Baltic Waters

Finland's Baltic Sea Fisheries at a Crossroads

– societal cost or asset

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Note: This report was translated into English with the assistance of artificial intelligence. While the translation has been reviewed, minor inaccuracies may remain.

Summary

Finnish herring fishing in the Baltic Sea has declined by 60 per cent since 2016 and in 2024 reached its lowest level of the 2000s.[1] Cod fishing in the Baltic Sea has already collapsed following earlier overfishing. Finnish salmon fishing has also decreased substantially.

The Finnish government and Minister of Agriculture and Forestry, Sari Essayah (Christian Democrats), strongly opposed the European Commission's proposal to reduce fishing quotas. The Commission's original proposal entailed a 62 per cent reduction in herring quotas, but the EU Agriculture and Fisheries Council instead decided to increase the quota for the central Baltic Sea by 15 per cent. Finland's fishing opportunities for herring and sprat theoretically increase by a combined 10 per cent. As fish stocks continue to be depleted, the value added declines. If the trend continues, it may force a (too) late fishing moratorium within a few years, as has already happened with Baltic cod

This report calculates the economic value of Finland's Baltic Sea fishery. The aim is also to estimate the value of allowing stocks to recover so that fishing can later be conducted sustainably. The calculations are based on Finnish fisheries statistics and other data.[2]

According to the analysis, Finland's large-scale fishery generates a negative socio-economic value, estimated at –5.1 million euros per year. A key reason is that large trawlers have high fuel consumption and carbon emissions, while being exempt from fuel and carbon taxes.

1 LUKE, https://www.luke.fi/sv/statistik/kommersiellt-fiske-i-havet/kommersiellt-fiske-i-havet-2024-preliminar-databasoffentliggorande

2 In some respects, the analysis draws on two earlier reports presenting corresponding calculations for Sweden, Fölster (2020) and Fölster (2024).

Two recovery scenarios are also described, based on scientific literature and successful international examples, such as the sustainable fishery in the Gulf of Riga. In these scenarios, large-scale pelagic fishing is sharply restricted for a period as part of a broader package of measures. The main scenario assumes that sustainable fishing can be established within ten years, with large-scale trawling permitted in 25 per cent of the Baltic Sea area, while the remaining area is reserved for small-scale coastal fishing and recreational fishing, or fully protected. Sustainable fishing here means that active commercial fishing can take place without jeopardising stock health or the ability to recover from one year to the next. In the second, more cautious scenario, large-scale trawling ceases entirely in favour of small-scale coastal fishing and recreational fishing

Finally, the socio-economic value generated by the two recovery scenarios is calculated. In both scenarios, significantly higher value added and socio-economic benefits are created than today's fishery generates. Transitioning to the main scenario would, after recovery, yield a socio-economic gain of 26 million euros per year (and 24 million euros per year in the cautious scenario). A large share of the gain in the main scenario stems from the recovery of coastal commercial fishing and recreational fishing, but even the large-scale fleet would be able to fish and earn more than today

The net present value of a shift in fisheries policy is calculated under the assumption that fish stocks take ten years to recover gradually (along a linear trend), and thereafter remain at a sustainable level. The net present value then amounts to 1 billion euros in the main scenario and 900 million euros in the cautious scenario over the coming five decades.

In addition, several socio-economic benefits are not valued here. For example, larger fish stocks in the Baltic Sea also serve a preparedness function: fishing can provide an important protein source in times of crisis. In the main recovery scenario, catches compared with continuing as today would, in the 2030s, correspond to several kilos per Finn per year, which is not insignificant.

Even considering uncertainties in the statistical basis, the conclusions are very clear. From both a fiscal and socio-economic perspective, the large-scale Baltic Sea fishery is highly unprofitable, especially compared with the potential recovery scenarios that underpin the calculations in this report. Current fisheries policy undermines the future revenues and survival of both the coastal and the large-scale fishing sectors.

A Vicious Circle for Baltic Sea Fish Stocks

Fishing in the Baltic Sea has long been regarded as an agricultural-type industry, but without the requirements for long-term yield that apply, for example, in forestry. But what value does Baltic Sea fishing actually generate, and what does it cost society? This report calculates the Finnish socio-economic balance sheet based on current fisheries policy for the Baltic Sea.

Most commercial fish stocks in the Baltic Sea are in poor condition.[3] The central Baltic herring stock has declined by more than 70 per cent between 1966 and 2024. The cod stock has collapsed. Since 2019, targeted fishing for the eastern Baltic cod stock has been prohibited, and in 2022 fishing for the western stock was also stopped. However, cod is still allowed as bycatch despite the stock being extremely weak. The causes of the decline are several, but the only measure that appears effective in the short term is reduced fishing pressure. In many parts of the world, fish stocks have recovered strongly following restrictions or temporary fishing bans, and in the long run provide much larger and more sustainable catches.[4]

Baltic Sea fisheries, however, have entered a vicious circle. The most valuable food fish, cod and turbot, have been virtually fished out, and salmon is also in sharp decline. Herring caught for human consumption is costly because the fish is easily damaged and, not least, because individual fish are increasingly small. Large-scale fishing for herring and sprat for feed production is comparatively profitable. In the feed fishery, prices paid for landed fish can reach just over 3 euros per kilo (compared with just over 5 euros for herring destined for human consumption), while fishing and handling costs are significantly lower.[5, 6] In the early 2000s, the price of herring for human consumption was 300 per cent higher than the price of herring for feed. Today, the ratio has fallen to 160 per cent.

Around 17 per cent of Finnish-caught herring goes to human consumption.[7] The rest is mainly used for animal feed in the form of fishmeal, often exported or landed directly in foreign ports.

The result is that, in the short term, fishing for feed appears most profitable, as it commands a better market price relative to costs. At the same time, the depletion caused by large-scale feed fishing, including bycatch of species under fishing ban, is so extensive that fishing for human consumption becomes difficult and almost ceases. This creates a vicious circle, with the risk of lower profitability for the entire fishing sector than would be possible if herring and sprat remained in the Baltic Sea in sufficient quantities to make human-consumption fishing viable, and above all to be naturally converted into desirable food fish such as salmon and cod.

3 BalicWaters Knowledge Base https://balticwaters.org/faktabanken/bestandens-utveckling-over-tid/

4 A review of successful examples is presented in Fölster (2024).

5 Figures exclude VAT. Source: LUKE https://statdb.luke.fi/PxWeb/pxweb/en/LUKE/

6 See also the situation a few years ago, when fishing herring for human consumption was considered relatively more profitable, perhaps partly because the fish were larger at the time, https://balticwaters.org/wp-content/uploads/2023/05/policydokument_Mer-lonsamt_2023.pdf

7 The figure refers to 2024 according to LUKE Infographic based on data from the Natural Resources Institute Finland. The corresponding figure for Sweden is also around 17 per cent of the Swedish herring catch, according to SCB and the Swedish Agency for Marine and Water Management.

The Vicious Circle Makes it Profitable to Exploit the Stocks to the Very End

Current fishing levels are neither long-term nor stable, but instead show a declining trend. Figure 1 below illustrates how the EU has been forced to reduce fishing quotas gradually, often belatedly. If the trend of the past thirty years continues, a fishing moratorium for herring and Baltic herring may be required in the early 2030s.

