A Case Study of the Margin of Tolerance in the Baltic Sea

An Overview of the Available Information on the Margin of Tolerance, Misreporting and the Environmental Impact

Executive summary

- Effective fisheries management cannot be achieved without robust catch data. Science indicates misreporting of herring and sprat in the Baltic Sea catches persists, threatening sustainable management of these fisheries. It is impossible to assess the health of fish populations and of the wider ecosystem, or to set and control effective quotas, if actual catches are unknown or their estimation inaccurate.

- In 2016, the reporting requirements for catches in the Baltic Sea were relaxed. Previously, a margin of tolerance of misreporting of 10% per species was permitted, as prescribed in 2009 by the EU Fisheries Control Regulation No. 1224/2009. After 2016, this margin of tolerance applied to the total catch, instead of reporting the weight per species. This meant that fishers remained compliant with EU law even when the landed quantities of individual species as recorded in the logbooks differed entirely by species when inspected.

- This likely facilitated extensive misreporting between species, particularly to save quotas for a given species to allow fishing to continue. This made logbooks even more unreliable as the basis for stock assessment and setting of fishing quotas.

- In the case of small pelagic species like herring and sprat, which are keystones of marine ecosystems and fisheries worldwide, this compounded existing pressures, including pollution and climate change. This facilitated the collapse of forage fish stocks, as well as severe consequences in the wider ecosystem and for the people reliant on it.

- Although the reasons for the decline of the various fish stocks in the Baltic are often complex, the case of herring and sprat clearly shows that legalising greater misreporting of catches has led to erroneous estimations of natural resources and undermined the capacity to set sustainable, science-based quotas. This has caused severe fish population declines. It also suggests that the margin of tolerance, when based on the total catch, can cause dangerous inaccuracies in catch reporting.

Background

Fishing quotas and fisheries management are based on a simple principle: to know what is left in the ocean you need to know what was taken out of it. Robust catch data is therefore a prerequisite for functioning fisheries management. It is impossible to set and control effective quotas and to assess the health of fish populations if catches are unknown or inaccurate (Ovando et al. 2021). The importance of accurate reporting of catches has recently been reinforced by the Court of Justice of the EU, which stated that "Member States can properly monitor the uptake of quotas and contribute to the achievement of the objectives of the CFP /…./ only if they can ensure that they have accurate and comprehensive information and data on fishing opportunities" (CJEU 2022).

In the EU, all fishing vessels of 10 metres in length or more are required to keep a fishing logbook of their operations and document all quantities of each species caught and kept on board above 50 kg. This catch data is reported via the Member States to the relevant scientific agencies, such as the International Council for the Exploration of the Sea (ICES), which use the data to gather information about marine ecosystems and to provide scientific advice regarding fishing opportunities. To account for the level of uncertainty in catch estimations onboard fishing vessels, the permitted margin of tolerance (MoT) in the fishing logbooks was set at 10% for all species in 2009 (EU Regulation No. 1224/2009).

As became evident during the negotiations on the revision of the EU Fisheries Control Regulation No. 1224/2009, this rule is opposed by parts of the fishing industry, mainly by industrial fisheries for small pelagic fish species and tropical tuna fisheries (DPPO 2020). The pelagic industrial fisheries argued that due to the massive volumes of catches (single catches up to 600 to 800 tons of fish, with total catches on board at the end of the fishing trip of up to 2,000 to 3,000 tons) it would be impossible to comply with the rule, because volumes would be too large to detect minor bycatch species and sampling would be too difficult to separate physiologically similar species (DPPO 2020). Since 2016, the reporting requirement has been relaxed for the Baltic Sea (Article 13 of the Baltic Multiannual Plan Regulation 2016/1139) - henceforth the Baltic Margin of Tolerance (MoT). In case of the landing of an "unsorted" catch, the logbooks do not need to contain the weights per species anymore. Instead, only the total weight of all fish together within the 10% margin of tolerance is required. Therefore, it is now unclear what exactly was caught and in which quantities.

