

# Possible solutions and mitigation methods to decrease the conflict and work towards a viable and sustainable coastal fishery

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### Aim

The aim of this paper is to give a brief background of one of the severest concerns of small-scale fisheries, the increasing seal-fishery conflict. We also aim to list the main possible solutions and mitigation methods to decrease the conflict and work towards a viable and sustainable coastal fishery. Researchers working with many aspects of the seal-fishery conflict reviewed this paper and are listed in Appendix II.

### Seal populations in the Baltic

The harbour seal, the ringed seal and the grey seal present in Swedish waters are listed in Annex II of the Habitats Directive. The Habitats Directive (Appendix 1.1) has the objective of promoting the maintenance of biodiversity while at the same time accounting for economic, social, cultural and regional requirements. The Directive forms a foundation for Swedish seal management. However, the protection of Baltic Sea seal populations is coordinated by a recommendation made by the Baltic Marine Environment Protection Commission (Appendix 1.1). The Helcom recommendation 27-28/2 adopted in 2006 concerning conservation of seals in the Baltic Sea area set out the general management principles for the seal populations. The recommendations goal for Baltic seal populations is a population size that increases until it reaches carrying capacity. However, this recommendation does not account for the Habitats Directive's objective to promote the maintenance of biodiversity while also accounting for economic, social, cultural and regional requirements. In the recommendation, there is no word about either socioeconomic or ecological consequences if the seal populations grow to the end.

In 2006, when the recommendation was adopted, the estimated grey seal population was 26 000 to 34 000, with the assumption that 60–80% of the seals were counted during the census (Appendix

1.3). In the south part of the Baltic Sea, the estimate was between 500 and 700 grey seals. The corresponding figure for ringed seals in the northern Baltic was 5000 to 7000 specimens (ww.rktl.fi).

Today, the grey seal population is estimated to be around 40 000–50 000 seals. Around the same numbers of seals have been counted since 2015. Whether the population has stabilised is not clear, however, as the counts could be density-dependent because of overcrowded haul-outs. However, in the south Baltic, there is a clear increase, with an estimated population of 4 400–5 800 and a yearly increase of 20%. The estimated number of ringed seals in the north Baltic has increased dramatically, currently numbered at over 20 000 individuals (Appendix 1.1). In conclusion, the situation for the largest seal population in the Baltic has changed considerably since 2006.

### The seal-fishery conflict

In parallel with the population increase, the conflict between seals and commercial fisheries has escalated, and many small-scale coastal fisheries have been severely affected. The conflict and its implications on fisheries have been studied in the Baltic, with several scientific and popular scientific reports that describe the seriousness of the conflict for fisheries and local communities (References Appendix 1.2). Seal interactions with people and the ecosystem have three dimensions:

- Direct impact on fisheries, including catch losses and damaged fishing gear due to seal depredation
- Seals' consumption of fish, which affects the fish population
- Spreading parasites harmful to people and fish.

### Direct impact on fisheries

The seal fisheries conflict has been ongoing for decades. Westerberg et al. (2000) estimated the costs of the direct damage of catch loss to be around 3 million euros in Sweden. At this time, there was already substantial scientific support that the increasing seal-fishery conflict threatens the coastal fisheries (References Appendix 1.2) and that protective actions should be taken, such as implementing seal-safe fishing gear and controlling the seal populations. Since then, the grey seal population has especially increased and expanded farther south and in parallel, the conflict has increased and spread to other fisheries. However, in 2014, the Swedish Agency for Marine and Water Management (SwAM) estimated that the cost of direct damage and lost catch in fishing gear due to seal damage exceeded 3 million euros. The constant estimated cost of damages due to seals reflects a severe decreased coastal fishery. In 2017, hidden losses in the cod gillnet fishery in the southern Baltic are estimated to in average five fish lost for each fish found damaged. The fishermen's logbook reports include an estimate of 63% seal damage in cod gillnet fisheries in the southern Baltic in 2017 (Königson et al., 2019). There are fisheries where seal-safe alternatives are available facilitating fishermen sustain their fisheries, however, in many fisheries there are still no alternative seal-safe gear ready to be implemented.

