8.4.1 EU request on potential management measures for salmon in the Gulf of Finland (ICES Subdivision 32)

Advice summary

ICES advises that the effect of any quota transfer from subdivisions 22–31 to Subdivision 32 would be uncertain, but is likely to increase the exploitation of Gulf of Finland salmon. At present, there is no biological basis to allow a higher harvest of the Gulf of Finland salmon stocks.

ICES advises that merging Gulf of Finland stocks together with stocks in assessment units (AUs) 1–4 in the full assessment model is a priority. Because of data needs and potential technical difficulties with the model development, it is difficult to determine an exact time frame for an analytical assessment for the Gulf of Finland stocks at this time.

ICES advises that management measures that may improve the effectiveness of the TAC would include effort control (limits on fishing licenses, limits on gears, limited soaking time of gillnets, etc.) in the coastal fisheries and increased enforcement to reduce illegal catches.

ICES advises that the sea trout survival study referred in the request is not applicable to salmon in the Gulf of Finland. Until specific information is available showing high survival of salmon released from gillnets, an exemption from the landing obligation would not be advised.

Request

1. Inter-area flexibility of TAC
A certain proportion (e.g. up to ~30% according to the Estonian taggings) of Gulf of Finland salmon migrates to the Main Basin and is caught there. Therefore, one may scientifically argue that a certain amount of the Main Basin salmon TAC should be allowed to be used in the Gulf of Finland. The amount of the Main Basin TAC that could be used in the Gulf of Finland should not exceed the amount that is equal to the proportion of the Gulf of Finland salmon (e.g. 30%) that migrates to the Main Basin.

<u>ICES is requested</u> to clarify the magnitude of the feeding migration of Gulf of Finland salmon to the Main Basin and whether the use of such an amount of Main Basin TAC in the Gulf of Finland would not undermine the sustainability of the Gulf of Finland salmon stock on the basis of the aforementioned reasons and provided that such use would only apply from the Main Basin to the Gulf of Finland management area, not the other way.

2. Developing quantitative assessment for Gulf of Finland salmon stocks and efficient local management measures to protect wild salmon stocks

In the ICES report the following is stated: "Making the TAC restrictive on catches would not necessarily protect wild stocks. Rather than merely restricting mixed-stock fisheries through a TAC system, the protection of wild salmon requires the adoption of management measures and fishing methods that strongly focus selection on the reared stocks".
Scientific opinion is needed providing information about the potential localized measures to protect wild salmon populations instead of setting restrictive TAC. Currently the TAC is not restrictive in the global scale in this region as the overall TAC is not fully utilized. Nevertheless, it is likely that the Estonian salmon quota will be fully utilized in the near future if strong recruitment (including mixed populations) of adult salmon will return to spawn and consequently be caught as a bycatch in the Estonian coastal fisheries. This would lead to restrictive measures or fishing stop in the coastal fisheries of Estonia.
Currently there is no quantitative assessment for Gulf of Finland salmon. EU member states are collecting and providing necessary data and doing relevant scientific studies as a prerequisite for such assessment. As the currently used method for providing TAC advice by ICES is not taking into account regional differences in stock development of wild and mixed stocks there is a need for quantitative assessment for the sake of the better management of salmon in the Gulf of Finland.

https://doi.org/10.17895/ices.advice.18686870

<u>ICES is requested</u> to take into account the regional differences in stock development of wild and mixed stocks when developing a quantitative assessment and providing the advice for TAC. ICES should also provide advice by listing the existing national management and conservation measures that, in combination with the present TAC management system, would be more effective than a TAC reduction only and could contribute to stock improvement.

3. Possible exemption of salmon from the landing obligation in the coastal gill net fishery
An scientific study on survival of released sea trout in the coastal gill net fishery in Finland has been conducted. The result indicates a 60 % survival rate of released sea trout (the scientific report is still being prepared). Scientific advice regarding survival of salmon released in gill net fishery is needed too. An exemption based on Article 15.4(b) in the Basic Regulation would allow release of bycatch salmon from gill nets and hence a solution to the difficulties of a limiting Estonian salmon quota.

<u>ICES is requested</u> to provide the opinion on whether the conclusions from the sea trout study can be assumed to apply for salmon as well.

Elaboration on the advice

Request item 1: Inter-area flexibility of TAC

The ICES advice for fishing in subdivision 32 (Gulf of Finland) in 2015 and 2016 has been 11 800 salmon, based on the average catch taken in 2011–2013. For 2015, the agreed EU TAC for the Gulf of Finland was 13 106 salmon, with a Finnish share of 11 762 and an Estonian share of 1344 salmon. In the Estonian Gulf of Finland coastal fishery, salmon is caught as bycatch mainly by gillnets (85%), but also by trapnets (15%) targeting other coastal fish species like whitefish, flounder, sea trout, pikeperch, and perch. In 2015, a commercial catch of 896 salmon was reported from these fisheries. The majority of salmon are caught during the spawning run in September–November.

