	6	0	0	43	1	0	2	0	49	3	52	194	418	321	933
2016	0	7	2	0	45	1	0	2	0	53	5	58	142	431	355	928
2017	0	9	2	0	36	1	0	2	0	46	4	50	140	358	215	713
2018	0	8	1	1	32	1	0	2	1	40	4	44	197	434	243	874
2019	0	9	1	1	53	0	0	3	1	62	5	67	226	451	296	974
2020	0	11	2	0	59	1	0	3	0	70	6	76	160	387	320	867
2021	0	8	1	0	35	2	na	na	0	43	4	47	202	379	293	874
2022	0	8	1	0	25	1	na	na	0	32	2	35	59	303	193	555
2023	0	8	2	0	25	0	na	na	0	33	2	35	28	243	127	399
2024	0	6	1	0	34	0	na	na	0	40	1	41	28	212	101	341

Table 2.2.1.4. Nominal catches of Baltic salmon in numbers, from offshore, coast, and river by country and region in 2015-2024. O = offshore, C = coast, R = river. See ICES (2023) for catches before 2015.

Year	Main Basin (subdivisions 22-29)																										
	Denmark		Estonia		Finland			Germany		Latvia			Lithuania			Poland			Russia		Sweden			Main Basin (subdivisions 22-29) Total			
	O	C	O	C	O	C	R	O	C	O	C	R	O	C	R	O	C	R	O	C	O	C	R	O	C	R	GT
2015	26433	0	0	1186	235	3081	8	2009	0	137	1923	512	620	72	1888	3180	565	0	0	0	2419	120	212	35033	6947	2620	44600
2016	18106	0	0	1158	152	3196	10	1623	0	0	2728	153	1510	97	2196	3102	557	0	0	0	2409	440	102	26902	8176	2461	37539
2017	5893	0	0	863	0	2978	10	5632	0	0	1864	614	996	48	658	9594	1166	0	0	0	2405	217	41	24520	7136	1323	32979
2018	9783	0	0	1042	64	3375	0	6586	0	347	937	247	1236	131	856	12593	1300	3	0	0	2407	216	45	33016	7001	1151	41168
2019	13809	0	0	1036	13	4155	0	6408	56	2226	1138	425	1287	166	384	7936	3498	0	0	0	2404	131	100	34083	10180	909	45171
2020	11065	0	0	815	0	2473	0	1599	0	1517	1158	510	1701	118	1006	6934	1665	54	0	0	2429	126	112	25245	6355	1682	33282
2021	11333	0	0	501	0	3006	0	2519	23	1249	1861	571	2967	8	32	14108	2176	46	na	na	2427	29	55	34603	7604	704	42911
2022	5395	0	0	231	0	3006	0	598	36	158	964	113	26	0	0	1701	62	40	na	na	2420	11	46	10298	4310	199	14807
2023	2564	0	0	169	0	2000	0	305	269	18	910	28	252	25	87	1798	185	33	na	na	101	1	52	5038	3559	200	8797
2024	2151	0	0	192	0	1791	0	681	175	123	548	126	493	43	36	1405	125	7	na	na	123	3	36	4976	2877	205	8058

Table 2.2.1.4. continued.

Year	Gulf of Bothnia (subdivisions 30-31)										Main Basin + Gulf of Bothnia (subdivisions 22-31)			
	Finland			Sweden			Total				Total			
	O	C	R	O	C	R	O	C	R	GT	O	C	R	GT
2015	9	29391	14412	0	28433	32247	9	57824	46659	104492	35042	64771	49279	149092
2016	79	24394	19880	0	29303	30735	79	53697	50615	104391	26981	61873	53076	141930
2017	0	21440	12883	0	23810	24737	0	45250	37620	82870	24520	52386	38943	115849
2018	0	22312	14628	0	27895	26609	0	50207	41237	91444	33016	57208	42388	132612
2019	11	22638	18240	0	24326	24049	11	46964	42289	89264	34094	57144	43198	134435
2020	0	21356	19236	0	23575	31650	0	44931	50886	95817	25245	51286	52568	129099
2021	0	21934	24422	0	23023	23758	0	44957	48180	93137	34603	52561	48884	136048
2022	0	15071	12769	0	18759	12988	0	33830	25757	59587	10298	38140	25956	74394
2023	0	11596	6739	1	16360	10461	1	27956	17200	45157	5039	31515	17400	53954
2024	0	10022	5564	1	15172	8626	1	25194	14190	39385	4977	28071	14395	47443

Table 2.2.1.4 continued.

Year	Gulf of Finland (Subdivision 32)													Subdivisions 22-32			
	Estonia			Finland			Russia		Total				Total				
	O	C	R	O	C	R	O	R	O	C	R	GT	O	C	R	GT	
2015	0	1373	38	48	7254	158	46	360	48	8673	556	9277	35090	73444	49835	158369	
2016	0	1629	393	51	6918	248	16	403	51	8563	1044	9658	27032	70436	54120	151588	
2017	0	1842	300	0	6669	208	0	380	0	8511	888	9399	24520	60897	39831	125248	
2018	0	1333	159	114	5477	85	0	458	114	6810	702	7626	33130	64018	43090	140238	
2019	0	1486	251	106	8222	60	0	602	106	9708	913	10727	34200	66852	44111	145162	
2020	0	1612	253	0	8987	185	72	680	0	10671	1118	11789	25245	61957	53686	140888	
2021	0	1200	221	0	5398	105	na	na	0	6598	326	6924	34603	59159	49210	142972	
2022	0	1540	168	0	3613	32	na	na	0	5153	200	5353	10298	43293	26156	79747	
2023	0	1212	310	0	4046	22	na	na	0	5258	332	5590	5039	36773	17732	59544	
2024	0	997	271	0	5729	2	na	na	0	6726	273	6999	4977	34797	14668	54442	

Table 2.2.1.5. Nominal catches of Baltic salmon in tonnes round fresh weight and numbers from sea, coast, and river by country and subdivisions in 2024. Subdivisions 22-32. O = offshore, C = coast, R = river, W = weight (tonnes), N = number of fish.

SD	Fishery		DE	DK	EE	FI	LT	LV	PL	RU	SE	Grand Total
22	O	W	0	0								0
		N	14	1								15
23	O	W										0
		N										0
	C	W										0
		N										0
24	O	W	5									5
		N	681									681
	C	W	1									1
		N	161									161
25	O	W							0			0
		N							2			2
	C	W							0		0	0
		N							5		3	8
	R	W							0		0	0
		N							3		35	38



SD	Fishery	DE	DK	EE	FI	LT	LV	PL	RU	SE	Grand Total	
28	O	W									0	
		N									0	
	C	W			1			1				2
		N			155			460				615
	R	W						1				1
		N						333				333
29	O	W								0	0	
		N								14	14	
	C	W			0	13						21
		N			37	1791						1828
	O	W								0	0	0
		N								1	1	1
30	C	W			9					0	9	
		N				1376				9	1385	
	R	W			0					26	26	
		N			0					3598	3598	

SD	Fishery	DE	DK	EE	FI	LT	LV	PL	RU	SE	Grand Total
31	C	W			52					95	147
		N			8396					15450	23846
	R	W			38					35	73
		N			5564					5028	10592
32	O	W									0
		N									0
	C	W			6	34					40
		N			997	5729					6726
	R	W			1	0					1
		N			271	2					273
200	O	W	11					8		1	20
		N		2150						1403	109
	R	W					0				0
		N					36				36
300	C	W			1						1
		N			250						250

SD	Fishery		DE	DK	EE	FI	LT	LV	PL	RU	SE	Grand Total
Total 22-31	O+C+R	W	6	11	1	113	3	3	9	0	157	311
		N	856	2151	192	17377	536	1004	1537	0	24248	47937
Total 32	O+C+R	W	0	0	7	34	0	0	0	0	0	41
		N	0	0	1268	5731	0	0	0	0	0	6999
	O	W	5	11	0	0	3	1	8	0	1	29
		N	695	2151	0	0	493	123	1405	0	124	4991
	C	W	1	0	7	109	0	1	1	0	95	222
Grand Total		N	161	0	1189	17542	43	548	125	0	15462	35070
	R	W	0	0	1	38	0	1	0	0	61	101
		N	0	0	271	5566	36	333	7	0	8662	14875
	O+C+R	W	6	11	8	147	3	3	9	0	157	352
		N	856	2151	1460	23108	572	1004	1537	0	24248	54936

Table 2.2.1.6. Nominal catches (commercial) of Baltic salmon in numbers from sea and coast, excluding river catches, by country in 2015-2024 and in comparison with TAC. Subdivisions 22-32. See ICES (2022) for catches before 2015.

Baltic Main Basin and Gulf of Bothnia (subdivisions 22-31)												
Year	Fishing Nation									Total	TOTAL TAC	Landing of TAC (in %)
	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden			
2015	15 867	638	30 166	2 009	1327	72	3 745	0	27 907	81 731	95 928	85
2016	9 701	726	24 821	1 623	1752	97	3 659	0	29 312	71 691	95 928	75
2017	3 045	593	21 878	1 176	1210	48	7 075	0	23 592	58 617	95 928	61
2018	5 993	581	23 551	1 360	987	367	8 545	0	27 678	69 062	91 132	76
2019	6 009	544	24 377	939	2591	578	6 494	0	24 021	65 553	91 132	72
2020	3 000	488	20 589	506	2048	198	3 849	0	23 274	53 952	86 575	62
2021	5 704	283	21 700	493	2296	265	11 524	na	21 748	64 013	94 496	68
2022	7	185	17 147	261	794		63	na	18 001	36 458	63 811	57
2023	14	129	12 896	280	835	25	200	na	16 364	30 743	63 811	48
2024	1	161	11 563	181	454	43	127	na	15 176	27 706	56 640	49

Table 2.2.1.6. continued.

Gulf of Finland (Sub-division 32)						
Year	Fishing Nation		Total	EC TAC	Landing of TAC (in %)	Russia
	Estonia	Finland				
2015	896	6452	7348	13106	56	46
2016	1028	6279	7307	13106	56	16
2017	1384	5999	7383	13106	56	0
2018	1043	5401	6444	10003	64	0
2019	1182	8118	9300	9703	96	0
2020	1381	8017	9398	9703	97	72
2021	1011	4448	5459	8883	61	na
2022	1275	3188	4463	9455	47	na
2023	1020	3621	4641	9455	49	na
2024	843	5304	6147	10144	61	na

Table 2.2.1.7. Non-commercial (recreational) catches of Baltic salmon in numbers from sea, coast, and river by country in 2015-2024 in subdivisions 22-31 and Subdivision 32 (O = offshore, C = coast, PI = probability interval). See ICES (2022) for catches before 2015.

Subdivisions 22-31																					
Year	Denmark		Estonia		Finland		Germany		Latvia		Lithuania		Poland		Russia		Sweden		O+C	River	Grand
	O+C	River	O+C	River	O+C	River	O+C	River	O+C	River	O+C	River	O+C	River	O+C	River	O+C	River	Total	Total	Total
2015	3500		548		3400	14578			733	0	620	1749	0	0	0	0	3065	19261	11866	35588	47454
2016	8000		432		3690	20138			976	13	1510	2010	0	0	0	0	2840	18711	17448	40872	58320
2017	6500		270		3210	13101	4456		654	0	996	562	3685	0	0	0	2840	16094	22611	29757	52368
2018	8595		461		2390	13613	5226		297	98	1000	600	3776	0	0	0	2840	15235	24585	29546	54131
2019	7796		492		2650	15500	5525		773	184	875	384	4940	0	0	0	2840	12686	25891	28754	54645
2020	8065		327		4210	17771	1093		627	443	1621	994	4750	0	0	0	2856	16089	23549	35297	58846
2021	5629		218		4190	21430	2049		814	248	2710	32	4760	0	na	na	3731	12401	24101	34111	58212
2022	4192		46		1355	11831	373		328	35	26	71	1700	0	na	na	3189	8264	11209	20201	31410
2023	2550		40		1125	6050	294		93	28	252	0	1783	0	na	na	645	5937	6964	12324	19288
2024	2150		31		250	4454	675		217	84	493	36	1403	0	na	na	410	6714	5629	11288	16917

Table 2.2.1.7. continued.

Subdivision 32										Subdivisions 22-32		
Year	Estonia		Finland		Russia		O+C	River	Grand	O+C	River	Grand
	O+C	River	O+C	River	O+C	River	Total	Total	Total			
2015	477	38	850	158	0	0	1327	196	1523	13193	35784	48977
2016	601	393	690	248	0	0	1291	641	1932	18739	41513	60252
2017	458	300	670	208	0	0	1128	508	1636	23739	30265	54004
2018	290	159	190	85	0	0	480	244	724	25065	29790	54855
2019	304	251	210	60	0	0	514	311	825	26405	29065	55470
2020	231	253	970	185	0	0	1201	438	1639	24750	35735	60485
2021	189	221	950	105	na	na	1139	326	1465	25240	34437	59677
2022	265	168	425	32	na	na	690	200	890	11899	20401	32300
2023	192	310	425	22	na	na	617	332	949	7581	12656	20237
2024	154	271	425	2	na	na	579	273	852	6208	11561	17769

**Table 2.3.1. Summary of the uncertainty associated to fisheries data series according to the expert opinions from different countries backed by data (D) or based on subjective expert estimation (EE). The conversion factors (mean) are proportions and can be multiplied with the nominal catch data in order to obtain estimates for unreported catches and discards, which altogether sum up to the total catches. Driftnet fishing has been closed from 2008. Finland and Sweden have had no offshore fishing for salmon after 2012.**

Parameter	Country	Year	Source	min	mode	max	mean	SD
Share of unreported catch in offshore fishery	DK	2001->	EE	0.001	0.01	0.10	0.04	0.023
	FI	2001-2012	EE	0.001	0.01	0.10	0.04	0.023
	PL	2001-2013	EE	0.001	0.25	0.40	0.22	0.083
		2014	EE	0.010	0.02	0.10	0.04	0.020
		2015-2016	EE	0.010	0.02	0.08	0.04	0.015
		2017->	EE	0.001	0.01	0.05	0.02	0.010
	SE	2001-2012	EE	0.050	0.15	0.25	0.15	0.041
	Others	2001->					0.08	0.015

Parameter	Country	Year	Source	min	mode	max	mean	SD
Share of unreported catch in coastal fishery (applies for the commercial fishing only)	FI	2001-2014	EE	0.001	0.10	0.15	0.08	0.031
		2015->	EE	0.001	0.01	0.10	0.04	0.022
	PL	2001-2012	EE	0.001	0.10	0.20	0.10	0.041
		2013-2018	EE	0.001	0.05	0.10	0.05	0.020
		2019->		0.001	0.01	0.05	0.02	0.011
	SE	2001-2012	EE	0.100	0.30	0.50	0.30	0.082
		2013-2014	EE	0.001	0.15	0.30	0.15	0.061
		2015-2018	EE	0.050	0.15	0.25	0.15	0.041
		2019-> *)	EE	0.010	0.05	0.15	0.07	0.029
	Others	2001->					0.11	0.014
Share of unreported catch in river fishery (applies for both commercial and recreational fisheries)	FI	2001-2016		0.050	0.20	0.35	0.20	0.062
		2017->	EE	0.050	0.15	0.25	0.15	0.041
	PL	2001-2009	EE	0.010	0.10	0.15	0.09	0.029
		2010->	EE	0.500	0.80	1.00	0.77	0.103
	SE	2001-2017	EE	0.100	0.20	0.40	0.23	0.063
		2018-> *)	EE	0.010	0.10	0.20	0.10	0.039
Average share of unreported catch in river fishery	Others	2001->				0.26	0.025	

Parameter	Country	Year	Source	min	mode	max	mean	SD
Share of discarded undersized salmon in longline fishery	DK	2001-2007	D, EE	0.100	0.15	0.20	0.15	0.020
		2008->	D, EE	0.005	0.03	0.05	0.03	0.009
	FI	2001-2012	D, EE	0.010	0.03	0.05	0.03	0.008
	PL	2001-2012	D	0.010	0.03	0.04	0.03	0.006
		2013->	D	0.010	0.02	0.04	0.02	0.006
	SE	2001-2012	D, EE	0.005	0.02	0.03	0.02	0.005
Average share of discarded undersized salmon in longline fishery	Others	2001->				0.05	0.004	
Mortality of discarded undersized salmon in longline fishery	DK	2001->	EE	0.750	0.80	0.85	0.80	0.020
	FI	2001-2012	EE	0.500	0.67	0.90	0.69	0.082
	SE	2001-2012	EE	0.750	0.85	0.95	0.85	0.041
	PL	2001->	D, EE	0.600	0.72	0.90	0.74	0.062
	Others	2001->					0.77	0.028
Share of discarded undersized salmon in driftnet fishery	DK	2001-2007	EE, D	0.001	0.03	0.05	0.03	0.010
	FI	2001-2007	D	0.001	0.02	0.03	0.02	0.006
Average share of discarded undersized salmon in driftnet fishery	Others	2001-2007				0.02	0.006	

Parameter	Country	Year	Source	min	mode	max	mean	SD
Mortality of discarded undersized salmon in driftnet fishery	DK	2001-2007	EE, D	0.600	0.65	0.70	0.65	0.020
	FI	2001-2007	EE	0.500	0.67	0.80	0.66	0.061
Average mortality of discarded undersized salmon in driftnet fishery	Others	2001-2007					0.65	0.032
Share of undersized salmon in trapnet fishery (released back to sea)	FI	2001-2016	EE	0.010	0.03	0.05	0.03	0.008
		2017->	D	0.010	0.06	0.15	0.07	0.029
	SE	2001->	EE, D	0.010	0.03	0.05	0.03	0.008
Average share of discarded undersized salmon in trapnet fishery	Others	2001->					0.04	0.010
Mortality of discarded undersized salmon in trapnet fishery	FI	2001->	EE, D	0.100	0.20	0.50	0.27	0.086
	SE	2001->	EE, D	0.300	0.50	0.70	0.50	0.082
Average mortality of discarded undersized salmon in trapnet fishery	Others	2001->					0.38	0.060
Share of discarded seal-damaged salmon in longline fishery	FI	2001-2007	D	0.001	0.00	0.02	0.01	0.005
		2008-2012	D	0.001	0.03	0.06	0.03	0.012
	SE	2001-2012	EE, D	0.020	0.05	0.08	0.05	0.012
	DK	2001-2007	EE, D	0.001	0.03	0.05	0.03	0.010
		2008-2012	EE	0.001	0.05	0.10	0.05	0.020
		2013-2014	EE, D	0.050	0.15	0.30	0.17	0.052
		2015	EE	0.050	0.20	0.35	0.20	0.062

Parameter	Country	Year	Source	min	mode	max	mean	SD
		2016-> **)	D	0.050	0.20	0.45	0.23	0.083
	PL	2001-2012	D	0.001	0.01	0.02	0.01	0.004
		2013-2015	EE, D	0.050	0.25	0.65	0.32	0.125
		2016->	D	0.050	0.35	0.65	0.35	0.122
	Others	2001->					0.13	0.019
Share of discarded seal-damaged salmon in driftnet fishery and other open sea gillnet fishery (GNS in Poland)	DK	2001-2007	EE, D	0.001	0.03	0.05	0.03	0.010
	FI	2001-2007	D	0.010	0.02	0.04	0.02	0.006
	PL	2008-2012		0.001	0.01	0.02	0.01	0.004
		2013-2015	EE,D	0.050	0.25	0.65	0.32	0.125
		2016->	D	0.050	0.35	0.65	0.35	0.122
	Others	2001-2007					0.15	0.035
Share of discarded seal-damaged salmon in trapnet fishery	FI	2001->	D	0.050	0.09	0.15	0.10	0.021
	SE	2004->	EE, D	0.010	0.02	0.04	0.02	0.006
	Others	2001->					0.06	0.011

\*) updated retrospectively also few year back in WGBAST 2023

\*\*) updated in WGBAST 2019

Table 2.3.2. Medians of estimated number of discarded undersized salmon and discarded seal-damaged salmon by management unit in 2001-2024. Estimates of discarded undersized salmon are proportional to nominal catches by the conversion factors (see Table 2.3.1). Estimates of seal damages are based partly on the logbook records and on the estimates proportional to nominal catches by conversion factors. In 2017-2024, seal damages of other gears included also part of the seal damages of long-line. Estimates should be considered as a magnitude of discards. Note that totals are medians of summary probability distributions of parameters and therefore not an exact sum of median values in columns.

Management unit	Year	Discard undersized (dead)					Discard seal-damaged					Grand Total
		Driftnet	Longline	Trapnet	Other gears	Total	Driftnet	Longline	Trapnet	Other gears	Total	
		Disc_GND	Disc_LLD	Disc_TN	Disc_OT		Seal_GND	Seal_LLD	Seal_TN	Seal_OT		
SD22-31	2001	3 154	11 814	1 091	580	16 639	8 832	3 337	6 865	1 108	20 142	36 781
	2002	2 177	12 432	1 240	584	16 433	7 038	3 847	6 517	312	17 714	34 147
	2003	2 333	15 964	910	299	19 506	7 082	4 454	6 053	1 571	19 160	38 666
	2004	2 735	13 500	1 543	610	18 388	7 829	4 508	6 802	1 328	20 467	38 855
	2005	1 862	7 913	849	326	10 950	7 870	3 820	4 849	581	17 120	28 070
	2006	1 241	5 644	777	168	7 830	4 563	2 833	2 491	1 595	11 482	19 312
	2007	1 231	3 477	767	208	5 683	3 866	1 971	4 316	406	10 559	16 242
	2008	13	847	779	253	1 892	7	1 113	3 661	590	5 371	7 263
	2009	0	2 737	1 376	321	4 434	0	3 108	3 347	387	6 842	11 276
	2010	0	3 471	839	159	4 469	0	4 008	2 289	284	6 581	11 050
	2011	0	2 300	612	164	3 076	0	4 850	2 257	191	7 298	10 374
	2012	0	1 485	581	188	2 254	0	2 701	3 124	361	6 186	8 440

Management unit	Year	Discard undersized (dead)					Discard seal-damaged					Grand Total
		Driftnet	Longline	Trapnet	Other gears	Total	Driftnet	Longline	Trapnet	Other gears	Total	
		Disc_GND	Disc_LLD	Disc_TN	Disc_OT		Seal_GND	Seal_LLD	Seal_TN	Seal_OT		
	2013	0	971	525	174	1 670	0	6 694	3 059	244	9 997	11 667
	2014	0	814	432	185	1 431	0	5 583	2 491	303	8 377	9 808
	2015	0	752	395	207	1 354	0	5 271	1 580	505	7 356	8 710
	2016	0	766	410	246	1 422	0	1 964	1 464	1 320	4 748	6 170
	2017	0	731	342	282	1 355	0	620	1 696	1 043	3 359	4 714
	2018	0	979	418	329	1 726	0	197	1 838	1 659	3 694	5 420
	2019	0	203	312	355	870	0	709	1 800	3 006	5 515	6 385
	2020	0	106	379	206	691	0	988	1 642	3 585	6 215	6 906
	2021	0	321	397	275	993	0	936	2 144	4 980	8 060	9 053
	2022	0	4	324	238	566	0	1	2 022	1 059	3 082	3 648
	2023	0	0	208	202	410	0	0	1 619	714	2 333	2 743
	2024	0	0	196	137	333	0	0	1 710	637	2 347	2 680
SD32	2001	3	60	17	87	167	3	58	2 924	714	3 699	3 866
	2002	10	65	33	89	197	73	176	2 828	317	3 394	3 591
	2003	2	9	2	60	73	20	30	3 497	216	3 763	3 836

Management unit	Year	Discard undersized (dead)					Discard seal-damaged					Grand Total
		Driftnet	Longline	Trapnet	Other gears	Total	Driftnet	Longline	Trapnet	Other gears	Total	
		Disc_GND	Disc_LLD	Disc_TN	Disc_OT		Seal_GND	Seal_LLD	Seal_TN	Seal_OT		
	2004	3	5	14	46	68	41	7	3 714	245	4 007	4 075
	2005	3	7	2	61	73	25	37	1 621	187	1 870	1 943
	2006	4	2	9	55	70	92	4	1 718	994	2 808	2 878
	2007	4	3	1	33	41	42	5	1 729	47	1 823	1 864
	2008	0	9	0	44	53	0	24	2 008	287	2 319	2 372
	2009	0	6	4	60	70	0	1	1 622	248	1 871	1 941
	2010	0	3	4	24	31	0	3	896	68	967	998
	2011	0	2	33	23	58	0	0	856	72	928	986
	2012	0	1	77	38	116	0	0	886	170	1 056	1 172
	2013	0	1	237	38	276	0	2	543	46	591	867
	2014	0	2	57	34	93	0	0	635	21	656	749
	2015	0	1	12	30	43	0	0	1 093	207	1 300	1 343
	2016	0	1	17	30	48	0	0	614	85	699	747
	2017	0	5	37	39	81	0	0	767	57	824	905
	2018	0	3	6	37	46	0	0	450	26	476	522

Management unit	Year	Discard undersized (dead)					Discard seal-damaged					Grand Total
		Driftnet	Longline	Trapnet	Other gears	Total	Driftnet	Longline	Trapnet	Other gears	Total	
		Disc_GND	Disc_LLD	Disc_TN	Disc_OT		Seal_GND	Seal_LLD	Seal_TN	Seal_OT		
	2019	0	2	4	37	43	0	0	803	6	809	852
	2020	0	5	10	54	69	0	0	688	7	695	764
	2021	0	1	5	33	39	0	0	218	5	223	262
	2022	0	0	9	26	35	0	0	265	4	269	304
	2023	0	1	8	35	44	0	0	230	4	234	278
	2024	0	1	5	17	23	0	0	238	4	242	265

**Table 2.3.3. Estimated number of seal-damaged salmon, dead discard of undersized salmon, unreported salmon in sea and river fisheries, and misreported salmon by management unit in 2001-2024. Estimates should be considered as order of magnitude.**

MU	Year	Sea fisheries				River fisheries				
		Seal damage		Discards (dead)		Unreported catch		Misreported catch	Unreported catch	
		median	90 % PI	median	90 % PI	median	90 % PI		median	90 % PI
SD22-31	2001	20 241	18 317-23 104	16 760	14 081-20 056	49 749	36 996-70 535	126 060	8 756	5 730-14 830
	2002	17 854	16 266-20 251	16 524	13 941-19 688	49 230	36 783-72 422	114 964	7 644	4 809-13 065
	2003	19 337	17 288-22 148	19 550	16 392-23 627	45 330	33 401-64 636	143 146	6 290	4 167-10 878
	2004	20 735	18 428-24 113	18 519	15 425-22 657	59 509	42 329-92 050	254 267	7 038	4 683-11 526
	2005	17 263	15 990-19 161	11 097	9 250-13 519	42 611	31 565-61 871	110 816	8 612	5 701-14 494
	2006	11 560	10 693-12 853	7 928	6 721-9 628	29 651	21 604-44 794	46 899	5 270	3 400-8 908
	2007	10 615	9 891-11 629	5 760	4 886-6 917	26 974	20 223-40 326	54 309	6 542	4 289-10 857
	2008	5 396	5 135-5 801	1 906	1 586-2 408	23 006	15 775-38 947	3 295	12 498	8 487-20 294
	2009	6 884	6 194-7 871	4 508	3 631-5 641	31 682	21 335-50 693	66 500	9 051	6 134-15 298
	2010	6 582	5 667-8 494	4 522	3 671-5 857	23 809	16 867-35 664	74 800	5 270	3 640-8 465
	2011	7 315	6 637-8 395	3 120	2 553-3 843	23 957	17 151-36 644	37 000	5 593	3 719-8 944
	2012	6 212	5 641-7 243	2 267	1 908-2 829	18 376	12 912-27 625	17 500	14 104	9 462-22 559
	2013	9 992	7 974-11 723	1 687	1 337-2 168	9 721	6 452-15 454	15 000	11 256	7 621-17 980
	2014	8 414	6 704-9 957	1 458	1 132-1 875	8 587	5 534-14 757	13 600	11 419	7 550-18 078

MU	Year	Sea fisheries					River fisheries			
		Seal damage		Discards (dead)		Unreported catch		Misreported catch	Unreported catch	
		median	90 % PI	median	90 % PI	median	90 % PI		median	90 % PI
	2015	7 360	6 116-8 507	1 369	1 102-1 761	6 927	4 783-10 830	16 600	14 108	9 288-22 092
	2016	4 759	4 007-5 279	1 445	1 154-1 844	6 783	4 685-10 276	26 000	15 274	10 255-23 358
	2017	3 369	3 134-3 542	1 400	1 073-1 842	5 456	3 658-8 510	32 000	10 100	6 760-15 711
	2018	3 697	3 627-3 807	1 767	1 369-2 369	6 357	4 160-9 761	42 600	5 901	4 046-9 285
	2019	5 524	5 464-5 615	890	686-1 216	3 100	1 915-5 307	600	6 115	4 189-9 449
	2020	6 227	6 163-6 340	707	552-932	2 716	1 688-4 467	200	7 573	5 104-11 628
	2021	8 073	7 986-8 225	1 014	823-1 283	3 029	1 937-5 094	0	7 081	4 729-10 799
	2022	3 083	3 028-3 184	576	420-837	2 032	1 162-3 618	0	3 768	2 569-5 592
	2023	2 335	2 286-2 426	420	296-610	1 716	1 005-3 172	0	2 387	1 617-3 623
	2024	2 350	2 301-2 438	345	240-503	1 583	917-2 825	0	2 001	1 350-3 021
SD32	2001	3 699	3 572-3 959	167	134-210	1 094	696-1 830	0	751	535-1 190
	2002	3 397	3 280-3 630	201	167-246	811	539-1 296	0	866	538-1 607
	2003	3 765	3 629-4 027	73	59-92	704	430-1 207	0	508	319-908
	2004	4 010	3 875-4 291	69	58-82	648	406-1 144	0	444	284-757
	2005	1 871	1 801-1 984	73	60-90	911	522-1 539	0	821	511-1 441

MU	Year	Sea fisheries						River fisheries		
		Seal damage		Discards (dead)		Unreported catch		Misreported catch	Unreported catch	
		median	90 % PI	median	90 % PI	median	90 % PI		median	90 % PI
	2006	2 808	2 699-3 021	71	58-87	1 003	568-1 893	0	585	417-943
	2007	1 824	1 762-1 952	41	32-52	937	551-1 707	0	500	331-803
	2008	2 317	2 235-2 496	53	43-66	1 265	716-2 371	0	510	373-772
	2009	1 873	1 800-2 020	70	56-88	1 084	598-2 031	0	700	469-1 098
	2010	967	931-1 036	31	25-41	499	291-913	0	297	219-412
	2011	927	892-999	59	52-68	625	361-1 195	0	337	246-496
	2012	1 056	1 015-1 136	117	107-131	910	506-1 728	0	328	239-476
	2013	592	569-635	277	264-296	837	477-1 490	0	353	236-569
	2014	656	632-702	93	84-105	789	464-1 412	0	264	193-392
	2015	1 300	1 274-1 369	43	35-54	303	161-640	0	156	114-226
	2016	699	683-740	48	39-60	299	160-677	0	304	226-409
	2017	825	806-868	81	70-98	335	186-656	0	238	185-318
	2018	477	466-502	46	35-61	269	145-546	0	195	145-273
	2019	811	792-852	44	33-59	367	190-766	0	259	192-360
	2020	695	679-733	70	53-96	414	222-792	0	307	231-426

MU	Year	Sea fisheries				River fisheries				
		Seal damage		Discards (dead)		Unreported catch		Misreported catch	Unreported catch	
		median	90 % PI	median	90 % PI	median	90 % PI		median	90 % PI
	2021	223	215-239	39	29-52	248	137-491	0	82	59-120
	2022	269	260-288	36	26-48	224	130-439	0	53	37-81
	2023	234	227-249	45	33-62	218	120-411	0	92	61-143
	2024	243	236-259	24	18-32	252	134-536	0	79	51-123

**Table 2.4.1. Fishing efforts in commercial Baltic salmon fisheries at sea and at the coast in 1987-2024 in subdivisions 22-31 (excluding Gulf of Finland). The fishing efforts are expressed in number of geardays (number of fishing days times the number of gear) per year. The yearly reported total offshore effort refers to the sum of the effort in the second half of the given year and the first half of the next coming year (e.g. effort in second half of 1987 + effort in first half of 1988 = effort reported in 1987, etc.). The coastal fishing effort on stocks of assessment unit 1 (AU 1) refers to the total Finnish coastal fishing effort and partly to the Swedish effort in Subdivision (SD) 31. The coastal fishing effort on stocks of AU 2 refers to the Finnish coastal fishing effort in SD 30, and partly to the Swedish coastal fishing effort in SD 31. The coastal fishing effort on stocks of AU 3 refers to the Finnish and Swedish coastal fishing effort in SD 30.**

Year	Offshore		AU 1			AU 2		AU 3	
	driftnet	longline	Commercial coastal	Commercial coastal	Commercial coastal	Commercial coastal	Commercial coastal	Commercial coastal	Commercial coastal
			driftnet	trapnet	other gear	trapnet	other gear	trapnet	other gear
1987	4 036 455	3 710 892	328 711	71 182	263 256	43 694	243 511	42 704	526 101
1988	3 456 416	2 390 537	256 387	84 962	245 228	55 659	259 404	58 839	798 038
1989	3 444 289	2 346 897	378 190	68 333	345 592	41 991	384 683	40 135	463 067
1990	3 279 200	2 188 919	364 326	111 333	260 768	71 005	233 540	68 152	279 610
1991	2 951 290	1 708 584	431 420	103 077	461 053	70 979	360 360	73 177	404 327
1992	3 205 841	1 391 361	473 579	115 793	351 518	68 096	282 674	61 703	339 384
1993	2 155 440	1 041 997	621 817	119 497	288 245	76 398	161 474	79 911	215 710
1994	3 119 711	851 530	581 306	83 936	194 683	59 488	210 927	55 256	205 848
1995	1 783 889	932 314	452 858	70 670	152 529	44 607	147 259	42 165	141 905
1996	1 288 081	1 251 637	78 686	58 266	100 409	42 055	92 606	29 029	90 245
1997	1 723 492	1 571 003	118 207	63 102	107 432	44 605	81 923	34 095	84 639

Year				AU 1		AU 2		AU 3	
	Offshore	Offshore	Commercial	Commercial	Commercial	Commercial	Commercial	Commercial	Commercial
	driftnet	longline	coastal	coastal	coastal	coastal	coastal	coastal	coastal
			driftnet	trapnet	other gear	trapnet	other gear	trapnet	other gear
1998	1 736 495	1 148 336	112 393	28 644	8 391	20 204	5 449	15 771	5 221
1999	1 644 171	1 868 796	126 582	43 339	9 325	31 845	5 715	20 889	5 071
2000	1 877 308	2 007 775	107 008	34 934	8 324	23 384	5 587	20 397	5 371
2001	1 818 085	1 811 282	102 657	40 595	3 879	23 743	2 661	30 831	2 514
2002	1 079 893	1 828 389	86 357	46 474	3 778	30 333	3 251	27 705	3 153
2003	1 329 494	1 439 370	95 022	47 319	8 903	27 060	7 138	34 964	9 984
2004	1 344 588	792 737	103 650	41 570	4 315	28 219	1 610	22 730	2 278
2005	1 378 762	1 099 118	84 223	45 002	5 886	33 683	4 914	26 243	5 844
2006	1 177 402	695 597	77 915	33 817	4 196	24 374	3 546	17 568	5 486
2007	413 622	639 638	45 557	35 406	4 298	23 920	2 888	18 485	4 602
2008	0	1 980 394	0	27 736	10 252	16 434	3 917	23 362	5 226
2009	0	2 135 367	0	32 676	7 062	24 174	5 149	15 718	5 411
2010	0	2 639 116	0	34 040	4 192	25 399	2 393	17 405	2 487
2011	0	1 441 613	0	27 927	3 625	18 347	2 768	15 788	3 067

Year				AU 1		AU 2		AU 3	
	Offshore	Offshore	Commercial	Commercial	Commercial	Commercial	Commercial	Commercial	Commercial
	driftnet	longline	coastal	coastal	coastal	coastal	coastal	coastal	coastal
			driftnet	trapnet	other gear	trapnet	other gear	trapnet	other gear
2012	0	667 347	0	21 309	2 911	11 714	1 539	10 355	1 551
2013	0	1 176 124	0	20 619	3 177	13 734	2 488	11 277	2 478
2014	0	800 824	0	20 782	3 608	16 234	3 121	9 084	3 135
2015	0	1 262 088	0	16 463	3 214	11 279	2 498	7 820	2 578
2016	0	1 506 037	0	15 931	5 701	9 068	4 154	8 565	4 813
2017	0	1 105 411	0	15 068	5 278	9 498	4 622	9 399	4 626
2018	0	377 379	0	15 028	4 924	8 909	4 572	8 917	4 553
2019	0	359 469	0	13 092	6 911	6 670	6 306	7 590	6 370
2020	0	292 746	0	14 398	4 073	8 120	3 493	8 087	3 504
2021	0	941 908	0	12 953	4 884	8 037	4 445	6 452	4 445
2022	0	0	0	11 654	6 584	6 250	6 067	5 452	6 074
2023	0	0	0	12 751	6 863	7 657	5 806	4 966	5 836
2024	0	0	0	7 161	3 206	4 885	2 706	1 398	2 721

Table 2.4.2. For the commercial out at sea longline salmon fisheries: Effort in hook days (number of hooks x number of days) 2014-2024. The yearly reported effort in longline salmon fisheries refers to the sum of the effort in the given year. And when available, effort in days per ship by country and area (subdivisions 22-31 and Subdivision 32), where number of fishing days divided in five groups, 1-9 fishing days, 10-19 fishing days, 20-39 fishing days, 40-59 fishing days, and 60-80 fishing days. CPUE expressed as number of salmon caught per 1 000 hooks. Data for previous years are available in previous WGBAST reports.

Year	Area	Country	Effort in hook days		Effort in days per ship					Total	Comments
			CPUE	60-79	40-59	20-39	10-19	1-9			
			Number of fishing vessels								
2014	Subdivisions 22-31	Denmark	173 540	121.6	1	6	5	3	3	18	
		Estonia	0	0	0	0	0	0	0	0	
		Finland	8 213	13.1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
		Germany	0	0	0	0	0	0	0	0	
		Latvia	0	0	0	0	0	0	0	0	
		Lithuania	0	0	0	0	0	0	0	0	
		Poland	811 786	2.8	0	4	5	2	31	42	
		Russia	0	0	0	0	0	0	0	0	
		Sweden	0	0	0	0	0	0	0	0	
	Subdiv. 32	Estonia	0	0	0	0	0	0	0	0	
		Finland	10 319	8.6	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
	Subdiv 22-32	<b>Total</b>	1 003 858		1	10	10	5	34	60	







Year	Area	Country	Effort in hook days		Effort in days per ship					Total	Comments
			CPUE	60-79	40-59	20-39	10-19	1-9			
Number of fishing vessels											
	Subdiv. 32	Estonia	0	0	0	0	0	0	0	0	
		Finland	9 263	12.3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
	Subdiv. 22-32	<b>Total</b>	1 103 417		1	3	17	22	59	100	
2019	Subdivisions	Denmark	76 550	50.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
	22-31	Estonia	0	0	0	0	0	0	0	0	
		Finland	1 420	7.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
		Germany	0	0	0	0	0	0	0	0	
		Latvia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	reported catch, but no information on effort
		Lithuania	38 000	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	data on number of salmon not available
		Poland	181 029	11.8	0	0	2	7	60	69	
		Russia	0	0	0	0	0	0	0	0	
		Sweden	0	0	0	0	0	0	0	0	
	Subdiv. 32	Estonia	0	0	0	0	0	0	0	0	
		Finland	5 642	16.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
	Subdiv. 22-32	<b>Total</b>	302 641		0	0	2	7	60	69	







**Table 2.4.3. Trapnet effort and catch per unit of effort in number of salmon caught in trapnets in the Finnish fisheries in Subdivision 32 (CPUE in number of salmon per trapnet day) 2001-2024. Data for 1988-2000 are available in previous WGBAST reports.**

Year	Effort	CPUE
2001	9 466	0.90
2002	5 362	1.00
2003	8 869	0.70
2004	7 033	0.90
2005	7 391	1.10
2006	7 917	1.20
2007	9 124	1.10
2008	9 902	1.30
2009	9 413	1.10
2010	9 161	0.50
2011	8 101	0.65
2012	7 243	1.12
2013	7 592	0.93
2014	8 049	0.89
2015	7 591	0.84
2016	6 901	0.90
2017	6 791	0.84
2018	4 826	1.05
2019	4 835	1.64
2020	4 993	1.51
2021	4 521	0.93
2022	4 546	0.68
2023	3 686	0.90
2024	4 151	1.22

**Table 2.6.1.1. Salmon river stocks included in the genetic baseline of 1 015 SNP-genetic markers. Individual river stocks that were genetically similar enough not to be distinguishable with enough confidence were grouped together.**

	Salmon river stocks	Country	Propagation	N
1	Tornionjoki (H/W), Kalixälven, Upper Lainio, Ängesån	Finland, Sweden	Hatchery / wild	244
2	9 Estonian rivers	Estonia	Hatchery / wild	193
3	Oulujoki	Finland	Hatchery	35
4	Simojoki, Iijoki	Finland	Hatchery / wild	68
5	11 Latvian rivers	Latvia	Hatchery / wild	226
6	Gauja	Latvia	Hatchery	26
7	Tebra	Latvia	Hatchery / wild	17
8	Uzava	Latvia	Hatchery / wild	8
9	Luga	Russia	Hatchery / wild	17
10	Kymijoki-Neva	Finland/Russia	Hatchery	97
11	Åbyälven, Rickleån	Sweden	Wild	46
12	Byskeälven, Åbyälven, Kågeälven	Sweden	Wild	94
13	Emån	Sweden	Wild	40
14	Indalsälven, Ljungan	Sweden	Hatchery / wild	103
15	Ljusnan	Sweden	Hatchery	30
16	Mörrumsån	Sweden	Wild	10
17	Lögdeälven, Öreälven	Sweden	Wild	49
18	Råneälven	Sweden	Wild	33
19	Skellefteälven, Kågeälven, Luleälven, Piteälven	Sweden	Hatchery / wild	115
20	Testeboån, Dalälven	Sweden	Hatchery / wild	55
21	Testeboån	Sweden	Wild	16
22	SE_Umeälven, Vindelälven, Ångermanälven	Sweden	Hatchery / wild	109

**Table 2.6.1.2. Proportions (median %) of stock groups in the Finnish salmon catch samples from the Gulf of Bothnia from three temporal fishing zones in 2017-2023, based on DNA-microsatellite and smolt age class data, and from two temporal fishing zones in 2024, based on SNP-genotype, smolt age, and scale reading data. Catch samples from the advanced and late (previously normal) fishing season have been analysed separately. \*There were no commercial catches from the advanced fishing season from the northernmost Bothnian Bay in 2018 and there was no commercial fishing of Atlantic salmon in the Bothnian Sea in 2024.**

Sea area	Starting date	Finishing date	GoB, WILD	GoB, HAIC, FIN	GoB, HAIC, SWE	Others	Sample size
<i>Advanced season</i>							
Bothnian Sea 2017-2023	15.5.	9.6.	73	23	3	1	690
Bothnian Sea 2024*	15.5.	9.6.	NA	NA	NA	NA	NA
Quark area 2017-2023	21.5.	14.6.	74	25	0	0	577
Quark area 2024	21.5.	14.6.	75	20	5	0	41
Bothnian Bay North 2017-2023	9.6.	24.6.	78	22	0	0	732
Bothnian Bay North 2024	9.6.	24.6.	82	15	3	0	153
<b>Total 2017-2023</b>			<b>75</b>	<b>23</b>	<b>1</b>	<b>0</b>	<b>1999</b>
<b>Total 2024</b>			<b>81</b>	<b>16</b>	<b>3</b>	<b>0</b>	<b>194</b>
<i>Normal season</i>							
Bothnian Sea 2017-2023	10.6.	17.7.	70	26	4	0	1215
Bothnian Sea 2024	10.6.	17.7.	NA	NA	NA	NA	NA
Quark area 2017-2023	15.6.	22.7.	63	33	3	0	811
Quark area 2024	15.6.	22.7.	65	19	16	0	298
Bothnian Bay North 2017-2023*	25.6.	27.7.	64	35	0	0	746
Bothnian Bay North 2024	25.6.	27.7.	78	15	7	0	144
<b>Total 2017-2023</b>			<b>66</b>	<b>30</b>	<b>2</b>	<b>0</b>	<b>2772</b>
<b>Total 2024</b>			<b>69</b>	<b>18</b>	<b>13</b>	<b>0</b>	<b>442</b>

Table 2.6.1.3. (A) Proportion of stock groups in (medians and probability intervals) in Finnish salmon catch samples from the Gulf of Bothnia. The estimates are shown separately for the regular fishing season (marked with F), corresponding with the dates of the fishing season before 2017, and for the advanced, early summer catches (marked with F\_Adv) from 2017 to 2023. The estimates from 2009 to 2023 are based on DNA-microsatellites and smolt age information, and the 2024 estimates are based on SNP markers and scale reading. No PI's are shown for 2024 as the scale reading was used to determine the proportion of wild and hatchery origin salmon after genetic stock identification. \*There were no commercial catches in the Bothnian Sea in 2024 and no commercial catch samples from the northernmost Bothnian Bay in 2018. (B) Proportion of stock groups in the Finnish salmon catch samples from the Gulf of Finland from 2009 to 2018 (based on DNA-microsatellite and smolt age class data) and from 2019 to 2024 (based on SNP-genotype, smolt age, and scale reading data). In the 2019-2024 the proportion of wild-origin salmon (from the yearly totals) are shown in parentheses for the Gulf of Finland hatchery stocks, comprised only of fish from the Kymijoki-Neva stock.

(A)

	GoB, WILD			GoB, HATC, FIN			GoB, HATC, SWE			Others	Sample size			Scale reading - wild %
	2.5 %	97.5 %		2.5 %	97.5 %		2.5 %	97.5 %		2.5 %	97.5 %			
<b>Gulf of Bothnia Finnish catch</b>														
*2024 <sub>F_Adv</sub>	<b>78</b>		<b>17</b>			<b>4</b>							<b>192</b>	<b>78</b>
2023 <sub>F_Adv</sub>	<b>72</b>	67	77	<b>21</b>	16	26	<b>5</b>	3	8	<b>2</b>	1	4	<b>369</b>	<b>70</b>
2022 <sub>F_Adv</sub>	<b>82</b>	77	87	<b>14</b>	9	19	<b>2</b>	1	5	<b>1</b>	0	3	<b>271</b>	<b>83</b>
2021 <sub>F_Adv</sub>	<b>63</b>	57	69	<b>34</b>	28	40	<b>2</b>	1	5	<b>0</b>	0	2	<b>300</b>	<b>64</b>
2020 <sub>F_Adv</sub>	<b>73</b>	68	78	<b>26</b>	21	31	<b>0</b>	0	1	<b>0</b>	0	1	<b>352</b>	<b>72</b>
2019 <sub>F_Adv</sub>	<b>75</b>	70	81	<b>24</b>	19	30	<b>0</b>	0	0	<b>0</b>	0	0	<b>312</b>	<b>-</b>
*2018 <sub>F_Adv</sub>	<b>79</b>	71	86	<b>20</b>	13	29	<b>0</b>	0	1	<b>0</b>	0	1	<b>156</b>	<b>-</b>

	GoB, WILD	2.5 %	97.5 %	GoB, HATC, FIN	2.5 %	97.5 %	GoB, HATC, SWE	2.5 %	97.5 %	Others	2.5 %	97.5 %	Sample size	Scale reading - wild %
<b>Gulf of Bothnia Finnish catch</b>														
2017 <sup>F</sup> <sub>Adv.</sub>	83	76	88	17	11	23	0	0	1	0	0	2	246	-
Mean/Total-adv.	75			23			1			0			1 829	
*2024 <sup>F</sup>	69			18			0			0			436	68
2023 <sup>F</sup>	71	66	75	24	20	28	5	3	7	1	0	2	517	71
2022 <sup>F</sup>	78	72	84	19	13	25	2	1	4	1	0	2	348	73
2021 <sup>F</sup>	70	65	75	26	21	30	4	2	7	0	0	1	418	69
2020 <sup>F</sup>	58	53	63	36	31	40	6	4	8	0	0	1	444	57
2019 <sup>F</sup>	72	67	76	27	23	31	1	0	0	0	0	0	506	-
2018 <sup>F</sup>	66	58	72	27	20	34	7	4	11	0	0	1	235	-
2017 <sup>F</sup>	61	55	66	38	33	44	1	0	3	0	0	0	397	-
2016 <sup>F</sup>	70	64	75	26	21	32	4	2	7	0	0	1	307	64
2015 <sup>F</sup>	69	62	76	28	21	35	3	1	6	0	0	1	219	64
2014 <sup>F</sup>	82	77	86	18	14	23	0	0	1	0	0	1	319	76-77

	<b>GoB, WILD</b>	<b>2.5 %</b>	<b>97.5 %</b>	<b>GoB, HATC, FIN</b>	<b>2.5 %</b>	<b>97.5 %</b>	<b>GoB, HATC, SWE</b>	<b>2.5 %</b>	<b>97.5 %</b>	<b>Others</b>	<b>2.5 %</b>	<b>97.5 %</b>	<b>Sample size</b>	<b>Scale reading - wild %</b>
<b>Gulf of Bothnia Finnish catch</b>														
2013 <sup>F</sup>	<b>59</b>	52	66	<b>39</b>	33	46	<b>0</b>	0	3	<b>0</b>	0	2	<b>220</b>	54-55
2012 <sup>F</sup>	<b>62</b>	54	69	<b>36</b>	29	43	<b>2</b>	1	5	<b>0</b>	0	1	<b>212</b>	54-55
2011 <sup>F</sup>	<b>78</b>	71	83	<b>21</b>	16	28	<b>1</b>	0	2	<b>0</b>	0	1	<b>220</b>	70
2010 <sup>F</sup>	<b>76</b>	69	82	<b>23</b>	18	30	<b>0</b>	0	2	<b>0</b>	0	1	<b>215</b>	68
2009 <sup>F</sup>	<b>66</b>	58	73	<b>32</b>	25	39	<b>2</b>	1	5	<b>0</b>	0	1	<b>252</b>	55
<i>Mean/Total-norm.</i>	<b>69</b>			<b>28</b>			<b>2</b>			<b>0</b>			<b>4 748</b>	

(B)

	Gulf of Bothnia, wild	G. of Bothnia, hatchery, FIN	G. of Bothnia, hatchery, SWE	G. of Finland, wild	G. of Finland, hatchery (wild Kymijoki-Neva)	Western Main Basin, wild, SWE	Eastern Main Basin	Sample size	Sampling dates	Scale reading - wild %
2024 <sup>SNP</sup>	51	4	4	0	40 (8)	0	0	285	28.5.-18.8.	59 %
2023 <sup>SNP</sup>	16	3	6	0	74 (22)	0	0	234	12.6.-29.7.	38 %
2022 <sup>SNP</sup>	31	0	7	0	62 (18)	0	0	71	11.6.-22.8.	49 %
2021 <sup>SNP</sup>	15	4	5	0	76 (12)	0	0	370	5.6.-30.8.	27 %
2020 <sup>SNP</sup>	34	6	5	0	55 (16)	0	0	375	26.5.-10.8.	49 %
2019 <sup>SNP</sup>	38	4	7	0	51 (17)	0	0	447	26.5.-18.8.	54 %
2018 <sup>M</sup>	29	17	1	2	46	0	3	305	21.5.-26.8	38 %
2017 <sup>M</sup>	14	16	3	0	66	0	0	411	6.6.-31.8.	30 %
2015 <sup>M</sup>	17	14	1	0	67	0	0	99	29.5.-9.9.	16-17%
2014 <sup>M</sup>	41	14	5	0	39	0	0	210	3.5.-9.9.	35 %
2011 <sup>M</sup>	51	8	1	0	38	0	0	97	15.6.-16.9	51 %
2010 <sup>M</sup>	43	9	1	0	46	0	0	102	16.6.-1.8.	41-42%

	<b>Gulf of Bothnia, wild</b>	<b>G. of Bothnia, hatchery, FIN</b>	<b>G. of Bothnia, hatchery, SWE</b>	<b>G. of Finland, wild</b>	<b>G. of Finland, hatchery (wild Kymijoki-Neva)</b>	<b>Western Main Basin, wild, SWE</b>	<b>Eastern Main Basin</b>	<b>Sample size</b>	<b>Sampling dates</b>	<b>Scale reading - wild %</b>
2009 <sup>M</sup>	39	13	3	0	43	0	1	102	26.5.-29.7.	37-38%
Mean	31	8	4	7	49	0	0	3357		

Table 2.6.1.4. Proportions (%) of salmon from individual rivers in the Finnish salmon catches from the (A) Gulf of Bothnia. The proportions are calculated separately for catches from the late fishing season (2013 -2024), corresponding to the fishing seasons in 2013-2016, and the advanced season (2017-2024). Only the stocks with proportions > 0 are listed (except for Råneälven, which is shown although there have not been any observations in the catches) (B) Median proportions of salmon in Finnish and Estonian salmon catches from Gulf of Finland in 2009-2024.

(A)

Fishing season	Year																	
		Tornio-Kalix, Wild	Tornionj. Hatch.	Simojoki, W	Iijoki, H	Oulujoki, H	Bothnian Bay SE, W	Luleälven, Skellefteälven, H	Byskeälven, Kägeälven, Åbyälven, W	Lögdeälven, Öreälven, W	Vindelälven, W	Dalälven, H	Råne, W	Indalsälven, H	Kymijoki-Neva, H	Kymijoki-Neva, W	Daugava, H	Sample size
Normal season	2013	50	0	5	17	21	0	0	3	0	0	0	0	0	0	-	0	220
	2014	75	0	3	7	11	0	0	3	0	0	0	0	0	0	-	0	319
	2015	66	5	2	13	9	0	2	0	0	1	0	0	0	0	-	0	219
	2016	63	0	2	9	17	1	3	2	0	0	0	0	0	0	-	0	307
	2017	57	13	2	17	8	0	1	0	0	0	0	0	0	0	-	0	397
	2018	63	8	1	15	3	0	7	0	0	0	0	0	0	0	-	0	235
	2019	67	9	2	14	4	0	0	1	0	1	0	0	0	0	-	0	506
	2020	52	14	1	12	9	1	5	1	0	1	0	0	0	0	-	0	444

Fishing season	Year																	
		Tornio-Kalix, Wild	Tornionj. Hatch.	Simojoki, W	Iijoki, H	Oulujoki, H	Bothnian Bay SE, W	Luleälv, Skellefteälv, H	Byskeälv, Kägeälv, Åbyälv, W	Lögdeälv, Öreälv, W	Vindelälv, W	Dalälv, H	Råne, W	Indalsälv, H	Kymijoki-Neva, H	Kymijoki-Neva, W	Daugava, H	Sample size
	2021	66	6	2	9	9	1	4	0	0	1	0	0	0	2	-	0	418
	2022	75	3	0	7	7	0	1	1	0	1	0	0	0	2	-	0	348
	2023	66	3	0	15	5	0	2	3	0	0	0	0	0	0	-	0	517
	2024	40	6	4	7	5	18	12	5	1	2	0	0	0	0	0	0	432
																	Total	4 362
Advanced season	2017	74	9	7	7	0	1	1	1	0	0	0	0	0	0	-	0	246
	2018	74	2	4	17	0	0	0	0	0	0	0	0	0	0	-	0	156
	2019	71	5	2	18	1	0	0	0	0	0	0	0	0	0	-	0	312
	2020	70	7	1	17	2	0	0	1	0	1	0	0	0	0	-	0	352
	2021	60	6	0	26	1	1	3	1	0	0	0	0	0	0	-	0	300
	2022	80	3	0	4	6	0	0	0	0	0	0	0	2	0	-	0	271
	2023	64	0	4	17	3	0	4	3	0	0	0	0	0	0	-	1	369

Fishing season	Year																																		
	2024	Tornio-Kalix, Wild	63	Tornionj. Hatch.	4	Simojoki, W	5	Iijoki, H	11	Oulujoki, H	1	Bothnian Bay SE, W	10	Luleälven, Skellefteälven, H	4	Byskeälven, Kägeälven, Åbyälven, W	1	Lögdeälven, Öreälven, W	1	Vindelälven, W	0	Dalälven, H	0	Råne, W	0	Indalsälven, H	0	Kymijoki-Neva, H	0	Kymijoki-Neva, W	0	Daugava, H	0	Sample size	192
																																		Total	2 198

(B)

Year	Tornio-Kalix, Wild	Tornionjoki, H	Simojoki, W	Iijoki, H	Oulujoki, H	Bothnian Bay SE, W	Luleälven, Skellefteälven, H	Byskeälven, Kägeån, Äbyälven, W	Vindelälven, W	Dalälven, H	Råne, W	Ljungan, W	Neva-FI, H	Neva-FI, W	Luga, W and R	Keila, W	Daugava, H
2009	37	6	1	6	1	0	1	0	0	0	0	0	43	0	0	0	0
2010	42	7	0	2	0	0	0	0	0	0	0	0	46	0	0	0	0
2011	50	1	0	6	0	0	1	0	0	0	0	0	38	0	0	0	0
2014	37	10	2	2	2	0	5	0	1	0	0	0	39	0	0	0	0
2015	15	7	0	6	0	0	1	0	1	0	0	0	67	0	0	0	0
2017	13	15	0	1	0	0	2	0	0	0	0	0	64	0	0	0	0
2018	25	13	1	4	0	0	0	0	1	1	1	1	45	0	2	1	3
2019	19	1	3	3	0	17	7	3	0	0	0	0	34	12	0	0	0
2020	17	2	3	3	1	14	5	2	0	0	0	0	40	12	0	0	0
2021	9	2	1	1	1	5	5	1	0	0	0	0	64	11	0	0	0

Year	Tornio-Kalix, W/Id	Tornionjoki, H	Simojoki, W	Iijoki, H	Oulujoki, H	Bothnian Bay SE, W	Luleälven, Skellefteälven, H	Byskeälven, Kägeån, Åbyälven, W	Vindelälven, W	Dalälven, H	Råne, W	Ljungan, W	Neva-FI, H	Neva-FI, W	Luga, W and R	Keila, W	Daugava, H
2022	17	0	3	0	0	11	7	0	0	0	0	0	44	18	0	0	0
2023	8	1	1	2	1	7	6	1	0	0	0	0	52	21	0	0	0
2024	38	3	2	1	0	10	4	1	1	0	0	0	32	6	0	0	0

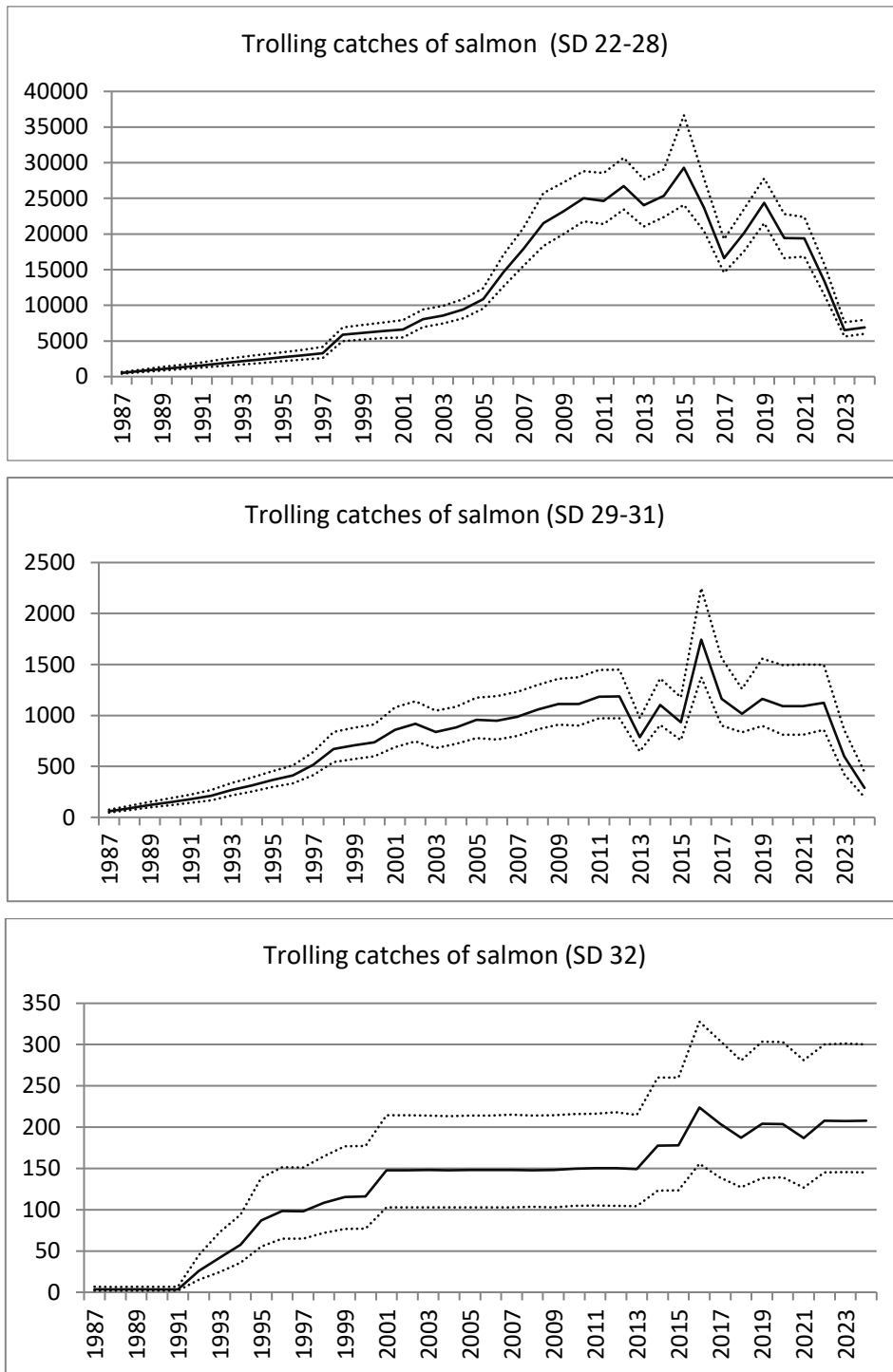


Figure 2.2.1.3 Combined expert estimates of total trolling catches in numbers (including retained fish and a 25% post-release mortality applied to released salmon) for Baltic salmon, 1987–2024 (medians with 95% p.i.).

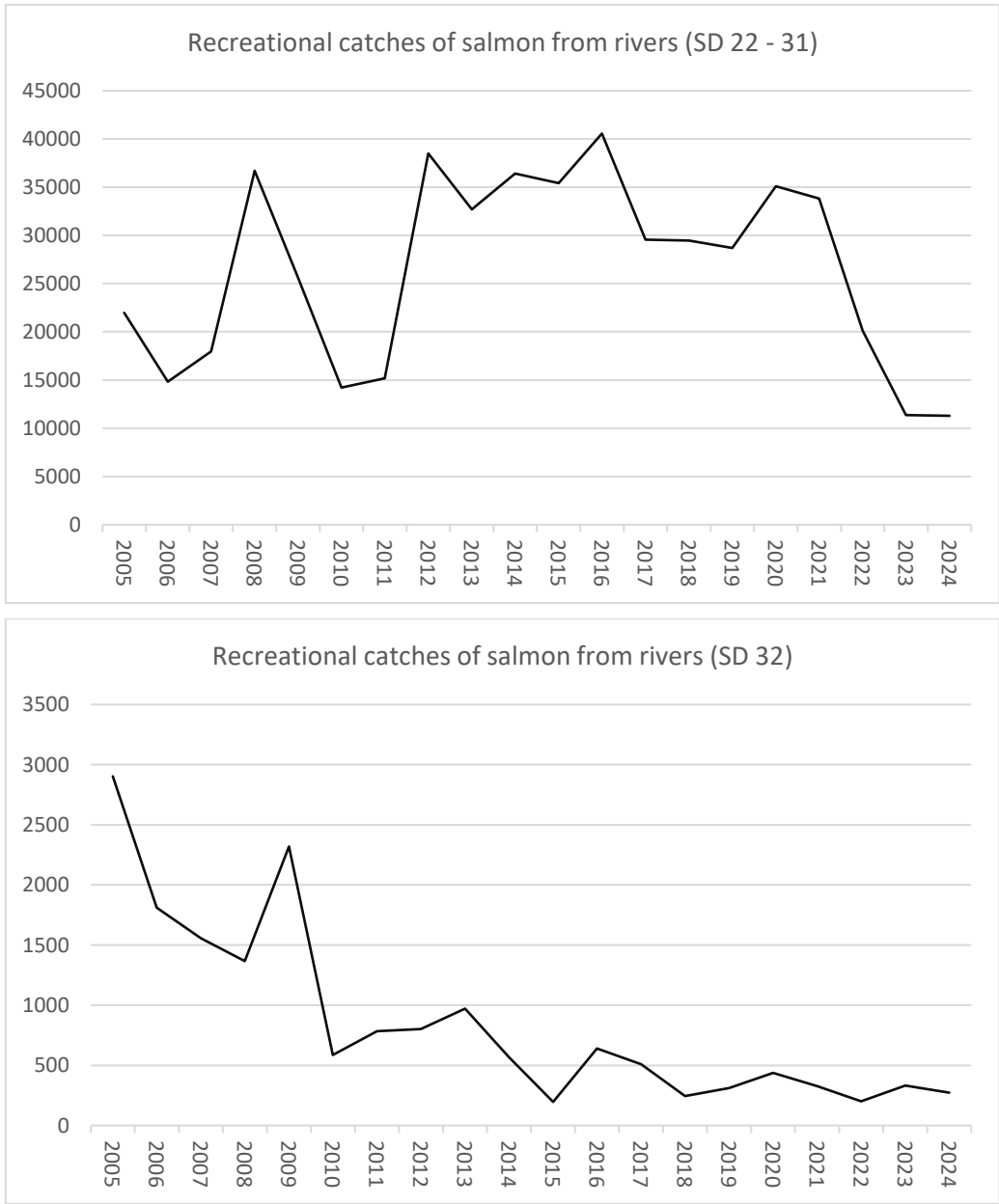


Figure 2.2.1.4. Recreational river catches for Baltic salmon, 2005 - 2024 (SD 22-31 and SD 32). Catches in numbers.

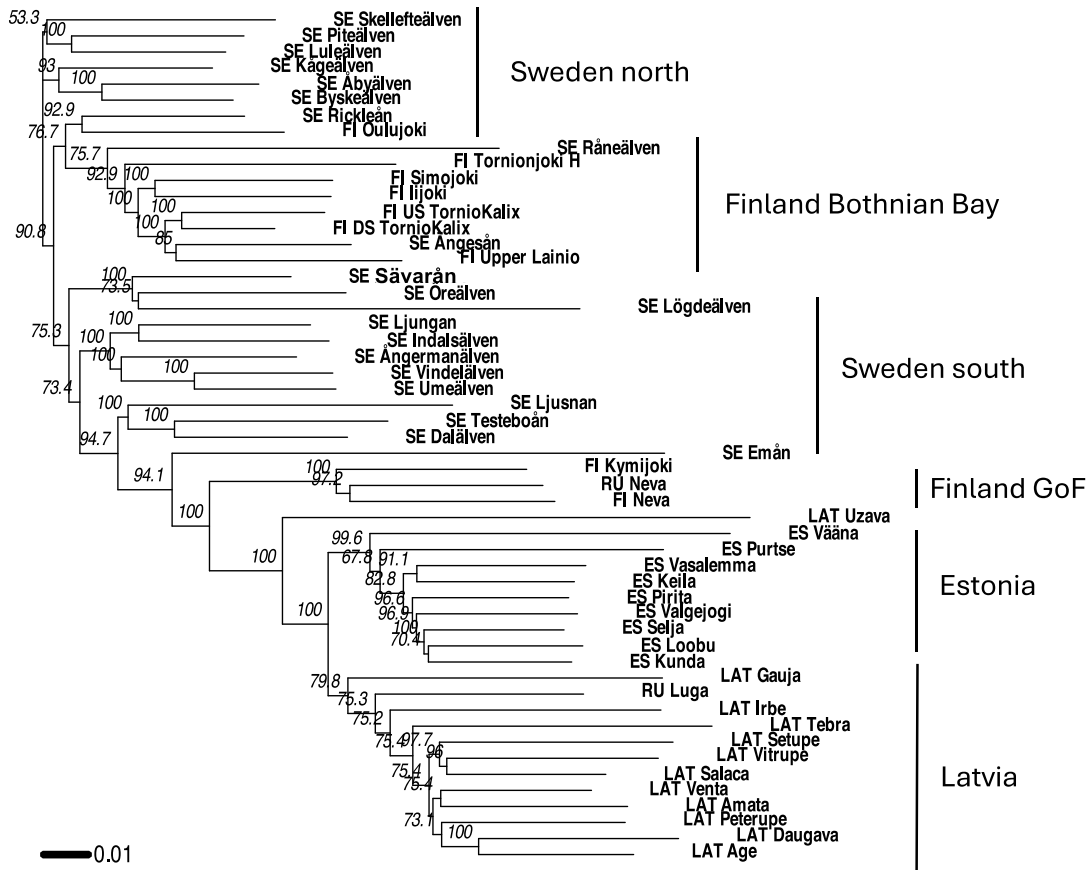
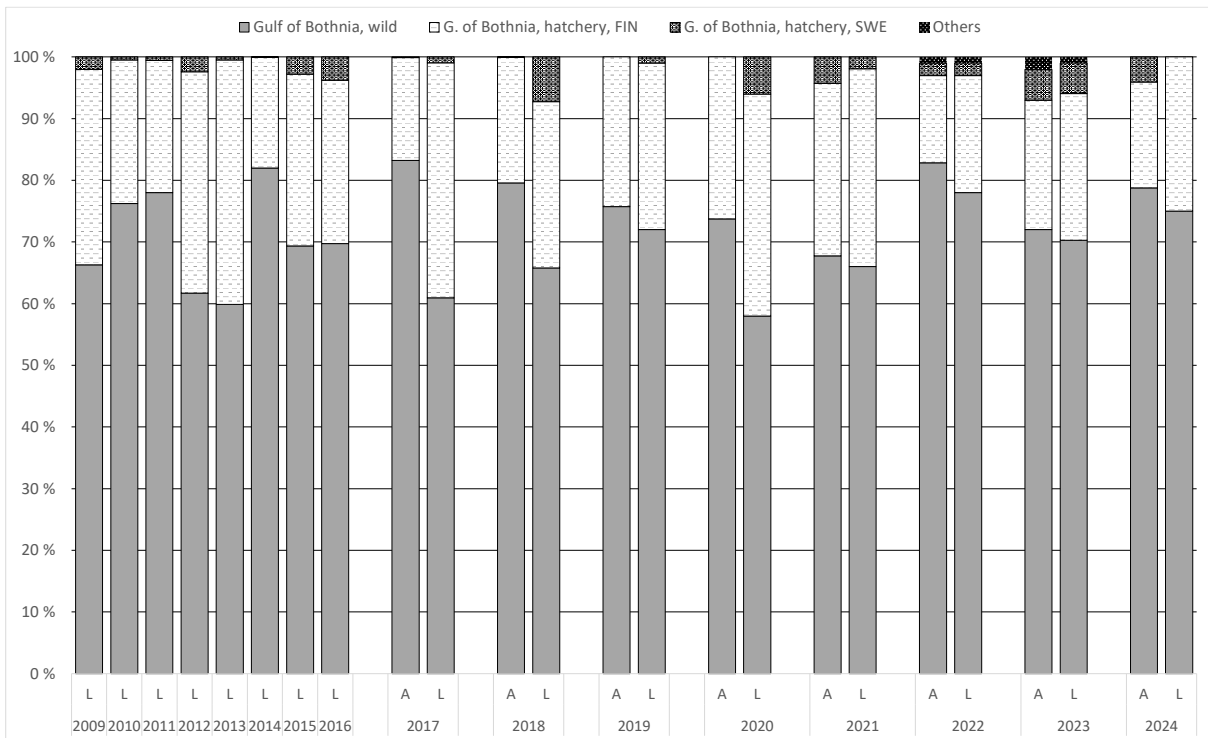
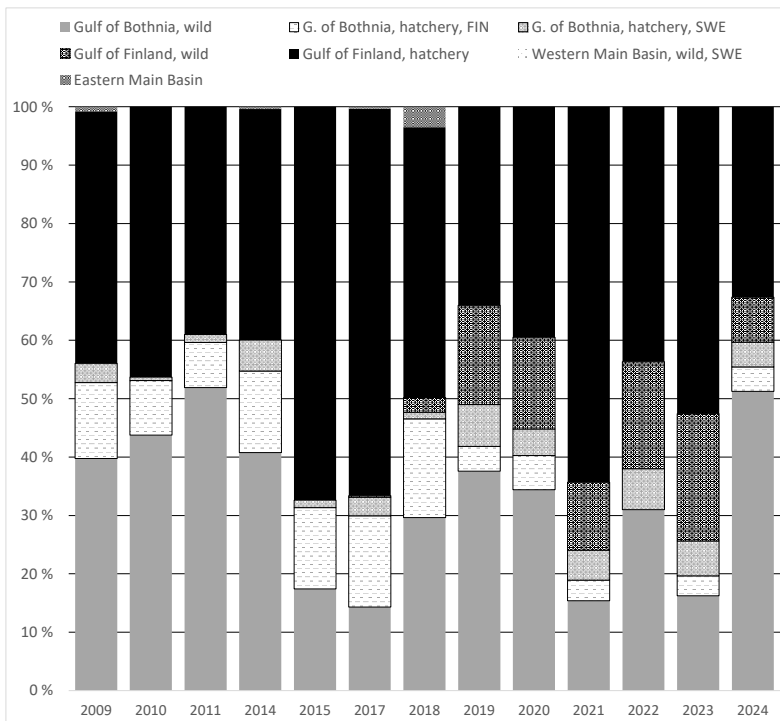


Figure 2.6.1.1. UPGMA tree based on Prevosti’s genetic distance between the salmon baseline stocks used in the mixed-stock analyses. The bootstrap values next to the nodes give the percentage of 1 000 replicate trees, where the branch is in the same position.

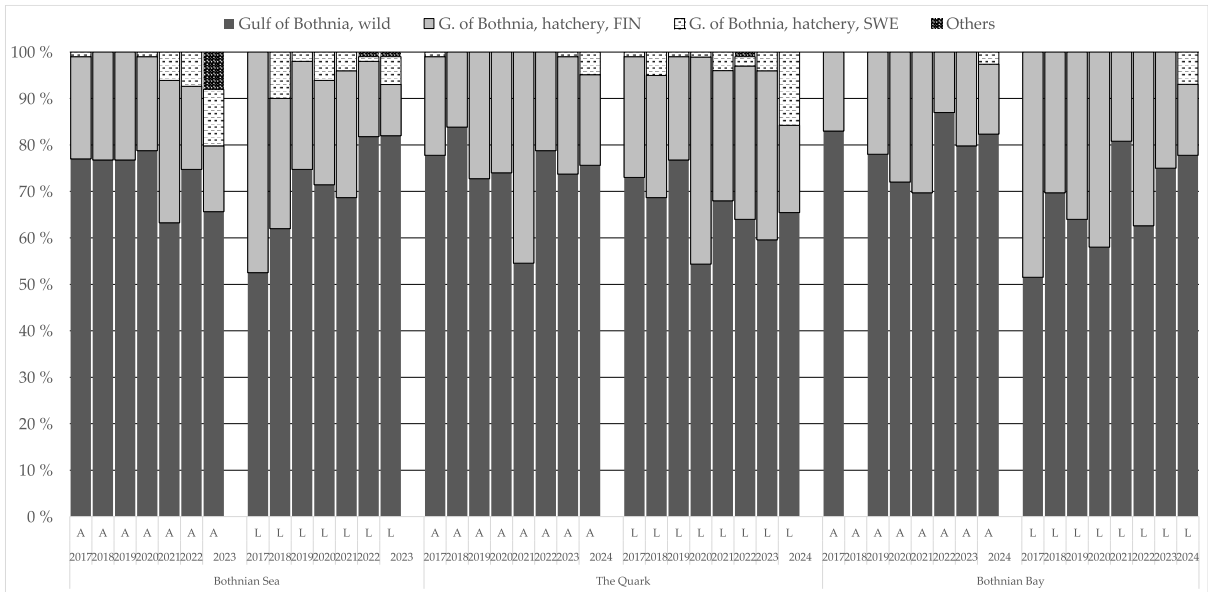
(A)



(B)

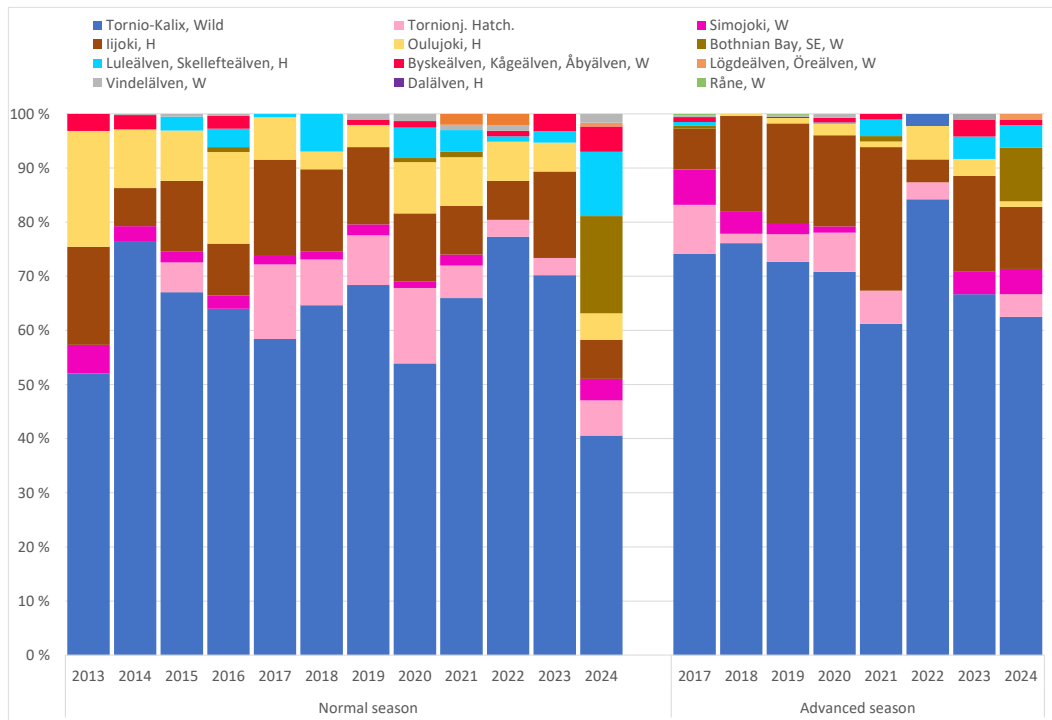


**Figure 2.6.1.2. (A) Proportions of salmon stock groups in Finnish salmon catches in the Gulf of Bothnia 2009 to 2024. The catches from the advanced fishing season (A) and the normal/late fishing season (L) since 2017 have been analysed separately. (There were no commercial catches from the advanced fishing season from the northernmost Bothnian Bay in 2018 and no commercial catches at all from the Bothnian Sea in 2024.) (B) Proportions of salmon stock groups in Finnish salmon catches in the Gulf of Finland 2009 to 2024.**



**Figure 2.6.1.3. Proportion of salmon stock groups in Finnish salmon catches in three fishing areas of the Gulf of Bothnia (Bothnian Bay – northern area, The Quark, Bothnian Sea) in 2017-2024. Catches from the advanced (A) and normal/late (L) fishing seasons have been analysed separately.**

(A)



(B)

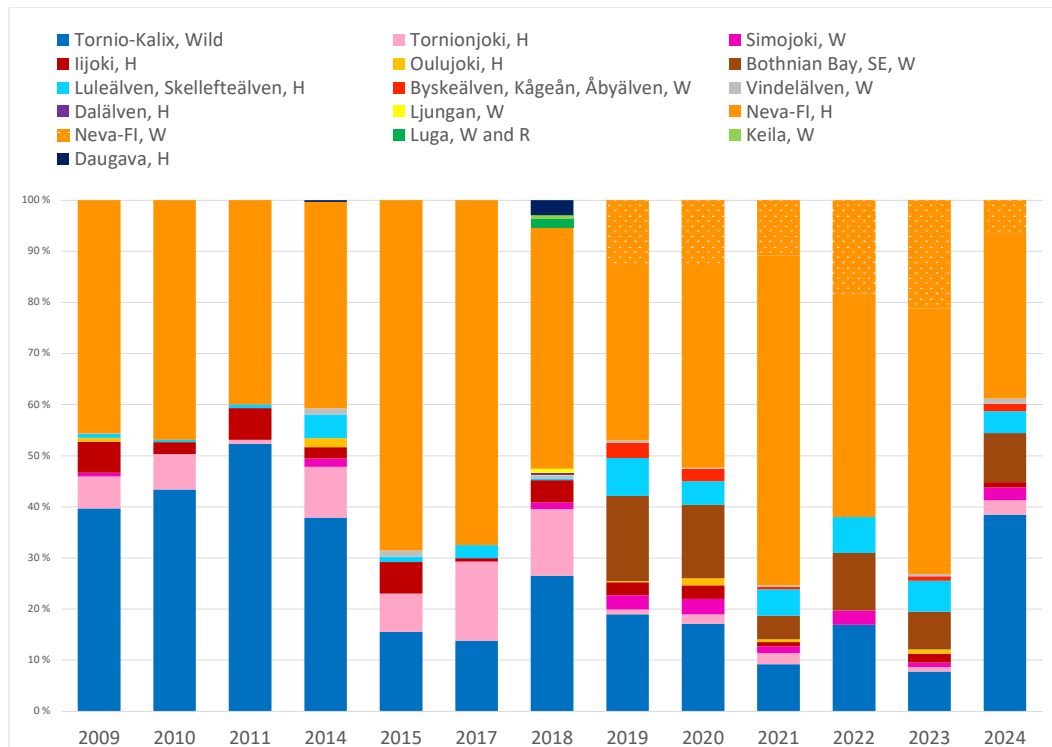


Figure 2.6.1.4. (A) Proportion of salmon stocks in Finnish salmon catches in the Gulf of Bothnia in 2013-2024. Catches from the advanced and normal (late) fishing seasons have been analysed separately. There were no samples from commercial catches from the advanced fishing season in northernmost Bothnian Bay in 2018, and there was no commercial salmon fishing in the Bothnian Sea in 2024. (B) Proportion of salmon stocks in Finnish salmon catches in the Gulf of Finland in 2009-2024.

## 3 River data on salmon populations

The Baltic salmon rivers are divided into four main categories: **wild**, **mixed**, **reared**, and **potential**. Details on how rivers in countries and assessment units (AUs) are classified into these four river categories are given in the Stock Annex (ICES, 2025). At present there are 58 salmon rivers, out of which 27, 14, and 17 are considered as wild, mixed (i.e. with both natural and reared production) and reared, respectively. In addition, 26 potential salmon rivers currently exist in four countries. In WGBAST 2024, a subgroup was formed to review the criteria for river classification, and this work is ongoing.

Wild smolt production in relation to smolt production capacity is one of the ultimate measures of management success. Among the wild rivers flowing into the Gulf of Bothnia and the Main Basin (AUs 1–5), smolt abundance is measured directly in the current index rivers **Simojoki** and **Tornionjoki/Torneälven** (AU 1), **Vindelälven** (AU 2), **Testeboån** (AU 3), **Mörrumsån** (AU 4), and in **Salaca** (AU 5). In addition, from one to a few years of smolt counting has also been done in **Åbyälven** (AU 2), **Rickleån** (AU 2), **Sävarån** (AU 2), **Öreälven** (AU 2), **Lögdeälven** (AU 2), **Ljungan** (AU 3), and **Emån** (AU 4). The smolt counts estimated by mark-recapture with all available juvenile abundance data are input into the river model, which is a rigorous tool for formal assessment of current smolt production (ICES, 2025).

Differences in the status of wild stocks are apparent over time, largely following the AU division. After the collapse of many stocks by the 1990s, stocks in most Northern Gulf of Bothnia rivers (AU 1–3) first increased in abundance in the early 2000s and now fluctuate with a relatively stable mean abundance. Many of the Southern Main Basin (AU 4–5) rivers have shown either an extremely low, or stable and relatively high abundance throughout, while the development in two out of three of the AU 6 wild salmon rivers has been very positive in terms of parr abundance. Since 2021, no new information is available from Russian rivers.

### 3.1 Wild salmon populations in Main Basin and Gulf of Bothnia

#### 3.1.1 Rivers in assessment unit 1 (Gulf of Bothnia, SD 31)

##### River catches and fishery

River catches and fishery are described here in more detail than in Section 2, when data is available. Catches in River **Tornionjoki** have dropped considerably from 2022 to 2023, and 2024 compared to the previous decade (Figure 3.1.1.1). The total catch was estimated at 5 788 kept and 487 released salmon in 2024 (Table 3.1.1.1a), with a CPUE of 0.43 kg/day. Finnish catch decreased due to a drop in rod catch, while the catch caught by other gear types (nets, hoopnet) increased from 2023. Fishing from a boat (rod fishing by rowing) dominates salmon fishing in River Tornionjoki.

Salmon catch in **Simojoki** was estimated at 31 salmon, out of which 28 were kept, in 2024 (Table 3.1.1.1a). In Simojoki, all salmon were caught by angling.

The reported catches in **Kalixälven** have decreased in later years mostly because of non-functional catch reporting system, and they do not correspond to the registered number of salmon that have passed the fishway. In total, 667 salmon were caught (501 kept) in 2024 (Table 3.1.1.1a). Rod fishing by rowing boats occurs in Kalixälven, but it is not as dominating there as in Tornionjoki.

In **Råneälven**, most of the salmon caught with rod are released and in 2024, no salmon were retained. Due to the low salmon catches in the beginning of season, the fishing rights owner closed the salmon fishery in the river on 24 June (Table 3.1.1.1a).

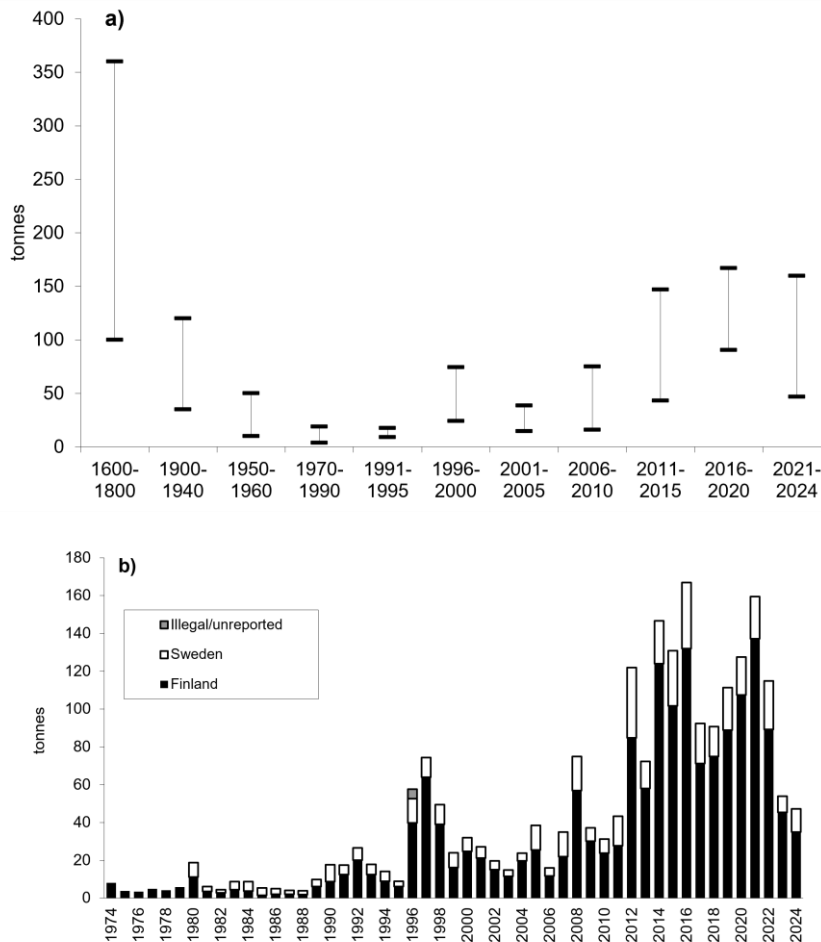


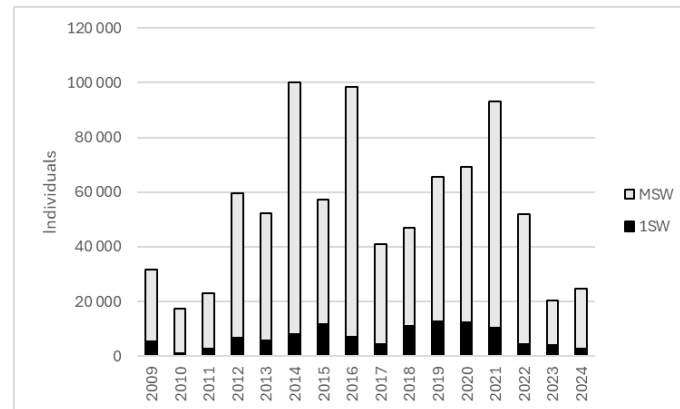
Figure 3.1.1.1. Total river catches in the River Tornionjoki (AU 1). a) Comparison of the periods from 1600 to present (range of annual catches). b) From 1974 to present. Swedish catch estimates are provided from 1980 onwards.

### Spawning runs and their composition

The spawning runs into **Tornionjoki** have been monitored using an echosounder called the Dual frequency Identification SONar (DIDSON) technique since 2009, but in 2019 the old DIDSON units were replaced by Adaptive Resolution Imaging Sonar (ARIS) units. The observed seasonal run size has ranged from 17 200 (2010) to 100 200 (2014) salmon (Table 3.1.1.2). Grilse account for a minority (2–24%) of the annual spawning runs. After a strong decline in 2023, when the spawning run declined by over a half, the run was similar in 2024 with 24 629 salmon (Figure 3.1.1.2).

The Tornionjoki counting site is located about 100 km upstream from the river mouth. Therefore, the number of salmon that are either caught below the site or spawn below the site are estimated and added into the hydroacoustic count in order to get an estimate of the total run (Lilja *et al.*, 2010). Also, according to auxiliary studies, a fraction of the spawners pass the counting site via the fast-flowing mid-channel without being detected by sonars. The mid-channel seems to be used by salmon the more the lower the river water level is (Isometsä *et al.*, 2021). Likewise,

salmon may avoid ascending to the upper spawning grounds during low flow conditions or because of health problems.



**Figure 3.1.1.2.** The number of salmon observed at the sonar in river Tornionjoki in 2009–2024. The monitoring site is placed approximately 100 km upstream from the river mouth, and does not contain all salmon ascending the river.

More than 15 000 catch samples have been collected from the **Tornionjoki** salmon fishery since the mid-1970s, as summarized in Table 3.1.1.3. After an unusually low proportion of 2SW salmon in the catches in 2023, their proportion increased to 67% in 2024 (Table 3.1.1.3).

A hydroacoustic split-beam technique was employed in 2003–2007 to count the spawning run in **Simojoki**. It seemed that these counts covered only a fraction of the total run, as there were irregularities in the river bottom at the counting site, allowing salmon to pass without being recorded. In 2008, the split-beam technique was replaced by DIDSON, and in 2020, a new generation version of DIDSON called ARIS replaced the old DIDSON. According to monitoring results, the seasonal run size has ranged from less than 1 000 up to more than 5 000 fish (Table 3.1.1.2). In 2024, the run was about 2 000 salmon, out of which approximately 13% were grilse (Table 3.1.1.2).

In **Kalixälven**, salmon are counted in the fishway at the waterfall in Jockfall about 100 km from the river mouth. The counted runs in 2014–2022 were 5 000–19 000 salmon. The run in 2024 increased with 1 000 salmon compared to 2023 (Table 3.1.1.2, Figure 3.1.1.2). Typically, very few – between 0 and 6 individuals – reared (adipose fin clipped) salmon are registered in the fish counter. In 2024, one adipose fin clipped salmon was registered.

Since 2014, the spawning run in **Råneälven** has been monitored with a sonar camera (SIM-SONAR). The technique is similar to the one used in Tornionjoki and Simojoki. The counting site is located about 35 km upstream from the river mouth, and the counts are expected to represent the total run, as almost no salmon spawning areas exist downstream. The total counted runs in the period 2014 – 2020 varied between 1 000 – 4 000 salmon. During the three latest year the run has decreased, and 429 salmon in total was counted in 2024 (Table 3.1.1.2, Figure 3.1.1.3).

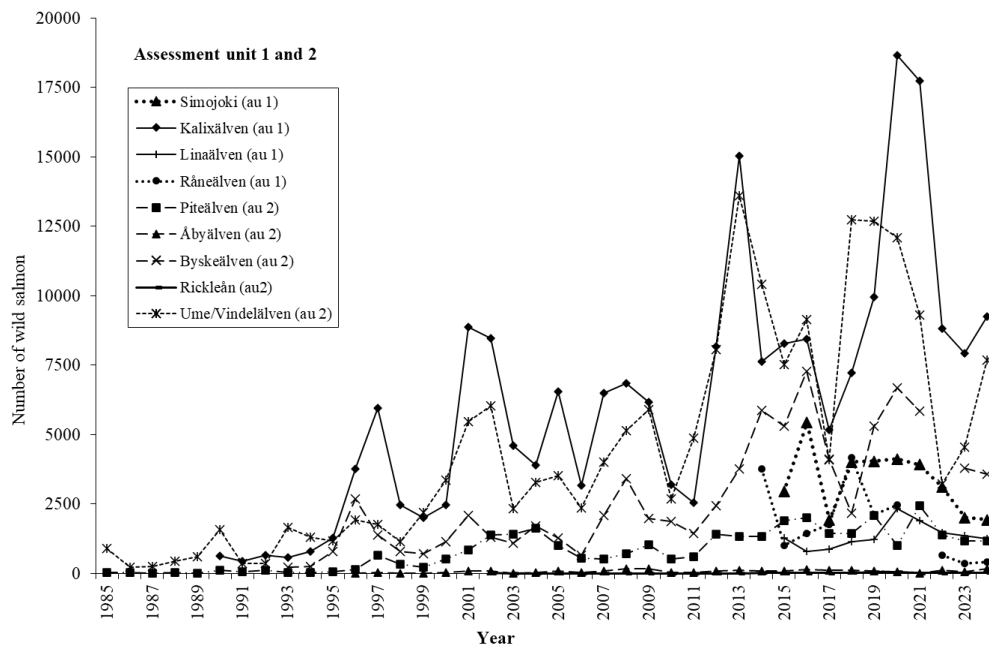


Figure 3.1.1.3. Salmon run in fishways (ecosounder in Simojoki and Råneälven) in rivers in assessment unit 1 and 2, in 1985–2024.

### Parr densities and smolt trapping

In **Simojoki**, the density of 0+ parr peaked at 55 ind./100 sqm in 2023, but dropped to an all-time low at seven ind./100 sqm in 2024 (Table 3.1.1.4, Figure 3.1.1.4). The density of older parr was more stable at 17 ind./100 sqm (Figure 3.1.1.5). The density of 0+ parr dropped also in **Tornionjoki** in 2024 compared to 2023 (16.1 ind./100 sqm), but the density of older parr was relatively high compared to recent years (23.8 ind./100 sqm) (Figure 3.1.1.5, Table 3.1.1.4).

In **Kalixälven**, the average density of 0+ has been stable during the previous five latest years, on average 23 ind./100 sqm but in 2024, the densities decreased to the lowest observed for the latest 10 years. The density of older parr has been nearly as stable, varying between 13–26 ind./100 sqm during the five latest years (Table 3.1.1.4). In **Råneälven**, the average density of 0+ parr in the previous five latest years has been six ind./100 sqm and never been over 10 ind./100 sqm during the whole time-series (Figure 3.1.1.4). In 2024, the densities decreased to the lowest observed and was the lowest in the 21st century. The density of older parr decreased from peak level at 14 ind./100 sqm in 2020 to five ind./100 sqm in 2024 (Figure 3.1.1.5).

Factors that affect the uncertainty of parr density estimates include summer temperature and flow conditions; for example, parr density estimates may be increased by low water level, which makes electrofishing more successful.

Of the AU 1 rivers, smolt production has been monitored in **Simojoki** and **Tornionjoki** using partial smolt trapping and mark–recapture experiments annually since 1977 and 1987, respectively (latest 10 years shown in Table 3.1.1.5). A so-called river model (also referred to as “hierarchical linear regression analysis”) is then applied to combine information from electrofishing and smolt trapping results to obtain updated estimates of wild smolt production for all years and rivers, regardless of whether smolt trapping occurred.

Smolt trapping did not provide reliable estimated from **Tornionjoki** in neither 2023 nor 2024, because the high flood prevented trapping when the run started. The river model estimated the 2024 smolt run to be approx. 1.73 million smolts (median value, 90% PI’s 1.38–2.17 million).

For **Simojoki**, smolt trapping was successful and covered the entire run in 2024. The river model estimated the 2024 smolt run to be approx. 45 000 smolts (median value, 90% PI’s 25 000–80 000). However, observed production has typically been lower than the predicted smolt abundance in

Simojoki. This difference in predicted and observed smolt production suggests that the survival of parr in the river is slightly overestimated in the river model.

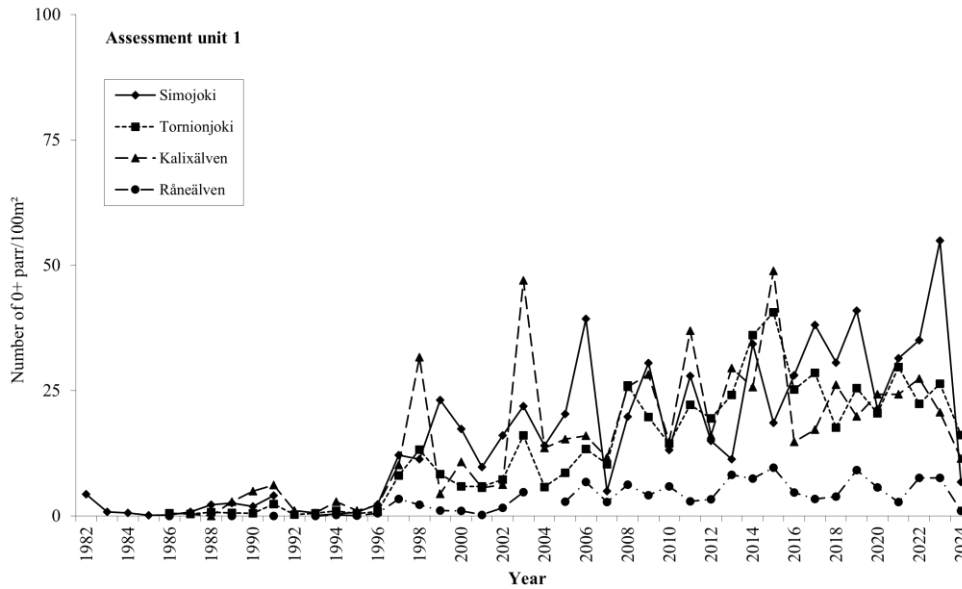


Figure 3.1.1.4 Densities of 0+ parr in rivers in Gulf of Bothnia (Sub-division 31), assessment unit 1, in 1982-2024.