Baltic MoT and misreporting

In the Baltic Sea the industrial fishery targets two species of pelagic fish: herring and sprat. Most herring and sprat are caught with pelagic trawls, which have a highly variable degree of mixing in the catches of both species. The degree of mixing varies on a spatial scale. According to logbooks and sales slips, this mixing can vary between < 5% and 40%, although these percentages are not quantifiable at this stage (ICES FO 2021). The catch volumes of these fisheries are enormous. The main players in the EU are Sweden (about 80,000 tons), Finland (about 80,000 tons), Denmark (about 40,000 tons), Poland (about 20,000 tons) and Germany (about 10-15,000tons) (Brocki et al. 2021).

The industry has a long history of misreporting catches, both in terms of total catch quantities but also in terms of species composition (Hentati-Sundberg et al. 2014). The scientific advice from ICES, the International Council for the Exploration of the Sea, which forms the basis of the European Commission's decision on how much fish may be caught, considers logbook data from commercial fishing in the Member States (ICES WGBFAS 2021, p.28). Without access to accurate

reporting on actual catches, there is a risk that ICES advice underestimates the stock of sprat and overestimates the stock of herring or the other way around (Havochvatten 2019). Stock biomass, fishing mortality and recruitment are key indicators used by scientists at ICES to calculate the maximum sustainable yield (MSY), which is used by the EU to set fishing quotas.

Despite that, unreliable information from the industry is a well-known and presumably an extensive problem, about which the Member State fisheries administration currently has little knowledge - which is a problem in itself (Balticeye 2021). To counteract misreporting, catch data is supplemented by data collected by the regional Marine Offices of the Baltic countries. Among them, Poland and Denmark have developed correction factors for misreporting (ICES WGBFAS 2020). However, these are variable from year to year and thus misreporting is still a potential problem in these countries (ICES WGBFAS 2020).

The evidence indicates that there is a strong incentive to misclassify species in the fishery in cases where the quota for one species has not been filled but the quota for another species is fully exhausted (ICES SA 2020).

The situation worsened with a new derogation in 2016. As long as the total catch was within the 10% of the reported catch, the new Baltic margin of tolerance rule allowed reporting of any combination of catch composition on board. Even when the landed quantities of individual species as recorded in the logbooks (e.g. 20% herring, 80% sprat) differed entirely by species when inspected (e.g. 80% herring, 20% sprat), the fishers remained compliant with EU law. A Representative of the Latvian Fisheries Control Department expressed concerns in relation to a regulatory gap which may facilitate species misreporting in the mid-water trawl fisheries targeting sprat and herring (Lassen et al. 2022). Therefore, since Regulation 2016/1139 came into force, misreporting between species caught is more likely to happen. Consequently, the logbook data that form a source of information for ICES stock status estimates, and therefore the advice that informs the setting of fishing quotas, became even more unreliable.

Overall, the evidence suggests that the relaxation of the Baltic MoT contributed to the severe decline of key fish populations in the Baltic Sea, with meaningful negative follow-on consequences for a range of fisheries and parts of the Baltic Sea ecosystem.

Actions by Member States

EU Member States are required to provide data on landings and samplings to ICES, and to ensure compliance with management measures through the technical measures set in the Council Regulation 2187/2005 and the Regulation 2016/1139 of the European Parliament and the Council. Because logbook data became even more unreliable from 2016, due to the relaxation of reporting requirements for the Baltic Sea, the national control agencies lost an important tool of data validation. It became impossible to triangulate the catch data from logbooks, data from point of first sale and the national independent sampling schema. For example, in 2019 Swedish vessels underwent controls by the Danish authorities on 19 occasions (Fishsec 2019). The pelagic trawlers involved had reported that 56% of their catches consisted of herring but the control results showed that it was only 27% of catches. This means that catches of sprat were far higher than those officially reported (Fishsec 2019). However, since the logbooks met the overall legal requirement of the total weight of all fish together being within the 10% margin of tolerance (i.e. the total weight was represented correctly), there was no evidence of systematic non-compliance with the reporting requirements of the Baltic Sea Multiannual Plan (MAP) recorded, and four among the vessels that significantly underreported the catches of sprat did not feel the need to correct their landings record to match the control findings (LR 2020).

