EU request on evaluation of a draft multiannual plan for the Baltic salmon stock and the fisheries exploiting the stock

Advice summary

Request 1 – to provide information on river size and potential productivity of wild stocks included in Annex I to the draft multiannual plan

The information requested is provided in Table 1.

Request 2 – to propose alternative options for stock productivity proxies/or reference points

ICES advises that the current stock-specific targets of 50% and 75% of the potential smolt production capacity deviate from the objective of the draft multiannual plan of achieving maximum sustainable yield for several of the river stocks. ICES therefore advises to use the smolt production required to produce the maximum sustainable yield (R_{MSY}) as stock-specific productivity reference points. R_{MSY} is defined for the river stocks for which data and information is sufficient for an analytical assessment. For stocks with no analytical assessment, ICES is not in a position to advise on river-specific productivity reference points.

ICES advises to apply the precautionary reference point R_{lim} as a limit reference point for the management of wild salmon river stocks. R_{lim} is defined as the lowest smolt production level from which the river stock would be expected to recover to R_{MSY} in one salmon generation, if all fishing was completely closed. To take account of uncertainties in the assessments, consistent with the ICES precautionary approach, R_{pa} may further be defined as the value of the estimated smolt production. This ensures that the true smolt production has less than 5% probability of being below R_{lim}.

Request 3 – to provide an analytical evaluation of the recovery rate of individual wild salmon stocks under alternative fishing scenarios and to propose candidate definitions for "MSYsalmon"

Definitions of MSY for the individual river stocks are dealt with under Request 2. Regarding candidate definitions for "MSYsalmon", ICES advises that it will not be possible to achieve MSY under a strategy that manages only the mixed sea fishery, as is currently the case and is also the strategy of the draft multiannual plan.

ICES furthermore advises that if the goal is to obtain maximum sustainable yield for all river stocks, the mixed-stock sea fisheries (both commercial and recreational) will have to be kept at very low levels or closed while optimizing the river fisheries. If the goal is to obtain almost maximum sustainable yield ("pretty good yield") from the Baltic salmon population as a whole, while maintaining a noticeable mixed-stock sea fishery with the current fishing patterns, then it must be acknowledged that some rivers will be below the level where they are capable of producing MSY and some stocks may even become extinct.

Regarding the evaluation of the recovery rate of individual wild salmon stocks under alternative fishing scenarios, ICES notes that neither the request nor the draft multiannual plan specify criteria for when a target is reached (i.e. the probability of achieving the target). Without guidance on this probability, ICES is not in a position to advise on when (or if) a stock has met one or several of the alternative targets. Instead, the probability of the smolt production being above alternative reference points for each stock with an analytical assessment is provided for a range of fishing scenarios (Table 2).

Request 4 – to provide information on the likely impact that alternative time limits, with associated F-values, would have on the stock projections to achieve MSY-targets and the future ICES advice on the fishing possibilities

ICES advises that regardless of the time-frame, no harvest rate value exists for the commercial sea fisheries that would be consistent with the MSY approach (maximizing yield while simultaneously sustaining all river stocks above R_{lim} with a high probability). As per the response to Request 3, ICES advises that it appears improbable that the objectives and targets would be achieved by managing only the commercial sea fisheries, unless these fisheries are kept at a very low level or closed.

Additional advice on the draft multiannual plan

ICES advises that the mixing of salmon between the two current management units (subdivisions 22–31 and Subdivision 32) is too high to justify two separate management units for Baltic salmon.

ICES advises that to meet the objectives and targets of the draft multiannual plan, the plan should be expanded to include all relevant fisheries and not only the commercial sea fisheries. ICES advises to include measures in the multiannual management plan that maximize the harvesting of reared salmon, as well as guidelines for the management of hatchery populations and stocking activities carried out for different purposes.

ICES advises that the status of salmon rivers may change and it is therefore important that the list of wild rivers in Annex I in the multiannual plan is updated when required, with the possibility to regularly include (or remove) rivers.

Request

The European Commission's request to ICES:

1) *ICES is requested to provide information on river size and potential productivity of wild stocks in the rivers included in Annex I to the draft multiannual plan.*

2) *Article 4 of the draft plan provides that the wild salmon smolt production of each stock listed in Annex I should eventually reach at least 75% of its potential smolt production capacity (i.e. the current MSY-proxy). Depending on the status of a given wild salmon stock at the time of entry into force of the plan, the plan should provide, taking into account the life cycle of salmon, adequate time limits to achieve certain targets: a first target is to reach 50% of the potential smolt production capacity, the second target to reach 75% thereof. The related time limits are marked in the draft plan as 'XX' in Article 4 (2)–(4).*

   ICES is encouraged to propose alternative options for stock productivity proxies and/or reference points, if more appropriate proxies or values can be determined and estimated.

3) *Furthermore, the plan should provide in its Article 5 (2) a fishing mortality range (marked 'between …to…') applicable to the ICES subdivisions 22–31 which is closely linked to the time limits to be defined in Article 4.*

   ICES is requested to provide an analytical evaluation of the recovery rate of individual wild salmon stocks under alternative fishing scenarios, including an estimation of the number of salmon generations and years required to reach the targets under different F-values for commercial fisheries. The evaluation of the time limits should be based on the stock projections and include fishing scenarios with the exploration rates ranging from F=0 to a level that corresponds to a fishing mortality that will give "MSYsalmon" (Fmsy or Fmsy Upper). In addition, ICES is requested to provide stock projections and stock developments with F-value range in close vicinity of F=0.1, including the relevant time limits.

   Defining the MSY approach for salmon in the Baltic ("MSYsalmon") is complicated due to a number of reasons (many wild river stocks of variable status, high proportion of reared salmon exploited in mixed stocks fisheries etc.). Both time to reach the target (per stock) and the proportion of river stocks having reached the target at a certain time, needs to considered when defining Fmsy or Fmsy Upper for salmon in subdivisions 22–31. ICES is requested to propose candidate definitions for "MSYsalmon" that are in accordance with the ICES MSY approach.

4) *To provide information on the likely impact that alternative time limits, with associated F-values, would have on the stock projections to achieve MSY-targets and the future ICES advice on the fishing possibilities.*

Additional request: During the process of addressing the requests, ICES was also requested by members of BALTFISH to provide any other relevant comments on the draft multiannual plan.

Elaboration on the advice

Baltic salmon

Salmon (*Salmo salar*) is present in rivers around the Baltic Sea. Because of a precise homing behavior, each river has its own population (river stock) that is genetically distinct and to a large extent demographically independent. An important part of the species' total genetic diversity exists between populations from rivers at different geographical scales.

ICES divides current Baltic salmon rivers into four main categories:

1. *Wild salmon rivers* are defined as self-sustainable, with no or limited releases of reared fish.
2. *Mixed rivers* have some wild production, but are subject to considerable stocking.
3. *Reared rivers* currently cannot hold self-sustaining river stocks (e.g. because of physical barriers), and are entirely dependent on stocking.
4. *Potential rivers* are not currently holding a self-sustainable stock, but could hold one in the future.

At present, there are 27 wild, 14 mixed, and 17 reared rivers. In addition, a relatively large number of potential salmon rivers exist, often with ongoing reintroduction programmes and/or occasional natural reproduction.

ICES has established six different assessment units (AUs) for Baltic salmon, based on both biological characteristics and management considerations (Figure 1).

The fisheries on Baltic salmon may roughly be divided into five different categories as shown in Table 3. The fisheries exploit salmon at different life stages, starting with the offshore fisheries, followed by the coastal fisheries, and ending with the river fisheries. This means that the number of salmon available to the coastal fisheries depends on catches taken in the offshore fisheries, whereas the number available to river fisheries depends on both offshore and coastal catches.

In 2019, commercial sea fisheries accounted for 51% of the total catch of Baltic salmon, recreational sea fisheries for 16%, and river fisheries for 33%. Approximately 85% of the commercial sea fisheries was reported and counted against the quotas. The remaining 15% of the commercial sea catches consisted of misreported catches (salmon reported as sea trout), unreported catches, and discards. The recreational sea catches and river catches were not counted against the quotas.

According to the latest analytical assessment (ICES, 2019), the current status shows a large variation, with a clear tendency for healthier river stocks in the northern Gulf of Bothnia (AUs 1–2), whereas stocks in the southeastern Baltic (AU 5) are in a particularly poor state. Besides the effects of fisheries, local factors (poor water quality, disease, migration obstacles, etc.) are presumed to cause a weak status for salmon in certain rivers and areas.

The draft multiannual plan for Baltic Sea salmon

<u>Scope and objectives</u>

The draft multiannual plan from 2018 addresses the Baltic Sea salmon stocks and EU fishing vessels exploiting the stocks in EU waters. With respect to exploitation, the draft plan would operate with the same two management units currently used: subdivisions (SDs) 22–31 and SD 32.

In addition to contributing to achieve the objectives of the Common Fisheries Policy and to fulfill relevant descriptors contained in the Marine Strategy Framework Directive (EU, 2008), a number of specific objectives and targets for the Baltic Sea salmon are listed in the draft plan, including the following:

- The plan shall contribute to the biodiversity, genetic integrity, and diversity of the Baltic Sea salmon stock.
- The plan shall aim at achieving maximum sustainable yield (MSY) as soon as possible or on a progressive, incremental basis at the latest by 2020 and maintaining thereafter the Baltic Sea salmon stock at levels which can produce maximum sustainable yield. It is noted that the reference to 2020 is outdated.
- The plan furthermore sets stock-specific targets for the wild stocks in terms of minimum proportion of potential smolt production capacity to be achieved. The overall aim is to reach at least 75% of the potential smolt

production capacity for each stock by a given time limit. Even though the time limit is not defined in the draft plan, "by a given time limit" is part of the special request to ICES.

- The link between MSY and the potential smolt production is not specified in the draft plan. However, it seems that the plan assumes that being at or above 75% of the potential smolt production capacity is consistent with MSY.

Fishing opportunities

The draft plan specifies the objectives and targets to be used to determine the fishing opportunities. For ICES SDs 22–31, the fishing opportunities shall be set at a level corresponding to a fishing mortality within a range. The range is to be decided based on scientific advice. According to Article 4(1) in the draft plan, the range corresponds to levels consistent with MSY. For salmon in SD 32, the fishing opportunities shall be set at a level that enhances the wild salmon stock status with a high probability of moving towards the MSY.

The draft plan does not specify which fishing mortality is referred to. However, since the plan only applies to EU fishing vessels in EU waters of the Baltic Sea, ICES has assumed that the fishing mortality referred to is generated by commercial EU fisheries on the total abundance of salmon, available to the fisheries in SDs 22–31 and 32. These commercial fisheries are conducted on a variety of salmon stocks on the feeding grounds and on salmon migrating back to the rivers, and they account for only approximately half of the total catches. Furthermore, the plan does not define the level of probability associated with "high probability" of achieving MSY.

EU Member State measures to protect weak wild salmon stocks

For wild salmon stocks that have not reached 50% of their potential smolt production capacity by the time the plan enters into force, the draft plan stipulates that relevant EU Member States shall establish national technical conservation measures in the waters of the Baltic Sea to be applied to their own fishing vessels exploiting the relevant salmon stocks.

Releases of reared salmon

The draft plan does not address the management of reared salmon released in the Baltic Sea. The only references to releases of salmon are in articles 14 and 15. According to Article 14 of the draft plan, all released parr or older salmon, excluding releases aiming to establish new salmon stocks or to support existing weak salmon stocks, must be fin-clipped before stocking. Article 15 specifies that direct restocking of salmon may be considered as a conservation measure when conducted in order to support the achievement of the objectives and targets of the draft plan.