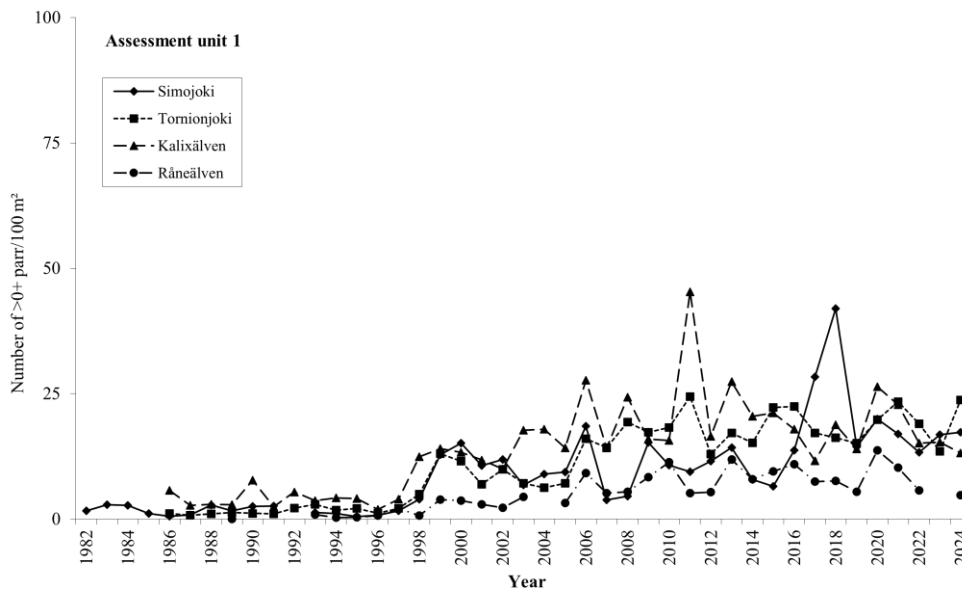


Figure 3.1.1.5 Densities of >0+ parr in rivers in Gulf of Bothnia (Sub-division 31), assessment unit 1, in 1982-2024.

### 3.1.2 Rivers in assessment unit 2 (Gulf of Bothnia, SD 31)

#### River catches and fishery

The catches in **Piteälven** in 2024 stayed at similar low level as in previous years. In **Åbyälven** no salmon was reported as kept, but seven were released. The total catch in **Byskeälven** in 2024 was 350, of which 79 were kept (Table 3.1.1.1b). In **Kågeälven** (wild salmon river since 2014), only catch and release has been allowed since 2012, with all salmon released and registered in an

obligatory reporting system. In the period 2015–2023, on average about 35 salmon per year (range: 1–92) have been caught and released in Kågeälven. In 2024, only 10 salmon were reported caught and released (Table 3.1.1.1 b).

In **Rickleån**, very few salmon (0–6) have been retained since 2016. The catches have increased during 2021 and 2022, but most of the caught salmon have been released. In 2024, a total of 24 salmon were caught, two of which were reported as kept (Table 3.1.1.1c).

In **Sävarån**, the catches of salmon have been very low and since 2014, the recreational fishery was regulated by the local administrators to become only catch and release. In 2024, the total catch of salmon was 12 and all but one were released.

The catch in **Ume/Vindelälven** increased in 2023 and 2024, when 106 and 212 salmon were kept for the respective years. In **Öreälven**, the catches have decreased heavily since 2020. In 2024, three salmon were kept. In **Lögdeälven**, the catches since 2012 have increased and just above 200 individuals whereof half were kept. In 2024, there were 33 kept salmon (Table 3.1.1.1c).

### Spawning runs and their composition

In the fishway at the hydropower plant in **Piteälven**, the counted salmon run has varied between 1 300 – 2 400 during the latest 13 years. In Piteälven, the registrations of fish were analysed by a consultant on behalf from the hydropower plant owner. The county administrative board of Norrbotten (CAB) did their own analysis of all the detections in 2021 and 2022 and found out that some of the small salmon had been registered as trout. The data delivered by the hydropower plant owner was updated based of the analysis of CAB. In 2023, only two grilse was registered even though there were rather high numbers of grilse in nearby rivers. Due to earlier misinterpretation of small salmon, a recalculation was carried out of the proportion of small trout using average value from the recalculation in 2021 and 2022 which increased the number of salmon and decreased number of trout. In 2024, the registration of grilse was minus 48 individuals, indicating problems with the registration. Fish do not migrate downstream in the fishway but they can make up- and downstream movements in the fishway. For calculation of the proportion of grilse and MSW in Piteälven, the proportions of grilse and MSW in Tornionjoki, Kallixälven and Vindelälven were used to recalculate the numbers. In 2024, the run was at the same level as previous year (Table 3.1.1.2, Figure 3.1.1.3)

In 2023, the number of counted salmon in the fishway at the hydropower plant in **Åbyälven** increased to 169 compared with 74 previous year (Table 3.1.1.2, Figure 3.1.1.2). Within the water framework national plan for the re-examination of hydropower, the owner of the Hednäs hydropower plant plans to apply for a revocation of permit for the power plant, which means that the power plant may be removed in the long run.

In the two fishways at Fällforsen in **Byskeälven** the total number of counted salmon has varied between 5 300 to 6 600 in 2019–2021. In 2022–2023, technical problems with the counter (Riverwatcher) prevented counting of the entire run. The missing counts from 2023 were imputed using data from 2021 when data were available for the whole season. The run in 2024 was the same level as previous year at approx. 3 000 salmon (Table 3.1.1.2, Figure 3.1.1.2).

In **Rickleån**, the salmon run has varied between 13–57 during the latest 10 years. In 2024, only 29 salmon were registered (Table 3.1.1.2).

In **Ume/Vindelälven**, the number of salmon decreased in 2021 and furthermore in 2022. From 2019 to 2022, the run decreased from 12 104 to 3 224. The run has increased during the three last years and in 2024 the registered number was 7 696 (Table 3.1.1.2, Figure 3.1.1.2).

### Parr densities and smolt trapping

Densities of salmon parr in electrofishing surveys in AU 2 rivers (Gulf of Bothnia, ICES SD 31) are shown in Table 3.1.2.1 and in figures 3.1.2.1 and 3.1.2.2. In Table 3.1.2.1, average densities from extended electrofishing surveys in Lögdeälven, Rickleån, Åbyälven, Vindelälven, and Öreälven are shown, including sites from upper parts of the river that recently have been colonized (see Section 4.4.2 in ICES, 2017a). Since the 2018 assessment, weighted average densities including these extended electrofishing surveys have served as input in the river model used to calculate prior smolt abundances. Estimated numbers of wild smolts are shown in Table 3.1.1.5.

In **Piteälven**, no consistent electrofishing surveys were made in the 1990s. The density of 0+ parr has been rather low in most of the years since then. In 2018, new electrofishing sites were added from the tributary Varjisån, which has its outlet just below the definitive obstacle (Storforsen) for salmon in Piteälven. For the last 10–15 years, salmon have been recolonizing Varjisån, and the densities have increased (Table 3.1.2.1). In 2024, no electrofishing was carried out. Due to the problems of electrofishing large parts of Piteälven, the number of ascending adults is used for indirectly estimating smolt abundance, even though passage efficiency in the fishway is low for salmon and trout (details in Section 4.2.1).

In **Åbyälven**, weighted mean densities, including sites above the hydropower station and the extended electrofishing surveys below the hydropower station, have served as input in the river model used to calculate smolt abundances (Table 3.1.2.1, details in ICES 2023a, Section 4.2.2). The use of weighted mean densities results in lower mean densities of 0+ and older parr compared with mean densities from using only the sites below the hydropower station. The mean densities of 0+ parr in the latest five years have varied between seven to 19 ind./100 sqm. but in 2024, the densities decreased to the lowest observed since 2003. For older parr, the mean densities for the latest five latest years have been stable with average of five ind./100 sqm. In Åbyälven, smolts have been counted from 2018-2020. In 2021, the smolt wheel was moved to River Öreälven (AU 2), where trapping failed due to flooding.

In **Byskeälven**, the mean densities of 0+ parr in 1989–1995 were about five ind./100 sqm. During the 2000s, the densities have been on rather high levels with a few exceptions, and in 2019 the 0+ density increased further to the highest recorded (52 ind./100 sqm) so far. In 2023, the densities of 0+ decreased with half compared with previous year and decreased even more in 2024. The densities of older parr have remained rather stable during the ten previous years and varied between 12-23 ind./100 sqm (Table 3.1.2.1).

In **Kågeälven**, the last releases of reared salmon parr were made in 2004, which means that the 0+ parr observed since 2013 have been mainly offspring of spawners which themselves were wild-born. There has been a stable occurrence of 0+ parr in recent years with an average of eight ind./100 sqm. but in 2024, the densities decreased to three ind./100 sqm. The densities of older parr have decreased in the previous five years compared with previous time-series but in 2024, the densities increased (Table 3.1.2.1). The parr densities indicate that the population has become self-sustaining. Spawning also occurs along the whole river stretch available for salmon.

In **Rickleån**, weighted mean densities, including sites above the three hydropower stations, have served as input in the river model used to calculate prior smolt abundances (for more details see Section 4.2.2 in ICES, 2020). The consequence of using weighted mean densities results in lower mean densities of 0+ and older parr compared with mean densities from using only the sites below the hydropower station. The mean densities in 2022 and 2023 have decreased to only two 0+ ind./100 sqm but in 2024 the densities increased to 10 ind./100 sqm. The mean density of older parr in the latest ten years has been 1-7 ind./100 sqm. (Table 3.1.2.1). In 2014–2017, smolts of salmon and sea trout were counted during their downstream migration in Rickleån using a smolt wheel ('Rotary-Screw-trap') and mark–recapture experiments. No smolt trapping has been performed since 2018.

In **Sävarån**, the mean densities of 0+ parr in 1989–1995 were about 1.4 ind./100 sqm, but increased substantially in the early 2000s. The densities have fluctuated strongly between four and 45 ind./100 sqm in the last 10 years (Table 3.1.2.1). No trapping of smolts has been carried out since 2014.

In **Ume/Vindelälven**, densities have fluctuated within the range of 5–25 ind./100 sqm during the 2000s (Table 3.1.2.1). However, from 2016–2019, the mean 0+ parr density declined to very low values (<5 ind./100 sqm), levels not seen in the river since the peak years of M74 (fry mortality) in the early 1990s. The reason for the very low density seems to be linked to small number of females passing the fish way in Stornorrfors in 2015–2018 (Table 3.1.1.2), combined with a low survival rate after having passed the ladder (see sections 3.4 and 3.6). However, the densities of 0+ parr started to increase in 2020, and peaked in 2022. The densities of 0+ parr decreased to the lowest of the four latest years in 2023 and even more in 2024. The densities of older parr have increased since 2021 to 2023 with an average of 14 ind./100 sqm but in 2024, the densities decreased to six ind./100 sqm.

The fishcounter Riverwatcher (VAKI) and PIT-antennas in the Ume/Vindelälven fishway record all marked and unmarked wild returning spawners. In 2016, the smolt counting was moved to a permanent trap within the fish ladder at the Stornorrfors hydropower dam just a few kilometers further downstream. However, the catch-mark-recapture procedure used in Vindelälven (since 2016) differs from that in other rivers; annual smolt runs are estimated based on data on the number of PIT-tagged smolts in year  $x$  combined with numbers of tagged and untagged grilse (1SW adults) returning in year  $x+1$ , assuming a common smolt-to-adult survival rate for marked and unmarked fish. This is technically possible since camera counters in combination with PIT-antennas are used to record all marked and unmarked wild returning spawners. In 2016–2018, however, there were technical problems with the new smolt trap, and therefore only few smolts were caught and marked. During 2019–2024, the success of smolt trapping improved. In 2024, 2 832 wild smolts were caught, of which 2 785 were marked with PIT-tags.

In **Öreälven**, parr densities in 2022–2024 decreased significantly from the observed previous years (Table 3.1.2.1). Densities of older parr were stable (three ind./100 sqm) during 2017–2022 but dropped in 2023–2024 below one ind./100 sqm. In 2021, the smolt wheel was moved from Åbyälven to Öreälven, where trapping failed due to flooding. In 2022–2024, however, complete data from Öreälven was collected, and in total 319, 223, and 196 salmon smolt were caught per year, respectively.

In **Lögdeälven**, parr densities have fluctuated between four and 21 ind./100 sqm during the 10 latest years (Table 3.1.2.1). The average for older parr for the four previous years has been relatively low with five ind./100 sqm (Table 3.1.2.1).

In 2015–2016, a smolt wheel was operated in Lögdeälven, close to the river mouth. No smolt trapping was done from 2017 onwards (Table 3.1.1.5).

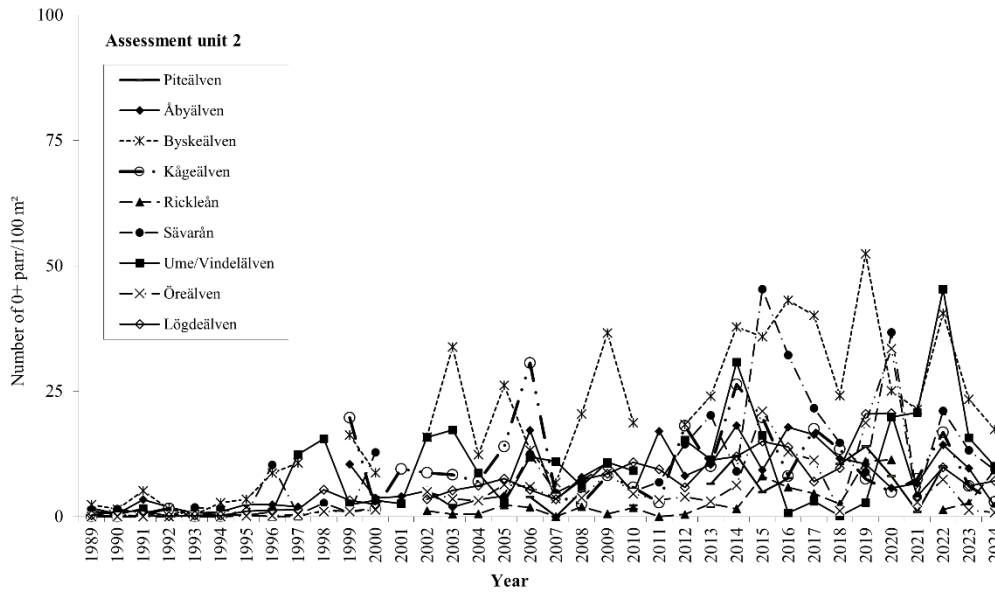


Figure 3.1.2.1 Densities of 0+ parr in rivers in Gulf of Bothnia (Sub-division 31), assessment unit 2, in 1989-2024.

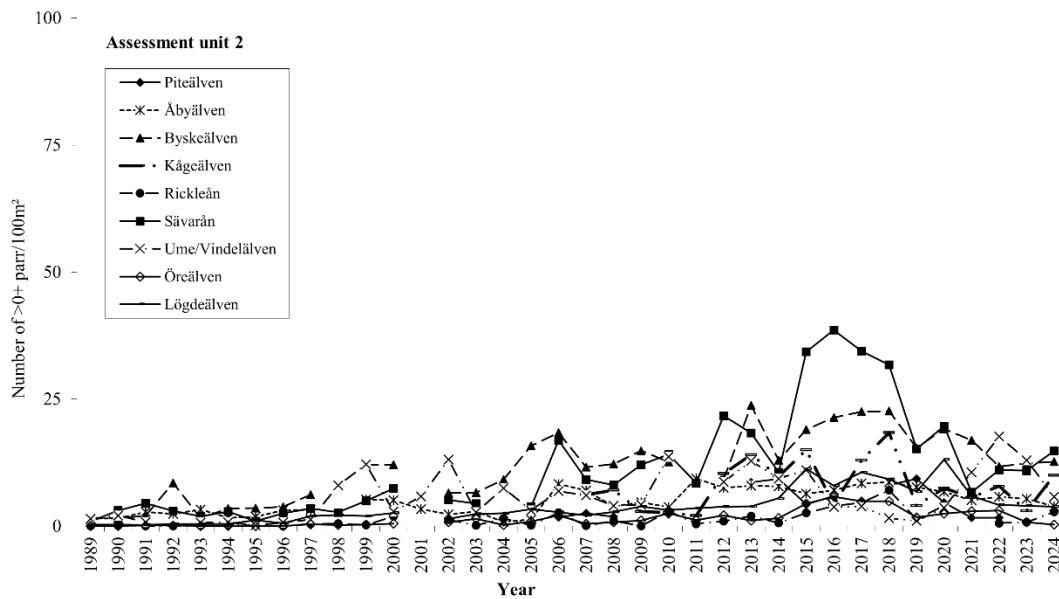


Figure 3.1.2.2 Densities of >0+ parr in rivers in Gulf of Bothnia (Sub-division 31), assessment unit 2, in 1989-2024.

### 3.1.3 Rivers in assessment unit 3 (Gulf of Bothnia, SD 30)

#### Spawning runs and their composition

In **Testeboån**, an electronic fish counter, Riverwatcher (VAKI Ltd) was installed in late August 2015 in the new built fishway. Since 2016, nearly the entire run has been monitored. In 2024, the counted number of salmon increased to the highest number observed at 352 salmon (Table 3.1.1.2). The hydropower plant was only operated for short periods during the summer and autumn due to low water flow, providing better conditions for the salmon to find the old riverbed and migrate up to the dam where they pass the fishway. Because more than 95% of the production area is located upstream of the Strömsbro hydropower station, where the counter is installed, the recorded numbers represent the majority of the run.

### River catches and fishery

In **Ljungan**, in general, the catches have increased since the early 2000s, but in the last two years, the catch decreased to a level similar to that in the early 2000s. In 2024, 40 salmon were caught, and all of them released (Table 3.1.1.d.). In **Testeboån** (wild river since 2013), landing of salmon is not allowed.

### Parr densities and smolt trapping

Parr densities from **Ljungan** are missing for several years due to high water levels in late autumn making electrofishing impossible. For example, the relatively high value for 2012 only mirrors data from one electrofishing site (Table 3.1.3.1) as the other sites could not be fished due to high water levels. In 2012, 2014, and 2015 (especially), parr densities showed signs of increase. In 2017, until 2021, the density of 0+ dropped markedly. This low density likely reflects that many adults died before spawning in the preceding autumn (Section 3.4.4). In 2024, the densities of 0+ increased. Densities of older parr have been at a low level for the nine latest years (Table 3.1.3.1).

Smolt trapping was installed in Ljungan in 2022 with no success but in 2023 and 2024, the trap was in function during the whole migration period and 166 and 334 salmon smolt were caught, whereof 147 and 330 were marked with PIT-tag respectively year (Table 3.1.1.5).

**Testeboån** received status as a wild salmon river by WGBAST in 2013. The latest releases of reared salmon (fry) in the river occurred in 2006, which means that the wild-born 0+ parr observed by electrofishing from 2012 and onwards most likely were offspring to salmon which themselves were wild-born. Fairly stable levels of 0+ parr densities in recent years indicate that the population is self-sustaining (Table 3.1.3.1). In 2022, the densities increased to the highest observed of 43 ind./100 sqm. (Table 3.1.3.1). The high densities can be explained by the high water level during spawning migration in 2021, which allowed salmon to pass beside the fishway, and by the highest recorded number of salmon observed in the fishway. In 2024, the densities of 0+ were 19 ind./100 sqm. Older parr has varied during the five latest years between 2–11 ind./100 sqm.

Smolt trapping using a smolt wheel has taken place in Testeboån since 2014. In 2015, the river was equipped with permanent facilities for counting of both smolts and ascending adults. Hence, Testeboån represents a full index river since 2018. Annual estimates of the total smolt runs in 2014–2024 have varied in the range of about 1 100 to 7 100 smolts (Table 3.1.1.5).

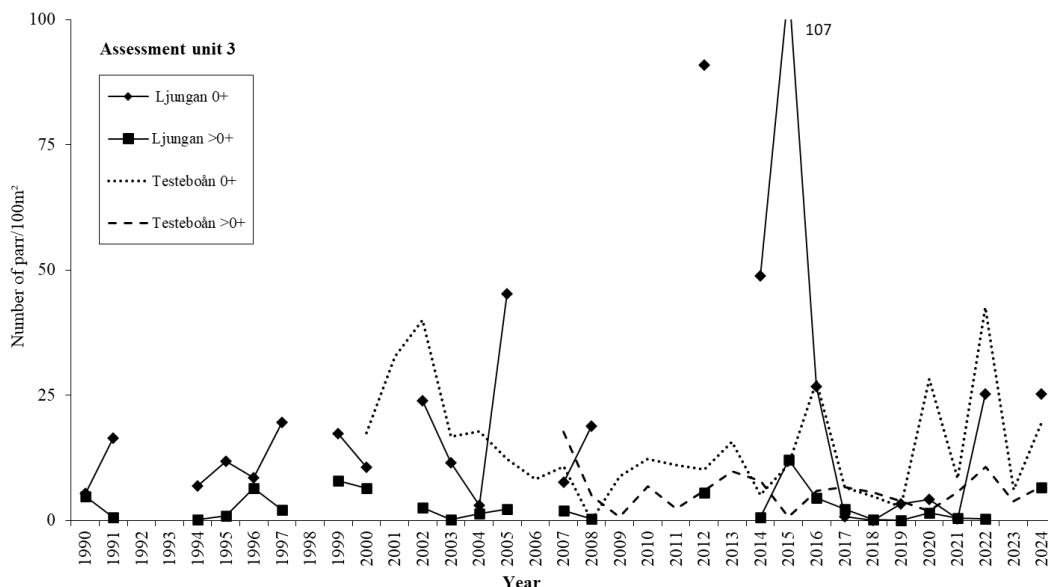


Figure 3.1.3.1 Densities of parr in Ljungan and Testeboån in the Gulf of Bothnia (Sub-division 30), assessment unit 3, in 1990–2024.

### 3.1.4 Rivers in assessment unit 4 (Western Main Basin, SD 25 and 27)

#### River catches and fishery

In **Emån**, anglers have increasingly applied catch and release over the past 15 years, and the river fishery is nowadays basically a 'no-kill fishing'. Therefore, the retained catches have decreased markedly, from more than 100 salmon fish per year in the early 2000s to nearly zero in recent years. In 2024, the catch was 126 salmon, whereof one salmon was retained.

In **Mörrumsån**, the catch in 2024 was 232 salmon, whereof 35 was retained (Table 3.1.1.1d). Similar to **Emån**, anglers have increasingly applied catch and release, which largely explains a decline in retained catches seen in recent years.

#### Spawning runs and their composition

In **Mörrumsån**, the Marieberg hydropower dam (c. 12 km from the river mouth), which was equipped with a fish ladder and a Riverwatcher, was removed in the summer of 2020. Since then, fish have been able to pass freely at the site, but no fish counting has taken place. In 2020 and 2021, tests counts were conducted further downstream from Marieberg. Since 2022, a video fish counter with guiding fences covering a portion of the river's width has been in operation at a new location closer to the river mouth (c. 4 km). Additionally, an ARIS camera, capable of detecting all fish passing through, has been intermittently operated near the new video fish counter. Daily data from both counters, along with other relevant information such as water flow, have been used to produce statistically based "expert estimates" of the total abundance of ascending salmon and sea trout from 2022 to 2024. However, Table 3.1.1.2 only presents the number of individuals actually registered by the camera counter.

Daily data from the counter, along with other relevant information such as water flow, have been used to produce estimates of the total abundance of ascending salmon and sea trout in 2022-2024. These estimates have been used in the full-life history model (FLHM) (Section 4.2.1). In 2024, the number of salmon observed at the fish counter in **Mörrumsån** was 110 (Table 3.1.1.2).

In **Emån**, at the hydropower station in Karlshammar, a fauna passage was constructed in 2020, allowing fish to pass the power station. Fish have been counted using a fish counter during the years 2020 – 2024, with a total of 18, 48, 92, 220, and 172 salmon recorded in each respective years. Fish counting will not continue in 2025.

#### Parr densities and smolt trapping

For **Emån**, Table 3.1.4.1 contains average densities from surveys below the first partial obstacle and also densities calculated across all sections in **Emån** that are accessible for salmon, including sites above partial obstacles (dams with fish ladders) located in habitats that currently seem to be recolonized. For the present assessment, these weighted mean densities were used as input in the recently developed southern river model (ICES, 2017c) to calculate prior AU 4 smolt abundances (Section 4).

During the four latest years, the densities of 0+ parr in **Emån** have been higher when extended sites were included compared to only "old" sites, indicating that the densities are higher in the recolonized sites. In 2023, the densities of 0+ decreased by half compared with the previous year and stayed at the same level in 2024. The densities of older parr, extended sites included, have varied from 1–8 ind./100 sqm during the period 1992–2024 with a mean value of one ind./100 sqm in recent five years (Table 3.1.4.1).

The estimated smolt production in River **Emån** has appeared very low compared to the presumed production capacity. In 2007, an overview of the conditions in the river concluded that probably the difficulties for particularly salmon spawners, and to a minor extent also sea trout,

to ascend fishways may lead to low production of juveniles above the fishways. Electrofishing sites in these upstream areas do therefore normally show low juvenile abundance. On the other hand, there is a highly successful sea trout and salmon fishery in the lower part of the river (at Em), and this fishery has not shown signs of lesser abundance of either species. On the contrary, salmon seems to have increased in abundance. In 2006, the lowermost dam (at Emsfors) was opened permanently and since then, increased parr densities for salmon have been recorded at the closest upstream electrofishing site. Additional measures are ongoing to facilitate up- and downstream migration at the second dam counted from the sea, above which significant habitats regarded suitable for salmon reproduction are located.

Since 2015, the average parr densities in Mörrumsån have varied between 33–66 (ind./100 sqm.) decreased (Table 3.1.4.1). For the present assessment, these weighted mean densities have been used as input for the southern river model (ICES, 2017c) to calculate prior AU 4 smolt abundances (Section 4). The 0+ parr densities in 2021 and 2022 were just above 60 ind./100 sqm which is above the average for the latest 10 years (50 ind./100 sqm). In 2024, the densities of 0+ increased compared with previous year (Table 3.1.4.1, and figures 3.1.4.1 and 3.1.4.2 for 0+ and >0+ parr, respectively).

For several years, a slight decline in average parr densities could be seen in the downstream river sections, whereas the uppermost (most recently accessible) part seemed to be in a building-up phase with increasing densities. Therefore, two contrasting trends were partly counteracting each other in the weighted averages used for computing smolt prior estimates. Since the health problems accelerated in 2014, however, the most marked decreases in parr densities have been seen above the first migration obstacle (Marieberg dam), which may indicate that spawners in poor condition have not managed to migrate upstream.

In Mörrumsån, hybrids between salmon and trout have been found during electrofishing since the early 1990s. In 1993–1994, at a period with high levels of M74-mortality and disease problems, the proportion of hybrids was high, up to over 50% in some sampling sites. After that, the occurrence of hybrids has varied. The amount of hybrids has decreased during 2006–2019. In 2019, the densities of hybrids were 0.6 ind./100 sqm. Occasionally over the years, genetic markers have been used to evaluate identifications made in the field of salmon/trout hybrid parr; in a majority of those cases identifications were found to be correct (Palm *et al.*, 2013).

In 2004, two new fishways were built at the power plant station about 20 km from the river mouth, which opened up about 9 km of suitable habitat for salmon, including about 16–21 ha of production area. In 2009–2020, a smolt wheel has been operated in Mörrumsån, ca. 12 km upstream from the river mouth. About 55% of the total production area for salmonids is located upstream the trap. A main reason for choosing this upstream location was that ascending adults are counted in a nearby fishway close to the smolt trap site, which should allow comparisons among numbers of ascending spawners and smolts from the upper part of Mörrumsån.

In 2009–2012, the estimated smolt production in the upstream parts of the river was lower than expected (ca. 2 000–8 000 per year). As a comparison, Lindroth (1977) performed smolt trapping in 1963–1965 at a site close to the one currently used and estimated the average annual salmon smolt production to 17 600 (range 12 400–25 000). However, since 2013, the smolt production in the monitored upper reaches of Mörrumsån has increased. From 2017 until 2024, the smolt production has varied between 3 000 and 12 000.



Figure 3.1.4.1 Densities of 0+ parr in rivers in the Main Basin (Sub-division 25-27), assessment unit 4, in 1985-2024.

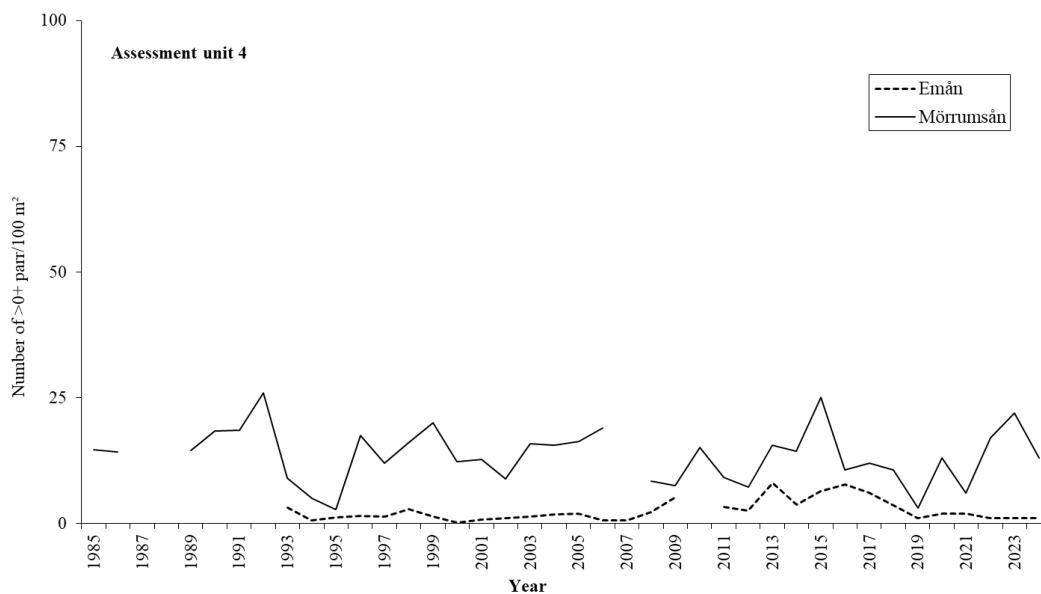


Figure 3.1.4.2. Densities of >0+ parr in rivers in the Main Basin (Sub-division 25-27), assessment unit 4, in 1985-2024.

### 3.1.5 Rivers in assessment unit 5 (Eastern Main Basin, SD 26 and 28)

#### Estonian rivers

The River **Pärnu**, which is a mixed river with ongoing releases and some natural spawning, flows into the Gulf of Riga and is the only Estonian salmon river in the Main Basin. Before year 2018, access to main spawning areas in River Pärnu was blocked by Sindi dam. The dam was removed in 2018-2019 and salmon gained free access to all potential spawning and rearing areas.

Electrofishing surveys on the spawning and parr rearing areas below the dam have been performed since 1996; the number of ind./100 sqm has been very low or zero during the whole period (Table 3.1.5.1 and Figure 3.1.5.1). The habitat quality below the dam is poor, which is the main cause for the low parr density. Since 2013, electrofishing is also carried out upstream from

the Sindi dam. Above the dam, salmon parr have been found only in some years, and densities have remained low. Since 2019 onward, average parr density has remained below 10 ind./100 sqm (Figure 3.1.5.1).

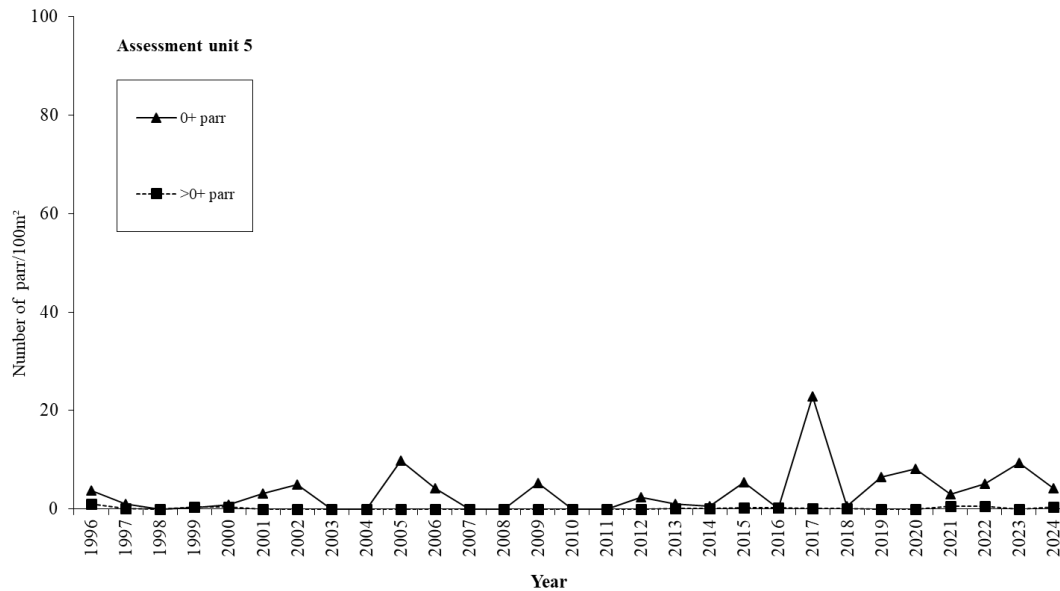


Figure 3.1.5.1 Densities of parr in the river Pärnu Main Basin (Sub-division 22-29) assessment unit 5, in 1996-2024. For exact values see Table 3.1.5.1.

### Latvian rivers

Currently, there are seven rivers in Latvia listed as wild salmon rivers: three flowing into the Gulf of Riga and four directly into the Main Basin. In addition to wild salmon rivers there are three rivers (**Daugava**, **Gauja**, and **Venta**) which have been annually stocked with hatchery-reared salmon smolts, and salmon populations in these rivers thus consist of a mixture of wild and reared fish. In 2024, salmon parr were found at five of seven wild salmon river catchments and in two of three mixed salmon river catchments sampled by electrofishing. Salmon parr in considerable amounts were also found in the Aģe River emptying into Gulf of Riga which is considered potential salmon river.

The wild salmon population in the index river **Salaca** has been monitored by partial smolt trapping and mark–recapture experiments since 1964, by parr electrofishing since 1992, and spawners are counted since 2021. From 2000, no releases of artificially reared salmon have been carried out in this river. In 2024, a total of 11 sites were electrofished in the River Salaca and its tributaries (Jaunupe, Svētupe, and Korģe) and there were 0+ salmon parr present in all the electrofished sites. Density of salmon 0+ parr in the whole River Salaca catchment (including tributaries) in 2024 was 76.3 ind./100 sqm, which is higher value than in last three years and density of older salmon parr was 1.1 ind./100 sqm (Table 3.1.5.1, figures 3.1.5.2 and 3.1.5.3). Despite year-to-year fluctuations, since 2010, salmon 0+ parr densities in the Salaca catchment have been showing an increasing trend.

Smolt trap in the Salaca River was operated between 19 April and 27 May 2024. There were eight days when smolt trap was not set because trap was damaged due to strong currents and high amount of drifting material. For these days, the results were interpolated. Highest salmon smolt amount was registered on 13 May. Total smolt run in 2024 was estimated to be 6 000 salmon smolts that migrated from Salaca River to the Gulf of Riga, which is 20% of potential smolt production capacity (PSPC) and three times less than in previous four year. Considering both the intensive overgrowth of spawning and rearing habitats and also their restoration measures, the

area of habitats currently available for salmon spawning and juvenile development in Salaca could have changed significantly, and thus the overall PSPC. Spawning habitat reassessment in Salaca was started in 2024 as a part of the *LIFE is Salaca* project and will be continued in following years.

Starting from 2021, Riverwatcher CS (VAKI Ltd) fish counter is annually installed in Salaca 4.3 km upstream from the river mouth, and a lamprey weir type wooden construction is used to guide spawners through fish counter. This site unfortunately excludes spawners ascending to Jaunupe and upper part of the Svētupe River, but it enables a full autumn season counting for Salaca for most of the years. In 2021, a total of 301 ascending salmon spawners were counted and 398 in 2022 (Table 3.1.5.2). In these two years during the spawning migration period, a very low water level was recorded, which is thought to have influenced the upstream migration magnitude. In 2023, a total of 293 ascending salmon were counted, but due to high flow conditions counter was taken out in 14 October. Considering that counting had to be stopped during the migration peak, total number of spawners was presumably greater, presumably not less than in 2022. Judging by water temperature, it is most likely that the ascent migration of salmon and sea trout continued for another 11 days after the VAKI fish counter was removed. In 2024, a total of 723 salmon spawners were counted which is the largest amount so far registered. Main migration takes place starting from second week of October to first week of November.

In 2024, no 0+ salmon parr were found in the small wild salmon river **Pēterupe** emptying into the Gulf of Riga. It was the second year in the row with only older salmon parr found in Pēterupe. In contrast to Pēterupe, after the previous year with no salmon parr, 0+ parr were present in Vitrupe and the parr density there was 7.4 ind./100 sqm. Absence of 0+ parr is most probably explained by combination of beaver activity and the log jams limiting the ascent migration to the suitable spawning grounds and habitat degradation (mostly deposition of sand and silt on the spawning gravel). Age structures of parr in Vitrupe and Pēterupe rivers testify that successful salmon reproduction does not occur every year. The current data series shows that in Vitrupe, after every five years, salmon spawning is found to have not occurred or to have been unsuccessful and in Pēterupe successful spawning occurs every second to third year. Reproductive area in both rivers is less than 4 ha. Considering the characteristics of the rivers Vitrupe and Pēterupe (width ranging from 5 to 16 m, shading exceeding 60%) and sea trout 0+ parr densities that exceed the salmon parr densities, these rivers should rather be looked at as sea trout rivers having occasional salmon reproduction.

Wild 0+ salmon parr were also detected in the **Irbe**, **Užava**, and **Tebra** River (Saka River catchment) flowing into Main Basin. Same as in previous years, older salmon parr were only present in the Tebra River. In the **Irbe** River, rapids and riffles suitable for salmon spawning and nursery constitute only 0.21 ha. In this river, deposition of sand and silt in habitats suitable for salmon reproduction is visible problem limiting spawning success and egg survival. Habitat mapping in the **Užava** River show that river canalization and straightening in 1960s has left considerable effect on available habitats in this river – only 14.4 km of the river remains in its natural riverbed. Total available and suitable reproduction habitats constitute only 0.59 ha (0.46 ha with good quality), but to a larger extent they are more suitable for sea trout which are periodically found there in similar density. In the Saka River, catchment suitable salmon reproduction habitats constitute 2.4 ha located in the Tebra River. There are no spawning grounds in Sala River itself. In some years, salmon parr are also found in its other confluence river Durbe which is sea trout river. According to habitat reassessment results in **Bārta** conducted in 2018, the total area of riffles suitable for salmon spawning and nursery constituted only 0.6 ha in the river section from the Latvian-Lithuanian border to the Lake Liepājas. None of the mapped habitats were evaluated to have high or good quality. Problems with habitat siltation and overgrowing with vegetation are common in this river. Annual electrofishing in Bārta is conducted since 2013 and no salmon parr is ever detected.

In 2024, wild salmon parr were found only in the river sections below rumba waterfall in the mixed salmon river **Venta**. Parr density in Venta decreased (3.4 ind./100 sqm) compared to last year (Table 3.1.5.1 and Figure 3.1.5.3) but the results may have been affected by high water level during electrofishing. For many years average parr production in Venta had a negative trend, as the suitable spawning and rearing grounds rapidly overgrow with vegetation. The increased overgrowth is presumably explained by mild winters, during which a sufficiently thick layer of ice that could clean vegetation from the riverbed does not form any more. The spawning and juvenile development areas mapped in 2006 most likely no longer reflect the current ones. A reassessment of the available habitats is necessary. The habitat restoration works carried out in 2011 in the most productive section of the river Venta (the middle section of the river below the Ventas rumba waterfall) temporarily contributed to the increase in the 0+ parr production, but when such works were repeated in 2015 and 2016, the increase in the density of parr did not follow. River restoration works carried out in 2023 using heavy machinery to take out excess vegetation and its roots in the same river section have shown some positive results with successful spawning afterwards in areas where salmon parr have been absent in electrofishing for many years. In certain sections of the river, the formation of a stronger current in the narrows between the vegetation has contributed to the washing away of the substrate suitable for spawning as the riverbed in many places is made up of dolomite bedrock. High temperatures and low water levels in summer, as well as during spawning period, also likely have had a negative impact on parr densities in previous years. Taking into account the many remote sections of the river, it can be assumed that poaching also is contributed to the current salmon population status in Venta.

In river **Gauja** catchment, wild salmon 0+ parr production decreased (6.9 ind./100 sqm) in 2024 compared to previous year. At the Gauja catchment level, the **Amata** River has contributed to the salmon parr production the most. In 2024, average salmon 0+ parr density in Amata was 20.1 ind./100 sqm which is the highest result so far for this river. A reassessment of habitats indicated that main salmon spawning and rearing habitats are situated in the Amata River, making up 5.4 ha, whilst in the Gauja River only 2 ha of suitable habitats are available in the lower and uppermost sections of the river and additional 2.2 ha are in its tributary Brasla River. The counting of spawning redds in 2022 showed that available spawning grounds in Amata are actively used by salmon. In the river Gauja itself, a significant problem affecting the success of salmon spawning and egg survival is a large-scale deposition of sand on the spawning grounds, whereas a large part of the riverbed and steep banks consist of loose sand, which is transported by the current in large amounts, especially in spring floods. As in 2023, in 2024 salmon and sea trout smolt counting was also performed in the Gauja River using same design and size smolt trap as in Salaca River. Unfortunately, due to unsuitable hydrological conditions (too high water level and strong current) the smolt trap near the river mouth (~1 km from the sea) was installed only on 16 May and was operated up to 04 June. By this time, the wild smolt run had largely ended. Given that the wild smolt count in the Gauja River basin in 2024 was unsuccessful, smolt estimate was calculated using parr densities from electrofishing survey. Estimated smolt production for the Gauja River basin in 2024 was 213 wild salmon smolts.

In the **Daugava** catchment, there are no suitable spawning grounds in the Daugava River below Rīgas hydropower plant situated 30 km from the sea, and only 0.8 ha of suitable reproduction habitats are available in its tributaries Lielā Jugla and Mazā Jugla. It must be noted that confluence of these two rivers is connected with Daugava trough two consecutive lakes which may mean an increased risk of predation on descending smolts. No salmon parr have been registered in Daugava catchment since 2015 despite continuous stocking. Therefore, Daugava should currently be considered a salmon river with a reared and not a mixed salmon population.

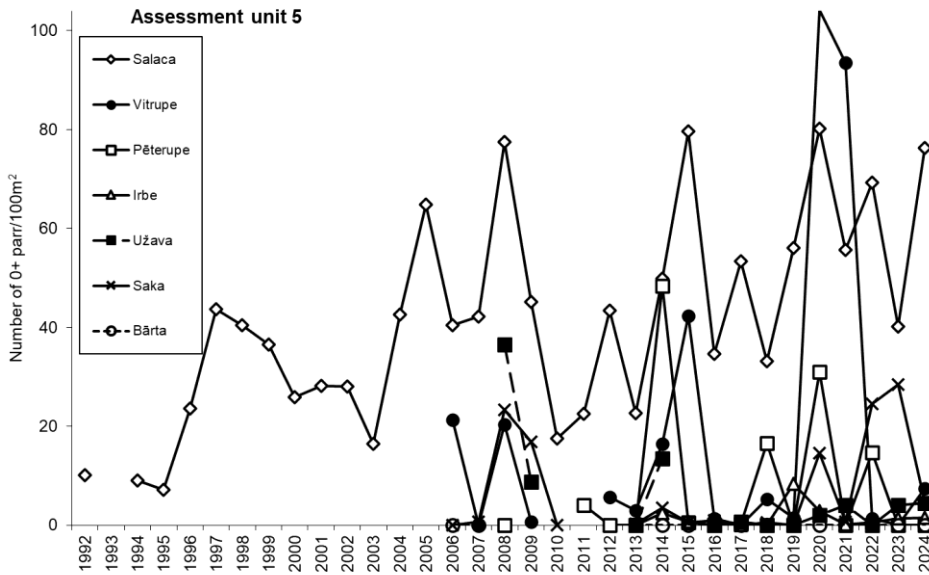


Figure 3.1.5.2. Densities of 0+ (one-summer old) salmon parr in wild Latvian salmon rivers in the Main Basin (Sub-division 22-29) assessment unit 5, in 1992-2024. For exact values see Table 3.1.5.1.

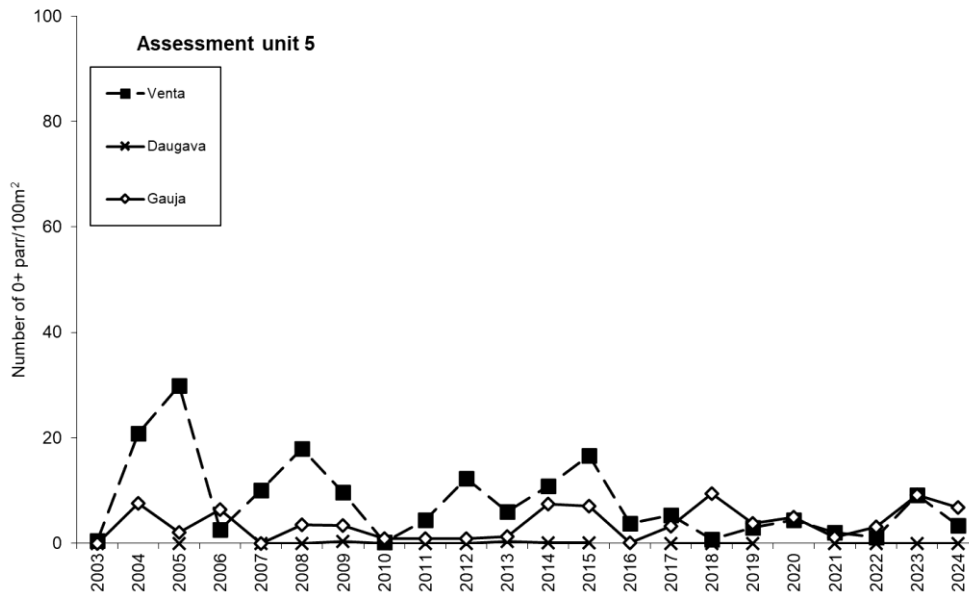


Figure 3.1.5.3. Densities of 0+ (one-summer old) salmon parr in the Latvian salmon rivers in the Main Basin (Sub-division 22-29) assessment unit 5, where supportive releases are performed, in 2003-2024. For exact values see Table 3.1.5.1.

**Lithuanian rivers**

Salmon are found in four tributaries of the Nemunas River, as well as in the B. Šventoji River, which flows directly into the Baltic Sea. Among these, only the Žeimena River—a tributary of the Neris—and its own tributaries, the Mera and Saria, support relatively wild salmon populations. Between 1967 and 1974, small numbers of artificially reared salmonids were released into the Žeimena River, which is considered an index river. The Mera River, a tributary of Žeimena, is primarily a sea trout river, and salmon production there has always been low.

Mixed salmon populations are present in the B. Šventoji River and in four tributaries of the Nemunas River: the Neris, Dubysa, Jūra, and Miniņa. Several tributaries of the Neris River—including the Šventoji (along with its own tributaries Virinta and Siesartis), as well as the Širvinta, Vilnia, and Vokė—also contain mixed salmon populations. These rivers have been regularly stocked with salmon over the years.

Parr densities in Lithuanian rivers are illustrated in Table 3.1.5.3 and Figure 3.1.5.4. In 2024, the average density of 0+ salmon parr in the index river Žeimena declined significantly to 4.24 individuals per 100 sqm. This marks a continuing downward trend from previous years, with densities recorded at 10.7 ind./100 m<sup>2</sup> in 2023 and 17.9 ind./100 sqm in 2022. The 2024 value is below the long-term average for the entire monitoring period, indicating a potential reduction in natural reproduction or early survival rates in one of Lithuania's most important salmon rivers. Important to note that older 1+ parr are rarely observed in substantial numbers during electrofishing. In many cases, they are not recorded at all, or their presence is limited to just a few individuals, suggesting downstream migration at age 1, or other environmental constraints (Table 3.1.5.3).

A similar declining trend was observed in the mixed stock Neris River, where the average density of 0+ parr in 2024 dropped to 4.1 ind./100 sqm. This is lower compared to 6.67 ind./100 sqm in 2023 and 9.4 ind./100 sqm in 2022. The consistent decrease over the past three years may reflect broader ecological pressures affecting spawning success or juvenile survival in this river system. Parr densities in rivers with mixed salmon populations showed considerable variability. In general, most of these rivers experienced a decrease in the number of 0+ parr in 2024. This suggests that natural reproduction remains fragile in many systems, possibly due to a combination of degraded habitat quality, suboptimal waterflow conditions, or environmental stressors such as temperature fluctuations. However, in a few rivers like the Miniija, Dubysa, Šventoji (Baltic Coast), and Vilnia, 0+ parr densities showed a slight increase compared to previous years. While these positive changes are encouraging, they appear to be isolated cases rather than part of a broader recovery trend. Overall, the observed data underline the need for continued efforts in monitoring, targeted habitat restoration, and support for natural reproduction. Long-term efforts are essential to stabilize and recover salmon populations in Lithuania's river systems, especially in the face of increasing environmental challenges.

The counting of migrating spawners using the VAKI counter was unsuccessful due to both environmental and technical issues in 2024. Early in the migration period, water levels were low and temperatures were high, which likely delayed fish movement. This was followed by heavy rains that caused a rapid rise in water levels and turbidity, making it difficult for the VAKI counter to function properly. Additionally, there are concerns that the counter itself may be obstructing migration, as it could be discouraging salmon and sea trout from using the Jūra River fish pass effectively.

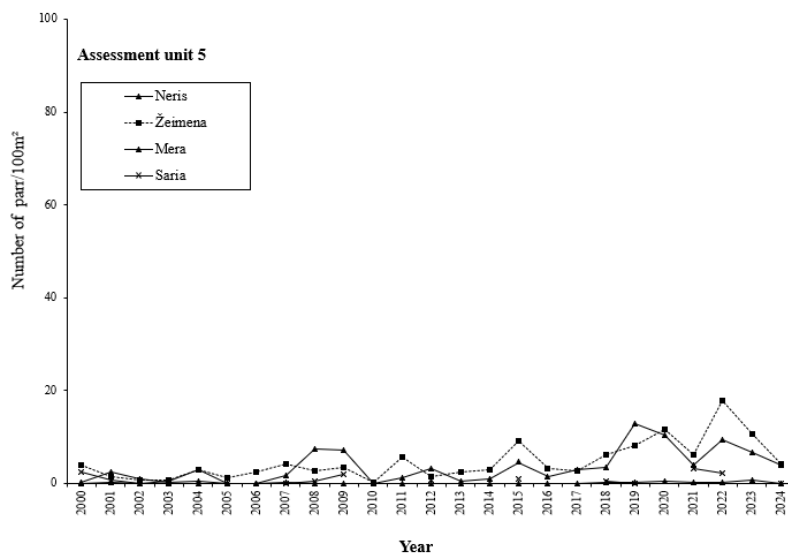


Figure 3.1.5.4. Densities of 0+ parr in Lithuanian rivers in Main Basin (Sub-division 22-29) assessment unit 5, in 2000-2024. For exact values see Table 3.1.5.3.

### 3.1.6 Rivers in assessment unit 6 (Gulf of Finland, SD 32)

All three wild salmon populations in the Gulf of Finland area are in Estonia: **Kunda**, **Keila** and **Vasalemma** (Table 3.1.6.1). These rivers are small, and their potential production is small. In addition, there is natural reproduction supported with regular releases in ten other rivers: **Kymijoki**, **Gladyshevka**, **Luga**, **Purtse**, **Selja**, **Loobu**, **Valgejõgi**, **Jägala**, **Pirita** and **Vääna**. In these mixed rivers, natural reproduction is variable, and enhancement releases have been carried out since year 2000. The salmon in rivers **Narva**, **Neva** and **Vantaanjoki** are of reared origin.

#### Status of wild and mixed AU 6 populations

Parr density in the wild river **Keila** started to increase significantly in 2005 and has increased furthermore since 2013. The parr density has remained on a high level in recent years indicating a good and stable state (Figure 3.1.6.1). Parr densities in river **Kunda** have shown a clear increase since 2015. Population status is considered to be good (Table 3.1.6.2). In comparison, the river **Vasalemma** is in a more modest state, although parr densities have increased in Vasalemma too. In 2018, the Vanaveski dam in river Vasalemma was opened and salmon gained access to all spawning and rearing areas. Previously only 2.4 ha of spawning areas below the dam were accessible, but now the total spawning area is at least 5 ha (the exact size of the added habitat area needs to be investigated). Despite free access, no salmon parr was found upstream of the Vanaveski dam in 2019. In later years salmon parr are found in all electrofished sites, parr density in 2024 was on the highest recorded level (Figure 3.1.6.1).

The most important change in the 1990s was the occurrence of salmon spawning in the Estonian mixed rivers **Selja**, **Valgejõgi** and **Jägala**, after many years without natural reproduction. In 2006, wild salmon parr were also found in rivers **Purtse** and **Vääna**. Since then, a varying wild reproduction has occurred in all these mixed rivers (Table 3.1.6.3, Figure 3.1.6.2). In 2016, the Kotka dam in river **Valgejõgi** broke, and has not been rebuilt. Thus, since autumn of 2016, salmon have been able to ascend to new spawning areas. Parr density at the new spawning areas has increased very slowly.

Ongoing salmon releases are carried out annually in **Valgejõgi** (since 1996), **Jägala** (since 1998), and **Purtse** (since 2005). Releases were ended in **Selja** (time period of releases 1997-2019), **Pirita** (time period of releases 1998-2019), in **Loobu** (since 2002-2020), and **Vääna** (1998-2005). According to the rearing programme by Estonian Ministry of Climate, releases will be continued in similar pattern. Salmon used for stocking in late 1990s originated from spawners caught in the rivers Narva and Selja broodstock fisheries. In addition, salmon from the Neva strain were imported as eyed eggs from a Finnish hatchery in 1995–1999. In 2003–2009, brood fish were again caught from river Narva. A captive broodstock based on salmon from wild river **Kunda** was established in 2007 at Polula Fish Rearing Centre, and all current salmon releases in Estonia (SD 32) are based on **Kunda** stock

On the north side of AU 6, all wild salmon populations in Finland were lost in the 1950s due to gradual establishment of a paper mill industry and construction of hydroelectric dams. The geographically nearest available strain, Neva salmon, was imported from Russia in the late 1970s, and releases into rivers **Kymijoki** and **Vantaanjoki** started in 1980. The water quality in the mixed river Kymijoki has improved significantly since then. Reproduction areas exist on the lowest 40 km of the river and parr density has showed an improving trend. The annual average densities of wild salmon parr in the lower reaches have ranged between 11 and 113 parr/100 sqm in 2015-2024 (Table 3.1.6.3). In 2024, 0+ parr density was the highest in four years.

Kymijoki flows to sea in three branches of which Langinkoski and Korkeakosi have partial migration obstacle and Ahvenkoski is still a total block (since the 1930s). Despite rainy autumns,

most of the nursery areas in the lower part of Kymijoki dry out because of water regulation between the power plants. Good quality habitats are located above the lowest power plants, but currently spawners can only access those areas via two river branches with dams equipped with fishways. The fish ladders in the Langinkoski branch do not function well, and salmon can ascend the dam only in rainy summers when the discharge is high. Because of higher outflow, usually most of the spawning salmon ascend to the Korkeakoski branch, where a fish pass at the hydropower station was finished in 2016. So far, the smolt production areas beyond the dams are only partially utilized. The new fish pass is expected to allow access of a much larger number of spawners to the better spawning and rearing habitats located upstream. If the fish pass will work well, it is anticipated to increase the natural smolt production of the river significantly. Likewise, in the Langinkoski branch, a varying number of salmon has ascended into the fish way (at Koivukoski power plant) depending on the water flow. Since 2016, the highest total number of salmon ascending past the lowermost dams in river Kymijoki has been nearly 700 in 2017, but much fewer salmon have passed in recent years, the estimates for 2022 and 2023 being approximately 200 and 150, respectively. Data from fish ladders at Koivukoski in 2024 is not yet available, but in Korkeakoski, salmon number increased from 2023.

Natural smolt production in Kymijoki has been estimated to vary between 7 000 and 78 000 in the last 15 years. Along with the gradual increase in natural production, smolt releases have decreased in the last few years. The released number of smolts (on average 117 000 per year, 2019–2022) is, however, still clearly larger than the estimated natural production (on average 49 000 smolts per year, 2019–2022).

An inventory of rearing habitats in the river Kymijoki suggests 75 ha of smolt production area in the eastern branches of the river, between the sea and Myllykoski (40 km from the river outlet). Out of this total, about 15 ha of the rapids are situated in the lower reaches with no obstacles for migration, whereas about 60 ha are located beyond dams. Potential smolt production has been assessed based on assumed parr density and smolt age distribution. The annual mean potential was calculated to 1.34 smolts per ha, yielding a total potential of the river of about 100 000 smolts per year. From this potential, annually about 20 000 smolts could be produced in the lower reaches and 80 000 in the upper reaches of the river (Table 4.2.3.3).

In the river **Vantaanjoki**, electrofishing surveys in 2010–2014 have shown only sporadic occurrence of salmon parr at just a few sites.

In Russia, **Luga** and **Gladyshevka** are the only rivers with natural Baltic salmon reproduction. In Luga the salmon population is supported by large and long-term releases. Since 2021, no new information is available from the Russian rivers.

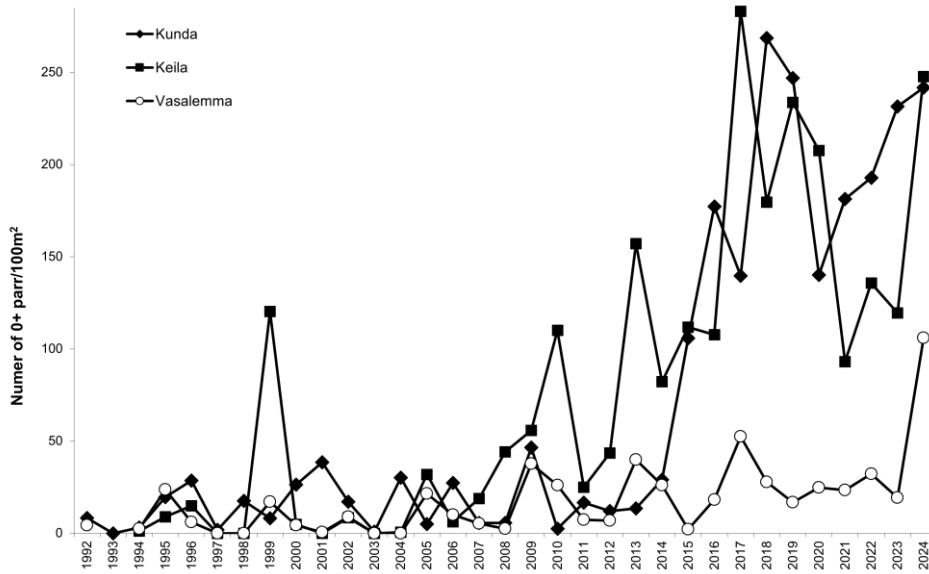


Figure 3.1.6.1. Densities of 0+ (one-summer old) salmon parr in the three wild Estonian salmon rivers

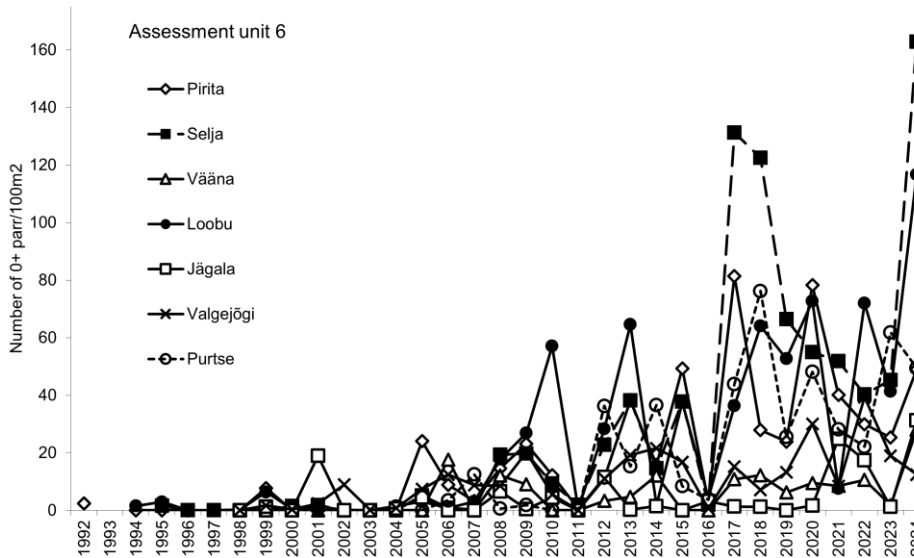


Figure 3.1.6.2. Densities of 0+ (one-summer old) salmon parr in seven Estonian salmon rivers where supportive releases are carried out.

### 3.2 Potential salmon rivers by country

The definition of a potential salmon river is a river with potential for establishment of natural reproduction of salmon (ICES, 2000). For most potential rivers there exists documentation of historical salmon occurrence. The status of restoration programmes in Baltic Sea potential salmon rivers is presented in Table 3.2.1.1. for rivers classified in ICES (2000) and the densities of rivers that are or may be considered potential in Table 3.2.1.2. Before any of these rivers may be transferred to the wild salmon river category, and new rivers added to the potential rivers category, the working group needs an update to the national river classification system.

#### Finland

Eight potential salmon rivers are listed in Table 3.2.1.1. Out of these three rivers **Kuivajoki**, **Kiiminkijoki**, and **Pyhäjoki** (AU 1, SD 31) were included in the Finnish Salmon Action Plan. Currently, salmon are released only in Kiiminkijoki. In 2023, 18 200 smolts and 20 000 parr of the

River Iijoki origin were stocked, but in 2024, no salmon juveniles were stocked in Kiiminkijoki. Electrofishing is currently conducted in **Kiiminkijoki** when the water level allows it. In 2024, electrofishing was possible only in the upper river stretches, where salmon reproduction does not usually occur, but some parr were found (Table 3.2.1.2). No clear trends can be seen in the parr densities.

In **Kuivajoki**, releases of salmon were terminated in 2012. Some regular (annual) natural reproduction takes place in the river, approximately at least since 2018 based on electrofishing data. It is possible that natural reproduction has been ongoing even earlier, but no electrofishing was carried out before 2021. In monitoring conducted in 2021 and 2024, parr of different ages were found at low densities in four and five out of five and six monitoring sites, respectively (Table 3.2.1.2).

Small-scale natural reproduction has also been observed in rivers Merikarvianjoki and Harjunpäänjoki (a tributary of Kokemäenjoki at the Bothnian Sea, SD 30), and in the rivers Kiskonjoki and Eurajoki (SD 29), as well as in Vantaanjoki at the Gulf of Finland (SD 32).

Plans have emerged to rebuild migratory fish stocks in several large, former salmon rivers in Finland. Projects are underway to study the preconditions for these activities in the rivers Kemijoki, Iijoki, and Oulujoki. Two fishways exist at Isohaara, which is the lowermost dam in the River Kemijoki. In 2021, the numbers of migrating salmon below these fishways were estimated to be about 6 100–6 800 salmon, including 1 000 wild salmon. Salmon have also been caught at the mouth of Kemijoki and released into upstream reproduction areas located in River Ounasjoki, but no information exists yet on the efficiency of the trap-and-transport- system. In River Iijoki, a smolt guiding fence and a channel through the Haapakoski dam (the uppermost dam on the river) was completed in 2022, and it will be modified based on fish monitoring in the coming years. A removable hydraulic fishway called “fish heart” was constructed at the lowermost dam of Iijoki in 2023, and its efficiency will be monitored in coming years. In the River Oulujoki, the number of ascending hatchery-released salmon passing through the Merikoski fishway at the river mouth since 2018 has varied between 344–3 870, and sea trout between 227–565. Each year, tens of wild salmon also migrate upstream, but their origin is unknown. A trap-and-transport system for spawners was constructed at the Montta hydropower station in 2017, but the outcomes have been very modest so far. The downstream migration and survival of smolts through multiple dams have been very low, if any, in all these rivers.

## Sweden

Three potential Swedish salmon rivers are listed in Table 3.2.1.1: **Moälven**, **Alsterån**, and **Helgeån**. Densities of wild salmon parr in electrofishing surveys in Alsterån are presented in Table 3.2.1.2.

Restoration efforts are ongoing at the regional–local level in the remaining potential Swedish salmon rivers. However, so far recent stocking activities and/or too low natural production have prevented them from having their status upgraded. The intention is to soon review and potentially update the list of Swedish potential salmon rivers according to new information

## Lithuania

Lithuania has no potential salmon rivers. Previously Minija/Veiviržas and Sventoji were considered potential rivers, but releases of salmon over several years have not resulted in natural reproduction, thus they are considered as mixed rivers.

## Poland

A restoration programme for salmon in seven potential Polish rivers was started in 1994 (Table 3.2.1.1), based on releases of hatchery reared Daugava salmon. The program has continued to this day and can be considered only moderately successful. To date, there is no good evidence of a fully successful re-establishment of any self-sustaining salmon population. However,

successful natural spawning has been monitored by electrofishing in the Slupia River (SD 25) since 2009. In other rivers, wild parr from natural spawning were also found in the Parseta, Łupawa (SD 25), and Drawa rivers (SD 24) in the last few years. In 2024, 34 salmon were recorded by a fish counter in a fish pass on Drawa River, which is less than in previous years. In addition, seven salmon were caught for breeding purpose in Pomeranian rivers.

In 2024, Polish hatcheries used eggs almost exclusively obtained from reared brood stock of River Daugava origin, except for salmon released to the Parseta River, where stocking was based on fish collected in this river. Only releases in the Drawa River were done with Nemunas strain since 2021. Total number of released hatchery reared alevins was 82 000, fry – 167 500 and 1 yr smolts – 147 600, less than half of the last year's numbers; 59% of smolts were released to Vistula R. (SD 26).

### **Russia**

The **Gladyshevka** River was selected as a potential river for the Russian Salmon Action Plan and is listed in Table 3.2.1.1. Densities of wild salmon parr from electrofishing surveys in Gladyshevka are presented in Table 3.2.1.2. In most years since 2004, wild salmon parr have been found in the river. Since 2021, there are no new data available on Russian rivers.

### **Estonia**

No potential salmon rivers have been listed in Estonia.

### **Latvia**

The Aģe River, which flows directly into the Gulf of Riga and is not currently listed as wild salmon river, is salmon river that holds substantial salmon population with high 0+ parr densities. It has accessible reproduction area of 1.2 ha in 10 km long section up to Aģes hydropower plant with potential for smolt production of approximately 800 to 1 000 smolts. Electrofishing time-series for this river (one site) start from 2011 and salmon parr have been annually detected since then. An additional three sites are electrofished starting from 2023. There have been no salmon releases. Average 0+ parr density in 2024 was 36.6 ind./100 sqm and 8.4 ind./100 sqm for older parr (Table 3.2.1.2). Trout spawning also takes place in this river, but at a smaller scale – in 2024, average 0+ parr density was 6.1 ind./100 sqm. It can be seen that productive generations of salmon and sea trout interchange every other year – in the years when the production of salmon 0+ parr increases, the production of sea trout parr decreases and vice versa, which suggests competition between the species for the available spawning grounds.

### **Germany**

So far, no German rivers with an outlet into the Baltic Sea have been identified as having a wild salmon population. There is controversy regarding the historical existence of wild Baltic salmon populations in Germany. A literature review by Zahn (2020) indicated the presence of historic wild salmon populations in some river systems of Schleswig-Holstein (S-H). In the River Trave, a few salmon are regularly caught during upriver spawning migrations. These fish may originate from earlier stocking activities with salmon from the Daugava system. However, in recent years, stocking of a limited number of one-year-old salmon has been initiated by a private initiative, using these spawners as broodfish. Furthermore, data from the German Water Framework Directive (WFD) sampling suggest that salmon parr may have been overlooked in some small rivers in S-H, and the occurrence of a very limited number of smolts in these rivers (e.g. Langballigau, Kronsbek, and Schwartau) with no stocking can be interpreted as evidence of natural reproduction. Additionally, irregular catches of a small number of salmon have occurred during upriver spawning migrations in the River Warnow in Mecklenburg-Western Pomerania. These fish are most likely strayers and it is unclear if there is any successful reproduction.

### **Denmark**

No potential Baltic salmon rivers have been listed in Denmark.

### 3.3 Reared salmon populations

#### 3.3.1 Releases

The total number of salmon smolts released in reared rivers around the Baltic Sea in 2000-2024 in AU 1–5 (subdivisions 22–31) is presented in Table 3.3.1.1. In 2024, salmon smolt releases were conducted by Finland, Sweden, Estonia, Latvia, Lithuania, and Poland. About 3.4 million smolts were released in 2024, with an additional 88 000 in AU 6 (Subdivision 32), making a grand total of 3.5 million smolts released in 2024, which is 0.1 million smolts less compared to 2023.

Releases of younger life stages (eggs, alevins, fry, parr) are presented in Table 3.3.1.2. These releases have in many cases consisted of hatchery surplus, often carried out at areas with poor habitat quality. In such cases, mortality among parr is high and releases contribute only to a small amount of smolts. On the other hand, when releases have taken place in potential, mixed or wild salmon rivers with good quality habitats, they have likely had a true contribution to the smolt production. Releases of younger life stages are expected to produce less than roughly 100 000 smolts in the next few years. However, the statistics available to WGBAST do not allow estimating the number of smolts expected from releases of younger life stages.

#### Releases by country

In **Sweden**, approximately 1.5 million reared young salmon were released in the Baltic Sea in 2024. Out of these, approximately 1.3 million (86%) were smolts out of which 47% were one-year-old (Table 3.3.1.1). The contribution of younger life stages (eyed egg and fry) increased in 2024 and was 13% of the total releases of salmon.

The decreased number of released young salmon in 2024 was a result of an extreme mortality (35–90%) of young salmon in 2023 in different compensatory hatcheries (also for the Atlantic salmon, not exclusively for the east coast), which will influence future releases (exactly how is unclear). The reason behind this elevated mortality is still not fully understood but is likely caused by a quality-issue with the feed used in the affected hatcheries. For other hatcheries using a different feed, no elevated mortality was observed and when a diet-switch was applied in the affected hatcheries, the increased mortality stopped within a couple of weeks. Ongoing studies on the cause for this spike in mortality will focus on the feed in relation to vitamin and lipid content and will be conducted by SLU. Previous studies done by the manufacturer has focused on the salt content but did not show any significant effect on the survival rate.

In **Finland**, releases are based on hatchery-reared and regularly renewed broodstocks rather than wild caught parents. In recent years, the releases have gradually been reduced. In Finland 1.198 million smolts were released in AU 1 and AU 3 and 71 000 in AU 6 in 2024 (Table 3.3.1.1). In addition, approx. 432 000 one-year-old parr, 86 000 eyed eggs, and 8 200 alevins were released in 2024.

In **Russia** there were annual releases in AU 6; in 2021, a total of 505 000 reared smolts were stocked. There is no information about releases in 2022-2024.

In **Estonia**, a rearing programme using the Neva salmon stock was started in 1994. Eggs were collected from the reared Narva stock and the mixed Selja stock. In the late 1990s, eggs were also imported from Finland. Captive stock based on spawners from the River Kunda was established in 2007. In the Main Basin area, salmon was released to Pärnu (Daugava origin). In 2024, there were 59 000 and 17 000 smolts released in AU 5 and AU 6, respectively (Table 3.3.1.1). In addition to that, 135 700 and 20 400 of salmon in younger fish stages were released in AU 5 and AU 6, respectively. These numbers consisted of one-spring and one-year-old parr.

In **Latvia**, artificial reproduction is based on sea-run wild and hatchery-origin salmon broodstock. The broodstock fishery is carried out in the rivers Daugava, Venta, and Gauja in October and November, and also in the Gauja River involving contracted anglers. In 2024, the total smolt production in Latvian hatcheries was 563 954 one-year-old smolts (Table 3.3.1.1), of which 298 052 were released in the Daugava River mouth.

Occasionally, **Lithuania** makes annual releases of a smaller number of smolts in AU 5; a total of 55 000 smolts were released in 2024 (Table 3.3.1.1). The smolts were released into five rivers: Neris, Šventoji (Neris catchment), Dubysa, Miniija, and Jūra catchment. In addition, 84 000 salmon fry were released in 2024.

In **Poland**, the last wild salmon population became extinct in the mid-1980s. A restoration programme was started in 1984, when eyed eggs of Daugava salmon were imported from Latvia. Since 2019, a part of eggs from Lithuanian salmon population (Zeimena) have been imported to Poland each year to create a broodstock and those offspring were released into the Drawa River. In subsequent years, eggs have been collected from returning spawners caught in Polish rivers, as well as from spawners reared in the hatcheries. Stocking material (smolts, fry, and alevins) are reared in seven hatcheries. In 2024, a total of 257 800 one-year-old smolts were released in AU 5 (Table 3.3.1.1). In addition, 130 000 salmon alevins and 850 000 salmon fry were released.

In **Germany**, no regular release programme for salmon exists in the Baltic region, as there are no known natural populations. Consequently, there were no official releases of salmon in rivers with outlet into the Baltic Sea in 2019-2024. The last year that salmon releases occurred in **Denmark** was in 2005.

### 3.3.2 Tagging data

Tagging data, mainly from external Carlin tags, have been used historically within the Baltic salmon assessment, to estimate population parameters as well as exploitation rates by different fisheries (see ICES (2025) for details). Both wild and reared salmon of different ages may be tagged, but a majority of the fish tagged over the years represent hatchery-reared smolts. The number of tag returns has become very sparse after 2009, and therefore, tag return data collected after 2010 is not used in the assessment.

Since smolt abundance is included as a parameter in the EU-MAP, smolt tagging is carried out as part of the data collection (for mark-recapture experiments). This is often done using streamer tags. Carlin tags have not been used in smolts since 2023, whereas T-bar anchor tags are still used to this day (e.g. in Finland and Estonia). Internal passive integrated transponder (PIT) tags are used in several wild (index) rivers in Sweden and also in reared rivers in Sweden and Finland (Table 3.3.4.1). Since 2020, a small part of smolts have been PIT-tagged and released to Polish rivers (Table 3.3.4.1). In addition, a batch marking method with alizarin red S dye was used in Finland in 2024 for experimental marking of stocked fish in the early development stages of salmon embryos and alevins (Table 3.3.4.1). Further, pop-up satellite tags were used by Sweden and Germany for a post-release survival study of salmon caught on trolling, and internal acoustic tags were implanted in a small number of wild smolts in Finland (in the River Tornionjoki) during the smolt migration in 2024 and continuing in 2025.

Tag return rates show decreasing trends for salmon tagged and released in the Gulf of Bothnia and Gulf of Finland, respectively. Nowadays, the reporting rate of tagged salmon varies between 0.1-0.3%. A similarly low recapture rate has been seen for Polish Carlin tags, where it decreased to below 0.5% since 2009, and tagging was terminated in 2012.

Tagging has provided information on straying of salmon. Spawning of salmon most often takes place in the river in which it originates from. However, tag recaptures have indicated that a few

percent of individuals may ascend into a different river (straying). Not all strayers necessarily enter the spawning grounds and contribute to spawning but may only temporarily visit the 'wrong' river. More detailed information on straying rates can be found in previous reports (e.g. ICES 2022).

### 3.3.3 Finclipping

Finclipping makes it possible to distinguish between reared and wild salmon in catches. Such information has been used, e.g. to estimate the proportion of wild and reared salmon in different mixed-stock fisheries. However, since not all Baltic salmon smolts released are finclipped, this information is currently not used in the WGBAST assessment model.

Since 2005, it has been mandatory in Sweden to finclip all released salmon (and sea trout). Since 2017, all salmon released in Finland are finclipped (except releases for enhancement purposes, mostly parr). Since 2000 all Estonian and since 2019 all Latvian reared smolts are also finclipped. All reared Lithuanian salmon smolts released in 2024 were also finclipped. In Poland, finclipping was stopped in 2013 and 2014 because of national veterinarian's objections.

In 2024, the total number of finclipped young salmon released was 3 247 356, and slightly decreased compared to 2023. Out of this total number, 9 100 were parr and 3 238 256 were smolts (Table 3.3.4.1). Most finclipping (in numbers) were carried out in SD 30–32, but part of the finclipped fish were also released in SD 26–29 (Table 3.3.4.1).

## 3.4 Thiamine deficiency and M74

In this section, updated information is provided on monitoring of thiamine deficiency and M74 in salmon. In the Stock Annex (ICES, 2025), further information is provided on the practice of M74 estimation and thiamine measurements along with secondary effects of M74.

M74 is a reproductive disorder caused by a low concentrations of thiamine (vitamin B1), resulting in early life-stage mortality (M74 from Swedish term *Miljöfaktor-74* due to initially unknown causation and the year of recognition, 1974 (Norrgren *et al.*, 1993)). A syndrome analogous to M74, referred to in North America as thiamine deficiency (TDC), is also documented in the New York Finger Lakes, the Laurentian Great Lakes, the Yukon River in Alaska, the Sacramento-San Joaquin River watershed in California, and coastal rivers in Oregon (Keinänen *et al.*, 2012, Fisher *et al.*, 1996, Mantua *et al.*, 2021, Reed *et al.*, 2023). The offspring of a thiamine deficient female do not develop normally, and the hatched fry tend to die early. Typical symptoms in M74-affected fry include uncoordinated movements (wobbling), inability to maintain an upright swimming position, inactivity, pallor, and body deformities such as a curved spines and swollen eyes and head, followed by death at the alevin stage (Keinänen *et al.*, 2000). In addition to low levels of thiamine, M74 is also associated with necrotic brain cells, oxidative stress, imbalance in fatty acids, and low levels of carotenoids (e.g. astaxanthin) (Amcoff *et al.*, 1999; Pickova *et al.*, 1999, 2003; Lundström *et al.*, 1999; Pettersson and Lignell, 1999; Vuori and Nikinmaa, 2007).

The cause of M74/TDC in salmonids is not fully known. In the Baltic Sea, M74 is linked to a lipid-rich fish diet and abundance of polyunsaturated fatty acids (Keinänen *et al.*, 2012, Vuorinen *et al.*, 2020, Vuorinen *et al.*, 2021), the flow of thiamine in the food web (Ejmond *et al.*, 2019) as well as large-scale changes in the Baltic Sea ecosystem (Majaneva *et al.*, 2020). In American studies, TDC is linked to the occurrence to salmonid consumption of planktivorous fish species containing the thiamolytic enzyme, thiaminase (Fisher *et al.*, 1996, Harder *et al.*, 2018). In the Baltic Sea, herring reportedly has a higher thiaminase activity than sprat, and currently research is ongoing at the University of Kalmar investigating the presence of thiaminase in salmon prey species.

There is limited documentation on how TDC directly impacts adult fish health and winter survival. While severe TDC can directly lead to adult mortality (Amcoff *et al.*, 1998, Brown *et al.*, 2005, Fitzsimons *et al.*, 2005), sublethal effects of deficiency may also reduce growth (Dahlgren *et al.*, 2024) and cognitive abilities, such as vision and foraging ability (Carvalho *et al.*, 2009). TDC can reportedly also impact the ability of migrating salmonids to ascend cascades (Ketola *et al.*, 2005) and decrease the number of attempts an individual fish will make to traverse challenging river reaches (Harbicht *et al.*, 2018).

M74/TDC as an emerging global threat to populations of salmonid fish and their associated fisheries was discussed during the session on *Thiamine deficiency in fishes* at the 2024 World Fisheries Congress in Seattle. There was a general consensus on the need of a coherent review of documented causes of TDC in various systems along with interdisciplinary approaches and networking in future work targeting TDC.

### 3.4.1 Monitoring of M74 in the Baltic Sea

In Sweden, monitoring of M74 is conducted annually with data from compensatory hatcheries in rivers Dalälven, Ume/Vindeln, Luleälven, Skellefteälven, Ångermansälven, Indalsälven, and Ljusnan. In Finland, Tornionjoki/Torneälven has an ongoing M74 monitoring programme. In previous years, more rivers were included in the Swedish and Finnish monitoring (Table 3.4.1.1 in this report, and Table 3.4.1.2 in ICES, 2024a). In Sweden, M74 incidences predominantly represent the percentage of females in a hatchery with high offspring mortality. In Finland, different data types have been used from different rivers over the years (Table 3.4.1.2 in ICES, 2024) but for hatching year 2024, only the level of free thiamine in unfertilized eggs was collected from one river, Tornionjoki.

Historically, M74 syndrome resulted in a high mortality of salmon yolk-sac fry in the hatching years 1992–1996, with an M74 incidence well above 50% in most Swedish and Finnish rivers (Table 3.4.1.1, Figure 3.4.1.1). Trends and annual fluctuations in average proportions of M74-affected females have been very similar in Swedish and Finnish rivers over the years, and very low since 2018 (Figure 3.4.1.1).

There may be some differences in M74 occurrence between salmon populations. Such variations could be explained by differences in diet as migration routes and feeding grounds during the feeding migration differ (Jacobson *et al.*, 2020) and perhaps also by genetic prerequisites for tolerating thiamine deficiency (research studies are currently being carried out at SLU).

In the Gulf of Finland, M74 has been monitored for certain years in the River Kymijoki in AU 6 (Gulf of Finland), where the incidence of M74 has generally been lower than in the northern AU 1 rivers Simojoki and Tornionjoki (Table 3.4.1.1). There has been no monitoring of M74 mortality in Kymijoki after autumn 2019.

In the Lithuanian River Neris, in autumn 2017, the free thiamine concentrations in unfertilized eggs of salmon that ascended were considerably higher compared to salmon of the Gulf of Bothnian rivers, and the incidence of M74 in hatching years 2018–2020 was very low or almost insignificant (albeit based on a small number of sampled fish).

In Estonia, M74 has been observed in hatcheries in some years during the period 1997–2006, but the mortality has not exceeded 15%. A small number of spawners has been collected for brood stock from the River Kunda since 2013, and no fry mortality has been observed.

There is no data to suggest that M74 occurs in Latvian salmon populations. The mortality in the main hatchery from hatching until the start of feeding varied in the range of 2–10% in 1993–1999. In addition, parr densities in the Latvian River Salaca did not decrease during the period in the

1990s when salmon reproduction in the Gulf of Bothnia was negatively influenced by M74 (Table 3.1.5.1).

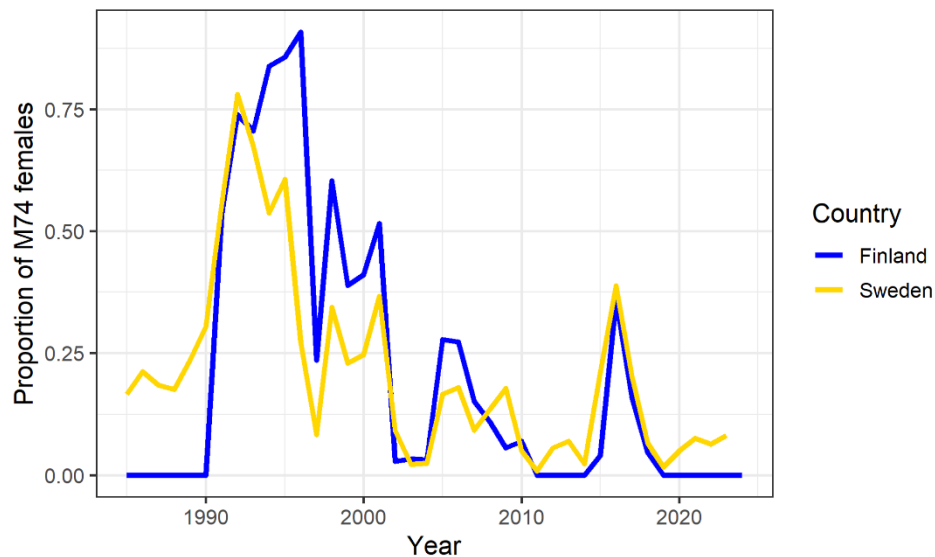


Figure 3.4.1.1. Proportion of M74 positive females in Swedish and Finnish hatcheries. Spawning years are given in the x-axis.

### 3.4.2 Thiamine concentrations in salmon eggs

The concentration of free thiamine in unfertilized eggs has a strong negative correlation with M74-related mortality of yolk-sac fry (Vuorinen *et al.*, 2021). Thus, prognosis for the incidence of M74 in offspring groups (females) can be conducted based on the concentration of thiamine levels (total levels or as free thiamine) in eggs vs. yolk-sac fry mortality. The threshold of free thiamine concentrations for incipient M74 mortality and 100% offspring mortality (LC100) is documented at the free thiamine concentrations 0.71 and 0.22 nmol/g in ovulated unfertilized eggs, respectively. LC50 value for the free thiamine concentration is 0.47 nmol/g and that for the total thiamine concentration was 1.11 nmol/g.

Data on thiamine concentrations in unfertilized salmon eggs are monitored annually in Sweden and Finland. The techniques used for measurements of thiamine concentrations differ between Swedish and Finnish monitoring, but the results are comparable. The eggs from 2024 of the ascending females from four Swedish rivers were analysed for total levels of thiamine using a method described in Larsson *et al.*, (2024). During the hatching season of 2025, mean levels for the various rivers were Dalälven 4.2 nmol/g, Luleälven 3.7 nmol/g, Skellefteälven 3.0 nmol/g, and Ume/Vindelälven 3.0 nmol/g. Mean level for free thiamine in Tornionjoki / Torneälven salmon eggs was 4.7 nmol/g (range 1.9–11.5, 53 females), and therefore no M74 is expected in hatching year 2025.

### 3.4.3 M74 in stock assessments

To obtain annual estimates of the M74-derived yolk-sac fry mortality, a Bayesian hierarchical model is applied to the Gulf of Bothnia monitoring data of M74 occurrence from rivers in Finland and Sweden. This information is needed to fully assess the effects of M74 on the reproductive

success of spawners. The model is described in the Stock Annex (ICES, 2025, Section C.1.6 and in previous reports). The model provides annual estimates of M74-related mortality for all rivers in Gulf of Bothnia, including those in which no monitoring has been carried out (Table 4.2.2.2, Figure 4.2.2.2).

### 3.5 Hazardous substances

In Sweden, the National Food Agency (NFA) is responsible for sampling, analysing, and providing dietary recommendations regarding dioxins and other toxic substances in fish. The NFA monitoring of dioxin and dioxin-like polychlorinated biphenyls (PCBs) in salmon and sea trout demonstrates a tendency towards lowered concentrations during 2014-2019 (Bergkvist and Aune, 2020). The Swedish control programme is set up in accordance with EU regulation 589/2014. Limits are set out in EU Regulation 1881/2006 with updates in EU Regulation 1259/2011. Sweden has an exception to the limits of dioxin when it comes to salmon and a few other fish species in the Baltic Sea (and in lakes Vänern and Vättern). In 2018, the European Food Safety Authority (EFSA) altered its statement on the risk posed to humans by dioxins and PCBs, something that has yet to be implemented by the NFA. EFSA is in the process of performing a larger risk-benefit study about fish consumption and exposure to contaminants, which may have effects on guidelines for human consumption. Also, Finland has an exemption to the EC regulation 1259/2011, which allows selling of Baltic salmon and sea trout on the domestic market. No export of wild-caught salmon or sea trout is allowed.

According to the Finnish survey for EU reporting (Airaksinen *et al.*, 2018) the concentrations of dioxins in salmon decreased approximately with 50% during the 2000s. However, dioxin concentrations in salmon sampled in 2016 still exceeded the maximum allowable value set by the EU (Airaksinen *et al.*, 2018). In Denmark, the following restrictions for marketing of salmon (and sea trout) were enforced from 05 December 2016: Salmon  $\leq 5.5$  kg gutted weight caught in ICES subdivisions 24–26 must be trimmed (deep-skinned) before marketing. In the same SDs, salmon weighing  $> 5.5$  kg and 2.0 kg caught in ICES SD 27–32 must also be analysed for dioxin before marketing.

A study on concentration of PCB and dioxins was recently conducted by Svenska miljöinstitutet, IVL (Hällén *et al.*, 2020). Within the project, levels of dioxin-like substances were measured in salmon from four catch areas along the northeast coast that were relatively similar. Median levels of dioxin-like substances in collected salmon during 2014-2019 period was 6.2 pg TEQ/g (wet weight), i.e. just below the EU marketing limit. Both the fat content and length of salmon correlated with its levels of dioxin-like substances. No age determination of salmon (and trout) was made within the project, whereby any age relationships could not be established. Furthermore, a statistically significant, decreasing time trend for the period 2014-2019 could be observed in dioxin-like substance concentrations, in particular with regard to dioxin-like PCBs. This coincides with results observed by the NFA with decreasing levels in salmon in recent years.

Additional studies are currently undertaken to investigate the levels of perfluorinated alkyl substances (PFAS), including carboxylic and sulfonic acids, in salmon from three Swedish rivers, two east coast rivers connected to the Baltic Sea, and one west coast river connected to Kattegat. Preliminary results indicate the highest levels in the salmon serum were recorded for perfluorooctanesulfonic acid (PFOS), with levels as high as 325 ng/g wet weight for linear PFOS. Several isoforms of PFOS were also detected. The dominant fluorinated carboxylic acid was perfluoroundecanoic acid (PFUnA). The levels in the salmon from the Baltic Sea rivers were much higher than those in salmon from the west coast, where the highest levels were recorded in specimens from the river Umeälven (pers. commun. E. Dahlgren).

### 3.6 Disease outbreaks

For several years since 2014, there was a high number of reports from fishers and local administrators of dying or dead salmon from Swedish and Finnish salmon rivers, spanning from Tornionjoki to Mörrumsån. The main type of health problem observed (with an unknown cause) was defined as Red Skin Disease (RSD, Weichert *et al.*, 2020). RSD is associated with external clinical signs like haemorrhage, erosions, and ulcerative/necrotic skin conditions in returning adults, typically followed by secondary fungal/oomycete infections causing death.

In addition to reports of dead or dying salmon, individuals with deviating behaviour have occasionally been observed (swimming close to river surface, not afraid of boats, etc.). Severe disease outbreaks have so far occurred in Tornionjoki (2014–2015, 2019), Kalixälven (2015), Ume/Vindelälven (2015–2020), Ljungan (2016–2020), and Mörrumsån (2014–2018). In several cases, the number of dead salmon (and other species) has been considerable, although quantitative estimates of total death rates are missing. It is also likely that infected individuals may leave the river long before the spawning period (Huusko *et al.*, 2020).

Besides national sampling programmes, the ICES Working Group on Pathology and Diseases of Marine Organisms (WGPDMO) had Baltic salmon health issues listed in its ToRs during 2019–2021. Overall, the RSD situation for wild salmon during 2021–2023 has been much less intense than during 2017–2020 (C. Axén, pers. commun.). The disease prevalence has varied considerably between both rivers and years. In some rivers, there are so far no reports of elevated levels of salmon death.

The reason for poor salmon health in some years is likely a combination of factors. Investigations carried out in 2016 by the Swedish and Finnish veterinary medical authorities (Statens veterinärmedicinska anstalt, SVA, and Livsmedelsverket, formerly EVIRA) confirmed the presence of skin bleeding and in some cases UDN-like skin changes (Ulcerous Dermal Necrosis) with subsequent fungal attacks.

In Ljungan, very low 0+ salmon densities were observed in 2017–2021, coinciding with recent health problems among adults. In 2022, densities of 0+ parr increased significantly, which is in line with observations of improved health status among ascending spawners in 2021 (see above). In Vindelälven, the average 0+ parr density declined and remained very low in 2016–2019. Since 2020, densities of 0+ parr have increased, and in 2022 the highest density of 0+ parr in the time-series was observed. The low salmon recruitment in Vindelälven in 2016–2019 reflects a combination of few ascending MSW spawners, low proportion of female spawners, elevated M74-mortality (Section 3.4.1) and observed and presumed additional mortality among spawners after having passed the Norrfors fishway (where counting takes place) (ICES, 2021a). The higher parr densities in recent years is a direct consequence of more and healthier MSW spawners with a higher proportion of females. During 2015, 2016, 2018, and 2020, ascending salmon were investigated for health related symptoms, including RSD, in rivers Mörrumsån, Torne- and Ume/Vindelälven. The work was carried out in collaboration between SVA, Ruokavirasto, Luke, Gothenburg University and SLU (SVA, 2017, 2019, 2021).

The sampling conducted by the Swedish Veterinary Agency (SVA) is part of a newly initiated Swedish national monitoring program targeting salmon health. There are several potential factors associated with the RSD, and it is not clear what is driving the problem. Thus, so far, the monitoring has been focused on collection of samples for future research. In addition, the value of various methods of data collection without sampling fish materials is evaluated, such as questionnaires to anglers in rivers, information from compensatory hatcheries, camera surveillance (detection of unhealthy fish via fish counters), and inventories at spawning areas. More extensive

analyses of collected material, that hopefully will provide more knowledge on the cause of RSD, are ongoing. So far, there have been no reports of RSD or UDN-like disease problems in Russian or Estonian salmon rivers. Late in 2017, pre-spawning mortality in salmon (and sea trout) was reported for the first time from the River Gauja in Latvia. Similar to Swedish rivers, the fish were described as apathetic; they showed slow response to irritants and were easily caught. There were also multiple observations of skin wounds with fungal infections. Studies on presence of infectious viruses and bacteria on salmon and sea trout, as well as histological examinations, did not reveal the cause of pre-spawning mortality. No new reports on health-related mortality in adult salmonids were received from Latvian anglers in 2018-2022, and no further veterinarian investigations have been conducted. In 2018, elevated mortality among adult salmon (mainly) and sea trout was also reported from tributaries within the Neris catchment (Nemunas river system) in Lithuania. Fish were observed to die from skin infections of fungal and/or bacterial origin, possibly reflecting secondary infections associated with UDN (not confirmed). In some cases, the proportion of affected individuals during and after the spawning period exceeded 90%. In 2019 and 2020, however, only few reports of affected or dead salmonids (no more than five fish per year) have been received from Lithuanian rivers. See Section 5.8 for additional observations on health issues related to sea trout.

### **3.6.1 A workshop on salmon and sea trout health in the Baltic Sea and its adjacent rivers**

Information related with health problems of salmon and sea trout provided by Baltic Sea countries are diverse. To improve the understanding of the most pending issues and systematization of knowledge related with health status of salmon and sea trout, the *Workshop on salmon and sea trout health in the Baltic Sea and its adjacent rivers* was held on 08–09 October 2024, at the Department of Aquatic Resources, Swedish University of Agricultural Sciences in Stockholm, Sweden (financed by SWAM). Representatives from Sweden, Finland, Estonia, Latvia, Poland, and Denmark gathered to discuss current health issues affecting salmon and sea trout in the region. The workshop identified key emerging threats, including water mould, M74 syndrome, and prophylactic kidney disease, as the most pressing concerns for wild salmon and trout (a scientific paper is forthcoming, Nadolna-Altyn *et al.* in prep.). Participants emphasized the need for further research and international collaboration to better understand and address these health challenges.

## **3.7 Tables**

**Table 3.1.1.1a. Estimated salmon catches (in individuals) in four wild rivers of AU 1 for the last 10 years. Releases are shown for Swedish rivers since 2004/2015, for Simojoki since 2023. Data on salmon catches since the 1970s and CPUEs (in tonnes) are available in previous WGBAST reports (e.g. 2021).**

Year	Simojoki		Kalixälven		Råneälven		Tornionjoki/ Torneälven				
	Kept	Released	Kept	Released	Kept	Released	Finnish Kept	Finnish Released	Swedish Kept	Swedish Released	Total Kept
2015	223		370	196	16		12709	972	2.984	170	15693
2016	247		248	208	9	43	17202	1296	3.854	369	21056
2017	63		200	199	11	45	10533	810	2.014	174	12547
2018	91		95	161	2	28	11288	1342	1.668	415	12956
2019	144		100	150	7	38	12640	1042	1.335	400	13975
2020	245		112	26	2	36	14516		1.613	293	16129
2021	145		190	200	5	34	20087	2689	2.179	425	22266
2022	101		115	345	1	12	11039		1.887	395	12926
2023	47	13	535	289	3	11	5572	571	1.288	199	6860
2024	28	3	501	166	0	5	4180	340	1.608	147	5788

**Table 3.1.1.1b. Estimated salmon catches (in individuals) in six rivers, including two reared rivers, of AU 2 for the last 10 years. Data on salmon catches since the 1970s are available in previous WGBAST reports (e.g. 2021).**

Year	Luleälven		Piteälven		Åbyälven		Byskeälven		Kågeälven		Skellefteälven	
	Reared		Wild		Wild		Wild		Wild		Reared	
	Kept		Kept	Released	Kept	Released	Kept	Released	Kept	Released	Kept	Released
2015	2923		50		15	75	232	1125	0	92	1400	
2016	3984		32	16	8	19	186	726	0	61	280	
2017	3566		27	15	13	28	171	573	0	18	400	
2018	4060		20	11	1	4	9	32	0	6		
2019	3850		30	15	5	35	98	289	0	25	1	3
2020	2775		15	25	4	84	79	522	0	46	100	
2021	238		30	35	2		106	451	0	31		9
2022	490		35	35	1	27	262	813	0	1	1	3
2023	374		5	10	2	16	39	203	0	1	n/a	n/a
2024	2342		48	5	0	7	79	271	0	10	150	0

**Table 3.1.1.1c. Estimated salmon catches (in individuals) in six rivers, including one reared river, of AU 2 for the last 10 years. Data on salmon catches since the 1970s are available in previous WGBAST reports (e.g. 2021).**

	Rickleån		Sävarån		Ume/Vindelälven		Öreälven		Lögdeälven		Gideälven
	Wild		Wild		Wild		Wild		Wild		Reared
	Kept	Released	Kept	Released	Kept	Released	Kept	Released	Kept	Released	Kept
2015	22	23	0	4	80	80	200	250	125		
2016	5	15	0	13	90	125	200	400	107	28	
2017	2	13	0		31	1	35	60	82	61	
2018	2	18	0	5	1	103	0	4	34	46	
2019	6	30	0	4	300	200	29	77	71	143	
2020	6	13	7	11	900	450	300	200	276	49	
2021	6	40	3	12	270	374	40	110	107	114	
2022	0	56	0	10	25	75	13	42	104	109	
2023	1	21	0	20	106	112	5	25	137	60	
2024	2	22	1	11	234	193	3	7	62	26	

Table 3.1.1.1d. Estimated salmon catches (in individuals) in eight rivers, including four reared rivers, of AUs 3 & 4 for the last 10 years. Data on salmon since the 1970s are available in previous WGBAST reports (e.g. 2021).

Year	Ångermanälven		Indalsälven		Ljungan		Ljusnan		Testeboån		Dalälven		Emån		Mörrumsån	
	Reared		Reared		Wild		Reared		Wild		Reared		Wild		Wild	
	Kept	Released	Kept	Released	Kept	Released	Kept	Released	Kept	Released	Kept	Released	Kept	Released	Kept	Released
2015	426		1500		6	155	326		0		1391	33	0	49	212	619
2016	348		1200		14	89	63	42	0		579	10	8	49	94	368
2017	188		1325	250	5	48	7		0		223	4	0	83	41	518
2018	700		1325	75	16	190			0		417	370	0	19	45	170
2019			2575	50	0	95			0		577	328	5	100	95	395
2020	374		2525	150	1	41					616	253	2	118	110	317
2021			2950	230	2	29					854	212		39	55	313
2022			1162	58							623	214		93	46	470
2023	111		291	51	0	22			0		953	20	1	91	51	223
2024	1134		1459	419	0	40			0	5	1005	998	1	125	35	197

Table 3.1.1.2. Numbers of wild salmon (MSW = multi-sea winter) in fishways and hydroacoustic counting in rivers of AUs 1-4 (SDs 25, 27, and 30-31) for the last 10 years. Data from earlier years are available in ICES (2024) – Data Output File, <https://doi.org/10.17895/ices.data.25887487>.