Apart from the Gulf of Finland area, Estonia has a coastal fishery in subdivisions 28 and 29 (Main Basin) where salmon are also caught as bycatch. The agreed EU TAC in 2015 for subdivisions 22–31 was 95 928 salmon. In 2015, the Estonian share in subdivisions 22–31 was 2020 salmon, with a commercial catch of 641 salmon reported from this fishery. For Finland, the share in subdivisions 22–31 was 24 787 salmon and the catch in 2015 was 30 185 salmon (including 5600 salmon swapped with the Latvian share).

According to tagging results available to ICES, about 20% of the smolts from the 2005 to 2010 cohorts released in Estonian Gulf of Finland salmon rivers were recaptured outside the Gulf Finland area (ICES, 2013). While there is evidence for migration of Gulf of Finland salmon to the Main Basin, the overall abundance of salmon in the Main Basin is much larger than that of the Gulf of Finland. Therefore, smolts from the Gulf of Finland in the Main Basin constitute a much lower proportion of the salmon found in the Main Basin. The proportion of adult Gulf of Finland salmon currently caught in the southern Main Basin is extremely low (< 1%, from genetic samples; ICES, 2016). The proportion of adult Gulf of Finland salmon caught in the Estonian coastal Main Basin fishery (further to the north) is unknown.

Previous tagging studies and genetic analysis of Finnish catches from the Gulf of Finland have shown that the proportion of Gulf of Finland salmon is considerably higher there than in the southern Main Basin, although stock proportions may differ markedly between coastal areas (ICES, 2015a). For example, a genetic analysis in 2014 of two samples taken along the Finnish coast (c. 130 km apart) showed that in the eastern sample (N = 135), more than half (55%) of the salmon originated from the reared “Finnish Neva” stock (released in River Kymijoki), whereas in the western sample (N = 75) Bothnian Bay stocks dominated (90%). No genetic stock estimates yet exist for Estonian coastal catches from the Gulf of Finland or from subdivisions 28–29.

Current status of the Gulf of Finland stocks is uncertain and long-term projections are lacking. Based on present knowledge of Gulf of Finland salmon stock status, the low proportion of Gulf of Finland salmon in the southern offshore Main Basin and the uncertainty related to the proportion of Gulf of Finland salmon in the northern coastal Main Basin, the effect of any quota transfer from subdivisions 22–31 to Subdivision 32 would be uncertain. However, a transfer of quota is likely to increase the exploitation of Gulf of Finland salmon given the relatively dispersed distribution of Gulf of Finland salmon in the Main Basin compared to within the Gulf of Finland. Higher exploitation in the Gulf of Finland would have negative effects on the development of these stocks. Given the present uncertainties on stock status, there is no biological basis to allow higher harvest of the Gulf of Finland salmon stocks.

Request item 2: Developing quantitative assessment for Gulf of Finland salmon stocks and efficient local management measures to protect wild salmon stocks

Quantitative assessment

Merging Gulf of Finland stocks together with stocks in AUs 1–4 in a full assessment model is a priority for ICES. At present, stock status is evaluated from expert opinions on potential smolt production capacity (PSPC) combined with parr densities and other information, without analytical assessment of uncertainties. Therefore, current estimates of the status of these stocks are qualitative and long-term projections are lacking. Plans exist to include the AU 6 stocks into the full life history model used for stocks in AUs 1–4, which is anticipated to provide analytical PSPC estimates with corresponding uncertainties; however, several issues related to data and technical development remain to be solved.

To conduct these analyses, a thorough evaluation of current data and future data requirements needs to be carried out. Important data must include information on the proportion of salmon from these and other stocks in catches from various parts of the Gulf of Finland (ICES, 2016). These data could be obtained from genetic analysis and tagging. There is also a need for at least one full index river. Some uncertainties exist regarding possibilities for hierarchical modelling (i.e. transferring of basic information derived from salmon in other parts of the Baltic to Gulf of Finland stocks). In an Atlantic salmon benchmark, comprising a data evaluation workshop (late 2016) and a method evaluation workshop (early 2017), ICES will prepare for the inclusion of Gulf of Finland salmon stocks in the full life history model by compiling and evaluating current data, identifying future data needs, and developing parts of the assessment model. Regional differences in development of wild and mixed salmon stocks will be considered in this work. Because of data needs and potential technical difficulties with the model development, it is difficult to determine an exact time frame for an analytical assessment of the Gulf of Finland stocks.