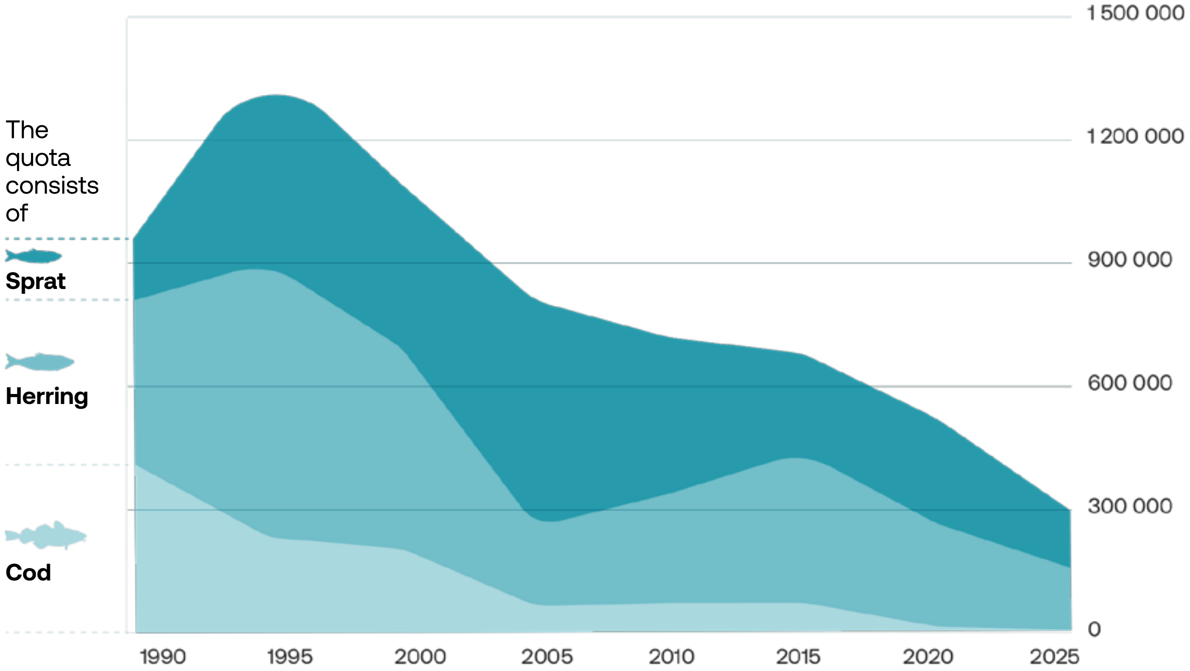
The figure shows that herring quotas in the 1990s were roughly eight times higher than the levels seen in recent years. A more prudent fisheries management regime could have preserved stocks sustainably and allowed more extensive fishing than is possible today. Both the large-scale and the coastal fisheries would have generated higher revenues. At the same time, herring stocks would have been large enough to maintain a substantial fishery for human consumption. Profitability across the entire fishing sector would therefore have been significantly higher

As recently as the 1990s, herring and sprat were naturally processed in large quantities by serving as prey for more valuable fish species such as cod and salmon. However, the cod quota was set far higher than sustainable levels. Had quotas been halved at that time, it would likely have been possible to maintain a cod fishery with higher profitability than today's feed fishery for herring. A stable herring stock could also have helped slow the decline of cod and facilitated its current struggle to recover.

Baltic Sea cod fishing was previously conducted mainly through large-scale bottom trawling. In the final years, however, cod became so small and weak that significant shares were no longer sold as food fish to retailers but instead exported for fishmeal production. The crisis in Baltic cod led the European Commission in 2019 to impose an immediate ban on fishing. The International Council for the Exploration of the Sea (ICES) recommended in 2019 that no cod fishing should be allowed in the eastern stock

A key question is whether it is possible to rebuild the stocks. A review of international examples suggests that stock recovery is possible, but requires a substantial reduction in large-scale fishing for several years.[8]

Figure 1. Fishing quotas TACs in the whole Baltic Sea over the last 30 years



Source: https://ices-library.figshare.com/collections/ICES_Advice_2024/6976944/20 According to the table 'agreed TAC' under the advice for Baltic Sea herring, p. 24–32, cod east and sprat, and a few pages into the advice, a table with figures per year.[9]

8 See Fölster (2024).

9 ICES advice has been used in the preparation of the diagram.

Finnish fishing in the Baltic Sea mirrors the broader development. Over the past five years, Finnish catches have declined substantially, measured in kilos of fish. This applies to herring, sprat and salmon alike. A common interpretation of the trend shown in the table below is that the overfishing of cod up until around 2012 initially created room for increased stocks of herring and sprat, but that these, too, have declined from around 2018 onwards.

Because of poor catches, the full quota is often not utilised. For the baseline calculations in this report, it is assumed that the trend-like decline continues and approaches zero by 2030. Due to rising fish prices, however, landing values and value added have been maintained. Part of the vicious circle is that the fewer fish remain, the higher the price of the ever-scarcer catches.

Finnish Fishing in the Baltic Sea 1994–2024[10] Herring, sprat, cod and salmon (1,000 kg)

	Herring	Sprat	Cod	Salmon
1994	97673	497	520	1049
1995	94612	4104	1852	1160
1996	93338	14351	3132	975
1997	90334	19851	1536	1051
1998	85545	27014	1034	720
1999	82237	18886	1569	612
2000	80697	23134	1817	591
2001	81916	15742	1716	444
2002	75580	17245	1044	441
2003	63358	8949	1163	343
2004	70552	16576	885	505
2005	66457	17883	283	461
2006	79433	19013	670	309
2007	88939	24581	853	339
2008	83137	24254	830	312
2009	90253	23160	879	314
2010	92400	24602	1028	215
2011	97645	15762	1106	227
2012	117164	8960	1670	330
2013	121616	11074	449	259
2014	130414	11812	376	249
2015	131444	11874	414	192
2016	136308	16806	86	192
2017	134133	16088	191	159
2018	126487	16455	54	204
2019	112722	16080	83	228
2020	92481	12502	24	187
2021	76726	14774	35	181
2022	68176	13487	30	153
2023	69330	14725	26	115
2024	53670	11701	18	105

Source: See "Catch in Finnish commercial marine fishery". Data from LUKE.

10 LUKE statistical database, https://statdb.luke.fi/PxWeb/pxweb/en/LUKE/

The dramatically declining stocks of salmon and cod previously led to increases in their natural prey, herring and sprat, but these are now also under heavy fishing pressure. In the calculations that follow, it is assumed that herring and sprat stocks, as well as the quotas for each species, continue their current negative trend and approach zero by 2030.

In broad terms, all Baltic Sea fisheries combined had a landing value of just under 156 million euros in 2021, with a decline thereafter.[11, 12] In the Baltic Sea, small-scale fisheries account for the vast majority of vessels (around 95 per cent), but only about 22 per cent of the landing value.[13]

Large-scale Finnish trawlers landed 23 million euros' worth of fish out of a total Finnish Baltic Sea landing value of 36 million euros in 2023.[14] Based on the average of the past four years, the large-scale Finnish trawlers' share of Finland's Baltic Sea landing value, 64 per cent, is used as a rule-of-thumb for allocating certain public-sector costs calculated later in the report.[15]

How Others Have Succeeded in Restoring Fish Stocks

A number of studies have established that areas which have introduced so-called "active fisheries management" have, to varying degrees, succeeded in restoring overfished stocks.[16] In some cases, stocks are on their way towards levels classified as "abundant". Active fisheries management involves applying a range of measures and restrictions aimed at conserving or returning stocks to sustainable levels. When fish stocks are low, active management in practice means fishing bans until a certain degree of recovery has taken place.