Year	Number of salmon																			
	Simojoki (AU 1)		Tornionjoki (AU 1)		Kalixälven (AU 1)		Linaälven (AU 1)	Råneälven (AU 1)	Piteälven (AU 2)		Åbyälven (AU 2)		Byskeälven (AU 2)		Rickleån (AU 2)	Ume/Vindelälven (AU 2)			Testeboån (AU 3)	Mörrumsån (AU 4)
	MSW	Total	MSW	Total	MSW	Total	Total	Total	MSW	Total	MSW	Total	MSW	Total	Total	MSW	Females	Total	Total	Total
2015	2549	2950	45456	57152	5221	8288	1281	1004	1566	1907	78	80	4224	5311	13	2781	790	7521		1057
2016	5125	5435	91137	98338	6368	8439	798	1454	1609	2009	116	155	5533	7280	17	4238	2741	9134	73	712
2017	1642	1918	36409	40952	4687	5174	872	1781	1335	1455	108	108	3465	4125	15	2582	908	4100	67	980
2018	3231	4016	35866	47028	5409	7215	1150	4184	1222	1431	113	113	1305	2168	36	2777	728	12754	21	183
2019	3749	4039	52738	65520	8681	9957	1237	2132	1922	2089	81	93	4578	5306	55	9668	3389	12683	160	no control
2020	3707	4124	56716	69149	12336	18664	2335	2461	759	1006	52	55	4297	6675	57	7992	3396	12104	104	no control
2021	3554	3929	82796	93121	13922	17731	1904	no control	<sup>3</sup> 1882	<sup>3</sup> 2444	21	24	5259	5863	19	8287	4307	9317	158	no control
2022	2888	3132	47777	52030	8326	8812	1473	661	<sup>3</sup> 1203	<sup>3</sup> 1392	120	133	<sup>1</sup> 2911		24	2690	1432	3224	66	369
2023	1819	2022	16020	20260	3845	7943	1355	363	<sup>3</sup> 689	<sup>3</sup> 1170	74	74	<sup>2</sup> 2792	<sup>3</sup> 3808	26	2043	1179	4549	141	433

Year	Number of salmon																			
	Simojoki (AU 1)		Tornionjoki (AU 1)		Kalixälven (AU 1)		Linaälven (AU 1)	Råneälven (AU 1)	Piteälven (AU 2)		Åbyälven (AU 2)		Byskeälven (AU 2)		Rickleån (AU 2)	Ume/Vindelälven (AU 2)			Testeboån (AU 3)	Mörrumsån (AU 4)
	MSW	Total	MSW	Total	MSW	Total	Total	Total	MSW	Total	MSW	Total	MSW	Total	Total	MSW	Females	Total	Total	Total
2024	1706	1935	21947	24629	8401	9256	1262	429	1026	1178	169	169	3036	3569	29	6196	3031	7696	352	110

<sup>1</sup> In Byskälven the fish counting 2022 was only partly analysed, until the 26 of June. Data is available but not analysed by the municipality.

<sup>2</sup> In Byskälven, fish counting 2023 failed from the 15 of August onwards. Extrapolation of number MSW and grilse in 2023 was executed using data from 2020 for the missing migration period.

<sup>3</sup> Data for Piteälven is updated for 2021 and 2022 after extra analyses verifying species and in 2023 using average proportion of salmon and trout for the two previous years. MSW proportion in Piteälven in 2024 was estimated based on MSW proportion in other large rivers.

**Simojoki:** Hydroacoustic counting near the river mouth, started 2003. **Tornionjoki:** Hydroacoustic counting 100 km upstream from the sea, started 2009. **Kalixälven:** Electronic counting started in 1998 and video fish counting in 2001, 100 km upstream from the sea. **Linaälven:** Tributary 65 km upstream from outlet into Kalixälven and 120 km from the sea. Fish counting started 2015 and is the entire run. **Råneälven:** Hydroacoustic counting 40 km upstream from the sea, started 2014. **Piteälven:** Old fishway built 1960 replaced with new fishway in 1992. Fish counting is the entire run. **Åbyälven:** Fishway built in 1995 at hydropower plat (Hednäs). Fish counting is only part of the total run. **Byskeälven:** Two operating fishways (one from 19th century, one from 2000). Fish counting is part of the total run. **Rickleån:** Four fishways was built 2002. Fish counting is part of the total run. **Umeälven/Vindelälven:** Fishcounting in the fishway is the entire run and includes both wild and reared salmon. **Testeboån:** Counting represents the majority of the run, started in 2015 in the fishway. **Mörrumsån:** From 2002-2018 electronic fish counter, 12 km from rivermouth (partial counts of total run). Hydropower dam and fishway removed in 2020. In 2022-2024 counting took place closer from the river mouth (c. 4 km) with a combination of sonar and video counter (reported numbers are individuals registered at the camera counter, representing partial run).

**Table 3.1.1.3. The age and sex composition of ascending salmon caught by the Finnish river fishery in the River Tornionjoki since the mid-1970s.**

	Year(s)											
	1974-1985	1986-1990	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021	2022	2023	2024
<b>N:o of samples</b>	<b>728</b>	<b>283</b>	<b>734</b>	<b>2114</b>	<b>2170</b>	<b>1879</b>	<b>2988</b>	<b>2650</b>	<b>975</b>	<b>416</b>	<b>192</b>	<b>126</b>
A1 (Grilse)	9%	53%	35%	7%	20%	8%	10%	17%	7%	1%	15%	2%
A2	60%	31%	38%	59%	50%	53%	43%	58%	77%	67%	37%	65%
A3	29%	13%	24%	28%	26%	31%	38%	18%	13%	30%	35%	17%
A4	2%	2%	3%	4%	3%	6%	6%	5%	2%	2%	11%	10%
>A4	0%	1%	<1 %	2%	2%	2%	3%	1%	0%	0%	2%	6%
Females, proportion of biomass	About 45%	49%	75%	71%	65%	67%	62%	61%	65%	72%	69%	80%
Proportion of repeat spawners	2%	2%	2%	6%	6%	8%	9%	7%	3%	4%	15%	16%
Proportion of reared origin	7%	46%*	18%	15%	9%	1%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%

\*An unusually large part of these salmon were not finclipped, but analysed as reared on the basis of scales (probably strayers). A bulk of these were caught in 1989 as grilse.

Table 3.1.1.4. Densities and occurrence of wild salmon parr in electrofishing surveys in the rivers of AU 1 (SD 31).

River year	Average density (parr/100 m <sup>2</sup> )				Sites with 0+ parr (%)	Number of sampling sites	Notes
	0+	1+	2+ & older	>0+ (sum of two previous columns)			
Simojoki							
2015	18.6	5.7	0.8	6.5	86%	36	
2016	28.1	10.2	3.5	13.7	83%	35	
2017	38.1	19.1	8.7	28.4	86%	37	
2018	30.6	25.6	16.4	42.0	83%	36	
2019	40.9	7.2	7.2	14.4	83%	36	
2020	21.3	13.4	6.5	19.9	83%	36	
2021	31.4	8.7	8.3	17.0	81%	36	
2022	35.1	10.3	3.0	13.3	81%	36	
2023	54.9	13.5	3.4	16.8	81%	36	
2024	6.8	13.8	3.5	17.3	75%	36	
Tornionjoki							
2015	40.6	17.0	5.3	22.3	99%	80	
2016	25.2	3.9	3.9	7.8	98%	61	Flood, only a part of sites was fished
2017	28.5	9.6	7.6	17.2	99%	80	
2018	17.6	10.9	5.3	16.2	92%	79	
2019	25.5	9.5	5.6	15.2	92%	79	
2020	20.2	12.9	7.0	19.8	100%	78	
2021	29.7	9.9	13.5	23.4	97%	77	
2022	22.3	13.9	5.1	19.0	99%	77	
2023	26.3	8.7	5.2	13.9	94%	77	
2024	16.1	17.1	6.7	23.8	83%	77	
Kalixälven							
2015	48.8	15.3	5.9	21.1	93%	30	
2016	14.8	11.8	6.2	17.9	100%	30	
2017	17.2	5.9	5.7	11.6	97%	30	

River year	Average density (parr/100 m <sup>2</sup> )				Sites with 0+ parr (%)	Number of sampling sites	Notes
	0+	1+	2+ & older	>0+ (sum of two previous columns)			
2018	26.2	11.6	7.2	18.8	83%	30	
2019	19.9	10.3	3.7	14.0	85%	40	
2020	24.3	18.9	7.5	26.4	100%	40	
2021	24.3	14.4	8.4	22.8	100%	31	Flood, only part of sites was fished
2022	27.4	10.1	5.1	15.2	87%	40	
2023	20.6	10.9	4.5	15.3	93%	40	
2024	11.4	7.9	5.3	13.2	90%	40	
Råneälven							
2015	9.6	5.5	4.0	9.5	79%	14	
2016	4.7	5.2	5.8	10.9	86%	14	
2017	3.4	2.6	4.9	7.5	100%	5	Flood, only a part of sites was fished.
2018	3.9	1.8	5.9	7.6	64%	14	
2019	9.2	3.5	2.0	5.5	86%	14	
2020	5.7	10.6	3.1	13.7	79%	14	
2021	2.8	8.0	2.3	10.3	67%	9	Flood, only a part of sites was fished.
2022	7.6	2.4	3.3	5.7	71%	14	
2023							No sampling because of flood.
2024	1.0	2.6	2.2	4.8	50%	14	



AU	River		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
3	Ljungan	smolts									1 877	3 075
		CV									0.33	0.30
	Testeboån	smolts	1 824	2 017	3 149			1 904	945	5 533		
		CV	0.37	0.14	0.18			0.59	0.47	0.53		
4	Mörrumsån	smolts	9 586	17 524	9 889	6 858	2 753	7 489	6 673	11 531	3 948	6 635
		CV	0.17	0.14	0.18	0.26	0.24	0.23	0.23	0.22	0.21	0.42

**Table 3.1.2.1. Densities and occurrence of wild salmon parr in electrofishing surveys in the rivers of AU 2 (SD 30-31) and average densities that are used as input in the river model for the last 10 years. Detailed information on the age structure of older parr (>0+) is available only from Piteälven, Åbyälven and Byskeälven. Data from earlier years is available in ICES (2024) – Data Output File, <https://doi.org/10.17895/ices.data.25887487>.**

River Year	Average density (parr/100 m <sup>2</sup> )				Sites with 0+ parr (%)	Number of sampling sites	Notes
	0+	1+	≥2+	>0+			
Piteälven							
2015	4.9	3.6	0.7	4.3	100%	7	7 site Piteälven
2016	7.6	4.7	1.2	6.0	100%	4	4 site Piteälven
2017							No sampling
2018	10.5			8.1	100%	7	1 site Piteälven, 6 site Varjisån
2019	14.0			9.3	100%	4	1 site Piteälven, 3 site Varjisån
2020	8.0			4.6	100%	8	2 site Piteälven, 6 site Varjisån
2021	1.0			1.7	100%	4	1 site Piteälven, 3 site Varjisån
2022	10.0			1.7	100%	6	1 site Piteälven, 5 site Varjisån
2023							No sampling
2024							No sampling
Åbyälven							
2015	9.3	4.7	1.6	6.4	100%	14	
2016	17.8	4.2	3.0	7.1	86%	14	
2017	16.3	5.7	2.7	8.4	100%	14	
2018	11.6	3.7	4.9	8.6	93%	14	
2019	10.5	5.2	2.5	7.7	95%	20	
2020	5.7	4.2	2.5	6.7	100%	20	
2021	6.6	2.4	2.7	5.1	95%	20	
2022	14.3	3.8	2.0	5.8	90%	20	
2023	9.6	4.4	1.0	5.4	100%	20	
2024	2.1	2.0	1.9	3.9	80%	20	
Byskeälven							
2015	35.9	14.0	5.1	19.0	100%	15	
2016	43.1	14.6	6.8	21.3	100%	15	
2017	40.1	15.5	7.0	22.6	100%	15	

River Year	Average density (parr/100 m <sup>2</sup> )				Sites with 0+ parr (%)	Number of sampling sites	Notes
	0+	1+	≥2+	>0+			
2018	24.1	13.1	9.5	22.6	100%	15	
2019	52.4	9.1	6.3	15.4	93%	15	
2020	25.0	14.4	4.7	19.1	93%	15	
2021	21.3	7.3	9.6	16.9	93%	15	
2022	40.5	7.0	4.7	11.8	93%	15	
2023	23.4	9.7	2.7	12.3	100%	15	
2024	17.4	6.8	5.9	12.7	93%	15	
Kågeälven							
2015	19.8			15.0	100%	13	
2016	8.1			4.3	90%	10	
2017	17.5			13.0	100%	7	
2018	13.4			18.4	90%	11	
2019	7.5			4.0	75%	12	
2020	4.9			7.5	91%	11	
2021	7.5			5.6	92%	12	
2022	16.8			7.9	92%	12	
2023	6.1			3.0	83%	12	
2024	2.9			10.0	50%	12	
Rickleån							
2015	8.1			2.6	100%	9	
2016	5.9			3.9	100%	11	
2017	4.6			4.6	100%	11	
2018	2.5			7.0	57%	12	
2019	11.1			1.4	100%	12	
2020	11.3			4.1	100%	13	
2021					0%	1	High flows. Not used in model
2022	1.4			0.6	46%	13	
2023	2.7			0.8	31%	12	One site removed from extended

River Year	Average density (parr/100 m <sup>2</sup> )				Sites with 0+ parr (%)	Number of sampling sites	Notes
	0+	1+	≥2+	>0+			
2024	9.3			2.8	86%	7	Reduced sampling due to flood
Sävarån							
2015	45.3			34.3	100%	9	
2016	32.2			38.6	100%	9	
2017	21.6			34.5	89%	9	
2018	14.7			31.7	100%	12	
2019	8.9			15.2	75%	12	
2020	36.7			19.7	100%	13	
2021	4.0			6.7	100%	6	Reduced sampling due to flood
2022	21.1			11.1	100%	13	
2023	13.2			10.9	79%	12	
2024	9.3			14.8	92%	13	
Ume/Vindelälven							
2015	16.2			11.0	95%	31	
2016	0.8			3.8	47%	29	
2017	3.1			3.9	78%	15	Reduced sampling due to flood
2018	0.1			1.6	10%	27	
2019	2.8			1.0	50%	28	
2020	19.9			3.6	71%	28	
2021	20.7			10.6	75%	20	Reduced sampling due to flood
2022	45.4			17.7	75%	28	
2023	15.7			13.0	59%	29	
2024	10.0			5.8	66%	29	
Öreälven							
2015	21.0			4.5	100%	13	
2016	12.9			5.8	80%	13	
2017	11.3			4.9	80%	10	
2018	1.2			4.9	50%	16	

River Year	Average density (parr/100 m <sup>2</sup> )				Sites with 0+ parr (%)	Number of sampling sites	Notes
	0+	1+	≥2+	>0+			
2019	18.7		1.7	100%	16		
2020	33.5		2.5	100%	15		
2021	2.8		2.9	50%	6	Reduced sampling due to flood	
2022	7.4		3.1	67%	15		
2023	1.3		0.8	31%	15		
2024	0.8		0.3	33%	9	Reduced sampling due to flood	
Lögdeälven							
2015	15.0		11.3	100%	11		
2016	13.9		7.9	100%	11		
2017	7.0		10.6	100%	8		
2018	9.7		9.3	100%	13		
2019	20.5		6.8	100%	13		
2020	20.6		13.1	92%	13		
2021	4.1		5.9	86%	7	Reduced sampling due to flood	
2022	9.9		4.1	100%	13		
2023	6.1		4.0	86%	12		
2024	7.1		3.8	75%	12		

Table 3.1.3.1. Densities and occurrence of wild salmon parr in electrofishing surveys in AU 3 (SD 30) that are used as input in the river model for the last 10 years. Detailed information on the age structure of older parr (>0+) is not available.

River year	Average density (parr/100 m <sup>2</sup> )		Sites with 0+ parr (%)	Number of sampling sites	Notes
	0+	>0+			
Ljungan					
2015	107	12.2	100%	9	
2016	26.8	4.5	100%	9	
2017	0.8	2.3	20%	10	
2018	0.0	0.2	0%	6	
2019	3.4	0.0	80%	10	
2020	4.2	1.6	73%	11	
2021	0.3	0.5	33%	12	
2022	25.3	0.3	100%	10	
2023				0	No sampling because of flood
2024	25.3	6.6	100%	11	
Testeboån					
2015	11.1	0.8	73%	11	
2016	27.8	6.0	73%	11	
2017	6.6	6.7	64%	11	
2018	4.9	5.7	73%	11	
2019	2.7	3.9	55%	11	
2020	28.2	1.9	91%	11	
2021	8.4	5.7	60%	10	Reduced sampling because of flood
2022	42.6	10.7	100%	11	
2023	6.1	3.9	57%	7	Reduced sampling because of flood
2024	19.4	6.8	100%	11	

Table 3.1.4.1. Densities of wild salmon parr in electrofishing surveys in the rivers of AU 4 (SD 25-26, Baltic Main Basin).

River Year	Average density (parr/100 m <sup>2</sup> )		Number of sampling sites	Notes
	0+	>0+		
Emån				
2015	32	6	9	
2016	53	8	11	
2017	41	6	11	
2018	8	4	12	
2019	30	1	12	
2020	29	2	11	
2021	15	2	12	
2022	24	1	10	
2023	11	1	11	
2024	13	1	11	
Mörrumsån				
2015	56	25	14	
2016	38	11	18	
2017	40	12	18	
2018	26	11	17	
2019	65	3	18	
2020	36	13	18	
2021	63	6	18	
2022	66	17	19	
2023	33	22	19	
2024	51	13	19	

**Table 3.1.5.1. Densities of wild salmon parr in electrofishing surveys in the Latvian and Estonian salmon rivers of AU 5 (Gulf of Riga, SD 28).**

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Pärnu			
1996	3.8	0.0	1
1997	1.0	0.1	1
1998	0.0	0.0	1
1999	0.2	0.4	1
2000	0.8	0.4	1
2001	3.1	0.0	1
2002	4.9	0.0	1
2003	0.0	0.0	1
2004	0.0	0.0	1
2005	9.8	0.0	1
2006	4.2	0.0	1
2007	0.0	0.0	1
2008	0.0	0.0	1
2009	18.4	0.0	1
2010	0.0	0.0	1
2011	0.0	0.0	1
2012	1.7	0.0	1
2013	1.0	0.1	5
2014	0.5	0.0	5
2015	5.4	0.2	6
2016	0.1	0.3	6
2017	22.8	0.2	5
2018	0.6	0.1	14
2019	6.5	0.0	5
2020	8.1	0,2	5

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
2021	3.0	0.5	5
2022	5.1	0.5	5
2023	9.4	0.0	5
2024	4.2	0.4	5
Vitrupe			
2006	21.3	0.0	1
2007	0.0	0.0	1
2008	20.4	0.0	1
2009	0.7	7.5	1
2010	*	*	*
2011	*	*	*
2012	5.7	5.7	1
2013	3.0	2.4	1
2014	16.5	0.8	1
2015	42.3	0.8	1
2016	1.3	3.2	1
2017	0.0	1.5	1
2018	5.2	0.0	1
2019	1.5	0.4	1
2020	104.2	0.0	1
2021	93.5	6.9	1
2022	1.3	11.4	1
2023	0.0	0.0	1
2024	7.4	0.0	1

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Irbe			
2013	0.0	0.0	0
2014	2.4	0.0	1
2015	0.7	0.0	1
2016	0.0	0.0	1
2017	0.0	0.0	1
2018	0.0	0.0	1
2019	8.3	0.0	3
2020	2.8	0.0	3
2021	0.2	0.0	3
2022	0.5	0.0	3
2023	1.4	0.0	3
2024	1.5	0.0	3
Saka <sup>2</sup>			
2006	0.0	0.0	1
2007	0.7	0.0	1
2008	23.3	0.0	1
2009	16.8	0.0	1
2010	0.0	0.0	1
2011	*	*	*
2012	*	*	*
2013	0.3	0.0	1
2014	3.5	0.0	1
2015	0.6	0.0	1
2016	1.0	0.0	1
2017	0.0	0.0	1

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
2018	0.5	0.0	1
2019	0.0	0.0	1
2020	14.6	4.5	1
2021	0.7	0.0	1
2022	24.5	0.1	1
2023	28.4	0.2	2
2024	4.7	0.4	2
Gauja <sup>3</sup>			
2003	0.0	0.0	3
2004	7.6	0	5
2005	2.0	0.9	4
2006	6.4	1.7	8
2007	0.0	2.3	8
2008	3.5	0.7	6
2009	3.4	3.3	6
2010	0.9	1.5	6
2011	0.9	0.7	6
2012	0.9	0.5	6
2013	1.3	0.9	7
2014	7.4	1.0	7
2015	7.1	1.3	7
2016	0.1	0.5	7
2017	3.2	0.4	7
2018	9.4	0.6	7
2019	3.8	0.4	7
2020	5.0	0.5	8

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
2021	1.1	0.1	9
2022	3.1	0	9
2023	9.2	0.2	9
2024	6.8	0.1	11
Daugava <sup>4</sup>			
2003	0.0	0.0	2
2004	*	*	*
2005	0.0	0.0	2
2006	*	*	*
2007	0.0	0.0	2
2008	0.0	0.0	2
2009	0.4	0.0	2
2010	0.0	0.0	2
2011	0.0	0.0	2
2012	0.0	0.0	2
2013	0.4	0.1	2
2014	0.1	0.1	2
2015	0.1	0.0	2
2016	*	*	*
2017	0.0	0.0	2
2018	0.0	0.0	2
2019	0.0	0.0	2
2020	*	*	*
2021	0.0	0.0	4
2022	0.0	0.0	6
2023	0.0	0.0	7

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
2024	0.0	0.0	7

<sup>1)</sup> includes electrofishing sites in tributaries Jaunupe, Korge and Svētupe

<sup>2)</sup> electrofishing site situated in tributary Tebra

<sup>3)</sup> includes electrofishing sites in tributary Amata

<sup>4)</sup> electrofishing sites are situated in tributaries Lielā Jugla and Mazā Jugla

<sup>\*</sup>) no electrofishing

Table 3.1.5.1. continued.

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Salaca <sup>1</sup>			
1992	10.1	4.3	10
1993	*	*	*
1994	9.0	1.5	6
1995	7.1	2.1	7
1996	23.6	0.8	8
1997	43.7	1.8	8
1998	40.5	1.7	10
1999	36.5	2.1	9
2000	25.9	1.4	9
2001	28.2	3.3	10
2002	28.0	6.0	10
2003	16.4	0.7	10
2004	42.6	1.1	10
2005	64.8	2.0	10
2006	40.4	8.2	10
2007	42.2	4.2	10
2008	77.5	3.5	10
2009	45.2	5.3	10
2010	17.5	4.9	10
2011	22.5	0.9	11
2012	43.4	1.8	11
2013	22.6	5.2	11
2014	49.9	2.8	11
2015	79.6	3.6	11
2016	34.7	3.3	11
2017	53.4	3.4	11

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
2018	33.2	3.8	11
2019	56.1	0.8	11
2020	80.2	0.9	11
2021	55.7	4.1	11
2022	69.3	2.2	11
2023	40.2	1.5	11
2024	76.3	1.1	11
Pēterupe			
2008	0.0	0.0	2
2009	*	*	*
2010	*	*	*
2011	4.1	0.0	2
2012	0.0	0.1	2
2013	0.0	0.0	2
2014	48.4	0.0	2
2015	0.6	8.3	2
2016	0.0	0.0	2
2017	0.3	0.0	2
2018	16.6	0.0	2
2019	0.0	2.7	2
2020	31.0	0.0	2
2021	0.0	4.3	2
2022	14.7	0.3	2
2023	0.0	1.8	2
2024	0.0	0.2	2

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Užava			
2008	36.5	0.0	2
2009	8.8	0.0	2
2010	*	*	*
2011	*	*	*
2012	*	*	*
2013	0.0	0.0	2
2014	13.5	0.0	2
2015	*	*	*
2016	0.0	0.0	2
2017	0.7	0.0	2
2018	0.0	0.0	2
2019	0.0	0.0	2
2020	2.0	0.0	2
2021	4.0	0.0	2
2022	0.0	0.0	2
2023	4.1	0.0	1
2024	4.4	0.0	1
Bārta			
2006	0.0	0.0	2
2007	0.0	0.0	1
2008	*	*	*
2009	*	*	*
2010	*	*	*
2011	*	*	*
2012	*	*	*

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
2013	0.0	0.0	2
2014	0.0	0.0	1
2015	0.0	0.0	2
2016	0.0	0.0	1
2017	0.0	0.0	1
2018	0.0	0.0	2
2019	0.0	0.0	1
2020	0.0	0.0	2
2021	0.0	0.0	2
2022	0.0	0.0	2
2023	0.0	0.0	1
2024	0.0	0.0	1
Venta			
2003	0.5	0.2	7
2004	20.8	5.6	7
2005	29.9	1.1	6
2006	2.6	2.9	5
2007	10.1	0.1	5
2008	18.0	1.5	5
2009	9.7	0.1	5
2010	0.2	0.2	5
2011	4.4	0.0	5
2012	12.3	0.7	5
2013	6.0	0.1	5
2014	10.9	0.4	5
2015	16.7	0.1	5

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
2016	3.8	0.1	5
2017	5.3	0.2	5
2018	0.8	0.0	5
2019	3.0	0.1	5
2020	4.4	0.1	5
2021	2.0	0.0	5
2022	1.2	0.1	5
2023	9.2	0.1	5
2024	3.4	0.2	5

<sup>1)</sup> includes electrofishing sites in tributaries Jaunupe, Korge and Svētupe

<sup>2)</sup> electrofishing site situated in tributary Tebra

<sup>3)</sup> includes electrofishing sites in tributary Amata

<sup>4)</sup> electrofishing sites are situated in tributaries Lielā Jugla and Mazā Jugla

<sup>\*</sup>) no electrofishing

**Table 3.1.5.2. Counted members of salmon spawners in the Salaca river catchment using a VAKI counter. Sex of fish was identified visually from videos.**

Year	Females	Males	Total
2021	244	57	301
2022	214	182	396
2023	179	114	293*
2024	515	208	723

\*The number of spawners was higher, but it was not possible to carry on the counting during the whole migration period due to unsuitable hydrological conditions. VAKI was removed two weeks before the end of migration.

**Table 3.1.5.3. Densities of salmon parr in electrofishing surveys in rivers in Lithuania of AU 5 (Baltic Main Basin).**

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Neris			
2000	0.19	0.06	10
2001	2.51	0.00	10
2002	0.90	0.00	11
2003	0.27	0.00	11
2004	0.41	0.05	10
2005	0.10	0.03	9
2006	0.06	0.02	9
2007	1.68	0.36	9
2008	7.44	0.32	9
2009	7.31	0.27	9
2010	0.10	0.16	9
2011	1.19	0.16	10
2012	3.30	0.20	9
2013	0.56	0.02	10
2014	0.90	0.01	12
2015	4.60	0.15	11
2016	1.52	0.30	11
2017	3.00	0.20	11
2018	3.46	0.70	11
2019	12.95	0.03	11
2020	10.50	0.17	11
2021	3.90	0.98	11
2022	9.36	0.70	11
2023	6.67	0.32	11
2024	4.10	0.20	11

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Žeimena			
2000	4.10	0.46	7
2001	1.40	0.10	7
2002	0.66	0.00	6
2003	0.72	0.00	6
2004	3.10	0.30	6
2005	1.33	0.47	5
2006	2.52	0.06	5
2007	4.20	0.80	5
2008	2.80	0.10	7
2009	3.50	0.40	7
2010	0.20	0.00	7
2011	5.70	1.20	5
2012	1.40	0.60	6
2013	2.37	0.30	6
2014	2.90	0.90	6
2015	9.20	0.00	6
2016	3.30	0.40	6
2017	2.80	0.00	6
2018	6.20	2.50	6
2019	8.18	0.00	6
2020	11.70	0.10	6
2021	6.10	0.16	6
2022	17.92	3.05	6
2023	10.70	0.00	6
2024	4.24	0.33	6

Table 3.1.5.3.continued.

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Mera			
2000	0.13	0.00	3
2001	0.27	0.00	3
2002	0.08	0.00	4
2003	0.00	0.00	4
2004	0.00	0.00	3
2005	0.00	0.00	2
2006	0.00	0.05	2
2007	0.22	0.22	2
2008	0.00	0.50	2
2009	0.00	0.25	3
2010	0.00	0.00	3
2011	0.00	0.05	3
2012	0.00	0.00	3
2013	0.08	0.00	3
2014	0.00	0.30	4
2015	0.00	0.00	3
2016	0.00	0.17	3
2017	0.00	0.00	4
2018	0.17	0.08	3
2019	0.59	0.09	3
2020	0.45	0.21	3
2021	0.17	0.08	3
2022	0.17	0.28	3
2023	0.84	0.00	3
2024	0.00	0.71	3

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Saria			
2000	2.5	0.00	1
2001	0.7	0.00	1
2002	0.00	0.00	1
2003	0.4	0.00	1
2004	3.00	0.00	1
2005	0.00	0.4	1
2006	*	*	
2007	0.00	0.00	1
2008	*	*	
2009	1.96	0.00	1
2010	*	*	
2011	*	*	
2012	0.8	0.00	2
2013	*	*	
2014	*	*	
2015	1.05	0.15	2
2016	*	*	
2017	*	*	
2018	0.55	0.55	1
2019	0.00	0.00	1
2020	*	*	
2021	3.30	0.00	1
2022	2.20	0.1	2
2023	*	*	
2024	0	1.7	1

\*) no electrofishing

Table 3.1.6.1. Estonian wild and mixed salmon rivers in the Gulf of Finland.

River	Wild or mixed	Water quality <sup>1)</sup>	Flow m <sup>3</sup> /s		First obstacle km	Undetected parr cohorts 1997-2024	Production of >0+ parr 1997-2024
			mean	min			
Purtse	mixed	IV	6.7	3.7	4.9	1 (since 2006)	0-8.6
Kunda	wild	III	4.3	0.8	2	1	0.4-64.2
Selja	mixed	V	2.4	0.8	42	6	0-7.7
Loobu	mixed	II	2.0	0.3	10	2	0-17.3
Valgejõgi	mixed	IV	3.4	0.6	85	2	0.8-8.9
Jagala	mixed	II	7.3	0.7	2	7	0-8.2
Pirita	mixed	V	6.8	0.4	70	4	0-8.8
Vaana	mixed	V	1.9	0.3	21	9	0-4.2
Keila	wild	V	6.2	0.5	2	3	0-48.9
Vasalemma	wild	II	3.5	0.2	41.7	3	0-8.9

## 1) Classification of EU Water Framework Directive

**Table 3.1.6.2. Densities of salmon parr rivers with only wild salmon populations. Subdivision 32.**

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Kunda			
1992	8.3	7.7	1
1993	0.0	5.3	1
1994	3.1	0.0	1
1995	19.5	3.6	1
1996	28.6	16.2	1
1997	1.9	25.4	1
1998	17.5	1.0	1
1999	8.2	21.4	1
2000	26.4	8.9	1
2001	38.4	17.4	1
2002	17.0	5.9	1
2003	0.8	4.3	1
2004	30.1	0.4	1
2005	5.0	49.3	1
2006	27.2	14.6	3
2007	5.5	5.8	3
2008	5.5	0.4	1
2009	46.5	0.8	1
2010	2.5	1.2	1
2011	16.6	14.6	1
2012	12.1	13.8	1
2013	13.5	6.5	3
2014	29.0	8.9	1
2015	105.8	14.1	1
2016	177.2	25.5	1
2017	139.6	20.2	1

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
2018	268.5	29.9	1
2019	246.9	15.8	1
2020	140.1	37.7	1
2021	181.2	34.3	1
2022	192.8	50.1	1
2023	231.5	32.9	1
2024	241.7	64.5	1
Keila			
1994	1.2	1.1	1
1995	8.9	0.4	1
1996	14.9	1.3	1
1997	0.0	6.2	1
1998	0.0	6.6	1
1999	120.3	1.5	1
2000	4.8	5.4	1
2001	0.0	1.5	1
2002	8.4	0.4	1
2003	0.0	0.0	1
2004	0.6	0.0	1
2005	31.9	3.0	1
2006	6.3	8.0	1
2007	18.9	2.8	1
2008	44.2	4.3	1
2009	55.8	25.8	1
2010	110.1	12.3	1
2011	25.0	24.7	1
2012	43.5	3.9	3

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
2013	157.1	33.8	1
2014	82.2	48.9	1
2015	111.8	18.1	1
2016	107.6	25.8	1
2017	283.1	27.0	1
2018	179.5	40.6	1
2019	233.7	23.4	1
2020	207.5	31.7	1
2021	93.1	33.3	1
2022	135.7	27.6	1
2023	119.5	12.6	1
2024	247.7	24.0	1
Vasalemma			
1992	4.3	3.1	1
1993	*	*	0
1994	2.4	0.0	1
1995	23.7	0.5	1
1996	6.1	5.9	1
1997	0.0	1.8	1
1998	0.0	0.1	1
1999	17.1	0.0	1
2000	4.4	2.0	1
2001	0.5	1.0	1
2002	8.9	0.4	1
2003	0.0	0.0	1
2004	0.0	0.0	1
2005	21.4	0.0	1

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
2006	9.9	1.0	2
2007	5.2	0.3	2
2008	2.5	1.1	2
2009	37.6	0.0	2
2010	26.0	1.9	2
2011	7.3	4.1	2
2012	6.8	1.1	2
2013	39.8	3.5	2
2014	26.1	4.2	2
2015	2.1	6.4	2
2016	18.2	0.5	2
2017	52.4	4.4	2
2018	27.8	8.9	2
2019	16.7	2.6	4
2020	24.7	6.3	4
2021	23.3	5.7	4
2022	32.1	4.9	4
2023	19.2	3.1	4
2024	106.0	6.5	4

\*) no electrofishing

Table 3.1.6.3. Densities of wild salmon parr in rivers where supportive releases are carried out, Subdivision 32, from the last 10 years. Data from earlier years are available in ICES (2024) – Data Output File, <https://doi.org/10.17895/ices.data.25887487>.

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Purtse			
2014	36.6	5.7	3
2015	8.4	4.0	3
2016	3.7	2.5	3
2017	43.9	1.7	3
2018	76.2	7.5	3
2019	25.5	6.8	3
2020	48.1	3.8	4
2021	28.1	8.6	3
2022	22.1	2.9	3
2023	61.8	3.1	3
2024	49.4	7.4	3
Selja			
2014	14.6	4.4	3
2015	37.8	0.7	3
2016	1.9	0.7	3
2017	131.2	0.5	3
2018	122.5	6	3
2019	66.4	2.8	3
2020	55.0	2.0	3
2021	51.8	2	3
2022	40.3	2.9	3
2023	45.3	2.1	3
2024	162.8	1.7	3

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Loobu			
2014	1.8	16.6	4
2015	37.6	1.2	4
2016	4.3	9.0	4
2017	36.3	0.9	4
2018	64.0	10.2	4
2019	52.7	9.5	4
2020	72.7	10.0	4
2021	7.5	17.3	4
2022	71.9	1.6	4
2023	41.3	7.0	4
2024	116.6	9.7	4
Kymijoki			
2014	54.0	NA	5
2015	112.7	NA	5
2016	33.7	NA	5
2017	11.0	NA	5
2018	95.2	NA	5
2019	62.8	NA	5
2020	94.0	NA	5
2021	58.2	NA	5
2022	32.4	NA	5
2023	17.6	NA	5
2024	63.8	NA	5

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Valgejõgi			
2014	21.6	5.1	3
2015	16.8	6.8	3
2016	0.6	3	3
2017	13	2	5
2018	7.1	1.1	11
2019	13.2	1.6	6
2020	30	3.1	5
2021	8.4	5.7	5
2022	39.3	2.6	5
2023	19.2	6.4	5
2024	12.4	3	5
Jägala			
2014	1.5	0.0	1
2015	0.0	0.0	1
2016	3.2	0.0	1
2017	1.3	1.3	1
2018	1.2	0.0	1
2019	0.0	0.0	1
2020	1.7	0.0	1
2021	24.8	0.0	1
2022	17.4	8.2	1
2023	1.2	0.4	1
2024	31.3 / 13.2 <sup>§</sup>	0 / 0 <sup>§</sup>	1/1 <sup>§</sup>

River Year	Number of parr/100 m <sup>2</sup> by age group		Number of sampling sites
	0+	>0+	
Pirita			
2014	15.8	3.7	4
2015	49.3	2.3	4
2016	3.0	8.8	4
2017	81.4	1.9	4
2018	27.9	8.2	4
2019	23.9	3.2	4
2020	52.2	2.5	4
2021	40.1	13.2	4
2022	29.9	9.5	4
2023	25.3	4.2	4
2024	49	4.3	4
Vääna			
2014	12.1	1.5	3
2015	0.0	1.5	3
2016	0.0	0.2	3
2017	10.8	0.1	3
2018	12.2	1.8	3
2019	6.2	0.3	3
2020	9.5	2.1	3
2021	8.5	0.5	3
2022	10.6	0.8	3
2023	1.8	0.4	3
2024	28	0.4	3

\*) no electrofishing

\$) electrofishing site below Linnamäe dam/above Linnamäe dam

Table 3.2.1.1. Reintroduction programme in Baltic Sea potential salmon rivers. Potential production estimates are uncertain and being re-evaluated. More details in previous reports (e.g. ICES, 2022).

River	Description of river						Restoration programme			Results of restoration			
	Country	ICES subdivision	Old salmon river	Potential production areas (ha)	Potential smolt production (num.)	Officially selected for reintroduction	Programme initiated	Releases	Origin of population	Parr and smolt production from releases	Spawners in the river	Wild parr production	Wild smolt production
Moälven	SE	31	yes	7	2000	no	yes	2	Byskeälven	yes	yes	yes	yes
Alsterån	SE	27	yes	4	4000	no	no	4	*	*	yes	yes	yes
Helgeån	SE	25	yes	7	3200	no	yes	2	Mörrumsån	yes	yes	yes	yes
Kuivajoki	FI	31	yes	58	17000	yes	yes	1. 4	Simojoki	*	yes	yes	*
Kiiminkijoki	FI	31	yes	110	40000	yes	yes	2	Iijoki	yes	yes	yes	yes
Siikajoki	FI	31	yes	32	15000	no	yes	1. 4	Mixed	no	*	0	0
Kalajoki	FI	31	yes	33	13000	no	yes	1. 4		no	*	*	*
Perhonjoki	FI	31	yes	5	2000	no	yes	1. 4	Tornionjoki/Oulujoki	yes	*	*	*
Merikarvianjoki	FI	30	yes	8	2000	no	yes	1. 4	Neva	yes	yes	yes	*
Kiskonjoki	FI	29	no?	2	2000	no	yes	2	Neva	yes	yes	yes	*
Uskelanjoki	FI	29	no?	6	3000	yes	yes	1	Neva	yes	yes	*	*
Vantaanjoki	FI	32	no?	16	10000	no	yes	1	Neva	yes	yes	yes	*
Porvoonjoki	FI	32	no?	6	5000	no	yes	1	Neva	yes	yes	0	*

River	Description of river						Restoration programme			Results of restoration			
	Country	ICES subdivision	Old salmon river	Potential production areas (ha)	Potential smolt production (num.)	Officially selected for reintroduction	Programme initiated	Releases	Origin of population	Parr and smolt production from releases	Spawners in the river	Wild parr production	Wild smolt production
Koskenkylänjoki	FI	32	no?	6.5	5000	yes	yes	1	Neva	yes	yes	>0	*
Urpalanjoki	FI	32	yes	2.3	2000	yes	yes	1	Neva	yes	yes	>0	*
Rakkolanjoki	FI	32	no?	2.5	2500	no	yes	1	Neva	yes	yes	>0	*
Wisła/Drweca	PL	26	yes	*	*	yes	yes	2	Daugava	yes	yes	*	*
Slupia	PL	25	yes	*	*	yes	yes	2	Daugava	yes	yes	yes	*
Wieprza	PL	25	yes	*	*	yes	yes	2	Daugava	yes	yes	*	*
Łeba	PL	25	yes	*	*	yes	yes	2	Daugava	yes	yes	*	*
Parseta	PL	25	yes	*	*	yes	yes	2	Daugava / Parseta	yes	yes	*	*
Rega	PL	25	yes	*	*	yes	yes	2	Daugava	yes	yes	*	*
Odra/Notec/Drawa	PL	24	yes	*	*	yes	yes	2	Daugava/Nemunas	yes	yes	*	*
Reda	PL	24	yes?	*	*	yes	yes	2	Daugava	yes	yes	*	*
Gladyshevka	RU	32	yes	1.5	1500	no	yes	2	Neva	yes	yes	>0	>0

**Releases:** 1 = Has been carried out, now finished; 2 = Going on; 3 = Planned; 4 = Not planned; \* = No data

Table 3.2.1.2. Densities of wild salmon parr in electrofishing surveys in potential rivers for 2014-2024. The Lithuanian rivers listed are considered as ‘mixed’ rivers. Data from earlier years are available in ICES (2024) – Data Output File, <https://doi.org/10.17895/ices.data.25887487>.

Country	Assessment Unit	SD	River and year	Number of parr /100 m <sup>2</sup>		Number of sampling sites
				0+	>0+	
Sweden	4	27	<b>Alsterån</b>			
			2014	1.9	0	1
			2015	4.6	0	1
			2016			no sampling
			2017			no sampling
			2018			no sampling
			2019	0	0	1
			2020	0	0	1
			2021	0	0	1
			2022	0	0	1
			2023	0	0	1
			2024	0	0	1
Finland	1	31	<b>Kiiminkijoki</b>			
			2014	1.8	n/a	12
			2015			no sampling
			2016			no sampling
			2017			no sampling
			2018	1.2	3.8*	15
			2019	3.2	0.7*	14
			2020	1.5	1.5*	14
			2021	5.5	0.9*	14
			2022	1.8	1.0*	13
			2023	1.1	0*	5
			2024	0.5	2.3	6

Country	Assessment Unit	SD	River and year	Number of parr /100 m <sup>2</sup>		Number of sampling sites
				0+	>0+	
<b>Kuivajoki</b>						
			2021	1.5	1.7	5
			2024	0.5	2.3	6
Latvia	5	28	<b>Aģe</b>			
			2014	0	0	1 <sup>#</sup>
			2015	49.6	12.1	1
			2016	1.7	11.9	1
			2017	14.1	2	1
			2018	45	3.2	1
			2019	39.4	5.5	1
			2020	148.1	11.4	1
			2021	97.2	14.4	1
			2022	173.6	9.9	1
			2023	71.1	5.1	4
			2024	36.6	8.4	4
Russia	6	32	<b>Gladyshevka</b>			
			2014	2	3	3
			2015	24.3	9.2	4
			2016			no sampling
			2017	12.5	0	4
			2018			no sampling
			2019	51	4.6	4
			2020	4.8	4.5	3

\* = adipose finclipping enabled separation of wild-origin older parr from reared older parr

n/a = reared parr, which are stocked, are not marked

# = not the usual site

Table 3.2.1.2. continued.

Country	Assessment Unit	Subdiv	River Year	Number of parr/100 m <sup>2</sup>		Number of sampling sites
				0+	>0+	
Lithuania	5	26	<b>Šventoji</b>			
			2014	5.32	0.08	5
			2015	8.23	2.7	5
			2016	3.12	1.7	5
			2017	0.54	0.1	5
			2018	3.4	1.4	5
			2019	10.73	0.9	6
			2020	4.26	0.63	6
			2021	4.9	0.65	6
			2022	5.6	0.2	6
			2023	17.11	1.39	6
			2024	10.4	1.1	6
Lithuania	5	26	<b>Siesartis</b>			
			2014	11.95	5.1	4
			2015	6.2	2.3	4
			2016	5.9	3.2	4
			2017	3.1	1.8	4
			2018	2.9	3.8	4
			2019	26.6	1.7	4
			2020	19.4	4.3	4
			2021	7.4	8.5	4
			2022	8.17	9.17	4
			2023	21.6	1.5	4
			2024	4.0	40.8	4
			<b>Virinta</b>			
			2014	5	0	2
			2015	1.5	0.9	2

Country	Assessment Unit	Subdiv	River Year	Number of parr/100 m <sup>2</sup>		Number of sampling sites
				0+	>0+	
			2016	3.7	1.0	2
			2017	0.35	0	2
			2018	6.3	1.9	2
			2019	1.4	0	2
			2020	2.17	2.33	2
			2021	2.15	2.25	2
			2022	2.65	3.15	2
			2023	3.25	1	2
			2024	1.83	22.1	2
			<b>Širvinta</b>			
			2014	2.7	0.15	2
			2015	1.6	0	1
			2016	1.6	0.4	1
			2017	4.5	0	2
			2018	5.3	0.4	1
			2019	0	0	1
			2020	7.8	0	1
			2021	0.4	2.0	1
			2022	1.2	0.81	1
			2023	21.7	0	1
			2024	0	4.2	1
			<b>Vilnia</b>			
			2014	31.4	2.3	4
			2015	8.8	3.75	4
			2016	14.9	3.2	4
			2017	16.7	6.3	4
			2018	2.1	2.7	4

Table 3.2.1.2. continued.

Country	Assessment Unit	Subdiv	River Year	Number of parr/100 m <sup>2</sup>		Number of sampling		
				0+	>0+	sites		
Lithuania	5	26	2019	28.7	0.2	4		
			2020	15.5	6.0	4		
			2021	6.55	2.2	4		
			2022	12.9	6.9	4		
			2023	14.5	6.1	4		
			2024	26.3	10.6	4		
			<b>Vokė</b>					
			2014	9.5	3.8	2		
			2015	2.2	1.45	2		
			2016	1.6	2.85	2		
			2017	6.8	1.7	2		
			2018	0.5	6.7	2		
			2019	11.0	3.0	2		
			2020	9.5	5.35	2		
			2021	2.6	1.2	2		
			2022	34.0	64.0	2		
			2023	10.2	2.8	2		
			2024	7	7.5	2		
			<b>B. Šventoji</b>					
			2014	8	0.8	2		
2015	8.7	1.5	2					
2016	0.41	0	4					
2017	3.3	0.54	3					
2018	0.8	0.5	2					
2019	1.48	0.12	2					
2020	2.02	0.52	2					
2021	2.27	0.31	2					

Country	Assessment Unit	Subdiv	River Year	Number of parr/100 m <sup>2</sup>		Number of sampling
				0+	>0+	sites
			2022	6.43	2.18	2
			2023	0	0.21	2
			2024	2.17	0	2
			<b>Dubysa</b>			
			2014	9	0.3	8
			2015	5.1	0.8	7
			2016	0.22	0.53	10
			2017	10.2	0.74	4
			2018	5.23	2.18	6
			2019	11.04	2.56	3
			2020	11.66	1.67	5
			2021	2.16	2.67	4
			2022	6.82	4.98	6
			2023	9.76	3.16	4
			2024	1.08	3.16	4
			<b>Minija</b>			
			2014	3.5	0.1	6
			2015	3.95	0.54	6
			2016	1.2	0.2	11
			2017	3.6	0.3	5
			2018	0.29	0.36	2
			2019	1.73	0.1	3
			2020	4.45	1.03	5
			2021	0.66	0.43	5
			2022	4.66	1.16	3
			2023	0.72	0.37	4
			2024	2.65	0.09	4



Assessment unit	Country	Age	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	Sweden	1yr	11		1				20							15	15	13	12	18	18	12	22	20	23	10	
		2yr	1	9	5	5	6	7	8	31	8	17	20	11	9	3	3	3									
4 Total			84	9	7	19	19	23	28	31	8	17	20	11	9	18	18	16	12	18	18	12	22	20	23	10	0
5	Estonia	1yr																	11				34	41	23	50	51
		2yr																	10	11				6	7	6	9
	Poland	1yr	309	230	186	262	207	161	385	310	374	463	380	275	155	325	359	176	249	43	237	217	360	280	296	148	258
		2yr	60	24	86	53	58	69	79	98	30	32	41	31	11	55	12	12	10		1						
	Latvia	1yr	1060	1069	867	961	777	566	814	868	944	752	756	394	649	737	738	675	614	678	569	787	730	561	395	544	564
		2yr	46		64	34	38	175	61	5	23	7															
	Lithuania	1yr				9	4	11	30			38		25	25	10	20	23	21	22	20	21	73	60	46	60	55
		2yr																									
5 Total			1475	1324	1203	1317	1084	983	1371	1281	1371	1292	1177	724	839	1127	1128	886	914	753	827	1025	1203	948	766	810	936
Assessment units 1-5 Total			5215	4977	4713	4673	4460	4403	4750	4621	4862	4608	4399	3845	3954	4184	4079	3743	3894	3780	3716	3752	4049	3986	3607	3491	3409
6	Estonia	1yr	69	129	101	86	82	96	125	80	122	125	77	64				32	22	37	80	34	9	15	11	9	9
		2yr	35	34	40	35	46	46	48	51	49	45	33	26	53	32	35	42	27	32	33	29	10	10	10	7	8
	Finland	1yr			65	80	58	84	13															25	34	31	
		2yr	362	400	338	266	275	325	276	222	337	266	271	146	218	199	150	79	99	103	145	183	145	52	60	70	71

Assessment unit	Country	Age	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
		3yr									3																
	Russia	1yr	77	103	136	70	271	233	247	278	270	230	238	129	315	466	427	352	450	377	373	662	519	505			
		2yr	41	135	1	107	85	81	33	55	1	31		1		1	0.4										
6 Total			584	801	681	644	817	865	742	686	778	700	617	366	586	697	613	505	598	549	631	908	682	607	116	116	88
Grand Total			5799	5778	5394	5317	5277	5268	5492	5307	5639	5308	5016	4211	4540	4881	4692	4248	4492	4329	4347	4660	4732	4593	3723	3607	3497

**Table 3.3.1.2. Releases of salmon eggs, alevin, fry, and parr to the Baltic Sea rivers by assessment unit in 2000-2024 (x 1 000). Data for 1996-1999 are available in the 2022 WGBAST report (ICES, 2023).**

Assessment unit	year	age						
		eyed egg	alevin	fry	1s parr	1yr parr	2s parr	2yr parr
1	2000		835	27	402	935		
	2001				98	1079		
	2002			19	145	775	5	
	2003					395	10	
	2004				63	266		
	2005		98		96	451	15	21
	2006		330	11	14	896		
	2007		201	30	82	482		
	2008		89	220	19	489		
	2009		210			212		
	2010		354	1		172		
	2011	22	614			68		
	2012		556			64		
	2013		129		1	63	0.3	
	2015		296		10	67		
	2016					69		
	2017					50		
	2018		300			73		
	2019		455			33		
	2020		200			296		
	2021	763	535	109		193		
	2022	155	130	20		190		2
	2023	336	420	208	46	278		
	2024	63			2	169		
2	2000			489	477	71		
	2001			821	343	83		

Assessment unit	age							
	year	eyed egg	alevin	fry	1s parr	1yr parr	2s parr	2yr parr
	2002			259	334	127		
	2003			443	242	45		
	2004			200	155			
	2005			712	60			
	2006				80	36		
	2007				41	57		
	2017	300						
	2018	300		1		118		
	2019	20		146				
	2020				8			
	2021			196		10		
	2022			99		8		
	2023			171		16		
	2024			198				
3	2000	516		158	239	30	34	
	2001	177		736	263		16	
	2002	74		810	161		17	
	2003			655	56	0	31	
	2004			503	6		7	
	2005			151	2	48	27	
	2006			295		18	4	
	2007			126	43	28	7	
	2008			210		101	4	
	2009			174	8	22	5	
	2010		74	215	5	15	5	
	2011	86		61	79	40		
	2012			573	116	60		
	2013				216	79		

Assessment unit	age							
	year	eyed egg	alevin	fry	1s parr	1yr parr	2s parr	2yr parr
	2014			22	155	444		
	2015				133	6		
	2016			77		31		
	2017			5		16		
	2018			20		17		
	2019	19		36		60		
	2020	168				19		
	2021		58					
	2022	215			9	2		
	2023					2		
	2024		8			32		
4	2001			40			2	
	2002			88				
	2003			42				
	2005			70				
	2006			45				
	2007			69				
	2008			145				
	2012				20			
5	2001			100	96	14		
	2002			160	106	33		
	2003			109	515			
	2004			120	52	11	10	
	2005		420	199	224			
	2006		30	376	236	1		
	2007		200	418	125			
	2008		364	295	483	17		
	2009		240	863	81	56		

Assessment unit	age							
	year	eyed egg	alevin	fry	1s parr	1yr parr	2s parr	2yr parr
	2010		31	639	81	84		
	2011		50	866	441	25		
	2012		201	645	194	128		
	2013			522	381	16		
	2014			354	282	62		
	2015		40	495	218	2		
	2016		10	159	148	5		
	2017			247		61		
	2018			519	237			
	2019		35	654	196		13	
	2020		29	775	147	12		
	2021		133	739	167	7		
	2022		122	924	124	27		
	2023		82	290	191	5		
	2024		130	934	128	8		
6	2000	267	51			233		
	2001		74			250		
	2002	20	102		640	272	13	5
	2003	21	120	120	240	248	35	
	2004		294		229	208	3	
	2005	80	26		263	110		
	2006				197			
	2007		98		90	148	28	
	2008		6		355	50	40	
	2009	610			260	63	143	
	2010				560	41	138	
	2011	94			212	55		
	2012				199	70	75	

Assessment unit	age							
	year	eyed egg	alevin	fry	1s parr	1yr parr	2s parr	2yr parr
	2013			99	112	95	7	28
	2014			98	22	15	24	
	2015			99	127	5	89	4
	2016				86	18		
	2017	56			55	120	21	
	2018			75	62	110	9	
	2019	48		47	52	126	10	13
	2020		22		40	162		
	2021	73			35	195		
	2022	87			38	230		
	2023	119	10		21	217		
	2024	23			19	249		

Table 3.3.4.1. Adipose finclipped salmon released in the Baltic Sea area in 2024 (and clipped or unclipped tagged using other methods).

Country	Species	Stock	Age	Number		River	Subdivision	Other tagging
				parr	smolt			
Estonia	salmon	Daugava	1 yr	7 700		Pärnu	28	
	salmon	Daugava	1 yr		51 200	Pärnu	28	
	salmon	Daugava	2 yr		8 300	Pärnu	28	1 800 T-bar
	salmon	Kunda	1 yr	1 400		Purtse	32	
	salmon	Kunda	1 yr		8 600	Purtse	32	
	salmon	Kunda	2 yr		3 200	Purtse	32	600 T-bar
	salmon	Kunda	2 yr		2 200	Valgejõgi	32	600 T-bar
	salmon	Kunda	2 yr		2 200	Jägala	32	600 T-bar
Finland	salmon	Tornionjoki	2 yr		3 000	Aurajoki	29	
	salmon	Tornionjoki	1 yr			Kokemäenjoki	30	5 000 parr alizarin dye
	salmon	Tornionjoki	2 yr		30 300	Kokemäenjoki	30	
	salmon	Iijoki	1 s			Iijoki	31	2 000 parr alizarin dye
	salmon	Iijoki	1 yr			Iijoki	31	126 400 parr alizarin dye
	salmon	Iijoki	2 yr		246 700	Iijoki	31	
	salmon	Oulujoki	1 yr			Oulujoki	31	15 000 parr alizarin dye
	salmon	Oulujoki	2 yr		296 500	Oulujoki	31	

Country	Species	Stock	Age	Number		River	Subdivision	Other tagging
				parr	smolt			
	salmon	Tornionjoki	1 yr			Perhojoki	31	17 600 parr alizarin dye
	salmon	Tornionjoki	2 yr		5 000	Perhojoki	31	
	salmon	Tornionjoki	2 yr		10 300	at sea	30	
	salmon	Iijoki	2 yr		611 000	Kemijoki	31	
	salmon	Iijoki	1 yr			Kemijoki	31	9 800 parr alizarin dye
	salmon	Iijoki	eyed egg			Kemijoki	31	63 400 alizarin dye
	salmon	Neva	1 yr			Kymijoki	32	247 900 parr alizarin dye
	salmon	Neva	2 yr		48 700	Kymijoki	32	
	salmon	Simojoki	2 yr		5 200	Eurajoki	30	
	salmon	Neva	2 yr		12 300	Vantaanjoki	32	
Sweden	salmon	Luleälven	2 yr		512 993	Luleälven	31	
	salmon	Skellefteälven	1 yr		17 382	Skellefteälven	31	2 000 PIT-tag
	salmon	Skellefteälven	2 yr		61 019	Skellefteälven	31	
	salmon	Umeälven	1 yr		3 655	Umeälven	31	1 250 PIT-tag
	salmon	Umeälven	2 yr		95 800	Umeälven	31	1 291 PIT-tag
	salmon	Ångermanälven	1 yr		122 477	Ångermanälven	30	

Country	Species	Stock	Age	Number		River	Subdivision	Other tagging
				parr	smolt			
	salmon	Indalsälven	1 yr		102 000	Indalsälven	30	
	salmon	Ljusnan	1 yr		167 775	Ljusnan	30	
	salmon	Dalälven	1 yr		190 820	Dalälven	30	995 PIT-tag
	salmon	Dalälven	2 yr		781	Dalälven	30	
Poland	salmon	Nemunas	1 yr			Drawa	24	2 000 PIT-tag (smolts)
Lithuania	salmon	Nemunas	1 yr		5 000	Dubysa	26	
	salmon	Nemunas	1 yr		5 000	Jūra	26	
	salmon	Nemunas	1 yr		10 000	Minija	26	
	salmon	Nemunas	1 yr		12 000	Šventoji	26	
	salmon	Nemunas	1 yr		22 900	Neris	26	
Latvia	salmon	Daugava	1 yr		298 052	Daugava	28	
	salmon	Venta	1 yr		104 198	Venta	28	
	salmon	Gauja	1 yr		161 704	Gauja	28	
<b>Total salmon</b>				<b>9 100</b>	<b>3 238 256</b>			



River	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Neva/Åland (1)	70	50																														
Neva/Kymijoki (1)	60-70		57	40	79	42	42	23		43	11	6	6	0	26													0				
Mean River Simojoki and Tornionjoki	75	71	84	86	91	28	61	39	42	52	3	4	3	23	19	10	7	7	3	0	0	0	0	4	33	16	1					
Mean River Luleälven, Indalsälven, Dalälven	74	62	49	58	33	8	29	21	23	31	7	3	4	17	18	12	18	21	4	1	1	6	4	20	30	21	3	3	7	9	2	4
<b>Mean total</b>	<b>77</b>	<b>66</b>	<b>59</b>	<b>61</b>	<b>38</b>	<b>15</b>	<b>40</b>	<b>25</b>	<b>28</b>	<b>39</b>	<b>8</b>	<b>3</b>	<b>3</b>	<b>18</b>	<b>22</b>	<b>11</b>	<b>15</b>	<b>15</b>	<b>5</b>	<b>1</b>	<b>4</b>	<b>6</b>	<b>2</b>	<b>19</b>	<b>34</b>	<b>18</b>	<b>6</b>	<b>1</b>	<b>4</b>	<b>7</b>	<b>5</b>	<b>2</b>

1) The estimates in the rivers Simojoki, Tornionjoki/Torne älv, and Kymijoki are since 1992, 1994, and 1995, respectively, given as the proportion of females (%) with offspring affected by M74 and before that as the mean yolk-sac-fry mortality (%)

2) From 2019 on the data for the rivers Tornion-, Simo-, Kemi-, Ii, and Kymijoki are derived from the free thiamine concentration of unfertilized eggs

**Table 3.4.1.2. M74 observations for Swedish Baltic salmon stocks (hatching years 2014-2024), showing the numbers of females sampled with offspring affected by the M74 syndrome and the total number of females sampled from each stock.**

	Luleälven		Skellefteälven		Ume/Vindel älven		Angermanälven		Indalsälven		Ljusnan		Dalälven	
	M74	Total	M74	Total	M74	Total	M74	Total	M74	Total	M74	Total	M74	Total
2014	4	220	1	50	12	60	3	80	5	125	4	92	13	103
2015	5	202	1	50	0	60	0	80	3	120	2	92	6	85
2016	21	184	2	50	7	36	19	78	18	120	36	92	33	98
2017	51	206	15	50	10	22	NA	NA	8	120	31	85	41	92
2018	36	180	11	50	3	14	2	19	NA	NA	7	53	20	97
2019	10	180	12	50	3	48	3	45	2	100	0	92	2	118
2020	5	112	1	50	0	52	0	45	1	100	0	80	4	111
2021	5	112	0	50	4	52	0	90	1	100	5	74	17	113
2022	5	160	4	50	0	56	1	44	1	100	13	83	25	109
2023	4	160	6	56	1	42	0	45	0	100	9	90	NA	NA
2024	0	0	9	69	5	67	5	100	0	0	0	0	4	100

## 4 Reference points and assessment of salmon

### 4.1 Introduction

In this section, results of the assessment model and alternative future projections of salmon stocks in assessment units (AU) 1-4 are presented. Furthermore, the current status of salmon stocks in AUs 5-6 is evaluated against their reference points.

Section 4.2 contains results showing the historical development of stocks, including estimation of stock–recruit dynamics and reference points, as well as assessment of the current stock status. In Section 4.3, the basis for the choice of scenarios and scenario results are presented, including scenario specific catch possibilities with associated development of stock status. Section 4.4 contains additional information which is either important for proper interpretation of the modelling results or serves as a critical accompaniment to them. Section 4.5 focuses on issues relevant for the future management of Baltic salmon, including fishing possibilities under alternative management strategies. Section 4.6 summarizes the earlier sections and draws conclusions. The two last sections (sections 4.7 and 4.8) bring up methodological and data related needs in order to further develop the assessment of the Baltic salmon.

### 4.2 Historical development of Baltic salmon stocks (assessment units 1–6)

#### 4.2.1 Assessment methods

In the assessment for salmon river stocks in AUs 1-4, stock-specific MSY-based reference points  $R_{lim}$  and  $R_{MSY}$  have been used since 2021 to assess stock status and future fishing possibilities. For a detailed description of the methodology used to derive the reference points, see Annex 4 in ICES (2021). Salmon in AU 5 and 6 are still without an analytical assessment, and it is not possible to evaluate river specific reference points related to MSY (i.e.  $R_{lim}$  and  $R_{MSY}$ ). Therefore, those estimated ranges of  $R_{lim}$  (18 – 43% in relation to potential smolt production capacity, PSPC) and  $R_{MSY}$  (57 – 86% in relation to PSPC) of the analytical assessment for AU 1-4 rivers are used instead to illustrate the perceived status of the AU 5 and 6 stocks.

The methodological basis and details of the status assessment and stock projections are given in the Stock Annex (ICES, 2024b). Below we only describe methodological updates introduced this year and review the definitions of the reference points in order to help with interpretation of the results.

#### *Changes since last assessment*

The observation model for **Simojoki** spawner counting was changed to better account for the up-and-down movement of the salmon at the echo sounder site. This movement is considered to happen at least partly as a response to disturbances caused by traffic at the nearby bridge upstream from the echo sounder site. It also seems that higher water temperatures (and/or lower level of water) increases this tendency. Until current year, this phenomenon has been accounted for in the model by calculating the net ascending number of salmon and assuming a fixed 5% overestimation coefficient for the count, which arises from the notion that the salmon moving downstream along the current are more difficult to observe than the ones that move upstream against it. Moreover, the detection is particularly difficult for 1SW salmon moving downstream since those are easily mixed with other fish species of similar (smaller) size. Thus, in current

assessment the model is fitted only with the net ascending number of MSW salmon. This net count is considered to be an overestimation, and a prior for this overestimation was elicited from three experts independently. The prior mean of the overestimation coefficient was 1.2, with a 90% PI of 1.03–1.63. As in previous model versions, the Simojoki spawner counts are fitted with the model predicted number of ascending salmon using a lognormal likelihood.

In recent years, the number of adult salmon counted in **Råneälven** has declined significantly, with parr densities showing a corresponding drop (Section 3.1.1). This sharp decline in spawner abundance was not captured by the full-life history model (FLHM), leading to a large positive bias in estimated spawner abundances. Spawner counting data from Råneälven were thus included in 2025's assessment, to decrease bias in abundance estimates for this river (as well as potential bias in post-smolt survival estimates). Before being used for modelling, raw data and their interpretations underwent a quality control process. Only the five years for which a quality control of the count data could be conducted have been included (2014–2015 and 2022–2024). Since the sonar does not cover the full width of the river at the site where it has been operated, an expert-based prior for the spawner counting detection probability was formulated using opinions elicited from two experts.

A first check of results from FLHM runs in 2025 indicated severe overestimation of the abundance of returning salmon in **Torneälven/Tornionjoki** (hereafter referred to as Tornionjoki), which is particularly problematic, since this is by far the most abundant wild salmon stock. Overestimating abundance for Tornionjoki will thus tend to lead to under-estimation of harvest rates in fishing scenarios. In addition, examination of FLHM results indicated overly-precise estimates of numbers of salmon entering the river in Piteälven, Testeboån, and Vindelälven. In these rivers exploited for hydropower most or all spawners must pass through a fish ladder, and therefore they have a different type of observation model for spawner counting in the FLHM. However, due to hydropower-related migrations problems, it is uncertain to what extent the counting data reflect the actual number of salmon returning to the river mouth.

For the above reasons, FLHM runs were stopped and several additional changes were made. These changes were aimed at giving higher weight to spawner counting observations in rivers Tornionjoki and Kalixälven, and lower weight for rivers Piteälven, Testeboån, and Vindelälven. The binomial observation model for rivers Piteälven, Testeboån, and Vindelälven was replaced with a lognormal observation model. This change allows for slightly less updating of the number of salmon that ascend through the ladder by the number counted (the number ascending was earlier obtained as a product of the number before the ladder and the probability to find the ladder from the Binomial observation model). Second, the hierarchical prior for the spawner counting detection probability was transformed to logit space, and bounds were added for the mean detection probability and coefficient of variation in detection probability across years for Tornionjoki and Kalixälven.

The changes to the FLHM described above resulted in some differences in results (based on comparisons with results from 2024, and the results from 2025's assessment model before the changes were implemented). The new observation error models for spawner counting in Piteälven, Vindelälven, and Testeboån resulted in less updating (less precise estimates) of the number of salmon entering the river each year, and thus also the number of spawners. Constraining the spawner counting detection probabilities for Tornionjoki and Kalixälven led to downward shifts in the estimated number of salmon entering these rivers. This effect was particularly strong for Kalixälven, where posterior distributions for the detection probabilities were in line with prior distributions, and posterior medians for numbers of salmon entering the river were on average 46% lower than the numbers from 2024's assessment. The effect was less marked in Tornionjoki; the estimated numbers of salmon entering the river were thought to be more realistic (on average 23% lower than in 2024's assessment), but likely still overestimated in some years. The lower

estimates of spawner abundance in Kalixälven were accompanied by lower annual smolt production estimates and a lower PSPC or unfished equilibrium smolt production. The changes made also had the combined effect of slightly lowering estimates of post-smolt survival for wild salmon over the assessment period.

#### *Interpretation of results from status evaluations*

Status for Baltic salmon river stocks is evaluated in relation to river-specific MSY-related reference points by comparing the current smolt production, which is based on model results (AU 1-4) or expert-elicited estimation (AU 5-6), with the smolt production corresponding to  $R_{MSY}$  or  $R_{lim}$ . The estimation of  $R_{MSY}$  and  $R_{lim}$  for AU 1-4 rivers, in turn, depends on the river-specific stock-recruitment curve and the smolt production at an unfished equilibrium ( $R_0$ ; potential smolt production capacity). Stock-recruitment dynamics are estimated under prevailing conditions regarding size and quality of spawning and rearing habitats and river migration possibilities (ICES, 2024b). The simulation of  $R_0$  is based on assumptions about future vital rates, where post-smolt mortality follows an auto-regressive model reverting to the average value over the sixth- to third-last years of the assessment, and the historical median mortality for M74 (ICES, 2025). The reference levels used to assess the status of AU 5-6 stocks are also set based on prevailing conditions in those rivers regarding e.g. accessible production areas. ICES stock assessment is thus intended to be used primarily for evaluations of current fishing opportunities and the impact of fishing on the status and development of individual river stocks.

For evaluations of factors other than fisheries exploitation, e.g. effects of power plants and dams on salmon abundance in rivers, additional analyses are needed. For example, the model presented by Leonardsson and Nilsson (2021) can be used to study the effects of human-induced disturbances in rivers, such as hydropower exploitation, by relating current smolt production to the potential smolt production capacity assuming no human impact (i.e. under pristine river conditions). That type of modelling tools may also be useful when evaluating the effects of different management measures, such as the construction of fishways or removal of power plants and dams, on the production and abundance of salmon in rivers.

The considerable variation in stock status observed among Baltic salmon river stocks (sections 4.2.3-4) may be explained by several factors. River stocks were at different levels when the recovery started 2-3 decades ago, and it may take several salmon generations before a weak stock reaches the MSY reference point, even if no fishing takes place (ICES, 2020b,c). Furthermore, the recovery rate itself varies due to variations in stock-recruit dynamics between stocks. During the recovery phase, salmon in some rivers may also recolonize new areas, resulting in gradually increasing production areas. This is a positive phenomenon, but it has the consequence that estimated status may decrease upon updating of the maximum smolt production in the assessment model, until the recruitment of salmon in recolonized areas reaches levels observed in river sections that have been inhabited by salmon during a longer period – a slow process that may take several generations. Lögdeälven, Öreälven, and Emån are examples of rivers where status is estimated to be comparably low because of ongoing colonization of upstream areas.

In other rivers, the underlying reasons for low status are more problematic. In Ljungan and Vindelälven, disease outbreaks among returning adult salmon over a series of years resulted in very low recruitment of parr and decreased smolt production levels (Section 4.2.3). The situation has improved considerably in Vindelälven in recent years, and an increase in parr abundance has also been evident for Ljungan since 2022.

In some rivers with wild salmon stocks, there are connectivity problems caused by power plants and dams that affect opportunities for up- and downstream migration. Since ICES evaluates status under prevailing conditions in the rivers (with respect to available production areas, current migration possibilities, etc., see above), a stock can obtain high status even though there are

passage problems at e.g. a power plant. Examples of rivers for which current stock status is assessed relatively high, despite obvious migration problems, are Piteälven and Testeboån. Conversely, the removal of a dam – and the resulting increase in available habitat and estimated production capacity – can lead to a temporary reduction in stock status until the newly accessible areas have been colonized (e.g. River Vasalemma in AU 6).

#### 4.2.2 Submodel results

The **river model** (also called **hierarchical linear regression analysis**) with its two versions, one of which is for the northern and the other for the southern rivers (ICES, 2024b, Section C.1.5), provides estimates of annual smolt production based on juvenile survey data from the rivers in AUs 1–4. The resulting posterior estimates of smolt production are inputted into the full life history model as likelihood approximations (sometimes also called ‘pseudo observations’ in the literature). For rivers in AUs 5–6, other methods are used to estimate smolt production (see ICES, 2024b, Section C.1.5 and ICES, 2017b).

Results of the river model indicate a substantial increase in smolt abundance in the AU 1–2 rivers since the late 1990s, followed by a period with high and stable smolt production without any trend in the last decade. However, in the near future (2025–2027), smolt abundance is projected to decline in the most northern rivers. This anticipated decrease reflects recent reductions in parr densities and weak spawning runs, although it should be noted that these predictions carry considerable uncertainty.

In some of the smaller AU 2 rivers, smolt abundance began to decline somewhat earlier, following peak levels around 2017–2019 (Table 4.2.2.1). In contrast, in Ume/Vindelälven – the most productive AU 2 river – smolt production dropped sharply in 2019–2021 due to severe health issues affecting adult salmon some years earlier. However, as the health situation has improved, smolt abundance in this river has since increased substantially, reaching a record high level in 2024 (Table 4.2.2.1).

The long-term increase in smolt production in AU 3 (Ljungan and Testeboån) is less pronounced and exhibits greater year-to-year variation compared to the AU 1–2 rivers. In Ljungan, severe health problems among adult salmon resulted in very low parr densities between 2017 and 2021, with no parr observed during the 2018 electrofishing survey. Consequently, smolt abundance in Ljungan was estimated to be very low during 2019–2022. However, in line with increased 0+ parr densities observed since 2022, estimated smolt production has risen in 2023–2024. In Testeboån, smolt production also increased during 2022–2024, reaching the highest levels estimated so far, following a few years of lower production (Table 4.2.2.1).

In AU 4, smolt production in Emån is estimated to have gradually increased until 2018, after which the abundance dropped significantly following a warm summer and low parr densities. After that, smolt abundances have remained low compared to previous years. In Mörrumsån, smolt production has been relatively stable since the mid-1990s, with no clear trend over time (Table 4.2.2.1). Note that smolt production in the AU 4 rivers is not projected more than one year ahead, due to the younger age structure of smolts in these southern rivers compared to those in the north. Testeboån and Ljungan in AU 3, where two-year-old smolts dominate (as in AU 4), are also included in the southern version of the river model.

For Tornionjoki, Simojoki, Åbyälven, Rickleån, Sävarån, Ume/Vindelälven, Öreälven, Ljungan, Testeboån, and Mörrumsån, the river model results are more informative (precise) than for other rivers because of the availability of smolt trapping data from two or several years. Smolt estimates of years without smolt trapping have also become somewhat more precise in these rivers. Smolt trapping has been conducted only in one year in Lögdeälven and Emån, which mainly increases the precision of smolt abundance in that specific year.

A **submodel for M74 mortality** provides input about fry mortality due to M74 into the life cycle model by analysing stock-specific data on annual incidences of M74 (see ICES, 2025, Section C.1.6). Figure 4.2.2.1 shows yearly estimates for M74 mortality (median and 95% probability interval) since the mid-1980s. Following several years with very high mortalities in the early 1990s, levels declined until the mid-2010s when M74 mortality was close to zero. In the spawning years 2015–2017, mortalities increased to about 5–15%, after which they have returned to the low levels that prevailed in the early 2010s (Figure 4.2.2.1, Table 4.2.2.2).

In general, the percentage of females with offspring affected overestimates the M74 mortality because part of the offspring will die due to normal yolk-sac-fry mortality, unrelated to M74. Also, not all offspring necessarily die from M74. Because of the long-term decreasing trend in mortality among offspring of females affected, the data on the proportion of affected females is expected to overestimate M74 mortality. Data on the total average yolk-sac-fry mortality are much better at tracking the general trend but overestimate the actual M74 mortality, because these data do not distinguish between normal yolk-sac-fry mortality and yolk-sac-fry mortality caused by the M74 syndrome. Figure 4.2.2.2 illustrates the probability that the offspring of M74-affected females would die, which has been possible to calculate for Simojoki, Tornionjoki, and an “unsampled salmon stock” that gets predicted M74 mortality estimates based on the hierarchical model structure. In recent years, that probability has been around 50% or somewhat higher.

This year, the M74-submodel was not updated due to one year pause in Finnish hatching experiments. Earlier, yolk-sac-fry mortality data from Finland has provided insight on proportion of juveniles that survive from M74, whereas Swedish data have provided information about the proportion of females that have considered to be affected by M74. Although thiamine is known to be strongly linked to M74 survival, and thiamine measurements on female salmon from 2023 spawning stock are available, we currently lack a formal mathematical method to incorporate this knowledge in the M74 submodel. Work will be continued to make this addition to improve the understanding of the M74 and to better utilize all available data on the matter. In addition, the Finnish yolk-sac-fry mortality data collection has been continued in 2024, and the results from this will be available later in 2025.

Based on measures of thiamine levels in eggs from spawners in Tornionjoki (AU 1) and from four Swedish rivers in 2024 (Section 3.4), M74 is expected to remain low among offspring hatching in 2025. Thus, it was decided that the previously estimated survival (based on 2024 stock assessment) for juveniles hatching in 2023 can be used also for juveniles hatching in 2024, and Table 4.2.2.2 and Figure 4.2.2.1 are identical to those in 2024 working group report. Note the one year lag in the hatching experiment data, as the information available for offspring from spawners in the year preceding the assessment becomes available after the working group meeting.

A small hierarchical Bayesian submodel is used to derive probabilities for migrating salmon to find the **fish ladder in Ume/Vindelälven** (ICES, 2014). In this river, salmon must pass the fish ladder at Norrfors to reach the spawning grounds located further upstream. The model is based on recurrent mark-recapture studies carried out since the mid-1990s. As seen from Figure 4.2.2.3, posterior estimates of the annual migration success for the period 1996–2024 have varied between 0.2 and 0.6 in most years, with a tendency for lower values in 2014–2018 when the adult salmon population showed poor health. Note that the poor health situation for adult salmon in Ume/Vindelälven precluded reliable results from the tagging studies in 2019–2020, whereas the results from 2021–2022 were omitted due to uncertainties regarding the representativeness of the tagging data collected in those years.

### 4.2.3 Status of AU 1–4 stocks and development of fisheries in the Gulf of Bothnia and the Main Basin

The full life-history model (FLHM) was run with JAGS software with two chains for 100 000 iterations after an adaptive phase and burn-in of 120 000 iterations. The model run in 2025 was shorter than usual, owing to the need to stop and restart FLHM run as described in Section 4.2.1. MCMC chains were thinned with an interval of 100 to yield a final sample size of 2 000 (1 000 iterations from each of two chains). While inspection of trace plots and Gelman-Rubin diagnostics indicated good convergence for most (>81%) of the monitored parameters and variables, some of the parameters describing proportions of wild salmon at sea (“Wprop”) showed poor mixing (one chain was stuck at 1). It was therefore necessary to select one chain for each monitored parameter/variable. A default MCMC chain was accepted where the Gelman-Rubin diagnostic point estimate was  $\leq 1.10$ . If the Gelman-Rubin diagnostic point estimate was  $> 1.10$ , a chain was selected based on a comparison of posterior mean values with results from an earlier run FLHM that showed good convergence in Wprop parameters. The resulting sample of 1 000 MCMC iterations was used in scenarios. Because of the shorter model run time, the level of convergence achieved in 2025 was worse than in previous years. Results are thus associated with some additional uncertainty.

The results indicate a strongly decreasing long-term trend in post-smolt survival until mid-2000, after which survival generally somewhat improved until the mid-2010s (Figure 4.2.3.1). Since then, a decreasing trend is seen again, with a drop from the average level of 15% in mid-2010s to the average level of about 10% during the first years of 2020s. The lowest overall survival was estimated for salmon that smolted in the year 2021: the median estimates of wild and reared smolts was 6.0% (90% PI 4–9%) and 1.5% (90% PI 0.6–4%), respectively. In the last year’s assessment with less data available about the survival of 2021 smolt cohort, the respective estimates of survival were 7.7% and 3.8%, i.e. the perception about the survival of the cohort has clearly become updated worse. The most recent smolt cohort (2023) from which some data exists to estimate survival, indicates 8.3% and 3.8% survival (median estimates) for wild and reared smolts, respectively. However, this remains the most uncertain survival estimate and is likely to be significantly updated as more data on adult salmon abundance from this smolt cohort become available. Post-smolt survival was low also in the years 2005–2006 (median estimate around 9–10% among wild and about 4% among reared smolts). Low survivals are estimated also in some other later years (e.g. around 9% in 2018 for wild post-smolts) but since 2010, there have also been some years with relatively high survival (closer to 20% for wild post-smolts).

The adult natural annual survival of wild salmon (median 92%, 90% PI 91–93%) is estimated to be higher than that of reared salmon (median 84%, 90% PI 78–90%). Thus, the difference in total sea survival back to the spawning/stocking site for wild and reared salmon is large because of the survival difference both at the post-smolt stage and at later marine stages.

Maturation (homing rate) of one-sea winter (1SW) salmon (grilse) has in most years been around 10–20% (average of medians over the whole time-series is 14%) and 20–50% (average of medians over the whole time-series is 33%) among wild and reared individuals, respectively (Figure 4.2.3.2). Differences between wild and reared salmon are smaller among multi-sea winter salmon, but in each sea age reared salmon has on average higher maturation rate. Generally, 30–50%, 50–70%, and 40–60% of two-sea winter (2SW), three-sea winter (3SW), and four-sea winter (4SW) feeding wild salmon have matured, respectively. The estimated maturation rates of 4SW salmon are on average lower than those of 3SW salmon. This is against intuition but might be an artefact due to the inconsistency between current model assumptions (no repeat spawners, all fish mature at the latest after five sea winters) and the biology of salmon (some repeat spawners exist and some salmon have a longer lifespan than five years at sea). Maturation rates of

reared salmon have generally increased over time, but no similar trend is visible among wild salmon. Maturation rates were generally at their lowest levels around 2010–2012.

The FLHM allows estimation of stock-specific stock–recruit relationships, which are presented as summary statistics (tables 4.2.3.1 and 4.2.3.2) and graphically (figures 4.2.3.3, 4.2.3.4, and 4.2.3.5). Table 4.2.3.2 and Figure 4.2.3.5 also show the estimates of the stock-specific MSY-based reference points  $R_{MSY}$  and  $R_{lim}$ , which are used to assess stock status.  $R_{MSY}$  is a target reference point defined as the smolt production corresponding to maximum sustainable yield, while  $R_{lim}$  is a limit reference point defined as the smolt abundance that would result in a smolt production of  $R_{MSY}$  in one generation time with no fishing.  $R_0$  (PSPC) is an “equilibrium smolt production”, i.e. the long-term average smolt production that can be reached without fishing. Reference points can also be expressed in terms of number of spawners ( $S_{MSY}$  and  $S_0$  in Table 4.2.3.2), obtained using optimization to find the MSY removal and population size for each sample from the posterior distribution.

As in 2024’s assessment, an extra step was needed in the calculation of reference points in 2025, to account for the posterior probability associated with steepness  $<0.20$  for some stocks. The reference points  $R_{MSY}$  and  $R_{lim}$  are undefined when steepness is lower than 0.20. To deal with this, samples for which long term average smolt production with no fishing was below 100 smolts (i.e. samples with particularly low steepness values) were omitted from status evaluations, since this level was taken to indicate populations that had crashed.

Among stocks, the point values (medians) of  $R_{lim}$  and  $R_{MSY}$  range from 18–43% and 57–86% of their corresponding PSPC’s point values, respectively (Table 4.2.3.2). Some large updates were observed in PSPC’s and reference points in the 2025 assessment compared with 2024 (Table 4.2.3.2). The largest change is in the estimate for Testeboån, where e.g.  $R_0$  increased by 48%. In contrast,  $R_0$  was updated 20-30% lower in Kalixälven, Kågeälven, Öreälven, and Emån. Generally, apart from Kalixälven, the rivers with largest updates to their reference points have also the most uncertain estimates.

Figure 4.2.3.4 illustrates river-specific stock–recruit curves. The blue clouds in the figure panels indicate posterior probability distributions of all the historical estimates of yearly egg deposition and corresponding smolt abundance (the density of the cloud indicates the probability). Curves added in the figure panels are draws from the posterior distribution of the Beverton–Holt stock–recruit function. Stock-specific estimates of stock–recruit steepness also showed large variation in central tendency and uncertainty (Figure 4.2.3.6). Owing to the parameterization of the Beverton–Holt stock–recruitment function used in the FLHM, steepness may be below 0.20, meaning that the stock will not replace itself, even in the absence of fishing mortality. In 2025’s assessment, several stocks (Kågeälven, Emån, and Testeboån) had a non-negligible probability for steepness to be below 0.20 (Figure 4.2.3.6).

Figure 4.2.3.5 illustrates how estimates of PSPC,  $R_{lim}$ , and  $R_{MSY}$  vary between stocks. The degree of overlap between the distributions for  $R_{lim}$  and  $R_{MSY}$  depends partly on the stock–recruit steepness, such that stocks with lower steepness tend to have more overlapping distributions, and vice versa. It is also affected by among-stock variation in the level of uncertainty, which is likely an outcome of several factors, including stock-specific assumptions about vital rate the amount of stock-specific data, the coherence of data and the amount of contrast existing in the data (i.e. whether data are available at both low and high population densities).

The total combined PSPC median estimate containing all the AU 1-4 stocks is about 2.9 million smolts (90% PI’s 2.6-3.3 million) (Table 4.2.3.2). Of this, AU 1 stocks account for 81%, and AU 2 stocks account for 17%. When adding the point estimates of PSPC shown in Table 4.2.3.3 for the AU 5 (242 000 smolts) and AU 6 (278 000 smolts), which are based on expert judgments, the total combined PSPC of all the assessed Baltic Sea wild salmon stocks is about 3.4 million smolts.

Since the mid-1990s, the status of many wild salmon populations in the Baltic Sea has improved, and the total wild production has increased from less than 0.5 to almost three million smolts (Figure 4.2.3.7, Table 4.2.3.3). After the record year 2017 (with median estimate of 2.9 million smolts), the total wild production temporarily slightly declined by about 0.3 million smolts, but has again increased to about 2.9 million smolts (median estimate) in 2024. Since the mid-2010s, the total smolt production of the AU 1 stocks has been clearly above the median estimates of both the combined  $R_{lim}$  and  $R_{MSY}$  of AU 1, and it has been fluctuating close to the median estimate of combined PSPC ( $R_0$ ) of these stocks. At the same period in AU 2, the combined smolt production has been fluctuating between the median estimates of the combined  $R_{MSY}$  and PSPC of AU 2 stocks. However, in 2019-2021 the smolt production in this AU was temporarily below  $R_{MSY}$  because of the disease-related failure of many spawners to reproduce, especially in the river Ume/Vindelälven. In the AU 3 total smolt production has recently been close to the median estimate of the AU's combined  $R_{MSY}$ , while in the AU 4 total smolt production has fluctuated between the combined  $R_{MSY}$  and  $R_0$  of the AU. Since 2010, the total combined AU 1–4 smolt production has been fluctuating between the median estimates of the total combined  $R_{MSY}$  and PSPC of all these AU's (Figure 4.2.3.7).

There are regional differences in trends in smolt production. For the wild salmon stocks of AUs 1–2, the very fast recovery of smolt production indicates high steepness for stock–recruit relationships in these rivers. The recovery is most pronounced in the largest rivers, but recently the recovery of salmon stocks spawning in smaller ‘forest rivers’ of the region (Åbyälven, Rickleån, Sävarån, Öreälven, Lögdeälven) has sped up. However, their current stock status (current production level against MSY) is assessed to be mostly lower than that of the larger salmon rivers, as discussed below. Of the two wild stocks in AU 3, Testeboån has also recovered, but the salmon of Ljungan has suffered from additional mortality among spawners in 2017-2021 due to health problems, which periodically reduced smolt production. For 2024, smolt production in Ljungan has returned back to the level that prevailed before the occurrence of health problems. In AU 4, the Mörrumsån stock has stayed relatively stable, while smolt production in Emån has generally been increasing.

Out of the 17 assessed stocks in AUs 1–4, 10 reached  $R_{lim}$  with >95% probability in 2024, six stocks reached  $R_{lim}$  with 70–95% probability, and one stock reached  $R_{lim}$  with 50-70% probability (Table 4.2.3.4a). All stocks in the AU 1 are estimated to have reached their  $R_{lim}$  with 100% probability, and the corresponding probabilities of having reached their  $R_{MSY}$  vary between 76–94%. However, in this AU the status evaluations of Tornionjoki and Råneälven are uncertain because of substantial overestimation of the number of spawners in recent years (see Section 4.3.1). In AU 2, five stocks (Piteälven, Byskeälven, Rickleån, Sävarån, and Vindelälven) have reached their  $R_{lim}$  with 96-100% probability, while among the rest of the AU 2 rivers, the corresponding probabilities range from 68% (Åbyälven) to 95% (Öreälven). The probabilities of having reached  $R_{MSY}$  vary between 38% (Åbyälven) and 93% (Sävarån). In AU 3, Ljungan has 95% probability of being above  $R_{lim}$  and 68% probability of having reached  $R_{MSY}$ , while Testeboån has 87% probability of being above  $R_{lim}$  and 70% probability of having reached  $R_{MSY}$ . Among the AU 4 stocks, Mörrumsån has likely reached both  $R_{lim}$  (100% probability) and  $R_{MSY}$  (73% probability), whereas Emån is above  $R_{lim}$  with 58% probability but it is uncertain if the stock has reached  $R_{MSY}$  (50% probability).

The FLHM captures the overall historical fluctuation of commercial catches in various fisheries fairly well, especially since 2010 (Figure 4.2.3.8). However, catches from the first decade of this millennium tend to be underestimated for most of the years and fisheries (Figure 4.2.3.8). Model-estimated catches of recreational sea fishing (trolling) and, for most of the years, also river fishing, follow closely the catch statistics throughout the time-series.

The model is fitted to the proportion of wild and reared salmon (separately for ages 2SW and 3SW) in the offshore (winter) catches. With a few exceptions, the posterior estimates of wild vs. reared proportions follow the observed proportions closely, showing an increase in wild proportion from around 25% in the 1990s to about 60-70% or more in the last two decades (Figure 4.2.3.9). No data on proportions of wild and reared salmon is available from the winters 2019/2020 and 2021/2022.

An increasing long-term trend in the number of spawners is seen in most of the rivers of the AUs 1–4 (Figure 4.2.3.10). Spawner abundance increased particularly in the years 2012–2014. In Simojoki, the very high estimates of spawners around the turn of the millennium reflect very intensive stocking of hatchery-reared parr and smolts in the river during the late 1990s. The model captures trends seen in fish ladder counts, often even short-term variation in rivers where the data are not used for model fitting (e.g. Byskeälven). Annual variation in river conditions affects the success of fish to pass through ladders and, therefore, the ladder counts themselves are not ideal indices of spawner abundance. Thus, it is expected that the estimates of spawner abundance and the fish ladder counts do not always indicate similar interannual variation. However, in Tornionjoki and Råneälven the most recent estimates (especially 2023 and 2024) of spawner abundance appear much too optimistic compared to the observed development based on spawner counts in these rivers.

Unlike in the other AU 1–3 stocks, the number of spawners dramatically dropped in Ume/Vindelälven for the years 2015–2018, which is related to the health problems of salmon decreasing both the abundance and success of spawners to pass through the fish ladder (Figure 4.2.2.3). Moreover, since 2014 the fish ladder counts in this river have not been as low as the model estimated numbers of spawners (Figure 4.2.3.10 vs. Table 3.1.1.2 and Figure 3.1.1.3). This is due to the need to accommodate Ume/Vindel stock dynamics in the FLHM to the extra losses among female salmon to reach spawning grounds in this river (see ICES, 2025, Section C.1.9). The drop in spawner abundance in Ume/Vindelälven dramatically decreased smolt production in 2019–2022 (Table 4.2.3.3 and Figure 4.2.3.10). However, more recent (2019–2020) spawning runs into the river have been abundant, and the smolt production is assessed to have increased back to a higher level starting in 2023.

The general synchronous drops and increases in the observed spawner counts are well-captured by the model. This is probably a consequence of fitting the model to spawner counts in combination with assuming annually varying maturation rates; maturation rates are generally estimated to be lower preceding poor spawning runs and higher preceding high spawning runs (Figure 4.2.3.2 vs. Figure 4.2.3.10). Also, the effect of annually varying post-smolt survival is visible in spawner counts and estimates, e.g. the low survival of the 2016 smolt cohort contribute to the low spawner abundance in (especially) 2018. However, the most recent (particularly 2023 and 2024) dramatic drops in spawner abundance in certain rivers are not very well captured by the model, and therefore spawner abundance in 2023–2024 is likely overestimated in these rivers, as pointed out above. The primary reason for not capturing this drop in the model is that the life-history of different stocks from smolt to spawner is constrained to be more-or-less the same in the current FLHM, giving limited flexibility to fit different spawner count time-series. In addition, the FLHM estimates annual post-smolt mortality in a given year using the average mortality over the four previous years. As a consequence, the model tends to smooth and average out river-specific differences in stock development, so that sudden changes (drops or rises) in river-specific data and/or post-smolt survival are not fully captured.

For 2025, the FLHM predicts similar spawner abundance as for 2024 in most rivers. This prediction must, however, be taken with caution, especially because of the most recent drop in the post-smolt survival and the related problems of capturing this change (as described above). Moreover, predictions are very uncertain, and e.g. natural conditions at sea during the spring of 2025 (not

currently well known/predicted) are expected to modify the spawning run strength via maturation rates and run timing.

Despite some fluctuations, there was a strong long-term decreasing trend in the harvest rate of offshore driftnets until the total ban of this gear type in 2008 (Figure 4.2.3.11a). After the peaks in 2003–2005 and again in 2011, harvest rate of offshore longlining dropped to about 0.1 and for years 2019–2021, this harvest rate dropped further to below 0.05, until dropping to zero due to the ban of directed salmon offshore fishing starting in 2022 (Figure 4.2.3.11b). The harvest rate in recreational offshore trolling increased from the 1990s until 2007–2010, when it was around 0.07–0.10. Over the past ten years, the offshore trolling harvest rate has once again declined to approximately 0.03 (Figure 4.2.3.11c).

Since the early 2000s, the coastal harvest rate, which predominantly consists of trapnet fishing, has decreased almost continuously (Figure 4.2.3.11d). During the first years of the 2020s, the harvest rate of this fishery was on the level of 0.15–0.20, but in 2024 it dropped to about 0.10–0.12 for wild AU 1 salmon (which has the highest coastal harvest rate of all wild Baltic salmon) (figures 4.2.3.11d and 4.2.3.12). Estimates of harvest rates in the rivers are inaccurate and lack a clear trend (Figure 4.2.3.11e). River-specific data indicate that there can be substantial variation in the harvest rate between rivers (Section 3.1), which is currently not taken into account in the FLHM.

The combined offshore harvest rate (driftnetting, longlining, and trolling) shows a clearly decreasing trend from 0.3–0.5 in the 1990s to mid-2000s to below 0.05 in the last few years (when targeted salmon fishing has been allowed only by trolling) (Figure 4.2.3.12). The combined harvest rate of coastal fishing shows even more pronounced decreasing trend, dropping almost steadily from 0.8–0.9 in the early 1990s to 0.1–0.2 in the most recent years (Figure 4.2.3.12).

#### 4.2.4 Status of AU 5–6 stocks

Since salmon stocks in AU 5–6 are yet without an analytical assessment, it has not been possible to calculate their river-specific reference points related to MSY (i.e.  $R_{lim}$  and  $R_{MSY}$ ). Instead, the min-max ranges of  $R_{lim}$  (18 – 43% in relation to PSPC) and  $R_{MSY}$  (57 – 86% in relation to PSPC) of AU 1–4 stocks, estimated by the analytical assessment, are used to perceive the status of the AU 5–6 stocks (figures 4.2.4.1 – 4.2.4.5). Because the estimates of annual smolt production vary greatly among AU 5–6 stocks (partly an artefact caused by assuming that all smolts are two-years old), the current status is assessed in two ways: 1) by using only the 2024 smolt production estimate; and 2) by using the average of the 2022–2024 smolt production estimates.

Smolt production in the **AU 5 stocks** are characterized by large interannual variation and most of the wild and mixed rivers show no clear long-term trend (figures 4.2.4.1 and 4.2.4.2). During the last decade, smolt production dropped from 50% or higher to below 50% of PSPC. Thereafter, smolt production has stayed at lower levels except for in years 2015, 2016, and 2021, when sudden temporal increases were observed in most rivers. A similar increase was also observed in 2023, but smolt production decreased in 2024. It is expected that smolt production will again increase in 2025 (Figure 4.2.4.1).

From 2021 to 2024, most AU 5 wild rivers were estimated to produce only about 1–35% of their PSPCs and they are therefore unlikely to have reached their level of  $R_{lim}$  in 2024 (given the associated uncertainties in estimation; Table 4.2.3.4b), except for the Salaca River (20% of PSPC) and the Tebra River in the Saka River catchment (28% of PSPC). Among the 12 AU 5 stocks, wild Salaca and Saka rivers have highest current status, expected to be within their  $R_{lim}$  range. River Salaca has the most extensive and longest time-series of monitoring data in the eastern Main Basin area (Section 3.1.5). Parr densities in this river showed an increase from the early to the late 1990s followed by a subsequent decrease starting in the early 2000s but have been increasing again starting from 2010. Smolt production in Salaca from 2017 to 2020 was mostly below  $R_{MSY}$

and close to  $R_{lim}$ . In 2024, smolt production in both the Salaca and Saka rivers was likely within the  $R_{lim}$  range. It is expected that the 2025 smolt production in the Saka River will likely decrease below the  $R_{lim}$  range, whereas in the Salaca River it is expected to be above  $R_{lim}$  (Figure 4.2.4.1).

Many AU 5 rivers are very small and their estimated PSPC only amounts to some thousands of smolts. Existing data from these rivers are fragmentary and typically indicate zero or near-zero annual smolt production. As a result, stock status is expected to be clearly below  $R_{lim}$  (Figure 4.2.4.1). Among this group of smaller wild AU 5 rivers, parr has recently been observed more frequently and with higher densities in rivers Saka and Irbe, while decreasing parr densities or even no parr have been observed in rivers Bārta, Pēterupe, and Vitrupe.

In the mixed AU 5 salmon rivers, smolt production in the River Pärnu has shown small signs of improvement in the years 2021 to 2023, but in 2024 it decreased. In 2025, increase of smolt production to a similar magnitude as in years 2021 to 2023 is expected. Observed smolt production in the mixed Nemunas river system has remained below the  $R_{MSY}$  range. In 2024 and 2025, the smolt production estimates fall within the range of  $R_{lim}$ . (Figure 4.2.4.2). Nemunas is a large watercourse with several tributaries, and many of them have been subject to long-term restoration efforts (habitat improvements, stocking, etc.; see ICES, 2018). In 2023, a slight increase in smolt production was estimated for the Gauja catchment reaching  $R_{lim}$ , but a decline below this range was again estimated for 2024, and similar production is expected in 2025. In the River Venta, smolt production has shown a decreasing trend for several years. A slight improvement was estimated for 2024 with a decrease expected in 2025 (Figure 4.2.4.2).

In comparison with AU 5, a large majority of the twelve **AU 6 stocks** have reached a higher proportion of their PSPC. Smolt production in most AU 6 river stocks shows positive trends but also large interannual variation, especially in the smallest rivers (figures 4.2.4.3 – 4.2.4.5). Among wild (Figure 4.2.4.3) and mixed (Figure 4.2.4.4) Estonian stocks, the clearest positive trend exists in two of the wild ones (Keila and Kunda) which have reached the  $R_{MSY}$  level.

Smolt production in wild Vasalemma has increased in the recent decade, and it is expected to just reach the  $R_{MSY}$  range for the first time in 2025 (Figure 4.2.4.3, Table 4.2.3.4b). In 2018, the Vanaveski dam was opened and salmon got access to additional spawning areas upstream. Following the opening of this dam, PSPC in Vasalemma has been estimated considerably higher than in previous years, which consequently caused a drop in the estimated stock status. However, the electrofishing data indicate a gradual colonialization occurring in these new rearing habitats, and further improvement of the Vasalemma stock status is expected.

In the small Estonian mixed rivers, the natural smolt production remained low for many years, but in the recent decade smolt production levels have improved (Figure 4.2.4.4, Table 4.2.3.4b). Current PSPC in some of these small rivers is severely limited by migration barriers, and parr densities show a lot of interannual variation. As a result of a dam removal in the mixed river Valgejõgi, its estimated PSPC has increased markedly since 2016 (from 1 500 to 16 500 smolts), because salmon regained access to all potential historical spawning and rearing areas.

In the Finnish mixed river Kymijoki, a positive trend for the salmon stock can be seen, although some variation in year classes has occurred. The smolt production most likely reached  $R_{MSY}$  in 2020 and 2022 but a decrease to the level of  $R_{lim}$  was estimated in 2023 and is also expected in 2024. In the Russian river Luga, wild smolt production is stable but low, and it has remained below 10% of PSPC, thus being below the level of  $R_{lim}$ , despite large-scale annual smolt releases using salmon of local origin (Figure 4.2.4.5, Table 4.2.3.4b). Since 2021 no information about river Luga is available, due to the cancelled working group meeting in 2022 and the following decision to suspend Russia from the work within ICES.

#### 4.2.5 Harvest pattern of wild and reared salmon in AU 6

About 90% of the salmon catches in the Gulf of Finland are taken from the northern coast by the Finnish commercial coastal fishery, with a considerably higher share of finclipped salmon than in Estonian catches (Figure 4.2.4.6). Genetic analyses of the stock composition of Finnish commercial salmon catches from 2019 to 2024 reveal substantial annual variation. The overall dominant contribution (40–76%) comes from local Neva salmon of predominantly released origin, followed by wild (15–51%) and hatchery-reared (4–13%) salmon from the Gulf of Bothnia rivers. The estimated contribution from wild Estonian and eastern Main Basin stocks in these Finnish catches was consistently close to zero (Section 2.6). It should be noted, however, that there were pronounced differences between sampling sites and sampling times between the years. The share of Gulf of Bothnian salmon was clearly higher during the early fishing season (June), whereas the share of Gulf of Finland Neva salmon was high later in the season. The proportion of other Gulf of Finland stocks (Russian and Estonian) in the genetically analysed catch samples from the northern Gulf of Finland has been estimated to be zero or close to zero (<0.5% Kunda in 2017, ICES, 2019).