National management and conservation measures in combination with the present TAC management system

Since 2011 the agreed TAC for Gulf of Finland has been set above the ICES advice, and the TAC was not reached. Catch has been near the advised catch. The present management system already includes a number of measures (e.g. closure of fisheries at river mouth, gear types, closed seasons, effort controls) in addition to TAC.

The causes of wild salmon mortality are many. These may be categorized as marine fishing mortality (MMF), river fishing mortality (MRF,) and natural mortality (MN) accounting for predation (i.e. by seals), disease, and impacts of poor environmental conditions. TACs are applicable only in the marine environment, and while these figures are not insignificant, other forms of mortality need to be addressed to protect wild salmon stocks.

In the case of MMF, causes of mortality which do not contribute to landing figures (or relate to TACs) include non-reported catch, illegal catch, and discarding with consequential mortality or reduced spawning success. MRF includes river catches, which do not relate to TACs, as well as non-reported and illegal catch.

For some of these causes of mortality, actions may be undertaken to improve the survival of wild salmon. These include, but are not limited to, improvements in both marine and riverine catch reporting, monitoring, and enforcement for illegal catch and of catch limits. In terms of reducing in-river MN actions may include river enhancement and improved water quality to increase spawning success and improve juvenile survival. The impact of MRF may be reduced through implementing seasonal fishing with closed seasons, catch limits, and closures during periods of low flow and high temperatures. Such actions are intended to improve productivity as a means of protecting of wild populations.

Management actions of these types are being implemented on some Gulf of Finland salmon rivers and are partly described in ICES (Section 2.9 in ICES, 2016). In recent years, larger protection areas have been implemented at the mouths of Estonian rivers. Fisheries inspection campaigns have also been conducted in the rivers Keila, Vasalemma, and Pirita during the spawning run in the last few years. In addition, Estonia has improved the access to spawning and rearing habitats by building fish ladders, and restoration of rearing habitats has been conducted.

In the Gulf of Finland, management measures that may improve the effectiveness of the TAC would include effort control (limits on fishing licenses, limits on gears, limited soaking time of gillnets, etc.) in the coastal fisheries and increased enforcement to reduce illegal catches. Poaching in closed rivers during the spawning season is considered an important factor affecting the abundance of wild salmon stocks in these rivers. Effective enforcement of fishing closures in rivers is regarded as an important measure to be taken in order to achieve and maintain good stock status. The increase in wild Estonian smolt production seen in the past few years could reflect recent campaigns to reduce poaching.

Request item 3: Possible exemption of salmon from the landing obligation in the coastal gillnet fishery

In the EU request, reference is made to a recent "scientific study on survival of released sea trout in the coastal gill net fishery". This Finnish pilot study explored the mortality rate of disentangled sea trout in an experimental coastal whitefish fishery, with 35–43 mm bar length gillnets during the cold water seasons in spring and autumn. Altogether, 74 sea trout were caught during the study, and 60% of the fish were found alive at the end of a 2- to 6-day observation period. The average length of the sea trout was 435 mm, indicating that a majority of the fish were post-smolts.

The study is based on a small sample size, does not provide a measure of uncertainty in survival (i.e. standard errors are not provided), and as such the results are considered preliminary. The report is also only available as a working paper. The results of this pilot study are not directly transferable to salmon in the Estonian coastal fishery as mortality will vary between species, gear type, and prevailing environmental conditions (Davis, 2002; Havn *et al.*, 2015; Dapp *et al.*, 2016). For example, 80–100% mortalities are reported in the literature for Pacific salmon enmeshed from salmon driftnets (e.g. Chopin and Arimoto, 1995). Compared to the sea trout in the pilot study, salmon are larger, and a major part of the Estonian catch is taken earlier in autumn, when the water temperatures are higher than in the above pilot study, and salmon are sensitive to thermal stress. If salmon should be released back to the sea in the Estonian coastal fishery, survival would likely be lower than for sea trout from the pilot study. In addition, the Estonian catch consists of spawning migrating salmon, and stress caused just prior to spawning could further impair their spawning success (even if they survived the handling).

As described in the ICES Report of the Workshop on Methods for Estimating Discard Survival (ICES, 2015b), discard survival estimates and their level of accuracy and precision will vary by species, fishery, and technical/environmental factors such as temperature and life history characteristics. That report proposes a systematic review that would account for differences in data quantity, data quality, and covariates among studies when assessing the possibility of exemptions to landing obligations.