A study published in the prestigious journal PNAS (Hilborn et al. 2020) examines the relationship between fishing pressure and changes in stock biomass, as well as between management intensity and fishing pressure, across more than 632 fisheries in 29 countries. Active fisheries management is reflected in high "Fish Management Index" (FMI) scores, calculated for 70 fishing nations or regions based on responses to 46 questions covering more than 1,000 fish stocks. According to the study, higher FMI scores are associated with better stock status. In regions where fisheries are intensively managed, stock biomass generally increases or remains close to management targets.

In several countries, reductions in fishing pressure can be directly linked to legislative changes and subsequent management. This often requires real capacity to monitor fishing activity. Within the EU, several studies have shown that inadequate monitoring has likely enabled catches up to twice as large as those reported.[17]

A previous report (Fölster, 2024) describes a number of successful examples of preserved or restored fisheries. Only a few particularly relevant cases are mentioned here.

11 The 2023 annual economic report on the EU fishing fleet (STECF 23-07), p. 104. Based on statistics from 2021.

12 The 2023 annual economic report on the EU fishing fleet (STECF 23-07), p. 104. Based on statistics from 2021.

13 According to STECF (2024) p. 100. https://stecf.jrc.ec.europa.eu/documents/d/stecf/stecf_24-07_aer

14 Of which almost all is herring and sprat, https://www.luke.fi/sv/statistik/kommersiellt-fiske-i-havet/kommersiellt-fiske-i-havet-2024. Large-scale refers to pelagic trawlers over 12 metres in length. See also, https://stecf.jrc.ec.europa.eu/documents/d/stecf/stecf_25-07

15 Based on STECF annual reports 2021–2025.

16 See for example Lotze et al. (2011).

17 See for example https://www.fishsec.org/app/uploads/2011/03/1226500209_46529.pdf

Herring in the Gulf of Riga

In the Gulf of Riga, Estonia and Latvia have jointly succeeded in reversing the decline of herring stocks through fisheries regulations, including the introduction of closed areas and seasonal closures.[18] Of the four herring stocks managed in the Baltic Sea, three are at risk of the same collapse that has already occurred for cod, while Riga herring is in good condition and has remained stable or even increased over the past two decades. Several fisheries management measures are applied in the area::

- No large trawlers are permitted in the Gulf of Riga, and bottom trawling is prohibited.[19]
- Restrictions apply to the types of fishing gear allowed.
- he fishing quota is divided equally between coastal fishers and trawlers, resulting in a relatively high share of coastal fishing.

To protect spawning fish, several offshore areas are completely closed to fishing, as are almost all areas deeper than 20 metres.[20] Certain periods of the year are also closed: in both Latvia and Estonia, fishing is prohibited for 30 days in spring, and Estonia additionally bans trawling from mid-June to mid-September. Fishing takes place year-round, but trawling is prohibited when herring aggregate into spawning shoals - a major difference from trawling practices, for example, in the Bothnian Bay. It is also noteworthy that coastal fishers use trap nets that do not prevent herring from spawning inside the gear.

The scope and precision of the joint Estonian–Latvian acoustic survey are several times more intensive than for other herring stocks in the Baltic Sea, and sampling from commercial landings is also extensive.[21] ÄThis is a major difference compared with the monitoring of herring stocks elsewhere in the Baltic.

Herring in the Gulf of Riga is fished exclusively by Latvia and Estonia, and consumption of herring for human consumption is relatively high in these two countries compared with others around the Baltic Sea. The Riga herring stock therefore provides an excellent case study of what more intensive fisheries management can achieve

18 FishSec (2023).

19 Vessel size is limited by a cap on engine power, which may not exceed 221 kW.

20 See for exemple https://www.su.se/english/divisions/stockholm-university-baltic-sea-centre/news/articles/2023-11-28-baltic-breakfast-fisheries-regulations-and-environmental-factors-behind-the-strong-riga-herring

21 Sepp et al. (2022).

Trawl Fishing Ban in the Öresund Strait

Trawl fishing has been prohibited in the Öresund Strait since 1932, making the area an important reference point. Fish stocks there have generally developed more favourably than in the rest of the Baltic Sea.[22] Copenhagen Economics (2018) examined the trawl ban in the Öresund region and calculated that the small-scale commercial fishery (comprising around 160 vessels) landed approximately 2,000 tonnes with a landing value of 36 million DKK. This demonstrates that even a relatively small fishing area can generate substantial value if it is well managed.[23]

Other Examples

Another example is **North Sea herring**, which collapsed as a result of severe overfishing. In January 1977, the North Sea countries extended their exclusive economic zones to 200 nautical miles from the coast. Shortly thereafter, the United Kingdom introduced a total ban on all targeted fishing for North Sea herring in British waters. The other North Sea countries stopped all targeted fishing for North Sea herring in 1977. The ban lasted for six years, until June 1983. From a longer-term perspective, the fishing moratorium became both an ecological and economic success. North Sea herring responded very well to the reduced fishing pressure

During the first half of the 20th century, the **Atlanto-Scandian herring** (also known as Norwegian spring-spawning herring) was Europe's largest vertebrate population.[24] But in just 20 years, from the 1950s to the 1970s, the stock was fished to collapse. Recovery took significantly longer than for North Sea herring. The first strong year class did not appear until 1983. By the late 1990s, annual catches were again between 500,000 and 1 million tonnes. In other words, it took nearly 30 years of fishing bans and restrictive quota setting for the stock to recover to a reasonable level.

Another example is the **Icelandic cod** population. Stocks plummeted in the post-war period, similar to many other commercial fish stocks in the Atlantic. In response to this crisis, Iceland introduced a system of Total Allowable Catch (TAC) quotas in 1984. These quotas were later made transferable, enabling fishers to trade their shares of the total allowable catch. However, the total quotas have been kept sufficiently low to strengthen the stocks. The biomass of the cod stock is now larger than at any time since 1985.[25] Older fish are also larger and heavier than in previous measurements, further indicating that the cod stock is in good condition.

These examples are supported by the scientific literature, including the previously mentioned study of management intensity and fishing pressure across more than 632 fisheries in 29 countries.[26] In regions where fisheries are actively and restrictively managed, stock biomass increases and ultimately yields larger, sustainable catches.

22 The proportion of large individuals of cod, haddock, whiting and lemon sole is higher in the Öresund than in the Kattegat, even though catches there are now lower than in the past. From 2024, the cod fishing ban also applies to all recreational fishing.

23 See also County Administrative Board of Skåne (2015). https://www.lansstyrelsen.se/download/18.4e0415ee166afb59324214dc/1713432663118/Havsplanering%20Öresund%20-%20Planeringsförutsättningar%20Öresund.pdf

24 See Hannesson (2022) for a description.

25 Iceland insider https://icelandinsider.is/uncategorized/thanks-to-sustainable-fisheries-icelands-cod-stock-now-larger-than-at-any-time-since-1985/

26 Hillborn et al. (2020).

Recovery Scenarios for the Baltic Sea

Based on these international experiences, two scenarios are developed here that differ in how quickly fish stocks recover. The starting point is that large-scale fishing in the Baltic Sea is paused or stopped during the coming years. How long it takes for stocks to recover is uncertain. Some evidence and experiences from cod stocks in the United States and other countries show that recovery can take 10 to 30 years.[27] As described above, however, these recoveries have occurred after partial fishing bans on species at the top of the food chain. In other cases, where fisheries management measures have been more consistent, recovery has generally been faster.[28] Likewise, recovery has been quicker for species lower in the food chain, such as herring.