Stock composition of Estonian coastal catches from 2016–2018 was for the first time genetically studied in WGBAST 2019 report. The catch composition differed substantially from the Finnish coastal catches from the northern Gulf of Finland. On average over 80% of the catches consisted of local wild and released stocks, whereas eastern Main Basin stocks contributed about 10% on average and Gulf of Bothnian stocks contributed less than 5%.

These results suggest that the main salmon fishery in Gulf of Finland, which takes place along the Finnish coast, has minor effect on the Estonian wild populations. In contrast, the small and geographically restricted Estonian coastal fishery mainly harvests Estonian wild stocks. The present harvest rate seems to be on a sustainable level, as the Kunda and Keila populations are in a good status, and smolt production has also increased in the River Vasalemma.

Salmon fishing on the Russian coast is not allowed. Despite this, the River Luga stock has remained on a very low level over the years. Circumstantial data indicate a high level of poaching at the river mouth and in the river, which may be the main reason for the low stock status. Note that since 2021 Russian data and other information (electrofishing, potential management changes etc.) has not been available to the working group.

### 4.3 Stock projection of Baltic salmon stocks in AUs 1–4

#### 4.3.1 Assumptions regarding the development of fisheries and key biological parameters

Table 4.3.1.1 provides a summary of the assumptions on which the stock projections are based. The fishing scenarios differ from the ones in previous assessments, but the overall structure is similar to, for example, the previous full assessment (ICES, 2024).

##### Fishing scenarios

Scenario 1 illustrates stock development in case all fishing (both at sea and in rivers) is closed, whereas Scenario 2 is similar, with the exception that only sea fisheries (both recreational and commercial) are closed but fishing is allowed in rivers except those where it is currently banned (see below). For fishing scenarios, four types of fishing patterns were used: scenarios 3–4 illustrate fishing scenarios with the fishing pattern as in 2021, including both commercial and recreational sea fisheries, with differing total removals at sea. Scenarios 5–10 show different total removals when fishing is confined to the coastal trap net fisheries in SD 29N-31, thus assuming

closure of all fisheries in the Main Basin (SD 22-29S). Scenarios 11-15, follow the same fishing pattern as scenarios 5 and 7-10, with the addition that recreational trolling is assumed to take place in the Main Basin (sections 2.1 and 2.2).

Where appropriate, scenarios account for annually varying harvest rates in recreational trolling and catchabilities in commercial longlining. In scenarios with offshore longlining, we assume that the catchability in the future will remain the same as in the last observed year (2021). For recreational trolling, the target removal was defined using reported catches for landed reared salmon, and the estimate of the number of dead wild salmon in 2024 from the FLHM. To obtain the desired total removal for each fishing scenario, optimization was performed to find an effort multiplier (relative to 2024's fishing effort) that resulted in a total sea catch corresponding to the desired (scenario-specific) total removal in the advice year (2026). Total sea catch was obtained as the sum of catches from the commercial and recreational trolling fisheries, depending on the fishing pattern. It should be noted that the current methodology maintains the fishing pattern between the scenarios in terms of relative differences in harvest rates, rather than catches for a given fishing pattern. Thus, for example, in scenarios with both offshore and coastal fisheries and high total removal, a greater share of the catch will be taken in the offshore areas compared to ones with lower removal, because offshore fisheries are assumed to take place first in scenarios. This problem is minor in scenarios in which commercial fisheries take place only in coastal areas.

Because the scenarios are technically defined in terms of future fishing effort, probability distributions for predicted catches depend on the estimated population abundance, age-specific catchabilities and assumed fishing effort. Figure 4.3.2.8 shows the harvest rates prevailing in a selection of scenarios.

As in 2024, river harvest rates for some wild stocks where a fishing ban or catch-and-release regulation is currently enforced were assumed to remain lower into the near future. Thus, river harvest rates between 2025 and 2037 were assumed to be equal to 10% of the harvest rate applied for other wild river stocks for Råneälven, Sävarån, Emån, Kågeälven, and Testeboån in scenarios 2-15.

In 2025, some additional scenarios were run to explore the implications of potential overestimation of the abundance of Tornionjoki salmon on status evaluations for other stocks. Since total removal is fixed in each scenario, overestimation of Tornionjoki salmon will lead to underestimation of harvest rates for other stocks, which could lead to overly-optimistic status evaluations. To assess the approximate magnitude of this effect, an extra scenario was run in which the estimated abundances of Tornionjoki salmon were reduced by 25% going into the scenarios (this figure was somewhat arbitrary but gave an abundance level that was more consistent with the spawner counting observations and detection probability prior). The extra scenario was otherwise the same as Scenario 7 (with a total removal of 40 000 salmon). Decreasing the abundance of Tornionjoki salmon led to a coastal fishery catch of ~14 000 Tornionjoki salmon, or roughly 35% of the total catch, in comparison to a catch of ~20 000 Tornionjoki salmon (~50% of the total catch) when no adjustment was made to initial abundances. Status evaluations for stocks other than Tornionjoki from the scenario with decreased abundance were very close to a second extra scenario with a removal of 50 000 salmon but no correction for Tornionjoki (results not shown), indicating that the effects of overestimation of Tornionjoki salmon on status evaluations could be countered by decreasing the total removal by 10 000 salmon (see Section 4.6 for discussion).

### **Survival parameters (post-smolt and adult natural mortality, M74)**

In the post-smolt mortality (Mps) projections, an autoregressive model with one-year lag (AR(1)) is fitted at the logit-scale to the historical estimates of the survival parameters from the FLHM. The AR(1) model is used to obtain a stable-state mean value and autocorrelation coefficient from the historical analysis to be used in the future projections. In 2025's assessment, a decision was

made to exclude only the final year from the historical time-series when defining the four-year window to calculate the stable-state mean of the AR(1) process, reverting to the methodology used in 2023 and earlier assessments. Thus, the median value of the mean post-smolt survival estimates during 2020–2023 (10%) was used, and the starting point for the AR(1) process in scenarios (first projected year) was 2024. These changes were made to include the latest available information on the development of this parameter and based on an expert judgement that these years most accurately reflect current survival at sea. The correlation coefficient of the AR(1) process was based on the whole historical time-series, as before.

The M74 projections also used an AR(1) model fitted to historical estimates from the FLHM. The method for M74 is similar, but the stable mean for the future is taken as the mean over the whole historical time-series. The starting point of M74 projections is 2024. Time-series for Mps and M74 survival are illustrated in Figure 4.3.2.1.

Adult natural mortality (M) is assumed to stay constant in the future, equalling the values estimated from the historical assessment. Different fisheries occur at different points in time and space, and many catch only maturing salmon, which have been subject to several months' natural mortality within a year. Thus, to increase the comparability of abundances and catches, the abundances at sea have been calculated by letting M first decrease the PFA (stock size at the beginning of the year) of multi-sea-winter (MSW) salmon for six months. Moreover, the stock size of grilse has been presented as the abundance after the period of post-smolt mortality and four months of adult natural mortality. This period is considered because the post-smolt mortality period ends in April, after which eight months of that calendar year remain during which grilse are large enough to be fished. Half of that period, i.e. four months, is considered to best represent the natural mortality that takes place before the fishing.

For scenarios including recreational trolling where only reared (finclipped) salmon are retained, the target catch is based on the estimate from the FLHM for 2024. This estimate uses a prior for the release mortality of wild fish with a median of 25%. Because no such empirical estimates yet seem to exist for Atlantic salmon (but see Section 2.5.3), this mortality rate is based on a previous review of studies dealing with troll-caught Pacific salmon (see ICES, 2017a for details).

In addition, survival after counting of spawning migrating salmon in Ume/Vindelälven was set to one in all scenarios (in previous years, when salmon showed health-problems in this river, some extra mortality after counting was assumed). Likewise, it was assumed that there will be no continued health-related mortality of spawners in Ljungan in the future.

### **Maturation**

Annual sea-age group-specific maturation rates are given as the average level computed over the historical period, separately for wild and reared salmon. This projection starts from 2026, as the maturation rates during the interim year (2025) can be predicted based on available sea surface temperature (SST) information from January to March of that year (ICES, 2014, Annex 4). The time-series of maturation rates are presented in Figure 4.3.2.2.

### **Releases of reared salmon**

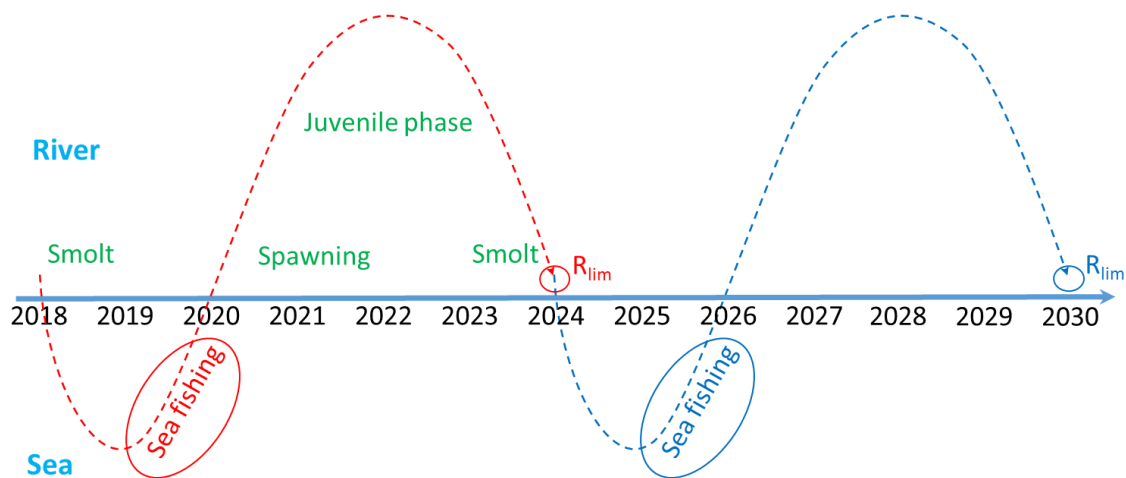
The number of released reared salmon per AU is assumed to remain at the same level in the future as was realised in 2023. Previously, projections have been based on the most recent available data (i.e. smolts released in 2024). However, in 2023 several Swedish salmon hatcheries experienced very high mortality among newly hatched fry, resulting in the 2024 Swedish smolt releases being only about 70% of typical levels. As smolt releases are expected to return to more normal levels beginning in 2025, the 2023 release numbers were chosen as the baseline for future projections, while the lower number of smolts released in 2024 has been incorporated into the historical assessment model.

Information on Russian releases in 2022-2024 was not available to WGBAST at the time of the working group meeting and these were assumed to be zero in future. Russia released about 500 000 one-year-old smolts in 2021 (Table 3.3.1.1).

### Evaluation of stock status under various catch options for 2026

For other fish stocks assessed by ICES, biological reference points often apply to spawning stock (typically expressed in terms of biomass, SSB) at the end of the advice year. For Baltic salmon, however, there is a half-century-long tradition of using smolt production as the main metric of abundance (ICES, 2020b). Accordingly, reference points and stock status for Baltic salmon are expressed and evaluated in terms of smolts (i.e. recruits produced by a certain spawning stock) rather than the spawning stock itself. Because of the time lag between spawning and smoltification, fishing in any specific year will not affect smolt production until several years later.

The schematic and approximate figure below illustrates how sea fishing for Baltic salmon in a particular calendar year affects future smolt production and stock status (evaluated using e.g.  $R_{lim}$ ). As shown by blue arrows, for example, fishing in 2026 will mainly affect smolt production in 2030 (or 2029, depending on the AU), whereas current stock status – i.e. smolt production in the last year with data (2024) – reflects past fishing and spawner abundances (mainly in 2020). The time lag from the year of fishing on maturing adults and resulting smolt production is the reason why fishing scenarios (future projections) are evaluated in terms of expected smolt production four (or three) years ahead of the year in which fishing will take place.



Based on results for the fishing scenarios presented above, stock status corresponding to smolt production in 2030 (AU 1-2) or 2029 (AU 3-4) is evaluated in Section 4.3.2. The one-year difference between AU's reflects latitudinal differences among rivers in average smolt age. Note that the time lag of three or four years from the advice year until smoltification is one year shorter than what was used for corresponding evaluations until 2020. The reason for this change was a shift in fishing pattern, with an increased share of coastal catches from the Gulf of Bothnia targeting maturing salmon during their spawning migration. In earlier years, when fishing on the Main Basin feeding grounds was taking a much larger part of the total sea catch than at present, using smolt runs 4-5 years ahead from the advice year as reference years was considered more accurate, as fishing was then targeting a larger share of immature salmon.

### 4.3.2 Results

According to the projections, stock size on the feeding grounds (pre-fishery abundance, PFA) will be about 0.78 (90% PI's 0.4–1.6) million salmon (wild and reared, 1SW and MSW fish in total)

in 2026 (Figure 4.3.2.3). Of this amount, MSW salmon (i.e. fish that stay in the feeding area for at least one and a half years after smolting) will account for 0.42 (90% PI's 0.2–0.7) million salmon. These MSW fish will be fully recruited to fisheries in 2026. From the predicted amount of 1SW salmon (0.35 million, 90% PI's 0.1–0.9 million) at sea in spring 2026, a fraction (most likely 15–30%) is expected to mature and become recruited to coastal and river fisheries, while the rest of the 1SW salmon will stay on the feeding grounds and are not expected to become recruited to those fisheries until subsequent years.

Because one of the simplifying assumptions of the modelled life cycle is that all salmon die after spawning, a lower maturation rate will increase the survival of the cohort to the next year compared to years with the same abundance but with average maturation. Similarly, a high maturation rate will decrease the abundance of MSW salmon in the following years. Because of this feature, it is important to note that the predicted abundance may easily become over- or underestimated because of the (predicted) development of maturation rates.

According to median values for 1SW and MSW wild salmon combined (0.55 million in 2026, Figure 4.3.2.3), the abundance of wild salmon at sea has fluctuated between 0.4–0.9 million with a slight increasing long-term trend. During the 2010s, the abundance was generally on a higher level than before and after that decade. After 2020, the abundance of wild salmon at sea has dropped to the level of 0.4–0.6 million.

In contrast to wild salmon, the abundance at sea of reared salmon strongly decreased from the mid-1990s to 2006–2007, mainly due to the decline in post-smolt survival. Substantial amounts of reared salmon are assessed to have been recruited to the fisheries for short periods both in the early and the late 2010s, but the current abundance is estimated to be low and is predicted to stay low during the coming years.

The combined wild and reared abundance (PFA, all ages) also declined substantially from the mid-1990s until 2006–2007. Thereafter the total abundance somewhat increased and stayed on an elevated level (1–1.5 million) over the last decade, after which it has decreased again and is currently fluctuating below one million (Figure 4.3.2.3).

Table 4.3.2.1a shows the predicted catches by scenario divided between offshore, coast and river fisheries for the year 2026. The table also shows the predicted number of wild spawners and the corresponding number of non-harvested (surplus) reared salmon in 2026 for each scenario. As described under the heading “Fishing scenarios” in Section 4.3.1, contrasting assumptions are made in the scenarios about the spatial fishing pattern, i.e. how the catch in each scenario would be divided between various fishing grounds (offshore, coast, and river).

Scenarios 1–2 are reference scenarios with zero catches either at sea and at rivers or only at sea. In scenarios 3–4, the fishing pattern which persisted before 2022 is applied by keeping the relative differences between the harvest rates of various fisheries similar to that estimated for 2021. Because of the sequential nature of fisheries, this application results in changes to the relative share of catches between fisheries: the higher the total removal (Scenario 3 → Scenario 4), the higher the proportion of catch taken by offshore fisheries (which catch fish first). In scenarios 5–10, sea catches are taken only by coastal fisheries in the area SD 29N–31, while in scenarios 11–15, sea catches contain both coastal SD 29N–31 fishing and (offshore) recreational trolling in the Main Basin.

Scenarios 11–15 resemble most closely the spatial fishing pattern which existed in 2024 (with a level of magnitude in the sea catches similar to Scenario 12). This spatial fishing pattern allows harvesting (as a released bycatch in trolling) of the AU 4–5 stocks, of which most AU 5 stocks are currently deemed to be below their  $R_{lim}$ . Scenarios 5–10 are designed to study catching possibilities at sea without harvesting AU 5 (and AU 4) salmon, targeting only maturing AU 1–3 salmon during their spawning migration.

Figure 4.3.2.4 illustrates future sea catches in scenarios 5-15, i.e. in the scenarios where sea fishing is allowed either only in SD 29N-31 and targeting spawning runs (scenarios 5-10), or also by trolling in all SD's (but allowing only reared fish to be retained and wild C&R salmon would suffer from additional mortality after release; scenarios 11-15). Within each fishing ground, further division of catch into their components (commercial, recreational, reported, unreported, etc.) may be assumed to be similar to the latest year (2024) with the available information about these catch components. For illustration, Figure 4.3.2.8 shows the harvest rates prevailing in coastal trapnet fishing under the scenarios 5-15. Scenarios 6 and 12 indicate rather similar harvest rate for this fishery as has been in the recent years.

Table 4.3.2.1b and Figure 4.3.2.9 show how the catch components have developed in the history and what they were in 2024. In all sea areas (except for the Main Basin in 2023-2024, where targeted fishing of salmon was banned), the share of various catch components has been relatively stable over the last four years of data, but with gradual increase in the share of catch caught by commercial fishing (Table 4.3.2.1b). From the total combined sea and freshwater catch in 2024, 60%, 10%, and 30% were taken by the commercial, recreational sea, and recreational river fisheries, respectively. From the total sea catch in 2024, the commercial catch component accounted for 85%. Reported commercial catch accounted for about 85% of the total commercial sea catch (i.e. from the total fishery-related mortality) in 2024. Unreporting, misreporting, and discarding (including seal damages) in 2024 are considered to have taken about 5%, 0%, and 10% shares of the total commercial sea catch, respectively. In SD 29N-31, an increasing proportion of the total sea catch has been taken by commercial fisheries during the last four years; in 2024, the proportion of this component was 98%, and about 84% of this catch is estimated to have been reported. It is important to note that it eventually depends on the applied management, how catch would become divided in the future between fishing grounds and between other components.

Figure 4.3.2.5a present stock-specific annual probabilities to meet  $R_{lim}$  under scenarios 1, 4, 7, and 15, while Figure 4.3.2.5b present corresponding probabilities to meet  $R_{MSY}$  under the same scenarios and years. Tables 4.3.2.2 to 4.3.2.5 show stock-specific probabilities to meet  $R_{lim}$  and  $R_{MSY}$  in the smolt production years 2030/2029 and many generations (>300 years) ahead from 2024. As explained earlier (see Section 4.3.1), stock status assessed in terms of smolt production in 2030/2029 reflects the direct, immediate effects of the 2026 fishing on salmon reproduction. The far-into-future scenarios aim to illustrate the (stabilized) status of stocks under the current assumptions. Finally, Table 4.3.2.6 summarizes the proportion of the 17 analytically assessed stocks expected to have reached  $R_{lim}$  in 2030/2029 and many generations ahead from 2024 under different scenarios and with given levels of certainty.

As expected, the lower the harvesting, the higher the expected status. For some of the stocks, river fishing alone (Scenario 2) has a visible effect on the probability to reach the reference points compared to the zero fishing scenario (Scenario 1). This is the case especially among the stocks (mainly Åbyälven, Kågeälven, Emån) which do not tolerate much fishing due to their stock-recruit dynamics (low steepness of S/R curves). Therefore, restrictions or bans on river fishing for salmon are likely to improve the status of these stocks. The status of these stocks is also notably affected by sea fisheries. None of the stocks in any scenarios are predicted in the short term to fall below  $R_{lim}$  with >0.5 probability (Table 4.3.2.2). When assessed against  $R_{MSY}$  (Table 4.3.2.3), Åbyälven is not expected to reach its  $R_{MSY}$  with >0.5 probability in short-term under the scenarios with catch approaching 100 000 salmon. However, for most of the stocks, there is little difference in the predicted short-term stock development among scenarios from no fishing up to sea removal of 80 000-100 000 salmon (Table 4.3.1.1). The overall small differences between most of the scenarios are also illustrated graphically in Figure 4.3.2.6, where probability density distributions for expected smolt production in 2030/2029 in rivers are directly compared to each other and to that in 2024.

Numerous salmon generations ahead from 2024 (i.e. in a stable state situation),  $R_{lim}$  is predicted to be reached with  $>0.5$  probability in all stocks and scenarios, except Kågeälven under the scenarios with sea catch at 100 000 salmon, and Emån in scenarios 3 and 4 (i.e. assuming the same fishing pattern as it was in 2021 and a total sea catch of 60 000 or 100 000; see Table 4.3.2.4). When selecting a more risk-averse threshold (0.8 probability to be above  $R_{lim}$ ), Kågeälven and Emån will not reach the threshold unless all fishing is closed at sea and in rivers. Moreover, Åbyälven and Testeboån approach or fall below the threshold in the scenarios 3 and 4. As expected,  $R_{MSY}$  has been and will be reached by lower probabilities than  $R_{lim}$  (Table 4.3.2.5). When using a threshold of 0.5 probability to reach  $R_{MSY}$ , all the assessed stocks are predicted to reach the threshold in a long run under the scenarios 1, 2, 6-8, and 13-15.

In line with expectations, changes in fishing have the smallest effect on those stocks that are close to their PSpC (Tornionjoki, Kalixälven, Piteälven) (Figure 4.3.2.5a,b). Because the overall level of harvesting is low or moderate in these scenarios compared to historical levels, the examined range of fishing mortalities only results in modest impacts on the chances of reaching the reference points. Future predictions about smolt abundance are also naturally more uncertain than the estimated abundance until 2024 (Figure 4.3.2.6).

Figure 4.3.2.7 shows longer-term predictions in the river-specific smolt and spawner abundances for three selected scenarios (1 = zero fishing; 7 = 40 000 sea catch in SD 29N-31; and 10 = 100 000 sea catch in SD 29N-31). The two most extreme scenarios (1 and 10) illustrate the predicted effects of contrasting amounts of fishing.

## 4.4 Additional information affecting the perception of stock status and development

This section focuses on supplementary information of importance for a comprehensive evaluation of the estimated current status and future stock development. We highlight model-related limitations, weaknesses in input data, and challenges in accounting for certain river-specific issues. These factors may affect both the accuracy and precision of status evaluations. We also discuss information on diseases and other factors that may influence stock status and development, which, for various reasons, are not fully incorporated in the current modelling.

### 4.4.1 Effects of post-smolt survival on stock development

The natural survival rate of young salmon in the sea during the post-smolt phase is a key factor influencing the abundance of adult salmon, stock status, and stock development. According to estimates from the FLHM, post-smolt survival for Baltic salmon has varied considerably over the years, with a marked decline from the mid-1990s until the mid-2000s, followed by a period of levelling-off with only a weak downward trend (Figure 4.2.3.1). After 2019, post-smolt survival declined further, however, with the 2021 wild smolt cohort showing the lowest value in the entire time-series (median = 6.0%). The estimate for the 2022 smolt year class is higher, exceeding 12%, whereas the estimate of the most recent year (2023), based solely on data from the abundance of 1SW salmon returning in 2024, declined to approximately 8% (Figure 4.2.3.1).

The yearly post-smolt survival estimates produced by the FLHM are influenced by estimates for the four preceding smolt cohorts. Therefore, the interannual variation in this survival becomes smoothed and the true variation is most likely larger than currently estimated. An additional factor, which tends to underestimate variation and may introduce bias into stock-specific spawner abundance and stock-recruit parameter estimates, potentially leading to flawed stock-specific status evaluations, is that post-smolt survival is currently assumed to be same for all wild stocks. As the input data used in FLHM represents all rivers in every assessment unit (AU

1-4), the resulting estimates of post-smolt survival can be thought of as some kind of (data-weighted) average, although stock-specific differences for this key parameter most likely occur.

In recent years, differences in post-smolt survival between stocks have become increasingly evident. Local biological and fishery-related data from certain rivers (notably Tornionjoki and Råneälven) show especially poor return rates (number of spawners vs. previous years' smolt runs), that fall far below the estimates from the FLHM (Section 4.2.3; Figure 4.2.3.10). At the same time there are no signs of any river-specific additional mortalities among adult salmon, which could explain the poor return rates. Against this background, it has become clear that allowing stock-specific levels for post-smolt survival is one of the most urgent changes needed in the FLHM (see Section 4.7).

At present, reasons for the large interannual variation in the post-smolt survival and the stock-specific differences in survival remain unclear. Research is ongoing to study the potential factors and the related mechanisms that may explain changes in post-smolt survival over time, as well as differences in this parameter between river stocks. The evidence collected so far indicates that variation in certain food-web related factors (quality and quantity of post-smolt's food, predators eating post-smolts) and the biological characteristics of smolts/post-smolts may be responsible of the variation in survival.

Due to uncertainties in the recent development of post-smolt survival and potential discrepancies between model estimates and actual levels for the smolt cohorts of 2021 and 2022, WGBAST decided last year to shift the starting year for stock projections of the post-smolt survival one year earlier than in previous years (ICES, 2024a). This change was implemented to avoid an overly optimistic perception of future survival levels. Consequently, the starting point for projections was based on data from both 1SW and MSW salmon, which is expected to be more robust. However, for this year's assessment, for precautionary reasons, it was decided to revert to the previous practice and use the lower estimate for the 2023 smolt cohort (instead of the higher 2022 estimate) as the starting year, which is based on the most recent data for 1SW salmon returning in 2024 (Figure 4.2.3.1).

#### 4.4.2 Uncertainties in stock status evaluations

The precision in status evaluations of individual river stocks depends to a large extent on the amount of available data. Data from several life stages (parr densities, smolt numbers, and number of ascending spawners) together with long time-series increase the possibility for an accurate status evaluation. In contrast, evaluations based solely on parr density data or limited to short time-series are subject to greater uncertainty.

River-specific factors may also introduce uncertainties in status evaluations. For example, migration obstacles, such as fishways at dams, affect migration possibilities and/or the survival of spawners and smolts to a varying extent in several rivers. As discussed in Section 4.2.1, ICES evaluates status under the conditions prevailing in rivers with respect to available production areas, current migration possibilities, etc. Thus, a stock can obtain high status even if there are passage problems resulting in extra mortality among spawners and smolts at power plants and dams. In addition, limited knowledge about the effects of power plants and dams on the migration success and survival of passing fish makes status assessments of these river stocks more uncertain.

For a majority of stocks included in the FLHM the amount of data/background information is satisfactorily high, and status evaluations are thought to be reasonably accurate. A few exceptions exist, however. **Piteälven** stands out as particularly data-poor. For this river, there is a lack of both electrofishing data with sufficient coverage and smolt counting. The modelling of Piteälven is instead based on spawner count data. Other rivers lack smolt counting data (for example

Råneälven and Byskeälven), leading to larger uncertainty in estimated smolt abundances, stock-recruit parameters and status estimates.

Based on fragmented independent data currently not used in the model, there is a concern that the status for Piteälven is biased upwards. The reason behind this bias is not known, but it may be partially explained by insufficient flexibility in the modelling of vital rates and between-river variability in the FLHM, which means that smolt-spawner survival is driven by data from other, not necessarily similar rivers. It is also likely that migration problems at the dam at Sikfors (located below the reproduction areas), which all salmon have to pass, affect the production potential, reference points and the status assessment in a similar way as in other rivers with reduced migration possibilities due to power plants and dams, like Testeboån and Åbyälven. Although the working group has planned to evaluate the way Piteälven is handled in the FLHM and explore alternative modelling options, this work has not yet been carried out due to time constraints. Therefore, status evaluations and projection results for Piteälven should be viewed with caution.

As outlined in Section 4.2.1, modifications were made to the prior distributions for parameters associated with the proportion of all ascending adult salmon that are detected (counted) in Tornionjoki and Kalixälven. These adjustments, which involved making the relevant priors more restrictive, were aimed at addressing identified overestimation of the number of returning individuals in some of these AU 1 rivers by the FLHM, particularly in recent years. Modifications were also made to observation models for spawning counting in rivers Piteälven, Testeboån, and Ume/Vindelälven, again in an attempt to reduce bias in spawner abundance estimates for some AU 1 rivers.

Despite these changes to the model, the discrepancy between the counted and modelled number of adults in **Tornionjoki** and **Råneälven** has remained substantial in recent years (e.g. Figure 4.2.3.10). As discussed above (see Section 4.4.1), these discrepancies likely reflect a significantly lower post-smolt survival for these river stocks in recent years, compared with the estimated post-smolt survival rates for all wild stocks in the FLHM (Tornionjoki), and/or overestimated smolt abundances given that no smolt counting data are available (Råneälven). As a consequence, estimates of current stock status and spawner abundances in future stock projections are most likely overestimated for Tornionjoki and Råneälven.

In **Kalixälven**, where video-based counts of ascending spawners are conducted relatively far upstream from the river mouth, the revised detection probability prior had a pronounced effect – resulting in posterior distributions that were more closely aligned with the mode of the expert-based detection prior, and significantly lower estimates of spawner and smolt abundances (Section 4.2.1). However, until empirical data on smolt production and spawner detection rates for this river become available, the accuracy of these revised lower estimates will remain uncertain and difficult to assess.

Simplifying assumptions about harvest rates represent another source of uncertainty. In both the historical assessment model and the future stock projections (scenarios), river harvest rates are assumed to be the same for all wild stocks that have no additional regulations (or 10% of this harvest in rivers where a fishing ban is enforced). Likewise, coastal fishery harvest rates are estimated at the assessment unit level for wild and reared salmon. However, coastal fishery harvest rates have been shown to vary substantially among stocks (even those belonging to the same assessment unit), because of stock-specific differences in migration timing and route (Whitlock *et al.*, 2021). Estimating harvest rates at the AU level (or higher) in the model could lead to bias in estimated smolt-to-spawner survival, stock-recruit parameters, and status evaluations.

Finally, the method used to calculate reference points (see Annex 4 in ICES, 2021a) makes the implicit assumption that salmon would be harvested instantaneously upon smoltification. This is not the case in reality, especially considering patterns of fishing that target reproductively

mature fish (for example the coastal and river fisheries). All else being equal, harvesting older fish means that the number of smolts at MSY will be higher. This is expected to cause status estimates to be biased high, although to an unknown extent, depending on the fishing pattern in a particular scenario.

### 4.4.3 Effects of M74 and disease on stock development

Many of the M74-fluctuations seen since the early 1990s have tended to last for some years before changing in direction (Figure 4.2.2.1). After a period with very low M74 abundance in 2011–2015, mortalities increased to higher levels in 2016–2018, after which the mortality has again dropped to low levels. Despite the recent positive development, the future occurrence and development of M74 is difficult to predict, which introduces uncertainty in forecasts of the development of salmon stocks.

The disease outbreaks reported from several rivers in 2014-2020 (Section 3.6) are also a concern for the future. The cause(s) of the disease is still unknown and accurately quantifying the amount of affected or dead salmon in a river appears difficult, if at all possible. Quantifying the effects of health issues among spawners on the recruitment in rivers is also difficult. Existing information indicates that M74 and disease among spawners mainly affects the number of eggs deposited or hatched or the number of dispersing fry. That is, losses seem to take place before the offspring reach stages with the highest density-dependent mortality. Therefore, a stock with high status is expected to show more resilience against various events that negatively affect early reproduction (i.e. from egg deposition to dispersal of fry), because these effects may partly be compensated by reduced density-dependent mortality among the offspring. In contrast, weaker populations are not expected to have similar 'buffers' against such losses.

Salmon 0+ parr densities often fluctuate considerably between years within rivers. Part of these fluctuations may be explained by generation effects, i.e. variation in year-class strength among spawners and various nuisance factors such as water flow (potentially affecting electrofishing results), but mortality due to M74 and/or other disease outbreaks is likely also part of the explanation. Compared to other rivers, the very low parr densities observed some years ago in **Vindelälven** and **Ljungan** are exceptional. In these rivers, disease related mortality among adults was very high in the period 2016-2020 (Section 3.6), and even if the health situation has since improved, the abundance of returning spawners in these rivers is still partly affected.

## 4.5 Future management of Baltic salmon fisheries

### 4.5.1 Current management system

The Baltic salmon are currently managed through two management areas, each with a single total allowable catch (TAC) regulating offshore and coastal fisheries. These quotas apply to fisheries targeting mixed aggregations of weaker and stronger wild river stocks, along with reared salmon. All wild salmon stocks were heavily overfished and severely depleted less than three decades ago, after which they have recovered thanks to strengthened fishing regulations, combined with reduced M74 mortality and restorations of freshwater habitats. However, several wild stocks are still weak or in their recovery phase.

A more formalized approach to accounting for variation in status between individual stocks – replacing earlier, more subjective considerations of trade-offs between recovery time and exploitation possibilities – was implemented in ICES' catch advice for 2022 (ICES, 2021b). Under this new framework, fishing opportunities are only advised when wild stocks are estimated to be

above  $R_{lim}$  with at least 50% probability. Thus, in areas where several stocks occur mixed during fishing, the status of all those stocks should fulfil the above criteria.

As presented in Section 4.2, the status of stocks in AU 1–4 is evaluated analytically. In contrast, the remaining river stocks are not analytically assessed, and in AU 5 the majority have not responded positively to previous reductions in fisheries exploitation. Status evaluations of AU 5 stocks are uncertain and to a large extent dependent on expert opinions, and stock projections to evaluate the effects of different exploitation levels on stock development are not possible. Calculations based on limited data from four AU 5 stocks have demonstrated some positive correlation between sea survival and recruitment (parr densities), indicating that sea survival probably has played a role in explaining the dynamics of at least some of these stocks (ICES, 2020a,b). The same calculations further showed that for the period up to and including 2018, around 1 000–1 500 wild AU 5 spawners may have been harvested annually by offshore fishing in the Main Basin, whereas 3 000–4 000 salmon returned to the rivers.

To increase spawner abundances in weak Main Basin river stocks, a ban on commercial sea fisheries targeting salmon, and restrictive regulations of the recreational trolling fishery, was enforced in 2022. However, variation in recruitment in AU 5 rivers indicates that also river conditions (including local environmental factors) play a significant role (ICES, 2020a,b). It is therefore likely that different areas/rivers need different measures to improve the situation for weak AU 5 stocks, of which reduced exploitation at sea constitutes one of several possible management actions.

So far, salmon stocks in AU 6 (Gulf of Finland) are also without an analytical assessment. In contrast to AU 5, these wild stocks have shown a positive development since the late 2000s with a presumed high current stock status. Little is known about the harvest rates of AU 6 salmon at sea. However, various pieces of information indicate that these stocks have partly different migration routes than salmon in the other AUs, as a majority seem to stay for feeding in the Gulf of Finland or further to the north in the Main Basin.

## 4.5.2 Fishing possibilities under alternative management strategies

Managing the Baltic salmon, with its many genetically distinct river stocks of varying status, is a challenge. The species is exploited in the offshore, along the coasts and in rivers, where the sea fisheries target mixed stocks. Despite this complexity, the current management system is based on only two TACs. This rather blunt management system is associated with difficult trade-offs between exploitation possibilities and the protection of weak stocks. In ICES 2023 (Section 4.5.3) and ICES 2024a (Section 4.5.2), a number of aspects perceived as important for the future management of Baltic salmon have been discussed in expanded detail, including time for recovery of weak stocks, releases of hatchery reared salmon, questions related to salmon as a fishery resource by different user groups, and possibilities for developing a more refined, stock-specific spatial management of coastal fisheries. It is noted that the implementation of a more stock-specific management system could prompt questions regarding how to allocate the "resource" among different user groups. However, this is not a biological issue, but rather one for managers and decision-makers to deal with.

## 4.6 Conclusions

Following a recent decline from 2020 to date, the pre-fishery abundance is expected to remain stable in 2025–2027. Based on the assessment results, all the 17 stocks in AU 1–4 were likely above  $R_{lim}$  in 2024 (Table 4.2.3.4a). Fifteen out of 17 stocks were assessed to be likely at or above  $R_{MSY}$  in 2024, while two stocks showed somewhat lower probabilities to reach  $R_{MSY}$  in 2024. Results from

stock projections indicate that even the harvesting of 80 000 salmon at sea will not result in AU 1-4 stocks falling below  $R_{lim}$  in the short-term. However, only the sea catch levels of max. 60 000 salmon and fishing confined to the Gulf of Bothnia will let AU 1-4 stocks to gradually develop to a level at or above MSY (assuming that natural survival of salmon prevails roughly at the current level).

However, it is not known if the recent and widespread decline in post-smolt survival indicates a longer-term trend or whether it is only temporary and survival has started to increase. Moreover, as the repeated downward updates of the survival estimate of the 2021 smolt cohort during the last three assessments (from approx. 12% in the 2023 assessment to approx. 8% in the 2024 assessment to 6% in 2025's assessment) showcase, there is a time-lag in how the FLHM captures trends in post-smolt survival. The stock projections assume post-smolt survival to stay at its current level (approx. 10%), thus the recent declining trend is not assumed to continue. In addition, as discussed in Section 4.4.1, variation in post-smolt survival between river stocks has become increasingly evident in recent years.

Because of the high uncertainty connected to the assumption related to this critical survival parameter, a precautionary choice for wild AU 1–4 stocks would be a catch scenario of 40 000 salmon. Yet, if the abundance of returning Tornionjoki salmon is overestimated in 2026 to a similar extent as estimates for 2023 and 2024, this would lead to an underestimation of harvest rates for other stocks. Consequently, status evaluations could become overly optimistic, increasing the risk of overexploitation for some weaker AU 1–4 stocks, such as those in Råneälven and Åbyälven. To account for this expected bias in catch composition, the catch level would need to be reduced below 40 000. As described in Section 4.3.1, the influence of overestimating the abundance of Tornionjoki salmon on the status of other stocks could be offset by reducing total removals in this fishing pattern by 10 000 salmon. This adjustment results in a precautionary catch opportunity of no more than 30 000 salmon for the 2026 sea fisheries.

The current assessment model does not include the AU 5 stocks, for which sea migrations are restricted to the Main Basin (and partly the Gulf of Finland; see Section 4.5.3.1 in ICES, 2021a). Although these stocks are not analytically assessed, data on recruitment combined with expert evaluations on production potential indicate very limited recovery; most AU 5 wild stocks are still (year 2024) believed to be far below their MSY level and most of them are also likely below their  $R_{lim}$ .

Salmon from AU 5 are harvested in the Main Basin by offshore fishing, where wild AU 5 salmon are only caught as bycatch in trolling since 2022, and in rivers by angling and sometimes poaching. Before 2022, also commercial offshore fishing targeting salmon was allowed in the Main Basin. The past fishing mortalities and natural mortality rates (at sea and/or in freshwater) have not allowed for recovery of the AU 5 stocks. There are indications, however, on positive effects of temporally increasing overall sea survival (survival from both natural and fishing-induced mortalities) on the recruitment among these stocks (ICES, 2020b). Thus, closure of Main Basin offshore fisheries, as advised by ICES since 2021, is expected to assist the recovery of the AU 5 stocks. However, in addition to sea fishing, several environmental factors acting on salmon during its freshwater phase are also believed to affect the development of the AU 5 stocks negatively. Therefore, even without any fishery it may still take considerable time (several salmon generations) until the currently weakest river stocks in AU 5 will recover.

Wild AU 6 stocks have shown a clear positive development since the early 2010s. The salmon in River Kunda is currently (year 2024) with high certainty above their MSY level and Keila is just below MSY level, whereas the stock status of Vasalemma is deemed to likely be at  $R_{lim}$  (Figure 4.2.4.3) although this stock has not yet fully populated the recently opened new reproduction areas. This indicates that the current harvest level allows a successful recovery of the AU 6 stocks. In 2025, smolt production is predicted to increase again in all these stocks.

Salmon smolt production in the AU 5 and AU 6 rivers is estimated to vary substantially from year to year. This is partly an artefact due to simplified assumptions about smolt age composition (assuming usually only one age for all smolts), when estimating smolt production from parr densities. However, it is also evident from the monitoring data that in reality salmon reproduction varies a lot from year to year in these rivers. Most of the rivers are relatively small and their environment is not as stable for successful salmon reproduction as the environment in larger, more northern salmon rivers.

Following a temporary and modest increase in M74 in recent years, this mortality factor for Baltic salmon has again returned to a historically low level. Another factor influencing stock development is the observed health-related problems affecting adults in certain rivers since 2014 (sections 3.6 and 4.4.2). In the last few years, the salmon health situation has improved but if these problems should return, this may result in decreased stock status as well as reduced fishing possibilities.

For some weak stocks, additional measures (on top of restrictions through the TAC system) may need to be implemented on the national level to increase the number of spawners, for example by reducing fisheries in rivers or coastal areas where these stocks are currently harvested. For instance, fishing restrictions have been enforced in and outside Vindelälven and Ljungan due to health problems among ascending adults in recent years. Similarly, in Emån and the recently appointed wild salmon rivers Testeboån and Kågeälven, an obligation to release caught salmon has prevailed for many years to increase the recovery rate of these river stocks. A comparison of scenarios 1 (no fishing at all) and 2 (only river fishing allowed) offers some insight into the positive effects of river fishing regulations. Measures focused on the freshwater environment, such as work to improve river habitats, migration possibilities and water quality, may also be necessary. Thus, special actions directed to the weakest stocks which are not only fishery-related ones are likely required at any advised TAC level, especially in AU 5 but also for a few weak stocks in other AUs, to enable these stocks to recover. Such work is already ongoing in several countries (see sections 2 and 3).

Due to the current management system, with a single TAC for SD 22–31, a large surplus of reared salmon cannot be utilized today because reared salmon is included in the same TAC as wild salmon. To reduce biological risks associated with straying of reared salmon into wild rivers, specific management measures could therefore be implemented, including increased fishing within rivers with only reared salmon and (or) reduced stocking of reared salmon smolts.

In general, Baltic salmon fisheries management could be developed to become more stock-specific, by implementing more flexible systems for the regulation of sea fisheries to steer exploitation towards harvesting of reared salmon and healthy wild stocks and avoid weak ones. The most obvious and effective way would be to implement spatial (possibly complemented with temporal) management, e.g. by implementing area-specific quotas. Our scenarios with sea fishing spatially restricted to only certain sub-division(s) and/or fisheries (scenarios 5-15; Table 4.3.1.1) are specifically motivated by this aim; in these scenarios fishing of the stocks which are below  $R_{lim}$  is fully (scenarios 5-10) or partly (scenarios 11-15) avoided, but simultaneously sea fishing of stronger wild stocks as well as most reared stocks could continue.

Integration of genetic data into population dynamics models can provide information about stock-specific abundance patterns and harvest rates in time and space, allowing evaluation of spatio-temporal management measures. This creates the potential to move towards stock-specific management whilst maintaining some level of catches in mixed-stock fisheries since fishing mortality can be directed towards certain stocks (and away from others) using knowledge of stock-specific migration patterns. Such tools are now available and have been applied to the coastal fisheries in Finland and Sweden (see Section 4.5.3.2 in ICES, 2021a); these tools could be adapted to form part of the WGBAST assessment framework in the future. In contrast,

recreational trolling in the Main Basin is considered as a true mixed-stock fishery where fully stock-specific harvesting is not possible. Regulations that only allow the landing of finclipped (reared) salmon, such as has been implemented in Sweden since 2013 and on the EU level since 2022, may reduce fishing mortality of wild stocks in trolling if the post-release mortality is low.

Sustainable management of Baltic salmon and its mixed-stock fisheries, which accounts for both conservation needs and exploitation possibilities, requires that management accounts for several aspects and trade-offs (further discussed in Section 4.5). A clarified framework on how to manage Baltic salmon by, e.g. formulating the principles in a multiannual management plan, would be beneficial also for the biological advice process related to this species.

## 4.7 Ongoing and future development of the stock assessment

The tasks listed below refer to ongoing, planned and potential updates of the assessment methodology.

### Ongoing and short term

- *Improving the flexibility of life-history processes in the FLHM (including potential inclusion of covariates).* As noted above, the FLHM assumes that several life-history processes (such as post-smolt survival) are common to all wild stocks. This is likely leading to bias in estimated stock statuses, as well as underestimated uncertainty at the level of individual stocks. At the same time, the potential for incorporating covariates, such as herring recruitment strength and sea surface temperatures for life-history parameters should be investigated, as means to increase precision in short-term projections. It is possible that increasing the flexibility of the FLHM by allowing stock-specific variation in life-history parameters may also help to understand the high status evaluations for rivers such as Piteälven.
- *Inclusion of AU 5 and AU 6 stocks in the full life-history model.* At present, these stocks lack an analytical assessment and are treated separately from the AU 1–4 stocks. Inclusion in the full life-history model (or development of a separate full life-history model in the case of AU 6 stocks) will require updated information regarding e.g. smolt age distributions, maturation rates, exploitation rates and post-smolt survival. In addition, increased amounts of basic biological data (e.g. smolt and spawner counts, updating of habitat size estimates, additional electrofishing sites) may be needed for some rivers. The smolt production model (“river model”) for southern stocks that has been developed could be expanded to also include AU 5 stocks in future, to produce smolt production priors and estimates for the full life-history model.
- *Improved description of river fisheries in the FLHM and scenarios.* River harvest rates are currently assumed to be equal for all wild stocks (and all reared stocks), except for those rivers where a fishing ban on salmon has been enforced, in the FLHM and scenarios code. This is an unrealistic assumption and makes the evaluation of probabilities to reach management targets under different fishing scenarios problematic if the true river harvest rate is higher than that assumed. Improving the description of river fisheries will be a long-term process but could be started over the next year (assembling available data, etc.).
- *Adding repeat spawners to the FLHM.* Salmon are currently assumed to die after first spawning in the FLHM. This assumption is known to be unrealistic (repeat spawners in some stocks now account for ~10% of all spawners). This is likely to cause bias in some parameter estimates e.g. stock–recruit parameters such as steepness, with implications for management reference points. A version of the FLHM that accounts for repeat spawners has been

developed. The repeat spawning model uses observations on the proportions of maiden spawners by year and sea-winter to learn about the propensity for repeat spawning by sea-age. The model structure is now ready, but further input is needed to parameterize the population dynamics of repeat spawning salmon.

- *Improving/adding more information about returning reared salmon.* At present, the understanding about the abundances of reared salmon at feeding areas and returning back to river mouths of regulated rivers is sparse. Especially the lack of catch samples from offshore fisheries under current fishing regulations means there is no present information about the amount of reared adult salmon. This may cause problems in the assessment in upcoming years, and possibilities to utilize available information from studies on reared stocks should thus be investigated.
- *Estimation of M74 mortality based on thiamine measurements.* The current sub-model for estimating M74 mortality is based on the hatchery data from four Finnish stocks and estimates on proportion of M74 females in a selection of Swedish salmon stocks. There is a pressure to stop hatchery experiments in Finland, and to begin using thiamine measurements to predict M74 mortality among the offspring. However, in order to estimate the overall M74 mortality in the populations of juvenile salmon, the M74 submodel needs to be fully updated.
- *Improvement of the fishing scenarios.* The current method to set up the fishing scenarios enables maintaining the same relative differences between harvest rates of different fisheries. However, it would be more practical to be able to maintain this pattern in terms of the relative differences between the catches. Also, the amount of uncertainty related to each harvest rate/catch at different fisheries and scenarios should be made more consistent, as in the current method, uncertainty increases heavily when a higher removal is assumed. The magnitude of the uncertainty has a direct effect on the probability of meeting the reference points in each scenario.
- *Adding annual variation to the catchability parameters of coastal trapnet and gillnet fisheries.* Annual variation in these parameters would be allowed by utilising autoregressive processes with a lag of one year, similarly as has now been done for offshore fisheries. However, an assumption of equal catchabilities for wild and reared salmon cannot be applied to the coastal fisheries, which may require testing several types of parameterisation to find a suitable version.

### Medium-term, important issues planned to be dealt with in the next 2–3 years

- *Quantification of effects of fishing pattern on reference points.* As mentioned above, the current reference point estimates may be biased downwards, potentially leading to overestimation of stock status. To follow a precautionary approach, the potential impact of fishing pattern (selectively) on reference points should be quantified.
- *Incorporating estimates of stock-specific exploitation rates in the coastal fishery.* There is a need to replace the present (crude) assumptions about how coastal fisheries affect the development of the river stocks with more precise stock-specific estimates as input in the assessment model. Stock-specific harvest rate estimates from a spatially and temporally-structured Bayesian mixed-stock analysis (MSA)/population dynamics model for the coastal migration of spawning Baltic salmon (Whitlock *et al.*, 2018) are now available (Whitlock *et al.*, 2021). Some development of the MSA model is first needed to ensure that data in the FLHM are not used twice (the current version of the MSA model uses posterior distributions for natural mortality and pre-season abundances from the FLHM).
- *Refine the two river models to improve smolt input used in the FLHM.* The present river models (northern and southern version) do not account for annual fluctuations in smolt age structure, which may result in biases. Development of the river models to account for fluctuations in parr growth rates and length-specific smoltification probabilities to improve estimates of smolt age structure would help solve this issue.
- *Continuing the work of expanding data collection in non-index rivers.* To improve precision in assessment results, there is a need to increase the collection of abundance data in non-index rivers. Therefore, an ongoing 'rolling' sampling programme that regularly collects smolt abundance data from rivers with limited data was established in Sweden in 2018.

### Long-term and/or less urgent issues, good to keep in mind

- *Allow for fluctuations in the stock–recruitment carrying capacity (K) over time in rivers.* Changes in physical river characteristics (e.g. habitat restoration and removal of obstacles to migration) have very likely led to increases in K over the assessment period for some rivers. K is time-invariant in the current model version, which may lead to biases in estimates of stock–recruit parameters and stock development for affected rivers).
- *Further use of scale-reading data:* Age data from catch samples (collected for MSA, see above) could be used to get improved knowledge of year-class strength, maturation and natural mortality rates.

## 4.8 Needs for improving the use and collection of data for assessment

As a part of the last benchmark for Baltic salmon (WKBALTSalmon; ICES, 2017b), all different types of information needed as input for the Baltic salmon stock assessment were reviewed with respect to needs, availability and quality. Data issues and questions listed in that benchmark report are extensive, and prioritizations is needed before decisions on data collection to be included in the European data collection framework (EU-MAP). However, WGBAST encourages member states to include these elements into their national data collection programmes, following. The current main priorities for assessment quality are highlighted below. They are related to improving the understanding of the status of populations and harvest patterns (e.g. between recreational and commercial harvest and life-history structures).

### **Biological monitoring**

The main priority is to ensure that representative information on the abundance of early life stages by electrofishing and/or smolt trapping is available from as many rivers as possible. For example, smolt trapping may be carried out in all rivers for at least a few years, even if annual monitoring is not feasible. Specifically, more information on the proportion of one-year-old smolts in AU 5-6 rivers would be important for further development of modelling. It is also necessary to review electrofishing sites with respect to available spawning areas, especially in cases where new such areas become available due to restoration of habitats or removal of migration obstacles, or where electrofishing has been very sparse. The inclusion of monitoring ascending spawners is an additional priority, especially in data poor rivers.

### **Fisheries**

The amount and quality of catch statistics varies considerably between rivers and countries, but catches have direct consequences for assessment. As the importance of recreational catch in assessment has been increasing, the quality of catch data should be assessed and if necessary, improved.

Bycatch of salmon occur in several Baltic Sea fisheries targeting other species, but available data are sparse. In particular, salmon has potential to be bycaught in pelagic trawling for herring and sprat, where smaller post-smolts typically may go unnoticed. An older crude extrapolation, based on data from scientific pelagic trawl surveys, suggested that the annual bycatch of salmon in the commercial pelagic fishery could have ranged from around 50 000 individuals per year in the 1980s to almost 200 000 in the 2000s (ICES, 2011). However, updated and more refined estimates are needed to better assess the impact of bycatches on salmon stocks.

### **Databases**

Continuing to incorporate the Transparent Assessment Framework (TAF) to data sharing and use is an ongoing priority. The inclusion of recreational salmon catches from the rivers, coast, and the sea to RDBES (ICES database) should continue.

### **Genetic data**

The genetic baseline used for mixed stock analyses (MSA) of sea catches was updated in this report. The new baseline uses single nucleotide polymorphisms (SNPs), and catch samples are similarly analysed for SNP genotypes to assign them into populations (Section 2.6). There is still a need to include samples from additional wild salmon and hatchery stocks into the baseline, especially from AU 5 stocks, to understand fishing pressure of different stocks. Some of the older existing baseline data may also need updating to ensure that the baseline reflects the current genetic composition. In addition, there is a need to expand catch sampling to match the ongoing fishery, e.g. by including trolling catches.

## **4.9 Tables & Figures**

Table 4.2.2.1. Likelihood approximations for wild salmon production (\*1 000) in Baltic salmon rivers, which are fed as “priors” into the full-life history model (FLHM). The values are derived from the latest river model (i.e. the hierarchical linear regression analysis, see Stock Annex), which utilizes both existing electrofishing data and smolt trapping data up to 2024 (with predicted values until 2027 and 2025 for rivers in the northern and southern version of the river model, respectively). The distributions are described in terms of their median and 90% probability interval (PI). Updated estimates (“posteriors”) derived from the FLHM are presented in Section 4.2.3. Note that the time-series starts from 1987; approximate values of the estimates prior to 2008 can be found in the earlier years’ reports.

		Wild smolt production (thousands)																			
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
<b>Assessment unit 1</b>																					
1	Tornionjoki	1212	1368	1500	1707	1780	1712	1504	1560	1863	2042	2026	1686	1567	1663	1937	1716	1728	1747	1994	1510
	90% PI	971-1518	1183-1673	1219-1840	1418-2064	1462-2162	1367-2150	1210-1862	1270-1912	1554-2234	1666-2489	1532-2751	1362-2116	1264-1954	1370-2013	1613-2347	1393-2096	1383-2169	1405-2148	1534-2579	945-2576
2	Simojoki	38	22	31	37	25	37	38	27	30	33	45	31	37	31	30	37	43	52	34	17
	90% PI	26-57	15-33	2146	30-45	15-39	3144	29-50	13-54	27-33	17-62	35-58	23-41	26-51	23-41	24-37	19-67	32-59	30-88	15-68	4-60
3	Kalxälven	480	624	530	575	734	636	718	637	671	676	511	525	462	635	646	614	568	475	432	294
	90% PI	173-1227	223-1614	189-1357	206-1466	251-1998	231-1619	259-1821	225-1541	242-1714	244-1720	184-1304	186-1338	153-1196	220-1670	232-1643	222-1543	205-1445	171-1200	151-1188	81-1088
4	Råneälven	37	33	42	49	43	41	43	46	55	64	58	44	36	56	73	61	57	44	30	30
	90% PI	10-105	9-96	12-119	15-136	12-121	12-114	13-117	14-125	17-148	20-189	17-160	12-127	10-103	15-159	23-200	18-178	17-162	12-129	7-97	5-160
<b>Total AU1</b>		<b>1766</b>	<b>2046</b>	<b>2103</b>	<b>2368</b>	<b>2583</b>	<b>2425</b>	<b>2302</b>	<b>2270</b>	<b>2619</b>	<b>2815</b>	<b>2639</b>	<b>2285</b>	<b>2102</b>	<b>2385</b>	<b>2686</b>	<b>2428</b>	<b>2397</b>	<b>2317</b>	<b>2490</b>	<b>1851</b>
	90% PI	1180-2907	1360-3416	1441-3362	1669-3711	1741-4320	1641-3927	1511-3850	1522-3732	1840-4129	1947-4440	1768-4273	1583-3622	1463-3304	1629-3883	1892-4227	1652-3884	1637-3835	1618-3565	1707-3882	1035-3884
<b>Assessment unit 2</b>																					
5	Piteälven*)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	90% PI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Abyälven	6	4	3	4	5	6	6	6	7	8	9	7	5	8	6	5	6	3	3	2,4
	90% PI	1-20	1-16	1-14	1-15	1-19	1-21	1-22	1-20	1-23	1-25	1-28	1-28	1-20	1-25	1-21	1-19	1-21	1-20	1-15	0-20
7	Byskeälven	101	88	92	107	115	99	121	106	135	152	172	172	144	158	131	111	117	108	104	69
	90% PI	34-258	29-226	30-247	35-288	39-303	34-257	42-320	37-270	46-356	53-393	61438	62-430	51-360	55-413	47-329	39-285	39-313	37-274	35-277	17-233
8	Kågeälven	11	11	8	5	4	7	12	12	20	17	17	17	12	12	8	8	9	10	7	6
	90% PI	1-44	1-43	1-37	1-26	0-23	1-32	1-49	1-47	1-70	1-62	1-62	1-61	1-47	1-48	1-35	1-34	1-36	1-40	1-34	0-36
9	Rickleån	0,5	0,4	0,4	0,8	0,8	0,7	2,2	0,7	4	5	3	3	1,8	2,6	2,7	1,5	1	1,1	1,9	1,9
	90% PI	0-6	0-5	0-5	0-8	0-8	0-7	2-3	0-7	3-5	3-7	0-17	0-18	0-13	0-17	0-12	0-9	0-10	0-17	0-19	0-19
10	Sävarån	5	2,6	2,1	1,9	3	4	5	7	8	12	14	14	12	8	8	6	6	7	5	5
	90% PI	3-6	1-15	1-14	1-13	1-15	2-6	1-19	1-22	1-26	1-43	1-48	1-47	1-33	1-26	1-27	1-22	1-22	1-23	1-19	1-121
11	Ume/Vindelälven	169	161	162	193	235	223	171	171	253	256	164	142	104	71	233	286	416	393	312	246
	90% PI	95-287	93-263	121-125	161-232	200-275	165-301	140-208	141-206	161-362	168-331	113-233	113-179	80-106	41-120	173-315	212-383	272-634	250-603	184-518	115-551
12	Öreälven	3	2,9	2,7	4	4	4	3	3	5	10	12	11	6	6	8	8	5	2,3	1,4	1,6
	90% PI	0-8	0-17	0-16	1-21	1-20	0-18	0-18	0-18	1-26	1-41	1-42	1-39	1-25	1-27	1-37	1-21	1-19	0-14	0-12	0-21
13	Lögdeälven	4	4	4	5	6	7	6	7	6	13	15	14	11	15	18	11	7	7	6	6
	90% PI	1-18	1-17	1-18	1-20	1-23	1-24	1-22	1-25	1-49	1-47	1-42	1-40	1-33	1-41	1-48	1-27	1-24	1-24	1-12	1-129
<b>Total AU2</b>		<b>298</b>	<b>273</b>	<b>275</b>	<b>321</b>	<b>374</b>	<b>351</b>	<b>327</b>	<b>312</b>	<b>438</b>	<b>473</b>	<b>405</b>	<b>380</b>	<b>294</b>	<b>281</b>	<b>414</b>	<b>437</b>	<b>567</b>	<b>533</b>	<b>441</b>	<b>337</b>
	90% PI	135-657	127-592	155-556	201-613	243-686	206-668	189-661	185-615	222-897	269-930	189-900	193-816	142-657	107-715	232-809	259-813	317-1074	293-1008	223-914	134-930
<b>Assessment unit 3</b>																					
14	Ljungan	1,8	3	3	2,9	3	13	7	9	19	10	2,2	0,4	0,5	0,5	0,1	2,2	4	4	NA-NA	NA-NA
	90% PI	0-16	0-16	0-29	0-33	0-34	3-46	0-42	1-34	6-51	1-27	0-22	0-11	0-7	0-4	0-2	1-4	2-6	1-6	NA-NA	NA-NA
15	Testeboån	2	0,5	1,1	0,8	1,5	1,9	1,4	1,5	1,5	2	3	2,2	1,4	1	4	5	4	3	0	0
	90% PI	0-9	0-4	0-7	0-4	0-7	0-8	1-3	1-3	1-2	1-3	0-13	0-13	0-2	2-9	1-18	2-8	0-14	NA-NA	NA-NA	NA-NA
<b>Total AU3</b>		<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>15</b>	<b>9</b>	<b>11</b>	<b>21</b>	<b>12</b>	<b>5</b>	<b>2,5</b>	<b>1,8</b>	<b>1,4</b>	<b>4</b>	<b>8</b>	<b>7</b>	<b>7</b>	<b>NA-NA</b>	<b>NA-NA</b>
	90% PI	0-25	0-20	0-36	0-37	0-41	3-54	1-45	3-37	7-53	3-38	0-31	0-21	1-10	0-6	2-11	1-22	1-14	1-30	NA-NA	NA-NA
<b>Assessment unit 4</b>																					
16	Erån	2,4	2,9	4	3	2,7	4	3	4	4	5	4	1,4	2,2	2,2	1,3	1,6	1,1	1,3	NA-NA	NA-NA
	90% PI	1-4	0-20	0-26	0-23	0-19	0-23	0-19	0-25	0-25	0-27	0-22	0-10	0-15	0-14	0-10	0-12	0-10	0-12	NA-NA	NA-NA
17	Mörrumsån	28	24	22	33	16	27	45	31	42	25	24	17	31	27	31	34	29	31	NA-NA	NA-NA
	90% PI	11-71	8-72	9-55	15-81	8-37	15-57	25-101	15-75	24-90	13-57	11-59	6-47	11-90	12-66	15-77	13-94	14-66	13-72	NA-NA	NA-NA
<b>Total AU4</b>		<b>30</b>	<b>27</b>	<b>26</b>	<b>36</b>	<b>19</b>	<b>31</b>	<b>49</b>	<b>35</b>	<b>46</b>	<b>30</b>	<b>27</b>	<b>18</b>	<b>33</b>	<b>29</b>	<b>32</b>	<b>36</b>	<b>30</b>	<b>32</b>	<b>NA-NA</b>	<b>NA-NA</b>
	90% PI	12-75	8-92	9-81	15-104	8-56	16-80	25-120	15-100	24-115	13-84	11-81	6-57	11-105	12-80	15-87	13-106	14-76	13-84	NA-NA	NA-NA

\*) Piteälven not included in river model

Table 4.2.2.2. Median values and coefficients of variation of the estimated M74 mortality for different Atlantic salmon stocks in the Baltic Sea (spawning years 1985-2022). The values in bold are based on observation data from hatchery or laboratory monitoring in the river and year concerned. Grey cells represent estimates for years from which no monitoring data was available. Note: the table has not been updated this year and is identical to that presented in the 2024 report.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Simojoki</b>	<b>8</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>8</b>	<b>2</b>	<b>43</b>	<b>64</b>	<b>53</b>	<b>64</b>	<b>52</b>	<b>55</b>	<b>8</b>	<b>44</b>	<b>27</b>	<b>27</b>	<b>23</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>13</b>	<b>7</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>11</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>
cv	0,62	0,91	0,56	1,05	0,59	0,89	0,17	0,14	0,16	0,10	0,16	0,14	0,30	0,11	0,21	0,23	0,23	0,63	0,59	0,91	0,49	0,30	0,50	0,45	0,61	0,75	1,70	1,38	1,22	1,60	0,72	0,29	0,42	1,20	1,69	1,33	1,13	1,19
<b>Tornionjoki</b>	<b>11</b>	<b>7</b>	<b>8</b>	<b>6</b>	<b>10</b>	<b>8</b>	<b>45</b>	<b>62</b>	<b>77</b>	<b>53</b>	<b>42</b>	<b>24</b>	<b>7</b>	<b>44</b>	<b>22</b>	<b>26</b>	<b>35</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>5</b>	<b>7</b>	<b>4</b>	<b>7</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>10</b>	<b>15</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
cv	0,75	0,91	0,76	0,93	0,80	0,88	0,32	0,24	0,06	0,10	0,32	0,46	0,45	0,18	0,22	0,22	0,24	1,05	1,47	1,33	0,49	0,50	0,63	0,65	0,45	1,01	1,78	1,39	1,08	1,43	0,76	0,56	0,34	0,88	1,55	1,43	1,17	0,84
<b>Kemijoki</b>	<b>10</b>	<b>7</b>	<b>9</b>	<b>6</b>	<b>10</b>	<b>8</b>	<b>43</b>	<b>62</b>	<b>62</b>	<b>43</b>	<b>42</b>	<b>23</b>	<b>4</b>	<b>30</b>	<b>19</b>	<b>20</b>	<b>24</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>10</b>	<b>22</b>	<b>13</b>	<b>15</b>	<b>6</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>10</b>	<b>14</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>
cv	0,78	0,89	0,77	0,96	0,79	0,90	0,30	0,24	0,22	0,30	0,31	0,46	0,89	0,40	0,50	0,49	0,45	1,08	1,38	1,33	0,31	0,29	0,42	0,30	0,50	0,71	1,65	1,41	1,09	1,51	0,77	0,52	0,68	0,65	1,57	1,31	1,14	1,22
<b>Iijoki</b>	<b>11</b>	<b>6</b>	<b>8</b>	<b>5</b>	<b>9</b>	<b>7</b>	<b>43</b>	<b>63</b>	<b>61</b>	<b>43</b>	<b>43</b>	<b>25</b>	<b>4</b>	<b>30</b>	<b>18</b>	<b>20</b>	<b>23</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>5</b>	<b>11</b>	<b>8</b>	<b>13</b>	<b>10</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>10</b>	<b>16</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>
cv	0,76	0,88	0,76	0,95	0,80	0,85	0,31	0,25	0,23	0,29	0,32	0,45	0,90	0,40	0,52	0,51	0,46	1,19	1,43	1,36	0,74	0,59	0,80	0,34	0,70	1,00	1,84	1,29	1,12	1,43	0,76	0,31	0,72	1,26	1,57	1,33	1,16	1,20
<b>Luleälven</b>	<b>10</b>	<b>7</b>	<b>9</b>	<b>5</b>	<b>9</b>	<b>8</b>	<b>46</b>	<b>57</b>	<b>56</b>	<b>37</b>	<b>35</b>	<b>28</b>	<b>2</b>	<b>27</b>	<b>15</b>	<b>21</b>	<b>25</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>10</b>	<b>7</b>	<b>9</b>	<b>23</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>7</b>	<b>10</b>	<b>6</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>
cv	0,77	0,89	0,76	0,92	0,78	0,86	0,13	0,16	0,06	0,14	0,19	0,16	0,34	0,12	0,16	0,15	0,22	0,63	0,45	0,65	0,41	0,25	0,24	0,20	0,17	0,43	0,61	0,78	0,61	0,56	0,38	0,35	0,36	0,47	0,59	0,57	0,54	0,51
<b>Skellefteälven</b>	<b>10</b>	<b>6</b>	<b>8</b>	<b>6</b>	<b>10</b>	<b>8</b>	<b>34</b>	<b>43</b>	<b>63</b>	<b>37</b>	<b>52</b>	<b>14</b>	<b>2</b>	<b>33</b>	<b>10</b>	<b>13</b>	<b>14</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>10</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>12</b>	<b>7</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>5</b>
cv	0,74	0,89	0,80	0,93	0,75	0,86	0,20	0,19	0,08	0,16	0,20	0,32	0,62	0,18	0,34	0,29	0,34	0,80	1,44	0,89	0,74	0,40	0,88	0,84	0,53	0,72	0,99	0,48	0,81	0,95	0,62	0,39	0,41	0,45	0,97	1,38	0,55	0,41
<b>Ume/Vindelälven</b>	<b>15</b>	<b>13</b>	<b>12</b>	<b>9</b>	<b>18</b>	<b>16</b>	<b>60</b>	<b>73</b>	<b>80</b>	<b>51</b>	<b>52</b>	<b>27</b>	<b>6</b>	<b>41</b>	<b>29</b>	<b>26</b>	<b>24</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>8</b>	<b>3</b>	<b>15</b>	<b>15</b>	<b>6</b>	<b>0</b>	<b>4</b>	<b>10</b>	<b>0</b>	<b>11</b>	<b>17</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>1</b>
cv	0,22	0,38	0,29	0,50	0,39	0,57	0,14	0,16	0,05	0,13	0,20	0,20	0,44	0,16	0,19	0,19	0,26	0,67	0,67	1,38	0,61	0,39	0,55	0,27	0,30	0,39	1,54	0,59	0,43	1,52	0,46	0,42	0,52	0,61	1,45	0,58	1,20	0,82
<b>Angermanälven</b>	<b>10</b>	<b>6</b>	<b>8</b>	<b>5</b>	<b>9</b>	<b>8</b>	<b>40</b>	<b>64</b>	<b>60</b>	<b>35</b>	<b>43</b>	<b>16</b>	<b>2</b>	<b>23</b>	<b>15</b>	<b>18</b>	<b>29</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>7</b>	<b>15</b>	<b>11</b>	<b>5</b>	<b>15</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>14</b>	<b>14</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>
cv	0,76	0,88	0,76	0,97	0,79	0,86	0,14	0,16	0,09	0,16	0,21	0,20	0,56	0,17	0,21	0,19	0,22	0,62	0,55	0,61	0,43	0,27	0,28	0,38	0,25	0,44	0,99	0,78	0,60	1,41	0,39	0,53	0,70	0,63	1,60	1,40	0,83	1,23
<b>Indalsälven</b>	<b>6</b>	<b>5</b>	<b>5</b>	<b>2</b>	<b>5</b>	<b>3</b>	<b>36</b>	<b>62</b>	<b>64</b>	<b>31</b>	<b>45</b>	<b>17</b>	<b>1</b>	<b>17</b>	<b>15</b>	<b>6</b>	<b>13</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>8</b>	<b>12</b>	<b>3</b>	<b>8</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>9</b>	<b>15</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>
cv	0,23	0,40	0,29	0,53	0,42	0,62	0,15	0,15	0,06	0,15	0,20	0,20	0,61	0,19	0,21	0,33	0,26	0,74	1,49	0,56	0,43	0,28	0,25	0,41	0,28	0,39	1,58	1,41	0,56	0,67	0,39	0,55	0,67	0,69	0,99	0,92	0,83	1,17
<b>Ljungan</b>	<b>10</b>	<b>6</b>	<b>9</b>	<b>5</b>	<b>10</b>	<b>8</b>	<b>49</b>	<b>69</b>	<b>53</b>	<b>41</b>	<b>26</b>	<b>23</b>	<b>4</b>	<b>24</b>	<b>13</b>	<b>9</b>	<b>29</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>5</b>	<b>10</b>	<b>8</b>	<b>8</b>	<b>10</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>10</b>	<b>14</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>
cv	0,77	0,88	0,76	0,97	0,78	0,87	0,19	0,19	0,19	0,20	0,29	0,34	0,61	0,29	0,50	0,56	0,31	1,09	1,33	1,32	0,73	0,62	0,77	0,75	0,72	1,01	1,72	1,34	1,09	1,47	0,77	0,52	0,67	1,22	1,57	1,32	1,15	1,20
<b>Ljusnan</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>6</b>	<b>28</b>	<b>63</b>	<b>59</b>	<b>41</b>	<b>49</b>	<b>17</b>	<b>3</b>	<b>33</b>	<b>18</b>	<b>31</b>	<b>24</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>7</b>	<b>8</b>	<b>6</b>	<b>10</b>	<b>7</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>22</b>	<b>14</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>8</b>	<b>5</b>
cv	0,85	0,93	0,86	1,01	0,87	0,62	0,19	0,16	0,07	0,14	0,19	0,22	0,44	0,19	0,20	0,15	0,24	0,64	1,48	1,30	0,44	0,36	0,37	0,27	0,33	0,53	1,66	0,75	0,58	0,78	0,35	0,36	0,42	1,26	1,65	0,56	0,40	0,36
<b>Dalälven</b>	<b>7</b>	<b>5</b>	<b>13</b>	<b>6</b>	<b>6</b>	<b>8</b>	<b>61</b>	<b>71</b>	<b>51</b>	<b>41</b>	<b>40</b>	<b>28</b>	<b>6</b>	<b>27</b>	<b>19</b>	<b>23</b>	<b>23</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>5</b>	<b>9</b>	<b>5</b>	<b>14</b>	<b>12</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>7</b>	<b>4</b>	<b>19</b>	<b>21</b>	<b>7</b>	<b>0</b>	<b>2</b>	<b>8</b>	<b>13</b>	<b>2</b>
cv	0,42	0,46	0,28	0,49	0,53	0,60	0,14	0,16	0,09	0,19	0,20	0,18	0,38	0,18	0,19	0,18	0,23	0,59	0,52	0,46	0,41	0,29	0,34	0,20	0,23	0,41	1,46	0,67	0,42	0,54	0,36	0,35	0,37	0,76	0,62	0,41	0,35	1,21
<b>Mörumsån</b>	<b>34</b>	<b>32</b>	<b>26</b>	<b>31</b>	<b>42</b>	<b>21</b>	<b>44</b>	<b>74</b>	<b>65</b>	<b>46</b>	<b>39</b>	<b>19</b>	<b>4</b>	<b>32</b>	<b>18</b>	<b>19</b>	<b>23</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>5</b>	<b>11</b>	<b>8</b>	<b>8</b>	<b>10</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>1</b>	<b>10</b>	<b>14</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>
cv	0,16	0,34	0,24	0,35	0,34	0,57	0,16	0,15	0,17	0,18	0,25	0,33	0,86	0,39	0,51	0,52	0,45	1,13	1,40	1,28	0,75	0,60	0,82	0,75	0,70	1,01	1,74	1,32	1,05	1,50	0,70	0,52	0,68	1,22	1,54	1,38	1,17	1,18
<b>Unsampled stock</b>	<b>11</b>	<b>6</b>	<b>8</b>	<b>6</b>	<b>9</b>	<b>7</b>	<b>44</b>	<b>61</b>	<b>61</b>	<b>43</b>	<b>42</b>	<b>24</b>	<b>4</b>	<b>30</b>	<b>19</b>	<b>19</b>	<b>23</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>5</b>	<b>11</b>	<b>8</b>	<b>8</b>	<b>10</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>10</b>	<b>14</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>
cv	0,73	0,91	0,77	0,97	0,79	0,87	0,31	0,24	0,23	0,30	0,32	0,46	0,90	0,42	0,51	0,51	0,45	1,18	1,35	1,35	0,75	0,61	0,79	0,75	0,70	0,98	1,74	1,36	1,12	1,39	0,72	0,50	0,65	1,16	1,65	1,48	1,21	1,25

**Table 4.2.3.1. Posterior probability distribution of alpha and K parameters of the Beverton-Holt stock-recruit relationship for Baltic salmon stocks included in the full life history model (FLHM). Posterior distributions are summarized with their mean, CV (%), and 90% probability intervals.**

stock	mean alpha	CV alpha	90%PI alpha	mean K	CV K	90%PI K
Tornionjoki	34	12%	26-39	2009	8%	1824-2424
Simojoki	100	28%	58-150	63	20%	49-85
Kalixälven	24	42%	11-43	465	10%	396-540
Råneälven	33	37%	13-53	68	20%	51-93
Piteälven	11	40%	5-19	30	11%	25-35
Åbyälven	161	21%	107-215	37	46%	16-71
Byskeälven	44	50%	14-86	144	22%	104-201
Kågeälven	269	51%	73-512	45	36%	23-74
Rickleån	95	23%	61-132	11	39%	6-20
Sävarån	100	28%	57-145	13	49%	6-24
Vindelälven	15	26%	10-23	307	12%	257-375
Öreälven	60	40%	28-106	16	81%	8-36
Lögdeälven	103	30%	52-155	39	81%	13-101
Ljungan	100	60%	20-210	8	70%	4-18
Testeboån	99	35%	43-162	9	54%	4-18
Emån	348	24%	213-491	26	40%	13-44
Mörrumsån	83	82%	4-215	42	28%	30-65

Table 4.2.3.2. Summary statistics (in thousands) for probability distributions of the long-term equilibrium unfished spawner production ( $S_0$ ), spawner abundance at maximum sustainable yield ( $S_{MSY}$ ), smolt production at maximum sustainable yield ( $R_{MSY}$ ), smolt production corresponding to recovery to the maximum sustainable yield level in one generation time (limit smolt production  $R_{lim}$ ) and long-term equilibrium unfished smolt production ( $R_0$  or PSPC) in the AU 1-4 rivers. Probability distributions for  $R_{lim}$  and  $R_{MSY}$  serve as reference points to evaluate the status of the stocks (Table 4.2.3.4). The posterior distributions are summarized with their median, mean and 90% probability interval (PI). In the rightmost column, relative changes in the median values of  $R_0$  compared with the last assessment (% change from the 2024 estimates) are shown.

	median_ $S_0$	mean_ $S_0$	90 % PI_ $S_0$	median_ $S_{MSY}$	mean_ $S_{MSY}$	90 % PI_ $S_{MSY}$	median_ $R_{MSY}$	mean_ $R_{MSY}$	90 % PI_ $R_{MSY}$	median_ $R_{lim}$	mean_ $R_{lim}$	90 % PI_ $R_{lim}$	median_ $R_0$	mean_ $R_0$	90 % PI_ $R_0$	% change in $R_0$ from 2024 to 2025
Simojoki	3.9	4.1	1.9-7.2	1.2	1.3	0.5-2.2	29	30	17-45	14	15	11-20	44	45	28-62	-1%
Tornionjoki	152.7	158.8	93.6-245.7	30.9	31.9	18.9-48	1377	1385	1152-1681	425	428	345-524	1795	1813	1590-2195	5%
Kalixälven	36.1	37.6	21.8-57.8	6.1	6.3	3.7-9.9	344	346	273-425	87	87	58-114	429	432	362-511	-29%
Råneälven	5	5.4	2.9-8.9	1.0	1.0	0.5-1.7	46	47	32-68	14.0	14.0	9-20	59	61	44-86	2%
Piteälven	1.9	2	1.2-3	0.2	0.3	0.1-0.4	24	24	19-29	5	5	3-6	28	28	24-34	6%
Åbyälven	1.7	2	0.6-4.5	0.6	0.8	0.1-1.9	11	13	4-26	7	8	3-15	18	20	7-41	-9%
Byskeälven	10.4	11.2	6-18.5	2.2	2.5	1.1-4.5	92	96	62-144	30	31	19-47	122	128	89-184	2%
Kågeälven	1.3	1.7	0-4.6	0.5	0.6	0-1.9	8	10	0-29	6.0	6.0	0-15	14	17	0-45	-19%
Rickleån	0.7	0.8	0.3-1.6	0.2	0.2	0.1-0.5	5	6	3-10	2.0	3.0	1-5	8	8	4-15	3%
Sävarån	0.7	0.8	0.3-1.7	0.2	0.3	0.1-0.6	5	6	3-11	3	3	2-5	8	9	4-16	-10%
Vindelälven	9.5	9.9	5.6-15.7	2.1	2.2	1.1-3.6	188	190	143-245	70	71	56-88	258	261	209-323	0%
Öreälven	0.9	1.2	0.4-2.9	0.2	0.3	0.1-0.7	7	10	4-23	3.0	4	2-8	10	13	6-30	-28%
Lögdeälven	1.8	2.6	0.6-7	0.6	0.8	0.2-2.4	13	18	5-49	7	9	3-24	21	28	8-71	-3%
Ljungan	0.4	0.5	0.1-1.2	0.1	0.2	0-0.4	3.3	4.0	1.2-9.3	1.4	1.8	0.8-4.1	5	6	2.2-12.7	-9%
Testeboån	0.2	0.2	0-0.6	0.1	0.1	0-0.2	2.2	2.8	0.4-7.1	1.4	1.7	0.4-4	3.7	4.5	0.8-11.1	48%
Emån	0.6	0.8	0-2.3	0.2	0.3	0-1.1	3.0	4,0	0-10	2.0	3.0	0-7	5	6	0-17	-25%
Mörrumsån	3.2	3.4	1.4-6.4	0.7	0.8	0.2-1.7	24	25	9-46	8	9	3-14	32	34	15-58	-8%

**Table 4.2.3.3. Wild smolt production in Baltic rivers (2005 and onwards) with natural reproduction of salmon grouped by assessment units: posterior probability estimates derived from the full life history model (FLHM) for the AU 1-4 rivers, and estimates derived by other means (inferred from parr densities, smolt trapping etc.) for the rest of the rivers. Median estimates (x 1 000) of smolts with the associated uncertainty (90% probability interval) are shown. The river specific reproductive areas and the potential smolt production capacities (PSPCs) are also shown as medians and 90% PIs. Note that estimates of the smolt production is not available from many AU 5 and some AU 6 rivers from the early and middle parts of the time-series; however, based on the available information these rivers account for only a very small proportion of the total AU specific (and grand total) smolt production.**

Assessment unit, sub-division, country	Category	Reprod. area (ha, median)	PSPC (x 1000)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Pred 2025	Pred 2026	Pred 2027	Method of estimation		
				Pot. prod.	Pres. prod.																								
<b>Gulf of Bothnia, Sub-div. 30-31:</b>																													
<b>Finland</b>																													
Simojoki	wild	252	44	33	36	31	42	36	34	35	32	35	34	33	32	45	46	39	39	34	33	41	41	42	39	36	1	1	
90% PI		222-284	28-62	27-40	30-43	26-37	35-52	29-44	28-41	31-42	26-39	31-41	27-41	25-42	29-35	36-57	39-55	32-46	31-47	28-41	28-39	33-52	33-51	34-54	30-49	28-46			
<b>Finland/Sweden</b>																													
Tornionjoki,Torneälven	wild	5562	1795	791	1072	1012	1336	1375	1332	1436	1540	1549	1439	1474	1632	1812	1792	1623	1606	1646	1740	1733	1735	1746	1809	1690	1	1	
90% PI		4405-6985	1590-2195	671-935	891-1267	859-1171	1144-1546	1190-1597	1156-1503	1246-1681	1337-1805	1352-1817	1243-1709	1267-1713	1447-1866	1572-2087	1498-2106	1404-1857	1371-1896	1437-1892	1525-2015	1503-1999	1473-2026	1511-2039	1548-2146	1372-2057			
<b>Sweden</b>																													
Kälviälven	wild	2612	429	357	390	355	391	396	395	374	392	382	364	394	401	434	431	417	417	405	426	432	429	431	419	382	1	1	
90% PI		2129-3208	362-511	273-467	313-479	278-444	313-494	318-503	313-506	302-462	317-499	301-480	290-474	314-499	320-502	353-546	340-540	333-547	332-524	326-507	339-544	344-542	341-533	343-549	325-540	301-494			
Råneälven	wild	387	59	34	40	35	45	44	42	47	50	48	45	49	52	58	59	55	55	54	56	59	56	57	56	56	1	1	
90% PI		333-451	44-86	22-48	28-53	24-47	33-58	33-58	31-54	37-59	39-61	37-60	34-58	37-64	40-68	44-76	44-79	41-74	41-72	41-72	41-75	43-79	43-76	43-77	42-76	41-74			
<b>Assessment unit 1, total</b>			<b>2327</b>	<b>1216</b>	<b>1538</b>	<b>1433</b>	<b>1814</b>	<b>1852</b>	<b>1803</b>	<b>1892</b>	<b>2014</b>	<b>2015</b>	<b>1882</b>	<b>1950</b>	<b>2116</b>	<b>2348</b>	<b>2329</b>	<b>2134</b>	<b>2116</b>	<b>2139</b>	<b>2255</b>	<b>2265</b>	<b>2262</b>	<b>2277</b>	<b>2323</b>	<b>2164</b>	<b>1</b>	<b>1</b>	
90% PI			<b>2025-2853</b>	<b>993-1489</b>	<b>1262-1842</b>	<b>1188-1699</b>	<b>1525-2150</b>	<b>1669-2202</b>	<b>1527-2104</b>	<b>1616-2244</b>	<b>1719-2403</b>	<b>1720-2397</b>	<b>1995-2283</b>	<b>1643-2318</b>	<b>1836-2471</b>	<b>2005-2765</b>	<b>1921-2779</b>	<b>1810-2524</b>	<b>1775-2539</b>	<b>1832-2513</b>	<b>1933-2672</b>	<b>1922-2672</b>	<b>1891-2687</b>	<b>1931-2718</b>	<b>1945-2812</b>	<b>1742-2671</b>			
<b>Piteälven</b>	wild	576	28	26	27	28	28	28	26	27	28	29	29	29	30	28	29	30	30	29	29	30	29	30	30	29	1	1	
90% PI		482-670	24-34	20-34	20-34	22-35	22-37	22-38	21-34	21-36	22-37	23-38	23-37	23-38	23-39	22-36	23-38	23-38	24-39	22-39	23-38	23-39	22-40	23-40	23-40	23-39			
Åbyälven	wild	184	18	2.3	4	4	5	4	2.7	2.8	4	4	4	5	5	7	8	7	6	6	7	10	9	9	10	8	1	1	
90% PI		100-300	7-41	1.2-5	2.2-7	2.5-6	3-8	2.4-6	1.6-4	1.7-5	2.4-6	2.9-7	2.8-6	3-7	3-8	5-10	5-12	5-9	4-9	4-10	5-11	6-15	6-14	6-14	7-16	5-12			
Byskeälven	wild	564	122	98	105	93	112	107	102	105	110	106	102	109	113	127	125	124	116	116	117	123	120	121	119	116	1	1	
90% PI		483-658	89-184	73-129	79-138	68-122	86-148	81-143	75-135	77-137	80-145	79-141	76-132	82-145	86-150	95-174	93-171	93-169	86-155	89-160	89-160	90-173	88-167	91-168	86-170	85-160			
Rickleån	wild	34	8	0.5	0.5	0.8	2.3	2.0	1.5	1.3	1.2	1.5	2.1	2.8	4	4	4	3	4	4	5	6	6	6	6	5	1	1	
90% PI		24-49	4-15	0.2-1.2	0.2-1.2	0.4-1.6	1.4-4	1.3-3	0.9-2.4	0.7-2.1	0.6-2.2	0.8-2.4	1.7-2.6	1.9-4	2.9-4	3-6	2.8-6	1.9-5	2.3-5	2.7-6	3-7	4-9	4-9	4-9	4-9	3-8			
Sävarån	wild	23	8	3	3	3.0	4	3	2.7	3	4	4	4	5	5	7	8	7	7	6	7	8	8	8	8	7	1	1	
90% PI		14-35	4-16	2.8-4	2.6-4	2.3-4	3-6	2.4-5	1.9-4	2.3-4	2.9-5	3-6	2.9-6	3-6	4.7	5-9	5-11	5-10	5-10	4-9	5-10	5-13	5-13	5-13	5-12	5-11			
Ume/Vindelälven	wild	1806	258	184	226	216	183	224	194	209	238	230	188	202	256	263	213	159	127	86	216	274	271	270	231	203	1	1	
90% PI		1432-2272	209-323	141-233	187-282	175-262	138-233	182-268	158-230	180-241	210-269	193-277	159-220	172-235	209-319	224-310	169-262	132-189	97-163	57-127	177-266	230-328	220-340	223-341	187-289	161-260			
Öreälven	wild	244	10	1.3	2.0	2.0	3	2.9	2.6	3	4	4	4	5	5	6	7	8	7	7	8	8	9	9	9	9	1	1	
90% PI		200-297	6-30	0.7-2.8	1.0-4	1.0-4	1.8-6	1.5-5	1.3-5	1.4-6	1.9-6	2.4-7	2.4-7	3-8	4-9	5-11	6-12	5-11	5-11	5-11	5-12	6-15	6-14	6-16	6-15	6-14			
Löjdeälven	wild	210	21	3	4	4	5	4	3	4	6	6	6	7	7	10	12	10	10	10	12	15	14	15	14	13	1	1	
90% PI		172-256	8-71	1.5-6	2.4-7	2.3-6	3-8	2.5-7	2.0-6	2.3-7	3-9	4-10	4-9	5-10	5-10	7-15	8-17	7-15	6-15	7-15	8-17	10-24	9-23	9-24	9-23	8-21			
Kågeälven	wild	96	14	na	na	na	na	11	8	5	5	8	10	11	15	14	14	11	12	12	14	17	15	14	13	11	1	1	
90% PI		67-138	0.0-45	na	na	na	2.7-45	2.7-40	1.8-35	1.2-24	1.0-24	1.9-31	2.8-35	2.8-35	5-44	8-24	7-24	6-21	7-23	7-21	7-24	10-28	8-26	7-26	6-24	5-23			
<b>Assessment unit 2, total</b>			<b>488</b>	<b>318</b>	<b>372</b>	<b>350</b>	<b>355</b>	<b>387</b>	<b>343</b>	<b>360</b>	<b>399</b>	<b>393</b>	<b>350</b>	<b>375</b>	<b>440</b>	<b>467</b>	<b>424</b>	<b>357</b>	<b>319</b>	<b>278</b>	<b>415</b>	<b>492</b>	<b>481</b>	<b>483</b>	<b>439</b>	<b>401</b>	<b>1</b>	<b>1</b>	
90% PI			<b>352-759</b>	<b>241-416</b>	<b>295-477</b>	<b>274-442</b>	<b>263-494</b>	<b>298-515</b>	<b>264-456</b>	<b>287-462</b>	<b>324-503</b>	<b>309-517</b>	<b>273-455</b>	<b>296-489</b>	<b>342-590</b>	<b>374-594</b>	<b>318-554</b>	<b>277-467</b>	<b>236-430</b>	<b>197-398</b>	<b>323-545</b>	<b>383-643</b>	<b>367-644</b>	<b>375-652</b>	<b>333-597</b>	<b>300-548</b>			
<b>Ljungan</b>	wild	50	5	4	3	4	4	4	4	3	4	4	4	4	5	5	4	2.3	2.4	2.5	3	2.8	4	4	4	4	1	1	
90% PI		17-127	2.2-13	2.8-6	2.2-5	3-7	3.0-6	2.5-5	2.5-5	2.3-5	2.6-6	2.5-6	2.4-5	2.9-6	3-7	3-7	2.9-6	0.5-4	0.6-4	0.6-4	0.9-6	1.7-4	3-6	2.4-6	1.8-5	2.4-6			
Testeboån	wild	11	4	0.9	1.7	1.3	2.0	0.9	1.0	1.0	1.6	1.7	1.6	1.7	1.6	2.5	2.6	2.7	2.5	1.2	4	3	3	3	2.1	5	1	1	
90% PI		9-13	0.8-11	0.1-7	0.2-10	0.2-7	0.6-4	0.2-2.7	0.3-2.9	0.3-2.8	0.5-4	0.5-3	0.8-2.9	1.0-2.7	1.2-2.3	1.7-4	1.1-4	1.7-4	1.7-4	0.7-2.0	2.9-6	2.2-5	2.0-6	2.0-5	0.3-4	2.7-8			
<b>Assessment unit 3, total</b>			<b>8</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>6</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>6</b>	<b>7</b>	<b>7</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>8</b>	<b>6</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>9</b>	<b>1</b>	<b>1</b>	
90% PI			<b>3.0-24</b>	<b>2.9-14</b>	<b>2.4-15</b>	<b>3-13</b>	<b>4-10</b>	<b>2.7-8</b>	<b>2.8-8</b>	<b>2.6-8</b>	<b>3-9</b>	<b>3-9</b>	<b>3-8</b>	<b>4-9</b>	<b>5-9</b>	<b>5-11</b>	<b>4-11</b>	<b>2.3-9</b>	<b>2.3-8</b>	<b>1.3-6</b>	<b>4-12</b>	<b>4-9</b>	<b>5-12</b>	<b>4-10</b>	<b>2.2-10</b>	<b>5-14</b>			
<b>Total Gulf of B., Sub-divs.30-31</b>			<b>2823</b>	<b>1539</b>	<b>1915</b>	<b>1789</b>	<b>2175</b>	<b>2243</b>	<b>2150</b>	<b>2257</b>	<b>2418</b>	<b>2413</b>	<b>2237</b>	<b>2331</b>	<b>2563</b>	<b>2823</b>	<b>2756</b>	<b>2496</b>	<b>2440</b>	<b>2421</b>	<b>2678</b>	<b>2763</b>	<b>2750</b>	<b>2766</b>	<b>2768</b>	<b>2574</b>	<b>1</b>	<b>1</b>	
90% PI			<b>2379-3636</b>	<b>1236-1919</b>	<b>1560-2334</b>	<b>1465-2154</b>	<b>1791-2654</b>	<b>1870-2725</b>	<b>1793-2569</b>	<b>1905-2714</b>	<b>2046-2915</b>	<b>2032-2923</b>	<b>1871-2746</b>	<b>1943-2816</b>	<b>2182-3070</b>	<b>2383-3370</b>	<b>2243-3344</b>	<b>2089-3000</b>	<b>2013-2977</b>	<b>2030-2917</b>	<b>2259-3229</b>	<b>2309-3324</b>	<b>2264-3343</b>	<b>2310-3380</b>	<b>2280-3418</b>	<b>2047-3234</b>			



Table 4.2.3.4a. Overview of current status for wild Baltic salmon stocks with analytical assessment (AU 1-4) in terms of their probability to reach  $R_{lim}$  and  $R_{MSY}$  in 2024.

Stock	Prob. to reach $R_{lim}$				Prob. to reach $R_{MSY}$					
	Prob.	>95%	70-95%	50-70%	<50%	Prob.	>95%	70-95%	50-70%	<50%
<b>AU 1</b>										
Tornionjoki*	1.000	X				0.939		X		
Simojoki	0.999	X				0.880		X		
Kalixälven	1.000	X				0.932		X		
Råneälven*	1.000	X				0.760		X		
<b>AU 2</b>										
Piteälven*	1.000	X				0.820		X		
Åbyälven	0.679		X			0.386				X
Byskeälven	1.000	X				0.792		X		
Kågeälven	0.783		X			0.631			X	
Rickleån	0.957	X				0.596			X	
Sävarån	0.990	X				0.785		X		
Vindelälven	1.000	X				0.972	X			
Öreälven	0.949		X			0.652			X	
Lögdeälven	0.828		X			0.543			X	
<b>AU 3</b>										
Ljungan	0.949		X			0.680			X	
Testeboån	0.865		X			0.697			X	
<b>AU 4</b>										
Emån	0.576			X		0.500			X	
Mörrumsån	1.000	X				0.728		X		

\*Status uncertain; see sections 4.2.3 and 4.4.1 for additional information.

Table 4.2.3.4b. Overview of current status of wild and mixed Baltic salmon stocks in AU 5-6.

Stock	Category	Average smolt production (2022-2024) in relation to PSC	Current smolt production (2024) in relation to PSC
Pärnu	mixed	4%	<1%
Salaca	wild	35%	20%
Vitrupe	wild	16%	<1%
Pēterupe	wild	9%	<1%
Gauja	mixed	12%	7%
Daugava	mixed	< 1%	< 1%
Irbe	wild	1%	1%
Venta	mixed	4%	9%
Saka	wild	24%	28%
Užava	wild	2%	4%
Bārta	wild	< 1%	< 1%
Nemunas	mixed	36%	29%
Kymijoki	mixed	43%	22%
Luga	mixed	NA	NA
Purtse	mixed	35%	22%
Kunda	wild	100%	100%
Selja	mixed	17%	15%
Loobu	mixed	53%	47%
Pirita	mixed	29%	30%
Vasalemma	wild	40%	27%
Keila	wild	82%	46%
Valgejõgi	mixed	39%	52%
Jägala	mixed	22%	0%
Vääna	mixed	8%	10%

Table 4.3.1.1. Key assumptions underlying the stock projections. The same post-smolt survival scenario and M74 scenario are assumed for all effort scenarios. Survival values represent the medians to which Mps and M74 are expected to return over the long term.

Scenario	Total removal (dead catch) for year 2026
1	Zero (sea and river)
2	Zero (sea)
<b>Fishing pattern as in 2021, consisting of offshore longlining, recreational offshore trolling, coastal trapnetting and river fisheries</b>	
3	60.000
4	100.000
<b>Fishing pattern with only coastal trapnetting and river fisheries</b>	
5	20.000
6	30.000
7	40.000
8	60.000
9	80.000
10	100.000
<b>Fishing pattern with recreational offshore trolling, coastal trapnetting and river fisheries</b>	
11	20.000
12	40.000
13	60.000
14	80.000
15	100.000
<b>River fisheries (all scenarios except scenario 1)</b>	
10% of river harvest rate applied up to 2037 for wild rivers with fishing ban/catch and release	
<b>Post-smolt survival of wild salmon</b>	
Average survival between 2020-2023 (10%); first projected year 2024	
<b>Post-smolt survival of reared salmon</b>	
Same relative difference to wild salmon as on average in history	
<b>M74 survival</b>	
Historical median (Figure 4.3.2.1)	
<b>Releases</b>	
Same number of annual releases in the future as in 2023	
<b>Maturation</b>	
Age group specific maturation rates in 2025 are predicted using January-March 2025 SST data. For other years, average maturation rates over the time series are used, separately for wild and reared salmon.	
<b>Ume/Vindelälven</b>	
Average proportions 2022-2024 for MSW sex ratio passing ladder	
Average of historical estimates for proportion of spawners that finds the fish ladder	
Zero extra mortality after passing the ladder	
<b>Piteälven and Testeboån</b>	
Average of historical estimates for proportion of spawners that finds the fish ladder	

**Table 4.3.2.1a. Estimates (in thousands of fish) of total removals and the corresponding fishing mortality in the sea fisheries by scenario in 2026. The table also shows the predicted total offshore catch (including a recreational trolling catch of 7 500 salmon, where applicable), total coastal catch, total river catch, total number of wild spawners, and corresponding reared surplus in 2026 (in thousands). All values refer to medians unless stated otherwise. Different scenarios are specified in Table 4.3.1.1.**

Scenario	Total commercial + recreational sea catch (2026)	F for total sea catch	Offshore catch	Coastal catch	River catch	Spawners	% change in spawners	Reared surplus
1	0	0.00	0.00	0.00	0.00	165.62	7.89%	53.28
2	0	0.00	0.00	0.00	28.54	151.76	-1.14%	40.35
3	60	0.11	41.02	16.88	24.01	130.04	-15.29%	32.96
4	100	0.21	66.90	28.87	20.92	112.75	-26.55%	29.67
5	20	0.04	0.00	19.99	26.42	139.83	-8.91%	37.69
6	30	0.05	0.00	29.96	25.40	133.62	-12.95%	36.24
7	40	0.07	0.00	40.00	24.29	127.23	-17.11%	34.78
8	60	0.11	0.00	60.00	22.16	114.98	-25.09%	32.14
9	80	0.15	0.00	79.99	20.11	102.89	-32.97%	29.59
10	100	0.20	0.00	99.96	18.00	91.00	-40.71%	26.93
11	20	0.03	7.87	11.26	26.82	144.90	-5.60%	37.27
12	40	0.06	7.87	30.62	24.70	132.88	-13.43%	34.60
13	60	0.10	7.87	50.21	22.65	120.49	-21.51%	31.92
14	80	0.15	7.87	70.08	20.58	108.17	-29.53%	29.31
15	100	0.19	7.87	90.36	18.44	96.27	-37.29%	26.80

Table 4.3.2.1b. Catch components and their shares in 2021-2024 in the Main Basin and Gulf of Bothnia combined and separately in the Åland Sea and Gulf of Bothnia.