Until specific information on survival of salmon released from gillnets is available, an exemption from the landing obligation would not be advised.

Suggestions

Genetic studies designed to determine the origin of salmon in the catch in areas of the Baltic Sea where this information is lacking or needs to be updated, such as coastal areas in subdivisions 28–29 and 32, could improve understanding of the mixing of Atlantic salmon.

A specific study would be needed to explore how releases from gillnets back to the sea in the Estonian coastal gillnet fishery affect survival rates of salmon, and to investigate the potential negative effects on spawning success.

Basis of the advice

Background

The italicized text below was provided by the EU as background to the request.

Wild stocks: The only wild salmon stocks in Subdivision 32 exist in three Estonian rivers. According to expert judgment, the smolt production has been below 50% of the potential smolt production capacity (PSPC) in most years in rivers Keila and Vasalemma. Smolt production increased in 2014 and is expected to further increase in 2015 and to remain relatively high in 2016 (based on recently observed parr densities). Smolt production in river Kunda has varied significantly (from less than 10% to 100% of the potential) (ICES 2015a).

Mixed stocks: On aggregated stocks, wild smolt production for mixed rivers in Subdivision 32 is considered to be below 50% of the PSPC. Of the 7 Estonian mixed salmon stocks in the Gulf of Finland only 2 are currently expected to be over 50% of their PSPC. Smolt production in Estonian rivers is variable and has generally been higher in the last decade. Wild smolt production in the mixed rivers Luga (Russia) and Kymijoki (Finland) has stayed well below 50% of their potential, without any obvious trends (ICES 2015a).

Reared stocks: Most of the salmon in the Gulf of Finland originate from smolt releases. Despite major releases, the catches have decreased considerably in the last decade, indicating low post-smolt survival of reared salmon. However, some increase in catches has been observed in recent years (ICES 2015a).

There are currently no offshore salmon fisheries (not forbidden though) in the Gulf of Finland. Salmon is a targeted species or unavoidable bycatch of static gears in coastal fisheries. According to the ICES advice the effort in fisheries catching salmon should not increase and improved measures to focus selection on the reared stocks should be implemented. Relocation of fisheries away from rivers and rivers mouths supporting wild stocks, or mixed stocks with only supportive releases, should be considered. Wild salmon should be protected from poaching when they return to rivers. Effort in the salmon fishery in the Main Basin (Subdivisions 24-29) should also not increase, as wild salmon from the Gulf of Finland use the Main Basin as a feeding area (ICES 2015a).

Regardless of the overall situation there has been continuous improvement in annual smolt production regarding both wild and mixed (rivers with supplementary stockings) stocks in Estonian salmon rivers, especially during the last decade. This trend is a consequence of the package of locally targeted protection and rehabilitation measures that is implemented in Estonia and is likely to continue.

Salmon TAC for Gulf of Finland is common for all the stocks in this management area and therefore improvement of relatively small salmon stocks in Estonia have not been reflected in the overall TAC recommendation proposed by ICES. There is also another important reason for that. Namely, ICES advice is not based on quantitative assessment or forecast and the precautionary approach applies. The TAC is calculated on the basis of the latest catch in the management area and new data available (catch statistics and parr densities) do not change the perception of the Gulf of Finland salmon stocks. In the absence of a quantitative assessment, it is difficult to evaluate the response of Gulf of Finland wild stocks to management measures. Making the TAC restrictive on catches would not necessarily protect wild stocks (ICES 2015a).

In addition, there is no management plan in place (work is ongoing to have it in place) and the expert judgement is used to approximate the status of stocks and suggesting that current wild smolt production is below MSY levels. The inclusion of Gulf of Finland salmon stocks in the current assessment model for Subdivisions 22-31 has been an objective of ICES for several years, but is not considered to be immediately feasible (ICES 2015a).

In Estonia, regulations to relocate the coastal fisheries away from river mouth areas where it is likely to catch Gulf of Finland wild salmon have been in force since 2011. As part of those regulations, the closed area at the river mouth was extended to 1500 m during the main spawning migration period in all wild and most of the mixed rivers. A lot of work has been done in *order to open migration routes in salmon rivers. Extra effort has been directed towards protecting wild salmon from poaching in the rivers when they return to spawn. These measures have at least partly resulted in the recent positive trend in natural reproduction (ICES 2015a).*

The lack of quantitative assessment and disregarding of regional development of the stocks lead in terms of the TAC to a controversial downward spiral as the TAC advice is based on the average catches and do not take into account improvement of the stocks of certain areas of the management unit. This approach has led, especially for Estonia, to a controversial situation when stocks are clearly improving, bycatches are increasing, but at the same time the quota is going down which may lead to restrictions of the coastal fisheries for other species. Such a development has put Estonian authorities into a peculiar situation where implementation of the proven effective safeguard measures (rehabilitation of the habitat and fisheries restrictions) to protect and enhance salmon stocks is losing public credibility (e.g. among fishermen and other stakeholders) as they likely lead to more restrictive measures in fisheries and fisheries related activities.