In particular, five northern European experiences serve as models for the recovery scenarios in this report:

1. Recovery of herring in the Gulf of Riga
2. Recovery of cod around Iceland
3. The trawl ban in the Öresund Strait
4. Recovery of North Sea herring
5. Recovery of the Atlanto-Scandian herring

The calculations are based on the total value added from fishing, assuming that the distribution between species remains the same throughout the recovery period as it was between 2000 and 2015. With these assumptions, two scenarios are described, and their value is calculated.

Photo: Tobias Dahlin

27 Sewell, B. et al. (2013).

28 Hillborn et al. (2020).

Main Scenario: Recovery of Fish Stocks to Levels Allowing Sustainable Fishing

With some support from a scenario described by FishSec (2022), it is assumed that a more far-reaching recovery of cod takes 20 years, but that limited fishing can take place after 10 years. FishSec describes how such cautious fishing can be achieved. The proposed measures are:

- Allocate only 25 per cent of the Baltic Sea area to demersal and pelagic trawl gear and other active gear, which must, however, be selective with very low bycatch of cod;
- Allocate 35 per cent of the Baltic Sea area to small-scale fishing with passive gear;
- Protect 40 per cent of the Baltic Sea through Marine Protected Areas (MPAs) where no fishing is permitted except recreational fishing. Recreational fishing may only take place if a permit is issued based on an environmental impact assessment confirming that the fishing does not harm the conservation values defined in the MPA management plan.[29]

Active fisheries management may also require measures beyond fishing restrictions alone. One factor affecting fishing opportunities in the Baltic Sea is, for example, seals and cormorants. Seal populations should therefore also be managed so that their numbers are compatible with long-term sustainable fish stocks

For cod, an annual catch of around 20,000 tonnes would be within reach after a further 10 years of fishing bans, i.e. by 2034. Catches of cod from trawl fisheries in the Baltic Sea, for all countries' fleets combined, ranged between 100,000 and 200,000 tonnes from the 1960s until the late 1970s. Catches increased and reached their peak of 400,000 tonnes in 1984, before declining to below 30,000 tonnes in 2016.[30] A corresponding recovery for herring and Baltic herring would imply that a cautious return to catch levels of around 300,000 tonnes per year could be possible after 2035 (compared with roughly 600,000 tonnes caught between 2000 and 2015). [31]

It is assumed that the Finnish share can amount to the same proportion as today, around 23 per cent of total Baltic Sea catches, even under a recovery scenario (and Sweden 20 per cent). Active fisheries management in the Baltic Sea that eventually enables higher quotas and larger catches would therefore increase Finnish catches substantially, even if Finland's share of total Baltic Sea fishing remains unchanged

The calculations cover all fish species assumed to benefit from a restricted or halted large-scale trawl fishery. With sustainable stocks, and with the protective measures described above, small-scale coastal fishing and recreational fishing would see a substantial improvement.

The Cautious Scenario: Fish Stocks Recover Slowly and Quotas Are Allocated Only to Small-Scale Fisheries

In this scenario, the recovery proves more difficult than expected, and pelagic trawling is therefore halted entirely and without a time limit. With this more drastic measure, the recovery in this scenario is sufficient only for small-scale commercial fishing and recreational fishing, both of which can increase their catches to the same extent as in the main scenario. Finnish small-scale commercial fishing, as well as recreational fishing, would therefore be able to expand substantially.

29 See Tunca et al. (2019).

30 During 2000–2015, cod quotas and landings averaged around 70,000 tonnes per year, ICES (2017, 2021).

31 See ICES (2021).

The Value of Finland's Large-Scale Baltic Sea Fishery

The Finnish large-scale commercial fishery in the Baltic Sea accounts, as shown above, for around 64 per cent of Finland's total landed value. When it comes to value added, the figures differ slightly. In 2023, half of the value added was generated by the large trawlers. Regarding the value added from Finland's Baltic Sea fishery, the small-scale fleet accounts for a somewhat larger share, 39 per cent. With a few exceptions, this segment uses passive gear and a larger proportion of the catch goes to human consumption.[32]

Value added in the Finnish fishing fleet, in million euros.

		Coastal fishing under 8,500/10,000 euros	Coastal fishing over 8,500/10,000 euros	Small trawlers	Large trawlers	Total
2008	**Value added (million euros)**	1.8	5.4	1.5	4.7	13.5
2009	**Value added (million euros)**	1.9	6.6	1.6	5.5	15.5
2010	**Value added (million euros)**	1.3	5.7	1.6	6.2	14.9
2011	**Value added (million euros)**	0.9	6.6	2.0	7.2	16.7
2012	**Value added (million euros)**	1.4	7.4	3.0	10.4	22.2
2013	**Value added (million euros)**	1.3	6.4	3.4	9.2	20.3
2014	**Value added (million euros)**	0.6	6.9	3.5	6.3	17.2
2015	**Value added (million euros)**	1.1	5.6	3.3	7.2	17.2
2016	**Value added (million euros)**	1.4	4.4	3.5	9.8	19.1
2017	**Value added (million euros)**	1.0	4.9	3.2	8.1	17.2
2018	**Value added (million euros)**	1.0	4.7	5.2	9.8	20.7
2019	**Value added (million euros)**	0.9	5.3	2.7	7.9	16.8
2020	**Value added (million euros)**	1.3	5.8	2.6	7.9	17.5
2021	**Value added (million euros)**	1.5	5.4	6.7	6.6	20.2
2022	**Value added (million euros)**	1.3	7.9	1.8	5.6	16.7
2023	**Value added (million euros)**	1.1	6.9	2.2	10.3	20.5

Source: LUKE statistical database, Profitability of commercial marine fishery by year, financial indicator and fishing method https://statdb.luke.fi/PxWeb/pxweb/en/LUKE/ and https://www.luke.fi/sv/statistik/fiskerinaringens-lonsamhet/fiskerinaringens-lonsamhet-2023

32 Corresponds to the category "Coastal fishing" in the table.

In a first step, the fiscal effects of Finland's large-scale Baltic Sea fishery are calculated. The numerical basis uses, as far as possible, the most recent years available, but in several cases averages over multiple years are used when annual variation is large.

Fiscal Effects of the Large-Scale Baltic Sea Fishery

The fiscal effects consist of the state's direct subsidies, indirect subsidies such as fuel tax exemptions, and the costs of administration and control. Offsetting these are tax revenues from the sector. These components are described below and then aggregated.[33]

Direct Subsidies

IWithin the EU's Common Fisheries Policy, a wide range of support measures are paid out, for example for investments in gear, marketing measures, or income loss for fishers affected by restrictions. Included here as direct costs are also the state's research funds aimed at preventing or addressing the consequences of overfishing. These are not direct subsidies to the fishing industry but to researchers, yet the need for such research is caused by overfishing. For 2030, these costs are assumed to remain at the same level even if large-scale fishing has ceased, some fishing operations may receive payments for remaining inactive, and research into the consequences of overfishing will likely be needed for a long time. Finnish authorities are not transparent in reporting direct subsidies to the large-scale fleet. Based on available information, these are estimated at around 3 million euros.[34] As shown later, the main results of the calculation are not sensitive to moderate under- or overestimation here.[35]

33 A corresponding calculation was presented for Sweden in Fölster (2020, 2024).

34 This refers to both subsidies within the framework of the EU's fisheries programme for Finland, https://mmm.fi/en/fisheries/strategies-and-programmes/emkvr, but also subsidies granted in addition to this, which can be pieced together from the various government strategies and programmes listed here: https://mmm.fi/en/fisheries/strategies-and-programmes. See also the conditions for various types of support https://merijakalatalous.fi/sv/ehfvf/att-soka-stod/vad-kan-jag-fa-stod-for/kommersiellt-fiske/

35 It should also be noted that this estimate is approximately half of what the corresponding Swedish authorities have reported, which is to be expected given that the landing value for large-scale Finnish trawlers is approximately half that of Sweden. See Fölster, 2024.