### Seals' consumption of fish affecting the fish population

A comprehensive study of known facts about fish consumption by mammals, birds and people in the Baltic for the year 2012 show that both seals and birds consume large quantities of fish (Appendix

1.3). A recommendation from the study was that predation and human consumption should be carefully considered in ecosystem analyses and stock assessment models. This is particularly true for local coastal fish populations. The impacts of seals on the larger off-shore populations, especially herring and sprat, or even cod, were estimated to be small compared to the fishery (Appendix 1.3). However, as these fish stocks are intensively exploited by the fishery, the additional mortality caused by the growing seal populations also deserve to be accounted for in resource management. However, it is important to note that in the study estimating the impact of seals on cod populations, there were no data on seals consuming cod stocks in the south Baltic. A more recent study on seal diet, show that cod is represented at a significant higher level in the seals' diets in the study area than represented in the data used in the study (Appendix 1.3). The past years' exponential increase in grey seals and the significant decrease in fishing efforts is also not reflected in the study. The latest assessment on the eastern Baltic cod populations shows declining cod stocks and a high natural mortality, resulting in advice to stop all fisheries for cod (Appendix 1.3). We now have to regard the seals' consumption in the management of cod stocks.

#### Spreading parasites harmful to people and fish

Seals are the final host for two parasitic nematodes, the seal worm *Pseudoterranova decipiens* and the liver worm *Contracaecum osculatum*. The seal worm, which has been found in the flesh of cod for several years, has been a known economic problem for the fishing industry, as the landed infected cod is destroyed and sold for a lower price or requires extra labour costs during filleting. With regard to the current poor condition of the cod population in the Baltic, it has been highlighted that the decreasing condition is connected with liver worm infection (Appendix 1.3). There is a need for further studies to investigate all aspects of the parasites' role, but one thing is clear: there is a direct connection with the number seals and the magnitude of the infestation of parasites.

#### Conclusion

These three aspects of the conflict are alarming. There is a correlation between the size of the population and the level of conflict. The seal-fishery conflict is one of the small-scale fisheries' main concerns; it not only affects the fish populations on an ecosystem level and the subjected fisheries but also the local coastal communities and their ability to meet the public demand of access to local fish.

#### Mitigation measures

There is not only one solution for the three aspects of the conflict. Development and implementation of seal-safe fishing gear and deterring techniques are necessary but do not solve the other aspects of the conflict. Therefore, we have listed several solutions that, when used in combination, could fulfil the aim of sustaining a viable small-scale fishery and local coastal communities.

- The ecosystem in the Baltic and our use of the Baltic as important food delivery demands a dramatic change in seal management. The HELCOM seal recommendation should account for both socioeconomic and ecological aspects in seal management as proposed by the Habitats Directive. Aiming to increase our seal population will increase all three aspects of the conflict even more.

- Development and implementation of seal-safe fishing gear or other methods such as scaring devices would decrease the catch loss and damage to fishing gear. There has been a significant effort to develop seal-safe fishing gear, and for some fisheries, there are actual options available. However, since the coastal fisheries in the Baltic affect fisheries with many different target species including pike-perch, herring, trout, salmon, perch, vendace, cod and whitefish, among others, there is a need for further development.
- There is an urgent need to start managing seal populations by hunting to reduce the population increase. The conflict is multifaceted and applies not only to one solution but to many. A general hunt as a complement to seal-safe fishing gears or other mitigation measures is necessary if we want to manage seal populations. At the same time, liberal rules for protective hunting aiming to eliminate seals around fishing gear should be given.
- A more intensive hunt is unfortunately limited by the EU ban on the trade of seal products, preventing the use of seals as a positive resource and making use of seal products. A joint demand from the Baltic states to the EU commission to reduce the restrictions is necessary.

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