Comments on the draft multiannual plan

Management units

The draft plan maintains two management units for EU commercial fisheries (one for SDs 22–31 and one for SD 32) under the current management. The rationale for keeping these TAC management units is not given in the draft. However, it may be related to the former understanding of stock dynamics, indicating that salmon caught in SD 32 (Gulf of Finland) were all of local origin and that almost all local wild and released reared salmon stay in this area throughout their sea-life period with very limited migration to other parts of the Baltic Sea, thus supporting the current two management units.

The current understanding of the stock dynamics in SD 32 is that the natural production in the area has increased over time, and that salmon from local wild and mixed rivers constitute a larger proportion of the total production in the Gulf of Finland than earlier. Although the majority of SD 32 salmon seem to remain in the Gulf of Finland and northern Main Basin throughout their sea life, a part migrates to the feeding grounds in the southern Main Basin. In addition, more recent information demonstrates that some of the Gulf of Bothnia stocks pass into Gulf of Finland during their spawning migration from the southern feeding areas to their rivers in Gulf of Bothnia.

This means that fisheries in SDs 22–31 should be taken into account when managing the salmon stocks in SD 32 and vice versa, and ICES considers that the mixing of salmon between the two current management units is too high to justify two separate management units. However, this does not mean that a separate quota for SD 32 may not be a useful tool to limit

the exploitation of wild salmon in that subdivision. In general, separate quotas for the different fisheries may improve management by allowing further protection of weak river stocks and support the MSY objective.

Fisheries considered in the management plan

The draft management plan has a strict focus on commercial sea fisheries. Although a substantial number of salmon are nowadays caught in recreational fisheries, these fisheries are not addressed. Hence, there is an obvious risk that a management plan not including tools to regulate exploitation by all relevant fisheries may become less effective and could fail in fulfilling its objectives and targets.

Reared salmon

Releases of hatchery-reared salmon in natural waters are carried out for various reasons, including compensation to fisheries for loss of natural production in rivers exploited by hydropower (compensatory releases), support to weak wild river stocks (supplemental releases), reintroduction of salmon in rivers where the original stock has become extinct, or to increase fishing possibilities on a local scale without any primary aims of increasing the natural production (put-and-take releases). It also appears to be rather common that releases of reared salmon are carried out without any clear management objectives, or possibly due to historical reasons that may no longer be relevant.

In 2018, 4.4 million smolts were released in the Baltic Sea. In comparison, the total wild smolt production in the same year was estimated to 3.1 million (ICES, 2019). Despite genetic and ecological risks associated with such large-scale releases, stocking activities are only covered to a minor extent in the draft multiannual plan.

Although reared salmon is an important resource for the Baltic Sea fisheries and is included in the current TAC system, releases of reared salmon constitute a genetic risk to wild populations. ICES therefore advises that a multiannual management plan should relate to the variety of ongoing stocking activities and take into account interactions between wild and reared salmon. This could include reduced stocking amounts, measures to maximize the harvesting of reared salmon, and guidelines for management of hatchery populations and stocking activities with different aims. Hence, negative impacts on wild stocks will be minimized.

Request 1 – To provide information on river size and potential productivity of wild stocks, included in Annex I to the draft multiannual plan

Information on river size and productivity is provided in Table 1.

ICES notes that two of the rivers listed as wild rivers in Annex I of the draft management plan currently have mixed status. In river Pärnu (Estonia) large stocking activities are carried out to facilitate recolonization of production areas, located above a recently removed dam. Therefore, Pärnu at present does not fulfill ICES criteria for wild population (wild salmon populations are self-sustaining populations with no or only very limited releases of reared fish).

Zeimena is a second-order tributary in the Nemunas River Basin (Lithuania). Because of stocking in several other tributaries, ICES has classified the entire Nemunas River Basin as mixed, whereas individual river tributaries have not been classified separately. Therefore, ICES repeats its earlier recommendation that the Zeimena tributary should be removed from Annex I until further evidence is made available to determine if it can be considered as a separate wild salmon river (ICES, 2018).

Request 2 – To propose alternative options for stock productivity proxies or reference points

Reference points for category 1 wild Baltic salmon stocks (i.e. all wild stocks in assessment units 1–4)

ICES proposes the following reference points for salmon stocks in the Baltic Sea with an analytical assessment.

$\mathbf{R_0}$ is the expected long-term average smolt production in a wild salmon stock if all fishing has been closed. This is often referred to as the potential smolt production capacity (PSPC).

R_{MSY} is defined as the smolt production level which results from exploitation at the harvest level that leads to the maximum long-term yield. The Salmon Action Plan, adopted by the International Baltic Sea Fisheries Commission in the mid-1990s, set the management targets for recovering salmon stocks to 50% of R_0, and for recovered stocks to 75% of R_0. Although the Salmon Action Plan expired in 2010, the 75% of R_0 continued to be considered as the target for wild stocks, although not formally agreed by management authorities. ICES has therefore used the 75% of R_0 as a general proxy for R_{MSY}. However, 75% of R_0 deviates from R_{MSY} for most stocks as shown in Figure 2. ICES therefore suggests that the target reference point of 75% of R_0 should be replaced by R_{MSY} to be fully consistent with the MSY objective.

In order to address the risk to the stock of not being able to produce MSY, ICES suggests to use **R_{lim}** as a limit reference point for wild Baltic salmon stocks. R_{lim} is the lowest smolt production level from which the smolt production is expected to recover to R_{MSY} in one salmon generation, if fishing was completely closed. This means that as long as the stock is above R_{lim}, it is possible to rebuild it to R_{MSY} within one generation time by managing the fishery. To take account of uncertainties in the assessments, consistent with the ICES precautionary approach, **R_{pa}** may further be defined as the value of the estimated smolt production that ensures the true smolt production has less than 5% probability of being below R_{lim}.

Reference points for wild stocks with no analytical assessment (stocks in assessment units 5–6)

The information available for salmon rivers in AU 5 (eastern Main Basin) is insufficient to support analytical assessment. Therefore, ICES is not able to estimate R_{MSY} and R_{lim} for those stocks.

For stocks in AU 6 (Gulf of Finland), ICES is in the process of developing analytical assessments. Once the assessments are operational, it should be possible to estimate potential smolt production capacities, as well as R_{MSY} and R_{lim} reference points for these wild salmon stocks.

Request 3 – To provide an analytical evaluation of the recovery rate of individual wild salmon stocks under alternative fishing scenarios and to propose candidate definitions for "MSYsalmon" that are in accordance with the ICES MSY approach

Candidate definitions for "MSYsalmon"

Definitions of MSY for the individual river stocks are dealt with under Request 2, where ICES proposes two reference points, R_{MSY} and R_{lim}, to be applied for each river stock in an MSY approach.

MSY for Baltic salmon can only be achieved with a stock-specific management strategy, involving not only the commercial sea fishery, but also the recreational sea fishery and the fisheries in the rivers. It will not be possible to achieve MSY under a strategy that manages only the mixed sea fishery, as is currently the case and is also the strategy of the draft multiannual plan. The mixed sea fishery exploits all wild stocks as well as released salmon. It is not feasible in the mixed sea fishery to maximize the yield of the Baltic salmon, while simultaneously maintaining all river stocks above R_{lim}.

The analysis of the trade-off between mixed and stock-specific fisheries (see basis of the advice below) illustrates that when the mixed fishery harvest rate is small, all stocks can achieve their MSY due to optimization of fishing in individual rivers. When mixed fishery harvest rate increases, some stocks fall below the level where they are capable of producing MSY.

The stocks that first fall below the level where they are capable of producing MSY are small compared to the ones that are more resilient to fishing. The contribution to the total yield from these small stocks is very limited and if they fall below their MSY level or even become extinct, it will not make a noticeable difference to the total yield. The figures of wild salmon smolt production indicate that the vast majority of the yield originates from the largest four river stocks (Tornionjoki/Torneälven, Kalixälven, Ume/Vindelälven, and Byskeälven; Table 1).

If the goal is to obtain maximum sustainable yield for all river stocks, the mixed sea fisheries (both commercial and recreational) will have to be kept at very low levels or closed while optimizing the river fisheries. If the goal is to obtain almost maximum sustainable yield ("pretty good yield") from the Baltic salmon population as a whole, while maintaining a noticeable mixed-stock sea fishery with the current fishing patterns, then it must be accepted that some rivers will be below the level where they are capable of producing MSY and some may even become extinct. Most of the weakest river

stocks are found in AU 5; these stocks are mainly exploited in the offshore mixed fisheries. Limitations on those fisheries will have the largest impact on the state of these stocks.

Evaluation of the recovery rate of individual wild salmon stocks under alternative fishing scenarios

Assessment Units 1–4 stocks

Neither the request nor the draft multiannual plan specify criteria for when a target is reached (i.e. the probability of achieving the target). Without guidance on this probability, ICES is not in a position to indicate when (or if) a stock has met one or several of the potential targets. Instead, the probability of the smolt production being above the potential targets for each stock and scenario is provided in Table 2.

Under the no fishing scenario evaluated, all stocks with the exception of Vindeälven and Emån are likely to reach all three targets with a probability of more than 85% in the medium term (15 to 25 years from 2018). With no commercial fishery and recreational fisheries at current effort level, the probability of reaching the targets drops slightly, but for most stocks it still remains above 70%. Commercial fisheries further reduce the probabilities of reaching the targets, with expected lower probabilities for higher harvest rates.

Assessment Unit 5 stocks

In AU 5, wild salmon has not improved in general, and all stocks still have a poor status and/or show declining trends. Most of these stocks are found in relatively small rivers in terms of discharge and available habitats.

Although sea fisheries in the southern Baltic Sea (Main Basin) are likely to have a negative impact on these stocks, the available information indicates that many factors are often acting in concert and that it may be difficult to point to a single reason for poor stock status. The importance of different factors seems to differ between rivers. It is therefore likely that different rivers need different measures to improve the situation for weak salmon stocks, and that management of sea fisheries only may be insufficient to rebuild stocks.

Assessment Unit 6 stocks

The wild salmon stocks in AU 6 currently exist only in Estonia. Salmon stocks in Estonian rivers seem to have responded well to local restrictive measures. Major decreases in sea harvest rates (like the ceased offshore fishing in the Gulf of Finland) and the non-prevalence of M74 (fry mortality) in this part of the Baltic Sea have likely also helped the recovery. If these conditions continue, it is realistic to assume that further improvement of the stocks will occur.

Request 4 – To provide information on the likely impact that alternative time limits, with associated F-values, would have on stock projections to achieve MSY-targets and the future ICES advice on fishing possibilities

Two time-frames were examined (2–8 years and 15–25 years). For the shorter time-frame, results are partly influenced by the recent positive stock developments. However, regardless of the time-frame, there is no harvest rate value for the commercial sea fisheries that would be consistent with the MSY approach (maximizing yield while simultaneously sustaining all river stocks above R_{lim} with a high probability). As per the response to Request 3, it seems unlikely to achieve the objectives and targets by only managing the commercial sea fisheries, unless these fisheries are kept at a very low level or closed (Table 2; Annex I).

The current advice on fishing opportunities for commercial sea fisheries provided by ICES has been a compromise for several years between protecting weak stocks (via expected gradual improvement) and still allowing some exploitation of salmon by commercial sea fisheries. The current harvest rate in the commercial fishery is below the level that would provide MSY for the most productive stocks. However, with the current fishing strategy, increasing the harvest rate towards MSY levels will increase the risk to the weak stocks.

Basis of the advice

Background

In 2011, the European Commission adopted a proposal for a regulation of the European Parliament and of the Council, establishing a multiannual plan for the Baltic salmon stock and the fisheries exploiting it (EU, 2011). The proposal aims at restoring and maintaining stocks of salmon in the Baltic Sea at sustainable levels. As the legislator has yet to adopt the plan, it should be aligned with the requirements of the Common Fisheries Policy adopted in 2013, taking into account the latest information and status of the salmon stocks.

ICES is requested to advise the European Commission on the draft of a multiannual management plan for salmon stocks in the Baltic Sea, proposed by BALTFISH ("draft plan").