Fuel Tax exemptions

As in other maritime sectors, registered fishing vessels are exempt from fuel tax.[36] Based on an analysis of fuel consumption for a large trawler, Finland's fuel tax exemptions for the large-scale fleet are estimated at 1.7 million euros per year.[37] A similar figure can be derived from the Finnish marine fishery's energy costs.[38] By 2030, this tax exemption is expected to fall to zero, assuming the large-scale fishery has ceased under current trends and policy.

Administrative Costs of the Fishery

Administrative costs, particularly monitoring compliance with regulations and quotas, are largely governed by EU fisheries policy.[39] Marine fishing is monitored by the Centre for Economic Development, Transport and the Environment in Southwest Finland, the Åland Government, and the Border Guard. These authorities also oversee landings and first sales. The Border Guard operates the fisheries control centre. Various ministries and agencies regulate and manage the fishery, prepare quota negotiation material, and conduct landing controls.

These authorities do not report how much of their costs relate specifically to the large-scale fleet, nor how much monitoring is actually carried out. In Sweden, for example, monitoring has been shown to be highly inadequate. Instead, the cost that should arise if EU requirements were met is estimated here at 2.9 million euros.[40] Costs are expected to remain at this level in 2030, as monitoring will still be required to ensure compliance with the expected fishing ban.

Tax Revenues from the Finnish Large-Scale Fishery and Processing Industry

The state not only incurs costs but also receives tax revenues. To estimate these, the value added of the large trawlers is used: 10.3 million euros in 2023. For the economy as a whole, taxes on profits, labour taxes, social contributions and VAT amount to around 40 per cent of value added. For 2030, tax revenues are assumed to fall to zero, based on the assumption of a fishing ban due to depleted stocks.

A key question is to what extent fishers would work in other sectors if they were not fishing. Standard methods for socio-economic analysis assume that all labour and capital would be employed elsewhere in the economy if the sector did not exist.[41] Exceptions may be made if clear market failures prevent redeployment, for example, some fishers nearing retirement or capital tied up in vessels with limited alternative use. A cautious assumption is that most labour and capital would eventually find productive use elsewhere. Therefore, it is assumed that 70 per cent of tax revenue would have been generated anyway. Net tax revenue attributable to the large-scale Baltic Sea fishery is therefore estimated at 1.24 million euros.

Most of the catches from the large-scale fishery in the Baltic Sea do not become food for humans, but animal feed in the form of fishmeal, which is imported from elsewhere if the herring fishery does not exist. The conclusion drawn from this is that the effects on tax revenues from the processing

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36 Vero, https://www.vero.fi/en/businesses-and-corporations/taxes-and-charges/excise-taxation/excise-duty-refunds/excise-duty-refunds-for-fuels-used-in-vessels/

37 In Fölster (2024), fuel tax exemptions for Sweden's large-scale Baltic fleet are estimated at 3.5 million euros annually.

38 In 2023, it amounted to 10.6 million euros, https://taloustohtori.luke.fi/sv/havsfiske/period/resultatrakning/ Large-scale sea fishing accounts for 64 per cent of landing values, but more of the fuel consumption after that takes much more fuel to pull large trawls back and forth. Here, it is estimated at 80 per cent of the total. This corresponds to approximately 8,500,000 litres of diesel.

39 Finnish Ministry of Agriculture and Forestry, https://mmm.fi/sv/fiskar/fiskerinaring/overvakning-av-kommersiellt-fiske-och-kvotuppfoljning

40 The prescribed controls are described here, among other places:https://www.europarl.europa.eu/factsheets/sv/sheet/116/fiskerikontroll

41 In Sweden, these standard methods are compiled in ASEK 7.

industry, which today processes fish from the large-scale Baltic Sea fishery, should be disregarded. The exception would be the industry that produces fishmeal from Baltic herring in Finland. However, this employs very few people, in contrast to the processing of fish for human consumption.

Summary of the fiscal costs and revenues of large-scale Baltic Sea fishing (million euros per year)

	Calculation 2023	Forecast for 2030
Direct subsidies	-3	-0.5
Exemption from fuel taxes	-1.7	0
Administrative costs	-2,9	-2.9
Tax revenues	1.24	0
Total	**-6.4**	**- 3.4**

Note: Rounded figures.

The state's costs associated with the large-scale Baltic Sea fishery are thus estimated at a net 6.4 million euros per year. This can be related to our estimate of the share of value added, 3.1 million euros, that would not be replaced by work and investment in other parts of the economy.[42]
By 2030, the large-scale fishery is assumed to have ceased, but consequential costs remain.

Some of the figures are subject to uncertainty. Even if the estimate of the state's costs for the Baltic Sea fishery were 50 per cent over- or underestimated, this would not change the conclusion that taxpayers bear significantly higher net costs than the net value added generated by the large-scale Baltic Sea fishery

Socio-Economic Value of Finland's Large-Scale Baltic Sea Fishery

The socio-economic value of the large-scale fishery consists of three components: the economic added value of production, the socio-economic cost of various public interventions, and a range of externalities. These are presented here, followed by a summary at the end.

The net economic added value of Finland's large-scale fishery, as described in previous sections, amounts to 10.3 million euros at present but will cease after 2030 as a result of stock depletion.

Public interventions fall into two categories. The first consists of measures that consume real resources, such as monitoring and administration. The second category consists of subsidies that do not consume resources but merely redistribute funds from taxpayers to fishers. These are not, in themselves, a socio-economic cost. However, they must be burdened with the efficiency loss that arises when public expenditure must be financed through taxation, which weakens incentives to work and invest and entails administrative costs. A standard valuation is that the efficiency loss corresponds to 30 per cent of public transfers. The socio-economic calculations in the next table are based on the figures for the state's financial costs in the previous table but are recalculated according to the reasoning above. In 2030, the large-scale fishery is assumed to have declined to zero, although a number of public costs remain, for example for monitoring and subsidies to restore damage caused by overfishing.

42 Based on an added value of 10.3 million euros for large-scale fishing in Finland and an accepted assumption in social calculations that 70 per cent of investments and labour would be productive in other parts of the economy if the industry in question did not exist.

External Effects of the Fishing Industry

Of the external effects, only carbon dioxide emissions are quantified here, while effects on other industries are discussed without quantification. The reason is that later sections develop alternative scenarios in which small-scale fishing and recreational fishing expand at the expense of today's large-scale fishery. The gains for these sectors are presented there and should not be double-counted by deducting them here as well. The alternative scenarios also address regional effects and other societal impacts..

Carbon dioxide emissions are an external effect of fishing that burden other people today and in the future. Emissions from Finland's large-scale fishing vessels can be calculated as follows. Fuel costs for Finnish marine fishing amounted to 10.6 million euros in 2023.[43] Large-scale marine fishing accounts for 64 per cent of the landed value, but a larger share of fuel consumption, as towing large trawls back and forth requires significantly more fuel. Here, this is estimated at 80 per cent of the total. This corresponds to approximately 8,500,000 litres of diesel, resulting in 21,000 tonnes of carbon dioxide equivalents (CO_2e).