Main Basin and Gulf of Bothnia (SD22-31)												
Year	Commercial at sea						Recreational at sea	In river		% commercial at sea	% recreational at sea	% river
	Reported	Discarded BMS		Seal damaged	Unreported	Misreported		Reported	Unreported			
		alive	dead									
2021	64010	1430	1010	8070	3030	0	23150	48880	7080	49,5 %	14,8 %	35,7 %
2022	36460	1060	580	3080	2030	0	11980	25960	3770	50,9 %	14,1 %	35,0 %
2023	30740	860	420	2340	1720	0	6360	17400	2390	58,0 %	10,2 %	31,8 %
2024	27710	810	350	2350	1580	0	5630	14400	2000	59,8 %	10,3 %	29,9 %
	<b>Catches at sea only, shares</b>							<b>Total</b>				
2021	63,6 %	1,4 %	1,0 %	8,0 %	3,0 %	0,0 %	23,0 %	77,0 %				
2022	66,1 %	1,9 %	1,1 %	5,6 %	3,7 %	0,0 %	21,7 %	78,3 %				
2023	72,4 %	2,0 %	1,0 %	5,5 %	4,1 %	0,0 %	15,0 %	85,0 %				
2024	72,1 %	2,1 %	0,9 %	6,1 %	4,1 %	0,0 %	14,7 %	85,3 %				
	<b>Commercial catches at sea only, shares</b>											
2021	82,5 %	1,8 %	1,3 %	10,4 %	3,9 %	0,0 %						
2022	84,4 %	2,5 %	1,3 %	7,1 %	4,7 %	0,0 %						
2023	85,2 %	2,4 %	1,2 %	6,5 %	4,8 %	0,0 %						
2024	84,5 %	2,5 %	1,1 %	7,2 %	4,8 %	0,0 %						
Åland Sea and Gulf of Bothnia (SD 29N-31)												
Year	Commercial at sea						Recreational at sea	In river		% commercial at sea	% recreational at sea	% river
	Reported	Discarded BMS		Seal damaged	Unreported	Misreported		Reported	Unreported			
		alive	dead									
2021	43450	1330	620	2450	2330	0	6970	48240	6870	44,7 %	6,2 %	49,1 %
2022	35150	1050	540	2330	1940	0	4120	25800	3710	54,9 %	5,5 %	39,5 %
2023	29260	850	380	1850	1620	0	1350	17250	2340	61,9 %	2,5 %	35,7 %
2024	26740	800	320	1890	1500	0	660	14230	1940	65,0 %	1,4 %	33,6 %
	<b>Catches at sea only, shares</b>							<b>Total commercial</b>				
2021	76,0 %	2,3 %	1,1 %	4,3 %	4,1 %	0%	12,2 %	87,8 %				
2022	77,9 %	2,3 %	1,2 %	5,2 %	4,3 %	0%	9,1 %	90,9 %				
2023	82,9 %	2,4 %	1,1 %	5,2 %	4,6 %	0%	3,8 %	96,2 %				
2024	83,8 %	2,5 %	1,0 %	5,9 %	4,7 %	0%	2,1 %	97,9 %				
	<b>Commercial catches at sea only, shares</b>											
2021	86,6 %	2,7 %	1,2 %	4,9 %	4,6 %	0%						
2022	85,7 %	2,6 %	1,3 %	5,7 %	4,7 %	0%						
2023	86,2 %	2,5 %	1,1 %	5,4 %	4,8 %	0%						
2024	85,6 %	2,6 %	1,0 %	6,0 %	4,8 %	0%						

**Table 4.3.2.2. River- and AU-specific probabilities in scenarios 1-15 for smolt production to be above  $R_{lim}$  in 2030 (AU 1-2) or 2029 (AU 3-4). Current status refers to 2024. Cells with a probability  $\leq 0.8$  are marked in yellow. No cells have a probability of  $\leq 0.5$ .**

AU	River	Current status	Probability to be above $R_{lim}$														
			Scenario														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Tornionjoki*	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Simojoki	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Kalixälven	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Råneälven*	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	Piteälven*	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Åbyälven	0.68	0.92	0.90	0.85	0.81	0.88	0.87	0.87	0.85	0.82	0.79	0.89	0.87	0.86	0.84	0.80
	Byskeälven	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Kågeälven	0.78	0.87	0.87	0.85	0.83	0.86	0.86	0.86	0.85	0.84	0.83	0.86	0.86	0.85	0.84	0.84
	Rickleån	0.96	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	0.99
	Sävarån	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Vindelälven	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Öreälven	0.95	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lögdeälven	0.83	0.97	0.97	0.96	0.94	0.96	0.96	0.96	0.96	0.95	0.94	0.96	0.96	0.96	0.95	0.94	

AU	River	Current status	Probability to be above $R_{lim}$														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3	Ljungan	0.95	0.99	0.99	0.98	0.97	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
	Testeboån	0.87	0.96	0.96	0.95	0.94	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
4	Emån	0.58	0.72	0.72	0.68	0.65	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
	Mörrumsån	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AU 1 total		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AU 2 total		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AU 3 total		0.96	0.99	0.99	0.99	0.98	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
AU 4 total		1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

\*Stock status and projections uncertain; see Section 4.4 for additional information.

**Table 4.3.2.3. River- and AU-specific probabilities in scenarios 1-15 for smolt production to be at or above  $R_{MSY}$  in 2030 (AU 1-2) or 2029 (AU 3-4). Current status refers to 2024. Cells with probability of  $\leq 0.5$  are marked in red.**

AU	River	Current status	Probability to be at or above $R_{MSY}$														
			Scenario														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Tornionjoki*	0.94	0.97	0.97	0.95	0.94	0.96	0.96	0.95	0.94	0.93	0.91	0.96	0.96	0.95	0.94	0.92
	Simojoki	0.88	0.97	0.97	0.92	0.87	0.95	0.94	0.93	0.90	0.86	0.80	0.96	0.94	0.91	0.88	0.83
	Kalixälven	0.93	0.95	0.94	0.94	0.92	0.94	0.94	0.94	0.93	0.92	0.90	0.94	0.94	0.93	0.92	0.91
	Råneälven*	0.76	0.96	0.96	0.95	0.93	0.96	0.96	0.95	0.95	0.94	0.91	0.96	0.96	0.95	0.94	0.93
2	Piteälven*	0.82	0.89	0.89	0.88	0.87	0.89	0.89	0.88	0.88	0.88	0.87	0.89	0.89	0.88	0.88	0.88
	Åbyälven	0.39	0.67	0.63	0.54	0.47	0.60	0.58	0.57	0.53	0.49	0.45	0.62	0.58	0.54	0.51	0.46
	Byskeälven	0.79	0.95	0.95	0.93	0.92	0.94	0.94	0.94	0.94	0.93	0.93	0.94	0.94	0.94	0.93	0.93
	Kågeälven	0.63	0.77	0.77	0.73	0.69	0.75	0.75	0.74	0.73	0.70	0.68	0.76	0.75	0.73	0.71	0.69
	Rickleån	0.60	0.91	0.88	0.82	0.77	0.87	0.85	0.84	0.82	0.79	0.75	0.88	0.85	0.82	0.81	0.77
	Sävarån	0.79	0.95	0.95	0.92	0.87	0.95	0.94	0.93	0.91	0.90	0.86	0.95	0.94	0.93	0.90	0.88
	Vindelälven	0.97	0.97	0.97	0.96	0.93	0.97	0.97	0.96	0.96	0.95	0.94	0.97	0.97	0.96	0.96	0.94
	Öreälven	0.65	0.93	0.92	0.89	0.85	0.91	0.91	0.90	0.89	0.87	0.85	0.91	0.91	0.89	0.88	0.86
	Lögdeälven	0.54	0.79	0.76	0.71	0.67	0.74	0.73	0.73	0.71	0.69	0.66	0.75	0.73	0.72	0.70	0.67
	3	Ljungan	0.68	0.86	0.85	0.81	0.76	0.84	0.84	0.84	0.83	0.83	0.82	0.84	0.84	0.83	0.83

AU	River	Current status	Probability to be at or above $R_{MSY}$														
			Scenario														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Testeboån	0.70	0.85	0.85	0.81	0.78	0.85	0.85	0.84	0.84	0.83	0.82	0.85	0.85	0.84	0.83	0.82
4	Emån	0.50	0.60	0.60	0.57	0.54	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Mörrumsån	0.73	0.93	0.92	0.91	0.90	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
AU 1 total		0.97	0.99	0.99	0.97	0.96	0.98	0.98	0.98	0.97	0.96	0.95	0.98	0.98	0.98	0.97	0.95
AU 2 total		0.94	0.98	0.98	0.95	0.92	0.97	0.97	0.96	0.96	0.94	0.92	0.97	0.96	0.96	0.95	0.93
AU 3 total		0.72	0.87	0.86	0.82	0.77	0.86	0.85	0.85	0.84	0.84	0.83	0.86	0.85	0.84	0.84	0.83
AU 4 total		0.74	0.91	0.90	0.88	0.84	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90

\*Stock status and projections uncertain; see Section 4.4 for additional information.

Table 4.3.2.4. River- and AU-specific probabilities in scenarios 1-15 for smolt production to be above  $R_{lim}$  over the long term. Current status refers to 2024. Cells with a probability of  $\leq 0.5$  and  $\leq 0.8$  are marked in red and yellow, respectively.

AU	River	Current status	Probability to be above $R_{lim}$														
			Scenario														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Tornionjoki*	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Simojoki	1.00	1.00	1.00	0.97	0.89	1.00	1.00	1.00	0.99	0.97	0.92	1.00	1.00	1.00	0.98	0.95
	Kalixälven	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Råneälven*	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	Piteälven*	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Åbyälven	0.68	1.00	1.00	0.87	0.69	0.99	0.99	0.98	0.95	0.91	0.84	0.99	0.99	0.96	0.93	0.87
	Byskeälven	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Kågeälven	0.78	0.85	0.78	0.51	0.35	0.72	0.68	0.65	0.58	0.50	0.43	0.74	0.68	0.62	0.54	0.46
	Rickleån	0.96	1.00	1.00	0.98	0.93	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99
	Sävarån	0.99	1.00	1.00	0.98	0.91	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99
	Vindelälven	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Öreälven	0.95	1.00	1.00	0.99	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Lögdeälven	0.83	1.00	1.00	0.97	0.89	1.00	1.00	1.00	0.99	0.98	0.97	1.00	1.00	1.00	0.99	0.98
	3	Ljungan	0.95	1.00	1.00	0.96	0.88	1.00	1.00	0.99	0.99	0.99	0.99	1.00	1.00	0.99	0.99

AU	River	Current status	Probability to be above $R_{lim}$														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Testeboån	0.87	0.97	0.95	0.78	0.62	0.94	0.94	0.93	0.92	0.91	0.90	0.94	0.94	0.93	0.92	0,90
4	Emån	0.58	0.85	0.72	0.40	0.25	0.72	0.72	0.72	0.72	0.72	0.72	0.71	0.71	0.71	0.71	0,71
	Mörrumsån	1.00	1.00	1.00	0.97	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1,00
AU 1 total		1,00	1,00	1,00	1,00	0,99	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
AU 2 total		1,00	1,00	1,00	1,00	0,99	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
AU 3 total		0,96	1,00	1,00	0,95	0,85	1,00	1,00	1,00	1,00	0,99	0,99	1,00	1,00	1,00	1,00	0,99
AU 4 total		1,00	1,00	1,00	0,96	0,91	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00

\*Stock status and projections uncertain; see Section 4.4 for additional information.

Table 4.3.2.5. River- and AU-specific probabilities in scenarios 1-15 for smolt production to be at or above  $R_{MSY}$  over the long term. Current status refers to 2024. Cells with a probability of  $\leq 0.5$  are marked in red.

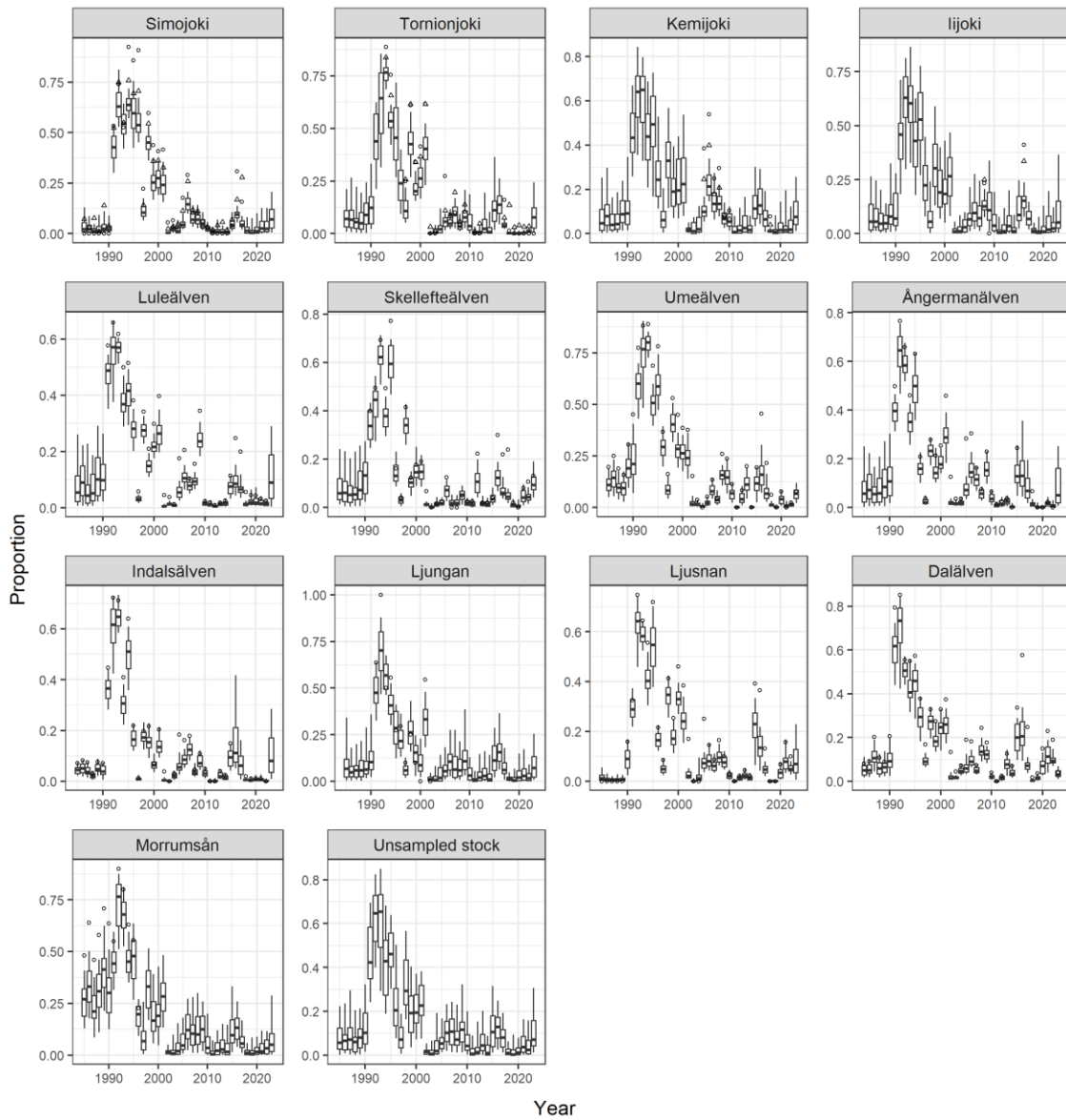
AU	River	Current status	Probability to be at or above $R_{MSY}$														
			Scenario														
			1	2	3	4	6	6,5	7	8	9	10	13	14	15	16	17
1	Tornionjoki*	0.94	1.00	1.00	0.99	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Simojoki	0.88	1.00	1.00	0.91	0.68	1.00	1.00	0.99	0.96	0.86	0.68	1.00	1.00	0.98	0.91	0.77
	Kalixälven	0.93	1.00	1.00	0.99	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Råneälven*	0.76	1.00	1.00	0.99	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	Piteälven*	0.82	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Åbyälven	0.39	1.00	1.00	0.77	0.47	0.99	0.98	0.96	0.91	0.80	0.62	0.99	0.97	0.94	0.85	0.70
	Byskeälven	0.79	1.00	1.00	0.99	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Kågeälven	0.63	0.85	0.76	0.43	0.25	0.69	0.65	0.62	0.51	0.40	0.30	0.73	0.64	0.55	0.45	0.34
	Rickleån	0.60	1.00	1.00	0.94	0.78	1.00	1.00	1.00	0.99	0.99	0.95	1.00	1.00	1.00	0.99	0.96
	Sävarån	0.79	1.00	1.00	0.93	0.75	1.00	1.00	1.00	1.00	0.98	0.93	1.00	1.00	1.00	0.99	0.96
	Vindelälven	0.97	1.00	1.00	0.98	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Öreälven	0.65	1.00	1.00	0.98	0.89	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99
	Lögdeälven	0.54	1.00	1.00	0.92	0.73	1.00	1.00	0.99	0.98	0.97	0.91	1.00	1.00	0.99	0.97	0.94
	3	Ljungan	0.68	1.00	0.99	0.91	0.77	0.99	0.99	0.99	0.99	0.99	0.98	0.99	0.99	0.99	0.99

AU	River	Current status	Probability to be at or above $R_{MSY}$														
			1	2	3	4	6	6,5	7	8	9	10	13	14	15	16	17
	Testeboån	0.70	0.96	0.93	0.69	0.46	0.92	0.92	0.91	0.90	0.88	0.86	0.93	0.91	0.90	0.88	0,86
4	Emån	0.50	0.84	0.70	0.32	0.17	0.70	0.70	0.70	0.70	0.70	0.70	0.69	0.69	0.69	0.69	0,69
	Mörrumsån	0.73	1.00	1.00	0.94	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1,00
AU 1 total		0,97	1.00	1.00	0.99	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AU 2 total		0,94	1.00	1.00	0.98	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AU 3 total		0,72	1.00	1.00	0.85	0.65	0.99	0.99	0.99	0.99	0.98	0.97	0.99	0.99	0.99	0.99	0.98
AU 4 total		0,74	1.00	1.00	0.90	0.76	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99

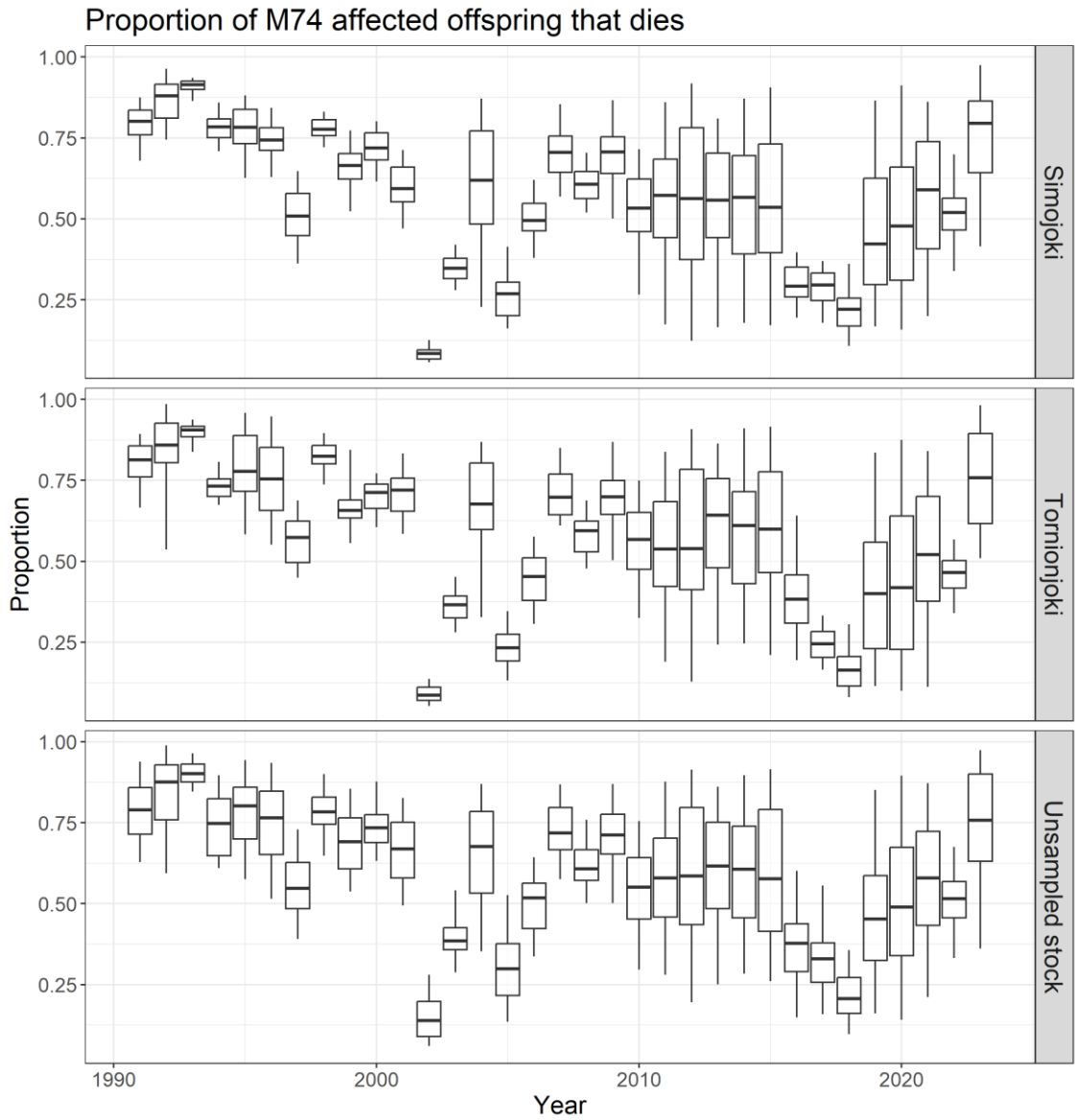
\*Stock status and projections uncertain; see Section 4.4 for additional information.

Table 4.3.2.6. Proportion of river stocks expected to be above  $R_{lim}$  within about one generation (G) ahead and at long-term equilibrium (Eq.), as determined using different probability limits ( $P_{lim}$ ) for scenarios 1-15. Number of stocks with analytical assessment is 17 (cf. tables 4.3.2.2 – 4.3.2.5). Current situation refers to smolt production in 2024. Note that “one generation ahead” corresponds to expected stock status in 2030 (AU 1-2) or 2029 (AU 3-4).

$P_{lim}$	Current situation	Time ahead (G)	Scenario																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
0,50	1,00	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
		Eq.	1.00	1.00	0.94	0.88	1.00	1.00	1.00	1.00	1.00	1.00	0.94	1.00	1.00	1.00	1.00	0.94	
0,80	0,82	1	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.88	0.94	0.94	0.94	0.94	0.94	
		Eq.	1.00	0.88	0.82	0.76	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
0,95	0,59	1	0.82	0.82	0.82	0.71	0.82	0.82	0.82	0.82	0.82	0.76	0.76	0.82	0.82	0.82	0.82	0.82	0.76
		Eq.	0.88	0.82	0.76	0.41	0.82	0.82	0.82	0.82	0.76	0.76	0.71	0.82	0.82	0.82	0.76	0.76	0.71



**Figure 4.2.2.1. M74 mortality among Atlantic salmon stocks within the Baltic Sea by spawning year class in 1985-2023. Boxplots illustrate medians, 50% and 95% probability intervals of the estimated M74 mortality. Open circles illustrate the proportion of females with offspring affected by M74 and triangles the total average yolk-sac-fry mortality among offspring.**



**Figure 4.2.2.2.** Estimated proportion of M74-affected offspring that die (i.e. mortality among those offspring that are from M74 affected females) by spawning year class in 1985-2023. Boxplots illustrate medians and 50% and 95% probability intervals.

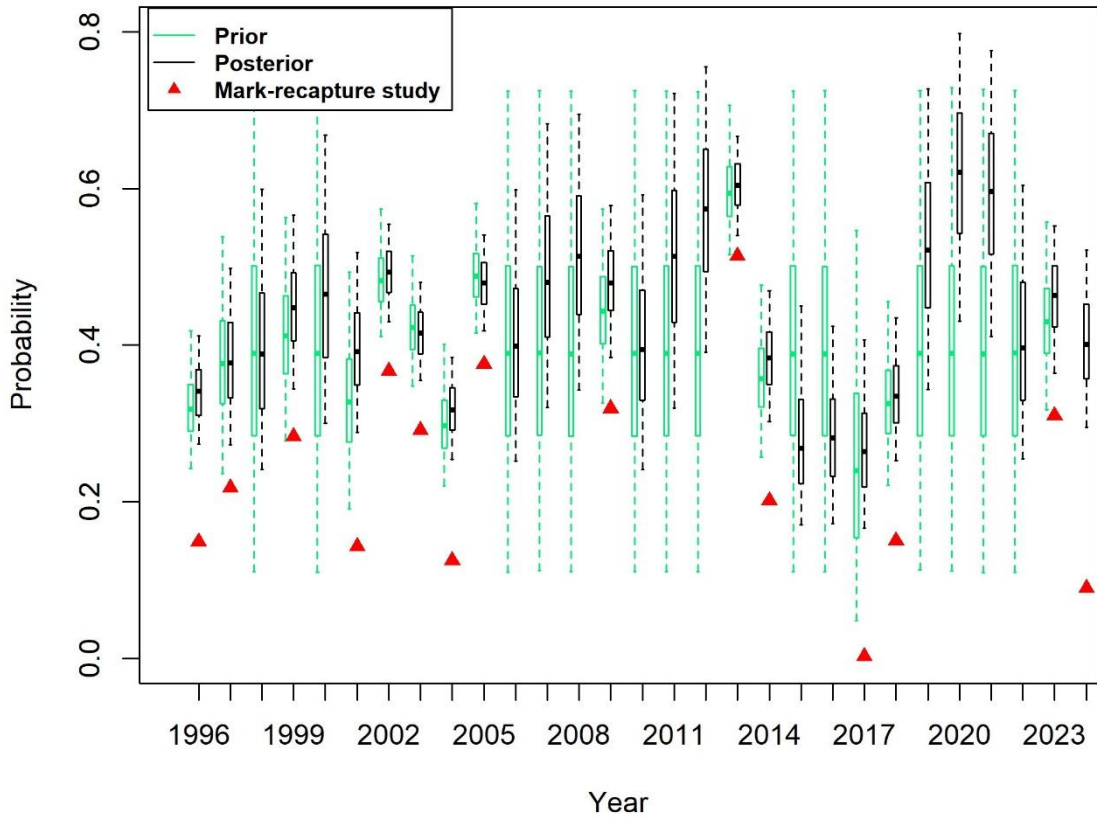
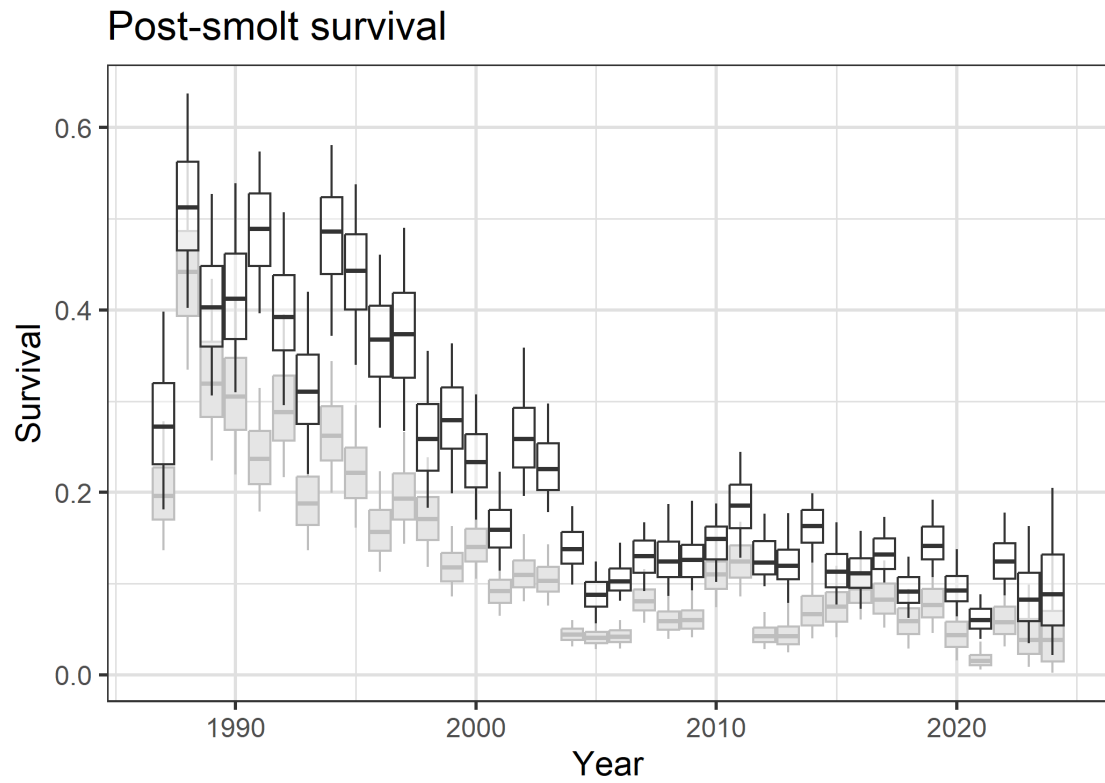
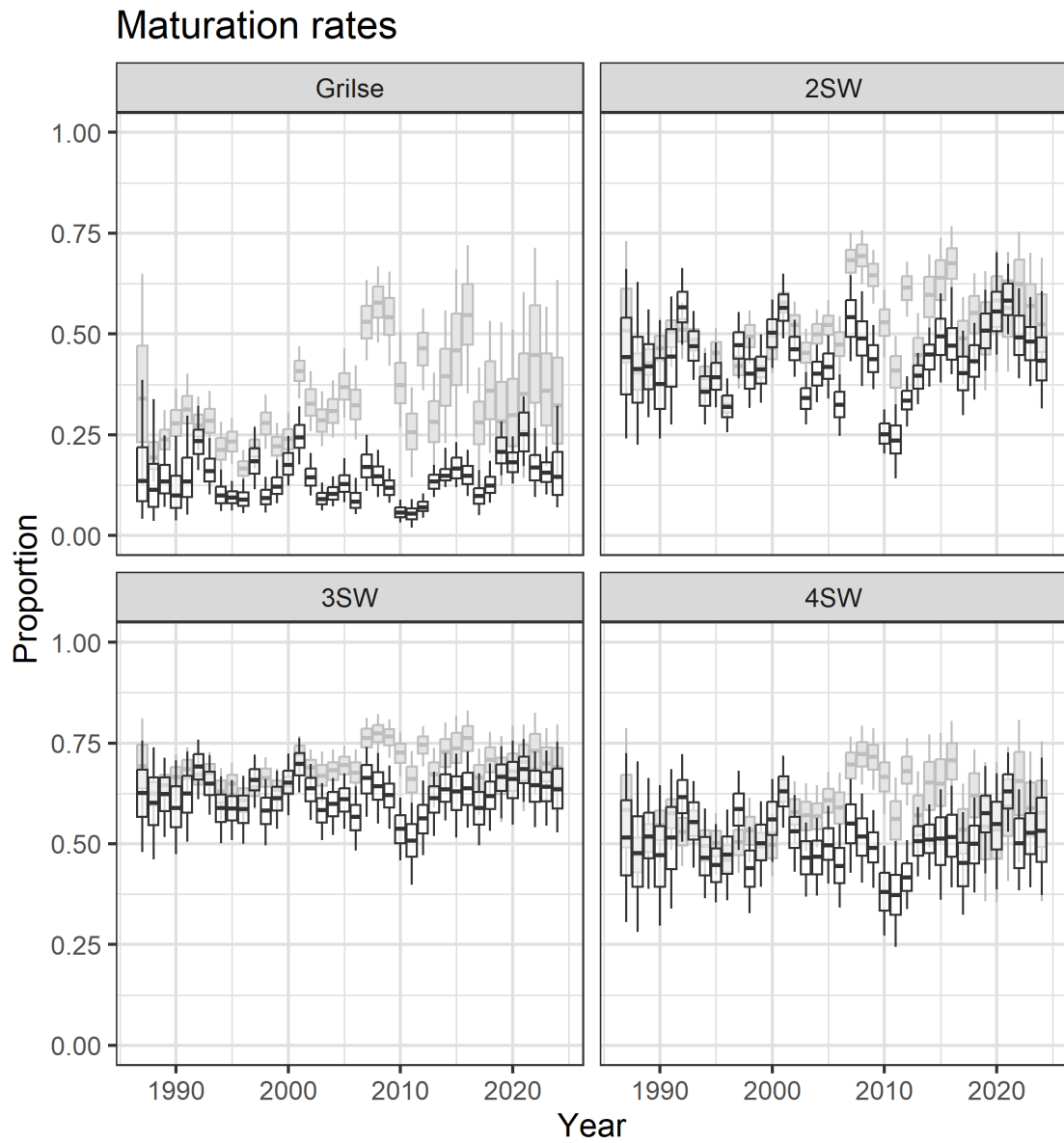


Figure 4.2.2.3. Probability that returning salmon find the fish ladder in River Ume/Vindel. For years in which mark-recapture experiments have not taken place, the prior distribution is the predictive distribution based on other years' mark-recapture studies.

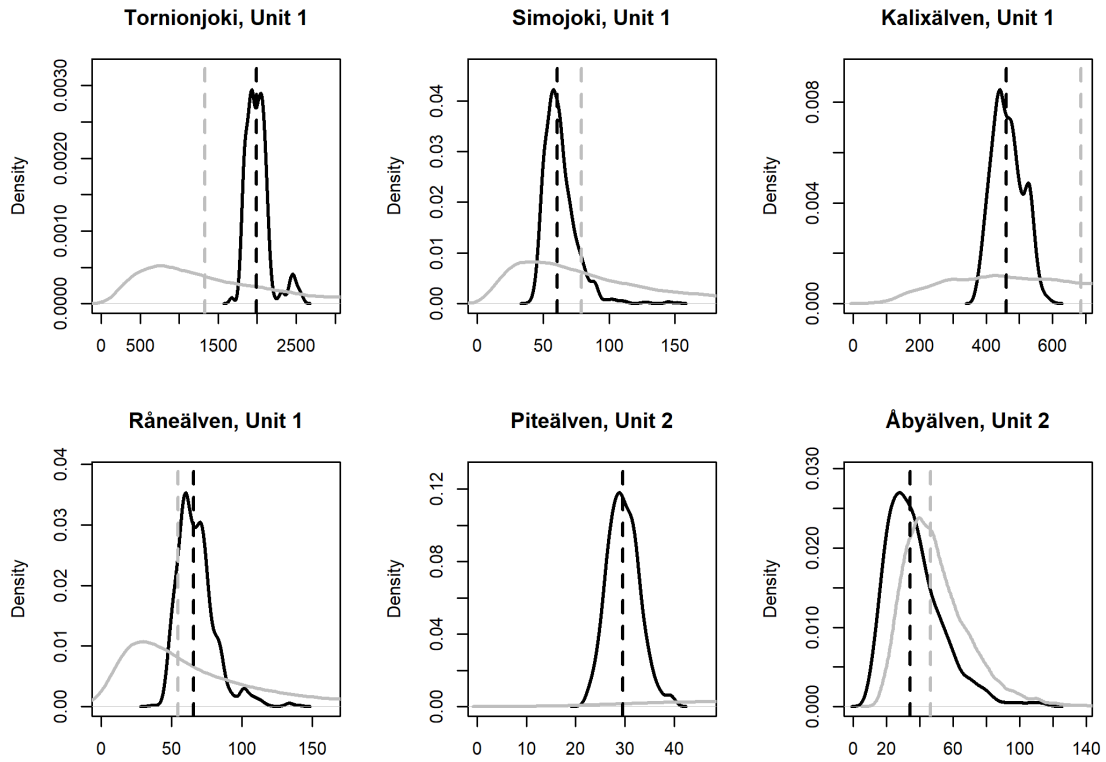


**Figure 4.2.3.1. Post-smolt survival for wild (black) and hatchery-reared salmon (grey). Boxplots show medians with 5%, 25%, 75%, and 95% quantiles. Note that the estimate for the penultimate smolt cohort (2023) is based only on abundance for 1SW salmon (grilse) returning in 2024, whereas the estimate for the final smolt cohort (2024) represents a model prediction based on the average for the four preceding years' estimates.**

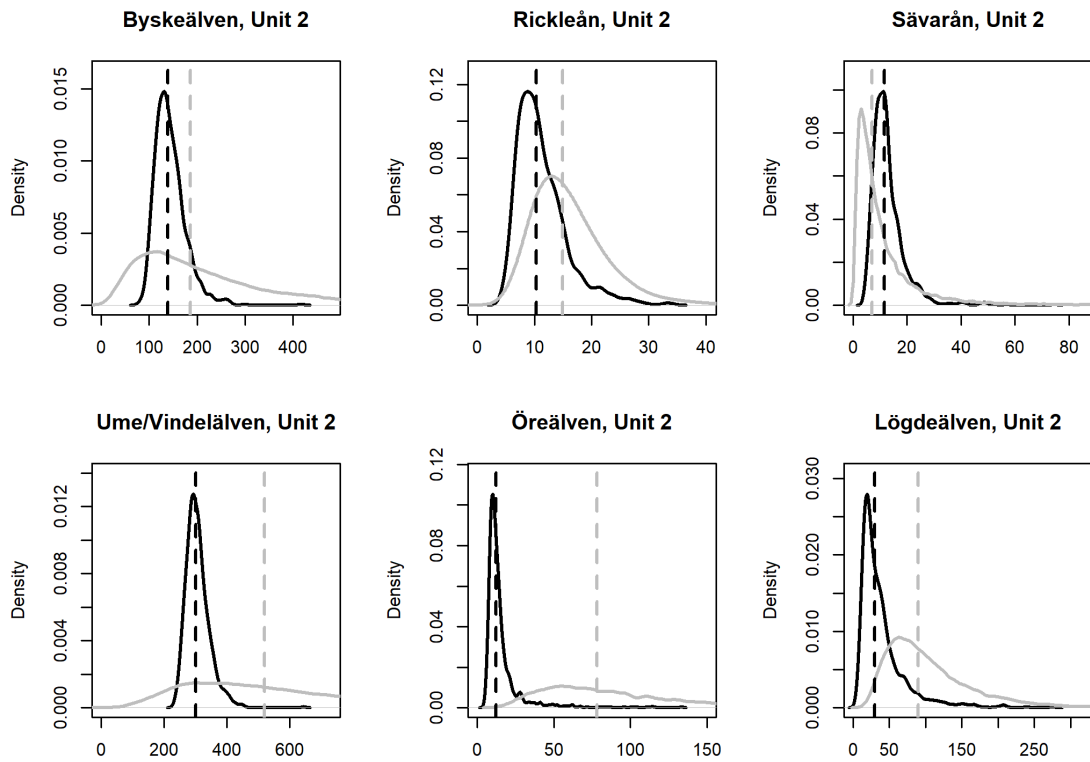


**Figure 4.2.3.2. Proportion maturing per age group and per year for wild (black) and reared salmon (grey). Box-plots show medians with 5%, 25%, 75%, and 95% quantiles.**

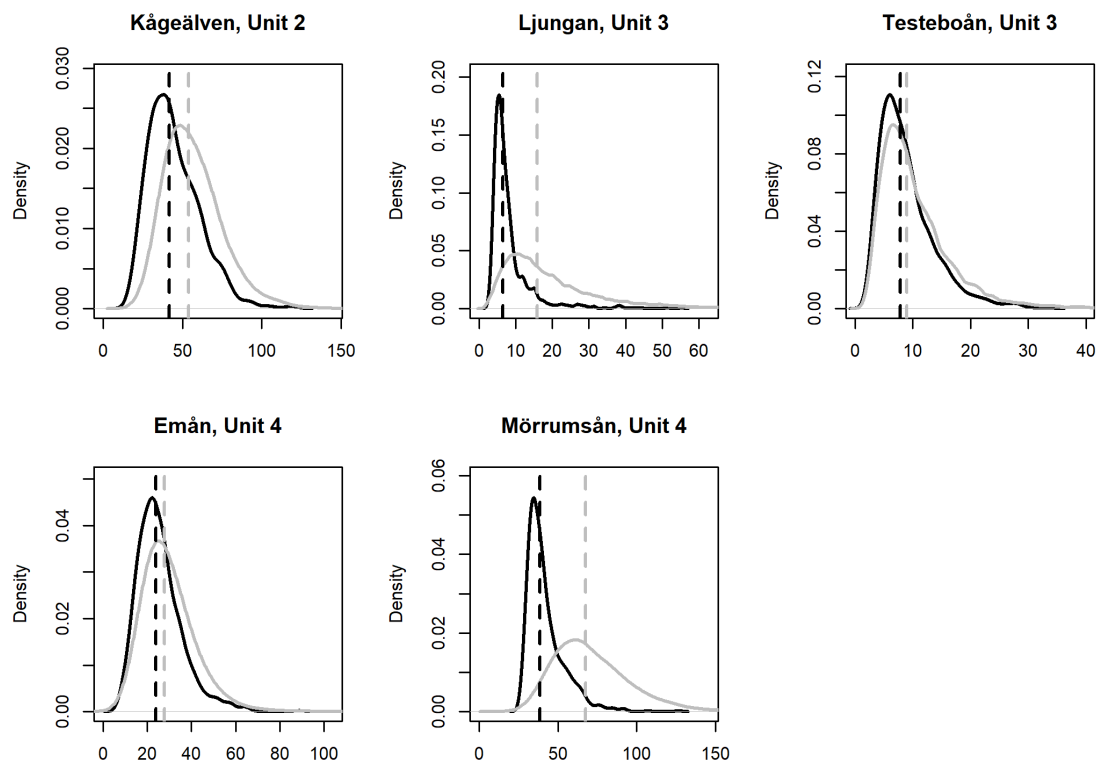
(A)



(B)

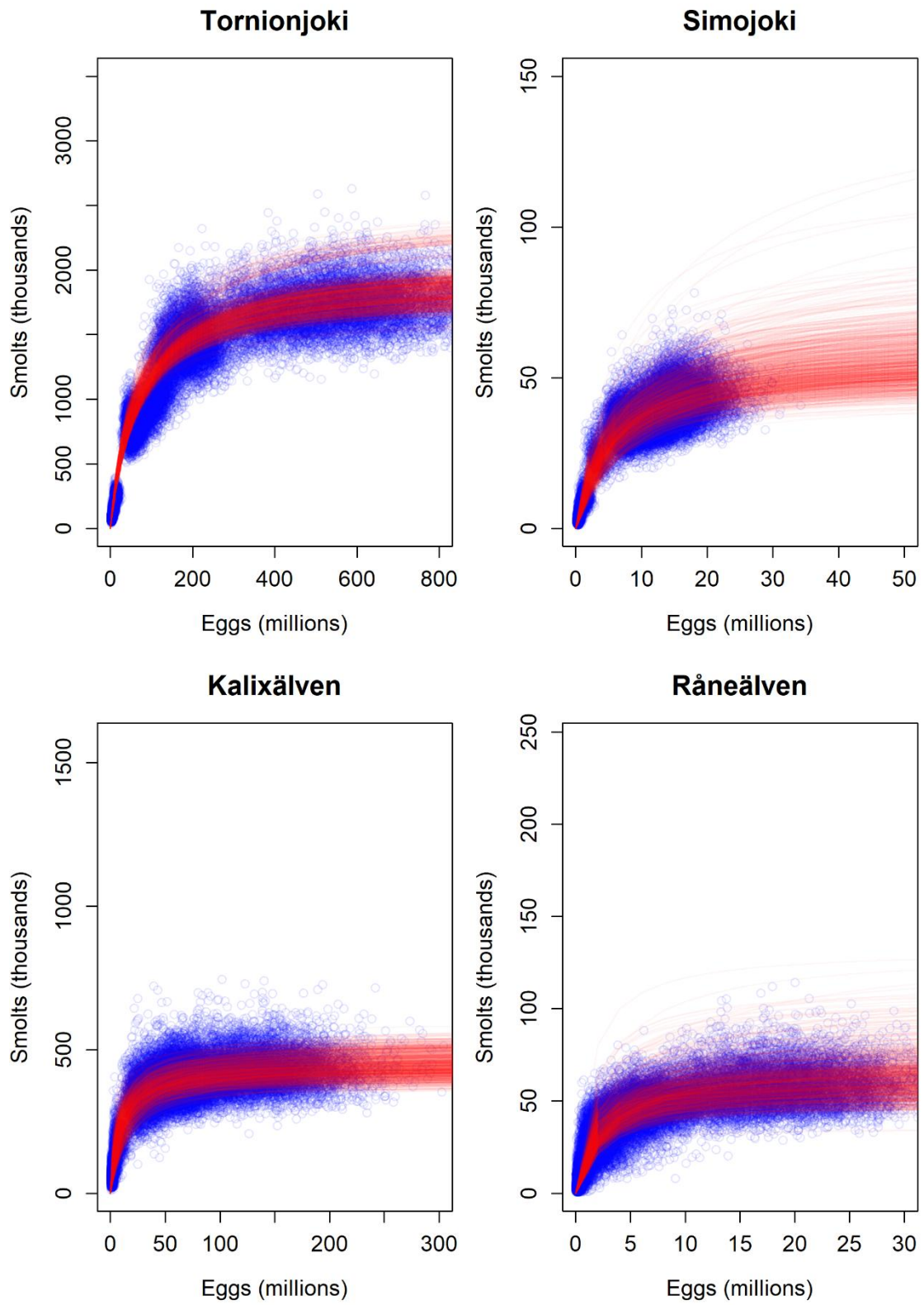


(C)

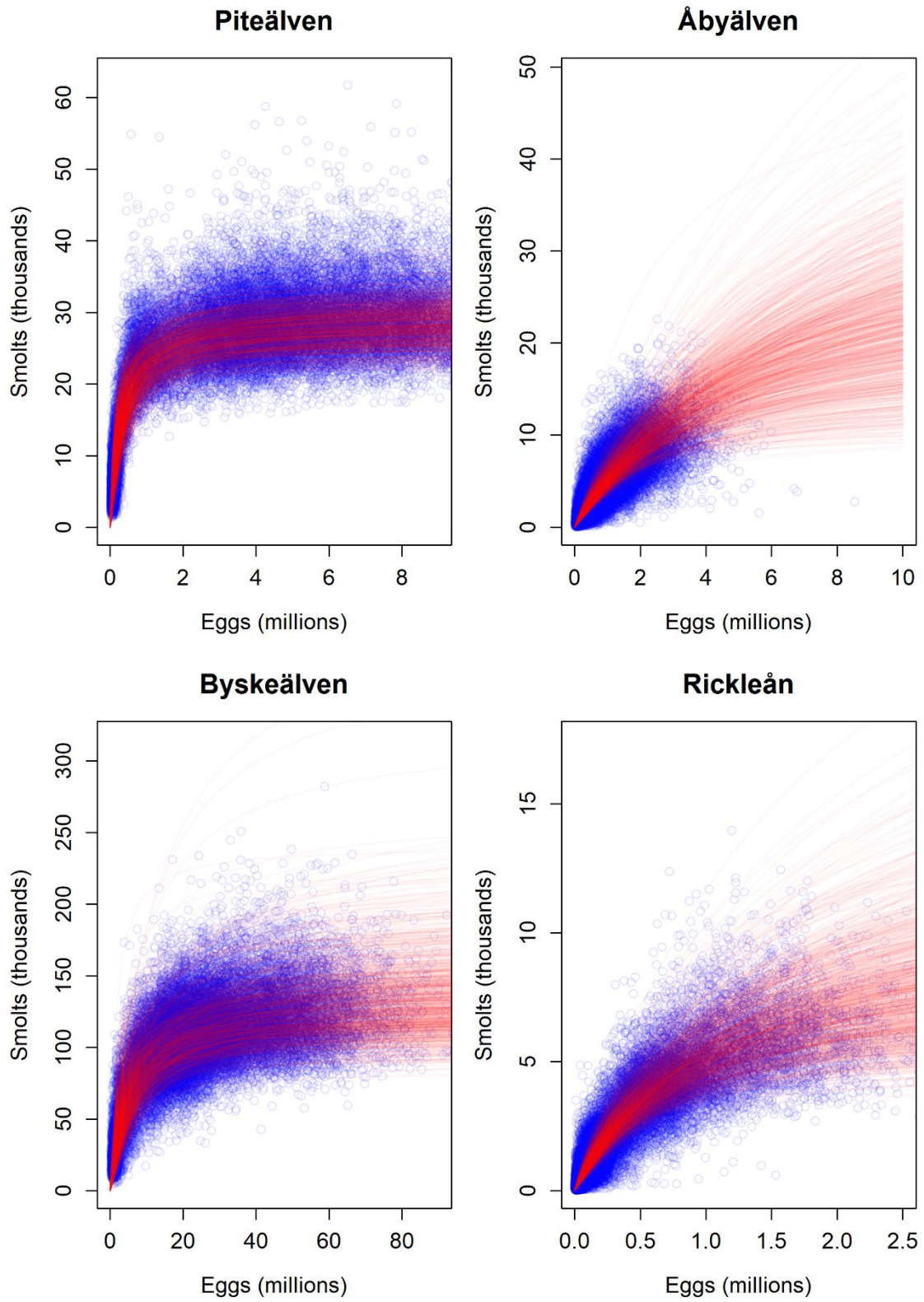


Figures 4.2.3.3a-c. Prior (grey line) and posterior (black line) distributions for K (maximum recruitment). Dashed vertical lines indicate prior medians (grey) and posterior medians (black).

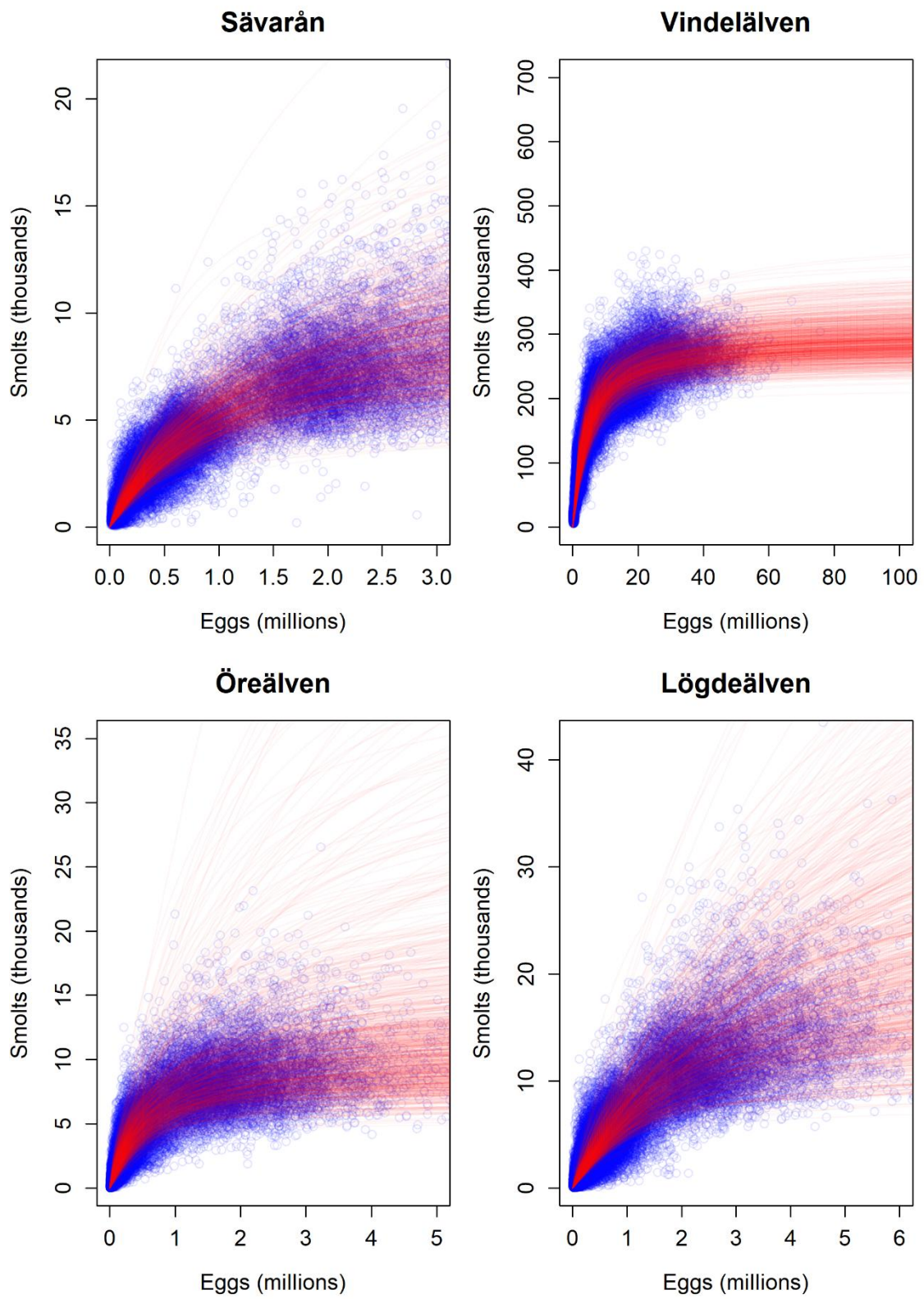
(A)



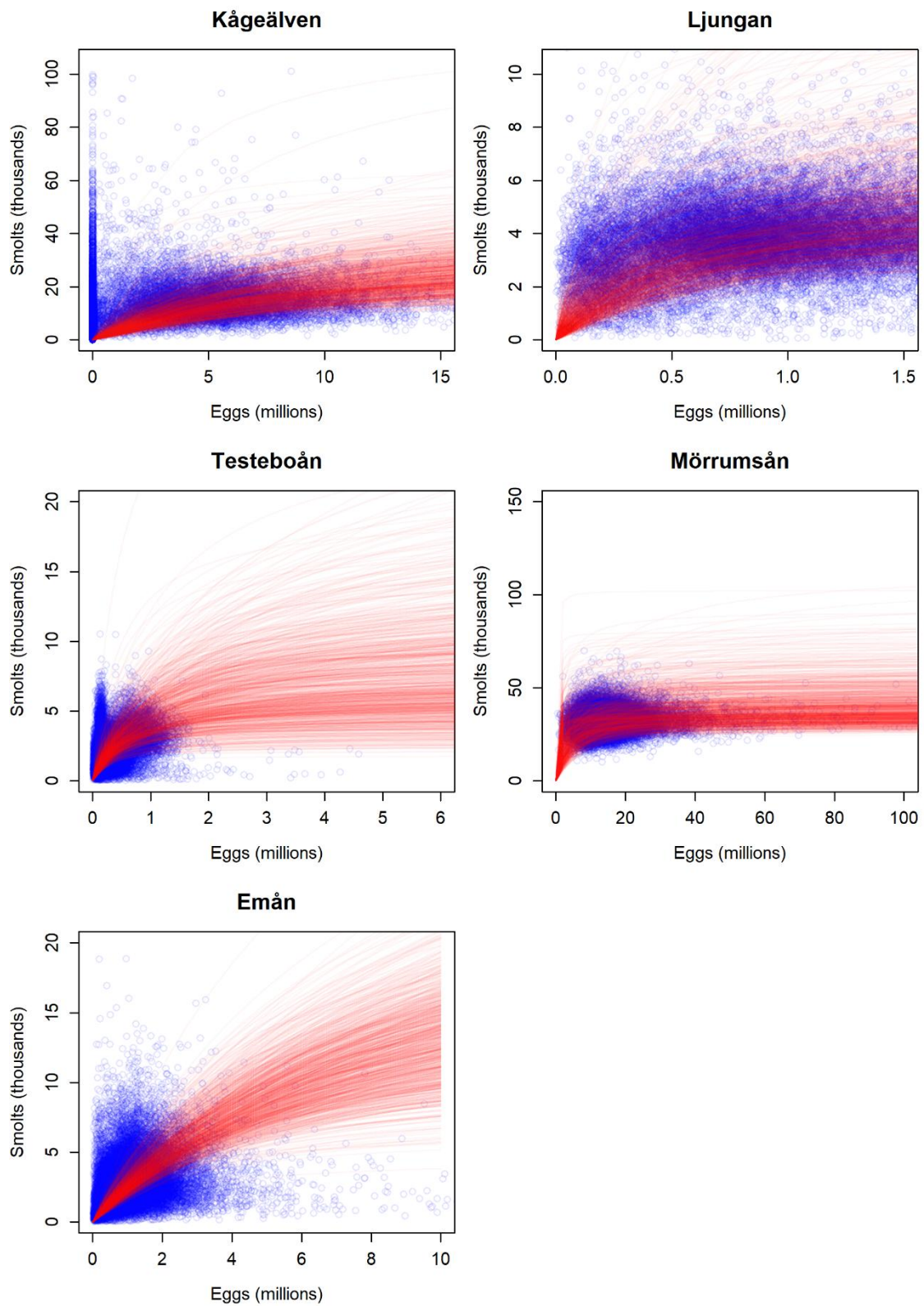
(B)



(C)

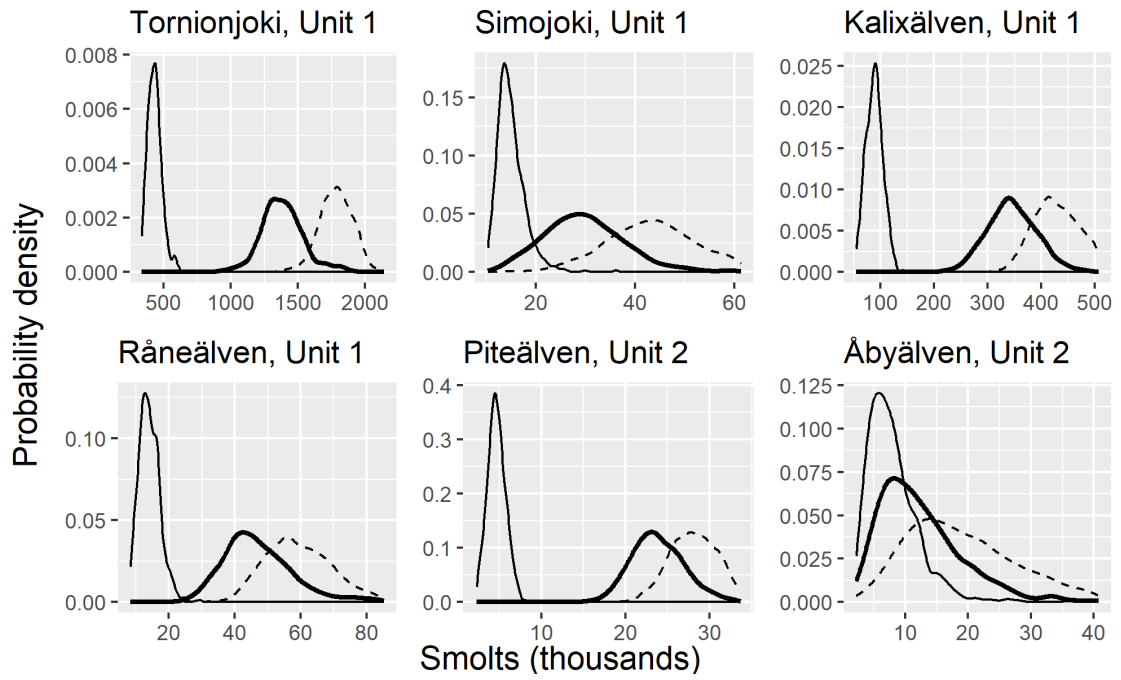


(D)

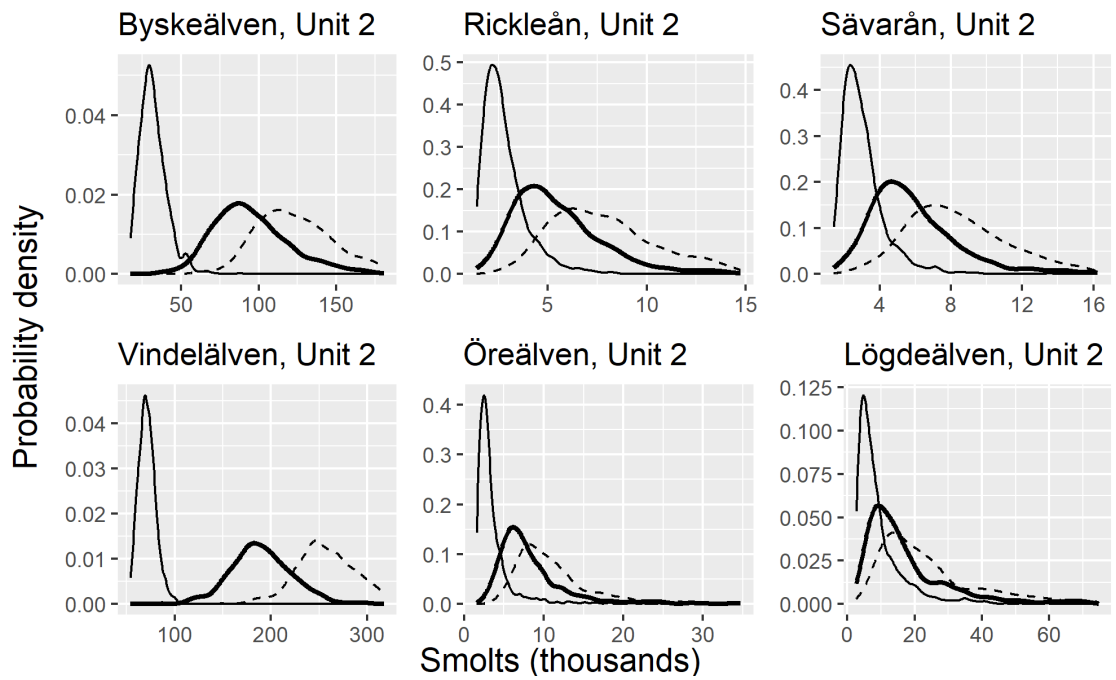


Figures 4.2.3.4a-d. Distributions for egg abundance (millions), plotted against the smolt abundance (thousands) for stocks of AUs 1-4. Blue dots present the posterior distributions of annual smolt and egg abundances, red curves indicate the distributions of stock-recruit relationship.

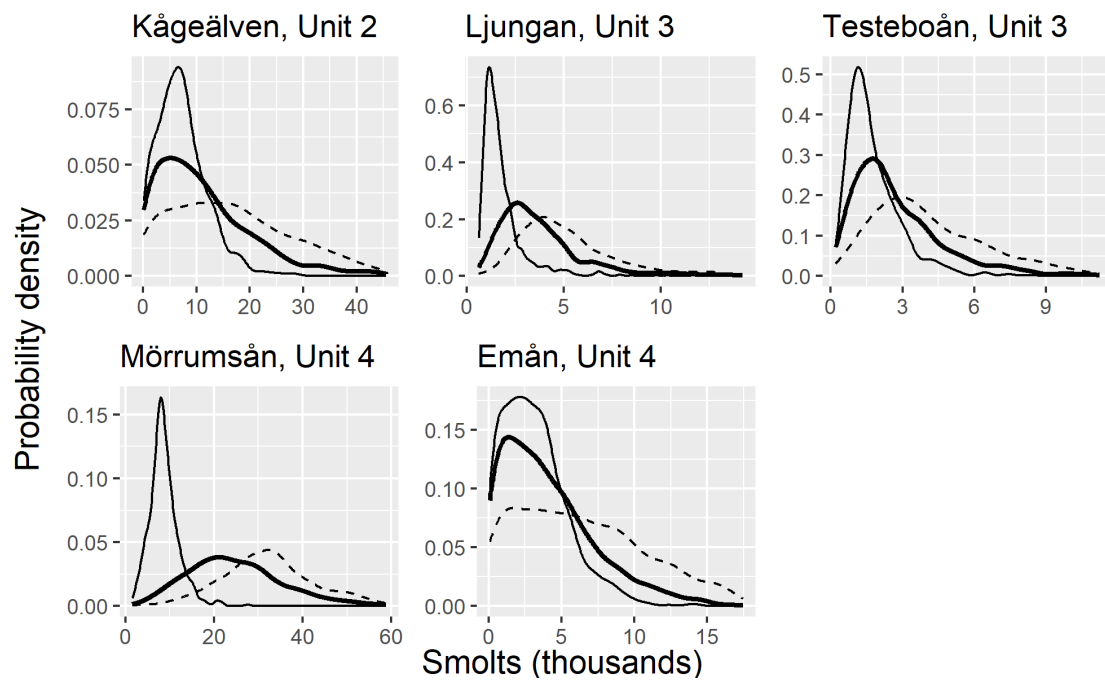
(A)



(B)



(C)



Figures 4.2.3.5a-c. Probability distributions for smolt production corresponding to maximum sustainable yield (MSY; thick black line), limit smolt production (recovery to the MSY level in one generation time; thin black line) and smolt production at the unfished demographic equilibrium ( $R_0$ ; dashed black line).

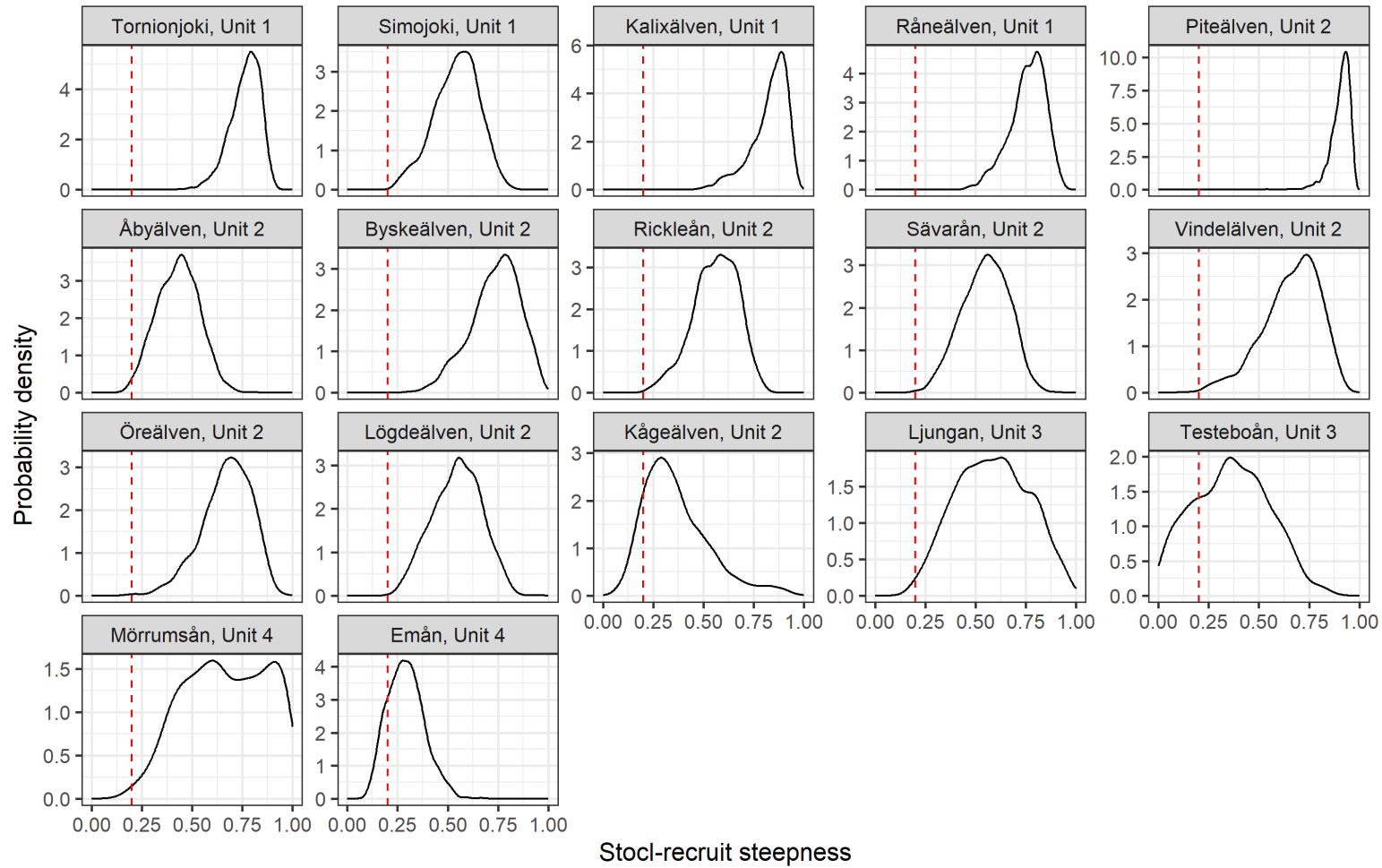


Figure 4.2.3.6. Stock-specific posterior probability density functions for stock-recruit steepness. Dashed red vertical lines on each panel indicate steepness equal to 0.20.

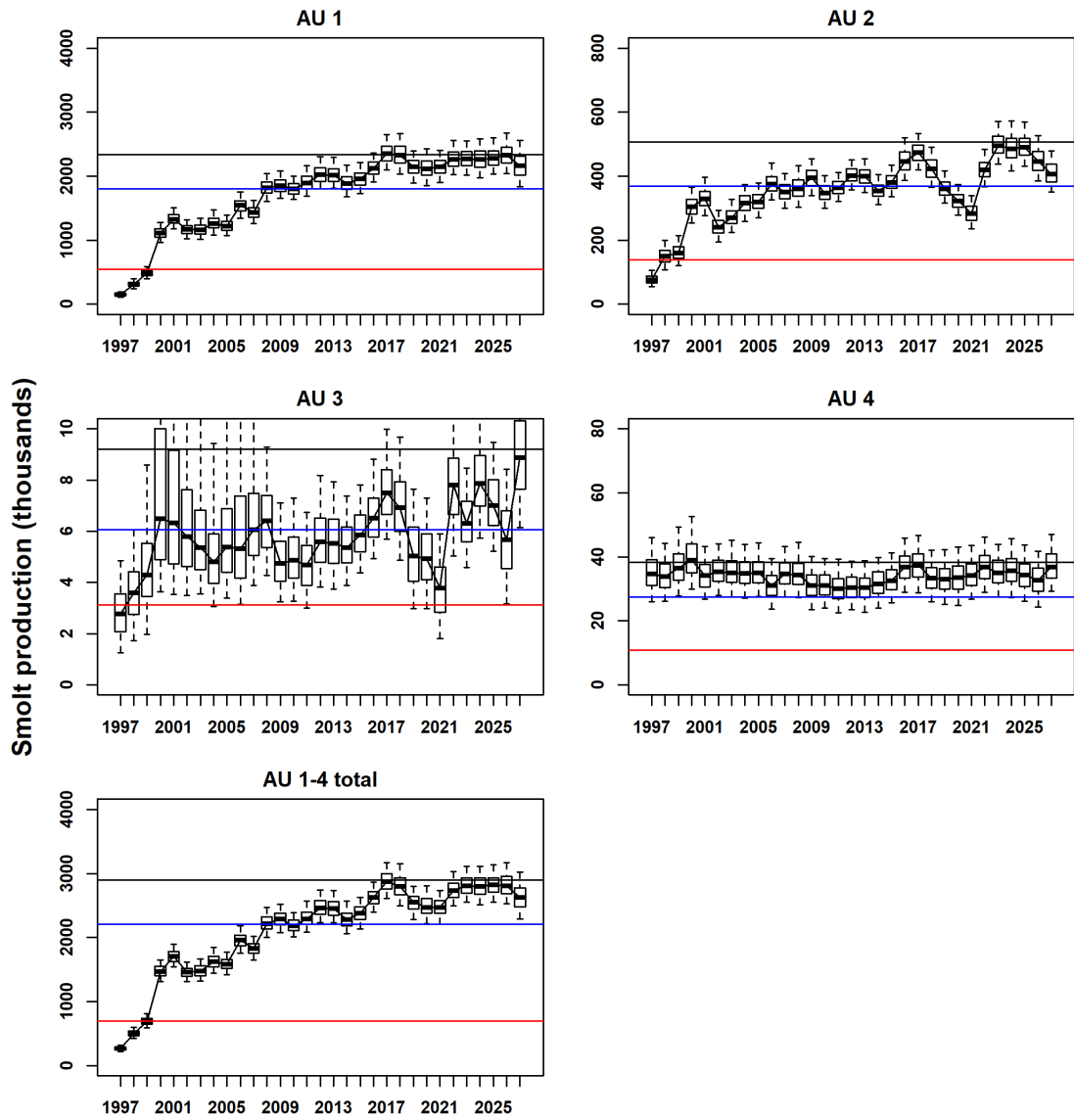
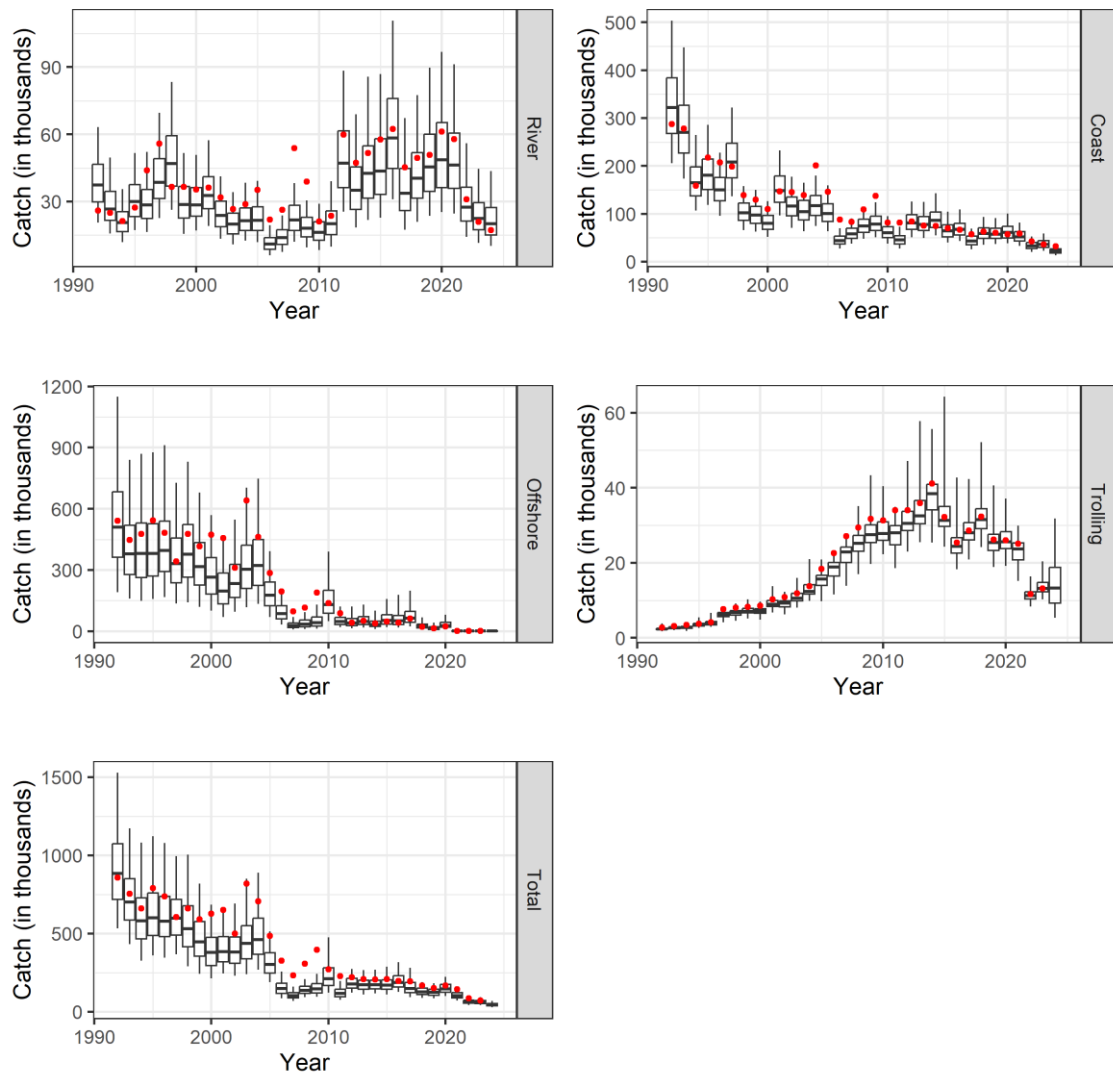
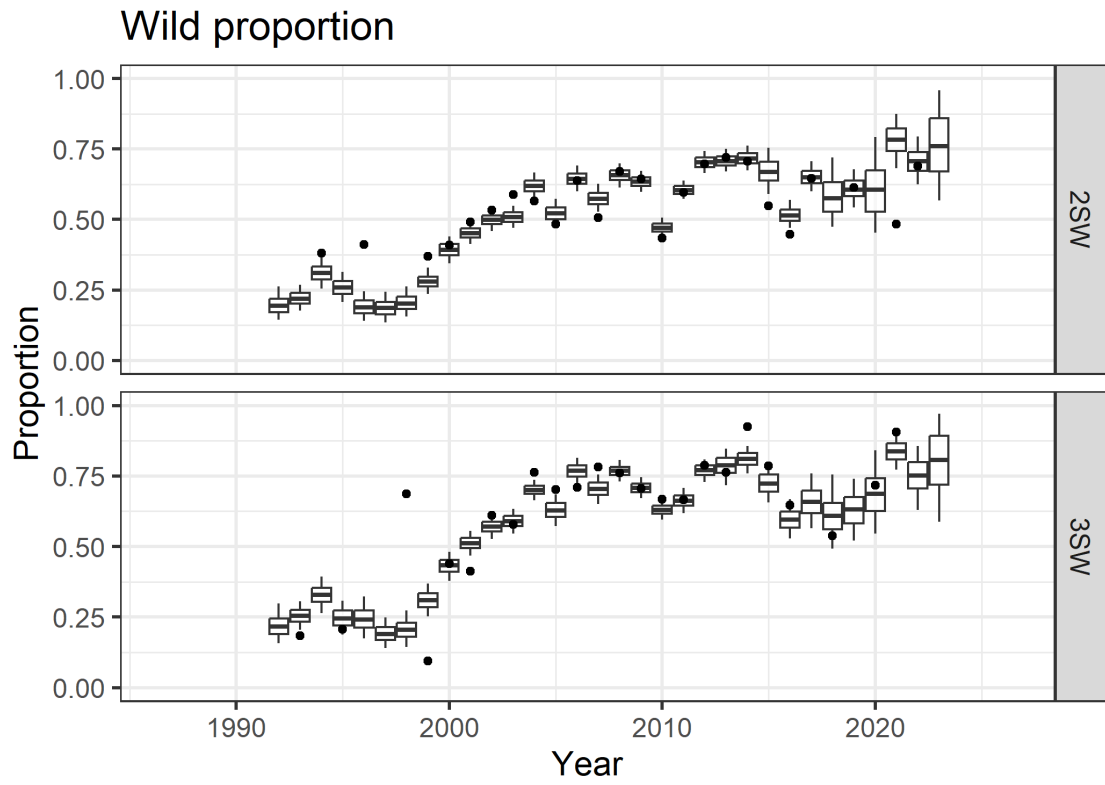


Figure 4.2.3.7. Posterior probability distributions for the total smolt production in AUs 1-4 and all units combined. Horizontal lines within each box show the median (solid line); whiskers denote the 90% PI for smolt production. Solid horizontal lines denote the posterior median for the unit-specific  $R_0$  (black line),  $R_{MSY}$  (blue line), and  $R_{lim}$  (red line).

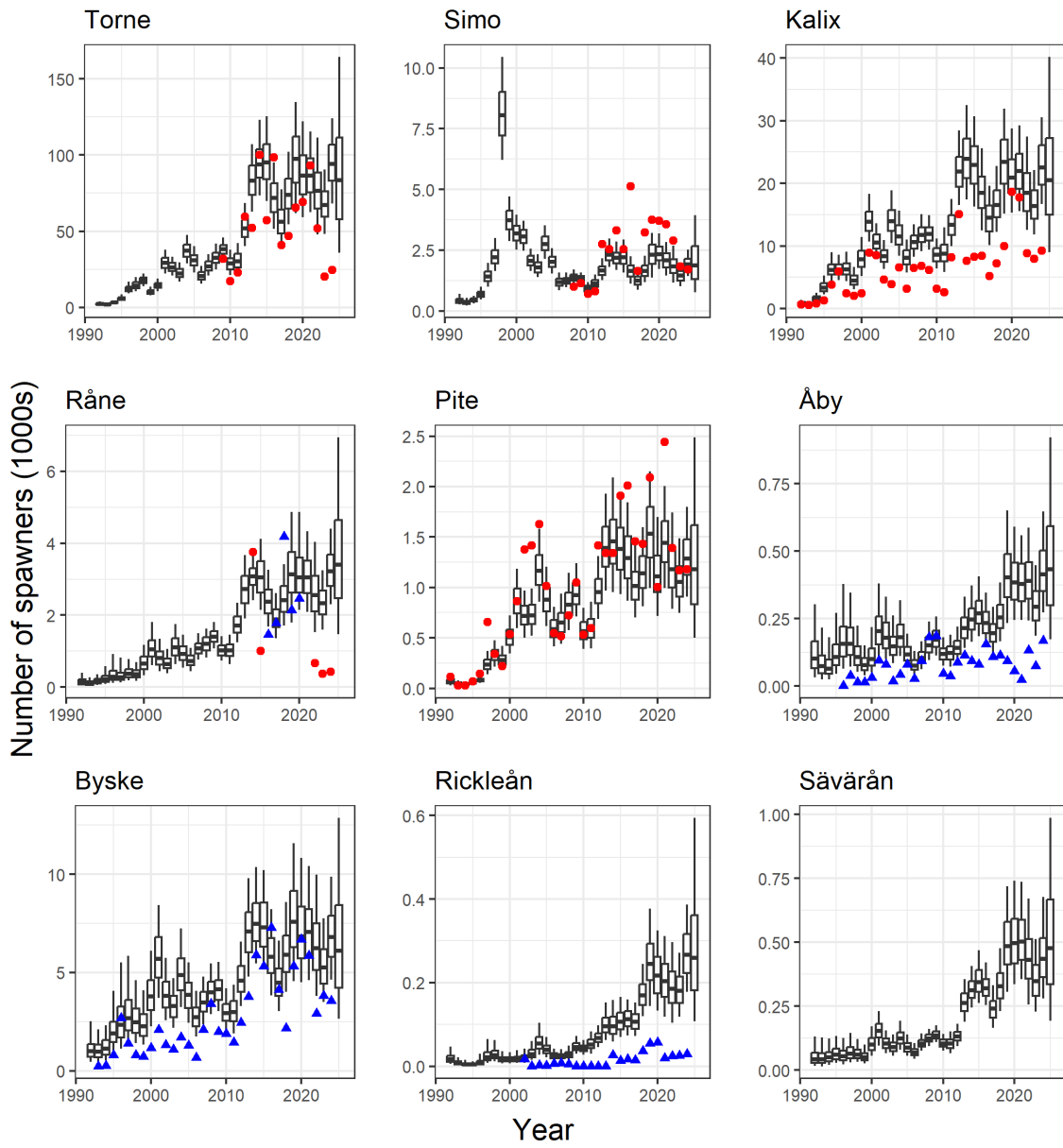


**Figure 4.2.3.8. Estimated posterior distributions of catches compared with corresponding observed catches (boxplots with medians, 5%, 25%, 75%, and 95% quantiles). Offshore catches cover both commercial fisheries and recreational trolling. Observed catches have been recalculated to account for unreporting.**

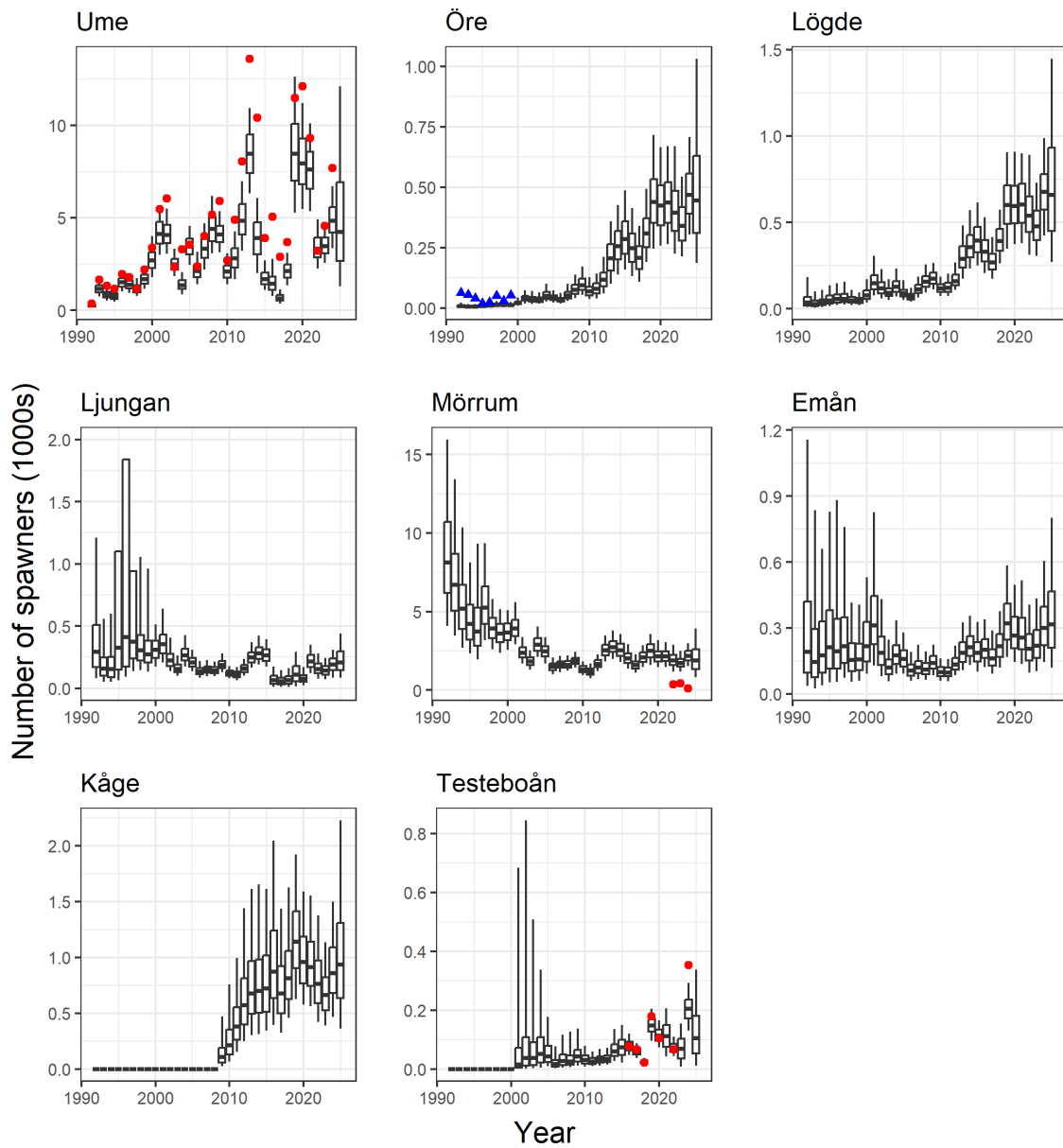


**Figure 4.2.3.9.** Estimated proportions of wild salmon in offshore catches compared with wild proportions observed in catch samples among 2SW and 3SW salmon. Boxplots show medians with 5%, 25%, 75%, and 95% quantiles.

(A)



(B)



Figures 4.2.3.10a-b. Estimated posterior distributions of the number of spawners (in thousands) in each river vs. numbers observed in fish counters. Observations indicated with dots are used as an input in the full life-history model, whereas the ones indicated with triangles are so far not used as an input. Boxplots show medians with 5%, 25%, 75%, and 95% quantiles.

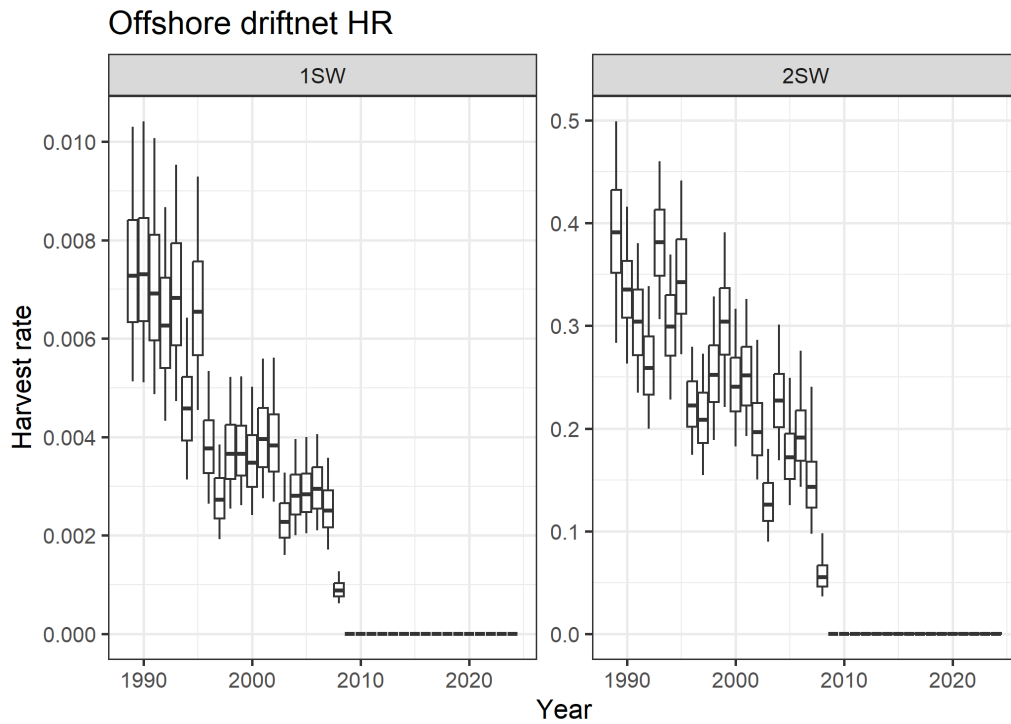


Figure 4.2.3.11a. Estimated posterior distributions of harvest rates (harvested proportion of the available population) in offshore driftnet fishery for 1SW and 2SW salmon. Note that the driftnet harvest rate in 2008 is not zero, since due to computational reasons it contains fishing effort from the second half of 2007. Boxplots show medians with 5%, 25%, 75%, and 95% quantiles.

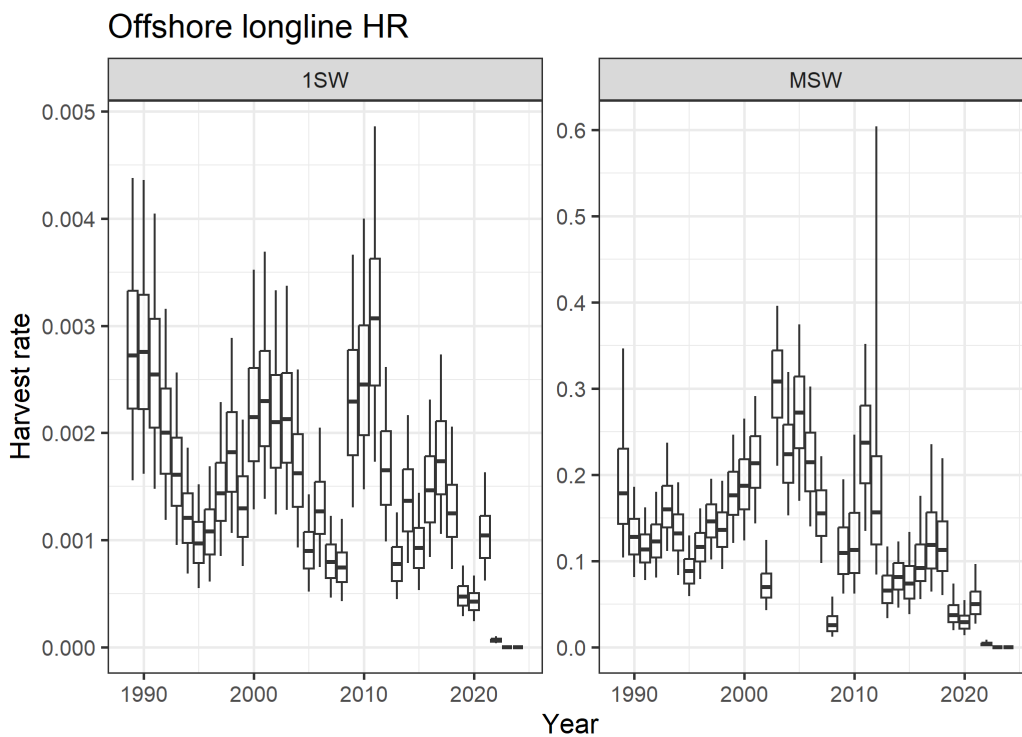


Figure 4.2.3.11b. Estimated posterior distributions of harvest rates (harvested proportion of the available population) in offshore longline fishery for 1SW and MSW salmon. Boxplots show medians with 5%, 25%, 75% and 95% quantiles.

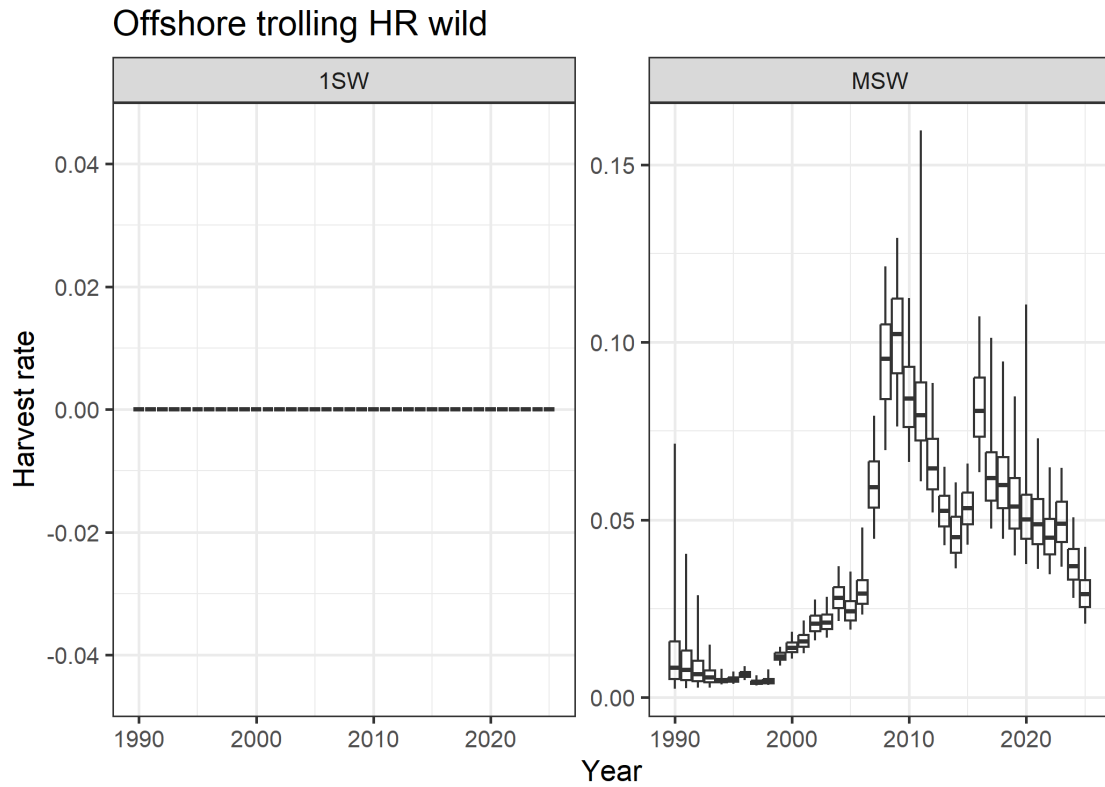
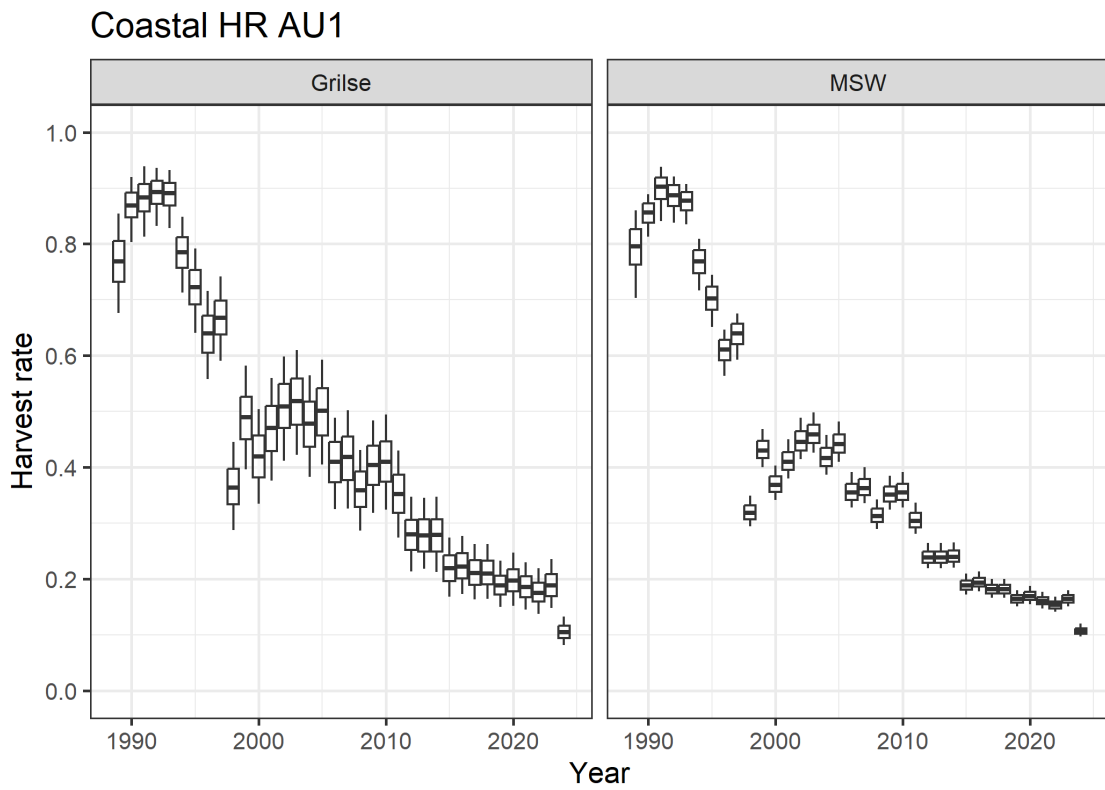
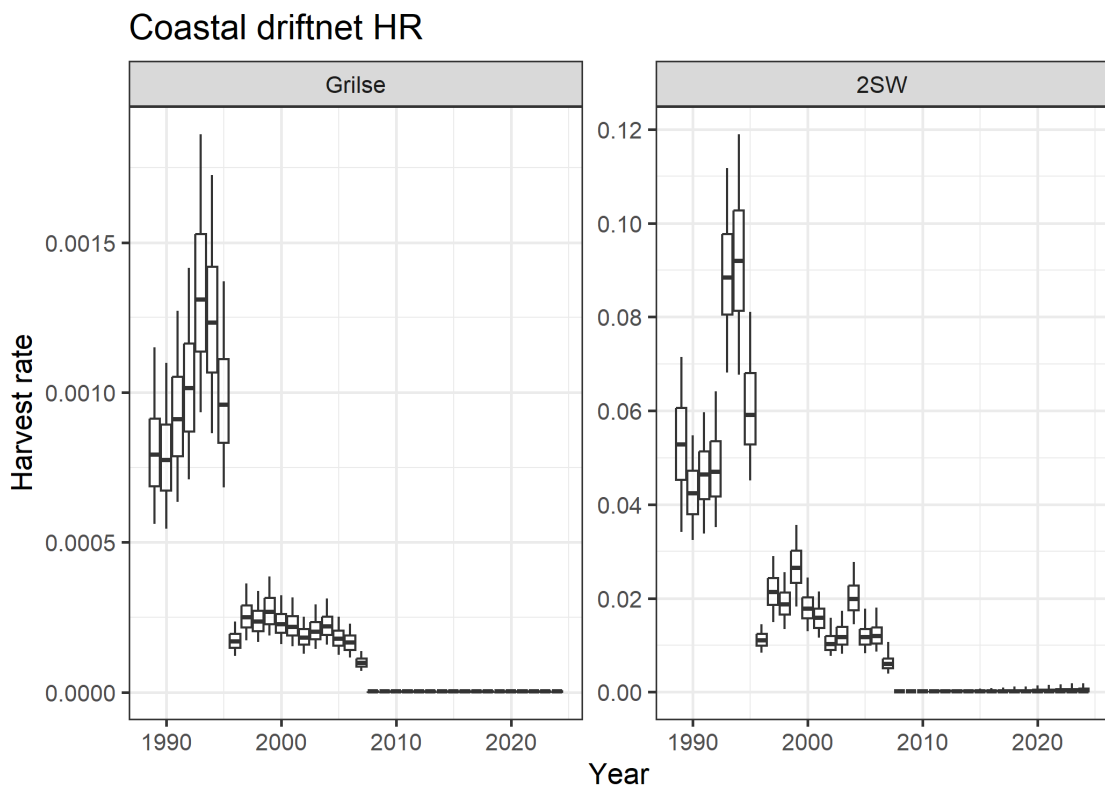


Figure 4.2.3.11c. Estimated posterior distributions of harvest rates (harvested proportion of the available population) in offshore recreational trolling fishery separately for 1SW and MSW salmon. Boxplots show medians with 5%, 25%, 75%, and 95% quantiles.