As in the initial European Commission proposal, Annex I of the draft plan contains a list of rivers in the Baltic Sea in which wild salmon stocks occur. The draft plan was prepared prior to ICES Advice of 31 May 2018 (ICES, 2018), reviewing the list of the initial Commission proposal. The draft plan includes the addition of two Swedish rivers, but not the removal of an Estonian river and a Lithuanian river basin. For the draft plan evaluation, ICES is requested to use Annex I as updated by ICES Advice of 31 May 2018, and not the Annex I of the BALTFISH draft plan.

Methods and results

Simulations of yield and smolt production

In order to answer the specific questions in the request, a population dynamics simulator was used to evaluate the performance of a range of commercial sea fishery harvest rates (with constant recreational fishing effort). ICES decided to examine a range from 0 to 0.9 (which encompasses the harvest rate that offers a maximum yield in the commercial sea fisheries that is between 0.2 and 0.3), with additional values examined below 0.1 to better illustrate the impact on the less productive river stocks.

Performance statistics were defined as follows:

- E (sea catch): expected yield in the commercial and recreational sea fisheries,
- E (commercial catch): expected yield in the commercial sea fisheries,
- E (river catch): expected catch in the river (river catch),
- E (spawners): expected number of spawners,
- E (smolts/R_0): expected smolt production (SP) relative to the maximal theoretical smolt production (R_0),
- E (smolts/R_{MSY}): expected SP relative to SP at MSY stock level,
- P (smolts > 0.75 × R_0): the probability that SP is above 0.75 × R_0,
- P (smolts > 0.50 × R_0): the probability that SP is above 0.50 × R_0,
- P (smolts > R_MSY): the probability that SP is above R_{MSY},
- P (smolts > 0.75 × R_{MSY}): the probability that SP is above 0.75 × R_{MSY},
- P (smolts > 0.50 × R_{MSY}): the probability that SP is above 0.50 × R_{MSY},
- P (smolts > R_{lim}): the probability that SP is above the SP level from which the river stock would be expected to recover to R_{MSY} in one salmon generation without any fishing (R_{lim}).

The above statistics were computed for two different time-scales: short-term performance as an average of future years 2–8, and medium-term performance as an average of future years 15–25. The starting year for the simulations was the status of the stocks in 2018, as assessed by ICES in 2019.

The results of the simulations are provided in Annex II.

Mixed-stock vs stock-specific river fishing analysis

In order to study the trade-off between mixed sea fisheries and river-specific fisheries, a simplified stable-state population dynamics model was constructed. The basic assumption was that mixed fishery at sea operates first, and then river-specific

fisheries catch what is left to reach MSY for each particular river stock. If the mixed sea fishery drives a river stock below the level capable of producing MSY, then the river fishing for that particular stock is closed in the analysis.

The results of the analysis are illustrated in Figures 3 and 4. Figure 3 shows how the total stable-state catch and the division of catches between sea and rivers changes as a function of mixed fishery harvest rate. Figure 4 shows how many of the stocks stabilize below MSY at each mixed-fishery harvest rate.

Sources and references

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Annex I Tables and Figures

Table 1 Size and productivity of Baltic salmon rivers listed in Annex I of the draft management plan. Data on river length (and the part accessible for salmon) and average annual water flow from ICES (2017) with updates. Estimated available habitat and posterior potential smolt production capacities (PSPCs) from ICES (2019).

River	Country	Category (ICES)	AU (ICES)	Length, km (accessible)	Flow, $m^3 s^{-1}$	Habitat, ha (90% range)	PSPC × 1000 (90% range)
Simojoki	Finland	Wild	1	175	45	252 (222–285)	61 (50–98)
Tornionjoki/ Torneälven	Finland/ Sweden	Wild	1	522	383	5409 (4282–6835)	1703 (1507–2044)
Kalixälven	Sweden	Wild	1	461 (323)	295	2604 (2124–3200)	641 (504–865)
Råneälven	Sweden	Wild	1	217	44	386 (332–449)	67 (42–125)
Piteälven	Sweden	Wild	2	402 (85)	168	576 (488–632)	27 (22–33)
Åbyälven	Sweden	Wild	2	175	15	86 (70–105)§	20 (12–46)
Byskeälven	Sweden	Wild	2	228	40	563 (482–659)	146 (102–246)
Kågeälven	Sweden	Wild	2	96 (34)	10	96 (67–139)	44 (27–72)
Rickleån	Sweden	Wild	2	147 (41)	16	31 (22–44)	11 (6–21)
Sävarån	Sweden	Wild	2	142 (75)	12	22 (14–36)	19 (9–58)
Ume/Vindelälven	Sweden	Wild	2	467 (453)	190	1768 (1394–2246)	236 (194–304)**
Öreälven	Sweden	Wild	2	240 (70)	34	107 (88–131)	47 (18–128)
Lögdeälven	Sweden	Wild	2	204 (100)	19	106 (86–131)	46 (13–155)
Ljungan	Sweden	Wild	3	399 (19)	138	20 (11–35)	1.9 (1–8)
Testeboån	Sweden	Wild	3	113 (21)	12	10	2.9 (2–5)*
Emån	Sweden	Wild	4	229 (45)	30	40 (30–49)	17 (8–33)
Mörrumsån	Sweden	Wild	4	186 (31)	28	56 (44–75)	42 (33–56)
Nemunas (Zeimena)***	Lithuania	Mixed	5	80	27	15 (12–18)	12 (8–15)
Barta/Bartuva	Lithuania/ Latvia	Wild	5	101 (49)	22	0.6	0.2
Salaca	Latvia	Wild	5	95	33	47	30
Vitrupe	Latvia	Wild	5	33	2	5	4
Peterupe	Latvia	Wild	5	42	2	5	5
Irbe	Latvia	Wild	5	32	17	0.2	0.1
Uzava	Latvia	Wild	5	56	6	0.6	0.2
Saka	Latvia	Wild	5	75	12	2.4	1
Pärnu#	Estonia	Mixed	5	144	49	50	30
Kunda	Estonia	Wild	6	82	4	1.9	2.1
Keila	Estonia	Wild	6	127	6	3.5	5.4
Vasalemma	Estonia	Wild	6	64	3.5	5	4

§ Existing estimated habitat area needs to be revisited.
* PSPC posterior most likely underestimated (ICES, 2019).
** Currently reduced PSPC due to health issues (ICES, 2019).
*** Žeimena flows into Neris (main tributary in the Nemunas River Basin).
# Recently reclassified to mixed (ICES, 2018).

Table 2 Probabilities for stock-specific smolt production in AUs 1–4 to be above 75% and 50% of the potential smolt production capacity (PSPC or R_0), above the smolt production required to produce the MSY (R_{MSY}), and above the lowest smolt production level from which the river stock would be expected to recover to R_{MSY} in one salmon generation, if all fishing was completely closed (R_{lim}) in the medium term (average for 15 to 25 years from 2018). Scenarios are presented for no fishing, only recreational fishing, and at different harvest rates (from 0.05 to 0.5, encompassing the harvest rate that provides a maximum yield in the commercial sea fisheries between 0.2 and 0.3) for commercial sea fisheries (with current recreational fishing effort). The harvest rate of 0.075 corresponds to the 2018 level. Results extracted from Annex 1 in ICES (2018).

Stock	Target	No fishing	Only recreational fisheries	Harvest rate (commercial fisheries)						
				0.05	0.075	0.10	0.20	0.30	0.40	0.50
Simojoki	P (Smolts > 0.75×R_0)	0.86	0.67	0.54	0.47	0.39	0.07	0.00	0.00	0.00
	P (Smolts > 0.5×R_0)	0.97	0.87	0.78	0.71	0.64	0.27	0.02	0.00	0.00
	P (Smolts > R_{MSY})	0.93	0.78	0.64	0.57	0.50	0.14	0.01	0.00	0.00
	P (Smolts > R_{lim})	0.99	0.94	0.87	0.83	0.77	0.40	0.06	0.00	0.00
Tornionjoki	P (Smolts > 0.75×R_0)	0.98	0.94	0.88	0.84	0.79	0.49	0.10	0.00	0.00
	P (Smolts > 0.5×R_0)	1.00	0.99	0.99	0.98	0.97	0.85	0.42	0.01	0.00
	P (Smolts > R_{MSY})	0.98	0.92	0.86	0.82	0.77	0.45	0.08	0.00	0.00
	P (Smolts > R_{lim})	1.00	1.00	1.00	1.00	1.00	0.97	0.78	0.11	0.00
Kalixälven	P (Smolts > 0.75×R_0)	1.00	0.98	0.97	0.96	0.94	0.80	0.45	0.05	0.00
	P (Smolts > 0.5×R_0)	1.00	1.00	1.00	0.99	0.99	0.97	0.82	0.29	0.00
	P (Smolts > R_{MSY})	0.98	0.93	0.89	0.86	0.82	0.60	0.24	0.02	0.00
	P (Smolts > R_{lim})	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.70	0.02
Råneälven	P (Smolts > 0.75×R_0)	0.98	0.89	0.84	0.79	0.75	0.45	0.11	0.01	0.00
	P (Smolts > 0.5×R_0)	1.00	0.99	0.97	0.96	0.94	0.74	0.36	0.03	0.00
	P (Smolts > R_{MSY})	0.98	0.90	0.85	0.82	0.77	0.48	0.13	0.01	0.00
	P (Smolts > R_{lim})	1.00	1.00	1.00	0.99	0.98	0.91	0.61	0.11	0.00
Piteälven	P (Smolts > 0.75×R_0)	1.00	0.99	0.99	0.99	0.98	0.93	0.73	0.29	0.00
	P (Smolts > 0.5×R_0)	1.00	1.00	1.00	1.00	1.00	0.99	0.97	0.69	0.04
	P (Smolts > R_{MSY})	0.93	0.88	0.85	0.81	0.79	0.63	0.33	0.07	0.00
	P (Smolts > R_{lim})	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.33
Åbyälven	P (Smolts > 0.75×R_0)	0.96	0.89	0.82	0.79	0.73	0.50	0.22	0.03	0.00
	P (Smolts > 0.5×R_0)	1.00	0.97	0.95	0.93	0.92	0.76	0.46	0.13	0.01
	P (Smolts > R_{MSY})	0.97	0.90	0.85	0.81	0.77	0.54	0.25	0.04	0.00
	P (Smolts > R_{lim})	1.00	0.99	0.99	0.98	0.97	0.90	0.65	0.26	0.02
Byskeälven	P (Smolts > 0.75×R_0)	0.98	0.94	0.91	0.88	0.86	0.68	0.33	0.07	0.00
	P (Smolts > 0.5×R_0)	1.00	0.99	0.99	0.98	0.98	0.91	0.68	0.23	0.01
	P (Smolts > R_{MSY})	0.97	0.93	0.88	0.85	0.82	0.61	0.28	0.05	0.00
	P (Smolts > R_{lim})	1.00	1.00	1.00	1.00	1.00	0.98	0.91	0.52	0.03
Kågeälven	P (Smolts > 0.75×R_0)	0.91	0.81	0.74	0.71	0.66	0.44	0.21	0.06	0.01
	P (Smolts > 0.5×R_0)	0.98	0.93	0.90	0.86	0.84	0.68	0.42	0.15	0.01
	P (Smolts > R_{MSY})	0.93	0.84	0.79	0.76	0.71	0.50	0.26	0.08	0.01
	P (Smolts > R_{lim})	0.99	0.97	0.95	0.93	0.91	0.79	0.56	0.22	0.02
Rickleån	P (Smolts > 0.75×R_0)	0.91	0.73	0.62	0.54	0.48	0.14	0.02	0.00	0.00
	P (Smolts > 0.5×R_0)	0.99	0.93	0.86	0.81	0.75	0.41	0.06	0.00	0.00
	P (Smolts > R_{MSY})	0.95	0.81	0.71	0.65	0.57	0.23	0.03	0.00	0.00
	P (Smolts > R_{lim})	1.00	0.97	0.94	0.92	0.88	0.60	0.16	0.01	0.00