Finland prices carbon emissions through a carbon tax, which in 2023 was 94 euros per tonne of CO_2e. In socio-economic calculations, however, the relevant figure is different and can follow two approaches. One is to attempt to determine the actual socio-economic damage of additional emissions, which proves very difficult. The other is to estimate the marginal cost of reducing emissions to meet climate targets. Here, we follow reasoning that leads to a marginal abatement cost of 0.2 euros per kilogram of carbon dioxide emissions.[44] For comparison, Sweden uses the ASEK 7 standard for socio-economic calculations, valuing one kilogram of emissions at 0.64 euros.

In total, the socio-economic cost of emissions from large-scale Finnish Baltic Sea fishery is estimated at 4.2 million euros.[45] The contribution to GDP is calculated, according to earlier reasoning, as 30 per cent (the share that would not be replaced by labour and capital being used elsewhere) of the large trawlers' added value.

Socio-economic cost of Finnish public interventions related to large-scale Baltic Sea fishing (million euros per year)

	2023	Forecast 2030
Resource cost	2.9	2.9
Transfers (efficiency loss only on net transfers	1.1	0.1
Total	**4**	**3**

Note: Rounded figures.

Summary of the socio-economic value of Finland's large-scale Baltic Sea fishery (million euros per year)

	2023	Forecast 2030
Contribution to GDP	3.1	0
Contribution via public finances	-4	-3
Carbon emissions	-4.2	0
External effects on other industries (not valued here, but estimated in the next section)		
Total	**-5.1**	**-3**

Note: Rounded figures.

43 LUKE marine fisheries financial accounts. 20.2.2026, https://taloustohtori.luke.fi/sv/havsfiske/period/resultatrakning/

44 Nordic Economic Policy Review 2023, https://pub.norden.org/nord2023-001/comment-by-markku-ollikainen.html

45 In Sweden, landings value for large trawlers in the Baltic was 43 million euros in 2023 (Fölster 2024), compared with 23 million euros for Finland.

The Value of Healthier Fish Stock in the Baltic Sea

The effects on other industries of a halt to large-scale fishing were not valued in the preceding chapter. Instead, this section calculates the fiscal and socio-economic value of two alternative scenarios in which small-scale coastal fishing and recreational fishing are allowed to expand. Similar calculations have previously been carried out by FishSec (2022).[46]

Photo: Nicklas Wijkmark

Calculation of Two Alternative Scenarios

The starting point is that large-scale fishing in the Baltic Sea is significantly restricted in the main scenario, or ceases entirely in the cautious scenario. How long it takes for fish stocks to recover is uncertain, but the two scenarios below are constructed based on the international experience and scientific literature presented earlier.

In the main scenario, coastal fishing and recreational fishing are assumed to recover to some extent, while large-scale fishing is confined to a limited quarter of the Baltic Sea. For herring and Baltic herring, this would imply a cautious return to catch levels of approximately 300,000 tonnes per year for the entire Baltic Sea (compared with around 600,000 tonnes per year caught between 2000 and 2015).[47] It is also assumed that fishing for other species recovers in a similar manner. For cod, after a recovery period, a sustainable annual catch of around 20,000 tonnes is cautiously assumed. As recently as 2000–2015, cod quotas and landings averaged around 70,000 tonnes per year.[48] A sustainable future catch of 20,000 tonnes is therefore substantially higher than what has been possible in recent years.

In the second, more cautious scenario, stock recovery is assumed to be slower, and no large-scale fishing is permitted. However, fishing opportunities for small-scale coastal fishing and recreational fishing can increase in the same way as in the main scenario

A key question for calculating the alternative scenarios is how much small-scale coastal fishing and recreational fishing together can increase their catches. An important aspect is that trawling is inherently non-selective - all species unable to pass through the mesh are caught and turned into fishmeal or discarded, in which case they rarely survive. The conclusion is that a halt to large-scale fishing can significantly increase the availability of fish for small-scale commercial fishers. It is also relevant that fish size has decreased markedly but can be expected to increase again under more restrictive fisheries management.[49]

46 BalticStern in HELCOM (2013), Döring and Egelkraut (2008), Blenckner et al. (2011).

47 ICES (2021).

48 ICES (2017, 2021).

49 At the Council of Ministers meeting in October 2022, the European Commission, Finland, Latvia, Lithuania, Poland and Sweden signed a statement expressing concern about the size and age distribution of Baltic herring. ICES was therefore asked to investigate the causes of the decline in stock size and propose measures. In spring 2024, ICES published an action plan, but little has been heard since.

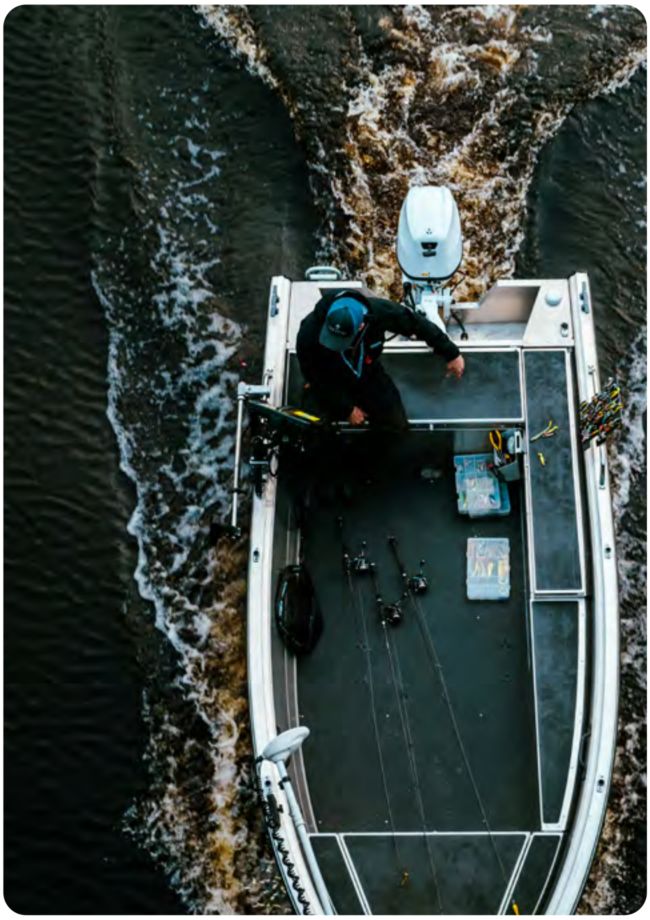
How Much Can Small-Scale Commercial Fishing Increase?

The value added generated by Finnish coastal fishing and small trawlers amounted to 10.1 million euros in 2023, according to the table above, and is assumed to increase by 6.5 million euros in both scenarios.[50] This also reflects that small-scale fishing more often supplies fish for human consumption, which yields a higher value added per kilogram.

Using the same assumptions as earlier, tax revenue is assumed to equal 40 per cent of the value added, but 70 per cent of this would have been generated elsewhere in the economy if the fishing sector did not exist. The net increase in tax revenue is therefore 0.8 million euros in both scenarios..

It is also assumed that most current subsidies to commercial fishing cease, except that small-scale fishing retains the fuel tax exemption. These costs do not increase proportionally with landings, as larger catches are expected per fishing trip or per distance travelled. The fuel subsidy is, however, halved relative to landings value when today's large-scale Baltic Sea fishery is replaced by small-scale fishing - because small-scale fishing, particularly with passive gear, consumes far less fuel than large-scale trawling.

How Much Can Recreational Fishing Increase?



Finland has around 1.8 million recreational fishers. They catch approximately 5,000 tonnes from the Baltic Sea (valued at 15 million euros in official statistics, or 3 euros per kilo).[51, 52] In the calculation below, recreational fishing in Finland is assumed to double, for example, increase by just over 5,000 tonnes per year in both scenarios.