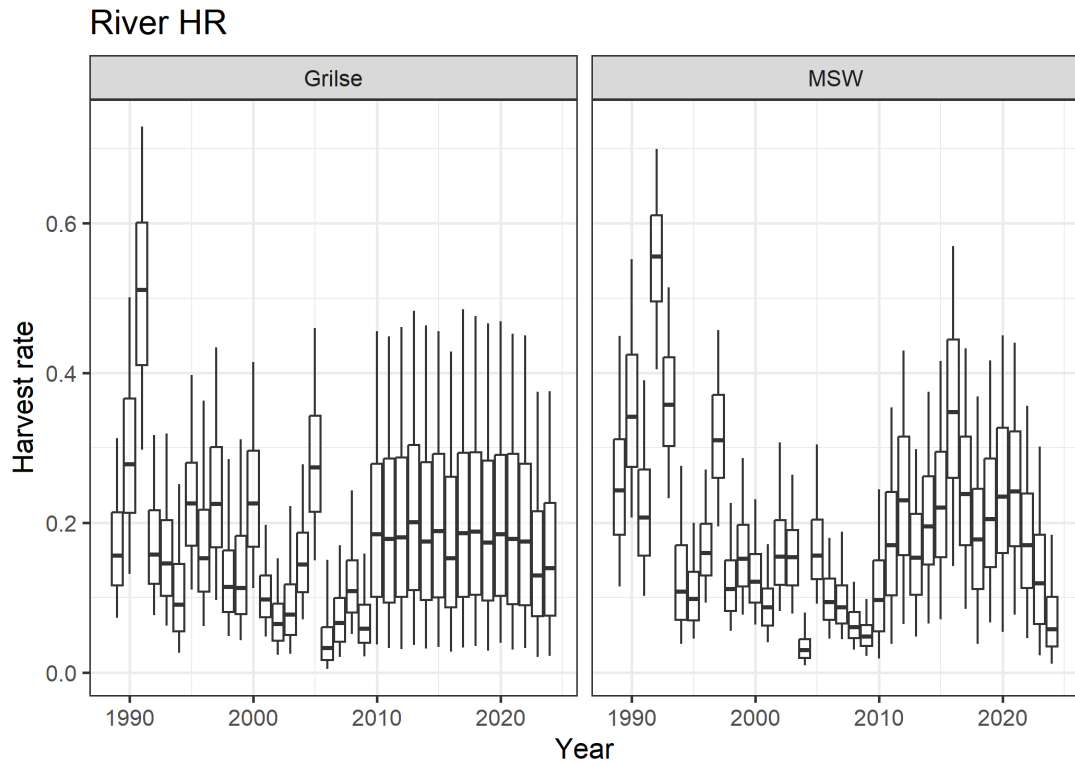
(D1)



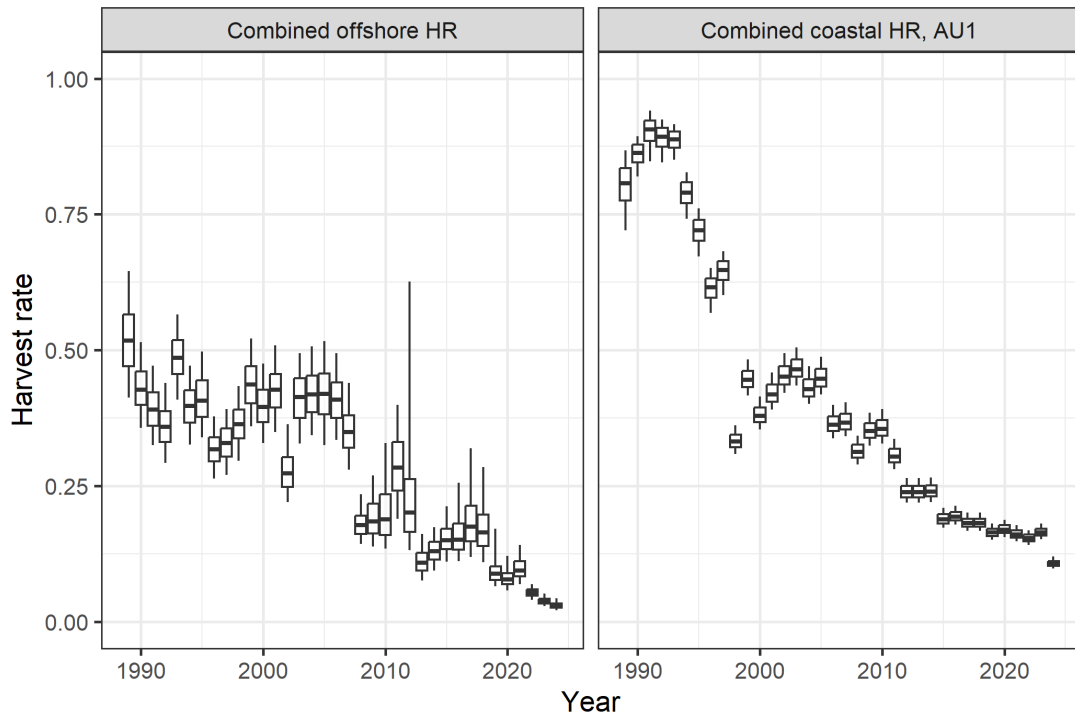
(D2)



Figures 4.2.3.11d1-2. Estimated posterior distributions of harvest rates (harvested proportion of the available population) for 1SW and MSW salmon in coastal fisheries (other than driftnetting) in AU 1 and in coastal driftnetting (all AUs together) separately. Boxplots show medians with 5%, 25%, 75%, and 95% quantiles.



**Figure 4.2.3.11e.** Estimated posterior distributions of harvest rates (harvested proportion of the available population) in the river fishery separately for 1SW and MSW salmon. Boxplots show medians with 5%, 25%, 75%, and 95% quantiles.



**Figure 4.2.3.12.** Combined harvest rates (harvested proportion of the available population) for offshore and coastal fisheries for MSW wild salmon in 1989-2024. Boxplots show medians with 5%, 25%, 75%, and 95% quantiles.

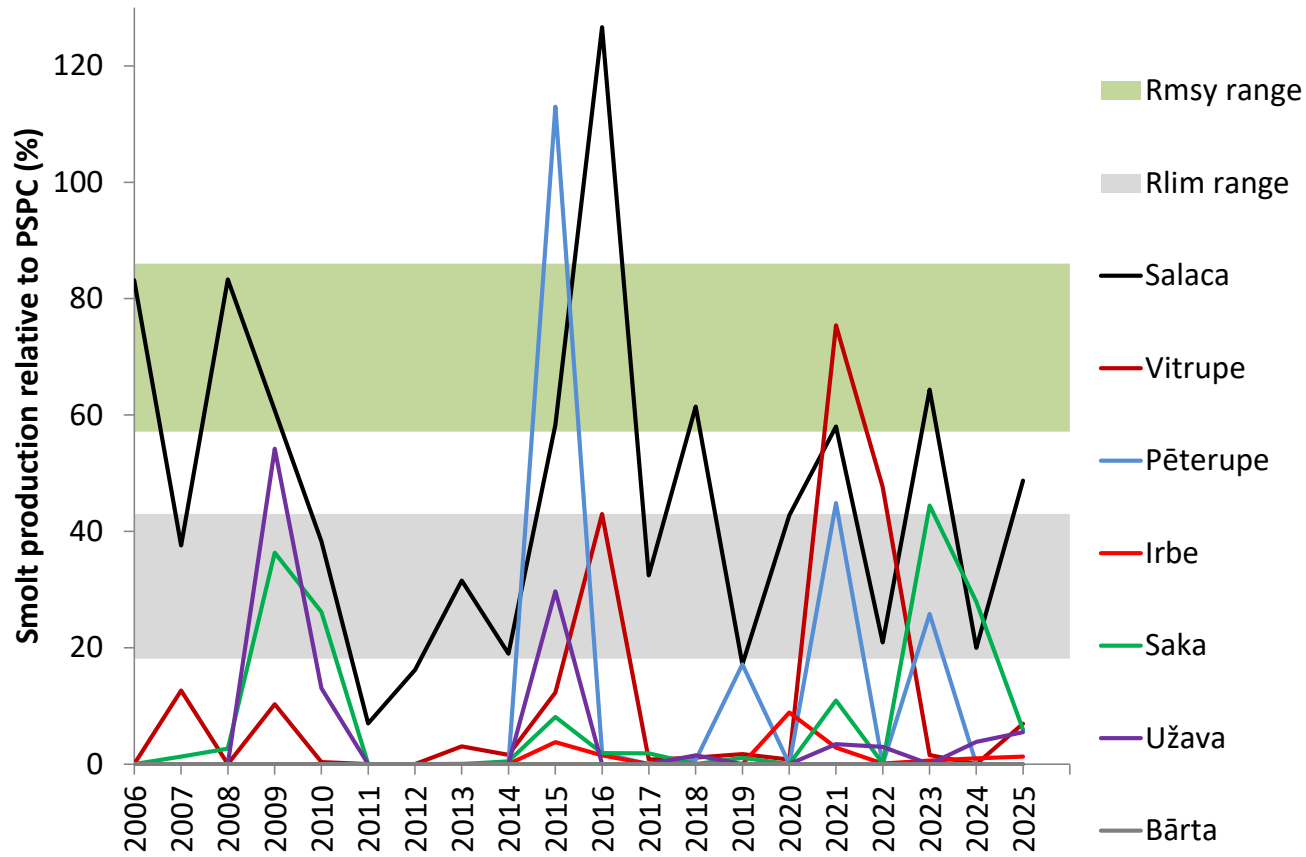


Figure 4.2.4.1. Atlantic salmon in AU 5, ICES Subdivision 28 (Main Basin). Wild smolt production in Subdivision 28, shown in proportion of the estimated PSPC in seven wild Latvian salmon rivers. The results are based on smolt counting in River Salaca and monitored parr densities and expert judgement for the rest of the rivers. The ranges of  $R_{lim}$  (grey) and  $R_{MSY}$  (green) are based on the assessment results of the AU 1-4 rivers.

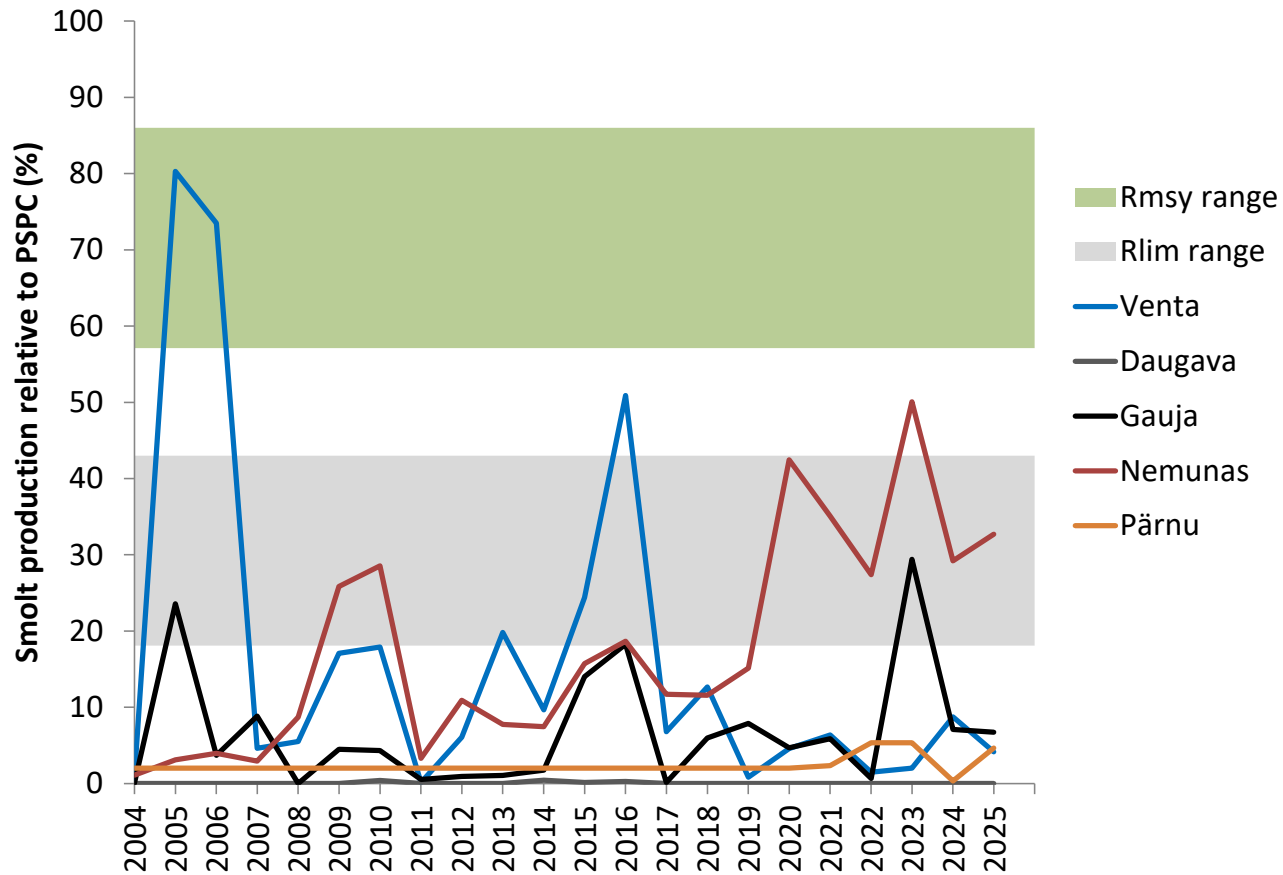
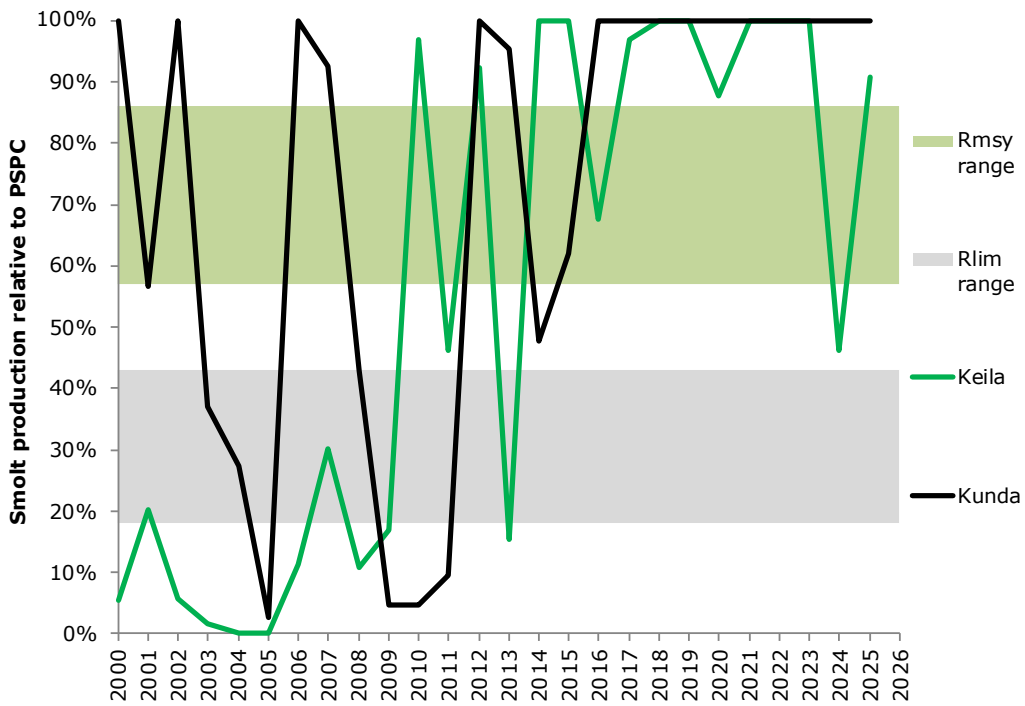
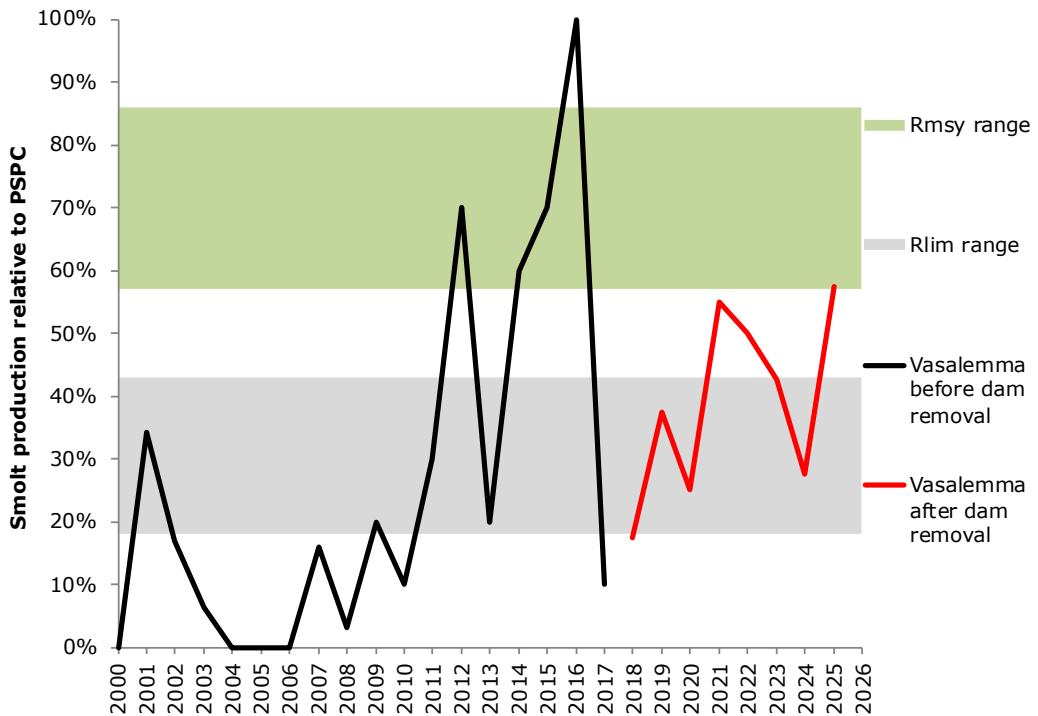


Figure 4.2.4.2. Atlantic salmon in AU 5, ICES subdivisions 26-28 (Main Basin). Wild smolt production in subdivisions 26 and 28, shown in proportion of the estimated PSPC in five mixed Latvian (Daugava, Gauja, and Venta), Lithuanian (Nemunas), and Estonian (Pärnu) salmon rivers. The results are based on monitored parr densities and expert judgement. The ranges of  $R_{lim}$  (green) are based on the assessment results of the AU 1-4 rivers.

(A)

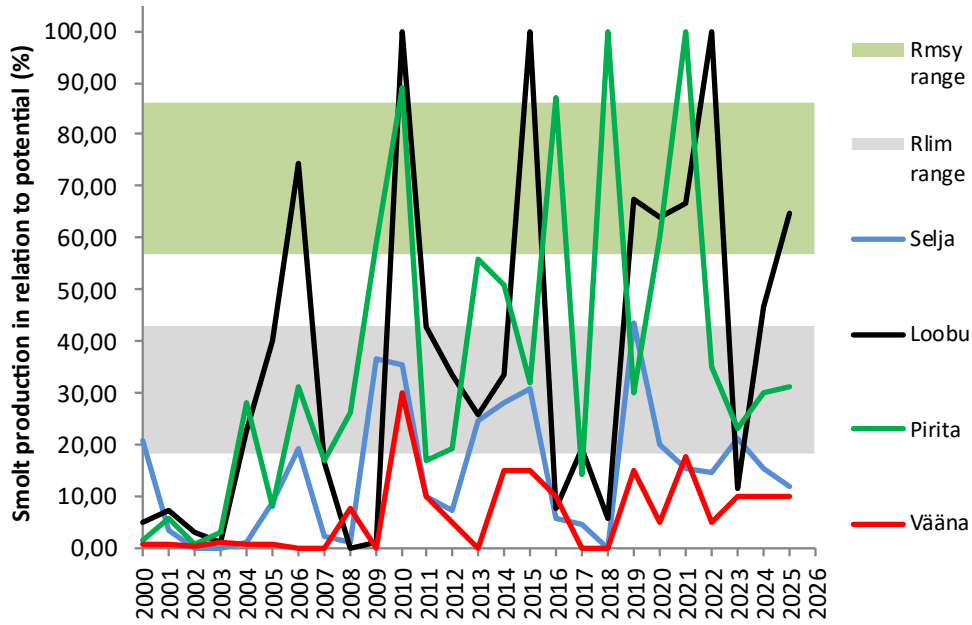


(B)

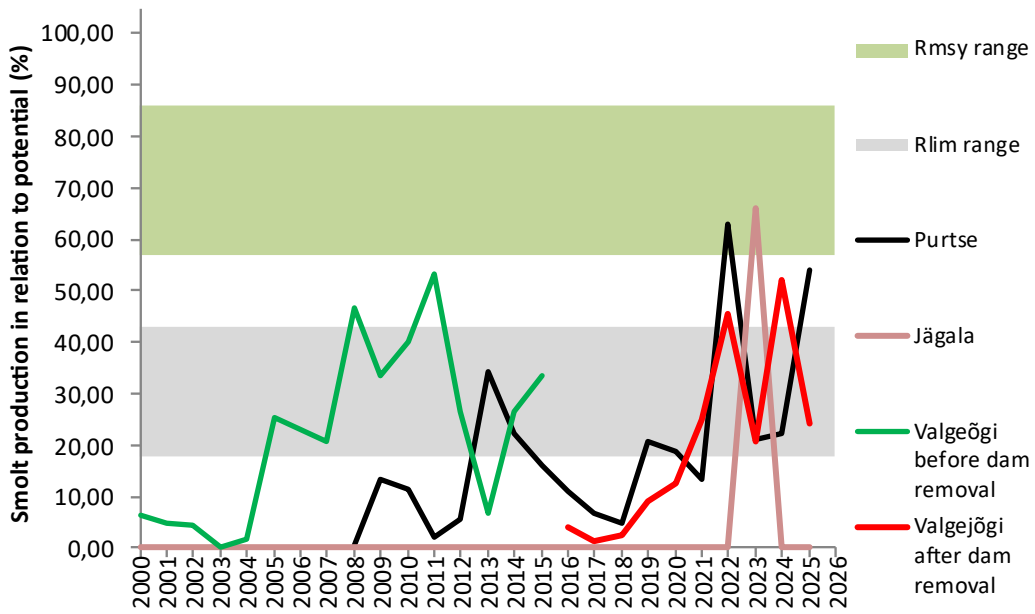


Figures 4.2.4.3a-b. Smolt production level in relation to the potential smolt production in AU 6 wild salmon populations. Note that the PSPC is calculated only based on the accessible rearing habitat (areas above migration obstacles are excluded). In 2018, a dam was removed in River Vasalemma and the estimated PSPC increased considerably. Therefore, the actual smolt production in relation to PSPC in this river is assessed as rather low, despite an increase in actual smolt production since 2018. The ranges of R<sub>lim</sub> (grey) and R<sub>MSY</sub> (green) are based on assessment results for the AU 1-4 rivers.

(A)



(B)



Figures 4.2.4.4a-b. Smolt production level in relation to the potential in Estonian AU 6 mixed salmon populations. Note that the potential is calculated only up to the lowermost impassable migration obstacle. The ranges of R<sub>lim</sub> (grey) and R<sub>MSY</sub> (green) are based on assessment results for the AU 1-4 rivers.

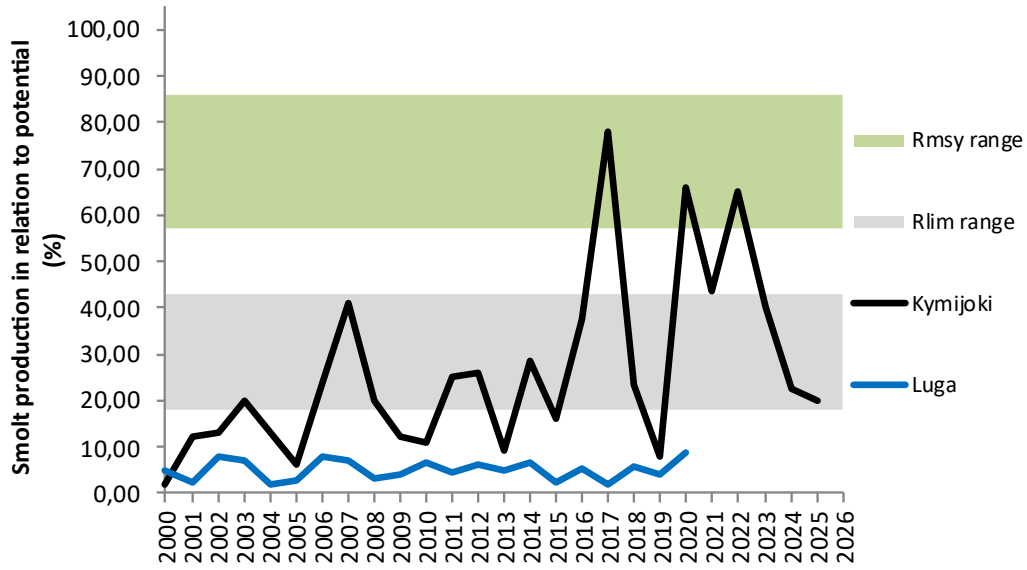


Figure 4.2.4.5. Wild smolt production level compared to potential in mixed rivers Kymijoki (Finland) and Luga (Russia). The ranges of R<sub>lim</sub> (grey) and R<sub>MSY</sub> (green) are based on assessment results for the AU 1-4 rivers.

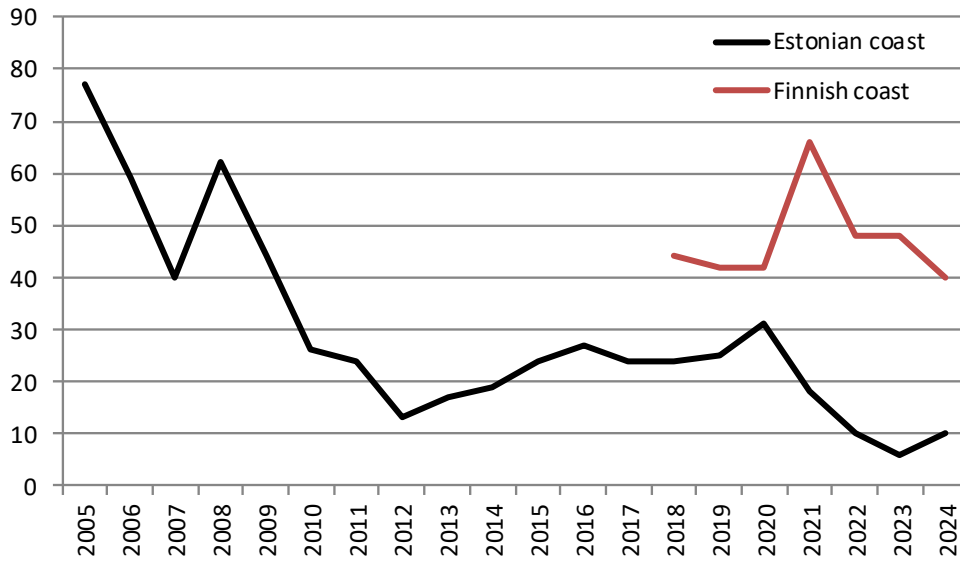


Figure 4.2.4.6. Share (%) of adipose finclipped salmon caught on the Estonian coast (black) and Finnish coast (red) of the Gulf of Finland.

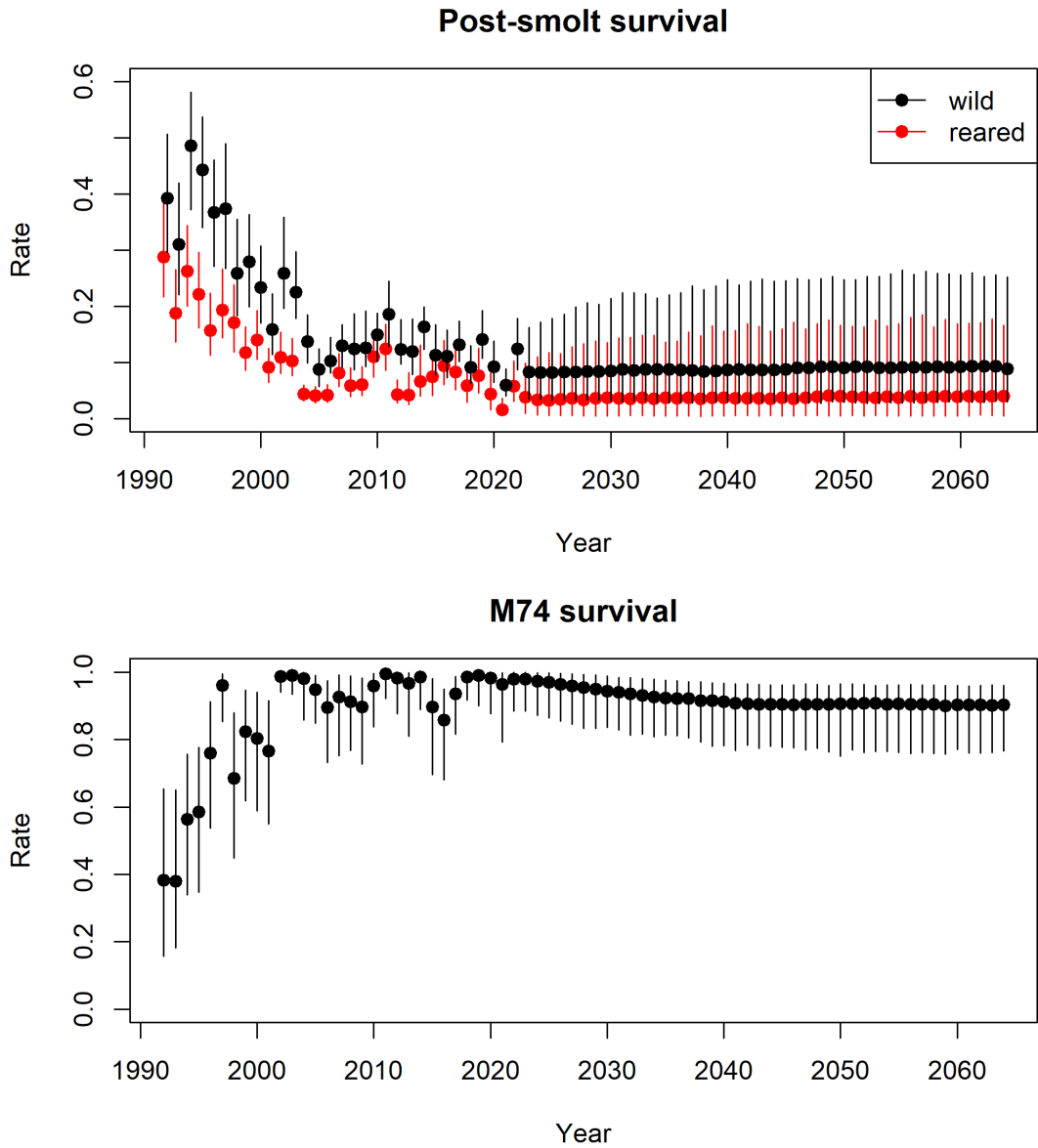


Figure 4.3.2.1. Median values and 90% probability intervals for post-smolt survival of wild and reared salmon and M74 survival assumed in all scenarios.

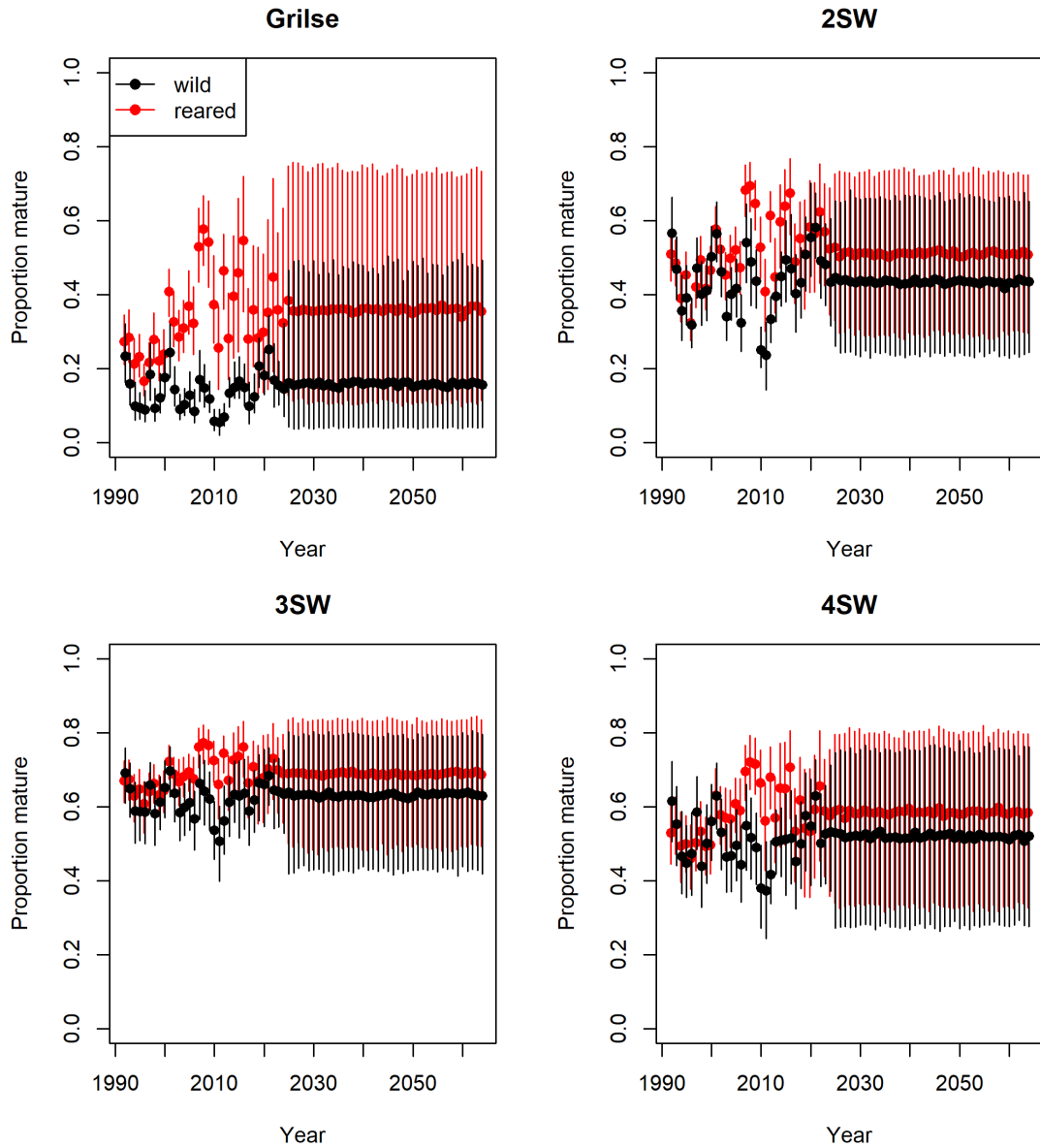


Figure 4.3.2.2. Median values and 90% probability intervals for annual proportions maturing per age group for wild and reared salmon (same in all scenarios).

### Pre-fishery abundance

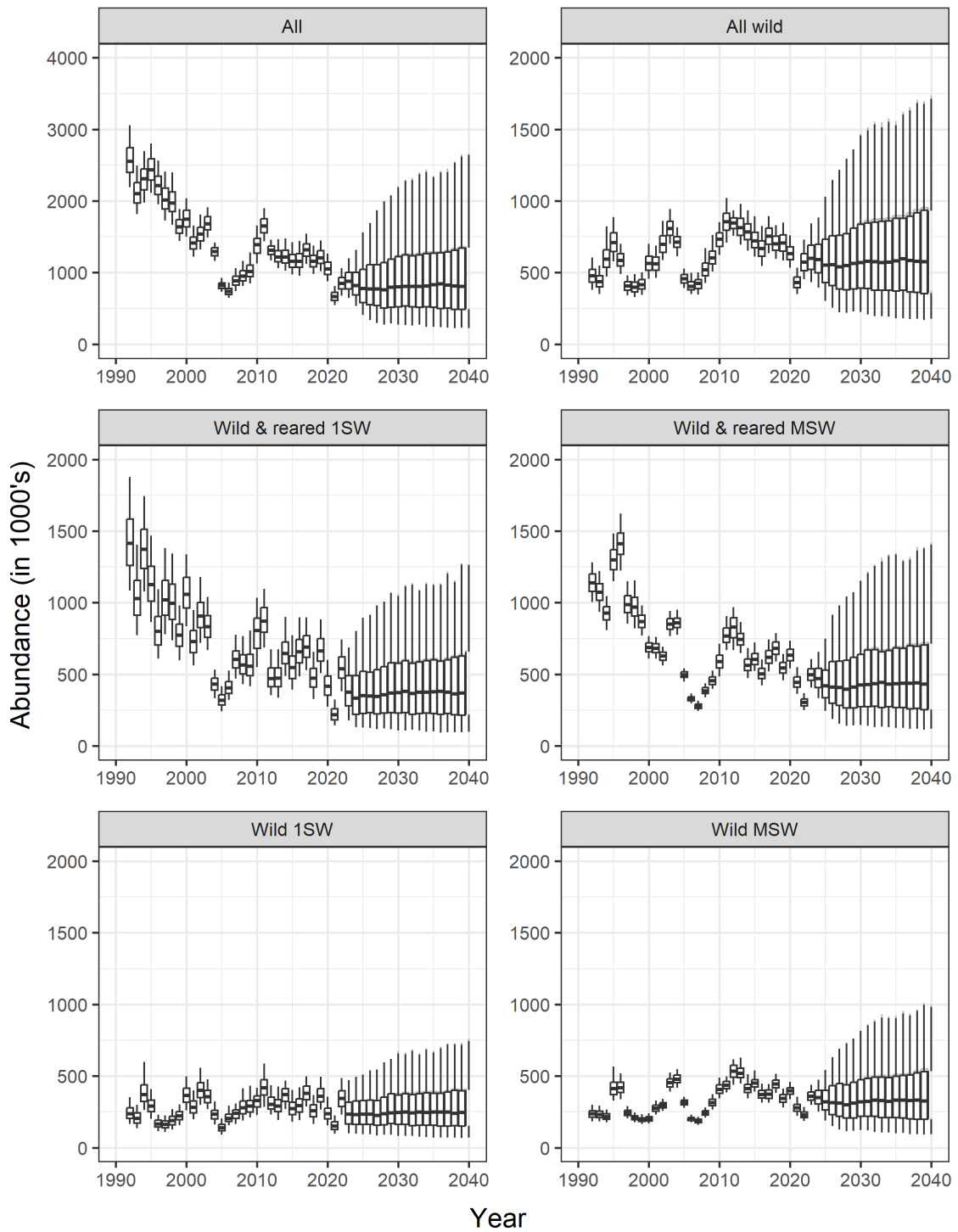
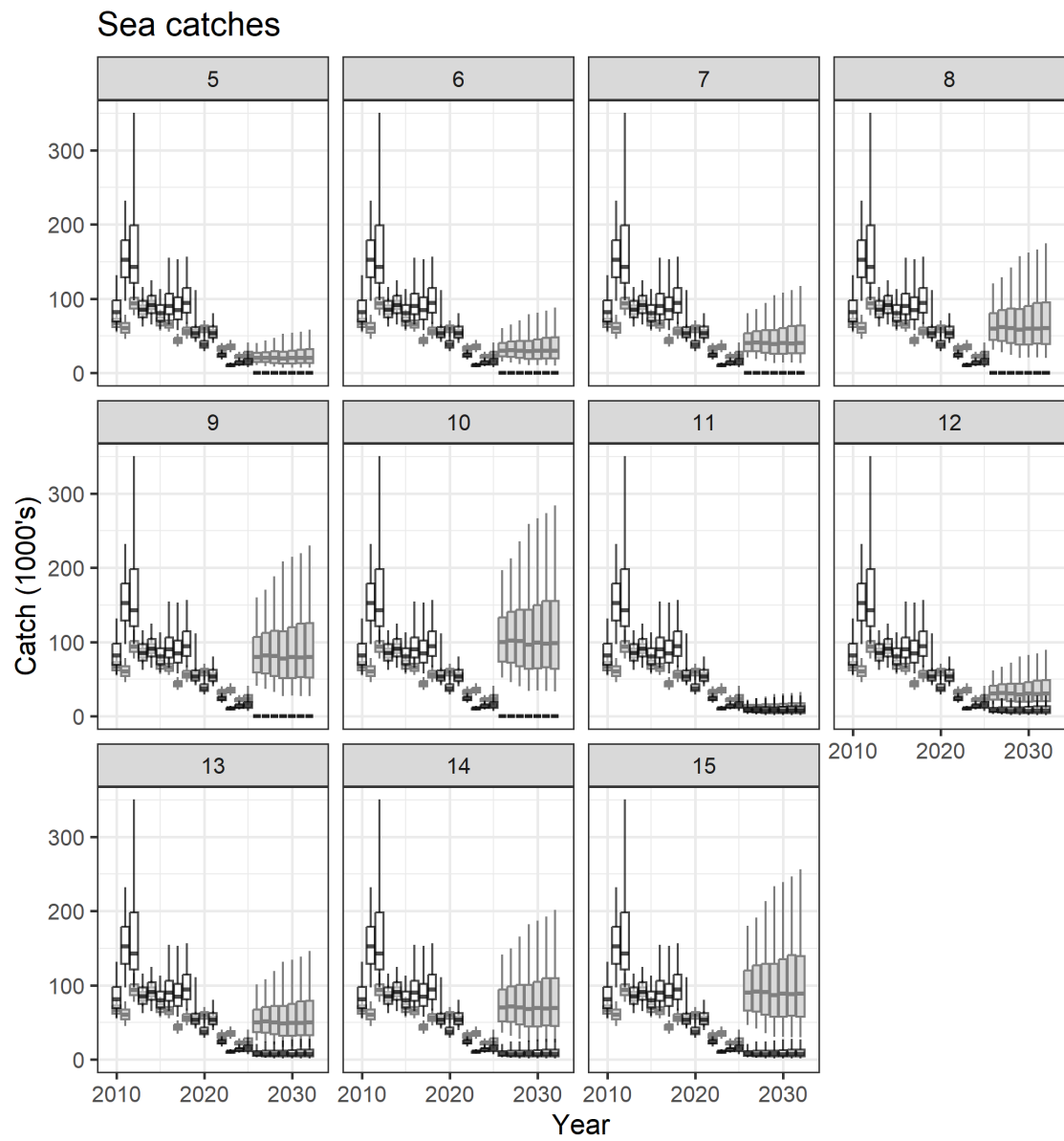
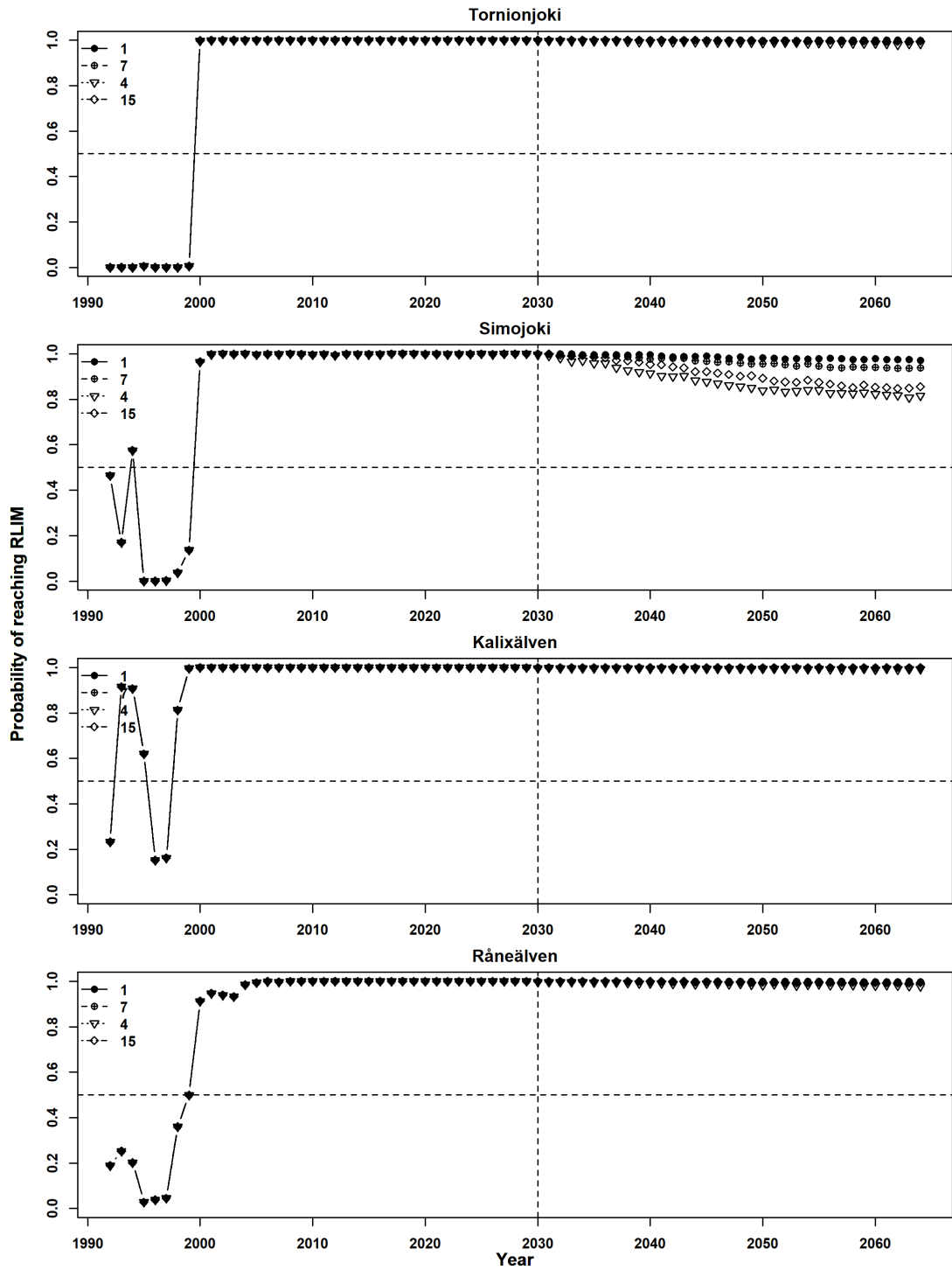


Figure 4.3.2.3. Pre-fishery abundances (PFA) of MSW and 1SW wild salmon and wild and reared salmon together based on scenarios 1 (zero fishing, grey boxes) and 7 (black boxes) (medians with 90% probability intervals). Note that due to the similarity of estimated PFAs between scenarios 1 and 7, the grey boxplots are barely visible. PFAs reflect the abundance that is available to the fisheries. In case of MSW salmon, natural mortality is accounted for until the end of June of the fishing year, and in case of post-smolts, until the end of August (four months after post-smolt mortality phase). See text for details.

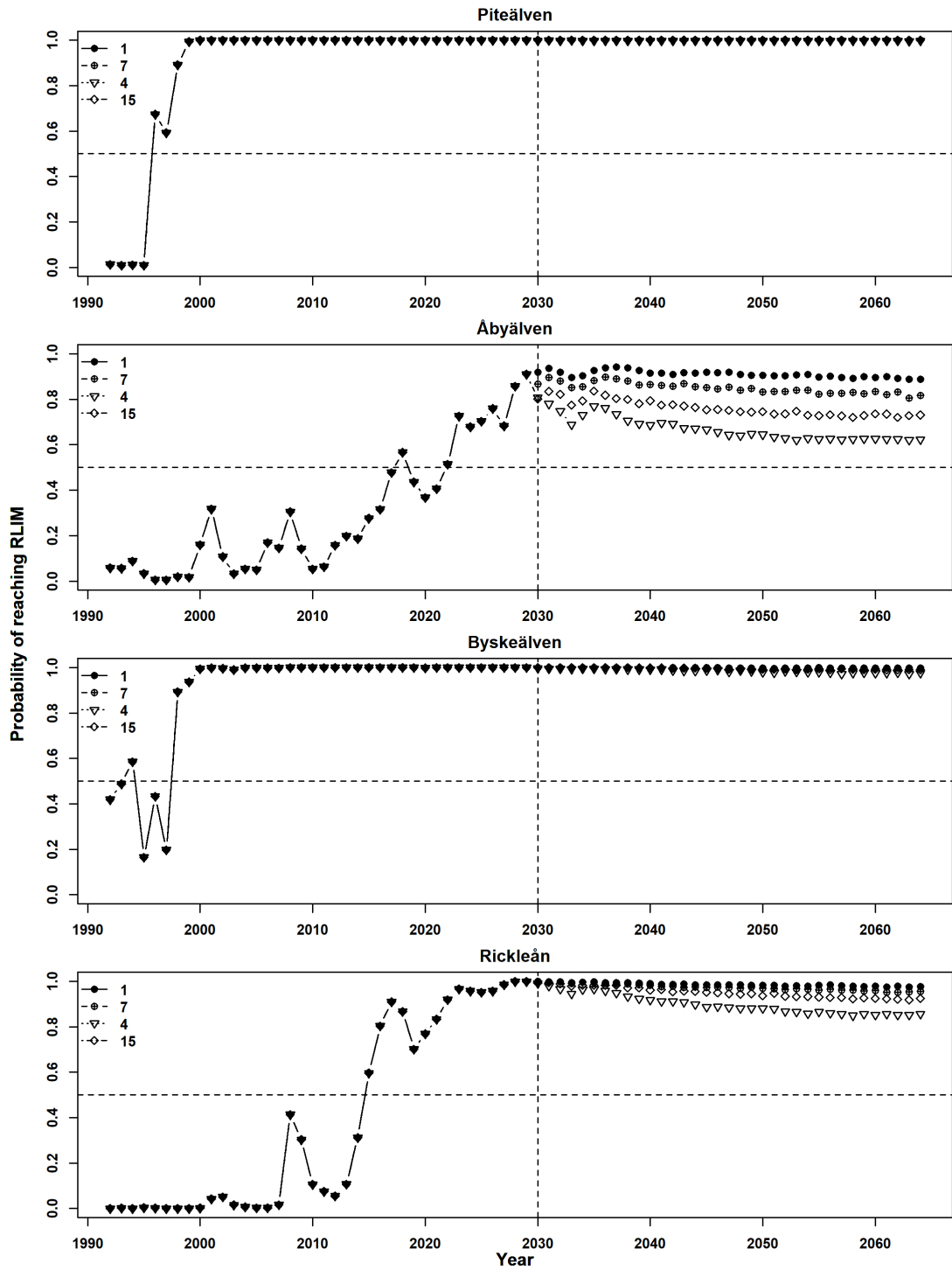


**Figure 4.3.2.4. Estimated total removal of sea (black boxplots) and at coastal areas (grey boxplots) based on scenarios 5-15. Boxplots show medians with 5%, 25%, 75%, and 95% quantiles.**

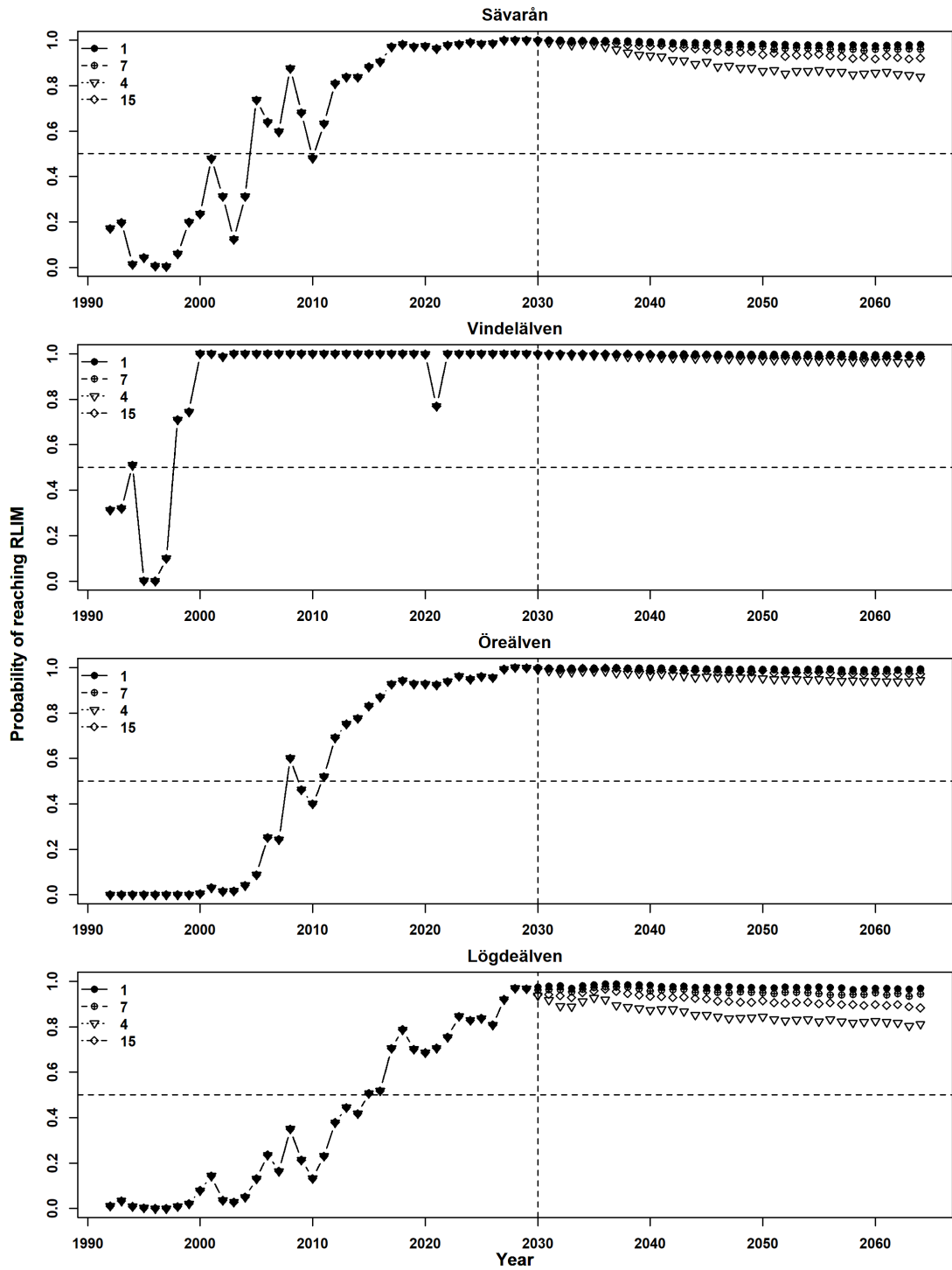
(A1)



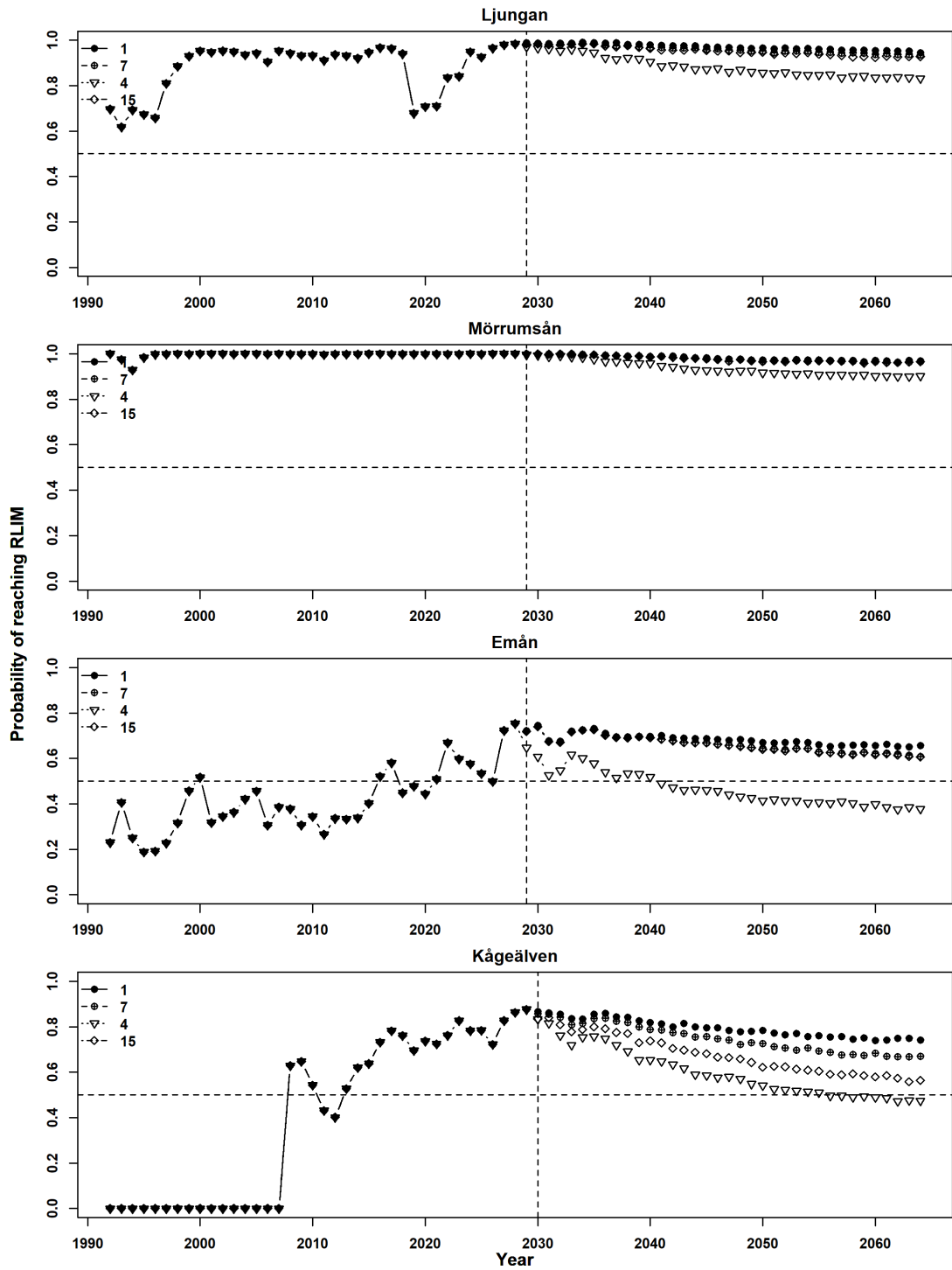
(A2)



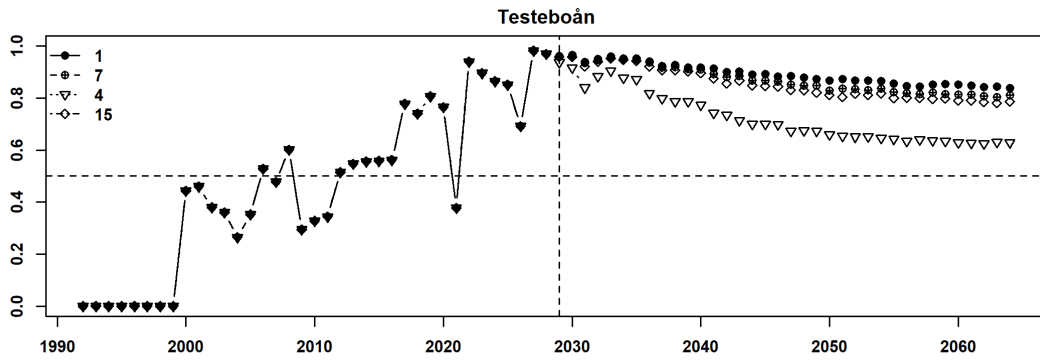
(A3)



(A4)

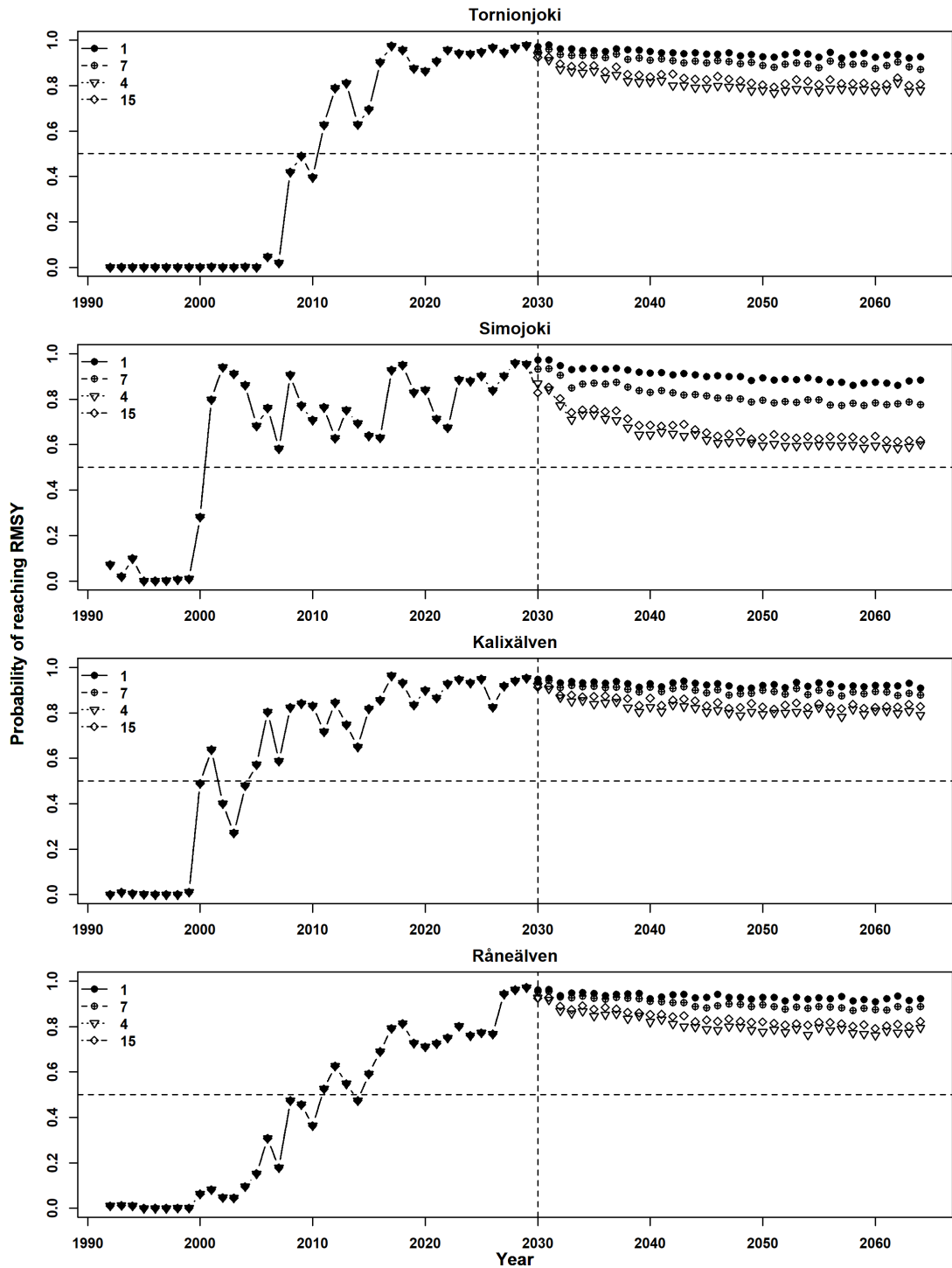


(A5)

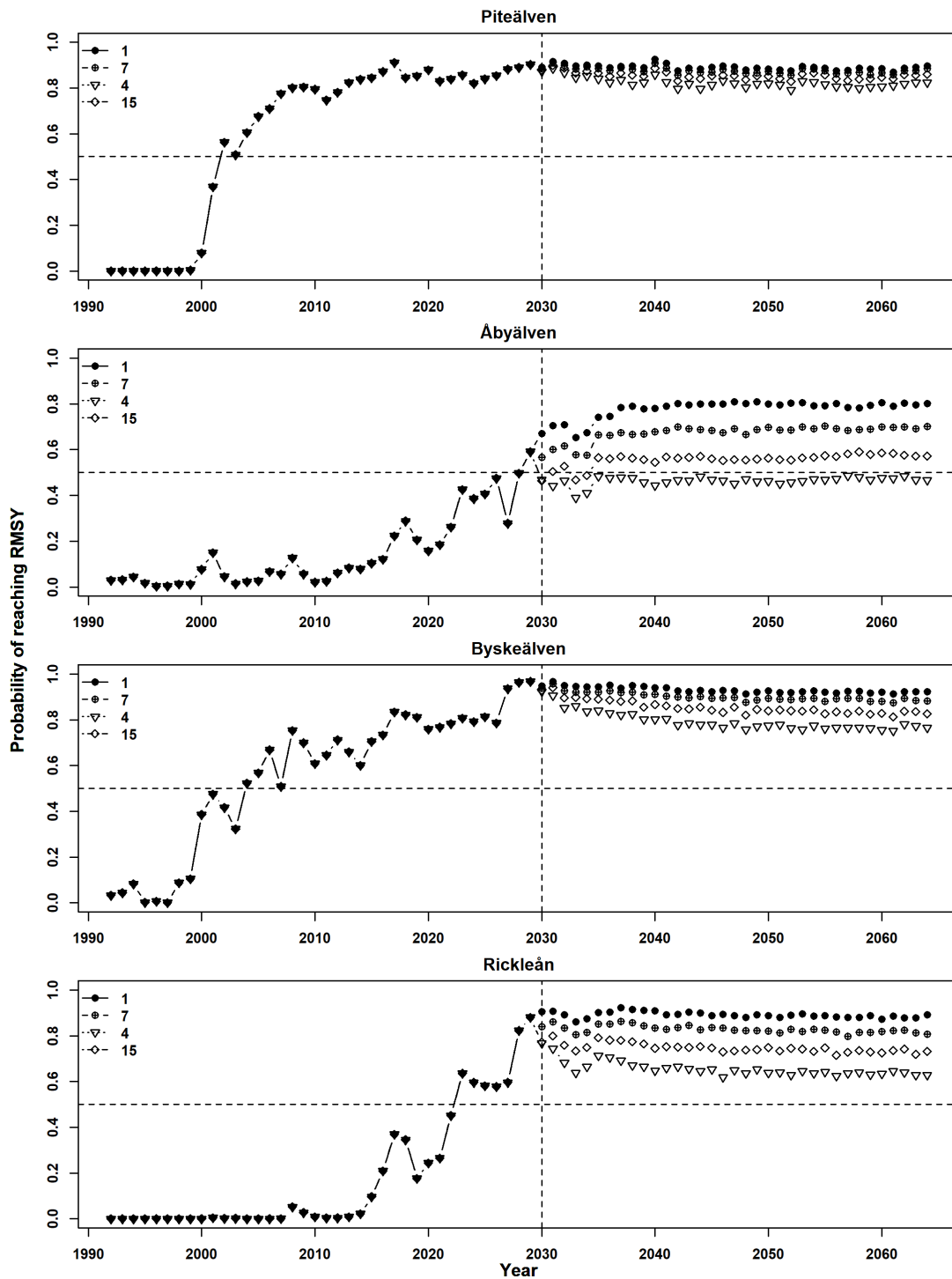


Figures 4.3.2.5a1-5. Probabilities for different stocks to meet the  $R_{lim}$  limit reference point for smolt production under scenarios 1, 7, 4, and 15. Fishing in 2026 primarily affects years 2029-2030.

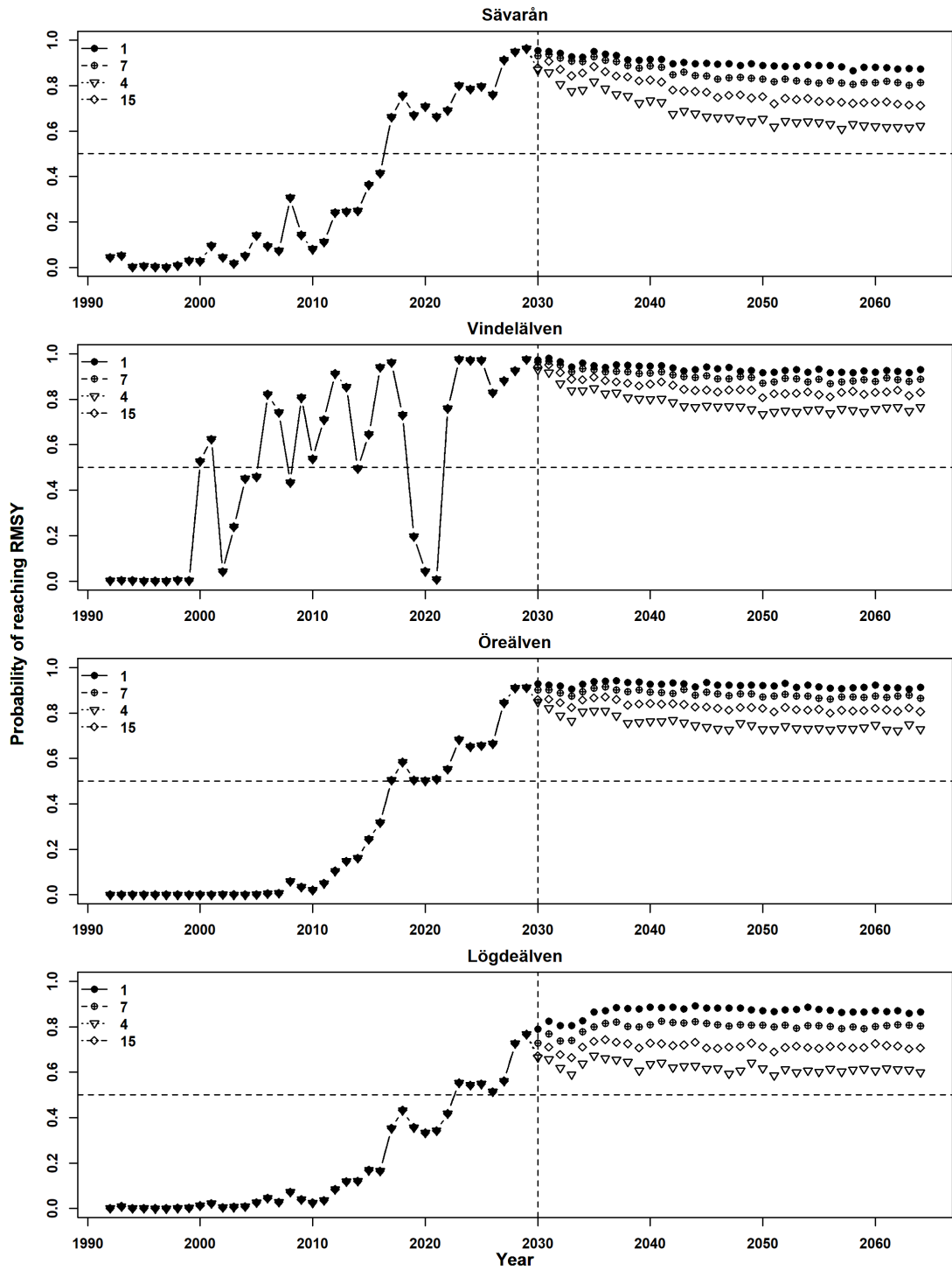
(B1)



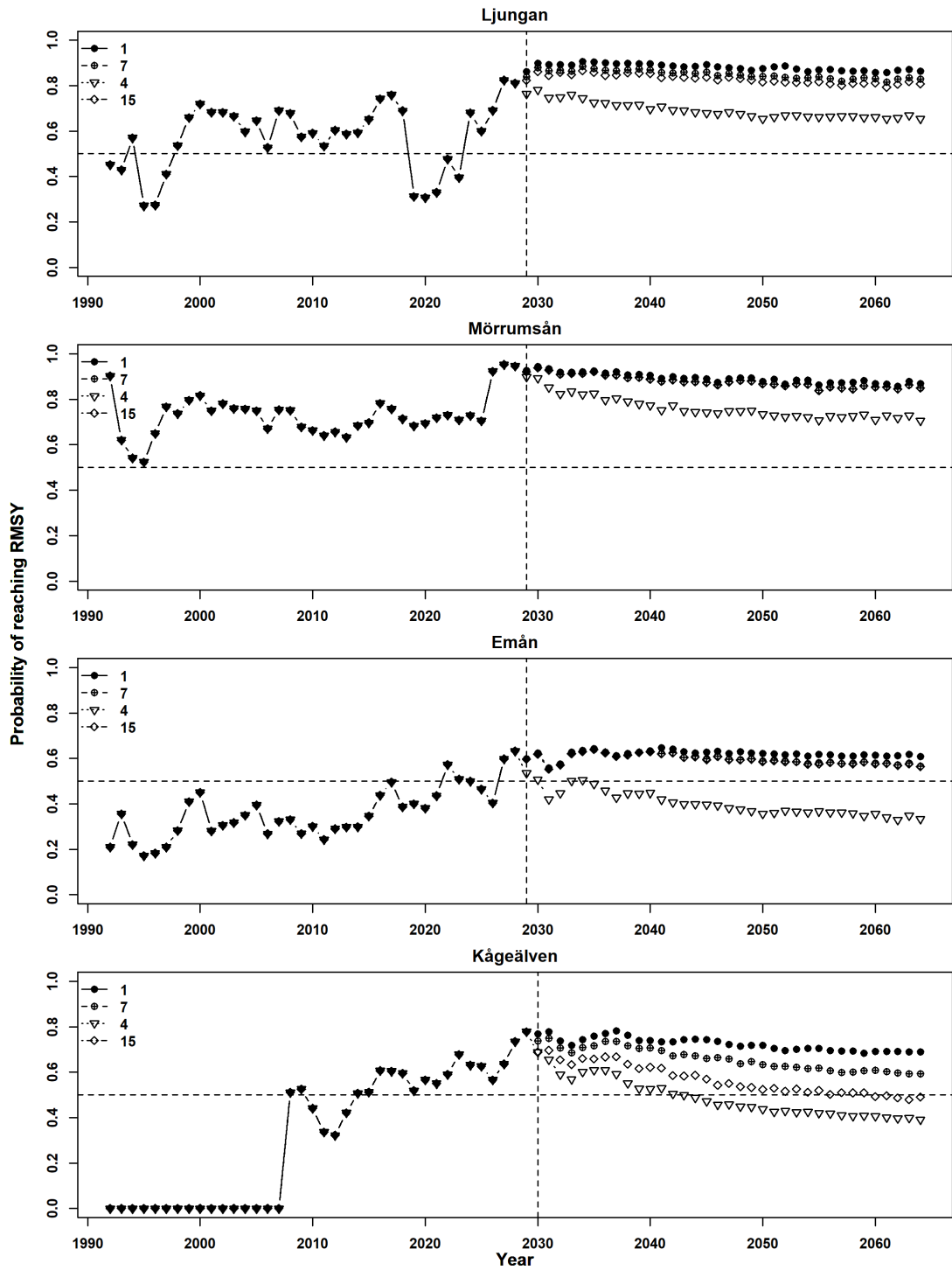
(B2)



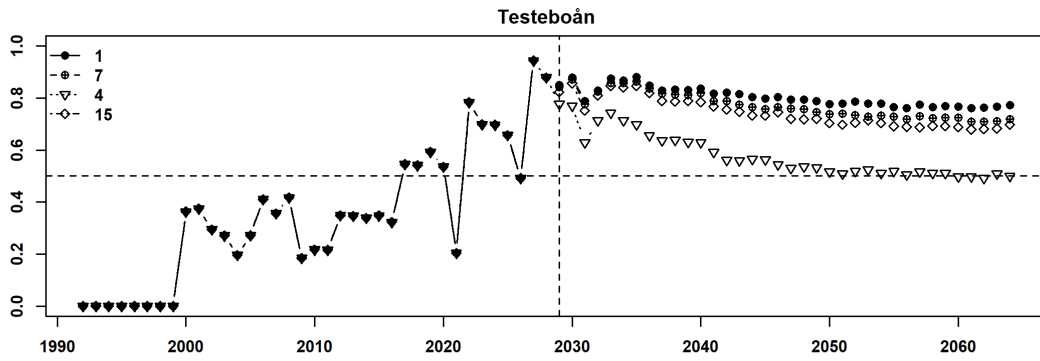
(B3)



(B4)

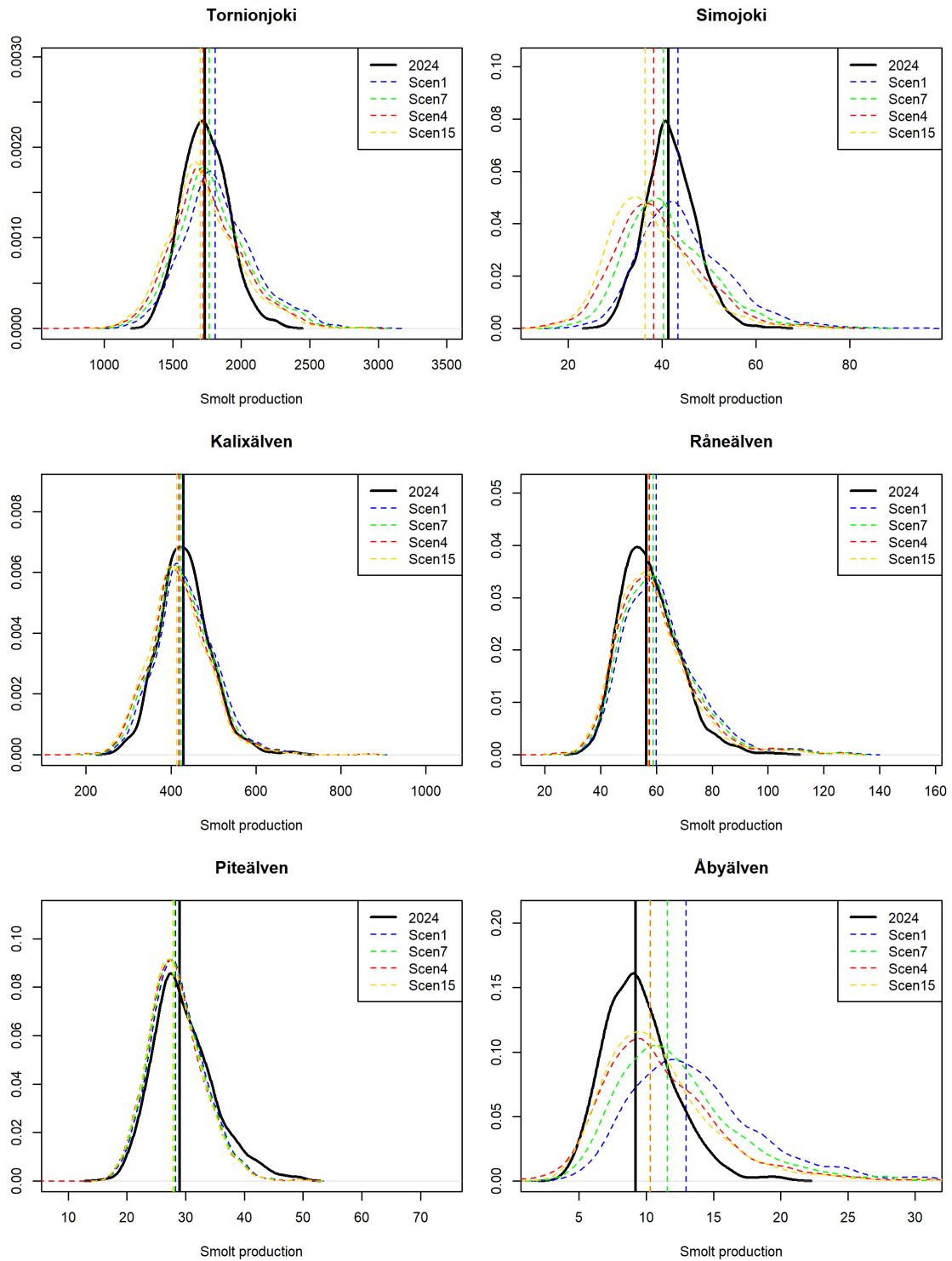


(B5)

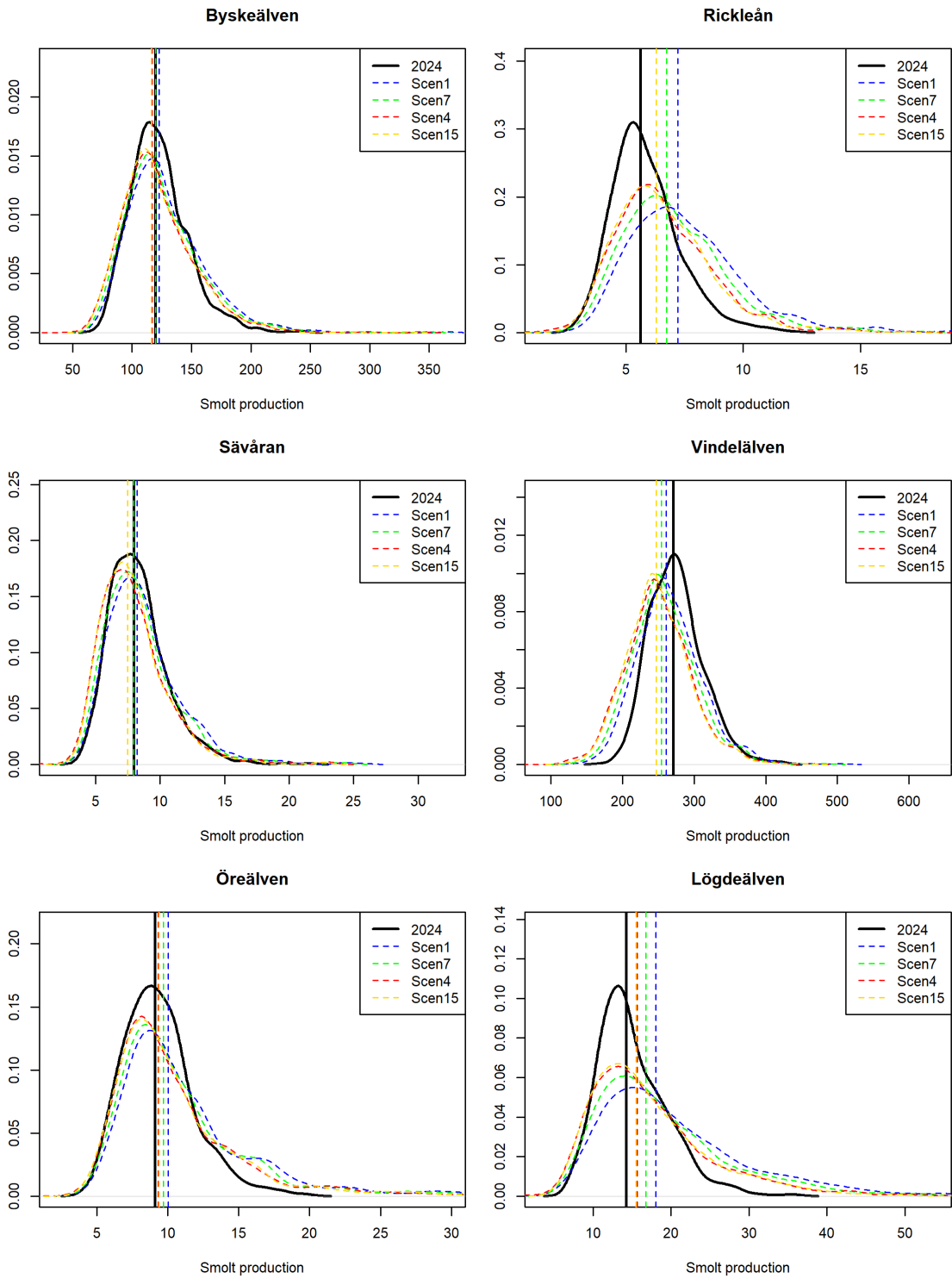


Figures 4.3.2.5b1-5. Probabilities for different stocks to meet the  $R_{MSY}$  target reference point for smolt production under scenarios 1, 7, 4, and 15. Fishing in 2026 primarily affects years 2029-2030.

(A)



(B)



(C)

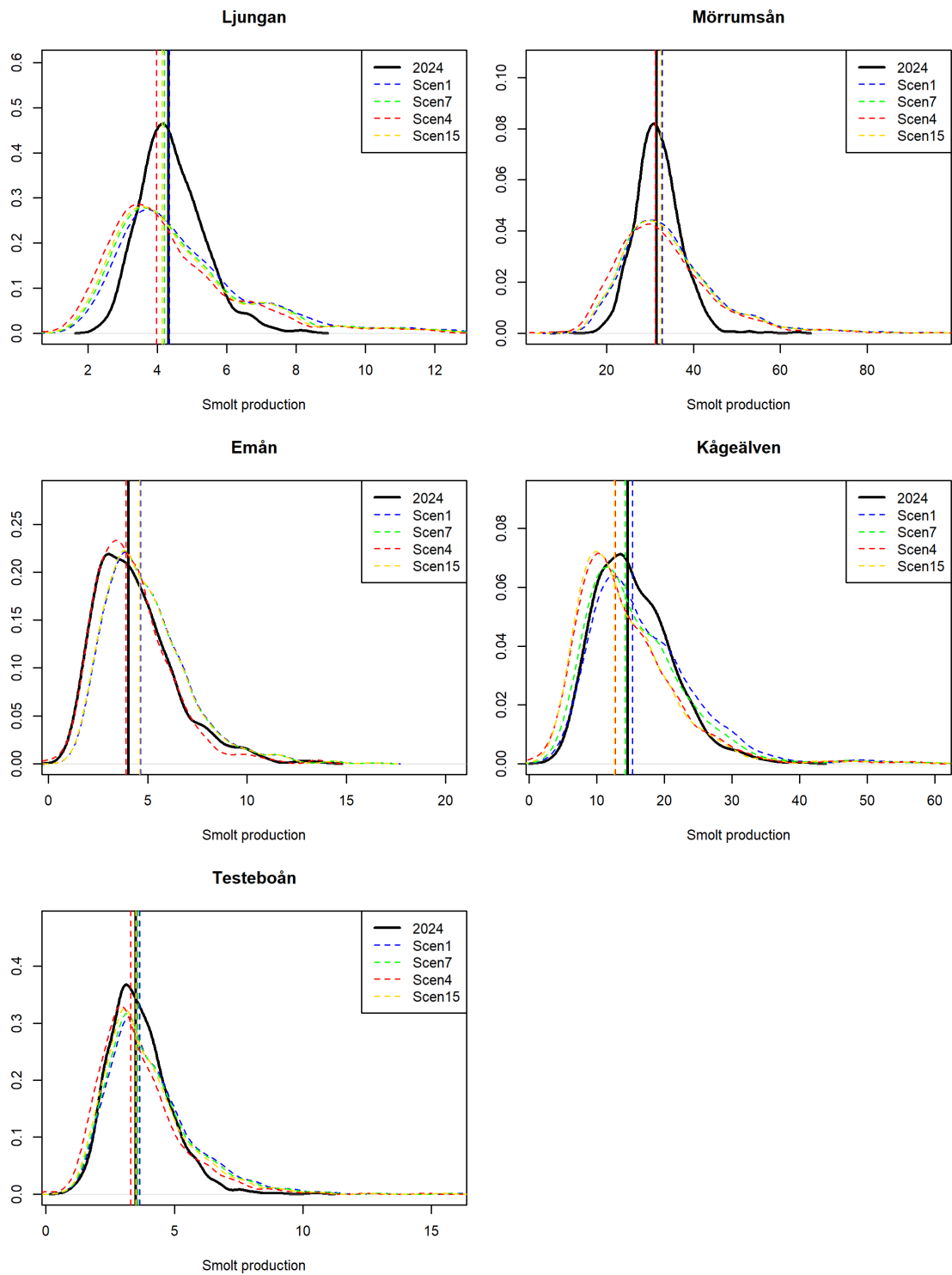
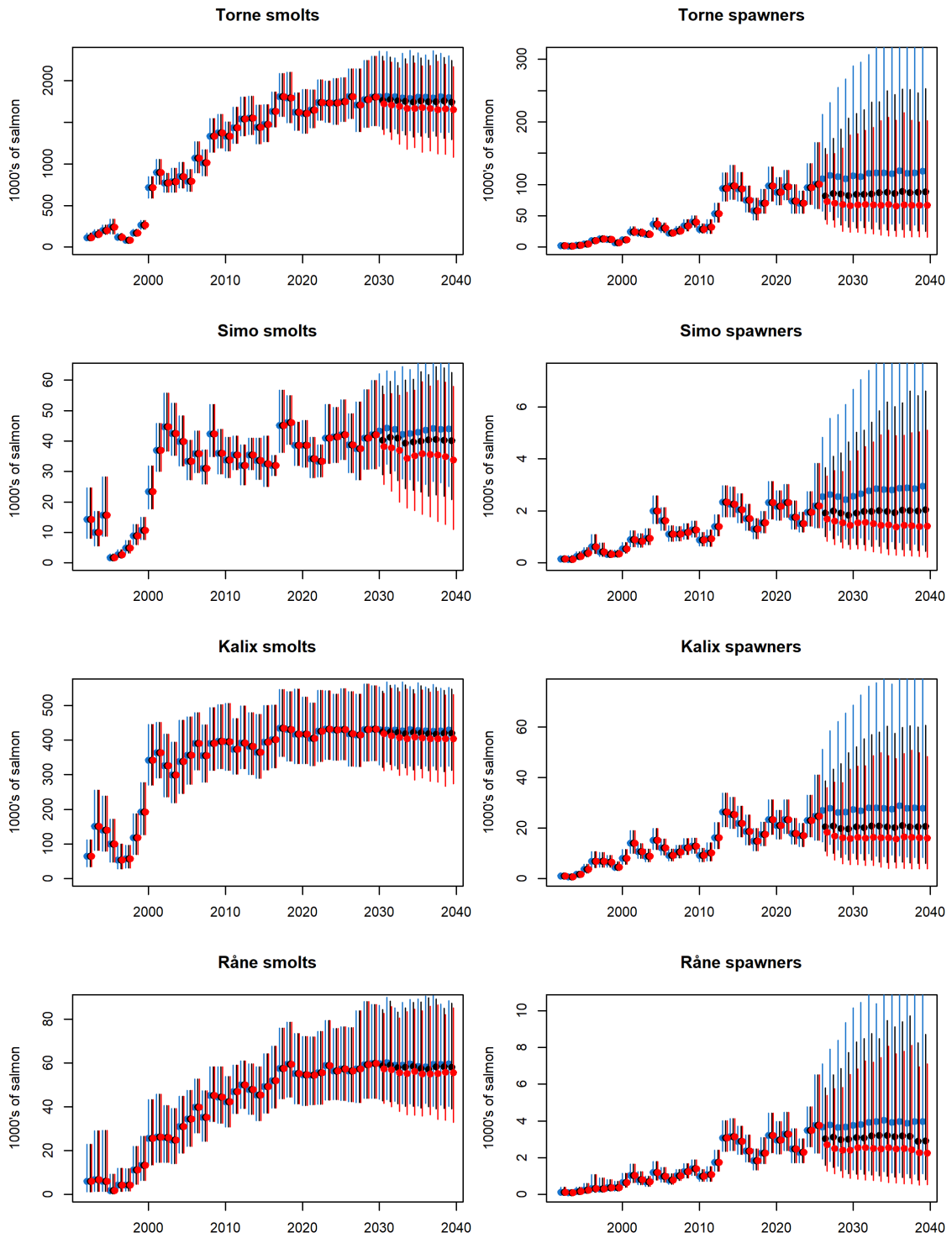
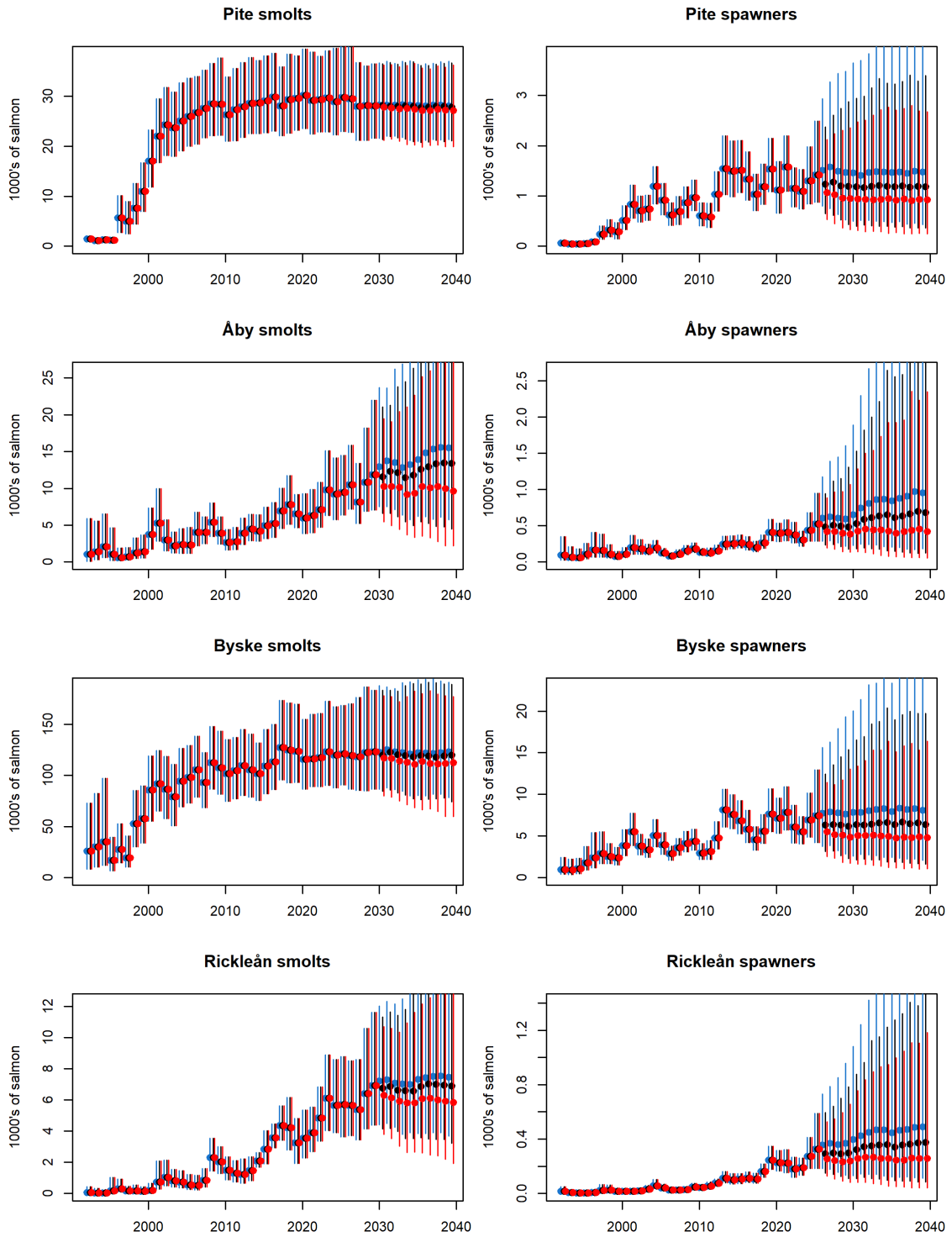


Figure 4.3.2.6a-c. Predicted smolt production in 2030 (2029 for Ljungån, Testeboån, Emån, and Mörrumsån) under fishing scenarios 1, 7, 4, and 15 (thin lines) compared to estimated production in 2024 (bold line). Vertical lines illustrate medians of the distributions.

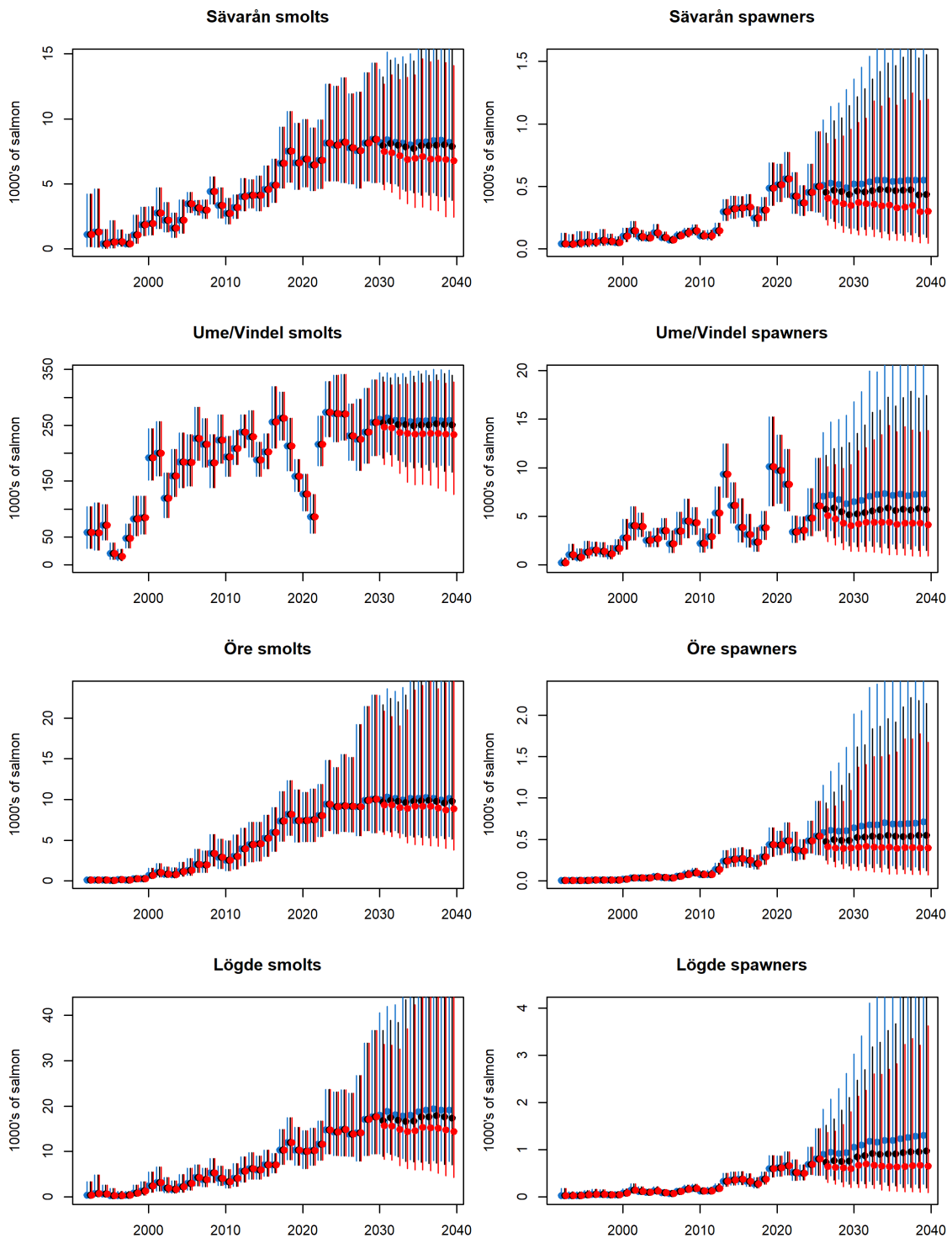
(A)



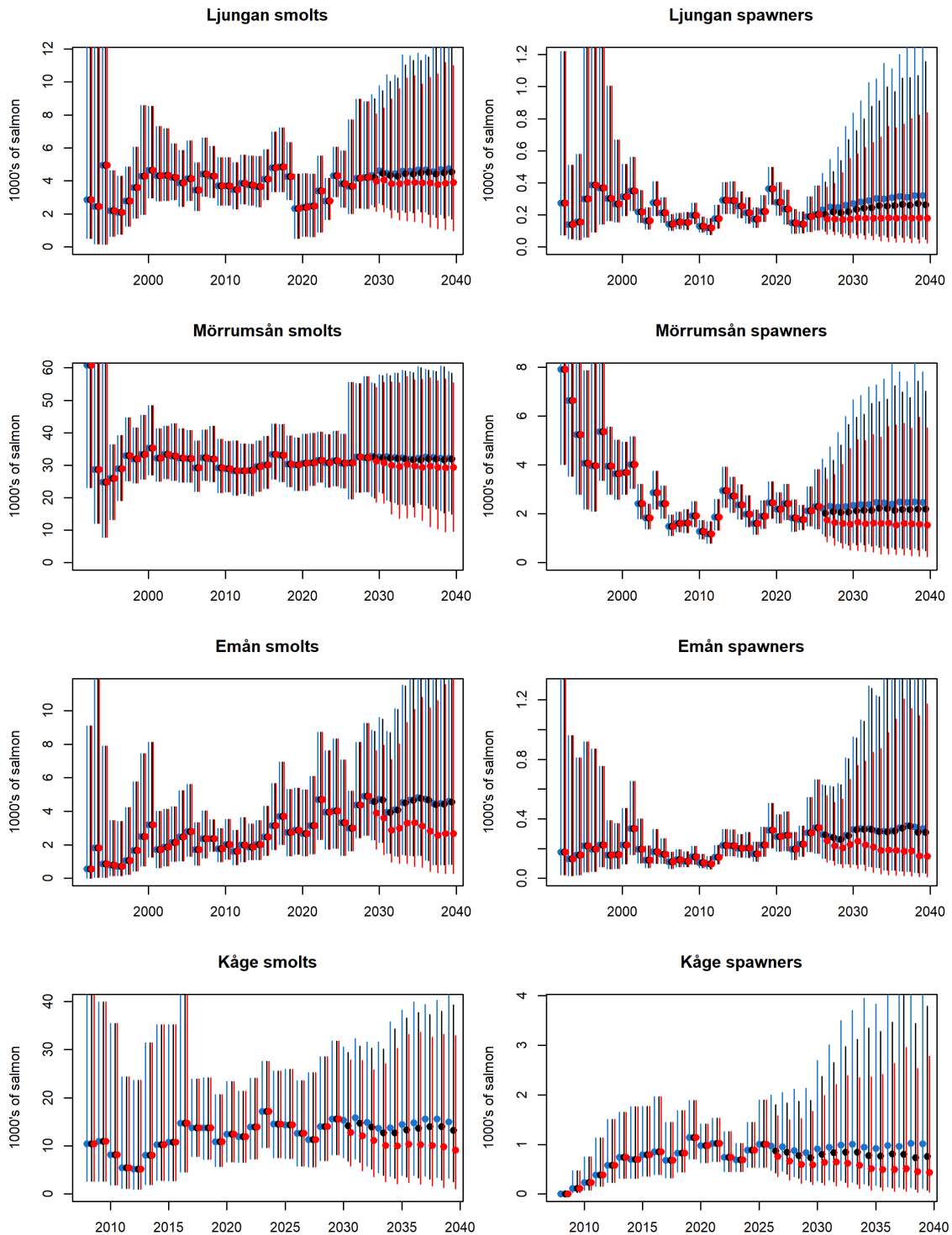
(B)



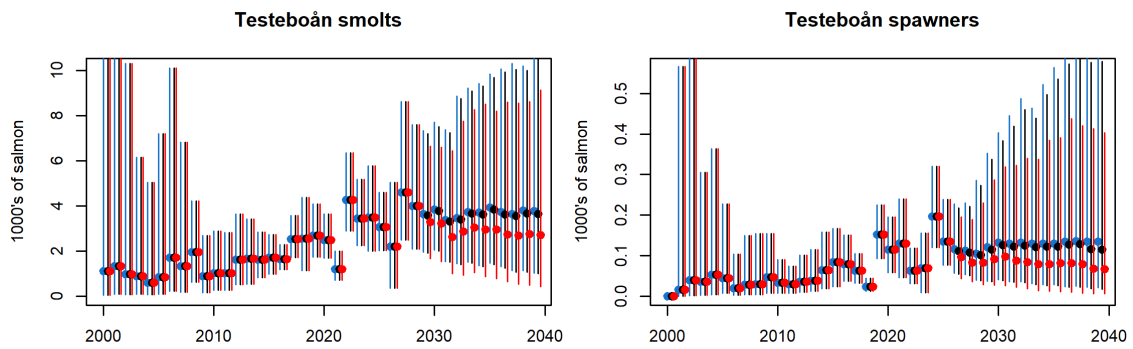
(C)



(D)



(E)



Figures 4.3.2.7a-e. Long-term predictions of river-specific smolt and spawner abundances for three scenarios. Blue = Scenario 1 (zero fishing); black = Scenario 7 (40 000 sea catch); red = Scenario 10 (100 000 sea catch). The two most extreme scenarios (1 and 10) illustrate the predicted effects of contrasting amounts of fishing.