Stock	Target	No fishing	Only recreational fisheries	Harvest rate (commercial fisheries)						
				0.05	0.075	0.10	0.20	0.30	0.40	0.50
Sävarån	P (Smolts > 0.75×R_0)	0.91	0.77	0.67	0.60	0.53	0.21	0.03	0.00	0.00
	P (Smolts > 0.5×R_0)	0.99	0.93	0.89	0.85	0.80	0.48	0.10	0.00	0.00
	P (Smolts > R_{MSY})	0.96	0.85	0.76	0.70	0.63	0.30	0.04	0.00	0.00
	P (Smolts > Rlim)	1.00	0.98	0.95	0.94	0.90	0.64	0.22	0.01	0.00
Vindeälven*	P (Smolts > 0.75×R_0)	0.64	0.39	0.24	0.18	0.14	0.03	0.01	0.01	0.01
	P (Smolts > 0.5×R_0)	0.80	0.53	0.40	0.33	0.25	0.06	0.02	0.01	0.01
	P (Smolts > R_{MSY})	0.76	0.51	0.37	0.29	0.21	0.05	0.02	0.01	0.01
	P (Smolts > R_{lim})	0.82	0.59	0.44	0.37	0.29	0.07	0.02	0.01	0.01
Öreälven	P (Smolts > 0.75×R_0)	0.94	0.80	0.72	0.66	0.60	0.27	0.03	0.00	0.00
	P (Smolts > 0.5×R_0)	0.99	0.96	0.92	0.88	0.85	0.58	0.16	0.01	0.00
	P (Smolts > R_{MSY})	0.97	0.86	0.77	0.72	0.68	0.35	0.06	0.00	0.00
	P (Smolts > R_{lim})	1.00	0.98	0.98	0.96	0.95	0.77	0.34	0.02	0.00
Lögdeälven	P (Smolts > 0.75×R_0)	0.92	0.75	0.65	0.55	0.48	0.17	0.01	0.00	0.00
	P (Smolts > 0.5×R_0)	0.99	0.93	0.87	0.82	0.76	0.42	0.08	0.00	0.00
	P (Smolts > R_{MSY})	0.97	0.83	0.73	0.67	0.59	0.25	0.03	0.00	0.00
	P (Smolts > R_{lim})	1.00	0.97	0.94	0.92	0.89	0.61	0.17	0.01	0.00
Ljungan	P (Smolts > 0.75×R_0)	0.88	0.75	0.66	0.63	0.56	0.34	0.19	0.05	0.00
	P (Smolts > 0.5×R_0)	0.97	0.88	0.81	0.77	0.73	0.51	0.29	0.11	0.01
	P (Smolts > R_{MSY})	0.93	0.81	0.74	0.70	0.64	0.42	0.24	0.07	0.01
	P (Smolts > R_{lim})	0.98	0.92	0.86	0.83	0.79	0.58	0.34	0.14	0.01
Testeboån	P (Smolts > 0.75×R_0)	0.92	0.81	0.75	0.71	0.65	0.47	0.27	0.09	0.01
	P (Smolts > 0.5×R_0)	0.97	0.93	0.89	0.87	0.83	0.64	0.44	0.19	0.03
	P (Smolts > R_{MSY})	0.95	0.87	0.81	0.77	0.73	0.53	0.33	0.12	0.02
	P (Smolts > R_{lim})	0.99	0.96	0.94	0.92	0.90	0.76	0.56	0.28	0.03
Emån	P (Smolts > 0.75×R_0)	0.76	0.51	0.39	0.34	0.27	0.09	0.01	0.00	0.00
	P (Smolts > 0.5×R_0)	0.90	0.68	0.58	0.52	0.45	0.20	0.04	0.00	0.00
	P (Smolts > R_{MSY})	0.85	0.62	0.51	0.45	0.39	0.16	0.03	0.00	0.00
	P (Smolts > R_{lim})	0.93	0.74	0.63	0.58	0.52	0.25	0.06	0.00	0.00
Mörrumsån	P (Smolts > 0.75×R_0)	0.93	0.85	0.79	0.76	0.72	0.57	0.42	0.26	0.11
	P (Smolts > 0.5×R_0)	0.98	0.95	0.92	0.91	0.89	0.77	0.60	0.39	0.19
	P (Smolts > R_{MSY})	0.94	0.88	0.83	0.80	0.77	0.63	0.45	0.28	0.13
	P (Smolts > R_{lim})	0.99	0.98	0.97	0.96	0.96	0.87	0.72	0.50	0.24

* Due to severe health issues in recent years, reduced smolt production is expected according to the last assessment.

Table 3 Summary of Baltic salmon fisheries, divided into five main categories with information on the type of fishery (commercial and/or recreational), gear(s) used, and the salmon stocks harvested (salmon from wild/reared rivers in SDs 22–31 and 32). Shown is also which commercial fisheries are TAC-regulated, and if mixed or individual river stocks are targeted. Parentheses indicate less common gears and stocks caught. SDs 22–29 = Main Basin; SDs 30–31 = Gulf of Bothnia; SD 32 = Gulf of Finland.

Main fishing category	Type of fishery		Stocks harvested					
			Wild			Reared		
	Commercial	Recreational	AU 1–3	AU 4–5	AU 6	AU 1–3	AU 5*	AU 6
Offshore sea SDs 22–29	longlines TAC (SDs 22–31)	trolling	mixed	mixed	(mixed)	mixed	mixed	(mixed)
Coastal sea SDs 30–31	trapnets TAC (SDs 22–31)	gillnets (trolling, trapnets)	mixed			mixed		
Coastal sea SD 32	gillnets, trapnets TAC (SD 32)	(gillnets, trolling)	(mixed)		mixed	(mixed)		mixed
Wild river SDs 22–32		angling (gillnets, dipnets, seines)	single	single	single			
Reared river SDs 22–32	trapnets	angling				single	single	single

* No releases of hatchery-reared salmon in AU 4.

Figure 1 Grouping of Baltic salmon river stocks in six assessment units. The genetic variability between river stocks of an assessment unit is smaller than the genetic variability between river stocks of different units. In addition, the river stocks of a particular unit exhibit similar migration patterns and harvest regimes. Accessible parts of salmon rivers marked with colours (wild = dark blue, mixed = light blue, hatchery reared = red).

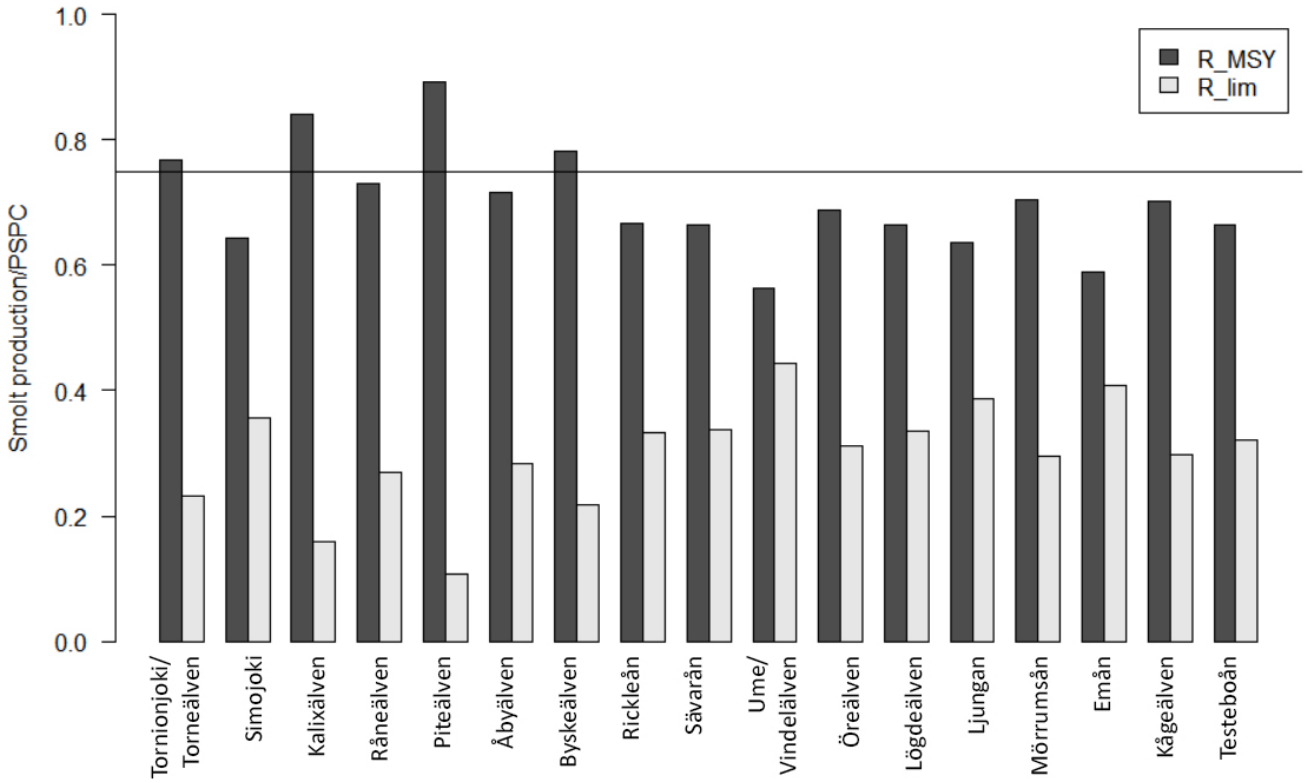

Figure 2 Point estimates of R_{MSY}/PSPC and R_{lim}/PSPC for each river. R_{MSY} is the long-term average smolt production that produces maximum sustainable yield, R_{lim} is the smolt production from which the population would recover to R_{MSY} in one generation under no fishing, and PSPC (R_0) is the long-term average smolt production under no fishing. The horizontal line shows the management target, as suggested in the draft multiannual plan (75% of R_0).

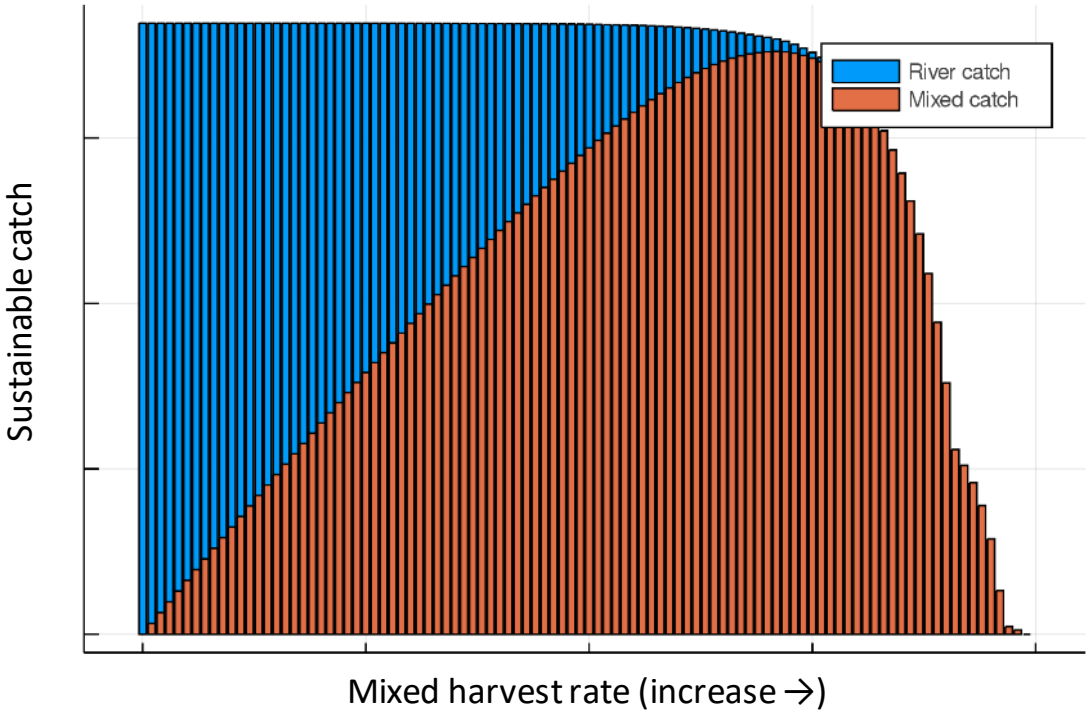

Figure 3 Total stable-state catch and the division of catches between sea and rivers vs. mixed sea fishery harvest rate. See *Mixed stock vs. stock-specific river fishing analysis* in the Basis of the Advice section for details.