This also leads to secondary effects. Copenhagen Economics, for example, estimates that recreational fishers around the Öresund spend as much as 400 million DKK per year on goods and services, corresponding to 200–400 DKK per kilo of fish. Prices for fish are also generally higher in the Öresund thanks to higher quality. Recreational fishing is roughly as large as commercial fishing there and is supported by 40–50 charter boats, which have almost disappeared elsewhere in the Baltic Sea. In Sweden, recreational fishers spend as much as 109 euros per kilo of fish when including investments in boats and equipment, and 3 euros per kilo excluding investments.[53]

Based on these figures, it is cautiously assumed here that recreational fishers' purchases of

50 This applies to all fish species. The increase in Finnish small-scale fishing is expected to be roughly the same as in Sweden, as estimated in Fölster (2024). Finnish small-scale fishing is larger than Swedish small-scale fishing in the Baltic Sea, while Swedish large-scale fishing is larger than Finnish large-scale fishing. It is difficult to know how a larger stock will ultimately be reflected in more catches for small-scale commercial fishing.

51 FOS, Natural Resources Institute Finland, Recreational Fisheries Statistics.

52 In the Swedish Baltic Sea, the corresponding figure is under 1,000 tonnes https://www.havochvatten.se/data-kartor-och-rapporter/data-och-statistik/officiell-statistik/officiell-statistik---fiske/fangststatistik-for-fritidsfisket.html

53 According to Statistics Sweden (SCB).

goods and services amount to 36 euros per kilo of fish in the Baltic Sea today, but fall to 27 euros per kilo in the alternative scenarios. The reasoning is that when it becomes easier to catch fish, more fish are caught with the same equipment, reducing the cost per kilo. At the same time, more people can fish more often, increasing total spending.

The increase in recreational fishers' purchases is calculated as:
(Catch in the alternative scenario in kg × cost per kg fish) – (Catch in the baseline × cost per kg fish)

This corresponds to 135 million euros in both scenarios. Using a standard assumption that value added equals 40 per cent of turnover, and again assuming that 70 per cent would have arisen elsewhere in the economy, the net increase in value added is 16 million euros. Tax revenue, at 40 per cent of value added, then increases by 6.5 million euros in both scenarios. Any administrative costs for recreational fishing are assumed to be fully financed through fishing permits or fees and are therefore excluded from the calculation.

Large-scale fishing in the Baltic Sea is permitted only in the main scenario and is assumed, after stock recovery, to increase compared with today, which is also reflected in increased fuel tax exemptions and carbon dioxide emissions by 25 per cent. However, an increase in other public subsidies and administrative costs is not assumed, as these are to a significant extent fixed costs or governed by agency budgets that are not expected to increase. For example, monitoring costs are not assumed to rise because fishing increases. Tax revenues, however, increase in proportion to increased value added. It is then assumed, based on the earlier scenario description, that the value added of the large-scale fishery can increase to 17.5 million euros in the main scenario (compared with 10.3 million euros today, although this is declining), but cease entirely in the cautious scenario.

Summary of the fiscal effects generated by the recovery scenarios compared with 2023 (million euros per year)

	Main scenario	Cautious scenario
Small-scale fishing		
Subsidies	Not utilised	
Exemption from fuel taxes (a fraction of today's fishing due to small-scale fishing not towing heavy trawls)	-0.3	-0.3
Administrative costs	0	0
Tax revenues	0.8	0.8
Recreational fishing		
Subsidies	None	
Exemption from fuel taxes	None	
Administrative costs	Fully self-financed through fishing fee	
Tax revenues	6.5	6.5
Large-scale fishing		
Direct subsidies	0	-
Unemployment benefit	0	-
Exemption from fuel taxes	-0.4	-
Administrative costs	0	-
Tax revenues	0.9	-
Total	**6.5**	**7**

Note: Rounded figures.

The calculation of the socio-economic value follows the same template as before, but with a few important additions.

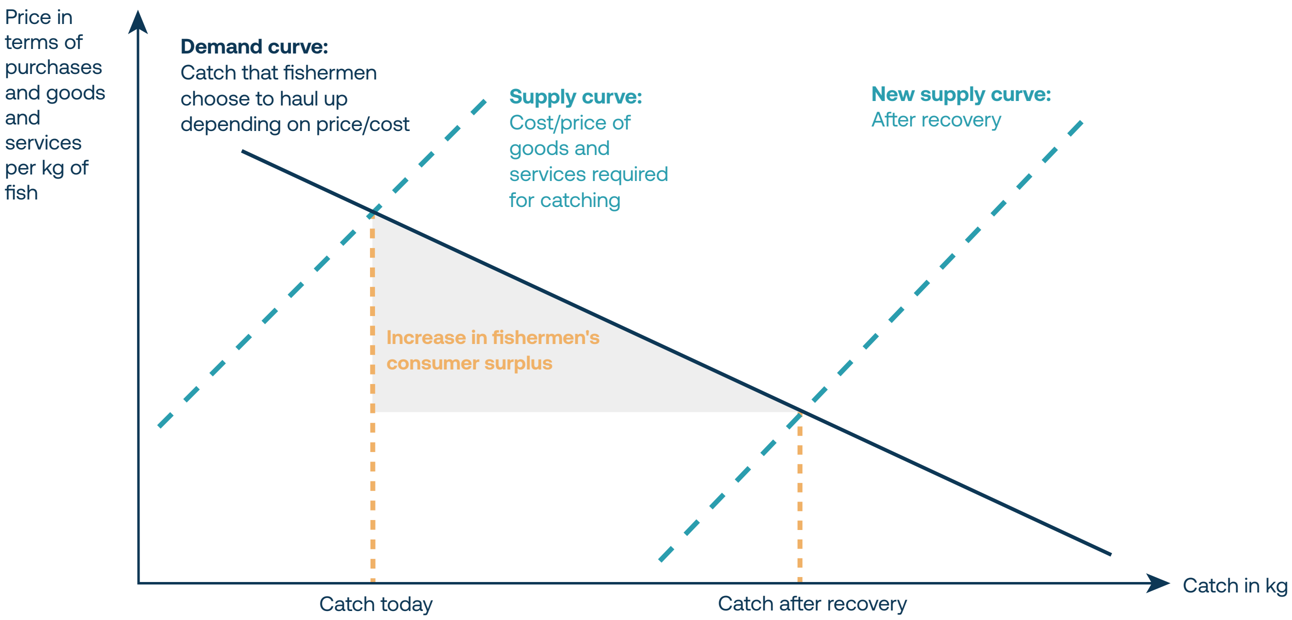
The calculation of the increased value added from small-scale fishing has already been described above. However, it is assumed, as before, that 70 per cent of this would have been generated in other sectors if the fishery had not existed. This leaves a net contribution to GDP of 2 million euros in both scenarios.

The socio-economic value resulting from increased fishing opportunities for recreational fishers consists of two parts. One part is the producer surplus corresponding to the value for companies that wholly or partly sell services or goods to recreational fishers. The calculation of this has already been described above as the basis for estimating the effect on tax revenues. A portion of the sales of goods and services associated with recreational fishing is counted as exports sold to fishing tourists. At least that portion would not have been channelled into purchases of other goods and services.[54]

The second part is the consumer surplus, which is the difference between what the consumer is maximally willing to pay for the product and what they actually have to pay for the product - in this case, the experience of fishing and the catch. In economic terms, consumer surplus can be viewed analogously to the profit (producer surplus) generated by a company's operations. Over the years, a number of attempts have been made to estimate consumers' willingness to pay for fishing. Many studies first estimate how better access to fish, catch per fishing trip, affects the number of fishing days, and how much consumers are willing to spend per additional fishing day, as well as the consumer surplus.