The Swedish Government, the Danish Government and BALTFISH (Baltic Sea regional fisheries body) have all called for the EU to address the absence of a limit on marginal tolerance between catch and landing records for unsorted catches of fish in the Baltic Sea (Miljø- og Fødevareministeriet 2019, Regeringskansliet 2019). Some of the EU Member States (Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden) have a coordinated program of inspections of fishing vessels at sea and in ports of landing which is organised in the framework of the Baltic Sea Joint Deployment Plan. The quantities of herring and sprat inspected ashore constantly decreased in the years between 2017 and 2020 from 36,500 tons to 15,000 tons for sprat and from 21,000 to 12,500 for herring. While stronger and more frequent controls of landings would be needed to counteract the effect of relaxing the margin of tolerance, instead the coverage of observed landings of herring and sprat out of overall ICES landings decreased from 10-13% to 6% between 2017 and 2020 (ICES 2022a, ICES 2021, EFCA 2017, 2018, 2019, 2020). In the same time span, the number of apparent infringements detected by the inspection teams ashore ranged between 34 and 85 cases per year.

Many of the reported infringements involved falsifying logbooks, landing declarations, sales notes, transfer declaration, transport documents or failure to keep or submit these documents as required (EFCA 2017, 2018, 2019, 2020). It is unknown how many of the infringements were related to the pelagic herring and sprat fisheries. However, as a case example, the Latvian Fisheries Control Department (FCD), reported there have in recent years been incidences of misreporting smelt for herring to save herring quota (Lassen et al. 2022). At the EU level more than one third of all serious infringements concerned failures to record and report catch data (ECA 2022). Nevertheless, the overall extent of misreporting infringements in Baltic herring and sprat fisheries is unknown and we therefore cannot say with certainty whether the trend of misreported species is increasing or decreasing, only that it is present. There is evidence that misclassification and misreporting of herring and sprat continues (EU 2022).

In 2020, to combat misreporting, the Danish Fisheries Agency put several new control and sampling plans into use, including “outsourcing” their inspections. This followed a letter of formal notice sent by the European Commission to Denmark, which alleged the Member State failed “to ensure that all fishery products are weighed at landing and that mandatory catch registration documents record the quantities of each species present, including industrial by-catches” (EU 2019). Previously, it was the Danish Fisheries Agency that was responsible for the sampling, which formed the basis for the Danish quota write-off. Now, the buyer's test results are used for quota depreciation of both Danish and foreign vessels’ landings in Denmark. The sampling and weighing of the landed catches are now supervised by third party surveyors (Fiskeristyrelsen 2021). In parallel, the number of checks and frequency of checks conducted by the Danish Fisheries Agency themselves has fallen significantly. The robustness and reliability of the new privatised control system has not been assessed here (such as to what extent it can prevent collusion between buyer and seller).

To counteract unreliable landing data, in June 2021 Finland implemented stricter rules in the reporting of mixed herring and sprat catches. It is now mandatory again that the weight of fish kept on board recorded in the fishing logbook must be for each landed species with a margin of tolerance of 10% (Act 354/2021). Finland has encouraged other Member States to follow this approach, since it would significantly reduce the misreporting of herring and sprat and would be an important step for strengthening the Main Basin herring stock in the future (FD 2021).

ICES identified a thorough investigation of the fisheries’ misreporting of herring and sprat, and an analysis of to what extent it affects the scientific stock estimates, as being a high priority (ICES WGBFAS 2020). That said, ICES has also noted that significant misreporting can potentially cause

serious issues regarding accurate understanding of fish stocks (ICES WGBFAS 2020) and Member States need to improve the accuracy of reporting to prevent their collapse.

Impacts

Small pelagic fish like herring and sprat are keystones of marine ecosystems and fisheries worldwide, including in the Baltic Sea. They represent a key link between planktic production (microscopic plants and animals) and higher trophic levels like larger fish, marine mammals and seabirds. They gather in immense schools on coastlines and in the open ocean and are prey for other animals to forage on. In some areas of the Baltic Sea herring and sprat exert a wasp waist control, meaning that very few numbers of small pelagic species channel huge amounts of energy from the planktic production to higher trophic levels. Such ecosystems can be particularly susceptible to fluctuations in the abundance of small pelagic species, and collapses of forage fish stocks have severe consequences for both the wider ecosystem and also for the people reliant on the fish for their livelihoods and/or nutrition.