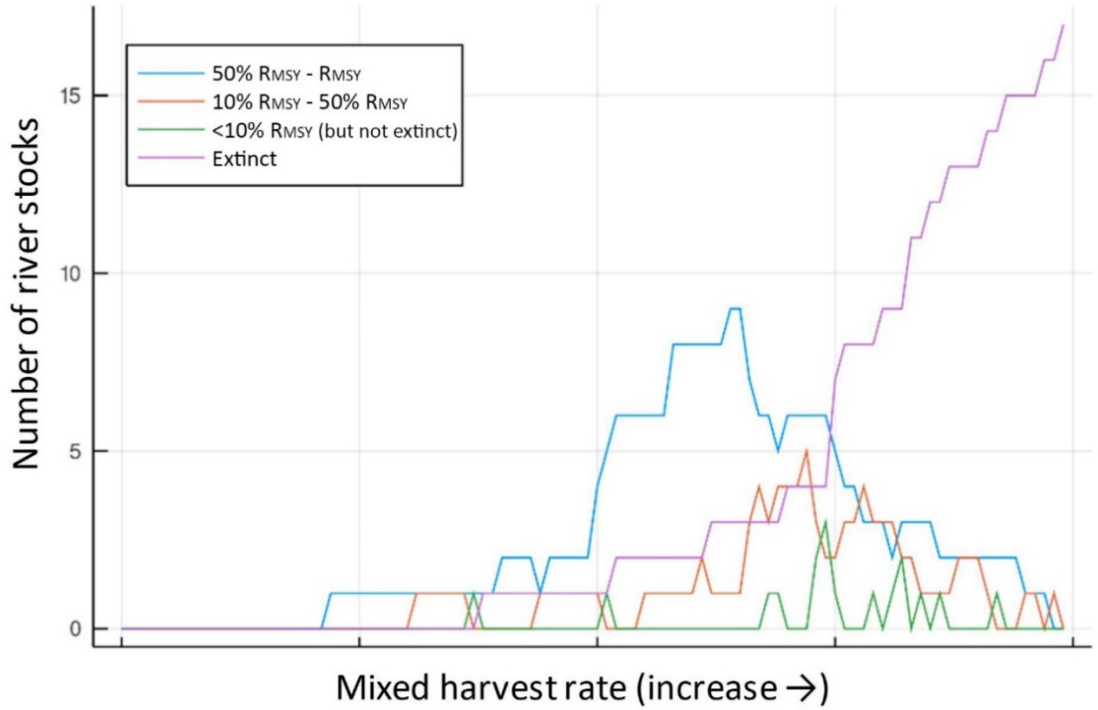

Figure 4 Status of stocks as a function of mixed stock harvest rate. Stocks start to fall into probable extinction when the harvest rate increases above a certain harvest rate. The *x*-axis covers the same range of harvest rates as in Figure 3, from zero to the level where all river stocks would become extinct. The blue line indicates the number of stocks having smolt production in the range 50–100% of R_{MSY}; the orange line indicates the number of stocks having smolt production in the range 10–50% of R_{MSY}; the green line indicates stocks with smolt production less than 10% of R_{MSY} ("barely alive"); and the pink line indicates the number of stocks that have become extinct. The number of stocks above R_{MSY} are not shown.

Annex II Simulation results

This annex contains 17 river stock-specific tables with results from management strategy simulations. In each table, a number of performance statistics are shown, calculated under a range of commercial fishing mortalities, averaged for two time-windows into the future, as described below.

Variable (table column)	Explanation
Harvest rate	Commercial harvest rate, from 0 to 0.9 (0.075 = current rate)
Time-frame	Short (2–8 years average) and medium-term (15–25 years average), from year 2018
E (Sea catch)	Expected yield in the commercial and recreational sea fisheries (thousands of fish)
E (Commercial catch)	Expected yield in the commercial sea fisheries (thousands of fish)
E (River catch)	Expected catch in the river (thousands of fish)
E (Spawners)	Expected number of spawners (thousands of fish)
E (Smolts/R_0)	Expected smolt production relative to the maximal theoretical smolt production (R_0)
E (Smolts/R_{MSY})	Expected smolt production relative to smolt production at MSY stock level
P (Smolts > 0.75 × R_0)	Probability that smolt production is above 0.75 × R_0
P (Smolts > 0.5 × R_0)	Probability that smolt production is above 0.50 × R_0
P (Smolts > R_{MSY})	Probability that smolt production (SP) is above SP at MSY stock level
P (Smolts > 0.75 × R_{MSY})	Probability that smolt production is above 0.75 × R_{MSY}
P (Smolts > 0.5 × R_{MSY})	Probability that smolt production is above 0.50 × R_{MSY}
P (Smolts > R_{lim})	Probability that smolt production is above R_{lim}

Listed below are the river-specific tables; please note that only rivers within AUs 1–4 are currently included in the analytical assessment by ICES. The tables are also available in electronic format (ICES, 2020d).

Table A1.1 Simojoki (AU 1, Finland).

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River Catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	9.16	1.03	1.60	0.93	0.99	0.97	0.99	1.00	1.00
No fishing	15–25y	0	0	0	8.55	1.00	1.56	0.86	0.97	0.93	0.97	0.99	0.99
0	2–8y	0.42	0	1.52	6.19	0.90	1.40	0.76	0.94	0.87	0.94	0.99	0.98
0	15–25y	0.39	0	1.36	5.63	0.85	1.32	0.67	0.87	0.78	0.88	0.95	0.94
0.05	2–8y	1.47	1.11	1.19	4.88	0.81	1.27	0.65	0.89	0.77	0.90	0.97	0.96
0.05	15–25y	1.28	0.97	1.01	4.27	0.74	1.15	0.54	0.78	0.64	0.79	0.90	0.87
0.075	2–8y	1.86	1.53	1.04	4.28	0.77	1.19	0.57	0.84	0.71	0.87	0.94	0.93
0.075	15–25y	1.60	1.32	0.87	3.68	0.69	1.06	0.47	0.71	0.57	0.73	0.85	0.83
0.1	2–8y	2.17	1.88	0.89	3.70	0.71	1.11	0.48	0.79	0.63	0.81	0.92	0.91
0.1	15–25y	1.81	1.57	0.72	3.08	0.62	0.96	0.39	0.64	0.50	0.66	0.80	0.77
0.2	2–8y	2.51	2.35	0.42	1.77	0.47	0.73	0.14	0.44	0.25	0.47	0.69	0.64
0.2	15–25y	1.61	1.51	0.25	1.14	0.32	0.50	0.07	0.27	0.14	0.29	0.44	0.40
0.3	2–8y	1.68	1.61	0.14	0.58	0.22	0.34	0.01	0.07	0.02	0.07	0.24	0.20
0.3	15–25y	0.53	0.51	0.04	0.19	0.08	0.12	0	0.02	0.01	0.02	0.07	0.06
0.4	2–8y	0.60	0.58	0.02	0.10	0.06	0.09	0	0	0	0	0.01	0.01
0.4	15–25y	0.03	0.03	0	0.01	0	0.01	0	0	0	0	0	0
0.5	2–8y	0.08	0.07	0	0	0.01	0.01	0	0	0	0	0	0
0.5	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.2 Tornionjoki/Torneälven (AU 1, Finland/Sweden).

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	248.46	1.01	1.31	1.00	1.00	1.00	1.00	1.00	1.00
No fishing	15–25y	0	0	0	236.07	1.00	1.30	0.98	1.00	0.98	1.00	1.00	1.00
0	2–8y	12.56	0	46.22	182.56	0.96	1.26	0.98	1.00	0.97	1.00	1.00	1.00
0	15–25y	11.91	0	43.28	172.68	0.95	1.24	0.94	0.99	0.92	0.98	1.00	1.00
0.05	2–8y	46.28	34.96	38.49	152.79	0.93	1.21	0.94	1.00	0.93	1.00	1.00	1.00
0.05	15–25y	43.46	32.81	35.75	143.21	0.91	1.18	0.88	0.99	0.86	0.98	1.00	1.00
0.075	2–8y	61.40	50.64	35.10	139.45	0.91	1.19	0.92	1.00	0.90	0.99	1.00	1.00
0.075	15–25y	57.33	47.28	32.37	130.18	0.88	1.15	0.84	0.98	0.82	0.96	0.99	1.00
0.1	2–8y	74.97	64.84	31.67	126.01	0.89	1.16	0.88	1.00	0.87	0.99	1.00	1.00
0.1	15–25y	69.66	60.24	29.03	117.08	0.86	1.12	0.79	0.97	0.77	0.95	0.99	1.00
0.2	2–8y	112.34	104.89	19.24	77.33	0.77	1.00	0.61	0.95	0.56	0.88	0.98	1.00
0.2	15–25y	100.79	94.09	16.94	69.24	0.71	0.93	0.49	0.85	0.45	0.77	0.93	0.97
0.3	2–8y	112.08	107.57	9.17	37.23	0.55	0.71	0.15	0.61	0.13	0.47	0.80	0.95
0.3	15–25y	86.16	82.69	6.81	28.72	0.44	0.57	0.10	0.42	0.08	0.31	0.59	0.78
0.4	2–8y	63.79	62.15	2.44	9.98	0.24	0.31	0	0.06	0	0.02	0.17	0.44
0.4	15–25y	22.44	21.87	0.84	3.63	0.09	0.12	0	0.01	0	0.01	0.04	0.11
0.5	2–8y	9.33	9.19	0.12	0.50	0.02	0.03	0	0	0	0	0	0
0.5	15–25y	0.08	0.08	0	0	0	0	0	0	0	0	0	0
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.3 Kalixälven (AU 1, Sweden).

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	93.81	1.01	1.20	1.00	1.00	1.00	1.00	1.00	1.00
No fishing	15–25y	0	0	0	89.07	1.00	1.19	1.00	1.00	0.98	1.00	1.00	1.00
0	2–8y	4.84	0	17.88	70.22	0.98	1.17	1.00	1.00	0.98	1.00	1.00	1.00
0	15–25y	4.58	0	16.84	66.57	0.97	1.16	0.98	1.00	0.93	0.99	1.00	1.00
0.05	2–8y	18.13	13.70	15.26	59.77	0.97	1.15	0.99	1.00	0.96	1.00	1.00	1.00
0.05	15–25y	17.19	12.98	14.32	56.74	0.96	1.14	0.97	1.00	0.89	0.99	1.00	1.00
0.075	2–8y	24.16	19.93	13.97	54.84	0.96	1.14	0.99	1.00	0.94	1.00	1.00	1.00
0.075	15–25y	22.86	18.85	13.11	51.88	0.94	1.12	0.96	0.99	0.86	0.99	1.00	1.00
0.1	2–8y	29.83	25.80	12.75	50.10	0.95	1.12	0.98	1.00	0.91	1.00	1.00	1.00
0.1	15–25y	28.17	24.36	11.94	47.31	0.93	1.10	0.94	0.99	0.82	0.98	0.99	1.00
0.2	2–8y	47.94	44.76	8.34	32.88	0.88	1.04	0.89	0.99	0.69	0.97	1.00	1.00
0.2	15–25y	44.71	41.74	7.74	30.66	0.85	1.01	0.80	0.97	0.60	0.92	0.98	1.00
0.3	2–8y	55.31	53.08	4.60	18.25	0.74	0.88	0.54	0.92	0.28	0.78	0.97	1.00
0.3	15–25y	49.82	47.81	4.10	16.47	0.69	0.82	0.45	0.82	0.24	0.67	0.88	0.98
0.4	2–8y	43.87	42.74	1.69	6.78	0.46	0.55	0.07	0.44	0.02	0.23	0.57	0.93
0.4	15–25y	31.55	30.74	1.19	4.93	0.35	0.41	0.05	0.29	0.02	0.15	0.40	0.70
0.5	2–8y	10.15	9.99	0.14	0.54	0.08	0.09	0	0.01	0	0	0.01	0.13
0.5	15–25y	1.38	1.36	0.02	0.08	0.01	0.01	0	0	0	0	0	0.02
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.4 Råneälven (AU 1, Sweden).