The need to avoid restrictions for coastal fisheries of other species than salmon has been the main reason why the BALTFISH has recommended a status quo for the TAC for the last two years, arguing that according to ICES advice a reduced TAC might have only limited value ("would not necessarily protect wild stocks") on protection of the wild salmon stocks and that more targeted measures than merely setting a TAC should be adopted.

There is a need for long-term solutions and changes of paradigm in salmon management in the Gulf of Finland in order to resolve the current unsatisfactory situation.

Gulf of Finland stock status

Smolt production in Gulf of Finland stocks shows a positive trend in most of the rivers, but large annual variation occurs. Regarding the wild Estonian stocks, increase in smolt production has been highest in river Keila where parr densities in some years have exceeded the previously estimated carrying capacity. A positive trend in smolt production can also be seen in river Kunda, where the estimated smolt production shows high annual variation. Smolt production in river Vasalemma has been very variable; however, strong year classes have become more frequent. Smolt abundance in relation to potential smolt production capacity (PSPC) in the wild Estonian rivers in 2015 and 2016 is considered to be around or above 75% (according to qualitative expert evaluations).

For the small Estonian mixed stocks, the trend has also been positive in recent years. However, smolt production in relation to PSPC in 2016 is expected to decrease below 50% in all of them. Based on parr density data the smolt production is expected to increase again in 2017.

In the Finnish mixed river Kymijoki no clear positive trend can be seen, although occasional stronger year classes have occurred. The smolt production has nevertheless remained far below the 50% level. In Russian river Luga wild smolt production has remained below 10% of PSPC, despite large-scale annual smolt releases. The river Luga population suffers from severe poaching.

Gulf of Finland salmon fisheries

Of the total reported salmon catch (7348 salmon in 2015) in the Gulf of Finland, 90% is taken in the Finnish coastal commercial trapnet fishery that targets mainly salmon and whitefish in June–August. The remaining catch is mostly taken in the Estonian gillnet fisheries. Russia reports no sea catch of salmon from the area. There is no off-shore salmon fishery in the area. Since the early 2000s Estonian and Finnish commercial catches show no clear trends.

Estonia's total Gulf of Finland salmon catch in 2015 was 1377 salmon, and the commercial catch comprised 896 salmon of which 24% were fin-clipped. Thus, 687 fish in the commercial catch originated from wild reproduction or from Russian releases (not fin-clipped). Besides wild salmon rivers, mixed rivers in the region also contribute to the wild smolt production.

Sources and references

Chopin, F. S., and Arimoto, T. 1995. The condition of fish escaping from fishing gears—a review. Fisheries Research, 21(3–4): 315–327.

Dapp, D. R., Walker, T. I., Huveneers, C., and Richard, D. R. 2016. Respiratory mode and gear type are important determinants of elasmobranch immediate and post-release mortality. Fish and Fisheries, 17: 507–524.

Davis, M. W. 2002. Key principles for understanding fish bycatch discard mortality. Canadian Journal of Fisheries and Aquatic Sciences, 59: 1834–1843.

Havn, T. B., Uglem, I., Solem, Ø., Cooke, S. J., Whoriskey, F. G., and Thorstad, E. B. 2015. The effect of catch-and-release angling at high water temperatures on behaviour and survival of Atlantic salmon *Salmo salar* during spawning migration. Journal of Fish Biology, 87: 342–359.

ICES. 2013. Report of the Baltic Salmon and Trout Assessment Working Group (WGBAST), 3–12 April 2013, Tallinn, Estonia. ICES CM 2013/ACOM:08. 334 pp.

ICES. 2015a. Report of the Baltic Salmon and Trout Assessment Working Group 2015 (WGBAST), 23–30 March 2015, Rostock, Germany. ICES CM 2015/ACOM:08. 362 pp.

ICES. 2015b. Report of the Workshop on Methods for Estimating Discard Survival 3 (WKMEDS 3), 20–24 April 2015, London, UK. ICES CM 2015\ACOM:39. 47 pp.

ICES. 2016. Report of the Baltic Salmon and Trout Assessment Working Group (WGBAST), 30 March–6 April 2016, Klaipeda, Lithuania. ICES CM 2016/ACOM:09. 257 pp.