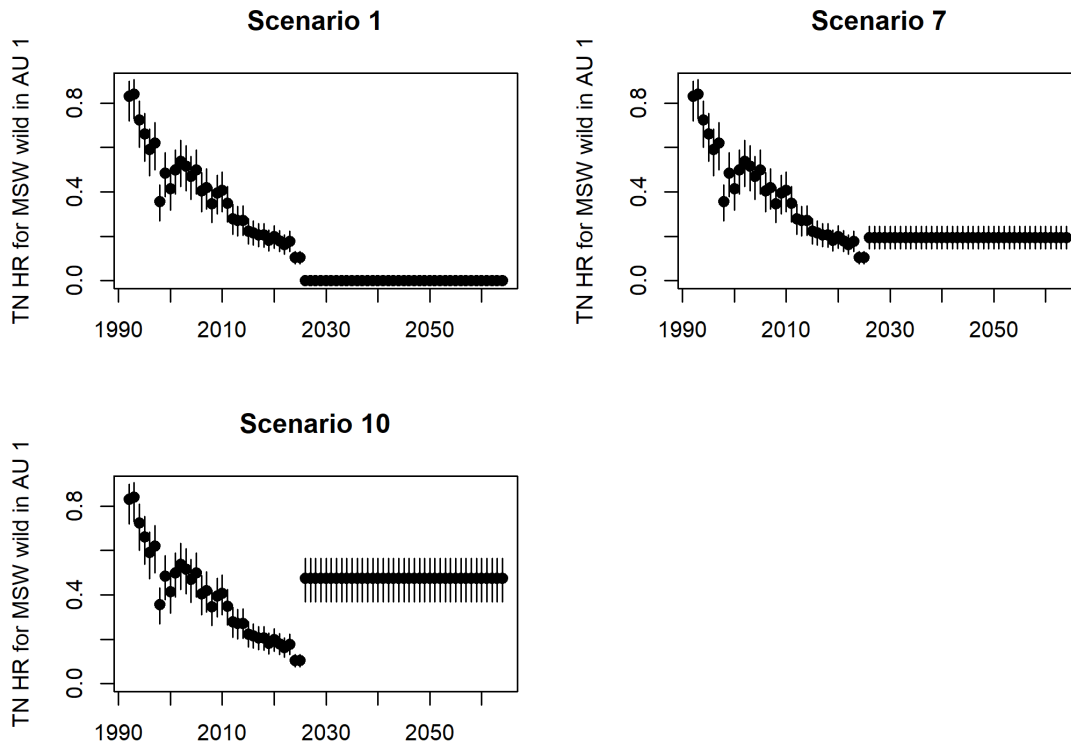
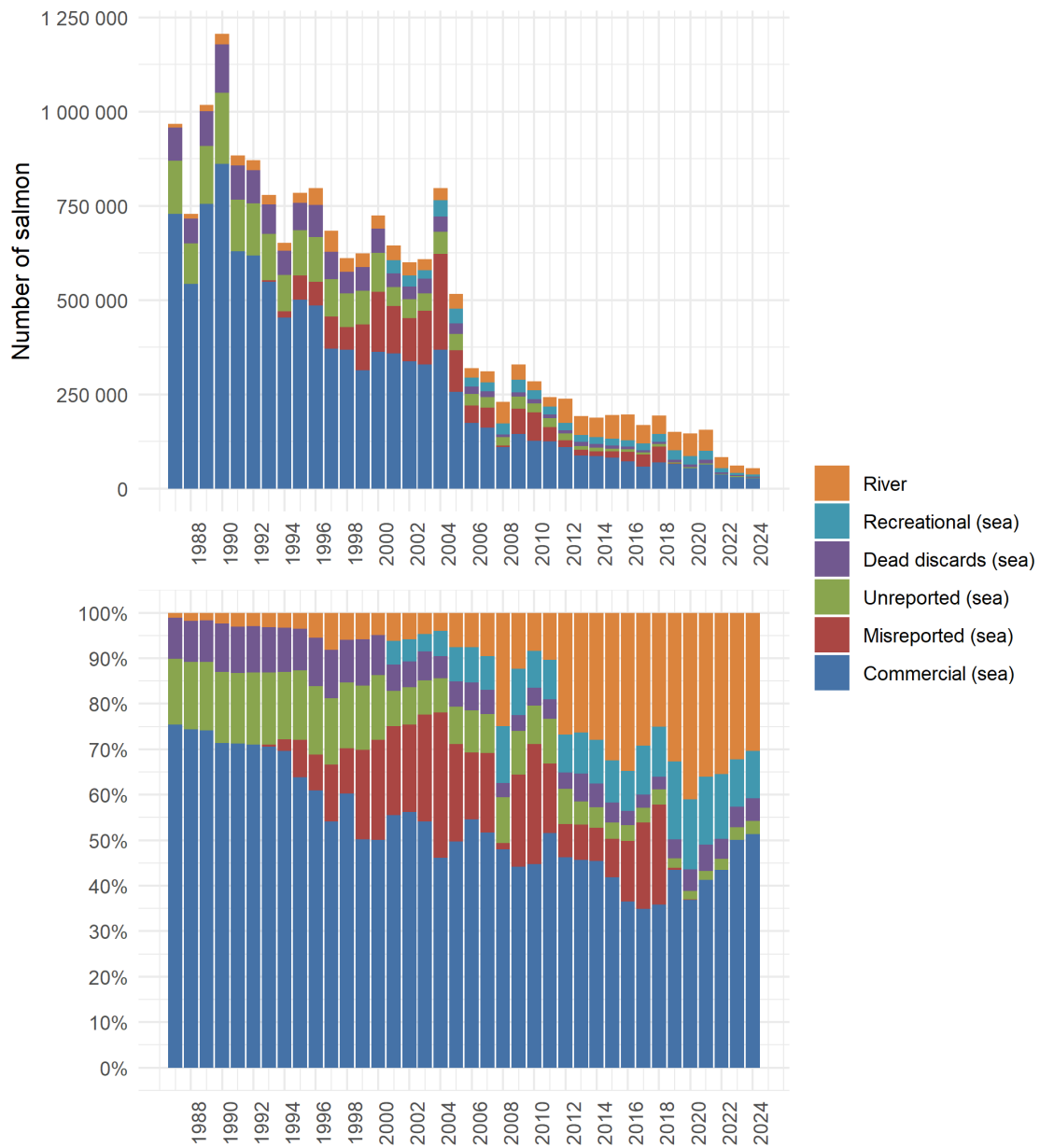


Figure 4.3.2.8. Harvest rates (median values and 90% probability intervals) for wild MSW salmon in coastal trapnet fishery within scenarios 1, 7, and 10. Scenario 1 is a no-fishing scenario and only coastal (trapnet) fishing would be allowed in the rest of the scenarios.



**Figure 4.3.2.9. Share of commercial and recreational catches at sea, river catches (river catches include unreporting and some commercial fishing), and discard/unreporting/misreporting of total sea catches in subdivisions 22-31 in years 1987-2024. Numbers of salmon in the upper panel with corresponding proportions of catch components in the lower panel.**

## 5 Sea trout

Sea trout basically has the same life cycle as salmon. The most important difference is that most strains do not migrate as far as the salmon. Instead, they spend the time at sea in coastal waters where the majority of sea trout from a specific strain stay within a few hundred kilometres from their home river. Some specimens, however, migrate further and in some strains in the southern Baltic, most sea trout seem to migrate longer distances into the open sea. Sea trout spawn and live during the first period of life in smaller streams than salmon. In the Baltic Sea area, sea trout are found in a much larger number of streams than salmon.

Below follows subsections on sea trout catches, fisheries, and biological monitoring data followed by descriptions of assessment methods and results.

### 5.1 Baltic Sea trout catches

#### 5.1.1 Commercial fisheries

Nominal commercial catches of sea trout in the Baltic Sea are presented in Table 5.1.1.1. The total catch was almost the same than in previous year and amounted to 96 tonnes in 2024. A majority (69%) of this catch was caught in the Main Basin.

In the Main Basin, the catch decreased from 954 tonnes in 2002 to 236 tonnes in 2008. After two years (2009–2010) of somewhat higher catches, around 450 tonnes, the total commercial catch again fell, reaching a minimum of 145 tonnes in 2015. In 2016, the total Main Basin commercial catch again increased somewhat to 184 tonnes (where it remained in 2017) and in 2018, it increased further to 274 tonnes. In 2019, catches decreased 45% and reached only 123 tonnes. As in previous years, the majority of this catch was from the Polish fishery (74%). In 2020, catches were slightly higher than in 2019 and amounted to 127 tonnes. In years 2022–2024, catches in Main Basin were low and reached only 64, 68, and 66 tonnes.

The total nominal commercial catch of trout in the Gulf of Bothnia was 19 tonnes in 2019, which was similar to 2018 (22 tonnes) and the 10-year average catch (23 tonnes). In 2020–2021, the level of catches decreased slightly to approx. 15 tonnes. In 2022, catches decreased again and was 11 tonnes in total. In 2023, catches in Gulf of Bothnia stayed low and was 13 tonnes. Last year was almost on the same level and reached 15 tonnes. All commercial catches in Gulf of Bothnia were from coastal fisheries.

In the Gulf of Finland, the total commercial sea trout catch in 2019 was 17 tonnes (Table 5.1.1.1), which is below the average for the last 10 years (21 tonnes). In 2020, catches were similar to the previous year and amounted to 16 tonnes. In years 2021–2022, catches were on similar level (14 tonnes). In 2023, catch reached 15 tonnes and in 2024 stayed almost on the same level (14 tonnes).

#### 5.1.2 Recreational fisheries

Recreational sea trout catches (landed) in the Baltic Sea are presented in Table 5.1.2.1. In 2024, data for whole time-series for the Baltic was updated. In 2022, the total catch was 645 tonnes. In 2023, recreational catches dropped to 503 tonnes and again in last year to 348 tonnes. The reason for this is primarily the decline in estimated catches in the Main Baltic area (Poland and Denmark).

Recreational catches in 2024 were taken mainly in Main Basin, accounting for 92% of the total recreational catch in the Baltic Sea. Most of the recreational catch in the coastal zones of the Gulf of Bothnia and the Gulf of Finland was taken by Finnish fishers.

Data on recreational coastal catches from the Main Basin in 2024 were available from Estonia, Latvia, Lithuania, Finland, Poland, Sweden, Denmark, and Germany (Table 5.1.2.1).

### **5.1.3 Total nominal catches**

The highest combined commercial and recreational nominal catches, above 1 300 tonnes, were taken in the early and late 1990s (Table 5.1.3.1). Since 2001, they have been decreasing to the level of 700–800 tonnes in recent years (tables 5.1.1.1 and 5.1.2.1 combined). In 2020, the combined catch reached 1 027 tonnes. Note, that when taking estimated levels of misreporting of salmon as sea trout in the Polish sea fishery into account (Section 2.3.3), the overall reported commercial sea trout catches have been much too high. However, since 2021, according to new regulation in Polish fisheries, the level of misreported catch has dropped almost to zero. This situation continued in 2022–2024. A column with annual estimates of salmon catches misreported as sea trout (in weight) in the last 10 years was added to Table 5.1.1.1. In last two years (2023–2024), the total combined catches reached 599 and 444 tonnes respectively and they have been showing a downward trend in recent years.

### **5.1.4 Biological catch sampling**

Strategies for biological sampling of sea trout and procedures are very similar to those for salmon (Section 2.5). In total, 1 605 sea trout were sampled in 2024, slightly more than in previous years (Table 5.1.4.1). Most samples were collected from Latvian ( $n = 650$ ), Polish ( $n = 378$ ), and Estonian ( $n = 268$ ) catches. In addition, 207 samples were collected from Swedish catches and 74 from Finland. Additionally, 28 sea trout were sampled in Germany (Table 5.1.4.1).

## **5.2 Data collection and methods**

### **5.2.1 Monitoring methods**

Monitoring of sea trout populations is carried out in all Baltic Sea countries. The intensity and period during which monitoring has been going on varies (ICES, 2008b). Some countries started their monitoring in recent years, while very long data series exist for a few streams in others (ICES, 2008b). From 2016, a new European Union (EU) regulation (2016/1251), adopting a multi-annual program for the collection, management, and use of data in the fisheries and aquaculture, obligated EU countries to collect sea trout catch data.

Most monitoring of sea trout is carried out by surveying densities of trout parr in nursery streams by electrofishing. In Denmark, only a few sites in Baltic streams are monitored annually. In addition, a rolling scheme is used for electrofishing-monitoring of sea trout on the national level. Due to the large time lap between fishing separate rivers, these are not directly useable for assessment but the results are used as background information on the status of populations as such. In a couple of countries, sampling of parr densities is used to calculate smolt production by a relation of parr to smolt survival, either developed in the same stream or in some other (ICES, 2008a). In most countries (but not in Denmark, Poland, and Germany), electrofishing is supplemented with annual monitoring of smolt escapement by trapping and counting in one or more streams. In total, smolt production estimates exist for 12–13 rivers in the entire Baltic area but the length of the time-series varies.

In four streams/ivers (Mörrumsån, Nybroån (Sweden), Salaca (Latvia), and Pirita (Estonia)), both number of spawners and smolts are monitored. Adult counts are determined by trapping or recording of ascending sea trout using automatic counters.

In 25 rivers (11 in Sweden, two in Poland, 10 in Germany, one in Estonia, and one in Latvia), the numbers of spawners are presently monitored by automatic fish counters or video systems.

An indication of the spawning intensity can also be obtained by counting of redds. Such information is collected from a number of sea trout streams in Poland, Lithuania, and Germany (ICES, 2008a). In one stream in Denmark, the catch in sports fisheries has been used to estimate the development of the spawning run. Catch numbers are also available from some Swedish rivers. Tagging and marking are furthermore used as methods to obtain quantitative and qualitative information on trout populations (see below). Evaluation of sea trout status in rivers is done based on national expert opinions, as well as on factors influencing status. Such evaluations are updated irregularly.

## 5.2.2 Assessment of recreational sea trout fisheries

There is a highly developed recreational fishery targeting sea trout in many countries. Angling (rod-and-line fishing) accounts for the majority of the catches. The most common methods are spin and fly fishing from the shore or in rivers and trolling with small boats at sea. The shore-based fishery along coasts and in rivers is highly diffuse and variable with strong local and regional variations depending on weather conditions and season. In the southern Baltic Sea, recreational fishing on sea trout takes places during the whole year with distinct activity peaks in spring and autumn, some night fishing occurs in summer.

While the recreational catches of sea trout are largely dominated by rod-and-line fisheries, there are other types of fisheries carried out in some countries. To a smaller extent, passive gears such as trapnets, gillnets, or longlines are being used for catching sea trout, either as a target species or as bycatch in other coastal recreational fisheries. Except for in northern Gulf of Bothnia, the catches from this type of fishing are estimated to be of minor importance in terms of impact on the stocks, i.e. removals.

Monitoring of the recreational fisheries is carried out in different ways. Below follows a description of methods and activities in the Baltic countries.

Since 2009, recreational catches of sea trout in Denmark have been estimated based on an interview-based recall survey, which is conducted by DTU Aqua in cooperation with Statistics Denmark. Information is collected two times per year. In addition, during spring 2017, a project on the recreational sea trout coastal rod-and-line fishery was carried out on the island Funen in SD 22. Two different approaches were applied: 1) on-site interviews (rowing creel) collected information on i.e. catch, release rates, and effort; and 2) by aerial survey, information on effort was obtained.

In Estonia, catch reporting has been mandatory since 2005. The data are reported to and stored in the Estonian Fisheries Information System (EFIS) for passive gears (gillnets, longlines) and salmon and sea trout rod-and-line fishing in rivers. The latest recreational fishery survey was carried out in 2016, based on a phone call approach.

Since 2002, the official catch estimates of the recreational sea trout fishery in Finland are based on a national recreational fisheries survey. Biannual surveys are conducted to estimate participation, fishing effort and catches of the recreational fishery (<http://stat.luke.fi/en/recreational-fishing>). A stratified sample of about 7 500 household dwellings is contacted with response rates of around 40–45% after a maximum of three contacts. Afterwards, a telephone interview is done for a sample of the non-respondents. Harvested and released catch is measured separately by

species. The latest estimate of recreational catch in sea is for 2022 being 28 tonnes (CV>50%). The estimate bases on the biennially executed Finnish Recreational Fishing Survey. The 2024 survey is in the pipeline at present. Due to methodological reasons the catch estimate varies significantly between the surveys. Other information, however, does not indicate such a large variation in the true catches between the years. In other words, the estimate is very uncertain.

In Germany, a nationwide telephone-diary survey with quarterly follow-ups was conducted in 2014/2015, contacting 50 000 German households to collect representative data on catch and effort, and social, economic, and demographic parameters for the German marine recreational fishery, also covering the recreational sea trout fishery. However, to collect more detailed information on the recreational sea trout fishery, an additional pilot study (diary recall survey) was conducted. During this study, a bus route intercept survey was used to recruit diarists, collect biological samples (length, weight, scales, and tissue samples), and socio-economic data. Ongoing analyses aim to combine both studies to provide a full picture of the recreational sea trout fishery in Germany. Anecdotal information showed that recreational sea trout catches in freshwater are small and probably insignificant compared to marine catches. The results of the survey conducted in 2015 were considered to be a reliable level of recreational fishing and their result (151 tonnes) was also adopted for the years 2016–2022. An update of the recreational sea trout catches was carried out in 2023.

In Latvia, a first attempt to estimate total sea trout catches from angling was done in 2018 using internet questionnaires. The main aim was to get general information about angling places, gears, and efforts. In a second part of the questionnaire, information about sea trout, salmon, cod, and eel catches were collected. The total estimate received of sea trout caught in the recreational fishery was deemed highly unrealistic, amounting to 51 978 individuals (156 tonnes), and should not be used in further analyses. Sea trout angling from coast is not popular in Latvia due to an unfavourable coastline (most of the coast consists of sandy beaches, no islands or archipelagos) and ice coverage in winter. However, all landings in the Latvian “self-consumption fishery” are reported in logbooks. According to this logbook information, landings of seatrout in 2018 were 1 957 individuals. Additionally, according to official reports from the licensed fishery, 103 sea trout were caught. This estimate does not include angling in Daugava River (no licensing, because Daugava stock consists mainly of reared salmon and sea trout) or angling from the coast. In 2019, recreational coastal (1 277), recreational offshore (10), and river angling (172) landed 1 459 sea trout. In the rivers, where natural reproduction of salmon occurs, all angling and fishing for salmon and sea trout is prohibited with exception of licensed angling for sea trout and salmon kelts during the spring season. This encompasses the rivers Salaca, Venta, and, from 2020, also Gauja. In total, 772 retained sea trout kelts were reported in licensed angling in 2020. The large increase in reported retained salmon and sea trout in the Salaca River can be explained by more active and accurate data registration and submission. Submission of data has improved due to amendments to the rules of licensed angling – anglers cannot buy a new licence without submitting a report about previous one.

In Lithuania, recreational sea trout fishing is mainly conducted in rivers. Since 2015, recreational (anglers) sea trout catches are estimated by an online survey, a face-to-face interview survey, and individual interviews and catch reporting with diaries of selected anglers and experts. CPUE data (ind./person/day) are estimated from survey data and combined with number of licences sold to anglers to calculate the total catch. Since 2015, estimated recreational catches based on online and on-site surveys combined with number of licenses.

In Poland, pilot study relating to salmon and sea trout recreational fisheries was conducted in 2017–2019. More details of this work were described in the Polish national report for 2017. Based on the results of the pilot study, sampling programme was included into regular sampling since 2020. In 2023, trolling boats have been observed in 10 harbours, i.e. Władysławowo, Kuźnica,

Jastarnia, Hel, Gdańsk Górki Zachodnie, Gdynia, Ustka, Darłowo, Kołobrzeg, Mrzeżyno, and Dziwnów, with particular importance of the Hel, Gdynia, Gdańsk Górki Zachodnie, and Kołobrzeg harbours. A total of 100 different active trolling boats had been inventoried in 2024. Number of active trolling boats varied between autumn/winter (57–64) and spring (65–84) seasons with a higher number of trolling boats in spring. In general, a decreasing trend of number of active trolling boats is observed since 2021.

A pilot study of estimation of Polish river recreational catches has begun in 2017 and was continued in next three years. First on three rivers: Ina (SD 24), Rega, and Stupia (SD 25), and from 2018 also on the Parsęta River (SD 25). In 2020, three new rivers were added to the survey: Łeba, Reda (SD 25), and Drwęca River (SD 26). The method used is based on catch records provided by fishing users supplemented with data from on-site surveys of anglers carried out according to the same schedule on the rivers studied. The data obtained from the catch records are delayed by two years, which results from the fishing fee system.

The results obtained with the method developed in the pilot study indicate that in year 2022, 2 274 sea trout were caught in the seven analysed rivers, which, assuming an average weight of 3 kg of sea trout, gives about 6.8 tons.

Results from on-site surveys performed in 2017–2020 show that the average catch per angler ranged from 0.9 sea trout (2016–2017) to 2.9 for (2019–2020). It was also observed that these values were higher for the Parsęta River. In 2020, the average number of fishing days per respondent was 28. The vast majority of surveys were for local anglers. According to the questionnaire, half of the surveyed anglers prefer the catch and release method. It has also been shown that periods of intensity of sea trout fishing can vary significantly between rivers. In the Ina, Rega, and Łeba rivers, the main fishing season is winter, while the rest of the fishing season is spread over time with peak just before spawning.

There are about 10 rivers with similar intensity of sea trout/salmon fishing in Poland, so, taking into consideration underestimation of registers, recreational catch in Polish rivers can be roughly estimated for 40–80 specimens of salmon and 5–10 tons of sea trout yearly. Thanks to this pilot study, a method for estimating the size of catches has been proposed in recent years and on its basis, the size of angling catches in rivers is determined.

In Russia, sea trout was previously a protected species in the Baltic Sea, and recreational fishers were not allowed to target sea trout in the sea nor in rivers. As from March 2020, sea trout fishing was allowed, but statistics for the catch have not been available.

In Sweden, recreational fishery for sea trout is very popular. Since there is no commercial fishing specifically targeting the species, commercial catches are low and most catches are from recreational fisheries. A major part of the Swedish recreational catch is taken along the Baltic coast (>2 400 km, including islands of Öland and Gotland), in particular by angling from shore or small boats, and from use of gillnets. Offshore recreational fisheries are in most cases done by trolling targeting salmon, with sea trout caught only occasionally. However, trolling closer to the coast targeting sea trout is starting to be popular in some areas. Swedish data on recreational sea trout river catches are almost only collected in larger salmon rivers, and therefore river catch statistics are far from complete. However, as mentioned, the largest proportion of the catch is assumed to be taken in coastal waters where no surveys specifically targeting sea trout are in place so far. Currently the best source for catch statistics comes from an annual national mail survey conducted by the Swedish Agency for Marine and Water Management (SWaM), the authority responsible for fisheries management. The survey is sent to about 17 000 randomly selected persons each year and it collects statistics on different aspects of recreational fishing (catches, expenditures, fishing days, etc.) for all species. However, this survey can neither estimate trout catches with good precision nor on the geographic scale needed for effective management. The

estimates of recreational catches of sea trout are uncertain. To begin with and as described above, sampling is only performed in salmon rivers. However, despite this, available data suggest that the recreational catches stand for a large proportion of the total sea trout catches. As summarized above, data from the recreational fisheries represent a combination of reported and estimated catches with the addition of expert evaluations. Therefore, the quality of the data varies a lot. Note that data on weight for recreational catches needs to be added for a few years in the time-series.

### 5.2.3 Marking and tagging

The total number of finclipped sea trout released in 2024 in the Baltic Sea area was 1 375 270 smolts and 100 487 parr, which is more than in 2023 (Table 5.2.2.1). Finclipping of hatchery-reared smolts is mandatory in Sweden, Finland, Latvia, and Estonia. The largest number of finclipped smolts was released in Sweden (581 691), followed by Finland (434 900) and Latvia (174 891). All released sea trout smolts have been finclipped in the Gulf of Finland since 2014 and in the Gulf of Bothnia since 2016. In Poland, in 2024, 100 000 smolts released to the Leba River (SD 25) were finclipped. Smolt were not finclipped in Denmark, Germany, and Russia. In 2024, 17 937 sea trout were tagged internally with passive transponders (PITs); the majority was tagged by Sweden and Poland as reared smolt. Polish smolts were released in the Vistula basin (4 000) in Subdivision 26 and into the Parseta River (2 000 smolts, SD 25). In Subdivisions 31 and 30, smolts tagged with PITs were stocked in rivers Skellefteälven (5 000), Umeälven (2 444), Dalälven (2 493), and Ljusnan (2 000) (Table 5.2.2.1). In Finland, 768 800 eyed egg and fry of sea trout were marked with Alizarin Red Staining solution and released in subdivisions 31–32 (Table 5.2.2.1). In 2024, there were no Carlin tagging of sea trout in Baltic Sea.

## 5.3 Assessment of recruitment status

### 5.3.1 Methods

The study group on data requirements and assessment needs for Baltic Sea trout (ICES 2008b; 2009) screened available data on sea trout populations around the Baltic Sea, and proposed an assessment method (ICES, 2011b). The basic method, theory and development is fully described in ICES (2011; 2012), and the slightly adjusted method applied since the assessment in 2012 is briefly summarized below, together with modifications applied in the present assessment.

Through screening of data availability (ICES, 2008b; 2009; 2011b), it was found that only abundance of trout from electrofishing were available from all countries. Together with habitat data, trout densities are collected annually from specific sites every year in most countries. However, at the time of the screening, the number of sites was highly variable and mostly sparse in many parts of the Baltic. From a few countries, directly useable data were not available, either because there was no electrofishing programme at all, or because the information collected was not sufficiently detailed. It was also found that only little and scattered information existed on other life stages (sea migration, abundance of spawners, smolt production and survival). Likewise, information on human influence, such as sea and river catches (especially recreational ones), was sparse.

An assessment model using electrofishing data together with habitat information collected at the same sites was proposed focusing on *recruitment status* as the basic assessment tool (reference point). Recruitment status was defined as the *observed recruitment* (observed densities) relative to the *potential maximal recruitment* (maximal densities that could be expected under the given habitat conditions, i.e. the predicted densities, see below) of the individual sea trout populations.

Due to the significant climatic (e.g. temperature and precipitation) and geological differences found across the Baltic area, as well as the huge variation in stream sizes, the model proposed is constructed to take variables quantifying such differences into account. Differences in habitat qualities (suitability for trout) influence trout parr abundance, given that stock status is below carrying capacity and spawning success is not limited by environmental factors such as migration obstacles downstream to monitored sites.

To allow comparison of trout abundances between sites with different habitat quality, a sub-model was used, i.e. the **Trout Habitat Score (THS)**. THS is calculated by first assigning values (scores) for the following relevant (and available) habitat parameters for 0+ trout: *average/dominating depth*, *water velocity*, *dominating substrate*, *stream wetted width*, *slope* (where available), and *shade*. Scores assigned range between 0 for sites with poor conditions and 2 for best conditions (assessed from suitability curves and in part by expert estimates; see details in ICES, 2011b). THS is then calculated by addition of score values resulting in a total score that can vary between 0 (very poor conditions) and 12 (10 if *slope* is omitted) for sites with very good habitat conditions. Finally, the THS values obtained were grouped in four **habitat classes** ranging between 0 (poorest) and 3 (best; ICES, 2011b).

The potential maximum recruitment for sites with a given habitat quality used in this year's assessment was the same as in 2015 (ICES, 2015). In calculations, observed parr abundance was transformed using  $\text{Log}_{10}(x+1)$  to minimize variation and improve fit to a normal distribution.

Predicted maximum densities were determined by a multiple linear regression analysis based on select sites displaying expected "optimal densities" (see Section 5.6.2. in ICES, 2015). The analysis found the variables *log (width)*, *average annual air temperature*, *latitude*, *longitude* and *THS* to be significant in determining optimal densities of 0+ trout ( $r^2 = 0.5$ , Anova;  $F_{2,254} = 51.8$ ,  $p < 0.001$ ) according to the following relation:

1. 
$$\text{Log}_{10}(0+\text{optimal density}) = 0.963 - (0.906 * \text{logwidth}) + (0.045 * \text{airtemp}) - (0.037 * \text{longitude}) + (0.027 * \text{latitude}) + (\text{THS} * 0.033).$$

This multiple regression relation 1) was used for calculating the potential maximal densities at the individual fishing occasions, with current **recruitment status 2)** calculated as:

2. 
$$\text{Recruitment status} = \log(\text{Observed density}+1) / \log(\text{predicted optimal density}) * 100.$$

Note that for two reasons, it is possible that single observed densities can sometimes be higher than the predicted mean, resulting in a recruitment status somewhat above 100%. First, as described above, predicted maximal densities are calculated using multiple regression based on observations that show variation around the mean. The maximum values used to assess status thus represent average densities across several sites with a given habitat quality score (THS), and individual observations may occasionally exceed the predicted (average) maximum. Second, the calculation of predicted maximal densities has not been updated since the construction of the present model in 2015, taking more recent observations into account.

Mean recruitment status was calculated for each assessment unit (see below and figures 5.3.2.1-5.3.2.3), each ICES subdivision (SD) and by AU and country combined. Recruitment status was calculated for each year for sites fished for at least two years during the period 2015–2024 (Figure 5.4.2.4) and for sites that were consecutively fished the last four years (Figure 5.4.2.5). Assessment units (AUs) are defined according to the table below:

Assessment unit	SD
Gulf of Bothnia (GoB)	30–31
Gulf of Finland (GoF)	32
Western Baltic Sea (West)	27 & 29
Eastern Baltic Sea (East)	26 & 28
Southern Baltic Sea (South)	22–25

### Recruitment trends

Long-term trends in recruitment were assessed for the 10-year period 2015–2024 to identify potential changes in status over time. Only sites with calculated status values available for at least two years within this period were included in the analysis. Trends were visualized using model-predicted slopes from a linear mixed-effects model, with year included as a fixed effect and site as a random factor to account for repeated measurements at the same location. Statistical significance was evaluated based on the slope of the fixed effect (year) and its associated 95% confidence interval.

In previous assessments, trends were evaluated using bivariate correlations over five-year periods (ICES, 2012). The current approach allows more sites and years to be included in the analysis, while accounting for the hierarchical structure of the data and avoiding inflated significance that can result from treating repeated observations as independent. It also accommodates unbalanced sampling designs, such as years with differing numbers of sampled sites.

For short-term trends, recruitment status in 2024 was compared with the mean recruitment status over the preceding three-year period (2021–2023). This comparison included only sites with data available for all four years. The difference in recruitment status between the two time periods was tested for statistical significance using paired t-tests based on site-level comparisons.

Both recruitment status and trend were calculated as average values for each of the following units of analysis: assessment units (AUs), ICES subdivision (SDs), and for AU further divided into countries.

For a final assessment, the results from the above status and trend analyses were combined with additional information gathered, most markedly from fisheries and count of spawners (where available).

### 5.3.2 Data availability for status assessment

The number of sites available for calculation of recruitment status is found in Table 5.3.2.1. The number of sites available for analysing 10-year trends was in total 943 unique sites and for four years 354. Positions of the sites is presented in figures 5.3.2.1–5.3.2.3.

## 5.4 Data presentation

### 5.4.1 Trout in Gulf of Bothnia (SD 30 and 31)

Sea trout populations are found in a total of 67 Gulf of Bothnia rivers, of which 32 have wild and 35 have mixed populations (tables 5.4.1.1 and 5.4.2.1).

The status of sea trout populations in Swedish rivers is in general considered to be uncertain. Populations are affected by human activities influencing freshwater habitats, mostly through overexploitation, damming, dredging, pollution, and siltation of rivers (Table 5.4.1.2).

Average 0+ parr densities for Swedish and Finnish rivers in the area are presented in Figure 5.4.1.1. Swedish rivers are divided into bigger, salmon rivers and trout rivers. The densities in salmon rivers have been low for many years and densities in trout rivers are higher and increasing since the beginning of this century with maximum of 34 per 100 m<sup>2</sup> in 2014. Since 2014, we observe decreasing trend with minimum of 14 in 2024. The SD 30–31 electrofishing results from Finland include few rivers (Lestijoki, Isojoki, and some tributaries of Tornionjoki). Densities of 0+ parr have been varying between 5 and 10 for the last several years (Figure 5.4.1.1).

Sea trout smolt runs (trapped and estimated) in the period 2002–2024 are presented in Table 5.4.1.3. In River Tornionjoki (SD 31), smolt trapping during the whole migration period for sea trout has only been possible in some years because the trout smolt run is earlier than for salmon, and in most years the trout smolt run is already ongoing when river conditions allow start of smolt-trapping; the seven annual estimates available for Tornionjoki range from about 11 000 to 27 190 sea trout smolts with maximum amount in 2022 (Table 5.4.1.3). In the two smaller SD 31 rivers, Sävarån and Rickleån, where trapping ended in 2013 and 2017, yearly production estimates have varied from ca. 200 to 2 100 and from 300 to 600 smolts, respectively. A screw trap has started in Isojoki (SD 30) in 2019 with a number of smolts estimated to 7 300; in next two years, it decreased to ca 3 500. Data after 2022 are not available (Table 5.4.1.3).

The number of sea trout spawners recorded by fish counters is low in ‘salmon rivers’ in Bothnian Bay in Sweden (Figure 5.4.1.2). The average number of sea trout counted in River Kalixälven increased somewhat after 2012 to above 300 with 333 in 2023 and maximum of 449 in 2024. In River Byskeälven, the number increased to above 300 fish in 2020, followed by a two-years decrease and again increase to maximum 531 in 2024. From 2011, the annual number of ascending sea trout in River Vindelälven has varied within the range 100–300. However, the number increased considerably in 2019 to almost 500 fish, followed by a decrease to 253 fish in 2022 and an increase to 436 in 2024. In contrast, River Piteälven has shown a positive trend that has lasted since the beginning of the century, with 2 251 sea trout spawners recorded in 2024. In smaller rivers, Åbyälven and Rickleån, the number of recorded spawners in 2023 was the highest in the 21st century, 109 and 232 respectively, and decreased substantially in 2024.

River catches of wild sea trout in SD 30–31 since 2013 do not reflect actual runs because of implemented restrictions (size and catch limits, in R. Torne a complete ban on harvest of sea trout, etc.) (Figure 5.4.1.3). However, since 2018, catches in SD 30 and 31 has increased from the lowest recorded level of approx. 500 to approx. 1 100 fish in 2020 and 733 in 2024 (Figure 5.4.1.4) despite the drop of River Kalixälven catch to zero in 2017 and thanks to increase of River Piteälven catch, mainly.

### 5.4.2 Trout in Gulf of Finland (SD 32)

The number of streams with sea trout in Gulf of Finland was partly updated in 2024. It is now estimated that there are 100 rivers and brooks with sea trout in this region; out of these 93 have

wild stocks, the rest are supported by releases (tables 5.4.1.1 and 5.4.2.1). The situation for populations is uncertain in 36 rivers and very poor in 20 (with current smolt production below 5% of the potential).

In Estonia, sea trout wild populations are found in 39 rivers and brooks in the Gulf of Finland region (Table 5.4.1.1). Electrofishing data from Estonian rivers show densities of up to 140 0+ parr per 100 m<sup>2</sup> in the 1980s. In more recent years, densities have in general been below 40 0+ parr per 100 m<sup>2</sup> with a positive trend in the last 20 years and 36 0+ parr per 100 m<sup>2</sup> in 2024 (Figure 5.4.2.1). Estonian rivers with higher smolt production are situated in the central part of the north coast. Smolt runs in River Piritä during the period 2006–2021 have varied between around 100 and 4 000, and after three years of high amounts, dropped to 132 in 2023 and increased to 870 in 2024 (Table 5.4.1.3). The number of spawners recorded by a fish counter in this river was between 50 and 66 in the last six years (Figure 5.4.2.2).

Parr densities for sea trout in the Finnish rivers in the Gulf of Finland varied but with an increasing trend since 2003 with the value above 60 in 2020 and a drop to approx. 40 in the last three years (Figure 5.4.2.1).

In Russia, wild sea trout populations are found in at least 48 rivers and brooks, including main tributaries (tables 5.4.1.1 and 5.4.2.1). A majority of these populations are situated in rivers or streams along the Russian northern Gulf of Finland coast, but the rivers with highest smolt production are located along the south coast. In most recent years (2019–20), average 0+ parr densities have in general been below 10 individuals per 100 m<sup>2</sup> (Figure 5.4.2.1) with very high variations in some tributaries of River Luga. The smolt run in River Luga during the period 2002–2014 varied between 2 000 and 8 000 wild trout smolts (Table 5.4.1.3). After increasing to a record level of 11 600 smolts in 2015, almost three times higher than the average for the total monitoring period (ca. 4 000 smolts), it again decreased to 3 600 in 2019 and 2020. Total production in the Russian part of Gulf of Finland has been estimated to about 15 000–20 000 smolts per year. Genetic studies have shown that 6–9% of the sea trout caught along the southern Finnish coast was of Russian origin (Koljonen *et al.*, 2014). New information about Russia sea trout is not available.

### 5.4.3 Trout in Main Basin (SD 22–29)

In the Main Basin, when including tributaries in larger water systems (Odra, Vistula, and Nemunas), there are 539 rivers and streams with sea trout populations, out of which 470 are wild (tables 5.4.1.1 and 5.4.2.1). However, these figures do not include Germany; the actual number of German sea trout streams/rivers has not yet been evaluated, although it has been estimated that it could be close to 90.

In Sweden, 207 sea trout rivers are found in the entire Main Basin. Out of these, 200 have wild sea trout populations whereas seven are supported by releases.

In Denmark, the number of populations was revised in 2024. One hundred ninety-two out of 233 trout rivers are wild, with a majority classified as being in good condition.

In Poland, the number of populations was revised in 2023; sea trout are found in 26 rivers, mainly in Pomeranian rivers (11), but also in the Vistula (six) and Odra (six) systems (including the main rivers). All Polish sea trout populations are mixed due to supplemental stocking since many years.

There are three Russian sea trout rivers flowing into the Main Basin (in the Kaliningrad Oblast). All are wild and their status is uncertain.

In Lithuania, sea trout are found in 19 river systems, whereof eight belong to the Nemunas catchment area. In eight Lithuanian river systems, there are wild populations (no releases), while the rest are mixed, with wild populations being supplemented by releases.

In Latvia, sea trout populations are found in 54 rivers, 49 of them wild.

In Estonia, sea trout occurs in 36 rivers and brooks discharging into the Main Basin. All of them are small with wild populations.

### **Main Basin East (SD 26 and 28)**

After a three years decline of average densities of 0+ parr in Estonia, Latvia, and Lithuania, they have increased to ca 30, 36, and 16, respectively, in 2024.

Estimated smolt numbers from smolt-trapping in Salaca, have varied between 21 154 in 2016 and 2 500 in 2024 (Table 5.4.1.3). In Salaca, the number of spawners has been counted since 2021. During this period, the number registered increased from 99 in 2021 to 470 in 2023 and 407 in 2024 (Figure 5.4.2.2).

The estimated total natural smolt production in Lithuanian rivers in 2024 was ca 62 000, more than in 2023 but only little more than half of 2022 production.

In Poland, average densities of 0+ parr in SD 26 rivers have been generally high but variable, with densities of up to more than 90 individuals per 100 m<sup>2</sup> in 2016 and decrease gradually to 26 in 2024 (Figure 5.4.3.1). Number of adult sea trout migrating upstream recorded by an electronic counter (VAKI) in a fish-pass at the Wloclawek dam in Vistula River decreased from 1 554 in 2015 to only 173 in 2017 and stay on a low level till 2020 (Figure 5.4.2.2). Since 2021 data have not been available.

There are only a few small streams on the east coast of Gotland Island in SD 28 in Sweden. Average densities of 0+ parr have been extremely variable in this area with densities between 12 and up to 362 individuals per 100 m<sup>2</sup> with value of 94 in 2024 (Figure 5.4.3.1).

### **Main Basin West (SD 27 and 29)**

Average 0+ parr densities in western Estonian rivers (SD 29) have increased during the 21st century, from close to zero to almost 50 per 100 m<sup>2</sup> in 2018 and 70 in 2024 (Figure 5.4.3.2). In the Swedish salmon river Emån, the average parr density decreased from above 40 to close to 0 in the 1990s and has been varying between one and 15 in the 21st century. Densities of parr in small Swedish trout streams in this area have been much higher, above 100 in 2003 and 2005, but with some drops to around 40 in 2012-2013, and in 2023 (Figure 5.4.3.2). Nominal (landed) river catches of sea trout in Emån are presented in Figure 5.4.1.4. The sport fishing harvest of sea trout in Emån has been declining to only a few fish. However, since catch and release numbers are not included, this does not give a correct picture of the total catch.

### **Main Basin South (SD 22-25)**

Average parr density in Swedish trout streams varies between 50 and 100 individuals per 100 m<sup>2</sup> with positive trend since 2020. In the salmon river Mörrumsån, density of trout parr have been much lower, usually below 10, reaching a minimum of less than two in 2020. In 2024, it was 2.6 (Figure 5.4.3.3). Results from smolt trapping in this river show that production in the upper half of the river (the smolt trap is located approximately 11 km from the outlet) has varied between 2 000 and 7 000 smolts during the last 10 years, with 3 650 in 2024 (Table 5.4.1.3). In Mörrumsån, the Marieberg hydropower dam (c. 12 km from the river mouth) equipped with a fish ladder and a VAKI counter, was removed in the summer of 2020. Since then, fish can pass freely at the site but without any fish counting. In 2020 and 2021, tests for counting fish were carried out further downstream, and since 2022 a video fish counter with guiding fences covering a portion of the river's width, has been in operation at a new location closer (c. 4 km) to the river mouth. Additionally, an ARIS sonar camera, capable of detecting all fish passing through, has been

intermittently operated close to the new video fish counter in 2020–2022. Daily data from both counters, along with other relevant information such as water flow, have been used to produce statistically based “expert estimates” of the total abundance of ascending salmon and sea trout in 2022 and 2024. In Figure 5.4.2.2, however, only the number of individuals actually registered in the camera counter are shown.

In Nybroån (AU 4), 5 km from the river mouth at Köpingsbro, a sugar mill was removed in 2012, and a fishcounter, Riverwatcher (VAKI Ltd), was installed. The number of ascending trout passing the camera has been high, above 4 600 in 2023 and 3 000 in 2024 (Figure 5.4.2.2).

The Swedish sport fishing harvest of sea trout has declined markedly the past decade; in 2024, it was a few fish (Figure 5.4.1.4). However, since catch and release is not included, this does not give a correct picture of the total catch in the rivers.

The total number of wild sea trout smolts produced in Danish rivers (SD 22–25) is at present estimated to around half of million per year. Since 2010, electrofishing data from Danish streams have shown average parr densities between 50 and 100 0+ per 100 m<sup>2</sup>, with minimum in 2024, similar to densities in Swedish rivers (Figure 5.4.3.3). Annual smolt migration in one stream on the Island of Bornholm (Læså, length 17 km, productive area 2.46 ha) was estimated between 2007 and 2013 on a base of trapping. There was very high variation among years (1 687–16 138) with average 6 300 individuals (Jespersen *et al.*, 2021) (Table 5.4.1.3).

The average parr abundance in Germany has been decreasing from 68 in 2014 to seven in 2023 and increased to over 20 in 2024 (Figure 5.4.3.3), but the set of electrofished sites has been changed in every year. Spawner numbers have been collected by video counting in several German streams in SD 22 and 24 with wild populations (Figure 5.4.2.2). The last available data are from season (2023/24). In all of them, number of fish was below 300, similar or less than in previous year.

Average densities of 0+ parr on spawning sites in Polish rivers in SD 25 have shown a decreasing trend, from 114 in 2004 to 21 in 2024 (Figure 5.4.3.3). Spawning runs have been monitored by fish counting in the Slupia River since 2006 and until 2013 varied between 3 500 and 7 500 fish, then dropped below 400 in 2017, increased to around 2 500 in 2020, and dropped again in 2021; since 2022, the counter did not work. Another counter has been operating since 2018 in River Parseta 54 km from its mouth; it recorded 3 808 spawners in 2020, dropped to ca 1 100 fish in 2022, and increased in 2024 to almost 2 800. Severe disease problems have occurred in all Polish Pomeranian Sea trout rivers since 2007. The affected sea trout display UDN-like skin damages followed by fungal infections, high mortality and lack of kelts. In 2024, it was observed in most of rivers, also between fresh, silver fish entering river in a summer.

## 5.5 Recruitment status and trends in development

Results from the updated analyses of recruitment status and trends for sea trout in rivers and streams around the Baltic Sea are shown in Table 5.5.1 and figures 5.5.1–5.5.6. The different time-series use different number of sites, so average recruitment status is only comparable within time-series (see Table 5.5.1, and Figures 5.3.2.1–5.3.2.3).

In the **Gulf of Bothnia** assessment unit (SD 30–31), the overall average recruitment status in 2024 was reasonably good (62%), but lower than the average for sites used in both the 10-year trend (72%) and the four-year trend (76%). The 10-year trend indicates a continued drop in status (Figure 5.5.1), while the short-term trend does not indicate a recent change in recruitment status (RS) (Figure 5.5.2).

The 10-year trend was negative in both SD 30 and SD 31 (Figure 5.5.3), being slightly higher in SD 30 (73% in 2024, 87% average of 10-year trend and 90% average of four-year trend) than in

SD 31 (52% in 2024, 57% average of 10-year trend and 64% average of four-year trend) (Table 5.5.1). While the long-term trend was negative in both SDs (Figure 5.5.3), the short-term trend did not show any development in either of the SDs (Figure 5.5.4).

The average 2024 recruitment status on the Swedish sites in Gulf of Bothnia was slightly higher than on the Finnish sites (Table 5.5.1). Both the long- and short-term trend was negative on the Finnish side, but stable on the Swedish side (figures 5.5.5 and 5.5.6).

In the **Gulf of Finland** assessment unit (SD 32), the analysis of trend does not indicate a statistically significant development in the recruitment status. Status is consistently high in both Finland and Estonia (Table 5.5.1 and figures 5.5.1–5.5.6).

The latest available data from Russia was from 2020. During the period 2014–2020, the average status was at the time 60% (Table 5.5.1).

In assessment unit **East** (SD 26 and 28), the overall average recruitment status has in later years been approx. 60% (Table 5.5.1).

Trend analysis does not indicate a statistically significant development in the recruitment status on either long or short term (Figure 5.5.1 and Figure 5.5.2).

The recruitment status was much higher in SD 28 (average 2024: 93%; 2015–2024: 93%; 2021–2024: 91%) compared to SD 26 (average 2024: 43%; 2015–2024: 46%; 2021–2024: 45%) (Table 5.5.1).

Analysis of trend does not indicate a statistically significant change in recruitment status in either of the two SDs, however with a declining tendency in the 10-year trend for SD 28 (figures 5.5.3 and 5.5.4).

The low recruitment status in SD 26 is mainly due to a large number of sites with a relatively low status in Lithuania (average 2024: 42%; 2015–2024: 44%; 2021–2024: 42%), while status in Polish rivers was better, however not high (average 2024: 51%; 2015–2024: 68%; 2021–2024: 67%) (Table 5.5.1). The trend analysis does not indicate a statistically significant development in either of the two countries (figures 5.5.5 and 5.5.6).

In SD 28, status was good in both Estonian (average 2024: 86%; 2015–2024: 106%; 2021–2024: 90%) and Latvian (2024: 95%; 2015–2024: 91%; 2021–2024: 91%) streams, and also good in the one Swedish stream on the east coast of Gotland (2024: 93%; 2015–2024: 89%; 2021–2024: 90%) (Table 5.5.1).

Analysis of trend does not indicate a statistically significant change in recruitment status in either of the countries in the SD (figures 5.5.5 and 5.5.6).

In assessment unit **West** (SD 27 and SD 29), the average recruitment status was relatively good, and in 2024 higher than in the preceding three years (Figure 5.5.2 and Table 5.5.1). Over the longer term, however, the trend has been negative (2024: 76%; 2015–2024: 70%; 2021–2024: 68%) (Figure 5.5.1). The level of the recruitment status was in recent years somewhat higher in SD 27 than in SD 29, due to a significant increase in 2024 compared to previous three years (SD 27: 2024: 80%, 2015–2024: 71%; 2021–2024: 70%; SD 29: 2024: 70% 2015–2024: 68%; 2021–2024: 60%) (Figure 5.5.4 and Table 5.5.1). The trend analysis indicated the short term to be positive in SD 27, but without significant development over time in SD 29.

In assessment unit **South** (SD 22–25), the overall average recruitment status was relatively low (average 2024: 47%; 2015–2024: 43%; 2021–2024: 58%), but with large variations between both subdivisions and countries (Table 5.5.1). Trend analysis does not indicate change in recruitment status over time (Figure 5.5.1 and Figure 5.5.2).

Even if the overall trend in the assessment unit did not indicate a change over time, this was not the case for SD 22 and SD 25, which both showed a negative 10-year trend (Figure 5.5.3), mainly

due to declines in both German and Polish streams (10-year trend) (Figure 5.5.5), indicating a decline in recruitment status in both countries.

In Subdivision 22, the overall average status was relatively low (2024: 44%, 2015–2024: 34%; 2021–2024: 30%), being reasonably good in Denmark (2024: 70%; 2015–2024: 66%; 2021–2024: 64%), but low in German streams (average 2024: 42%; 2015–2024: 31%; 2021–2024: 23%) (Table 5.5.1).

SD 22 includes streams in both Schleswig-Holstein (SH) and Mecklenburg-Vorpommern (MV).

In 2024, information was available for Schleswig-Holstein (SD 22) for the first time in three years. Here recruitment status was low in both 2024 (38%) and for the years 2015–2021 (39%) (Table 5.5.1). Trend analysis does not indicate a change in recruitment status during the last 10-year period (data not shown).

Recruitment status was also low in MV (SD 22), however with significantly higher average level in 2024 (47%) compared to the previous three years, and the last 10 years (2015–2024: 28%). Also here, the 10-year trend did not indicate a change over time (data not shown).

In SD 23, with only Swedish sites, the average status was good (2024: 84%; 2015–2024: 79%; 2021–2024: 82%) (Table 5.5.1). The trend analysis does not indicate a statistically significant development in the recruitment status (figures 5.5.3 and 5.5.4).

In SD 24, the overall average status was low (2024: 43%; 2015–2024: 34%; 2021–2024: 55%) (figures 5.5.3–5.5.4 and Table 5.5.1).

The situation in SD 24 varies considerably between countries, with a low average status in the large number of German (MV) sites (average 2024: 39%; 2015–2024: 29%; 2021–2024: 47%), good in the one Danish stream (2024: 72%, 2015–2024: 63%; 2021–2024: 63%), good in Swedish (2024: 88%; 2015–2024: 100%; 2021–2024: 112%), and Polish streams (average 2024: 79%; 2015–2024: 85%; 2021–2024: 84%) (Table 5.5.1).

In SD 25, the overall recruitment status was good (2024: 69%; 2015–2024: 77%; 2021–2024: 75%) due to good status in Sweden (2024: 90%; 2015–2024: 82%; 2021–2024: 73%), but slightly lower status in Poland (2024: 64%; 2015–2024: 76%; 2021–2024: 75%). Even if the level in recruitment status is good, the overall 10-year trend was slightly negative (Figure 5.5.3). This is mainly due to a decline in status in Polish rivers.

## 5.6 Reared smolt production

Total number of reared sea trout smolts released 2024 in the Baltic Sea (SD 22–32) was 2 979 000, which is less than in last year (3 057 000) and below the last 10-year average. Out of this total, 2 016 000 smolts were released into the Main Basin, a little below the average, 855 000 into the Gulf of Bothnia, less than average, and 108 000 into the Gulf of Finland, less than the last 10-year average (Table 5.6.1).

In Finland, trout smolt production is mainly based on reared broodstocks supplemented by spawners caught in rivers. In the past 10 years, the number of smolts released has decreased and was 598 000 in 2024, whereof 67% were stocked into the Gulf of Bothnia and 18% into the Gulf of Finland.

In Sweden, the number of trout smolts stocked in 2024 was 572 000, a little less than the average level in the last 10 years. A majority of the Swedish smolts were released into Gulf of Bothnia (79%).

Estonia has stopped all sea trout releases in 2018.

In Poland, juvenile fish are reared from spawners caught in each Pomeranian river separately but almost the entire Vistula stocking is of reared broodstocks origin now. A total of 914 000 smolts were released into Polish rivers in 2024, less than in last year (1 137 000) and a little less than the 10 years average.

Denmark released 707 000 smolts in 2024, more than in 2023 (656 000) and more than the average in the past 10 years.

Latvia released 165 000 smolts in 2024, half of 2022 releases and less than the average in the past 10 years.

Lithuania released 22 000 in 2024, similarly to previous years.

Germany released 2 000 smolts, much less than average and similarly to 2023.

In addition to direct smolt releases, trout are also released as eggs, alevins, fry, and parr (Table 5.6.2). The estimated number of smolts originating from these releases of younger life stages over time ('smolt equivalents', calculated as described in Table 5.6.2) is presented in Table 5.6.3. In 2024, the estimated smolt number expected from releases of younger life stages in previous years was around 154 000, mainly in Main Basin rivers, a little more than in 2023 and much less than in previous years (10-year average 210 000). The prediction for 2025 is approximately 152 000 smolts for the whole Baltic, of which 105 000 will migrate into the Main Basin.

## **5.7 Recent management changes and additional information**

### **5.7.1 Management changes**

According to the Council Regulation (EU) 2018/1628 of 30 October 2018, fixing for 2019 the fishing opportunities for certain fish stocks and groups of fish stocks applicable in the Baltic Sea, and, amending Regulation (EU) 2018/120 as regards certain fishing opportunities in other waters, most of the sea trout in the Baltic Sea is exploited in coastal areas. Therefore, it was prohibited to fish for sea trout beyond four nautical miles and to limit bycatches of sea trout to 3% of the combined catch of sea trout and salmon, in order to contribute to preventing misreporting of salmon catches as sea trout catches. These regulations, combined with unfavourable weather conditions and increasing seal damage, have resulted in serious changes in Polish fisheries. The offshore fisheries (both catch and effort) have been reduced, and the issue of misreporting salmon as a sea trout dropped.

Additionally, in Sweden, from 01 September 2019, new fishing regulations were introduced in SD 30 to improve the situation for coastal fish populations in this area. These regulations include a ban for fishing with nets in areas with less than three meters depth between 01 September and 10 June, a complete net ban between 15 October and 30 November, an increase of the minimum size for sea trout from 40 to 50 cm, and a daily bag limit of one wild sea trout when fishing with sport fishing equipment or fykenets. In April 2021, a daily bag limit of one wild sea trout when fishing with sport fishing equipment or fykenets was introduced also along the Swedish south-east coast (SD 27–29). The new regulations implemented in 2021 also include a few new protection areas along the south-east coast to protect sea trout during the autumn migration. In addition, from 2022 no fishing is allowed in the protection area outside Ljungan except rod fishing on finclipped sea trout. In 2024, twelve new protection areas were established in SD 25, 27, and 29, with closed fishery during parts of the year (mainly in spring), with the purpose to protect coastal fish in general.

In 2021, Lithuania introduced a commercial fishing ban for salmon and sea trout in the Curonian Lagoon. These species must be released, regardless of their viability. Information on catches and discards is not reported anymore, which complicates and distorts the collection of sea trout migration data through the Curonian Lagoon.

### 5.7.2 Additional information

In recent years in Poland, measures of stocking efficiency have been conducted, involving genetic parental assignment techniques. In 2021, 200 of sea trout, returning to the Rega for reproduction, were collected and genotyped. Molecular analyses, focused on 13 microsatellite loci, were supposed to indicate the descendants of fish used for artificial spawning in 2016, among the sea trout returning to the rivers in 2020. The genotypic parental database of spawners from 2016, was composed of 429 fish used for artificial spawning in the Rega River that year. This was the last year of the study where fish at sea age 2.2+ and 1.3+ were analysed. Parenthood analysis, performed for fish caught in 2021 in the Rega, indicated that at least 11% of fish originated from the 2016 artificial spawners database. In 2024, next 183 returning sea trout from the Paręta River were genotyped, which could have been the offspring of fish used for artificial spawning from years 2018–2020. No offspring of parents from 2018 was detected. However, it was concluded that only 1% came from the spawning of 2019 and about 40% from the spawning of 2020.

In the Danish river Vejle, the number of ascending spawners was estimated in 2024. The total run was estimated to be 3 271 (2 906–3 636) sea trout. Lengths were between 26 and 88 cm (median 54 cm) and 74% were female and 26% male. Anglers caught 1 032 sea trout (annual average 700–1 400), corresponding to 32% of the run. From these, 422 were retained (13% of ascending spawners and 41% of the landed number of sea trout). Overall, catch and release has become increasingly popular in this river.

Extensive reassessment of spawning and rearing habitats through mapping launched in Latvian Salaca in 2024. Work will continue in 2025. Given the extensive habitat restoration work being carried out within the LIFE is Salaca project, information on suitable habitat areas is continuously updated.

Reports on thiamine deficiency in sea trout are not well documented in the Baltic. It is however well documented from several American studies that salmonids, including trout, can suffer from TDC displaying genetic variation in capacity for tolerance to thiamine deficiency and a variation in causes underlying the deficiency (Fitzsimons *et al.*, 2021, Heisey *et al.*, 2023). The limited reports from the Baltic Sea area may be due to a lack of studies or a lower prevalence of M74 syndrome, possibly influenced by differences in reproductive cycles. The sea trout's shorter cycle compared to salmon may contribute to this. A study by Czczuga *et al.*, (2005) investigated M74 occurrence in sea trout (*Salmo trutta m. trutta*) returning to spawn in Polish rivers in 2003. Among 250 females, M74 syndrome was identified in 14% of individuals. Differences in egg carotenoid composition, particularly the dominance of red carotenoids in orange and yellow-orange eggs, were also noted (Czczuga *et al.*, 2005). Additionally, preliminary data from sea-run Baltic brown trout indicated that yolk-sac fry exhibiting M74-like symptoms like lethargy, skin darkening, and 100% mortality, had significantly low mean thiamine concentrations (0.14 nmol/g in 1994 and 0.34 nmol/g in 1998) compared to healthy progeny (4.4 nmol/g in 1994 and 3.9 nmol/g in 1998). This suggests that some family groups of Baltic brown trout may suffer from reproductive disorders linked to thiamine deficiency (Amcoff *et al.*, 1999).

A compilation on fish health in salmonid fish was conducted by SVA in 2019 and 2020. In Section 2.8, results from sampling of Baltic salmon are presented. In trout, UDN-like symptoms were reported via SVA database (SVA 2019). Ulcerative dermal necrosis (UDN) is a chronic dermatological disease of cold-water salmonid fish with symptoms where fish develop severe skin

lesions. Lesions become infected with overgrowths of fungi, such as *Saprolegnia*. In Torneälven, four sick/dead trout were reported together with one with UDN-like symptoms. In Ume/Vindelälven, one report of sick/dead fish was reported for trout with additional five reports where species were not noted. In Indalsälven, one trout was reported as sick/dead. From inventories conducted during spawning report of some trout with fungal infections from river Ljungan and Mörrumsån but not from river Örekilsälven, Öreälven, Kägeälven, or Vindelälven (SVA 2020).

Concentrations of dioxins in salmon are available from the IVL study (Hällén *et al.*, 2020). Only eight individuals were included in the study. Concentrations were lower compared to salmon with mean levels at 3–4 pg TEQ/g (wet weight). However, the collected trout was generally smaller than salmon, and the sample material can thus have been made up of younger individuals.

## 5.8 Assessment result

Sea trout in **Gulf of Bothnia** (SD 30 and 31) are still considered to be vulnerable. Even if the average recruitment status (RS) is still relatively good, the overall long-term trend has been negative. This is due to a decline in RS in Finnish rivers, partly driven by higher values in 2015 and lower values in 2024. Average densities of parr also went down in recent years.

The RS level is better in SD 30 than in SD 31 and for the most recent years higher in Finland than in Sweden.

The number of spawners has in general increased over the last decade, but the number of ascending sea trout is still low. Only in River Pite has the number of spawners increased markedly over the last two decades. In all other rivers, the absolute number of spawners is still very low, considering the size of the rivers, and it is likely that the number of spawners is limiting recruitment.

Time-series of smolt emigration does not allow the evaluation of possible longer-term trends. However, in previous years the numbers observed in River Torne were low considering the size of the stream.

It is recommended to maintain the present fishing restrictions in the region, and in SD 31 strengthen the implementation of restrictions in the gillnet fishery targeting other species, in order to minimize the bycatch of young sea trout. In addition, sea trout should be protected in the in-river fishery all the way up to its spawning grounds, including the actual spawning streams, and that release of trout in the sports fishery should be done as carefully as possible.

In the **Gulf of Finland**, trout populations seem to be in a good shape in both Finland and Estonia, with stable densities and high recruitment status.

In Russia, the status for trout populations is presently uncertain, due to lack of updated information.

In the assessment unit **West** (SD 27 and 29, Western Main Basin), the overall level in recruitment status has increased in 2024 but the trend for the last 10-year period has been negative. The reason for the negative trend is uncertain. There was no significant development in the 10-year trend but in SD 27, recruitment was in 2024 significantly higher than in the preceding three years.

Recently introduced fishing restrictions (protected areas) in Sweden SD 27 are likely to contribute to the safe-guarding of trout populations and presently the situation does not raise concern.

In assessment unit **East** (SD 26 and 28, Eastern Main Basin), parr densities are moderate but recruitment status was still good in Estonia. Presently the situation does not raise concern.

In Latvia, the overall recruitment status was stable and high, showing no trend over the last 10 years and not over the last four years either. A decrease in the smolt run in 2024 is likely due to a reduction in the spawning population observed in 2021/2022.

Many of the sea trout streams in Latvia are highly affected by beaver activities, which reduces migration opportunities and reduces areas with good trout habitat. Beaver dams often also reduce water-covered habitats downstream to the dams, which may be problematic, especially in smaller streams and particularly in years with high summer temperatures. Predation by seal is also estimated to be considerable and possibly limiting recruitment.

However, all in all, the situation does not raise concern in this part of the assessment unit.

In Lithuania (SD 26), parr densities are relatively low, with large variation between tributaries, but the overall average recruitment status has been moderate and stable in recent years, and smolt numbers have increased in recent years.

Several reasons are likely to influence the trout populations negatively.

Fluctuating water flows during the spawning period may impede access to spawning areas and in some areas, beaver dams are locally preventing access to spawning areas. Beaver dams also affect adversely habitat conditions. In dry periods during the incubation, spawning nests may dry out. In general, there is shortage of spawning possibilities in all areas, and poor habitat conditions also limits recruitment.

Recent fishing restrictions in the Curonian Lagoon forbid landing sea trout and salmon. The two species are caught as bycatch in the coastal fishery, which still continues. The result will be that sea trout and salmon are still caught – probably damaged seriously. The consequence is that information on the actual catch is not available for assessment.

While recruitment and production potentially could be higher, the situation does not raise serious concern.

However, while many natural factors, varying both temporary and spatially, negatively influence recruitment, it is still recommended that attempts are made to improve spawning possibilities and in general and, where this is possible, also improve habitat quality.

It is also recommended that information on catches in the coastal fishery should be made available for assessment.

In Poland (SD 26), the Vistula sea trout population was historically the largest in the Baltic, with river commercial catches of hundreds of tonnes in the 20th century. Presently the number of ascending sea trout is a few hundred. This is a result of drastically reduced access possibilities to potential spawning grounds, seal predation in the river mouth, and still existing commercial fishery in lower river. The situation has been not improved despite decades of mass stocking with fish originating from hatcheries brood stocks.

There are also very few small trout streams flowing directly to the sea with a few, maximum tens of entering spawners. Their status is unstable and depends on hydrological conditions.

In order to improve the situation for the populations, access to spawning and nursery areas must be secured. This involves the removal of migration obstacles and also securing access to the river from sea, with larger closed areas in the sea and cessation of fishing in the lower Vistula.

**Assessment unit South** (SD 22, 23, 24, and 25) includes several countries.

In Denmark, sea trout populations are subject to a considerable, almost exclusively recreational, fishery and removal, mostly in the sea, where the majority of the catch is in SD 22. In 2024, however, the catch in SD 22 was strongly reduced compared to previous years. The reason for this decline is unknown.

In the streams, spawning possibilities are in many places still considered to be insufficient, in spite of significant restoration works in recent years.

Overall, the situation does not raise concern, but reasons for the decline of catches in SD should be investigated.

In German streams within SD 22 and SD 24 (covering Schleswig-Holstein [SH] and Mecklenburg-Western Pomerania [MV]), data from SH in recent years is only available for 2024. While conditions in MV improved in 2024, the overall situation has remained unchanged over the past decade, with recruitment status remaining low.

The number of streams where spawner counts are conducted has increased significantly in recent years, which is expected to enhance future assessment opportunities.

So far, the estimated number of ascending sea trout remains low relative to their potential. However, this number is also influenced by stream accessibility, which varies with water flow. A slight increase observed in 2023 is believed to be linked to improved accessibility. Several factors in the rearing areas contribute to the continued low numbers, including limited spawning habitat, widespread and increasing beaver activity, predation by otters (notably in SH), water shortages, and inadequate watercourse maintenances/management. Coastal fishing both commercial and recreational also negatively impacts spawner numbers.

Given the persistently low status, efforts should be made to improve the habitat quality wherever possible. This includes active restoration projects, such as expanding spawning habitats, improving general habitat quality, and increasing accessibility. Adjustments to watercourse maintenance practices could also yield benefits, and accessibility should be improved wherever feasible. Preventing freshwater pollutants, such as agricultural runoff and silt, from entering water bodies is crucial for maintaining habitat quality. Fishing mortality should be reduced. Suitable management measures may include seasonal closures (which exist in MV but not for uncolored fish with loose scales in SH), extended closed areas in river mouths and estuaries, minimum distances to the coast and headline depth restrictions for gillnets, increased minimum landing sizes (currently 40 cm in SH and 45 cm in MV), and bag limits (which exist in MV but not in SH). In general, harmonization of existing fisheries management regulations for sea trout between SH and MV should be pursued.

To support more robust assessments, data on parr densities and recruitment status should be collected annually, at a minimum from a set of representative sites in both SH and MV.

In western Poland (SD 24 and 25), status of sea trout is poor and only few rivers have self-sustaining populations. The larger parts of potential spawning grounds are not accessible due to migration obstacles. In almost all small spawning tributaries, reproduction is very sensitive to hydrological conditions, which have in recent years been problematic with longer dry periods resulting in low flow, impeding access to spawning areas.

As in recent years, ascending sea trout in almost all rivers in the area, are infected with the disease *ulcerative dermal necrosis* (UDN). This heavily reduces the number of spawners, which in turn increases the necessity of implement regulations enlarging the spawning populations.

Despite relatively good average recruitment status, this has declined in recent years. The situation is believed not to be representative to the streams in general, because the sites used for the assessment are not entirely representative, and the actual status for entire river systems is judged to be lower (expert evaluation).

If entirely self-sustaining populations are to be established, access to spawning grounds should be secured.

Access to river mouths from sea should also be secured by having sufficiently large, protected areas around the river mouths.

In Swedish rivers (SD 24 and 25), recruitment status remained on a good-high and fairly stable level. However, trout populations in smaller streams in this subdivision may experience negative impacts under warming climate conditions.

The counted number of spawners and smolt in the typical sea trout river Nybroån (in SD 24) and in the more typical salmon river Mörrumsån (in SD 25) do not show any clear trends over time. However, the number of spawners in 2024 was lower than the previous year in both rivers. The number of smolt in Nybroån was lower in 2024 compared to the previous two years, while in Mörrumsån it remained around average levels, fluctuating between approximately 2 000 and 6 000 in recent years.

A newly established protected area in SD 25 will likely benefit populations and the situation does not raise concern.

In SD 23, the recruitment status has in recent years been good for a longer time-period and the populations here seems to be in good shape.

### 5.8.1 Future development of model and data improvement

In 2017, the ICES Working Group to Develop and Test Assessment Methods for Sea Trout Populations (anadromous *Salmo trutta*) (WGTRUTTA) was established. The group has gathered and summarized available sea trout data and information on life history (created a database and publications) and examined S–R relationships and different modelling options. A large-scale density model for trout is also being developed in Scotland, similar to a model recently developed for salmon (Malcolm *et al.*, 2019). Another approach has been developed to classify and evaluate the status of trout in watersheds in Norway, based on human impacts, catch statistics, counting of spawners, and local information and studies (Norwegian Scientific Advisory Committee for Atlantic Salmon, 2022a,b). The working group also worked on developing models for evaluating recruitment status based on electrofishing data.

## 5.9 Recommendations

- Data data on parr densities and recruitment status should be collected annually in all areas.
- Total population size of 0+ and older parr, as well as estimated total production of smolt should be calculated for rivers where data are available. Especially important are values for index rivers.
- Total production area available for sea trout should be provided for streams, where data are available. If possible, the areas should be divided into habitat quality classes.
- Sufficient and continuous data coverage of sea trout parr densities from typical trout streams should be collected in all countries.
- Sea trout index-rivers should be established to fulfil assessment requirements with respect to geographical coverage and data collection needs.
- Data on recreational sea trout catches should be consistently collected, taking into account the potentially high impact of recreational fisheries on sea trout stocks and the lack of these data in several countries. Information should be sufficiently detailed to provide information on both geographic distribution and whether the catch is retained or released after capture.

## **5.10 Tables & Figures**

**Table 5.1.1.1. Nominal commercial catches (in tonnes round fresh weight) of sea trout in the Baltic Sea (2001-2024). S = Sea, C = Coast, and R = River.**

Year	Main Basin															Total Main Basin	Gulf of Bothnia				Total Gulf of Bothnia	Gulf of Finland				Total Gulf of Finland	Grand Total	Estimated misreported catch*									
	Denmark		Estonia		Finland		Germany		Latvia			Lithuania			Poland			Sweden				Finland		Sweden					Estonia		Finland		Russia				
	S	C	S	C	S	C	S	C	S	C	R	S	C	R	S		C	R	S	C		R	S	C	R				S	C	R	S	C	R	S	C	R
2001	54	2	5	14	10	1	11	0	0	2	0	486	219	11	23	2	3	844	2	54	16	44	115	8	0	17		25	984								
2002	35	5	2	8	12	0	13	0	0	2	0	539	272	53	11	2	0	954	0	49	25	0	74	11	0	11		23	1051								
2003	40	2	1	4	9	1	5	0	0	0	0	583	169	32	8	3	0	858	0	41	21	0	62	7	0	7		14	934								
2004	46	3	1	5	12	0	7	0	0	1	0	606	122	36	9	3	0	851	1	39	21	0	61	7	0	7		14	926								
2005	14	4	1	7	14	0	7	1	0	1	0	480	86	20	5	3	0	644	0	46	24	0	70	6	0	11		18	732								
2006	44	10	1	10	12	0	7	0	0	1	0	414	98	17	6	2	0	623	1	40	20	0	61	9	0	13		23	707								
2007	26	4	2	8	9	0	8	0	0	1	0	354	133	39	6	3	0	592	0	45	15	0	61	13	0	12		26	678								
2008	18	4	1	11	13	0	8	0	0	2	0	34	90	48	4	3	0	236	0	47	19	0	67	8	0	18		26	328								
2009	12	7	1	8	4	0	10	0	0	2	0	259	103	26	3	3	0	439	0	46	17	1	64	11	0	17		28	530	266							
2010	8	5	0	6	3	0	5	0	0	2	0	343	81	30	2	3	0	489	0	37	20	1	58	11	0	10		22	568	299							
2011	6	5	0	5	3	0	0	6	0	2	0	139	65	39	1	2	0	275	0	33	18	1	53	12	0	10		22	350	148							
2012	11	8	0	5	18	0	4	1	0	3	0	37	74	26	0	3	0	191	0	41	18	2	61	14	0	16	0	29	281	70							
2013	4	7	0	6	14	0	5	1	0	11	0	43	44	8	0	3	0	148	0	29	14	1	44	12	0	9	0	21	212	60							
2014	10	5	0	6	14	0	5	1	0	5	0	21	72	28	0	3	0	170	0	22	11	0	33	10	0	7	0	17	220	54							
2015	8	5	0	4	14	0	4	0	0	6	0	13	83	7	0	2	0	145	0	16	13	1	30	11	0	6	0	17	192	66							
2016	1	6	0	3	12	0	5	0	0	4	0	62	86	3	0	2	0	184	0	18	10	0	29	14	0	6	0	20	232	104							
2017	6	5	0	3	9	0	4	0	0	1	0	111	41	1	0	3	0	184	0	16	9	16	41	13	0	6	0	19	244	128							
2018	3	7	0	1	10	0	6	1	0	0	7	179	55	3	0	2	0	274	0	13	9	0	22	10	0	6	0	16	312	170							
2019	3	6	0	2	10	0	4	1	0	8	0	3	82	3	0	1	0	123	0	12	7	0	19	11	0	6	0	17	159	2							
2020	2	17	0	7	2	0	5	0	0	0	6	1	77	8	0	1	0	127	0	10	6	0	16	11	0	5	0	16	159	1							
2021	2	3	0	1	5	0	7	0	0	0	0	0	55	6	0	1	0	81	0	10	5	0	14	9	0	5		14	109	0							
2022	6	3	0	1	4	0	3	0	0	0	0	0	36	6	0	6	0	64	0	7	4	0	11	10	0	4		14	90	0							
2023	3	5	0	1	6	0	4	0	0	0	0	0	41	6	0	2	0	68	0	9	4	0	13	10	0	4		15	95	0							
2024	0	5	0	1	4	0	7	0	0	0	0	0	42	5	0	1	0	66	0	10	5	0	15	8	0	6		14	96	0							

\*calculated from number of misreported salmon, subtracted from total catch

Table 5.1.2.1. Nominal landed recreational catch (in tonnes round fresh weight) of sea trout in the Baltic Sea (2001-2024). S = Sea, C = Coast, and R = River.

Year	Main Basin								Total Main Basin	Gulf of Bothnia			Total Gulf of Bothnia	Gulf of Finland		Total Gulf of Finland	Grand
	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Sweden		Finland	Sweden	Estonia		Finland			
	C <sup>2</sup>	C <sup>4</sup>	R+C	C <sup>3</sup>	C+O+R	C+O+R	C+O <sup>1</sup>	R		C+R	C	R		C+R	C+R		
2001								n.a.	0.0	7.0			7.0	0.0	3.0	3.0	10.0
2002			0.2					2.8	3.0	6.5	0.0	38.4	44.9	0.0	2.6	2.6	50.5
2003			0.2					3.6	3.8	11.1	0.0	31.5	42.6	0.0	1.6	1.6	48.0
2004			0.5					2.6	3.1	10.6	0.0	28.2	38.8	0.0	2.1	2.1	43.9
2005			0.5					1.5	2.0	10.6	0.0	30.9	41.5	0.0	2.7	2.7	46.2
2006			16.1					1.3	17.4	117.3	0.0	32.5	149.8	0.0	63.3	63.3	230.4
2007			16.3					1.3	17.6	120.2	0.0	31.5	151.6	0.0	63.1	63.1	232.3
2008			10.2					2.6	12.7	88.9	0.0	39.7	128.6	0.0	75.3	75.3	216.6
2009			10.4					2.3	12.7	90.6	0.0	45.8	136.4	0.0	78.5	78.5	227.6
2010			2.4		0.1		1.6	3.3	7.3	59.3	0.0	39.1	98.4	0.0	3.2	3.2	108.9
2011			2.4		0.0		1.7	2.2	6.3	59.5	1.7	39.3	100.5	0.0	4.2	4.2	111.0
2012			8.3		0.0		2.4	2.2	12.9	89.6	2.5	38.9	130.9	0.0	26.8	26.8	170.6
2013		1.4	8.2		3.0		8.9	1.3	22.8	89.6	1.5	46.2	137.3	3.3	26.8	30.1	190.2
2014		1.5	0.3		3.8		5.0	0.7	11.3	59.2	1.4	43.0	103.6	3.1	16.2	19.3	134.3

Year	Main Basin								Total	Gulf of Bothnia			Total	Gulf of Finland		Total	Grand
	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Sweden	Main	Finland	Sweden	Gulf of	Estonia	Finland	Gulf of		
	C <sup>2</sup>	C <sup>4</sup>	R+C	C <sup>3</sup>	C+O+R	C+O+R	C+O <sup>1</sup>	R	Basin	C+R	C	R	Bothnia	C+R	C+R	Finland	
2015		1.7	8.2	151.1	2.9		6.8	0.6	171.3	80.9	0.0	27.6	108.6	4.6	23.5	28.1	308.0
2016		2.3	7.2		5.1		5.6	0.4	20.6	197.8	0.0	21.7	219.6	4.9	29.5	34.4	274.6
2017		1.9	7.3		3.7		152.1	0.1	165.1	199.9	0.0	15.5	215.4	4.3	29.3	33.6	414.1
2018	47.1		17.1		7.7		99.4	0.0	171.2	28.4	0.0	15.5	43.9	6.4	22.5	28.9	244.0
2019	30.0	3.0	17.0	151.1	3.4	5.5	178.7	0.2	389.0	27.6	0.0	26.0	53.6	4.8	22.3	27.1	469.7
2020	401.2	2.3	6.0	151.1	3.8	8.8	222.7	2.3	798.2	20.8	0.0	24.2	45.0	4.1	20.3	24.4	867.6
2021	218.6	2.6	6.0	151.1	5.2	1.1	172.4	0.2	557.2	22.1	0.0	10.2	32.4	3.5	20.2	23.7	613.3
2022	255.7	2.3	3.0	151.1	1.8	1.2	189.4	0.2	604.7	16.8	0.0	9.1	26.0	4.8	10.1	14.9	645.5
2023	234.0	2.4	3.0	83.1	4.2	0.8	137.2	0.1	465.0	16.4	0.0	7.2	23.6	4.5	10.1	14.5	503.1
2024	178.9	2.2	0.0	83.1	4.2	0.8	39.9	0.1	309.1	17.3	0.0	7.8	25.1	4.1	10.0	14.1	348.4

<sup>1</sup>=O+C data based on pilot study 2017-2023

<sup>2</sup>=data from Danish national web-based survey (Statistics Denmark)

<sup>3</sup>=based on national recreational fisheries survey 2021/2022

<sup>4</sup>=based on mean weight from commercial catches

Table 5.1.3.1. Nominal catches (commercial + recreational; in tonnes round fresh weight) of sea trout in the Baltic Sea in 1979-2000. Commercial and recreational catches after 2000 are presented in tables 5.1.1.1. and 5.1.2.1. S = Sea, C = Coast, and R = River.

Year	Main Basin												Total						Total	Gulf of Finland			Total	Grand	
	Denmark <sup>1,4</sup>		Estonia		Germany <sup>4</sup>		Latvia	Lithuania		Poland		Sweden <sup>4</sup>			Main	Finland <sup>2</sup>		Sweden	Gulf of	Estonia		Gulf of			
	S + C	C	S + C	C	S + C	C	S + C	C	S <sup>9</sup>	S + C	R	S <sup>6</sup>	C <sup>6</sup>	R	Basin	C	R	S <sup>6</sup>	C <sup>6</sup>	R	Bothnia	C	C	R	Finland
1979	3	na	10	na	na	na	na	na	81 <sup>3</sup>	24	na	na	3	121	6	na	na	na	na	6	na	73	0	73	200
1980	3	na	11	na	na	na	na	na	48 <sup>3</sup>	26	na	na	3	91	87	na	na	na	na	87	na	75	0	75	253
1981	6	na	51	na	5	na	na	na	45 <sup>3</sup>	21	na	na	3	131	131	na	na	na	na	131	2	128	0	130	392
1982	17	na	52	1	13	na	na	na	80	31	na	na	3	197	134	na	na	na	na	134	4	140	0	144	475
1983	19	na	50	na	14	na	na	na	108	25	na	na	3	219	134	na	na	na	na	134	3	148	0	151	504
1984	29	na	66	na	9	na	na	na	155	30	na	na	5	294	110	na	na	na	na	110	2	211	0	213	617
1985	40	na	62	na	9	na	na	na	140	26	na	na	13	290	103	na	na	na	na	103	3	203	0	206	599
1986	18	na	53	na	8	na	na	na	91	49	7	9	8	243	118	na	1	24	na	143	2	178	0	180	566
1987	31	na	66	na	2	na	na	na	163	37	6	9	5	319	123	na	1	26	na	150	na	184	0	184	653
1988	28	na	99	na	8	na	na	na	137	33	7	12	7	331	196	na	na	44	42	282	3	287	0	290	903
1989	39	na	156	18	10	na	na	na	149	35	30	17	6	460	215	na	1	78	37	331	3	295	0	298	1.089
1990	48 <sup>3</sup>	na	189	21	7	na	na	na	388	100	15	15	10	793	318	na	na	71	43	432	4	334	0	338	1.563
1991	48 <sup>3</sup>	1	185	7	6	na	na	na	272	37	26	24	7	613	349	na	na	60	54	463	2	295	0	297	1.373
1992	27 <sup>3</sup>	1	173	na	6	na	na	na	221	60	103	26	1	618	350	na	na	71	48	469	8	314	0	322	1.409

Year	Main Basin												Total						Total	Gulf of Finland			Total	Grand
	Denmark <sup>1,4</sup>		Estonia		Germany <sup>4</sup>		Latvia	Lithuania		Poland		Sweden <sup>4</sup>			Main	Finland <sup>2</sup>		Sweden	Gulf of	Estonia		Gulf of		
	S + C	C	S + C	C	S + C	C	S + C	C	S <sup>9</sup>	S + C	R	S <sup>6</sup>	C <sup>6</sup>	R	Basin	C	R	S <sup>6</sup>	C <sup>6</sup>	R	Bothnia	C	C	R
1993	59 <sup>3</sup>	1	386	14	17	na	na	202	70	125	21	2	897	160	na	na	47	43	250	14	704 <sup>7</sup>	0	718	1.865
1994	33 <sup>8,3</sup>	2	384	15 <sup>8</sup>	18	+	na	152	70	76	16	3	769	124	na	na	24	42	190	6	642	0	648	1.607
1995	69 <sup>8,3</sup>	1	226	13	13	3	na	187	75	44	5	11	647	162	na	na	33	32	227	5	114	0	119	993
1996	71 <sup>8,3</sup>	2	76	6	10	2	na	150	90	93	2	9	511	151	25	na	20	42	238	14	78	3	95	844
1997	53 <sup>8,3</sup>	2	44	+	7	2	na	200	80	72	7	7	474	156	12	na	16	54	238	8	82	3	93	805
1998	60	8	103	4	7	na	208	184	76	88	3	6	747	192	12	0	9	39	252	6	150	3	159	1.158
1999	110 <sup>8,3</sup>	2	84	9	10	1	384	126	116	51	2	3	898	248	12	0	18	41	319	8	93	3	104	1.321
2000	58	4	64	9	14	1	443	299	70	42	4	3	1.011	197	12	0	14	36	259	10	56	3	69	1.339

<sup>1</sup>Additional sea trout catches are included in the salmon statistics for Denmark until 1982 (Table 3.1.2)

<sup>2</sup>Finnish catches include about 70% non-commercial catches in 1979-1995, 50% in 1996-1997, and 75% in 2000-2001

<sup>3</sup>Rainbow trout included

<sup>4</sup>Sea trout are also caught in the western Baltic in subdivisions 22-23 by Denmark, Germany, and Sweden

<sup>5</sup>Preliminary data

<sup>6</sup>Catches reported by licenced fishers and from 1985 also catches in trapnets used by nonlicenced fishers

<sup>7</sup>Finnish catches include about 85% non-commercial catches in 1993

<sup>8</sup>ICES subdivisions 22 and 24

<sup>9</sup>Catches in 1979-1997 included sea and coastal catches, since 1998 coastal (C) and sea (S) catches are registered separately

na = data not available

+ catch less than one tonne



**Table 5.2.2.1. Adipose finclipped and tagged sea trout released in the Baltic Sea area in 2024.**

Country	Subdivision	River	Age	Number of finclipped			Tagging	Other Methods		
				fry	parr	smolt	Carlin	T-bar Anch	PIT	ARS (1)
Poland	25	Parseta	2yr							2 000
Poland	25	Leba	1yr			110 000				
Poland	26	Vistula	1yr							2 000
Poland	26	Vistula	2yr							2 000
Sweden	27	Stockholm various places	1yr			105 550				
Sweden	27	Stockholm various places	2yr			10 000				
Sweden	27	Trosaån	1yr			3 000				
Sweden	27	Nyköpingsån	2yr			3 000				
Latvia	28	Venta	1yr			74 191				
Latvia	28	Gauja	1yr			37 507				
Latvia	28	Gauja	2yr			13 504				
Latvia	28	Daugava	1yr			34 745				
Latvia	28	Daugava	2yr			472				
Finland	29	Aurajoki	2yr			2 200				
Finland	29	at sea	2yr			19 300				
Finland	30	at sea	2yr			24 000				

Country	Subdivision	River	Age	Number of finclipped			Tagging	Other Methods		
				fry	parr	smolt	Carlin	T-bar Anch	PIT	ARS (1)
Finland	30	Karvianjoki	2yr			1 200				
Finland	30	Kokemäenjoki	2yr			19 000				
Finland	30	Kokemäenjoki	1yr parr							30 000
Finland	30	Kokemäenjoki	2yr parr							5 000
Finland	30	Eurajoki	2yr			3 400				
Finland	30	Lapväärtinjoki	2yr			22 000				
Finland	30	Lapväärtinjoki	2s parr							8 700
Finland	30	Lapväärtinjoki	1yr parr							10 000
Sweden	30	Böleån	1yr			6 000				
Sweden	30	Gavleån	2yr			200				
Sweden	30	Tämnrån	1yr			2 093				
Sweden	30	Ljungan	2yr			48 169				
Sweden	30	Ljusnan	1yr			16 121				1 000
Sweden	30	Ljusnan	2yr			45 061				1 000
Sweden	30	Ljusnan	1yr parr		39.306					
Sweden	30	Dalälven	1yr parr		499					499

Country	Subdivision	River	Age	Number of finclipped			Tagging	Other Methods		
				fry	parr	smolt	Carlin	T-bar Anch	PIT	ARS (1)
Sweden	30	Dalälven	2yr parr	60.682					500	
Sweden	30	Dalälven	1yr	9 128					499	
Sweden	30	Dalälven	2yr	42 441					995	
Sweden	30	Indalsälven	1yr	39 000						
Sweden	30	Ångermanälven	2yr	23 570						
Sweden	30	Ångermanälven	1yr	17 142						
Finland	31	Perhojoki	1yr parr							17 700
Finland	31	Perhojoki	2yr	4 800						
Finland	31	Perhojoki	eyed egg							35 000
Finland	31	Lestijoki	1yr parr							12 100
Finland	31	Siikajoki	2yr	5 000						
Finland	31	Oulujoki	2yr	89 200						
Finland	31	Oulujoki	1yr parr							30 000
Finland	31	Kiiminkijoki	1s parr							39 500
Finland	31	Kiiminkijoki	2yr	18 500						
Finland	31	Kiiminkijoki	3yr	1 500						



Country	Subdivision	River	Age	Number of finclipped			Tagging	Other Methods		
				fry	parr	smolt	Carlin	T-bar Anch	PIT	ARS (1)
Finland	32	Tervajoki	fry							24 000
Finland	32	Tervajoki	eyed egg							49 200
Finland	32	Tervajoki	1yr parr							10 700
Finland	32	Vaalimaanjoki	eyed egg							90 800
Finland	32	Vaalimaanjoki	1yr parr							6 700
Finland	32	Vehkajoki	eyed egg							62 900
Finland	32	Vehkajoki	1yr parr							7 600
Finland	32	Summajoki	1yr parr							15 600
Finland	32	Summajoki	eyed egg							61 900
Finland	32	Summajoki	2yr			1 600				
Finland	32	Kymijoki	2yr			25 300				
Finland	32	Kymijoki	1yr parr							60 000
Finland	32	Sipoonjoki	2yr			800				
Finland	32	at sea	2yr			79 900				
<b>Total sea trout</b>						<b>100 487</b>			<b>17 937</b>	<b>768 800</b>

(1) ARS = Alizarin Red Staining

**Table 5.3.2.1. Number of fishing occasions/sites available for assessment of trout recruitment status for the period 2015-2024, distributed on ICES subdivisions (SD), and the number of sites available for trends analysis (sites fished all years 2014-2023).**

SD	Year										Repeated fishing	
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2015-2024*	2021-2024**
22	91	56	127	131	172	44	153	98	106	230	260	25
23	7	7	7	7	7	8	8	8	7	15	17	12
24	3	3	145	52	96	101	68	118	108	144	211	43
25	19	20	22	34	33	33	37	37	38	42	44	35
26	115	106	120	111	101	98	98	99	119	110	137	94
27	13	13	13	12	12	12	13	12	14	21	23	15
28	18	17	17	37	58	51	52	47	53	55	68	43
29	5	5	4	5	4	5	4	5	5	7	8	5
30	33	38	32	43	29	37	31	24	29	41	57	22
31	34	32	30	42	30	39	36	31	32	41	56	25
32	59	51	55	55	56	52	47	41	44	41	62	35
Total	397	348	572	529	598	480	547	520	555	747	943	354

**Notes:**

\* At least two fishing occasions on during the 10-year period

\*\* Sites fished consecutively 2021-2024

**Table 5.4.1.1. Status of wild and mixed sea trout populations. Partial update in 2024.**

Area	Country	Potential smolt production (x1000)	Smolt production (% of potential production)								Total		
			<5 %		5-50 %		> 50 %		Uncertain		wild	mixed	
			wild	mixed	wild	mixed	wild	mixed	wild	mixed	wild	mixed	
Gulf of Bothnia	Finland	< 1									0	0	
		1-10	1	3	1						2	3	
		11-100*			1						1	0	
		> 100									0	0	
		Uncertain									0	0	
		<b>Total</b>		1	3	2	0	0	0	0	0	3	3
	Sweden	< 1									0	0	
		1-10									0	0	
		11-100									0	0	
		> 100									0	0	
		Uncertain								25	26	25	26
		<b>Total</b>		0	0	0	0	0	0	25	26	25	26
<b>Total</b>		1	3	2	0	0	0	25	26	28	29		

Area	Country	Potential smolt production (x1000)	Smolt production (% of potential production)									
			<5 %		5-50 %		> 50 %		Uncertain		Total	
			wild	mixed	wild	mixed	wild	mixed	wild	mixed	wild	mixed
Gulf of Finland	Estonia	< 1	1		2		4		12		19	0
		1-10			4		14		1		19	0
		11-100					1				1	0
		> 100									0	0
		Uncertain									0	0
	Total		1	0	6	0	19	0	13	0	39	0
	Finland**	< 1	1	1							1	1
		1-10	2	2	5	0					7	2
		11-100				2					0	2
		> 100									0	0
Uncertain										0	0	
Total		3	3	5	2	0	0	0	0	8	5	
Russia***	< 1	1		3		2		2		8	0	
	1-10	7		2				2		11	0	
	11-100*	1	1	1						2	1	

Area	Country	Potential smolt production (x1000)	Smolt production (% of potential production)								Total	
			<5 %		5-50 %		> 50 %		Uncertain		wild	mixed
			wild	mixed	wild	mixed	wild	mixed	wild	mixed		
		> 100									0	0
		Uncertain									19	0
	Total		9	1	6	0	2	0	23	0	40	1
Total			13	4	17	2	21	0	36	0	87	6
Main Basin	Denmark	< 1	16	1	42	2	95	5			153	8
		1-10		1	14	10	30	8			44	19
		11-100		1	2	5	1	4			3	10
		> 100									0	0
		Uncertain									0	0
	Total		16	3	58	17	126	17	0	0	200	37
	Finland	< 1									0	0
		1-10									0	0
		11-100	1								1	0
		> 100									0	0
		Uncertain									0	0

Area	Country	Potential smolt production (x1000)	Smolt production (% of potential production)									
			<5 %		5-50 %		> 50 %		Uncertain		Total	
			wild	mixed	wild	mixed	wild	mixed	wild	mixed	wild	mixed
Total			1	0	0	0	0	0	0	0	1	0
Estonia	< 1		2		4		8		13		27	0
	1-10		2		2		4				8	0
	11-100				1						1	0
	> 100										0	0
	Uncertain										0	0
Total			4	0	7	0	12	0	13	0	36	0
Latvia	< 1								7		7	0
	1-10								4		4	0
	11-100										0	0
	> 100										0	0
	Uncertain								20	1	20	1
Total			0	0	0	0	0	0	31	1	31	1
Lithuania	< 1				2	2	1	1			3	3
	1-10				1		1	1			1	2

Area	Country	Potential smolt production (x1000)	Smolt production (% of potential production)									
			<5 %		5-50 %		> 50 %		Uncertain		Total	
			wild	mixed	wild	mixed	wild	mixed	wild	mixed	wild	mixed
		11-100			1	1					1	1
		> 100*									0	0
		Uncertain									0	0
	Total		0	0	2	4	3	2	0	0	5	6
	Poland	< 1			3	1			1		1	4
		1-10			1			1			1	1
		11-100		3	4			1			0	8
		> 100		1							0	1
		Uncertain									0	0
	Total		0	4	1	7	1	2	0	1	2	14
	Russia***	< 1									0	0
		1-10									0	0
		11-100									0	0
		> 100									0	0
		Uncertain							3		3	0

Area	Country	Potential smolt production (x1000)	Smolt production (% of potential production)									
			<5 %		5-50 %		> 50 %		Uncertain		Total	
			wild	mixed	wild	mixed	wild	mixed	wild	mixed	wild	mixed
	Total		0	0	0	0	0	0	3	0	3	0
	Sweden	< 1									0	0
		1-10									0	0
		11-100									0	0
		> 100									0	0
		Uncertain							200	7	200	7
	Total		0	0	0	0	0	0	200	7	200	7
Total			21	7	68	28	142	21	247	9	478	65
Grand total			35	14	87	30	163	21	308	35	593	100

\*includes data from large river systems

\*\*in seven wild rivers, it is not known if releases are carried out

\*\*\*data from Russia is not updated

**Table 5.4.1.2. Factors influencing status of sea trout populations. Partly updated for WGBAST 2025.**

Area	Country	Potential smolt production (x1000)	Number of populations					Other	Uncertain
			Over exploitation	Habitat degradation	Dam building	Pollution			
Gulf of Bothnia*	Finland	< 1	0	0	0	0	0	0	0
		1-10	5	5	4	1	0	0	
		11-100	1	1	0	0	0	0	
		> 100	0	0	0	0	0	0	
		Uncertain	0	0	0	0	0	0	
	Total	6	6	4	1	0	0		
Total		6	6	4	1	0	0		
Gulf of Finland	Finland	< 1	2	2	1	0	0	0	
		1-10	9	9	7	0	0	0	
		11-100	2	2	1	1	0	0	
		> 100	0	0	0	0	0	0	
		Uncertain	0	0	0	0	0	0	
	Total	13	13	9	1	0	0		
	Russia	< 1	5	5	0	4	0	0	
		1-10	11	9	2	7	0	0	

Area	Country	Potential smolt production (x1000)	Number of populations					Uncertain
			Over exploitation	Habitat degradation	Dam building	Pollution	Other	
		11-100	3	3	1	3	0	0
		> 100	0	0	0	0	0	0
		Uncertain	11	11	3	8	0	0
	Total		30	28	6	22	0	0
	Estonia	< 1	1	5	0	0	0	0
		1-10	4	3	1	4	0	0
		11-100	2	0	2	0	0	0
		> 100	0	0	0	0	0	0
		Uncertain	0	0	0	0	0	0
	Total		7	8	3	4	0	0
Total			50	49	18	27	0	0
Main Basin*	Finland	< 1	0	0	0	0	0	0
		1-10	0	0	0	0	2	0
		11-100	1	1	1	0	0	0
		> 100	0	0	0	0	0	0

Area	Country	Potential smolt production (x1000)	Number of populations					Uncertain
			Over exploitation	Habitat degradation	Dam building	Pollution	Other	
		Uncertain	0	0	0	0	0	0
	Total		1	1	1	0	2	0
	Estonia	< 1	29	29	0	0	0	0
		1-10	6	6	0	0	0	0
		11-100	1	0	0	0	0	0
		> 100	0	0	0	0	0	0
		Uncertain	0	0	0	0	0	0
	Total		36	35	0	0	0	0
	Latvia	< 1	3	7	2	0	0	0
		1-10	0	0	0	0	0	0
		11-100	0	0	0	0	0	0
		> 100	0	0	0	0	0	0
		Uncertain	8	17	12	0	0	0
	Total		11	24	14	0	0	0
	Lithuania	< 1	0	0	0	0	0	0

Area	Country	Potential smolt production (x1000)	Number of populations					Uncertain
			Over exploitation	Habitat degradation	Dam building	Pollution	Other	
		1-10	0	4	5	2	0	0
		11-100	0	1	2	1	0	0
		> 100	0	1	1	1	1	0
		Uncertain	0	0	0	0	0	0
	<b>Total</b>		0	6	8	4	1	0
	<b>Poland</b>	< 1	0	4	3	1	1	0
		1-10	0	1	2	0	0	0
		11-100	5	3	8	1	1	0
		> 100	1	1	1	1	1	0
		Uncertain	0	0	0	0	0	0
	<b>Total</b>		6	9	14	3	3	0
	<b>Russia</b>	< 1	0	0	0	0	0	0
		1-10	0	0	0	0	0	0
		11-100	0	0	0	0	0	0
		> 100	0	0	0	0	0	0

Area	Country	Potential smolt production (x1000)	Number of populations					Uncertain
			Over exploitation	Habitat degradation	Dam building	Pollution	Other	
		Uncertain	3	2	0	2	0	0
	Total		3	2	0	2	0	0
	Denmark	< 1	0	51	62	0	0	0
		1-10	0	39	35	0	0	0
		11-100	0	0	0	0	0	0
		> 100	0	0	0	0	0	0
		Uncertain	0	0	0	0	0	0
	Total		0	90	97	0	0	0
Total			57	167	134	9	6	0
Grand total			113	222	156	37	6	0

\*data from Sweden were unavailable

Table 5.4.1.3. Sea trout smolt estimates for the period 2002-2024.