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	10.10	1.02	1.39	0.99	1.00	0.99	1.00	1.00	1.00
No fishing	15–25y	0	0	0	9.74	1.00	1.37	0.98	1.00	0.98	1.00	1.00	1.00
0	2–8y	0.50	0	1.84	7.30	0.96	1.32	0.95	0.99	0.96	0.99	1.00	1.00
0	15–25y	0.48	0	1.73	6.99	0.94	1.29	0.89	0.99	0.90	0.98	1.00	1.00
0.05	2–8y	1.84	1.39	1.52	6.06	0.93	1.27	0.91	0.99	0.92	0.98	1.00	1.00
0.05	15–25y	1.73	1.31	1.41	5.71	0.90	1.23	0.84	0.97	0.85	0.96	0.99	1.00
0.075	2–8y	2.40	1.98	1.37	5.45	0.90	1.24	0.87	0.98	0.88	0.97	0.99	1.00
0.075	15–25y	2.27	1.87	1.26	5.16	0.87	1.19	0.79	0.96	0.82	0.94	0.98	0.99
0.1	2–8y	2.91	2.52	1.23	4.89	0.88	1.20	0.83	0.97	0.85	0.96	0.99	1.00
0.1	15–25y	2.72	2.35	1.12	4.59	0.84	1.15	0.75	0.94	0.77	0.91	0.97	0.98
0.2	2–8y	4.16	3.89	0.72	2.87	0.73	1.00	0.54	0.87	0.58	0.84	0.94	0.97
0.2	15–25y	3.64	3.40	0.61	2.51	0.67	0.92	0.45	0.74	0.48	0.69	0.87	0.91
0.3	2–8y	3.88	3.73	0.32	1.29	0.51	0.69	0.15	0.52	0.17	0.46	0.72	0.84
0.3	15–25y	2.75	2.64	0.22	0.93	0.39	0.54	0.11	0.36	0.13	0.31	0.52	0.61
0.4	2–8y	2.06	2.01	0.08	0.32	0.22	0.30	0.01	0.08	0.01	0.05	0.18	0.31
0.4	15–25y	0.70	0.68	0.03	0.11	0.09	0.12	0.01	0.03	0.01	0.03	0.07	0.11
0.5	2–8y	0.31	0.30	0	0.02	0.02	0.03	0	0	0	0	0	0
0.5	15–25y	0.01	0.01	0	0	0	0	0	0	0	0	0	0
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.5 Piteälven (AU 2, Sweden).

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	2.95	1.00	1.12	1.00	1.00	0.98	1.00	1.00	1.00
No fishing	15–25y	0	0	0	2.81	1.00	1.12	1.00	1.00	0.93	1.00	1.00	1.00
0	2–8y	0.19	0	0.57	2.22	0.99	1.11	1.00	1.00	0.95	1.00	1.00	1.00
0	15–25y	0.18	0	0.54	2.11	0.98	1.10	0.99	1.00	0.88	1.00	1.00	1.00
0.05	2–8y	0.65	0.47	0.50	1.94	0.98	1.10	1.00	1.00	0.92	1.00	1.00	1.00
0.05	15–25y	0.61	0.45	0.47	1.83	0.97	1.08	0.99	1.00	0.85	1.00	1.00	1.00
0.075	2–8y	0.86	0.69	0.46	1.81	0.97	1.09	1.00	1.00	0.91	1.00	1.00	1.00
0.075	15–25y	0.82	0.66	0.44	1.72	0.96	1.08	0.99	1.00	0.81	0.99	1.00	1.00
0.1	2–8y	1.06	0.90	0.43	1.68	0.96	1.08	0.99	1.00	0.89	1.00	1.00	1.00
0.1	15–25y	1.01	0.86	0.41	1.60	0.96	1.07	0.98	1.00	0.79	0.99	1.00	1.00
0.2	2–8y	1.76	1.62	0.31	1.21	0.92	1.03	0.97	1.00	0.71	0.99	1.00	1.00
0.2	15–25y	1.66	1.54	0.29	1.15	0.91	1.02	0.93	0.99	0.63	0.97	1.00	1.00
0.3	2–8y	2.22	2.12	0.20	0.80	0.85	0.95	0.84	0.99	0.38	0.93	0.99	1.00
0.3	15–25y	2.05	1.96	0.19	0.74	0.82	0.91	0.73	0.97	0.33	0.85	0.98	1.00
0.4	2–8y	2.22	2.16	0.11	0.42	0.67	0.75	0.36	0.85	0.07	0.56	0.89	1.00
0.4	15–25y	1.91	1.85	0.09	0.37	0.60	0.67	0.29	0.69	0.07	0.43	0.76	0.98
0.5	2–8y	1.05	1.03	0.02	0.09	0.24	0.27	0	0.09	0	0.02	0.14	0.77
0.5	15–25y	0.46	0.45	0.01	0.04	0.11	0.13	0	0.04	0	0.01	0.06	0.33
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.6 Åbyälven (AU 2, Sweden)**.**

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	2.91	1.03	1.44	0.98	1.00	0.99	1.00	1.00	1.00
No fishing	15–25y	0	0	0	2.79	1.01	1.41	0.96	1.00	0.97	0.99	1.00	1.00
0	2–8y	0.14	0	0.52	2.09	0.97	1.35	0.92	0.99	0.94	0.99	1.00	1.00
0	15–25y	0.14	0	0.49	1.98	0.94	1.31	0.89	0.97	0.90	0.96	0.99	0.99
0.05	2–8y	0.47	0.34	0.44	1.77	0.93	1.30	0.88	0.98	0.90	0.97	0.99	1.00
0.05	15–25y	0.45	0.32	0.41	1.68	0.90	1.25	0.82	0.95	0.85	0.94	0.98	0.99
0.075	2–8y	0.61	0.49	0.40	1.62	0.90	1.26	0.85	0.97	0.87	0.97	0.99	1.00
0.075	15–25y	0.58	0.46	0.37	1.52	0.87	1.22	0.79	0.93	0.81	0.93	0.97	0.98
0.1	2–8y	0.74	0.63	0.36	1.47	0.88	1.22	0.81	0.96	0.84	0.95	0.99	0.99
0.1	15–25y	0.69	0.58	0.34	1.37	0.85	1.18	0.73	0.92	0.77	0.90	0.95	0.97
0.2	2–8y	1.08	1.00	0.23	0.94	0.75	1.05	0.59	0.85	0.64	0.83	0.94	0.96
0.2	15–25y	0.94	0.87	0.20	0.82	0.69	0.96	0.50	0.76	0.54	0.72	0.87	0.90
0.3	2–8y	1.09	1.04	0.12	0.50	0.56	0.79	0.28	0.60	0.33	0.56	0.76	0.82
0.3	15–25y	0.79	0.76	0.09	0.36	0.46	0.64	0.22	0.46	0.25	0.41	0.58	0.65
0.4	2–8y	0.73	0.71	0.04	0.18	0.31	0.43	0.06	0.23	0.07	0.20	0.37	0.45
0.4	15–25y	0.35	0.34	0.02	0.09	0.18	0.25	0.03	0.13	0.04	0.12	0.21	0.26
0.5	2–8y	0.19	0.19	0.01	0.02	0.06	0.09	0	0.01	0	0.01	0.02	0.04
0.5	15–25y	0.03	0.03	0	0	0.01	0.02	0	0.01	0	0	0.01	0.02
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.7 Byskeälven (AU 2, Sweden)**.**

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	18.82	1.01	1.29	1.00	1.00	0.99	1.00	1.00	1.00
No fishing	15–25y	0	0	0	17.91	1.00	1.28	0.98	1.00	0.97	1.00	1.00	1.00
0	2–8y	0.96	0	3.52	13.89	0.97	1.24	0.98	1.00	0.97	1.00	1.00	1.00
0	15–25y	0.91	0	3.33	13.14	0.96	1.22	0.94	0.99	0.93	0.99	1.00	1.00
0.05	2–8y	3.22	2.34	3.07	12.08	0.95	1.22	0.96	0.99	0.94	0.99	1.00	1.00
0.05	15–25y	2.99	2.17	2.84	11.21	0.92	1.18	0.91	0.99	0.88	0.98	0.99	1.00
0.075	2–8y	4.21	3.38	2.82	11.11	0.94	1.20	0.94	0.99	0.92	0.98	1.00	1.00
0.075	15–25y	3.95	3.17	2.63	10.42	0.91	1.17	0.88	0.98	0.85	0.97	0.99	1.00
0.1	2–8y	5.15	4.37	2.59	10.24	0.92	1.18	0.92	0.99	0.90	0.98	1.00	1.00
0.1	15–25y	4.81	4.08	2.41	9.56	0.90	1.15	0.86	0.98	0.82	0.95	0.99	1.00
0.2	2–8y	8.12	7.51	1.77	7.03	0.83	1.07	0.74	0.96	0.70	0.92	0.98	1.00
0.2	15–25y	7.36	6.81	1.59	6.37	0.79	1.02	0.68	0.91	0.61	0.86	0.95	0.98
0.3	2–8y	9.11	8.70	1.03	4.12	0.68	0.87	0.43	0.80	0.37	0.70	0.90	0.97
0.3	15–25y	7.67	7.32	0.86	3.48	0.60	0.77	0.33	0.68	0.28	0.57	0.77	0.91
0.4	2–8y	7.24	7.04	0.44	1.75	0.43	0.55	0.11	0.38	0.07	0.27	0.54	0.78
0.4	15–25y	4.65	4.52	0.28	1.13	0.30	0.38	0.07	0.23	0.05	0.18	0.34	0.52
0.5	2–8y	2.22	2.18	0.06	0.24	0.10	0.13	0	0.02	0	0.01	0.04	0.13
0.5	15–25y	0.45	0.44	0.01	0.05	0.03	0.03	0	0.01	0	0.01	0.01	0.03
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.8 Kågeälven (AU 2, Sweden).