Their schooling behaviour makes herring and sprat, like most clupeoids, particularly vulnerable to fishing techniques. Fish schools can easily be detected by acoustic devices such as sonar and echo sounders, and can be effectively captured by large pelagic trawls or purse seines (Banks et al. 2001). This is especially problematic since the clustering and number of small pelagic fish schools is density-independent and hence not related to their abundance (Petitgas et al. 2001). Even at a low stock size, herring were found to aggregate in large schools for spawning or feeding and could therefore still be detected and potentially fished towards stock collapse (Beare et al. 2002). Continued heavy fishing mortality in combination with low recruitment and poor year classes due to unfavourable environmental conditions would reduce populations below the critical minimum stock size within two to four years (Lasker 1985).

Several of the low trophic level key stocks in the Baltic Sea are in a desperate state. Although some stocks fluctuate, most commercial stocks' long-term trend points downward. Western Baltic spawning herring stock is severely depleted after what is thought to be a combination of fisheries mismanagement and overfishing (Polte et al. 2021, Froese et al. 2022). The Central Baltic herring stock is only around 25% biomass compared to the 1970s and fishing pressure has again been too high since 2014 (ICES 2021). ICES has had to severely correct their view on this stock in the past years. The spawning stock biomass, which in 2017 was estimated to be over 1.3 million tons, was in fact less than almost 600,000 tons that year. And the fishing mortality, which was thought to be low, was in reality above the precautionary level. For the Gulf of Bothnia herring, spawning stock biomass (SSB) has declined sharply since 2010 and is now very close to the limit below which it is not sustainable. According to Baltic Sea Centre's fishery researcher Henrik Svedäng there are several indications that fishing mortality has been underestimated while spawning stock biomass has been overestimated (Balticeye 2022).

Sprat in the Baltic has greatly benefited from changes in hydrographic conditions and the release from predation pressure by Atlantic cod (*Gadus morhua*) (Möllmann et al. 2021). However, nowadays it is thought that the Baltic Sea sprat stock is in a fragile condition (EU 2022). Its stock biomass fluctuates; strong year-classes (1994, 2003, 2008, 2014) are followed by 4-5 weaker ones. Fishing mortality has been higher than present FMSY in most years since late 1990s (ICES 2022).

The depletion of many of the Baltic Sea small pelagic fish stocks has severe consequences for the wider ecosystem. It affects food web functionality, reduces the resilience and resistance against further environmental changes, and diminishes prospects for socioeconomic benefits, including

fishing opportunities (ICES 2020). A striking example is the poor stock status of Baltic cod. The capture fishery of herring and sprat in the Baltic Sea is suspected to be partially responsible for the disastrous level of cod stocks (Brocki et al. 2021). Sprat and herring are important food items for cod, particularly sprat. The relative proportion of sprat caught in the main cod distribution area has increased over the past decade, from 37% of the total catch in 2010 to 58% in 2019 (ICES 2020b). This sprat fishery in the overlap area with cod is potentially decreasing the local sprat density in the main cod distribution area, which in turn may lead to increased food deprivation for cod (Casini et al., 2016). However, it is not only cod that are affected; low sprat and herring stocks also affect a wide range of other marine species such as salmon, marine mammals and seabirds (Oesterwind et al. 2016, Scotti et al. 2022).

It is expected that the situation for many species in the Baltic Sea will worsen due to the climate crisis. The Baltic Sea has already experienced substantial changes in its hydrography as a result of recent warming, with an estimated increase in sea-surface temperature of up to 1°C per decade. Projections of future climate change suggest that this trend will continue in the future. Such warming and the continuing influx of nutrients from agriculture are expected to lead to increasing areas of hypoxia and anoxia, areas with low or depleted oxygen content in the water column. There is no doubt that these changes will affect ecosystems and species by triggering complex nonlinear dynamics, but the resilience of commercial species will, in addition, be affected by their history of exploitation and their current stock status (Froese et al. 2022). In short, climate change is a factor aggravating the effects of overfishing (Rijnsdorp et al. 2010, Möllmann et al. 2021).