Here, the consumer surplus is calculated in accordance with a method used in many contexts.[55] The method is called "The Rule of Half". The consumer surplus is then calculated as 0.5 × (the increased amount of fish caught by recreational fishers in kg) × (the change in price/cost per kg of catch). This is illustrated in the diagram below. The price/cost per kilo of catch is cautiously assumed, according to earlier reasoning, to decrease from 36 to 27 euros per kilo, because a fisher can succeed in catching more fish on each trip compared with today. The increase in consumer surplus is then calculated at 24 million euros.

Figure 2. Illustration of consumer surplus of recreational fishermen



54 See also Pluntke, Brynteson and Livsey Berg (2025) on maritime tourism

55 It is recommended by ASEK, which formulates standards in Sweden for calculating socio-economic values in infrastructure contexts.

However, the same reasoning applies to consumer surplus as before: at least some domestic fishers would likely have purchased other goods or services that also generate consumer surplus if they had not purchased fishing experiences. Therefore, we follow our earlier assumption, namely that 70 per cent of the consumer surplus would have arisen anyway. The net increase in consumer surplus is therefore 7.1 million euros in both scenarios.

The socio-economic effect of government subsidies and interventions is calculated using the same method as for the large-scale fishery. Only actual resource use is counted as a socio-economic cost, not transfers that merely redistribute funds. Both, however, are burdened with the 30 per cent efficiency loss that arises when the money must be raised through taxation elsewhere in the economy.

The social cost of carbon dioxide emissions is also calculated as before, except that it is assumed that small-scale commercial fishing gives rise to emissions only half as large in relation to the landing value, and that recreational fishing emits as much as small-scale commercial fishing per kilo of fish.

Four components are presented only qualitatively because they are very difficult to estimate.

The first of these is the value of a stronger regional economy. Fishing-based cultural environments are often important for local identity and attract tourists to coastal regions. Many of the cultural environments that draw visitors are centred around a local fishing harbour, and the fact that fishing keeps harbours active and thereby attracts tourists to an area constitutes a positive externality. These harbours are, however, often associated with small-scale and local fishing, while large-scale fishing can instead have a negative impact on opportunities for bathing and recreation.

The second of these four components is the value of healthy food, which fish very much is.

The third component mentioned only qualitatively is the public's valuation of having more fish in the sea. The mere existence of a functioning ecosystem in the Baltic Sea has a value, even for people who do not use it. That such a value exists may seem obvious, and there are economic studies in other fields showing that there is a willingness to pay to preserve natural assets. However, the estimates vary considerably, and the value is therefore not quantified here.[56]

A fourth component is that larger fish stocks in the Baltic Sea also serve a preparedness function. Fishing can constitute an important source of protein in times of crisis. The increase in catches of herring and salmon in the main scenario would, in the 2030s, correspond to an additional several kilos of herring and salmon per Finn per year, without counting the increase in other fish species — which is not insignificant

Taken together, there is thus a substantial improvement in the overall socio-economic profitability of the fishery in the recovery scenarios. In the main scenario, the large-scale fishery would increase its catches and its value added from 10.3 million euros in 2023 to 17.5 million euros in 2035. Without the restrictions assumed in the main scenario, however, the large-scale fishery would move towards zero catches and zero value added, in the same way as has already occurred for cod.

Even in the main scenario, the large-scale fishery would remain socio-economically unprofitable. Its socio-economic profitability would indeed improve from –5.1 million euros per year according to the earlier calculation to –3.5 million euros. The main reason is the continued large greenhouse gas emissions that arise from towing heavy trawls through the sea. The calculation refers to pelagic trawling.

56 In a survey by TemaNord (1999), it was estimated that Swedes were willing to pay a total of 2.4 billion per year in, for example, increased taxes to keep Sweden's fish populations viable.

Summary of the increase in socio-economic value in the alternative scenarios compared with 2023 (million euros per year)

	Main scenario	Cautious scenario
Small-scale commercial fishing		
Contribution to GDP	2	2
Contribution via public finances		
Resource costs	0	0
Transfers	-0.1	-0.1
Carbon dioxide emissions	-0.45	-0.45
Recreational fishing		
Contribution to GDP	16	16
Consumer surplus	7.1	7.1
Bidrag via statliga finanser	None	
Carbon dioxide emissions	-0.7	-0.7
Large-scale fishing:		
Contribution to GDP	2.3	
Contribution via public finances		
Resource costs	0	
Transfers (efficiency loss only on net transfers)	0.4	
Carbon dioxide emissions	-1.1	
Qualitative values:		
Value of a stronger regional economy	Positive, not quantified	
Healthier food supply	Positive, not quantified	
Public valuation of a healthier sea	Positive, not quantified	
Improved crisis preparedness	Positive, not quantified	
Total	**25.9**	**23.9**

Note: Rounded figures.

Final Synthesis

In the preceding sections, the question was divided into two parts for the sake of simplicity: first, the change in the socio-economic performance of the large-scale fishery in the Baltic Sea in recent years and going forward was calculated, without considering what could happen if it were restricted. In the second calculation, the change in the socio-economic performance of the fishery as a whole, including small-scale fishing and recreational fishing, was calculated under the assumption that appropriate protective measures were introduced and that large-scale fishing was thereby limited. In this concluding section, these two calculations are combined in order to determine the net effect of restricting large-scale fishing and implementing fisheries management in line with successful international examples, compared with continuing as today.

An important aspect in combining the calculations is the time dimension. The calculation concerning the scenario of continuing as at present shows the socio-economic values for 2023, but also projects the trend forward, which would entail a continued decline in fishing until 2030. Thereafter, fishing is assumed to continue at the low level of 2030 as a result of overfishing and zero quotas for herring and sprat

The recovery scenarios, by contrast, assume that fish stocks recover, which is assumed to occur from 2035. Here, a calculation is made of the socio-economic present value of the changed fishery that arises over the coming five decades, with 2023 as the reference point. This produces a series of 50 annual values that are then summed. The present value calculation in the model is implicit. No discounting of future values is applied, but they are also not adjusted upwards for real wage growth or other real price increases that can be expected to occur. Implicitly, therefore, the assumption has been made that the discount rate is equal to the inflation-adjusted annual increase in wages and relevant prices.

Assume first that, in the absence of measures, fish stocks follow the current trend and decline until 2030, and thereafter remain at the same minimal level. Compared with 2023, the dwindling stocks in themselves cause a socio-economic loss, but this is offset by reduced carbon dioxide emissions and other costs, so that the socio-economic value per year can be assumed to be roughly the same as in 2023, or slightly lower.

In the recovery scenarios, fish stocks are gradually restored and from 2035 give rise to the sustainable fishery described in earlier sections. The present value of the socio-economic benefit of switching to the main scenario is then 1 billion euros, and around 0.9 billion euros if the cautious scenario becomes necessary. The reason the two scenarios produce similar outcomes is that, in the main scenario, the large-scale fishery does indeed generate increased catches and contributions to GDP, but this is largely offset by continued high carbon dioxide emissions.

BalticWaters is an independent foundation with a single goal: to keep our sea alive. The foundation carries out environmental projects and conducts applied research to demonstrate which measures can contribute to a healthier Baltic Sea and resilient fish stocks. BalticWaters also works to develop and disseminate knowledge about the sea to the public, authorities, and decision-makers. The aim is to increase understanding of the challenges facing the marine environment and to build public support so that decisions are taken and measures implemented.

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