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	5.84	1.01	1.43	0.94	0.99	0.95	0.98	1.00	1.00
No fishing	15–25y	0	0	0	5.59	0.99	1.42	0.91	0.98	0.93	0.98	0.99	0.99
0	2–8y	0.29	0	1.03	4.18	0.93	1.32	0.84	0.95	0.88	0.95	0.98	0.99
0	15–25y	0.27	0	0.97	3.96	0.91	1.29	0.81	0.93	0.84	0.92	0.96	0.97
0.05	2–8y	0.94	0.68	0.88	3.53	0.88	1.25	0.78	0.92	0.83	0.91	0.96	0.97
0.05	15–25y	0.88	0.64	0.81	3.31	0.85	1.21	0.74	0.90	0.79	0.88	0.93	0.95
0.075	2–8y	1.21	0.97	0.79	3.22	0.85	1.21	0.74	0.90	0.79	0.89	0.95	0.96
0.075	15–25y	1.14	0.92	0.74	3.03	0.82	1.17	0.71	0.86	0.76	0.85	0.92	0.93
0.1	2–8y	1.46	1.24	0.72	2.92	0.83	1.17	0.71	0.88	0.75	0.87	0.93	0.95
0.1	15–25y	1.37	1.16	0.66	2.73	0.79	1.13	0.66	0.84	0.71	0.82	0.90	0.91
0.2	2–8y	2.15	1.99	0.46	1.87	0.69	0.98	0.50	0.73	0.56	0.72	0.84	0.87
0.2	15–25y	1.89	1.75	0.40	1.65	0.63	0.89	0.44	0.68	0.50	0.65	0.76	0.79
0.3	2–8y	2.21	2.11	0.25	1.01	0.51	0.72	0.28	0.51	0.33	0.49	0.65	0.68
0.3	15–25y	1.74	1.67	0.19	0.80	0.41	0.59	0.21	0.42	0.26	0.40	0.52	0.56
0.4	2–8y	1.57	1.52	0.09	0.38	0.28	0.40	0.07	0.21	0.08	0.19	0.33	0.39
0.4	15–25y	0.95	0.92	0.05	0.23	0.18	0.25	0.06	0.15	0.08	0.14	0.20	0.22
0.5	2–8y	0.45	0.44	0.01	0.05	0.06	0.09	0.01	0.02	0.01	0.02	0.04	0.05
0.5	15–25y	0.14	0.14	0	0.02	0.02	0.03	0.01	0.01	0.01	0.01	0.02	0.02
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.9 Rickleån (AU 2, Sweden).

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	1.46	0.99	1.49	0.93	0.99	0.96	0.99	1.00	1.00
No fishing	15–25y	0	0	0	1.46	1.00	1.50	0.91	0.99	0.95	0.99	1.00	1.00
0	2–8y	0.07	0	0.24	0.99	0.88	1.31	0.76	0.95	0.86	0.95	0.99	0.99
0	15–25y	0.07	0	0.24	1.00	0.88	1.31	0.73	0.93	0.81	0.93	0.97	0.97
0.05	2–8y	0.21	0.15	0.19	0.80	0.80	1.20	0.63	0.90	0.75	0.90	0.97	0.97
0.05	15–25y	0.21	0.15	0.19	0.80	0.79	1.19	0.62	0.86	0.71	0.86	0.94	0.94
0.075	2–8y	0.27	0.22	0.18	0.72	0.76	1.14	0.54	0.86	0.70	0.86	0.96	0.96
0.075	15–25y	0.27	0.21	0.17	0.71	0.75	1.12	0.54	0.81	0.65	0.81	0.92	0.92
0.1	2–8y	0.32	0.27	0.15	0.64	0.72	1.08	0.47	0.83	0.61	0.82	0.93	0.93
0.1	15–25y	0.31	0.26	0.15	0.62	0.69	1.04	0.48	0.75	0.57	0.75	0.89	0.88
0.2	2–8y	0.40	0.37	0.08	0.35	0.51	0.77	0.18	0.51	0.28	0.51	0.74	0.74
0.2	15–25y	0.34	0.31	0.07	0.30	0.44	0.65	0.14	0.41	0.23	0.41	0.60	0.60
0.3	2–8y	0.30	0.28	0.03	0.14	0.27	0.41	0.02	0.15	0.04	0.15	0.33	0.32
0.3	15–25y	0.16	0.15	0.02	0.08	0.15	0.23	0.02	0.06	0.03	0.06	0.16	0.16
0.4	2–8y	0.12	0.12	0.01	0.03	0.09	0.13	0	0	0	0	0.02	0.02
0.4	15–25y	0.02	0.02	0	0.01	0.02	0.02	0	0	0	0	0.01	0.01
0.5	2–8y	0.02	0.02	0	0	0.01	0.01	0	0	0	0	0	0
0.5	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.10 Sävarån (AU 2, Sweden)**.**

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	3.29	1.01	1.53	0.93	0.99	0.97	0.99	1.00	1.00
No fishing	15–25y	0	0	0	3.62	1.02	1.53	0.91	0.99	0.96	0.99	1.00	1.00
0	2–8y	0.15	0	0.53	2.21	0.90	1.36	0.80	0.95	0.87	0.95	0.98	0.98
0	15–25y	0.17	0	0.58	2.44	0.90	1.35	0.77	0.93	0.85	0.94	0.98	0.98
0.05	2–8y	0.48	0.35	0.43	1.78	0.83	1.25	0.70	0.91	0.79	0.91	0.97	0.97
0.05	15–25y	0.53	0.38	0.46	1.97	0.82	1.24	0.67	0.89	0.76	0.89	0.95	0.95
0.075	2–8y	0.60	0.48	0.38	1.58	0.79	1.20	0.64	0.89	0.74	0.89	0.96	0.96
0.075	15–25y	0.66	0.53	0.40	1.73	0.78	1.18	0.60	0.85	0.70	0.85	0.94	0.94
0.1	2–8y	0.70	0.59	0.33	1.39	0.75	1.14	0.56	0.85	0.67	0.85	0.93	0.93
0.1	15–25y	0.76	0.64	0.35	1.50	0.73	1.10	0.53	0.80	0.63	0.80	0.90	0.90
0.2	2–8y	0.85	0.79	0.18	0.75	0.56	0.84	0.25	0.59	0.36	0.59	0.79	0.78
0.2	15–25y	0.80	0.74	0.16	0.70	0.48	0.73	0.21	0.48	0.30	0.48	0.65	0.64
0.3	2–8y	0.62	0.60	0.07	0.29	0.31	0.47	0.04	0.20	0.08	0.21	0.41	0.40
0.3	15–25y	0.37	0.35	0.04	0.17	0.19	0.29	0.03	0.10	0.04	0.10	0.22	0.22
0.4	2–8y	0.26	0.25	0.02	0.07	0.11	0.16	0	0.01	0	0.01	0.05	0.05
0.4	15–25y	0.04	0.04	0	0.01	0.02	0.03	0	0	0	0	0.01	0.01
0.5	2–8y	0.04	0.04	0	0	0.01	0.02	0	0	0	0	0	0
0.5	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.11 Vindelälven (AU 2, Sweden)**.**

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	2.17	0.46	0.82	0.82	0.94	0.91	0.97	0.99	0.96
No fishing	15–25y	0	0	0	1.73	0.76	1.35	0.64	0.80	0.76	0.83	0.90	0.82
0	2–8y	0.74	0	0.64	1.33	0.27	0.49	0.61	0.81	0.75	0.86	0.94	0.85
0	15–25y	0.51	0	0.41	0.91	0.53	0.93	0.39	0.53	0.51	0.60	0.70	0.59
0.05	2–8y	2.17	1.58	0.48	1.01	0.13	0.22	0.47	0.71	0.64	0.77	0.89	0.76
0.05	15–25y	1.30	0.95	0.27	0.61	0.42	0.74	0.24	0.40	0.37	0.46	0.57	0.44
0.075	2–8y	2.63	2.11	0.41	0.86	0.19	0.33	0.41	0.65	0.57	0.71	0.85	0.69
0.075	15–25y	1.47	1.18	0.21	0.49	0.39	0.69	0.18	0.33	0.29	0.38	0.49	0.37
0.1	2–8y	2.95	2.51	0.35	0.73	0.15	0.27	0.35	0.56	0.50	0.66	0.81	0.63
0.1	15–25y	1.50	1.27	0.16	0.38	0.33	0.58	0.14	0.25	0.21	0.30	0.41	0.29
0.2	2–8y	3.03	2.80	0.16	0.33	0.08	0.14	0.11	0.26	0.21	0.32	0.51	0.31
0.2	15–25y	0.83	0.77	0.04	0.09	0.10	0.19	0.03	0.06	0.05	0.08	0.12	0.07
0.3	2–8y	1.92	1.83	0.05	0.11	0.01	0.03	0.03	0.06	0.05	0.08	0.15	0.08
0.3	15–25y	0.15	0.14	0.00	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02
0.4	2–8y	0.83	0.81	0.01	0.03	0	0	0.02	0.02	0.02	0.02	0.03	0.02
0.4	15–25y	0.00	0.00	0	0	0	0	0.01	0.01	0.01	0.01	0.01	0.01
0.5	2–8y	0.19	0.19	0	0	0	0	0.01	0.01	0.01	0.01	0.01	0.01
0.5	15–25y	0	0	0	0	0	0	0.01	0.01	0.01	0.01	0.01	0.01
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.12 Öreälven (AU 2, Sweden).

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	7.25	0.99	1.44	0.94	0.99	0.96	0.99	1.00	1.00
No fishing	15–25y	0	0	0	7.47	1.01	1.46	0.94	0.99	0.97	0.99	1.00	1.00
0	2–8y	0.35	0	1.23	4.97	0.89	1.30	0.80	0.96	0.87	0.96	0.98	0.99
0	15–25y	0.36	0	1.28	5.17	0.91	1.32	0.80	0.96	0.86	0.96	0.98	0.98
0.05	2–8y	1.10	0.80	1.01	4.10	0.83	1.21	0.71	0.93	0.79	0.92	0.98	0.98
0.05	15–25y	1.13	0.82	1.04	4.28	0.85	1.23	0.72	0.92	0.77	0.91	0.97	0.98
0.075	2–8y	1.40	1.12	0.90	3.68	0.80	1.16	0.64	0.91	0.73	0.90	0.97	0.97
0.075	15–25y	1.43	1.15	0.92	3.81	0.81	1.17	0.66	0.88	0.72	0.87	0.96	0.96
0.1	2–8y	1.65	1.40	0.80	3.28	0.76	1.10	0.58	0.87	0.66	0.86	0.95	0.96
0.1	15–25y	1.69	1.43	0.81	3.38	0.77	1.11	0.60	0.85	0.68	0.84	0.93	0.95
0.2	2–8y	2.13	1.97	0.45	1.86	0.58	0.84	0.28	0.62	0.38	0.61	0.81	0.84
0.2	15–25y	2.08	1.92	0.43	1.83	0.55	0.80	0.27	0.58	0.35	0.57	0.74	0.77
0.3	2–8y	1.68	1.60	0.19	0.78	0.35	0.50	0.04	0.27	0.08	0.24	0.47	0.51
0.3	15–25y	1.25	1.20	0.13	0.59	0.25	0.37	0.03	0.16	0.06	0.15	0.30	0.34
0.4	2–8y	0.73	0.71	0.04	0.18	0.13	0.18	0	0.02	0	0.02	0.07	0.09
0.4	15–25y	0.21	0.20	0.01	0.06	0.04	0.05	0	0.01	0	0.01	0.02	0.02
0.5	2–8y	0.11	0.11	0	0.01	0.01	0.02	0	0	0	0	0	0
0.5	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.13 Lögdeälven (AU 2, Sweden).