The deterioration of the Baltic stocks and the wider ecosystem has led not only to significant ecological but of course also to socioeconomic consequences. The cod collapse for example, generally understood to have been precipitated by deteriorating environmental conditions and overfishing, had substantial negative socioeconomic impact on Baltic Sea fisheries, including, among others, the small-scale coastal fishery (Lade et al. 2015). The decline of sprat and herring stocks in the Baltic aggravates disputes among fishers between those fishing for consumption and those fishing for feed. This is the case in the southern part of the Baltic, where these species are an important part of peoples' diets due to their low prices and consumer values (Brocki et al. 2021). Due to the low stocks of herring, it is now often unprofitable for small scale fisheries to target them (Tagesspiegel 2017, Sverigeradio 2022), although these herring fisheries for human consumption have existed since the time of the Vikings (Atmore et al. 2022).

The reasons for the decline of the various fish stocks in the Baltic are often complex. The Baltic Sea ecosystem is affected by multiple stress factors including nutrient pollution, deoxygenation, ocean warming and acidification; these stressors act concurrently, and their effect may be exacerbated in the presence of heavily depleted stocks (Möllmann et al., 2021; Polte et al., 2021). To what extent the misreporting of catches in the industrial herring and sprat fishery affected the stock declines cannot be reliably disentangled. However, the erroneous estimation of resources and the resultant catch limits of industrially fished species being set at too high a level may affect the resources available to other fish species in the ecosystem (Brocki et al. 2021). Correct catch data from the fisheries are central to the stock analyses conducted by fisheries scientists, and incorrect reporting can lead to grossly incorrect estimates. Basing political decisions on uncertain assessments is very problematic and can lead to a decrease in the legitimacy of fisheries science (Hentati-Sundberg et al. 2014). Hentati-Sundberg identified a reinforced social–ecological feedback between overcapacity, reduced fishing quotas and underreporting of catch quantities, which is important in preventing recovery in European fish stocks. The Baltic example shows that fisheries cannot be managed sustainably without good catch data and that it is impossible to set effective quotas and assess the health of fish populations if the catches are unknown or inaccurate. This essential principle should be immediately evident.

Key recommendations on how to ensure accurate recording of catches and thus contribute to the recovery of affected fish populations in the Baltic Sea

- It is essential that the rules on the logbook and the margin of tolerance assure proper monitoring of quota uptake and accurate catch reporting. Any derogations, such as the 10% margin of tolerance, must be linked to species and robust control at landing.
- ICES and other scientific institutions should be provided with the best data quality and quantity possible to ensure reliable stock assessments.
- Member States should follow the lead of Finland and reintroduce the requirement to document the weight of fish kept on board in the fishing logbook for each caught species.
- The Danish approach to weighing and to sample 100% of the catch during landing by an independent third party should be further explored and introduced on a wider scale only if appropriate and reliable. However, it should not replace the requirement to keep detailed fishing logbooks for each caught species, nor discourage improvements in real-time monitoring of quotas. First-hand logbook data is a prerequisite to ensuring reliable data on where, when and what is caught, enabling fisheries control agencies to triangulate catch, landing and first sale information to detect inconsistencies. It is essential to determine when quotas are exhausted, and to take appropriate measures accordingly, such as the temporary closure of fisheries.
- A significant increase in control, enforcement, onboard monitoring and sampling of landings is required to ensure that misreporting ceases.
- Effective control including Remote Electronic Monitoring on board vessels could contribute to ensuring that Baltic sprat fisheries are sustainable. We suggest that all efforts are made to minimise herring by-catch in the Baltic sprat fisheries.
- EU leaders must ensure that all fishing in the Baltic Sea has climate and ecosystem impact assessments, and that Member States allocate the quota available to those fishers with the least environmental impact, delivering the best social and economic benefits.

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