SD	24	24	25	26	26	26	26	28	28	30	31	31	31	31	32	32	32
Country	DK	SE	SE	LT	LT	LT	LT	LV	LV	FIN	SE	SE	FIN	SE	RU	EE	EE
River name	Laeså	Nybroån	Mörrum	R. Mera	R. Mera	R. Siesartis	R. Siesartis	R. Salaca	R. Salaca	R. Isojoki	Sävarån	Rickleån	Tornionjoki	Hartijoki	Luga	Pirita	Pirita
Method	1	15	2	5	6	5	6	3	4	14	7	8	9	16	10	12	13
2002				12				13100							8200		
2003				11				11000							2500		
2004				11				2500					12510		2500		
2005				0		5		7700							5000		
2006	4543			3		8		10400			510		12640		2800		
2007	2481			32		104		15200			1051				5000		
2008	16138			170		95		15800			2124		10810		2500	884	772
2009	1687		6995	11		163		16900			1848				6900	2138	1945
2010	2920		3526	3		73		19400			1232				3300	2301	2198
2011	8409		5086	584	n.d.	243	n.d.	4900			637		19420		3100	832	153
2012	8702		5517	606	33	576	40	11400			231				2000	766	740
2013	5326		10220	422	0	186	2	9600			1600				2100	1769	1429

SD	24	24	25	26	26	26	26	28	28	30	31	31	31	31	32	32	32
Country	DK	SE	SE	LT	LT	LT	LT	LV	LV	FIN	SE	SE	FIN	SE	RU	EE	EE
River name	Læså	Nybroån	Mörrum	R. Mera	R. Mera	R. Siesartis	R. Siesartis	R. Salaca	R. Salaca	R. Isojoki	Sävarån	Rickleån	Tornionjoki	Hartijoki	Luga	Pirita	Pirita
Method	1	15	2	5	6	5	6	3	4	14	7	8	9	16	10	12	13
2014			6867	344	98	559	6	3100	265			348	n.d.		6200	260	227
2015			3612	0	226		23	12100	712			n.d.	n.d.		11600	1020	687
2016			5298	768	306	537	95	17500	1369			604	17350		2600	3830	3771
2017			3461	1866	91	676	8	5400	540			470	n.d.		3500	2241	1410
2018			3173	379	n.d.	792		5999	594				n.d.		5800	3346	3783
2019			2126	745	38	654		3158	302	7300			23 270		3600	684	554
2020			4357	867	67	798		4800	552	6084			n.d.		3600	n.d.	
2021			3533					21154	1088	3496			n.d.		n.d.	1980	
2022		7618	6235					9600	882				27 190	209	n.d.	375	

SD	24	24	25	26	26	26	26	28	28	30	31	31	31	31	32	32	32
Country	DK	SE	SE	LT	LT	LT	LT	LV	LV	FIN	SE	SE	FIN	SE	RU	EE	EE
River name	Læså	Nybroån	Mörrum	R. Mera	R. Mera	R. Siesartis	R. Siesartis	R. Salaca	R. Salaca	R. Isojoki	Sävarån	Rickleån	Tornionjoki	Hartijoki	Luga	Pirita	Pirita
Method	1	15	2	5	6	5	6	3	4	14	7	8	9	16	10	12	13
2023		4683	2075					11700	433				n.d.	1080	n.d.	132	
2024		4129	3650					2500	115					591	n.d.	870	

n.d.= no data

- 1) based on smolt trap - directly counted number of smolts, varying efficiency over years due to water level (probability level data available)
- 2) Median values of Bayesian estimates are only for the upper part of the river!
- 3) estimated smolt output on the base of counted smolts and mean trap efficiency (2014=8.5%; 2015=5.9%; 2016=9.5; 2023=4.6%)
- 4) directly counted number of smolts during trapping season
- 5) estimated output derived by electrofishing data. (assumed survival probabilities to smolts: 0+ --> 40%; >0+ --> 60%)
- 6) counted number of individuals smolts in trap. Assumed trap efficiency almost 100%
- 7) "simple" Petersen estimates - trap moved to river Ricklean in Year 2014
- 8) Trap located close to river mouth, so this is the total estimated production
- 9) estimated smolt output. Trap efficiency in 2016 from efficiency for salmon smolt
- 10) estimated number of smolt output based on results of floating trap-netting- 2.9 % in 2016, due to high water only part of migration period covered
- 11) directly counted number of smolts in trap
- 12) Original estimates based on smolt trapping
- 13) Estimates based on a Bayesian model \*) due to high water level counts individual numbers presumably too low
- 14) Partial smolt trapping (screwtrap) and mark-recapture experiments
- 15) directly counted from trap
- 16) Petersen method

**Table 5.4.2.1. Status of wild and mixed sea trout populations in large river systems.**

Country	River (Area)	Potential smolt production (x1000)	Smolt production (% of potential production)									
			<5 %		5-50 %		> 50 %		Uncertain		Total	
			wild	mixed	wild	mixed	wild	mixed	wild	mixed	wild	mixed
Lithuania	Nemunas (Main Basin)	< 1			2		1	1			1	3
		1-10					1	1			1	1
		11-100			1		1				1	1
		> 100									0	0
		Uncertain									0	0
<b>Total</b>			0	0	0	3	3	2	0	0	3	5
Poland	Odra (Main Basin)	< 1									0	0
		1-10			3						0	3
		11-100		1		1					0	2
		> 100									0	0
		Uncertain									0	0
<b>Total</b>			0	1	0	4	0	0	0	0	0	5
Poland	Vistula (Main Basin)	< 1									0	0
		1-10							1		0	1
		11-100		3		1					0	4

Country	River (Area)	Potential smolt production (x1000)	Smolt production (% of potential production)										
			<5 %		5-50 %		> 50 %		Uncertain		Total		
			wild	mixed	wild	mixed	wild	mixed	wild	mixed	wild	mixed	
		> 100										0	0
		Uncertain										0	0
<b>Total</b>			0	3	0	1	0	0	0	1	0	5	
Russia*	Luga (Gulf of Finland)	< 1	1		1							2	0
		1-10	1		1							2	0
		11-100	1			1						1	1
		> 100										0	0
		Uncertain								1		1	0
<b>Total</b>			3	0	2	1	0	0	1	0	6	1	
Finland	Tornionjoki (Gulf of Bothnia)	< 1	1		1							2	0
		1-10		5	1							1	5
		11-100		1	1							1	1
		> 100										0	0
		Uncertain										0	0
<b>Total</b>			1	6	3	0	0	0	0	0	4	6	

\*data from Russia is not updated

**Table 5.5.1. Average recruitment status for assessment units, ICES SDs and assessment unit and country.**

AU	SD	Country	All sites year 2024							Sites with four years of data 2021-2024							Sites with at least two years of data in 2025-2024						
			Year	n sites	mean	min	max	CL_lower	CL_upper	Years	n sites	mean	min	max	CL_lower	CL_upper	Years	n sites	mean	min	max	CL_lower	CL_upper
GoB			2024	82	<b>62,3</b>	0	193	51,5	73	2021-2024	47	<b>76,1</b>	0	202	69,1	83	2015-2024	111	<b>71,6</b>	0	208	67,7	75,4
GoF			2024	41	<b>95,9</b>	0	235	79,7	112	2021-2024	35	<b>107</b>	0	239	97,7	116	2015-2024	62	<b>104</b>	0	270	98,8	108
East			2024	166	<b>60</b>	0	207	52,8	67,3	2021-2024	137	<b>59,4</b>	0	212	55,2	63,5	2015-2024	206	<b>58,6</b>	0	227	56	61,1
West			2024	27	<b>76,3</b>	0	131	62,7	89,9	2021-2024	20	<b>67,6</b>	0	133	58,5	76,7	2015-2024	30	<b>69,8</b>	0	133	64,4	75,2
South			2024	431	<b>47,2</b>	0	138	44	50,4	2021-2024	115	<b>58,4</b>	0	221	54,7	62	2015-2024	531	<b>43,4</b>	0	221	41,7	45
	22		2024	230	<b>43,6</b>	0	114	39,7	47,6	2021-2024	25	<b>29,6</b>	0	102	23,2	35,9	2015-2024	260	<b>33,8</b>	0	125	31,6	35,9
	23		2024	15	<b>84</b>	0	122	68	100	2021-2024	12	<b>81,7</b>	0	128	72,2	91,1	2015-2024	17	<b>79,4</b>	0	149	72,4	86,4
	24		2024	144	<b>42,7</b>	0	128	37	48,3	2021-2024	43	<b>55</b>	0	142	49,4	60,5	2015-2024	211	<b>34,3</b>	0	142	31,9	36,8
	25		2024	42	<b>69,1</b>	15,4	138	60,1	78,1	2021-2024	35	<b>75,2</b>	0	221	69,1	81,2	2015-2024	44	<b>77</b>	0	221	73,4	80,6
	26		2024	110	<b>43</b>	0	152	35,4	50,6	2021-2024	94	<b>45,1</b>	0	212	40,7	49,4	2015-2024	137	<b>45,8</b>	0	227	43,2	48,4
	27		2024	21	<b>79,9</b>	16,1	127	67,4	92,4	2021-2024	15	<b>70,1</b>	0	133	60	80,2	2015-2024	23	<b>70,8</b>	0	133	64,8	76,8
	28		2024	55	<b>93,3</b>	0	207	81,9	105	2021-2024	43	<b>90,6</b>	0	207	83,4	97,8	2015-2024	68	<b>93,1</b>	0	212	88,4	97,8
	29		2024	7	<b>69,6</b>	0	131	30,5	109	2021-2024	5	<b>60,1</b>	0	118	39,6	80,6	2015-2024	8	<b>68,3</b>	0	131	56,5	80
	30		2024	41	<b>73,2</b>	0	154	59,6	86,9	2021-2024	22	<b>90,2</b>	0	179	82,6	97,7	2015-2024	57	<b>86,9</b>	0	198	82	91,8
	31		2024	41	<b>51,6</b>	0	193	35,5	67,7	2021-2024	25	<b>63,9</b>	0	202	53,2	74,6	2015-2024	56	<b>57,1</b>	0	208	51,6	62,6
	32		2024	41	<b>95,9</b>	0	235	79,7	112	2021-2024	35	<b>107</b>	0	239	97,7	116	2015-2024	62	<b>104</b>	0	270	98,8	108
GoB		Finland	2024	25	<b>53,2</b>	0	177	28,8	77,6	2021-2024	11	<b>97,4</b>	0	202	77,4	117	2015-2024	32	<b>72,3</b>	0	208	64,2	80,4
GoB		Sweden	2024	57	<b>66,2</b>	0	193	54,9	77,5	2021-2024	36	<b>69,6</b>	0	149	63,2	76,1	2015-2024	79	<b>71,2</b>	0	193	67,1	75,2
GoF		Estonia	2024	23	<b>114</b>	37,6	235	93,4	134	2021-2024	20	<b>121</b>	0	239	109	134	2015-2024	35	<b>118</b>	0	270	112	124
GoF		Finland	2024	18	<b>73,2</b>	0	152	50,3	96,2	2021-2024	15	<b>87,4</b>	0	153	76,3	98,5	2015-2024	19	<b>87,3</b>	0	153	81	93,6
GoF		Russia	2024	0						2021-2024	0						2015-2024	8	<b>59,8</b>	0	224	37,4	82,2
East		Estonia	2024	6	<b>85,9</b>	0	207	22,8	149	2021-2024	5	<b>89,5</b>	0	207	58,9	120	2015-2024	7	<b>106</b>	0	212	91,5	121
East		Latvia	2024	49	<b>94,5</b>	0	197	83,8	105	2021-2024	37	<b>90,7</b>	0	179	83,4	98	2015-2024	61	<b>91</b>	0	197	86	96
East		Lithuania	2024	99	<b>42,1</b>	0	152	34	50,2	2021-2024	84	<b>42,4</b>	0	212	37,8	47	2015-2024	125	<b>43,8</b>	0	227	41,1	46,5
East		Poland	2024	11	<b>50,9</b>	0	110	28,1	73,7	2021-2024	10	<b>67,4</b>	0	131	55,7	79	2015-2024	12	<b>68,2</b>	0	131	60,2	76,2
East		Sweden	2024	1	<b>93</b>	93	93			2021-2024	1	<b>90,5</b>	80,5	97,9	83,4	97,7	2015-2024	1	<b>88,6</b>	70,4	107	81,9	95,4
West		Estonia	2024	1	<b>131</b>	131	131			2021-2024	0						2015-2024	1	<b>121</b>	110	131	113	129
West		Sweden	2024	26	<b>74,2</b>	0	127	60,8	87,6	2021-2024	20	<b>67,6</b>	0	133	58,5	76,7	2015-2024	29	<b>68,7</b>	0	133	63,3	74,2
South		Denmark	2024	13	<b>69,7</b>	0	103	53,4	86	2021-2024	5	<b>64,1</b>	0	101	49,3	78,9	2015-2024	13	<b>66</b>	0	114	58,7	73,2
South		Germany	2024	351	<b>41,1</b>	0	114	37,8	44,3	2021-2024	57	<b>38,2</b>	0	122	33,8	42,5	2015-2024	444	<b>29,9</b>	0	125	28,4	31,4
South		MV	2024	244	<b>42,7</b>	0	114	38,6	46,7	2021-2024	57	<b>38,2</b>	0	122	33,8	42,5	2015-2024	354	<b>28,3</b>	0	125	26,6	29,9
South		SH	2024	107	<b>37,5</b>	0	86,3	32,4	42,6	2021-2024	0						2015-2024	90	<b>38,8</b>	0	105	35	42,7
South		Poland	2024	37	<b>65,3</b>	15,4	117	56,3	74,3	2021-2024	34	<b>75,9</b>	0	221	69,6	82,2	2015-2024	39	<b>76,5</b>	0	221	72,6	80,3
South		Sweden	2024	30	<b>86,6</b>	0	138	75,1	98	2021-2024	19	<b>86,6</b>	0	142	79,6	93,6	2015-2024	35	<b>84,3</b>	0	149	79,6	89

**Table 5.6.1. Sea trout smolt releases (x 1 000) into the Baltic Sea by country and subdivision in 1990-2024. Note that project-based fisheries enhancement releases are included.**

country		age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
Main Basin 22-29	DK	1yr	5	1	4	4	4	19	17	177	177	177	196	196	19	751	634	614	562	562	398	387	387	365	261	281	272	272	333	313	589	591	550	322	687	669	743	656	707		
		2yr																30	30	30	30	21	9	9	2	2	2	2	2	0	0	0	0	0	0						
	EE	1yr	50	5		5				16	28	30	32	30	32	30	32	30	23	25	2	21	20	17	21	26	21		5												
		2yr			5	6	10	10		16																															
	FI	1yr				11				1	0		4		26		28	1	15		35	52	45	52	18	115		40	5	30	14		15				41	53	11	42	
		2yr			129	169	165	123	103	171	144	181	153	182	168	258	197	131	134	244	303	164	187	218	136	113	121	76	107	123	93	97	103	92	87	97	78	51	50	46	
		3yr			35	16	0			26	1	8	0	13	17	25	35	34	24		9	16	16	15				8	14	4		0									
	LT	1yr						5	5	4	4	10												23	58	45		11	10	23	29	32	32	31	11	26	20			22	
		2yr										3																													
	LV	1yr	1	1	6	26	44	26	24	20	1	1	7	25		114	160	170		74	91	113	63	50	153	236	270	161	115	98	308	391	296	187	341	323	368	166	146		
		2yr	1	4	6	7	5	2					11	29		2	10	67		116	177	112	132	65																	
	PL	1yr	51	85	102	2	148	140	266	483	298	492	330	138	151	211	30	16	46	322	455	188	358	434	267	132	174	243	289	328	301	546	1024	431	787	620	503	602	378		
		2yr	857	847	498	248	376	845	523	642	821	1028	1001	924	845	733	739	804	765	843	968	1261	1021	834	1060	936	981	1046	888	619	634	651	8	515	290	370	326	535	536		
	SE	1yr	13	9	8	19	41	18	6	4	23	19	90	7	10	108	10	116	11	131	15	76	180	129	170	118	138	207	156	183	156	144	156	131	158	142	131	109			
		2yr	32	51	78	61	44	46	84	90	60	95	87	76	100	93	40	48	103	44	36	63	78	31	31	27	35	20	20	30	17	33	40	17	29	22	17	17	10		
DE	1yr																						14	14	14	13	15	14	15	15	15	15	7	10	10	7	2	2			
Main Basin Total			1010	1167	903	544	795	1239	1114	1600	1576	2029	1880	1730	1445	2204	1935	1925	1921	2322	2513	2406	2453	2255	2123	2052	1953	2058	2025	1779	2190	2518	2214	1766	2426	2348	2225	2177	2016		
Gulf of Bothnia 30-	FI	1yr			9								7		1	5																							6		
		2yr			358	579	700	716	527	525	510	663	639	483	540	462	478	503	451	305	358	477	541	608	676	426	519	472	503	493	477	411	417	458	401	532	444	335	324	400	
	3yr																																								
	SE	1yr			99	30	5	18	39	15	1	28	12	49	10	34	75	28	11	15	6	27	9	27	20	4	4	8	3		1	1	1	1					2		
2yr				19	7					6		1										40	61	55	110	197	181	219	239	253	220	198	215	205	869	128	149	98			
Gulf of Bothnia Total			445	392	406	406	413	376	460	642	554	429	407	372	405	424	380	428	361	413	569	530	410	428	400	420	395	311	293	230	190	276	295	259	236		251	297	356		
Gulf of Finland 32	EE	1yr																																							
		2yr																																							
	FI	1yr			5		22			4	5	15	12	13	5		38		4																						
		2yr			191	260	249	306	312	284	342	128	228	277	386	355	372	367	290	281	190	279	247	316	291	213	239	216	242	173	132	194	178	143	73	67	71	66	105		
RU	1yr																																								
	2yr																																								
Gulf of Finland Total				197	261	270	330	318	287	348	177	331	331	398	380	427	373	329	291	198	301	364	352	308	222	260	292	294	253	138	285	263	227	127	98	71	67	105	108		
Grand Total			1455	2212	2205	1932	2272	2499	2402	3106	2997	3447	3150	3050	2726	3613	3219	3144	2893	3296	3886	3883	3890	3747	3230	3365	3315	3475	3283	2863	3330	3694	3392	2768	3498	3747	3007	3057	2979		

**Table 5.6.2. Release of sea trout eggs, alevins, fry, and parr into Baltic rivers in 2024. The number of smolts is added to Table 5.6.3 as enhancement.**

Region	Egg	Alevin	Fry	Parr				Smolt			
				1- s old	1- y old	2- s old	3- s old	2025	2026	2027	Total
<b>Sub-divs. 22-2</b>	(1)	(1)	(4)	(6)	(9)	(10)	(10)				
Denmark			1.000	6.000	1.000			120	390	-	510
Estonia								-	-	-	-
Finland		13.000				1.000		150	130	-	280
Germany			780.000					-	23.400	-	23.400
Latvia								-	-	-	-
Poland		2.962.000	1.512.000	8.000				-	75.460	-	75.460
Sweden								-	-	-	-
Lithuania			152.000					-	4.560	-	4.560
<b>Total</b>	-	2.975.000	2.444.000	14.000	1.000	1.000	-	270	103.940	-	104.210
<b>Sub-divs. 30-3</b>	(2)	(3)	(5)	(7)	(8)	(8)	(10)				
Finland	35.000	101.000		10.000	180.000	16.000		-	23.520	2.290	25.810
Sweden	150.000		61.000	40.000	9.000	1.000		-	1.200	4.370	5.570
<b>Total</b>	185.000	101.000	61.000	50.000	189.000	17.000	-	-	24.720	6.660	31.380
<b>Sub-div. 32</b>	(1)	(1)	(4)	(6)	(9)	(10)	(10)				
Estonia								-	-	-	-
Finland	438.000		75.000		109.000			13.080	6.630	-	19.710
Russia								-	-	-	-
<b>Total</b>	438.000	-	75.000	-	109.000	-	-	13.080	6.630	-	19.710
<b>Grand total</b>	623.000	3.076.000	2.580.000	64.000	299.000	18.000	-	13.350	135.290	6.660	155.300
		Rate of survival		Time to				Rate of survival			Time to
		to smolt		smoltification				to smolt			smoltification
	(1)=	1.0%		2 years		(6)=		6.0%			2 years
	(2)=	0.5%		3 years		(7)=		6.0%			3 years
	(3)=	1.5%		3 years		(8)=		12.0%			2 years
	(4)=	3.0%		2 years		(9)=		12.0%			1 year
	(5)=	2.0%		3 years		(10)=		15.0%			1 year

Table 5.6.3. Estimated number of sea trout smolts originating from eggs, alevins, fry, and parr releases in 2000-2024.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027		
<b>Sub-divs. 22-29</b>																													
Denmark	25.555	45.759	7.912	17.790	17.508	13.695	13.695	13.704	12.540	12.540	10.737	9.177	9.606	9.240	9.246	9.519	518	518	518	453	930	756	735	741	600	390	-	-	
Estonia	-	2.100	1.200	400	1.110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Finland	22.670	33.965	19.550	18.735	160	-	-	-	11.445	13.815	10.350	8.100	14.375	16.260	17.787	14.349	18.313	16.141	15.990	12.264	10.845	12.015	1.110	9.075	150	130	-	-	
Germany	24.900	61.200	72.240	27.240	36.900	32.550	38.400	29.640	29.910	40.800	34.500	29.400	34.650	32.700	32.580	31.860	35.874	29.550	24.129	5.250	19.500	17.250	20.250	13.281	16.683	23.400	-	-	
Latvia	8.644	11.007	960	5.340	15.227	6.462	3.189	19.015	6.840	17.664	30.595	5.987	15.300	28.913	7.787	11.621	6.000	6.828	-	8.400	-	-	-	-	-	-	-	-	
Poland	148.500	84.240	68.400	91.000	63.236	77.690	61.459	107.686	84.901	108.422	114.982	95.939	103.756	130.787	133.965	120.012	143.635	127.479	167.504	87.693	126.736	87.247	101.617	82.491	83.870	75.460	-	-	
Sweden	39.333	42.690	5.320	29.335	2.055	27.700	4.425	1.623	2.210	898	-	2.385	1.737	2.940	3.258	1.368	1.380	2.379	2.346	2.373	1.845	60	750	-	12	-	-	-	
Lithuania	-	-	-	1.670	2.400	4.350	7.440	18.180	12.990	8.040	6.750	5.370	10.935	8.580	6.300	4.560	4.680	3.840	6.120	2.820	4.530	4.620	7.452	6.906	3.720	4.560	-	-	
<b>Total</b>	<b>269.602</b>	<b>280.961</b>	<b>175.582</b>	<b>191.510</b>	<b>138.596</b>	<b>162.447</b>	<b>128.608</b>	<b>189.847</b>	<b>160.836</b>	<b>202.179</b>	<b>207.914</b>	<b>156.358</b>	<b>190.359</b>	<b>229.420</b>	<b>210.924</b>	<b>193.289</b>	<b>210.400</b>	<b>173.268</b>	<b>216.607</b>	<b>119.253</b>	<b>164.386</b>	<b>121.948</b>	<b>131.914</b>	<b>112.494</b>	<b>105.035</b>	<b>103.940</b>	<b>-</b>	<b>-</b>	
<b>Sub-divs. 30-31</b>																													
Finland	80.662	26.523	42.828	36.670	1.890	31.362	11.787	22.704	29.892	32.550	46.753	39.285	25.881	22.595	18.782	12.878	12.879	21.328	16.284	15.761	11.295	15.081	11.561	28.186	16.728	28.693	2.290	-	-
Sweden	78.440	43.614	24.092	22.921	36.170	20.207	22.756	24.561	16.690	16.497	12.811	13.026	5.456	21.906	9.073	25.850	12.996	17.203	11.003	14.220	7.902	13.031	1.354	2.963	12.775	4.291	4.370	-	-
<b>Total</b>	<b>159.102</b>	<b>70.137</b>	<b>66.920</b>	<b>59.591</b>	<b>38.060</b>	<b>51.569</b>	<b>34.543</b>	<b>47.265</b>	<b>46.582</b>	<b>49.047</b>	<b>59.564</b>	<b>52.311</b>	<b>31.337</b>	<b>44.501</b>	<b>27.855</b>	<b>38.728</b>	<b>25.875</b>	<b>38.531</b>	<b>27.287</b>	<b>29.981</b>	<b>19.197</b>	<b>28.111</b>	<b>12.915</b>	<b>31.149</b>	<b>29.503</b>	<b>32.984</b>	<b>6.660</b>	<b>-</b>	<b>-</b>
<b>Sub-div. 32</b>																													
Estonia	-	-	2.412	2.532	4.407	2.100	420	-	-	1.536	2.098	6.552	9.486	3.519	840	1.020	618	-	-	-	-	360	-	-	-	-	-	-	-
Finland	5.500	2.049	419	340	3.429	345	11.574	8.997	4.353	5.919	5.233	291	1.747	1.632	1.050	7.716	2.409	2.722	1.384	4.529	3.865	2.795	3.434	10.851	17.875	6.630	-	-	-
Russia	3.630	7.800	200	1.630	1.281	6.690	3.924	-	312	9.381	126	3.441	1.746	3	2.910	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>9.130</b>	<b>9.849</b>	<b>3.031</b>	<b>4.502</b>	<b>9.117</b>	<b>9.135</b>	<b>15.918</b>	<b>8.997</b>	<b>4.665</b>	<b>16.836</b>	<b>7.457</b>	<b>10.284</b>	<b>12.979</b>	<b>5.154</b>	<b>4.800</b>	<b>8.736</b>	<b>3.027</b>	<b>754</b>	<b>1.384</b>	<b>4.529</b>	<b>3.865</b>	<b>3.155</b>	<b>3.434</b>	<b>10.851</b>	<b>17.875</b>	<b>6.630</b>	<b>-</b>	<b>-</b>	
<b>Grand total</b>	<b>392.476</b>	<b>360.947</b>	<b>245.533</b>	<b>255.603</b>	<b>185.773</b>	<b>223.151</b>	<b>179.069</b>	<b>246.108</b>	<b>212.083</b>	<b>288.061</b>	<b>274.935</b>	<b>218.953</b>	<b>234.675</b>	<b>279.075</b>	<b>243.578</b>	<b>240.753</b>	<b>239.301</b>	<b>212.554</b>	<b>245.278</b>	<b>153.762</b>	<b>187.448</b>	<b>153.214</b>	<b>148.263</b>	<b>154.494</b>	<b>152.413</b>	<b>143.554</b>	<b>6.660</b>	<b>-</b>	<b>-</b>

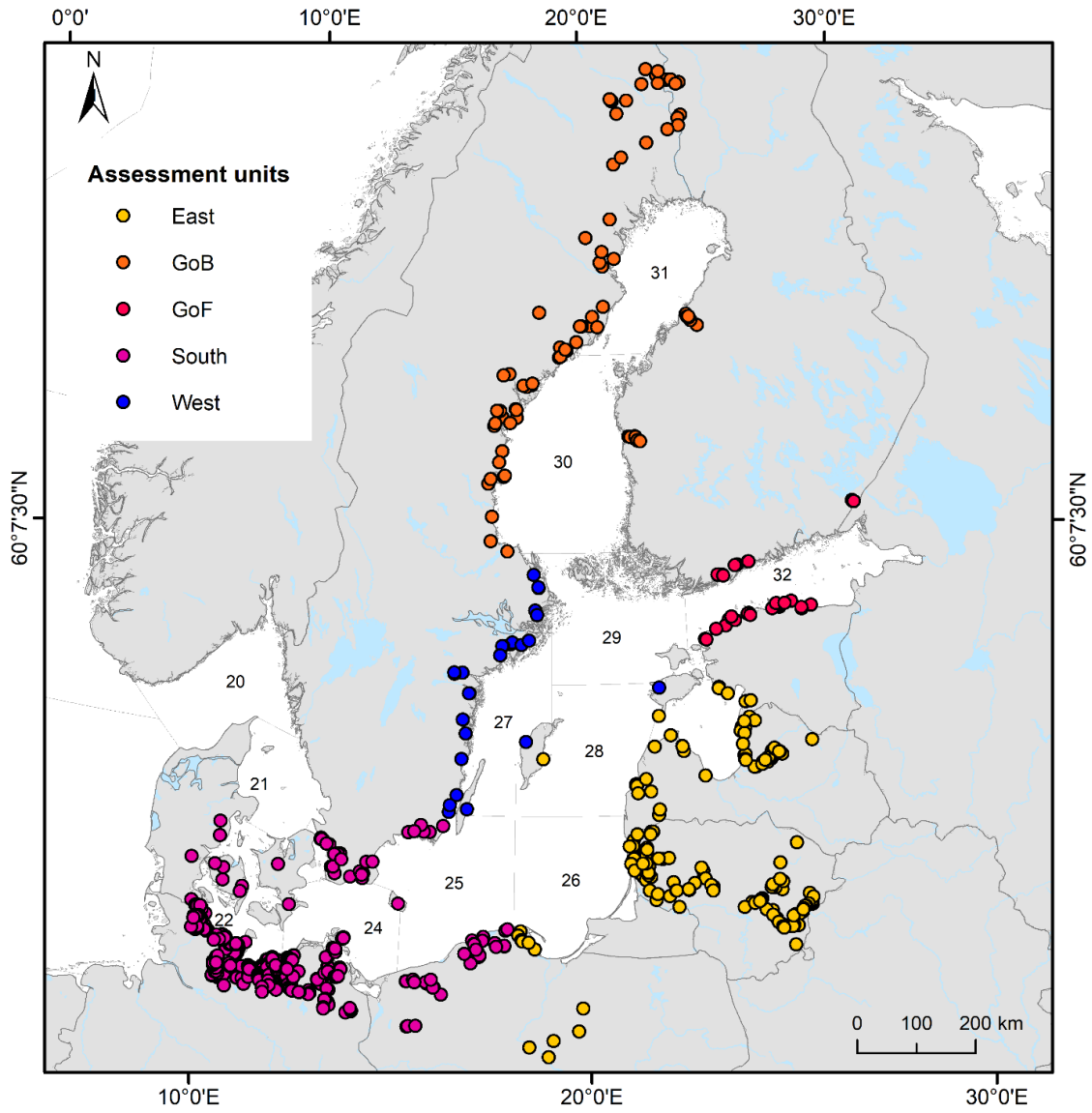


Figure 5.3.2.1. Electrofishing sites (n = 747 sites) in subdivisions 22–32 fished in 2024.

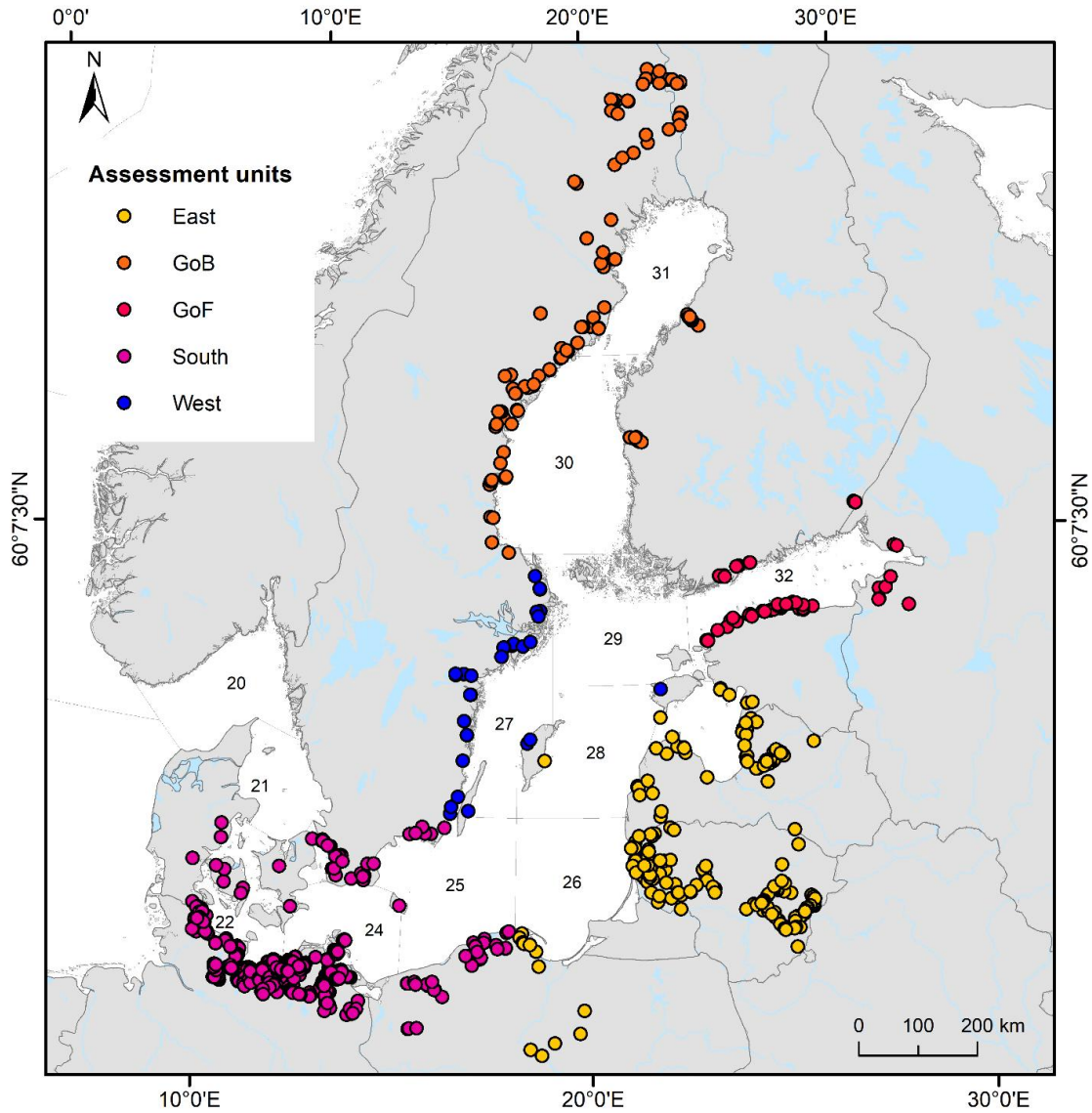


Figure 5.3.2.2. Electrofishing sites (n = 943 sites) in subdivisions 22–32 available for analysis of 10-year trend (2015–2024) in sea trout recruitment status.

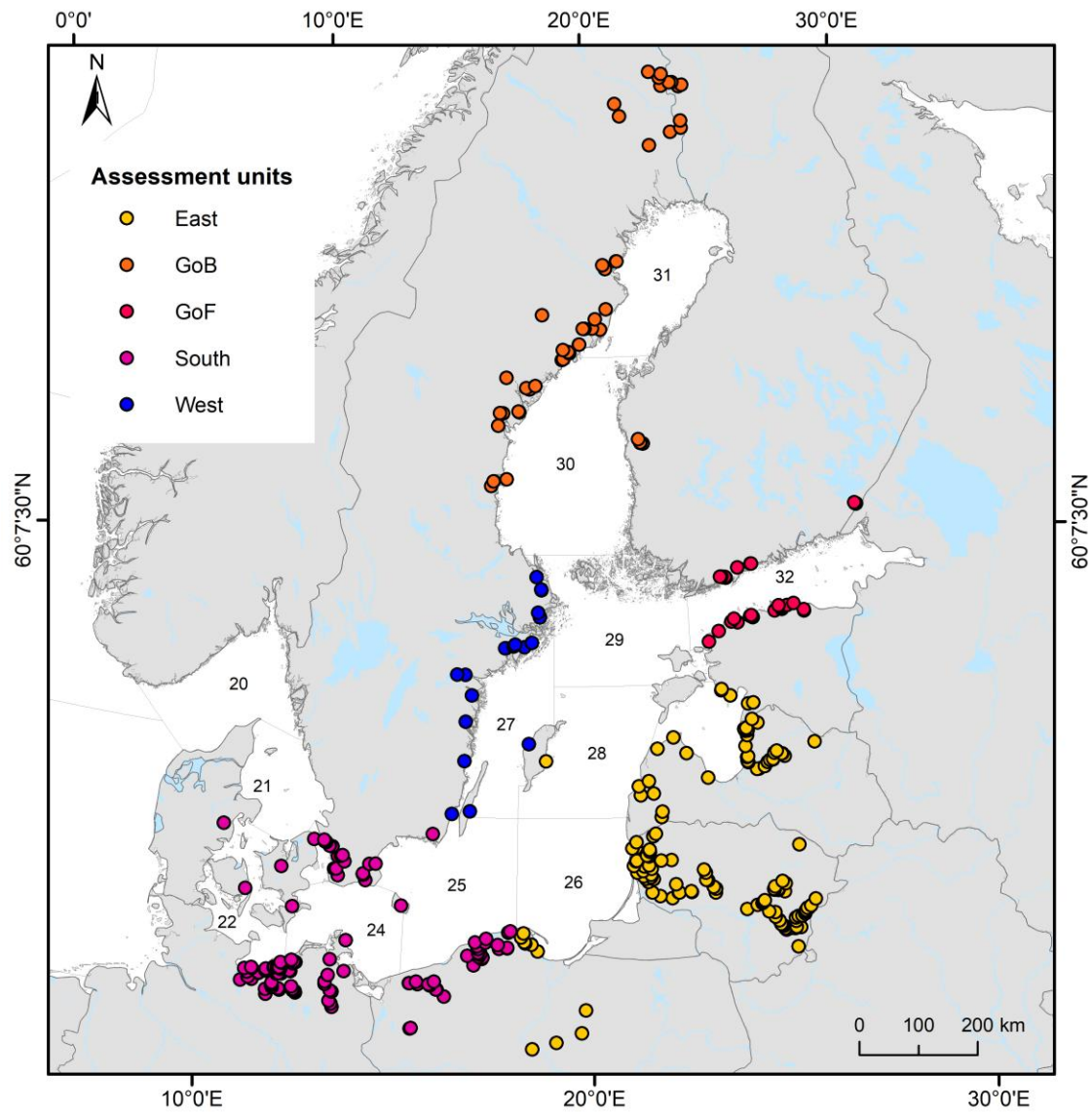


Figure 5.3.2.3. Electrofishing sites (n = 354 sites) in subdivisions 22–32 used for calculating four-year trend (2021–2024) in recruitment status for sea trout.

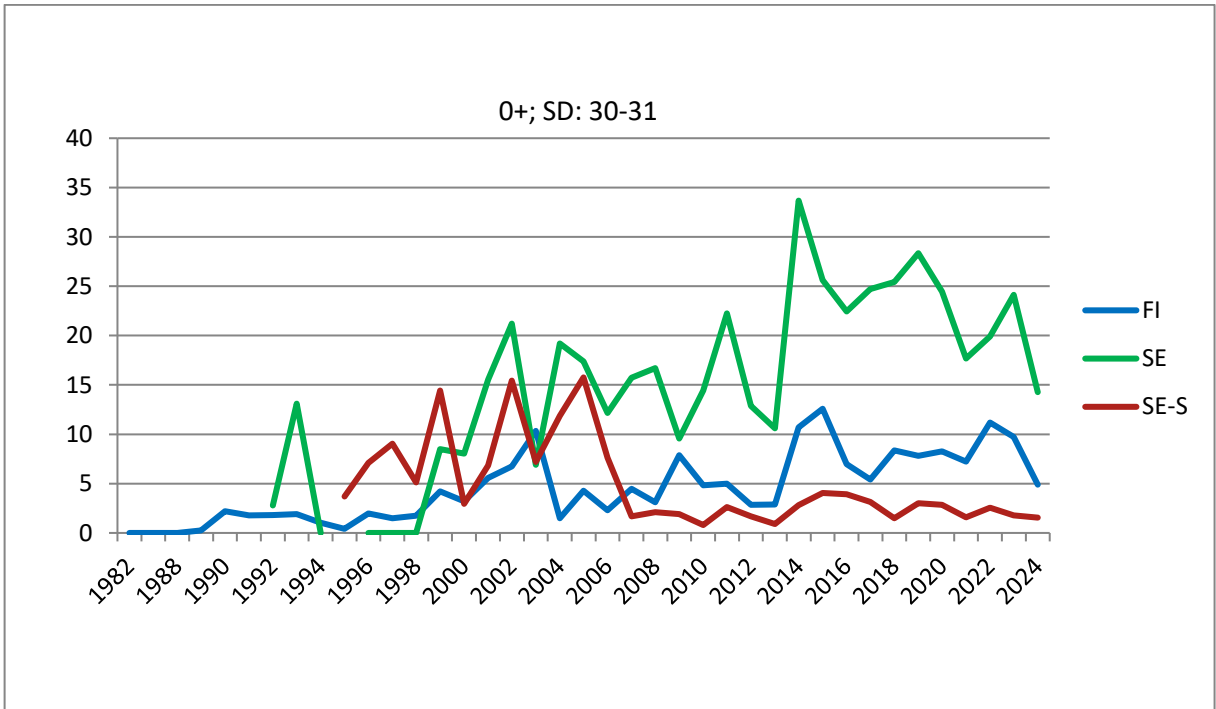


Figure 5.4.1.1. Average densities of 0+ trout in Finnish (FI) and Swedish trout (SE) and Swedish salmon (SE-S) rivers in ICES SD 30-31.

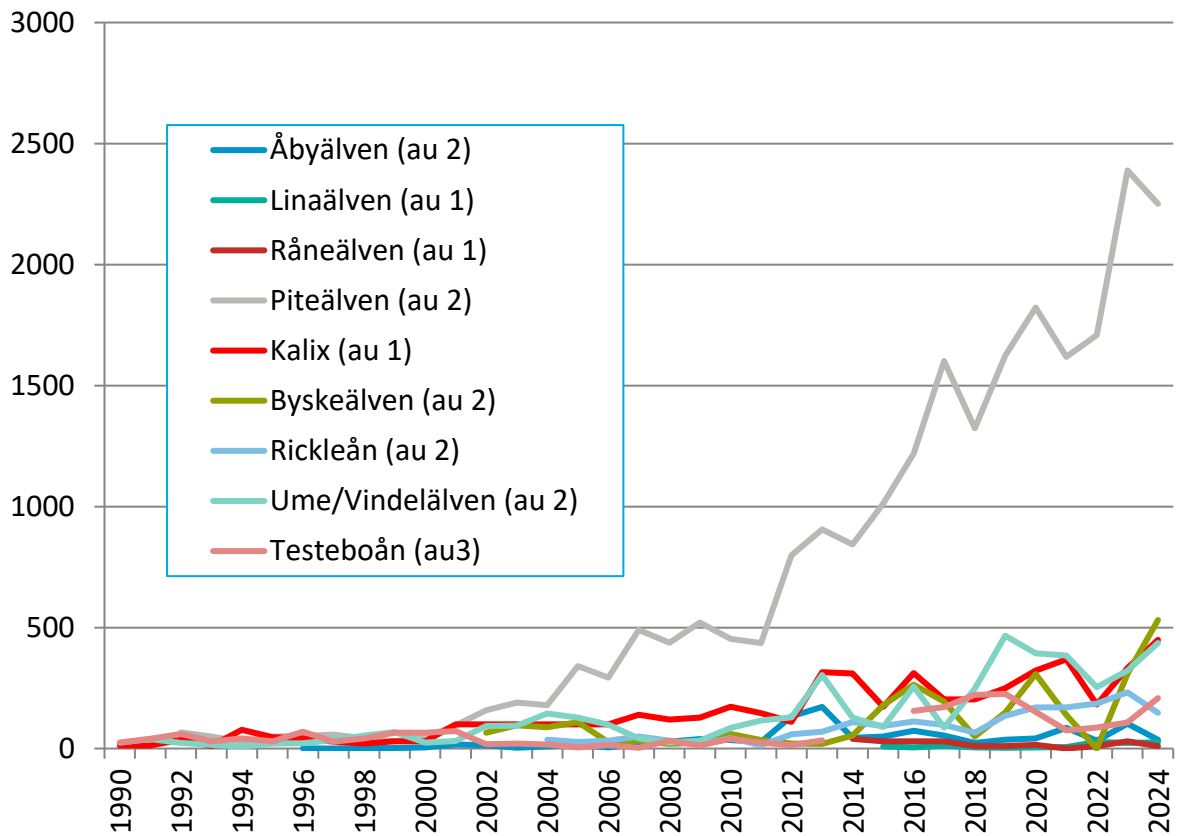


Figure 5.4.1.2. Number of ascending sea trout spawners from fish counters in Swedish rivers debouching into the Bothnian Bay.

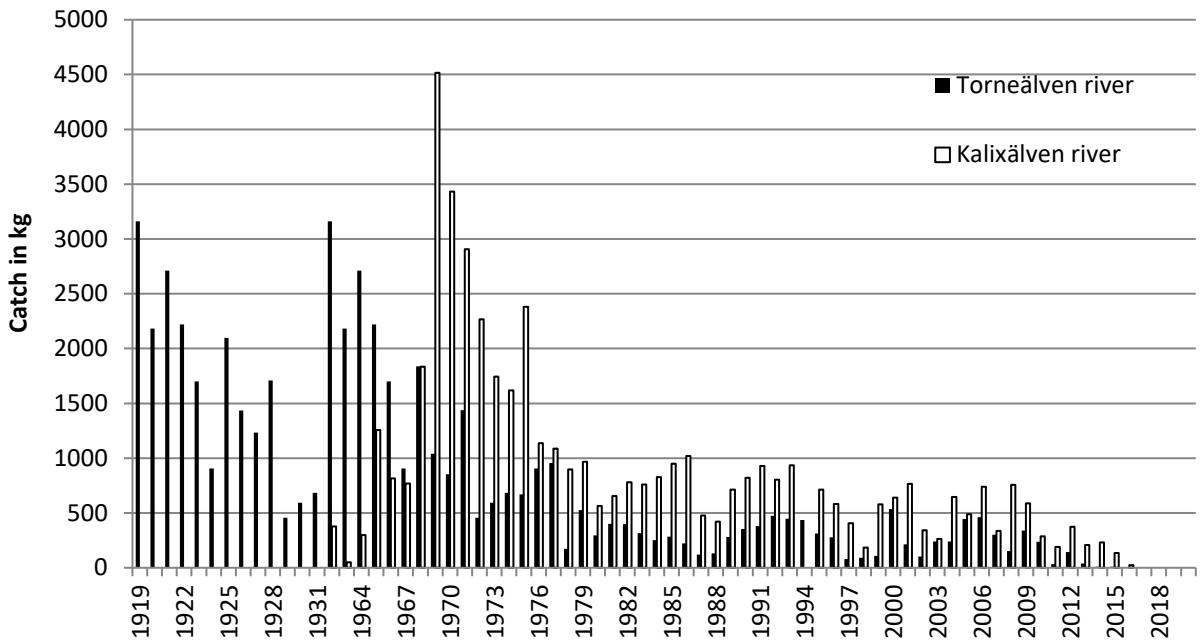


Figure 5.4.1.3. Swedish sea trout catches (landed, in kilos) in rivers Kalixälven and Torneälven (SD 31). Note that since 2013 there is a ban for landing of sea trout in Torneälven (not updated).

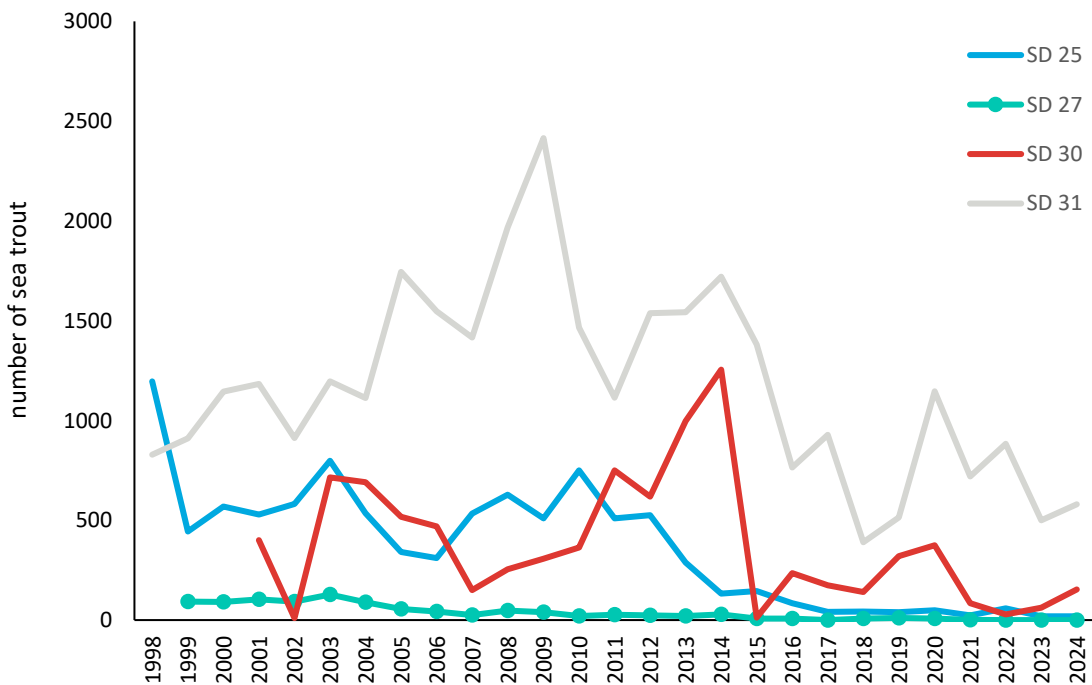


Figure 5.4.1.4. Nominal catches (in numbers) of sea trout in Swedish wild rivers (ICES SD 25-31). Only landed catches are included (no catch and release, updated for WGBAST 2025).

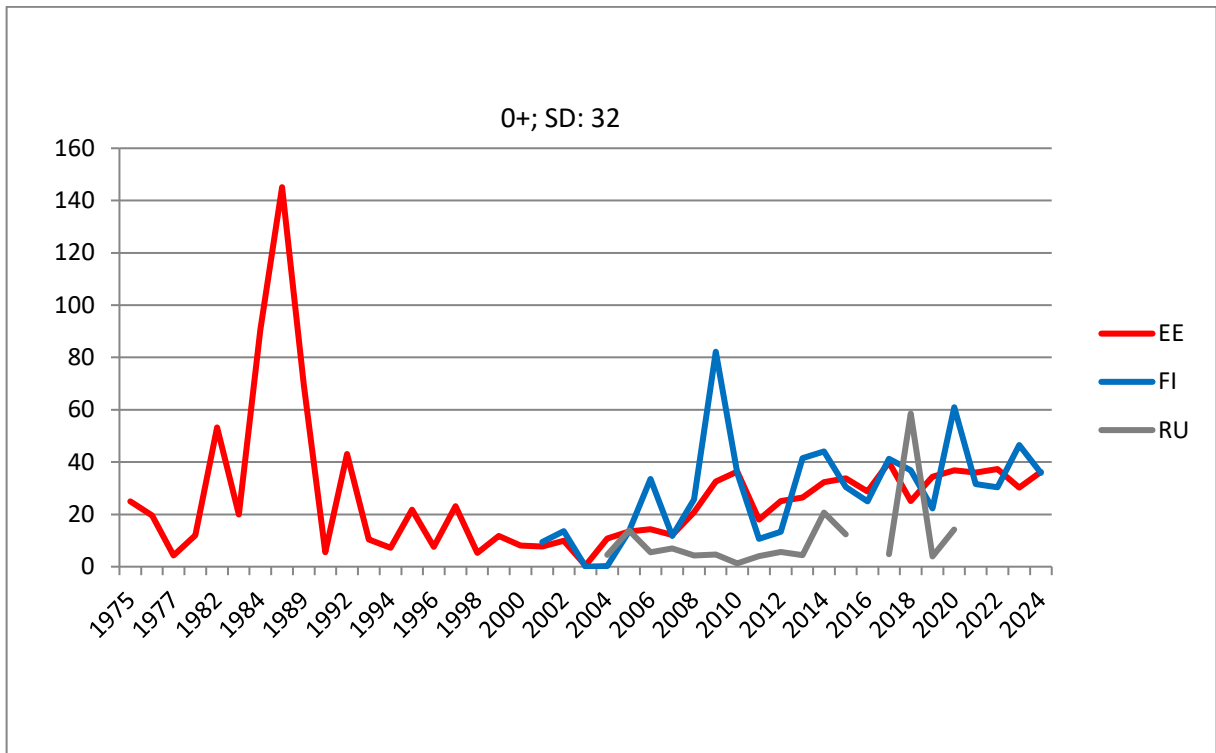
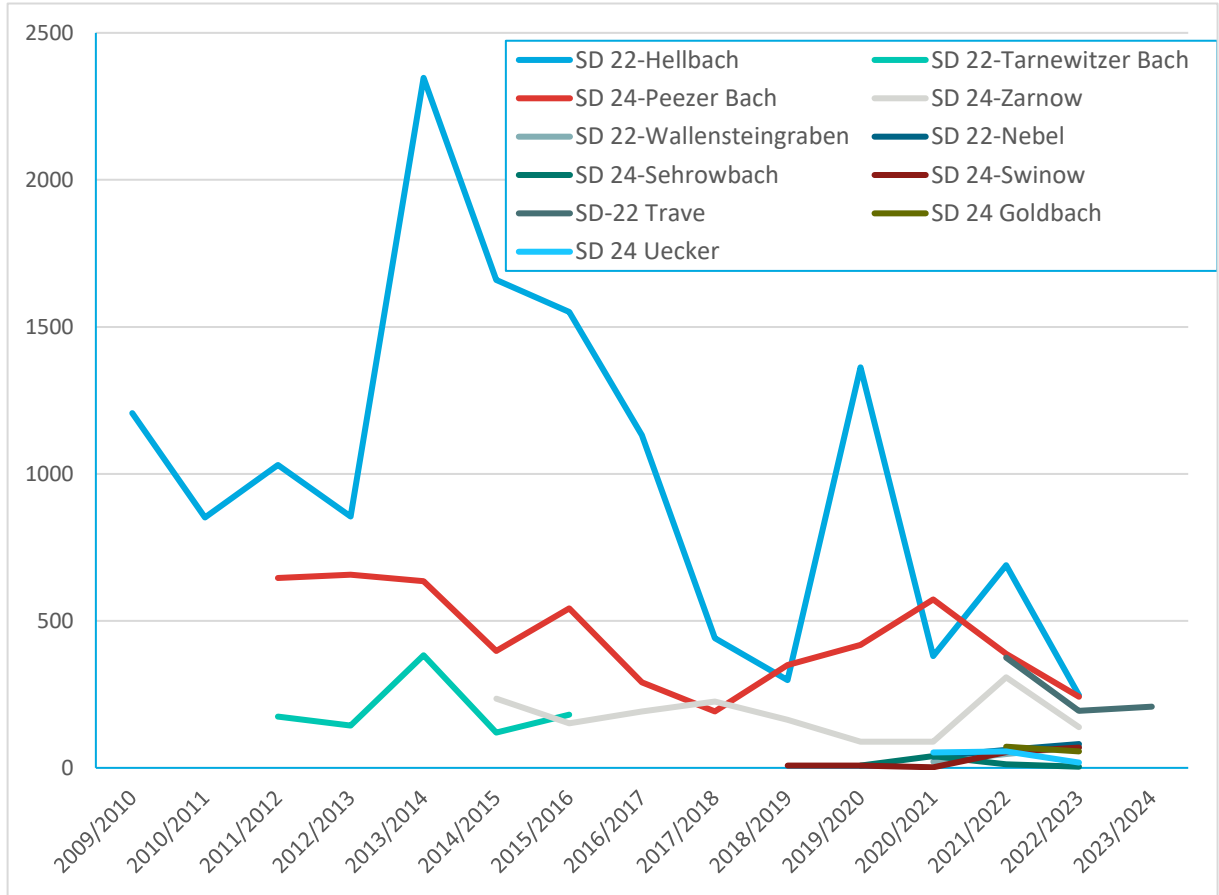
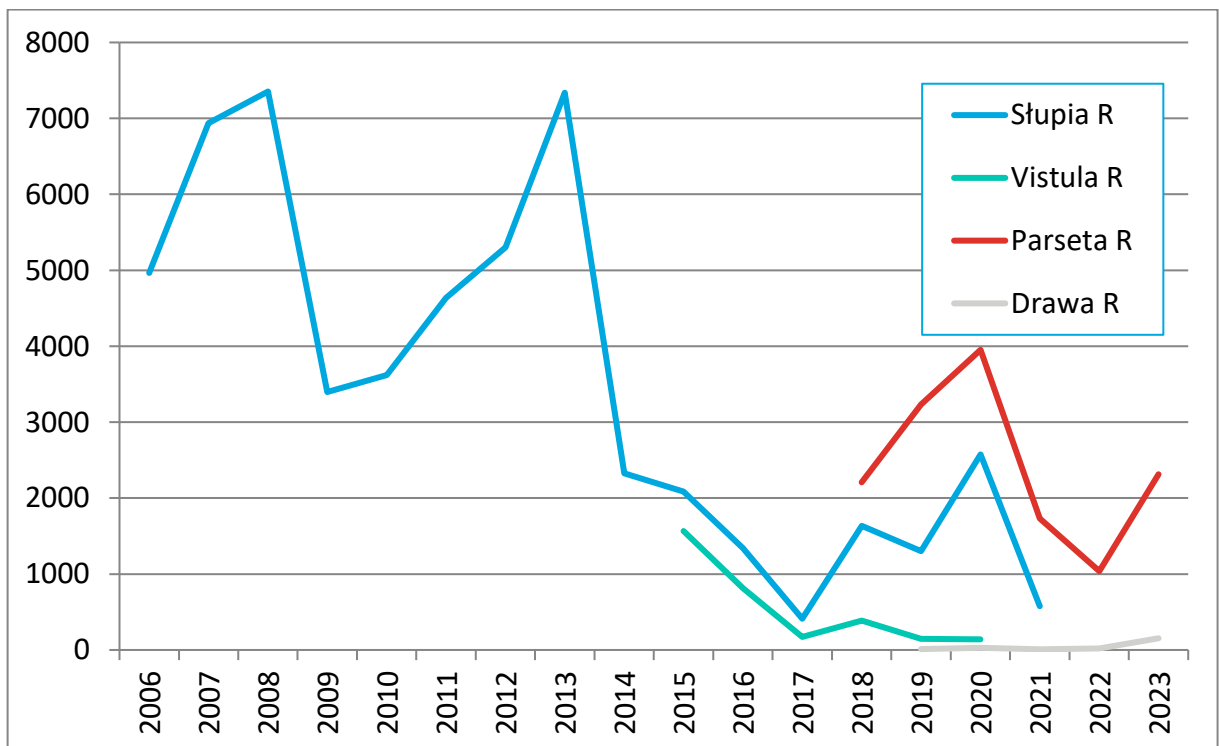


Figure 5.4.2.1. Average densities of 0+ trout in Estonian (EE), Finnish (FI) and Russian (RU) rivers in the Gulf of Finland (ICES SD 32).

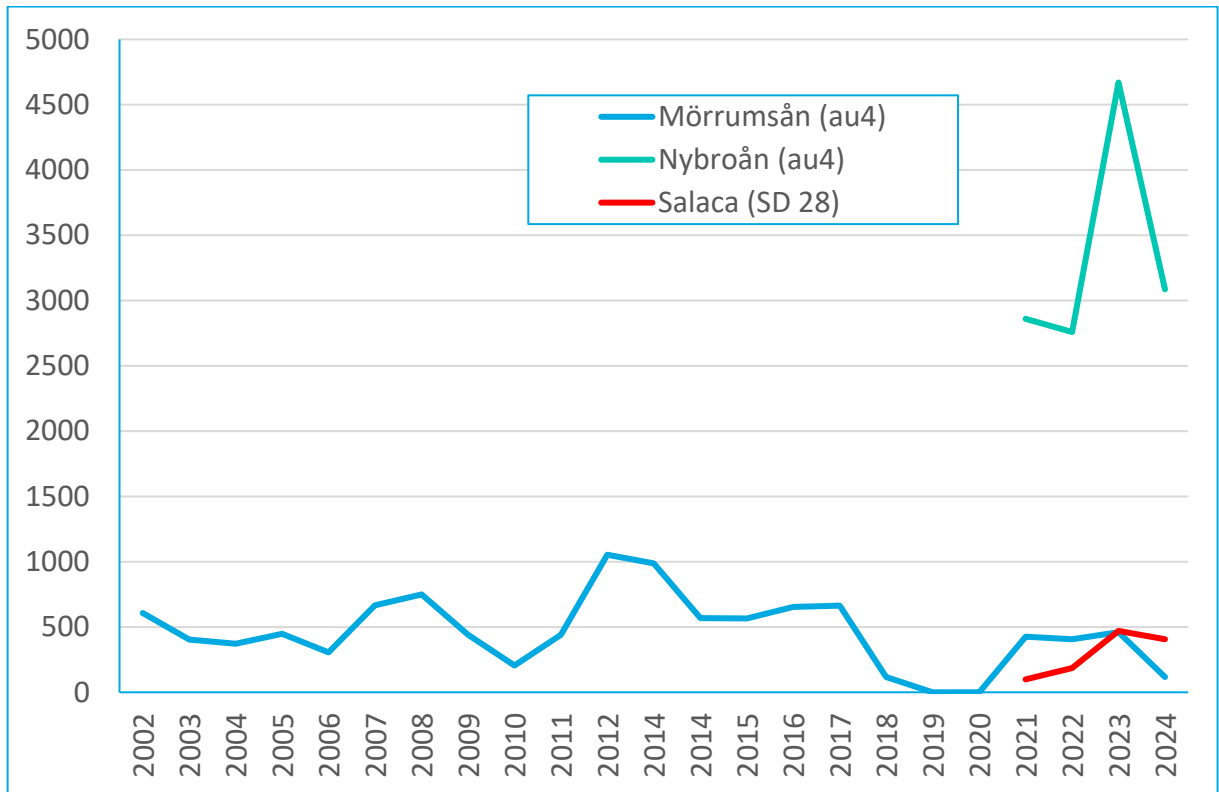
(A)



(B)



(C)



(D)

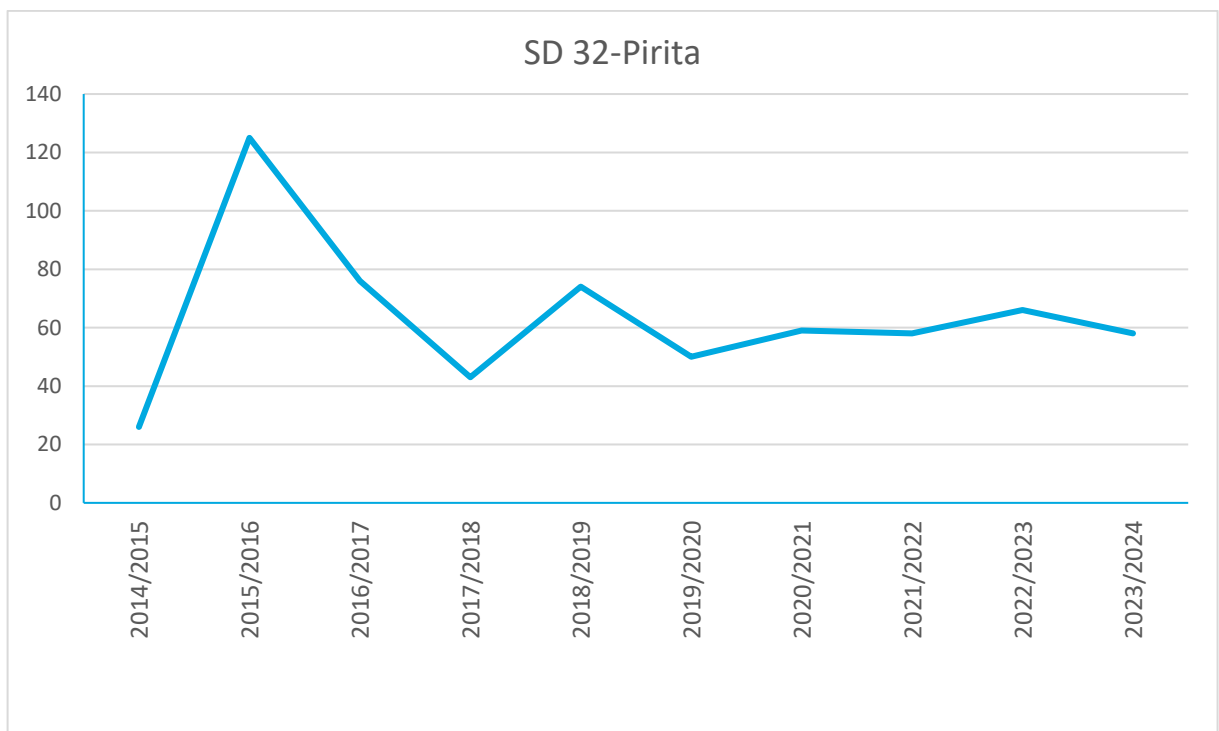


Figure 5.4.2.2. Video monitoring based on spawners counts in German small river systems (A), Vaki counter numbers from Polish rivers SD 25 and 26 (B), Swedish Mörrumsån and Nybroån, SD 25, Latvian Salaca, SD 28 (C) and Estonian Pirita River SD 32.

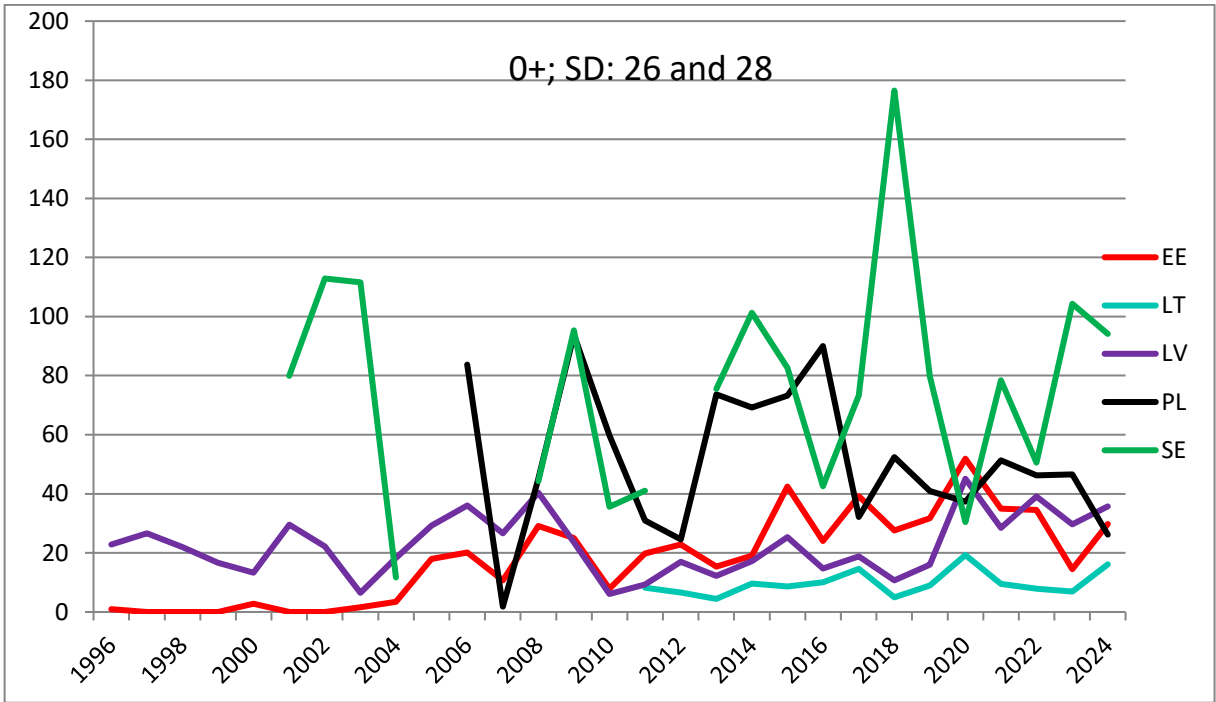


Figure 5.4.3.1. Average densities of 0+ trout in Estonian (EE), Lithuanian (LT), Latvian (LV), Polish (PL) and Swedish (SE) rivers in ICES SD 26 and 28.

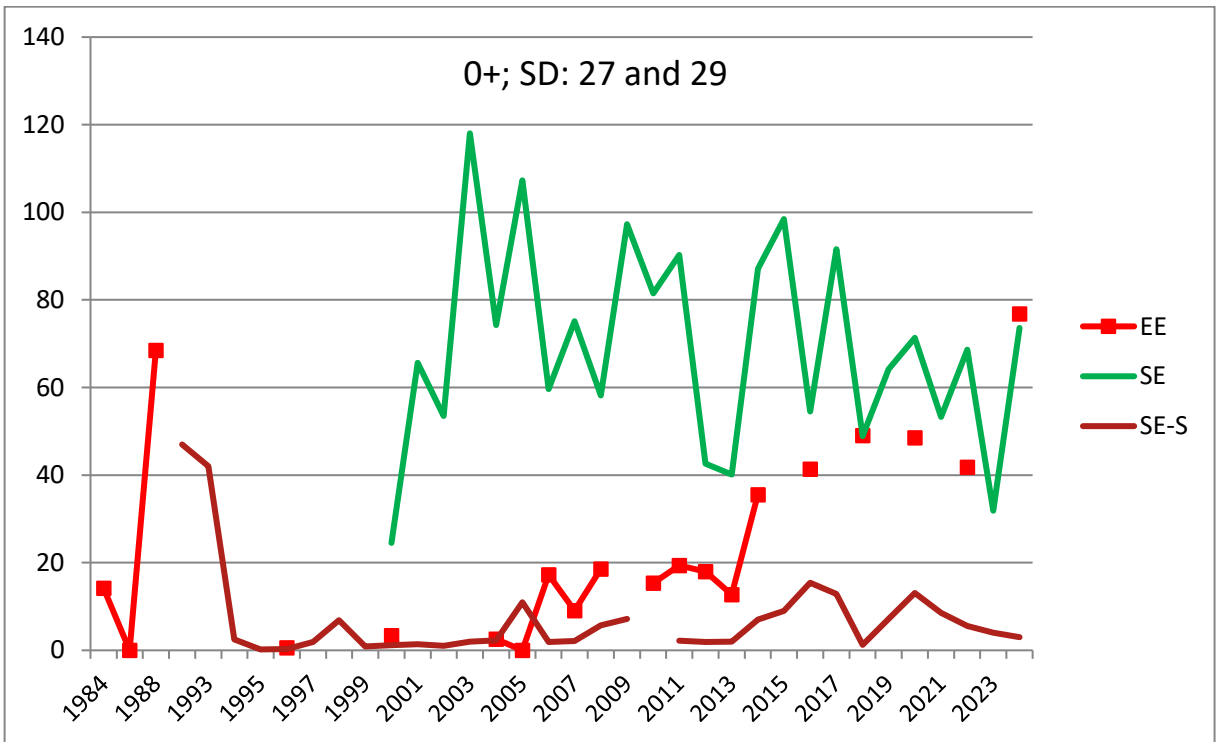


Figure 5.4.3.2. Average densities of 0+ trout in Estonian (EE), Swedish salmon (SE-S) and Swedish trout (SE) rivers in ICES SD 27 and 29.

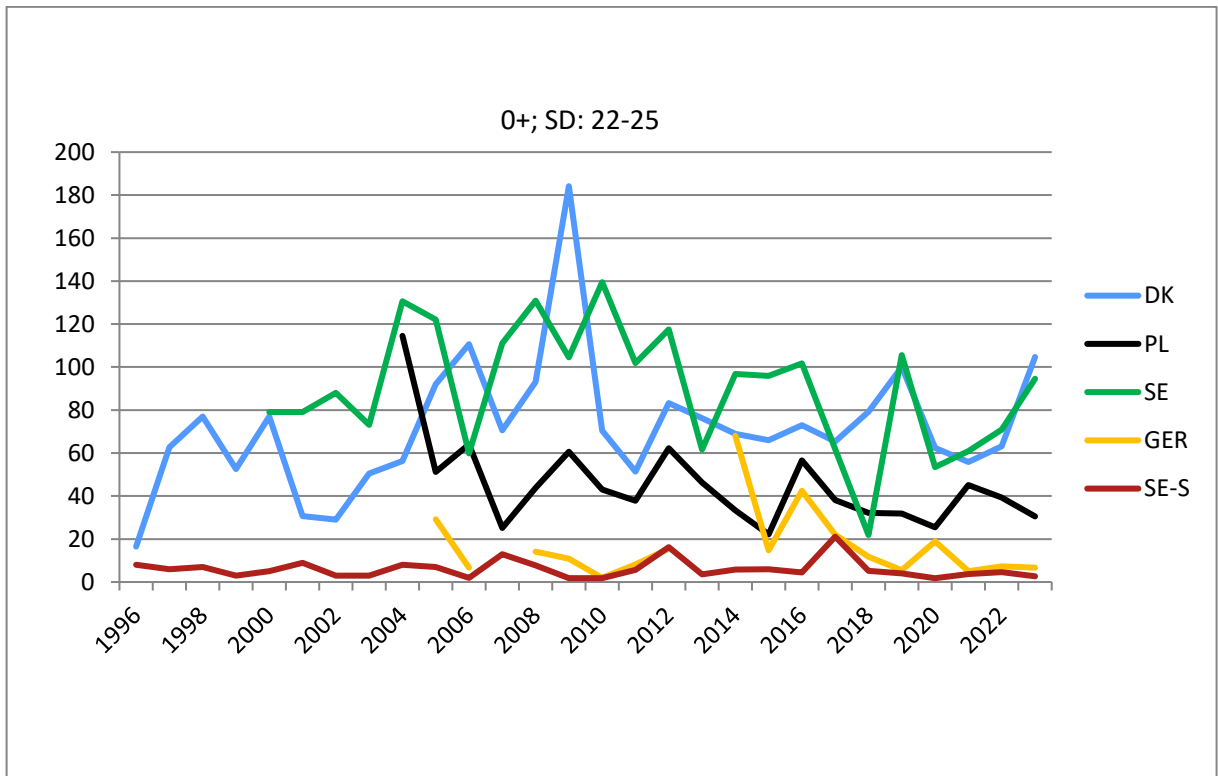


Figure 5.4.3.3. Average densities of 0+ trout in Danish (DK), Polish (PL), German (GER), Swedish salmon (SE-S) and Swedish trout (SE) rivers in ICES SD 22-25.

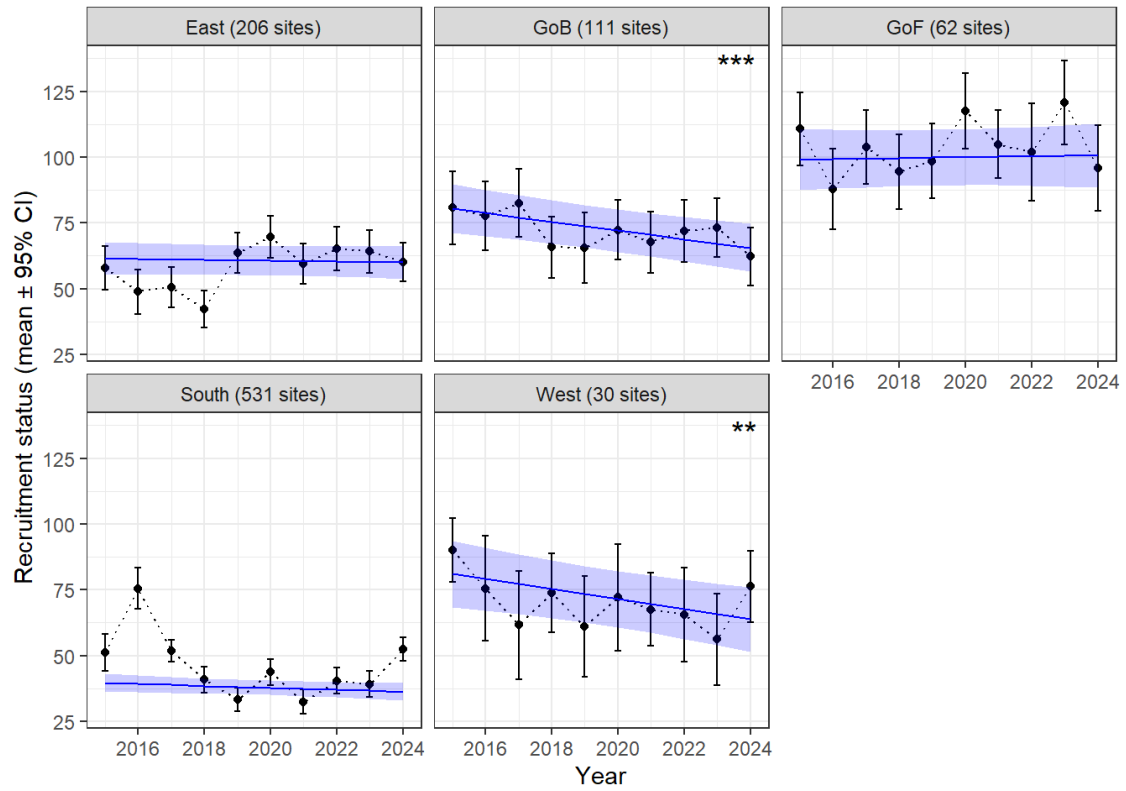
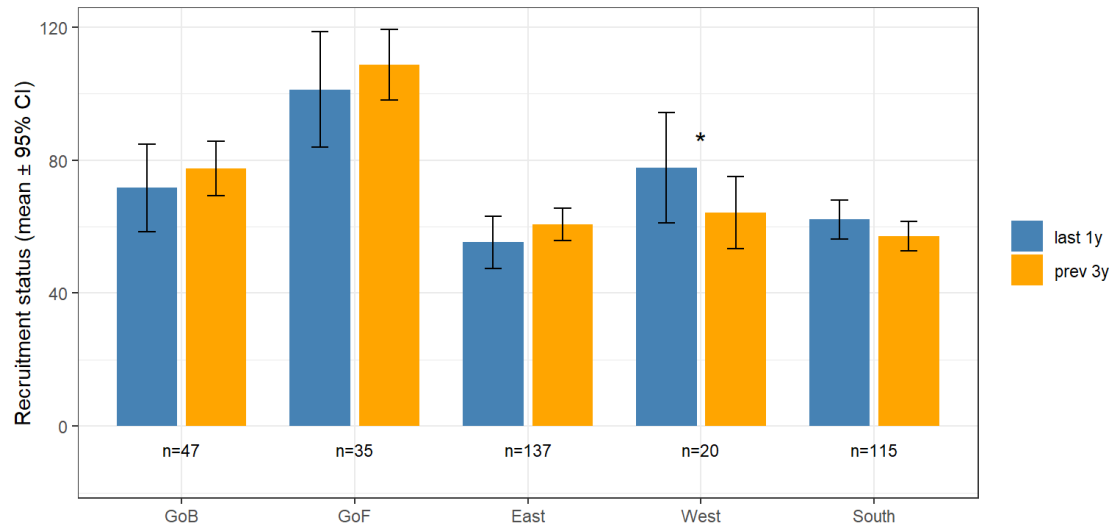
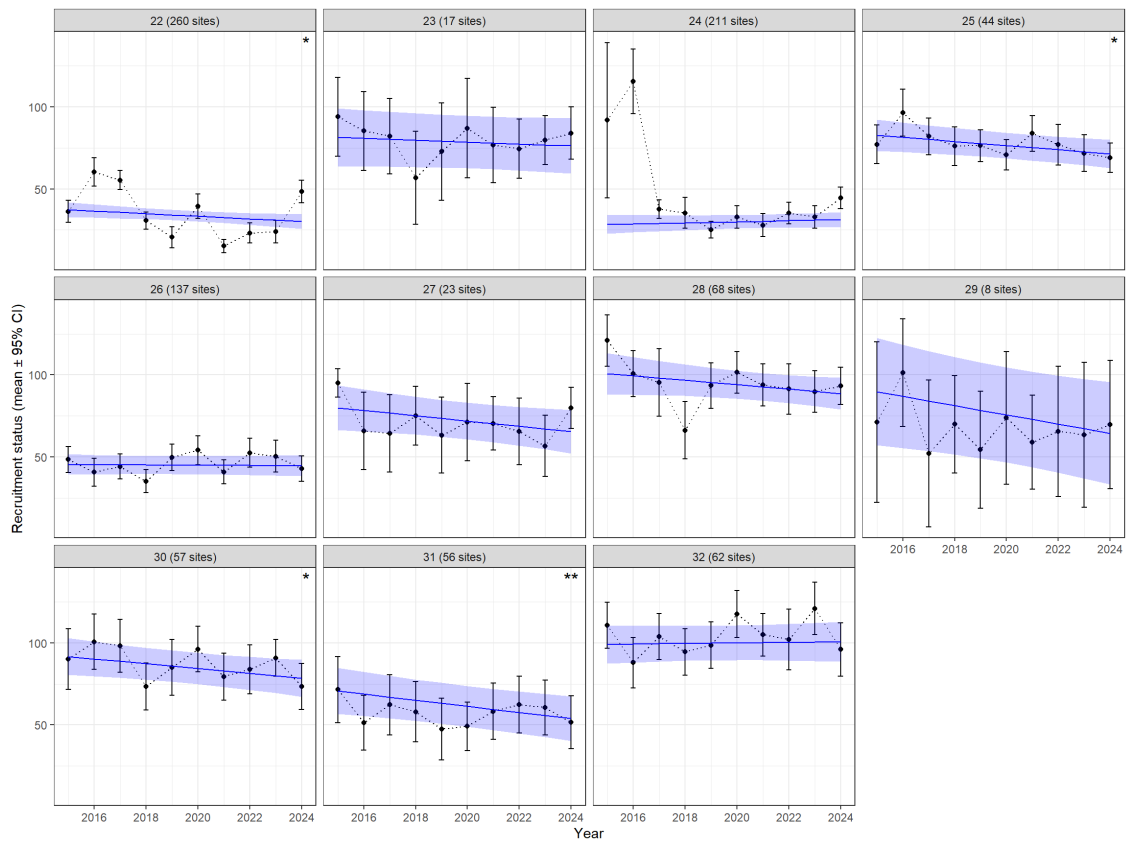


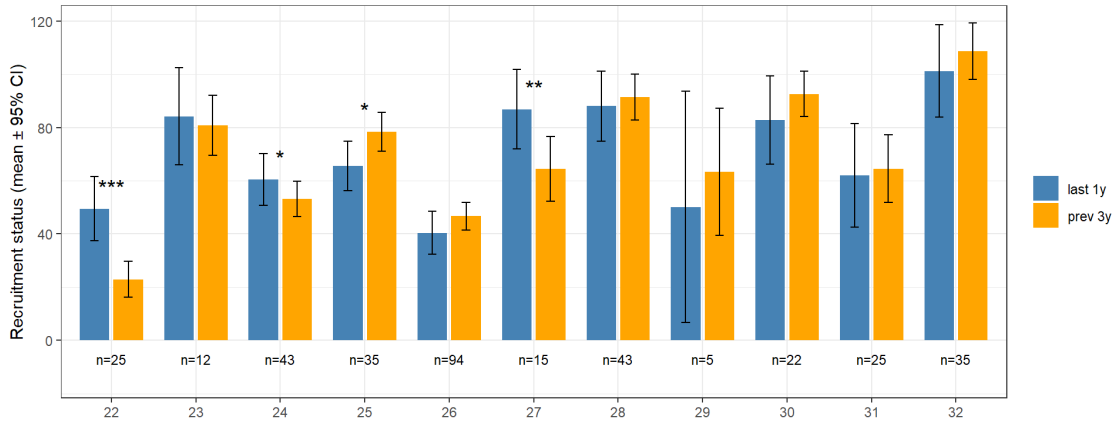
Figure 5.5.1. Sea trout by assessment unit in the Baltic Sea. Dots show average recruitment status (%) for 0+ sea trout parr in 2015-2024 (including sites with at least two years of data). Recruitment status is calculated as observed parr densities compared to modelled optimal parr densities by river system. The blue line shows modelled linear trend with 95% CI from linear mixed models with site as random factor. Number of sites is shown in brackets. Asterisks denote statistically significant trends (\* for  $p < 0.05$ , \*\* for  $p < 0.01$ , and \*\*\* for  $p < 0.001$ , linear mixed model).



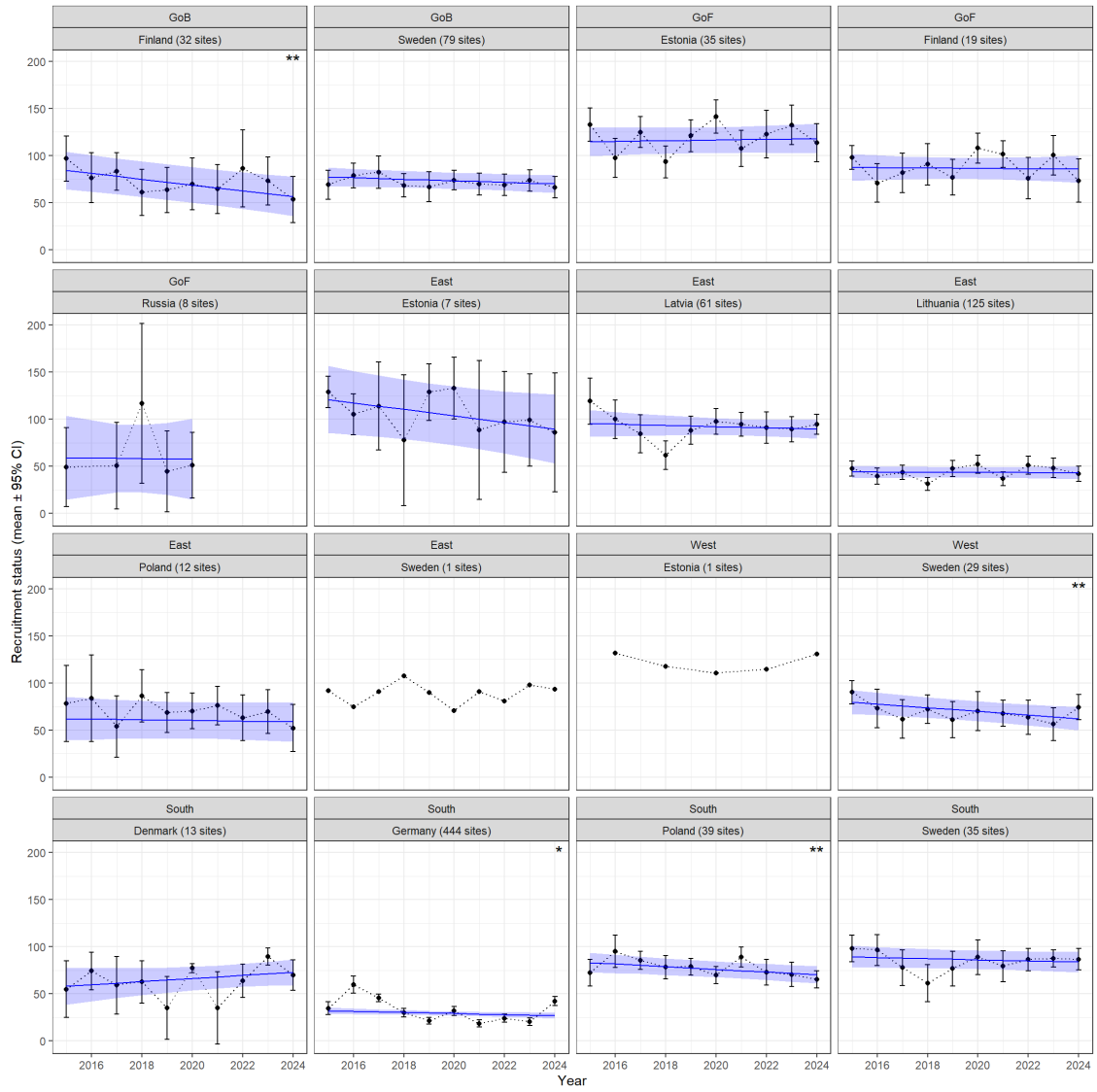
**Figure 5.5.2. Sea trout by assessment unit in the Baltic Sea.** The average recruitment status (%) for 0+ sea trout parr in 2024 compared to 2021-2023 (including sites with four years of data). Recruitment status is calculated as observed parr densities compared to modelled optimal parr densities by river system. The number of sites is shown below each pair of bars. Asterisks denote statistically significant differences between time-periods (\* for  $p < 0.05$ , \*\* for  $p < 0.01$ , \*\*\* for  $p < 0.001$ , paired t-test for sites).



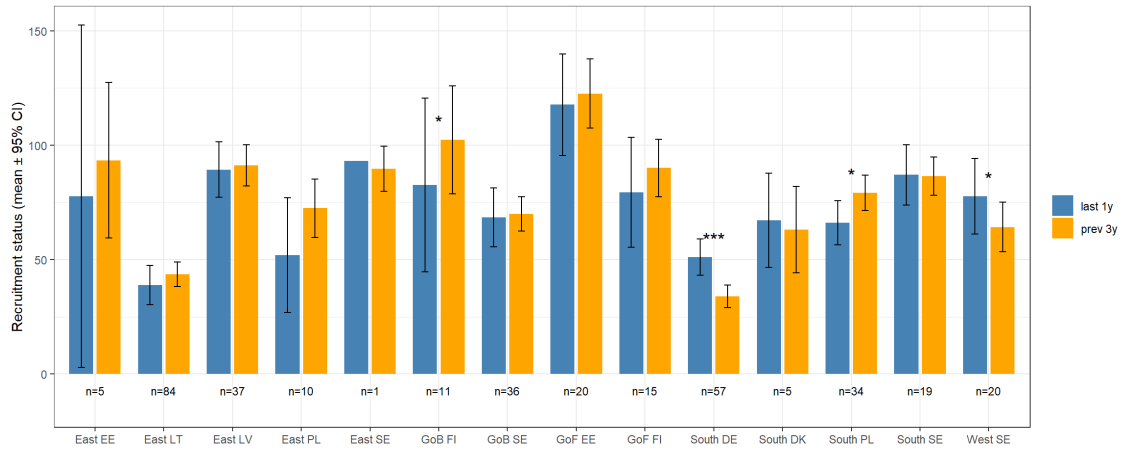
**Figure 5.5.3. Sea trout in subdivisions 22–32 (Baltic Sea).** Dots show average recruitment status (%) for 0+ sea trout parr in 2015–2024 by Subdivision (including sites with at least two years of data). Recruitment status is calculated as observed parr densities compared to modelled optimal parr densities by river system. The blue line shows modelled linear trend with 95% CI from linear mixed models with site as random factor. Number of sites is shown in brackets. Asterisks denote statistically significant trends (\* for  $p < 0.05$ , \*\* for  $p < 0.01$ , and \*\*\* for  $p < 0.001$ , linear mixed model).



**Figure 5.5.4. Sea trout by subdivision in the Baltic Sea. The average recruitment status (%) for 0+ sea trout parr in 2024 compared to 2021-2023 (including sites with 4 years of data) by Subdivision. Recruitment status is calculated as observed parr densities compared to modelled optimal parr densities by river system. The number of sites is shown below each pair of bars. Asterisks denote statistically significant differences between time-periods (\* for  $p < 0.05$ , \*\* for  $p < 0.01$ , \*\*\* for  $p < 0.001$ , paired t-test for sites).**



**Figure 5.5.5. Sea trout by country and assessment unit in the Baltic Sea. Dots show average recruitment status (%) for 0+ sea trout parr in 2015-2024 (including sites with at least two years of data). Recruitment status is calculated as observed parr densities compared to modelled optimal parr densities by river system. The blue line shows modelled linear trend with 95% CI from linear mixed models with site as random factor. Number of sites is shown in brackets. Asterisks denote statistically significant trends (\* for p<0.05, \*\* for p<0.01, and \*\*\* for p<0.001, linear mixed model).**



**Figure 5.5.6. Sea trout by country and assessment unit in the Baltic Sea. The average recruitment status (%) for 0+ sea trout parr in 2024 compared to 2021-2023 (including sites with 4 years of data). Recruitment status is calculated as observed parr densities compared to modelled optimal parr densities by river system. The number of sites is shown below each pair of bars. Asterisks denote statistically significant differences between time-periods (\* for  $p < 0.05$ , \*\* for  $p < 0.01$ , \*\*\* for  $p < 0.001$ , paired t-test for sites).**

## 6 References

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## Annex 1: List of participants

Name	Institute	Country
Adam Lejk	National Marine Fisheries Research Institute	Poland
Anders Kagervall	SLU Department of Aquatic Resources	Sweden
Anne Cooper	ICES Secretariat	
Antanas Kontautas	Marine Research Institute of the Klaipeda University	Lithuania
Antoine Kopp	DG MARE	
Antti Rätty	Natural Resources Institute Finland – Oulul	Finland
Armin Steibli	Institut für Fischerei Sachgebiet	Germany
Atso Romakkaniemi	Natural Resources Institute Finland – Oulu	Finland
Caroline Ek	SLU Department of Aquatic Resources	Sweden
Edgaras Ivanauskas	Institute of the Klaipeda University	Lithuania
Elin Dahlgren	SLU Department of Aquatic Resources	Sweden
Hans Jakob Olesen	DTU Aqua, National Institute of Aquatic Resources	Denmark
Henni Pulkkinen	Natural Resources Institute Finland - Oulu	Finland
Jānis Bajinskis	Institute of Food Safety, Animal Health and Environment Fish Resource Research Department	Latvia
Jenni Prokkola	Natural Resources Institute Finland – Turku	Finland
Johan Dannewitz	SLU Department of Aquatic Resources	Sweden
Katarina Magnusson	SLU Department of Aquatic Resources	Sweden
Katarzyna Nadolna-Ałtyn	National Marine Fisheries Research Institute	Poland
Marc Simon Weltersbach	Thünen-Institute of Baltic Sea Fisheries	Germany
Martin Kesler	University of Tartu	Estonia
Pauliina Louhi	Natural Resources Institute Finland	Finland
Piotr Dębowski	Inland Fisheries Institute – Department of River Fisheries	Poland
Rafał Bernaś	Inland Fisheries Institute – Department of River Fisheries	Poland
Rebecca Whitlock	SLU Department of Aquatic Resources	Sweden
Stefan Palm	SLU Department of Aquatic Resources	Sweden
Stefan Stridsman	County Administrative Board or Norrbotten Waters and Fisheries Unit	Sweden

<b>Name</b>	<b>Institute</b>	<b>Country</b>
Stig Pedersen	DTU Aqua, National Institute of Aquatic Resources	Denmark
Tapani Pakarinen	Natural Resources Institute Finland	Finland
Tuomas Leinonen	Department of Production Systems	Finland
Viktor Thunell	SLU Department of Aquatic Resources	Sweden

## Annex 2: Generic ToRs for Regional and Species Working Groups

The following ToRs apply to: AFWG, HAWG, NWWG, NIPAG, WGWIDE, WGBAST, WGBFAS, WGNSSK, WGCSE, WGDEEP, WGBIE, WGEEL, WGEF, WGHANSA, WGNAS and WGNEP.

### The working group should focus on:

- a) Conduct an assessment on the stock(s) to be addressed in 2025 using the method (assessment, forecast or trends indicators) as described in the stock annex and documented in TAF; - complete and document an audit of the calculations and results; and produce a **brief** report of the work carried out regarding the stock, providing summaries of the following where relevant:

Quality control and quality assurance of input data. In the event of late, missing or inconsistent data document issues and deviations from the stock annex.

- i) Where misreporting of catches is significant, provide qualitative and where possible quantitative information and describe the methods used to obtain the information;
- ii) For relevant stocks (i.e., all stocks for NEAFC request advice), estimate the percentage of the total catch that has been taken in the NEAFC Regulatory Area in the most recent years.
- iii) For Category 3 stocks replace the former 2 over 3 advice rule (2 over 5 for elasmobranchs) which is no longer considered precautionary for any remaining stocks not using the appropriate rule in Table 1 of [ICES 2023](#).
- iv) Evaluate spawning stock biomass, total stock biomass, fishing mortality, catches (projected landings and discards) using the method described in the stock annex;
  - 1) for category 1 and 2 stocks, in addition to the other relevant model diagnostics, the recommendations and decision tree formulated by WKFORBIAS (see Annex 2 of [https://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/Fisheries%20Resources%20Steering%20Group/2020/WKFORBIAS\\_2019.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/Fisheries%20Resources%20Steering%20Group/2020/WKFORBIAS_2019.pdf)) should be considered as guidance to determine whether an assessment remains sufficiently robust for providing advice.
  - 2) If the assessment is deemed no longer suitable as basis for advice, provide advice using an appropriate Category 2-5 approach as described in ICES technical guidance for harvest control rules and stock assessments for stocks in categories 2 and 3 or in [Advice on fishing opportunities](#) (for Cat 5 & 6).
  - 3) If the assessment has been moved to a Category 2-5 approach in the past year, consider what is necessary to move back to a Category 1 and develop proposal for the appropriate benchmark process.
- v) Provide all requested catch scenarios for the year(s) beyond the terminal year of the data (These are listed in ICES Guidance for completing single-stock advice)
- vi) Historical and analytical performance of the assessment and catch options with a succinct description of associated quality issues. For the analytical performance of category 1 and 2 age-structured assessments, report the mean Mohn's rho (assessment retrospective bias analysis) values for time series of recruitment, spawning

stock biomass, and fishing mortality rate. The WG report should include a plot of this retrospective analysis. The values should be calculated in accordance with the "Guidance for completing ToR viii) of the Generic ToRs for Regional and Species Working Groups - Retrospective bias in assessment" and reported using the ICES application for this purpose.

- b) Produce and quality assure a first draft of the advice for each stock according to ACOM guidelines.
- c) Include non-fisheries conservation considerations in accordance with the "ICES Guidelines on Non-Fisheries Conservation Considerations".
- d) Review progress on benchmark issues and processes of relevance to the Expert Group.
  - i) update the benchmark issues lists for the individual stocks in SID;
  - ii) review progress on benchmark issues and identify potential benchmarks to be initiated in 2025 for conclusion in 2026;
  - iii) determine the prioritization score for benchmarks proposed for 2027–2028;
  - iv) as necessary, document generic issues to be addressed by the Benchmark Oversight Group (BOG)
- e) Prepare the data calls for the next year's update assessment and for planned data evaluation workshops;
- f) Identify research needs of relevance to the work of the Expert Group.
- g) Review and update information regarding operational issues and research priorities on the Fisheries Resources Steering Group SharePoint site.
- h) Update TAF, SAG, ASD (Advice and Scenarios database) and SID with final assessment input and output and advice information.
- i) Consider and comment on Ecosystem and Fisheries Overviews with a focus on:
  - i) identifying and correcting mistakes and errors (both in the text, tables and figures), and
  - ii) proposing concrete evidence-based input that is considered essential for the advice but is currently under-developed or missing (with references and Data Profiling Tool entries, as appropriate).

Information of the stocks to be considered by each Expert Group is available [here](#).