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	6.29	0.97	1.46	0.90	0.98	0.94	0.98	0.99	0.99
No fishing	15–25y	0	0	0	6.75	1.01	1.52	0.92	0.99	0.97	0.99	1.00	1.00
0	2–8y	0.29	0	1.00	4.16	0.84	1.27	0.72	0.92	0.81	0.92	0.96	0.96
0	15–25y	0.31	0	1.11	4.56	0.88	1.33	0.75	0.93	0.83	0.93	0.97	0.97
0.05	2–8y	0.88	0.64	0.80	3.31	0.77	1.15	0.59	0.86	0.70	0.86	0.93	0.93
0.05	15–25y	0.97	0.70	0.88	3.68	0.81	1.22	0.65	0.87	0.73	0.87	0.94	0.94
0.075	2–8y	1.11	0.89	0.71	2.95	0.72	1.09	0.52	0.82	0.63	0.82	0.92	0.92
0.075	15–25y	1.20	0.96	0.76	3.22	0.75	1.14	0.55	0.82	0.67	0.82	0.92	0.92
0.1	2–8y	1.29	1.09	0.62	2.58	0.68	1.03	0.44	0.76	0.57	0.76	0.89	0.89
0.1	15–25y	1.38	1.17	0.66	2.80	0.70	1.06	0.48	0.76	0.59	0.77	0.89	0.89
0.2	2–8y	1.51	1.40	0.32	1.34	0.48	0.72	0.16	0.46	0.25	0.47	0.68	0.67
0.2	15–25y	1.47	1.36	0.30	1.32	0.45	0.67	0.17	0.42	0.25	0.43	0.61	0.61
0.3	2–8y	1.03	0.99	0.11	0.48	0.25	0.37	0.02	0.12	0.04	0.12	0.27	0.26
0.3	15–25y	0.68	0.65	0.07	0.33	0.16	0.24	0.01	0.08	0.03	0.08	0.17	0.17
0.4	2–8y	0.38	0.37	0.02	0.09	0.08	0.11	0	0.01	0	0.01	0.03	0.03
0.4	15–25y	0.07	0.07	0	0.02	0.02	0.02	0	0	0	0	0.01	0.01
0.5	2–8y	0.05	0.05	0	0.01	0.01	0.01	0	0	0	0	0	0
0.5	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.14 Ljungan (AU 3, Sweden).

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	0.33	1.06	1.67	0.90	0.97	0.94	0.97	0.99	0.98
No fishing	15–25y	0	0	0	0.34	1.05	1.66	0.88	0.97	0.93	0.97	0.98	0.98
0	2–8y	0.01	0	0.05	0.22	0.95	1.49	0.79	0.91	0.85	0.92	0.96	0.94
0	15–25y	0.01	0	0.05	0.22	0.92	1.45	0.75	0.88	0.81	0.89	0.94	0.92
0.05	2–8y	0.05	0.03	0.04	0.17	0.88	1.38	0.71	0.86	0.79	0.87	0.93	0.90
0.05	15–25y	0.04	0.03	0.04	0.17	0.84	1.32	0.66	0.81	0.74	0.81	0.90	0.86
0.075	2–8y	0.06	0.05	0.04	0.16	0.84	1.32	0.67	0.83	0.76	0.84	0.91	0.89
0.075	15–25y	0.05	0.04	0.03	0.15	0.80	1.25	0.63	0.77	0.70	0.78	0.86	0.83
0.1	2–8y	0.07	0.06	0.03	0.14	0.80	1.26	0.63	0.80	0.71	0.81	0.89	0.86
0.1	15–25y	0.06	0.05	0.03	0.13	0.75	1.17	0.56	0.73	0.64	0.74	0.82	0.79
0.2	2–8y	0.08	0.08	0.02	0.08	0.63	0.99	0.42	0.62	0.52	0.62	0.74	0.69
0.2	15–25y	0.07	0.06	0.01	0.06	0.53	0.84	0.34	0.51	0.42	0.53	0.63	0.58
0.3	2–8y	0.07	0.07	0.01	0.03	0.43	0.67	0.22	0.39	0.29	0.41	0.53	0.47
0.3	15–25y	0.05	0.04	0.01	0.02	0.32	0.50	0.19	0.29	0.24	0.29	0.37	0.34
0.4	2–8y	0.04	0.04	0	0.01	0.22	0.35	0.07	0.16	0.10	0.17	0.26	0.21
0.4	15–25y	0.02	0.02	0	0.01	0.13	0.21	0.05	0.11	0.07	0.12	0.16	0.14
0.5	2–8y	0.01	0.01	0	0	0.05	0.08	0	0.02	0.01	0.02	0.03	0.03
0.5	15–25y	0	0	0	0	0.01	0.02	0	0.01	0.01	0.01	0.02	0.01
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.15 Testeboån (AU 3, Sweden)**.**

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	0.45	1.03	1.55	0.94	0.99	0.96	0.99	1.00	1.00
No fishing	15–25y	0	0	0	0.43	1.01	1.52	0.92	0.97	0.95	0.97	0.99	0.99
0	2–8y	0.02	0	0.08	0.32	0.95	1.43	0.86	0.94	0.90	0.94	0.98	0.98
0	15–25y	0.02	0	0.07	0.30	0.92	1.38	0.81	0.93	0.87	0.93	0.96	0.96
0.05	2–8y	0.07	0.05	0.07	0.26	0.90	1.35	0.81	0.92	0.85	0.92	0.96	0.96
0.05	15–25y	0.06	0.05	0.06	0.24	0.86	1.30	0.75	0.89	0.81	0.89	0.94	0.94
0.075	2–8y	0.09	0.07	0.06	0.24	0.88	1.32	0.78	0.90	0.84	0.90	0.95	0.95
0.075	15–25y	0.08	0.06	0.05	0.22	0.83	1.25	0.71	0.87	0.77	0.87	0.92	0.92
0.1	2–8y	0.11	0.09	0.05	0.22	0.85	1.28	0.74	0.88	0.80	0.88	0.93	0.94
0.1	15–25y	0.10	0.08	0.05	0.19	0.80	1.20	0.65	0.83	0.73	0.84	0.90	0.90
0.2	2–8y	0.15	0.14	0.03	0.14	0.71	1.07	0.55	0.75	0.64	0.75	0.85	0.85
0.2	15–25y	0.12	0.11	0.03	0.11	0.63	0.95	0.47	0.64	0.53	0.64	0.75	0.76
0.3	2–8y	0.15	0.14	0.02	0.07	0.54	0.81	0.32	0.55	0.40	0.55	0.68	0.69
0.3	15–25y	0.11	0.11	0.01	0.05	0.44	0.66	0.27	0.44	0.33	0.44	0.55	0.56
0.4	2–8y	0.11	0.11	0.01	0.03	0.32	0.48	0.12	0.27	0.16	0.28	0.39	0.41
0.4	15–25y	0.06	0.06	0	0.02	0.22	0.33	0.09	0.19	0.12	0.19	0.28	0.28
0.5	2–8y	0.04	0.04	0	0	0.09	0.13	0.01	0.04	0.02	0.04	0.07	0.07
0.5	15–25y	0.01	0.01	0	0	0.03	0.05	0.01	0.03	0.02	0.03	0.03	0.03
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.16 Emån (AU 4, Sweden)**.**

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P(Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	2.06	0.97	1.65	0.75	0.89	0.86	0.92	0.97	0.93
No fishing	15–25y	0	0	0	2.20	1.01	1.71	0.76	0.90	0.85	0.91	0.96	0.93
0	2–8y	0.08	0	0.29	1.24	0.74	1.25	0.50	0.71	0.64	0.76	0.86	0.78
0	15–25y	0.08	0	0.29	1.26	0.74	1.25	0.51	0.68	0.62	0.71	0.82	0.74
0.05	2–8y	0.19	0.12	0.23	1.01	0.65	1.10	0.41	0.62	0.54	0.67	0.80	0.70
0.05	15–25y	0.18	0.12	0.22	0.99	0.62	1.05	0.39	0.58	0.51	0.62	0.72	0.63
0.075	2–8y	0.23	0.17	0.21	0.90	0.60	1.01	0.35	0.57	0.49	0.63	0.76	0.66
0.075	15–25y	0.21	0.16	0.19	0.86	0.56	0.95	0.34	0.52	0.45	0.55	0.66	0.58
0.1	2–8y	0.26	0.21	0.18	0.80	0.55	0.93	0.30	0.51	0.44	0.57	0.72	0.61
0.1	15–25y	0.23	0.19	0.16	0.74	0.50	0.84	0.27	0.45	0.39	0.50	0.60	0.52
0.2	2–8y	0.30	0.27	0.10	0.45	0.36	0.61	0.13	0.28	0.22	0.33	0.49	0.35
0.2	15–25y	0.21	0.19	0.07	0.34	0.26	0.44	0.09	0.20	0.16	0.23	0.34	0.25
0.3	2–8y	0.22	0.21	0.05	0.20	0.18	0.31	0.03	0.10	0.06	0.12	0.21	0.14
0.3	15–25y	0.10	0.09	0.02	0.09	0.09	0.14	0.01	0.04	0.03	0.05	0.09	0.06
0.4	2–8y	0.11	0.10	0.02	0.06	0.06	0.11	0	0.01	0	0.01	0.04	0.02
0.4	15–25y	0.02	0.02	0	0.01	0.01	0.02	0	0	0	0	0.01	0
0.5	2–8y	0.02	0.02	0	0.01	0.01	0.01	0	0	0	0	0	0
0.5	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0

Table A1.17 Mörrumsån (AU 4, Sweden).

Harvest rate	Time-frame	E (Sea catch)	E (Commercial catch)	E (River catch)	E (Spawners)	E (Smolts/R_0)	E (Smolts/R_{MSY})	P (Smolts > 0.75 × R_0)	P (Smolts > 0.50 × R_0)	P (Smolts > R_{MSY})	P (Smolts > 0.75 × R_{MSY})	P (Smolts > 0.50 × R_{MSY})	P (Smolts > R_{lim})
No fishing	2–8y	0	0	0	6.29	1.03	1.46	0.97	0.99	0.97	0.99	1.00	1.00
No fishing	15–25y	0	0	0	5.92	1.01	1.43	0.93	0.98	0.94	0.98	0.99	0.99
0	2–8y	0.28	0	1.13	4.51	0.96	1.36	0.89	0.98	0.92	0.97	0.99	1.00
0	15–25y	0.27	0	1.06	4.21	0.93	1.32	0.85	0.95	0.88	0.94	0.97	0.98
0.05	2–8y	0.74	0.49	1.00	4.01	0.93	1.32	0.85	0.96	0.88	0.96	0.98	0.99
0.05	15–25y	0.69	0.45	0.93	3.72	0.89	1.27	0.79	0.92	0.83	0.91	0.96	0.97
0.075	2–8y	0.95	0.71	0.95	3.77	0.91	1.29	0.82	0.95	0.86	0.95	0.98	0.98
0.075	15–25y	0.88	0.66	0.88	3.50	0.87	1.24	0.76	0.91	0.80	0.90	0.95	0.96
0.1	2–8y	1.14	0.92	0.89	3.54	0.89	1.27	0.79	0.94	0.83	0.94	0.98	0.98
0.1	15–25y	1.05	0.84	0.82	3.26	0.85	1.21	0.72	0.89	0.77	0.88	0.94	0.96
0.2	2–8y	1.75	1.58	0.66	2.65	0.80	1.13	0.65	0.86	0.71	0.84	0.93	0.95
0.2	15–25y	1.56	1.40	0.59	2.35	0.74	1.05	0.57	0.77	0.63	0.75	0.85	0.87
0.3	2–8y	2.03	1.91	0.46	1.82	0.67	0.95	0.46	0.69	0.51	0.67	0.81	0.85
0.3	15–25y	1.68	1.58	0.38	1.51	0.59	0.83	0.42	0.60	0.45	0.57	0.69	0.72
0.4	2–8y	1.89	1.82	0.27	1.08	0.50	0.70	0.29	0.46	0.32	0.45	0.59	0.64
0.4	15–25y	1.42	1.37	0.20	0.81	0.40	0.57	0.26	0.39	0.28	0.38	0.46	0.50
0.5	2–8y	1.22	1.20	0.11	0.45	0.26	0.38	0.12	0.23	0.14	0.21	0.29	0.32
0.5	15–25y	0.79	0.78	0.07	0.29	0.19	0.27	0.11	0.19	0.13	0.18	0.23	0.24
0.6	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.6	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.7	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.8	15–25y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	2–8y	0	0	0	0	0	0	0	0	0	0	0	0
0.9	15–25y	0	0	0	0	0	0	0	0	0	0	0	0