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Abstract

Management of fisheries in the Baltic Sea has, apart from its international aspects (being nearly an EU-only sea) has some very specific environmental conditions as an almost landlocked sea. Its scale is large enough to include different stocks of several species, but due to its poor oxygen conditions it has a lower biodiversity than other close by ecosystems, like the North Sea.

The management process in the Baltic Sea includes both effort restriction and closed areas, having delivered some successful results (as in the eastern stock of cod) but with room for improvement in multispecies advice. Fisheries management plans for Natura 2000 areas are also under development. Some uncertainties remain as to the effect of fishing pressure on the stocks through the trophic interactions, where there is scope for development in the science and the delivery of better harvest control rules. In this respect the impact assessment of the cod plan was considered positive, but it also advises the consideration of additional measures such as explicit discard rules and the inclusion of recreational fisheries.

With respect to the management strategies, in addition to better science and measures an effort in simplification and coordination would be needed. This would better match economic and social aspects of the fleet, among others, the need to deal with an increasing complexity of environmental regulation and a decreasing amount of alternative fishing grounds where to operate, due to the wide array of current and planned uses of marine space.
1. Introduction

Management of fisheries in the Baltic Sea has, apart from its international aspects (being nearly an EU-only sea) some very specific environmental conditions as an almost landlocked sea. Its scale is large enough to include different stocks of several species, but due to its poor oxygen conditions and the decreasing salinity from the western to the eastern parts it has a lower biodiversity than other close by ecosystems, like the North Sea.

2. Historical background

The main changes that have occurred in the recent history of the Baltic Sea fisheries management are the disappearance of the International Baltic Sea Fisheries Commission (IBSFC) and the introduction of long term management plans (LTMP).

The International Baltic Sea Fisheries Commission was the management body for fisheries in the Baltic until 2006. It was founded in 1973 in Gdansk, Poland, as one of the first organisation dealing with the common use of marine living resources. The IBSFC was dissolved on 31st December 2006 after nearly all countries around the Baltic Sea joined the EU. The only non EU country in the Baltic Sea is Russia. Therefore, the scope of the Common Fisheries Policy (CFP) was expanded to include the new countries and fisheries management in the Baltic turned to a bilateral relationship between the EU and Russia.

As IBSFC and EU had already cooperated before 2007 many of the main management instruments were already in force like TAC and quota regulations or technical measures. The main change was that now also other instruments of the CFP were put into force like the regulations on the balance between fishing capacity and fishing opportunities, the effort restrictions and the closed areas. Additionally, the new member states were able to receive money under the new European Fisheries Fund for e.g. decommissioning of vessels or funding for the modernisation of fleets and fish processing facilities. As one of the new instruments of the CFP after the reform 2002 a long term management plan for Baltic cod entered into force the 1st of January 2009, while the move to a multi-species long management plan was decided in June 2011. This multispecies management plan would include two different cod stocks (eastern and western stocks) as well as herring and sprat. This plan is not yet adopted but will most likely get into force after the new CFP will be adopted in 2013.

3. Fleets and fisheries

Economic results for the Baltic Sea European fleets for 2010 are presented in the table in the following page.
Table 3.1 Economic results of the Baltic Sea European fleets

<table>
<thead>
<tr>
<th></th>
<th>Baltic Sea Value landed (€ million)</th>
<th>Baltic Sea value as % of total value landed in Area 27</th>
<th>Total income (€ million) in Area 27</th>
<th>Direct subsidies (€ million) in Area 27</th>
<th>Direct subsidies as % of total income in Area 27</th>
<th>Gross value added (GVA) (€ million) in Area 27</th>
<th>Gross value added (GVA) as % of total income in Area 27</th>
<th>Gross profit (€ million) in Area 27</th>
<th>Gross profit as % of total income in Area 27</th>
<th>Net profit (excluding subsidies) (€ million) in Area 27</th>
<th>Net profit (excluding subsidies) as % of total income in Area 27</th>
<th>Crew wage per FTE (€ 1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>17.6</td>
<td>12.5%</td>
<td>145.7</td>
<td>1.3</td>
<td>0.9%</td>
<td>76.2</td>
<td>52.3%</td>
<td>32.7</td>
<td>22.4%</td>
<td>18.9</td>
<td>13.0%</td>
<td>26.7</td>
</tr>
<tr>
<td>Denmark</td>
<td>42.3</td>
<td>11.2%</td>
<td>404.7</td>
<td>0.1</td>
<td>0%</td>
<td>267</td>
<td>66%</td>
<td>147.4</td>
<td>36.4%</td>
<td>58.8</td>
<td>14.5%</td>
<td>43.7</td>
</tr>
<tr>
<td>Estonia</td>
<td>13.1</td>
<td>100%</td>
<td>15.1</td>
<td>2</td>
<td>13.6%</td>
<td>7.3</td>
<td>48.4%</td>
<td>2.7</td>
<td>18%</td>
<td>0.5</td>
<td>3%</td>
<td>8.7</td>
</tr>
<tr>
<td>Finland</td>
<td>26.6</td>
<td>100%</td>
<td>31.6</td>
<td>1.5</td>
<td>4.6%</td>
<td>12.2</td>
<td>38.7%</td>
<td>2.5</td>
<td>7.9%</td>
<td>-1.6</td>
<td>5.2%</td>
<td>10.2</td>
</tr>
<tr>
<td>Lithuania</td>
<td>6.1</td>
<td>89.5%</td>
<td>7.3</td>
<td>0.1</td>
<td>1.4%</td>
<td>2.1</td>
<td>28.8%</td>
<td>0.9</td>
<td>12.9%</td>
<td>0.4</td>
<td>5%</td>
<td>5.3</td>
</tr>
<tr>
<td>Latvia</td>
<td>21</td>
<td>100%</td>
<td>21.9</td>
<td>0</td>
<td>0%</td>
<td>11.5</td>
<td>52.4%</td>
<td>8.2</td>
<td>37.6%</td>
<td>1.6</td>
<td>7.1%</td>
<td>6.2</td>
</tr>
<tr>
<td>Poland</td>
<td>40</td>
<td>100%</td>
<td>55</td>
<td>14.8</td>
<td>27%</td>
<td>21.8</td>
<td>39.6%</td>
<td>10.4</td>
<td>18.9%</td>
<td>6.2</td>
<td>11.2%</td>
<td>9</td>
</tr>
<tr>
<td>Sweden</td>
<td>46.7</td>
<td>45.2%</td>
<td>142.3</td>
<td>0</td>
<td>0%</td>
<td>72.7</td>
<td>51.1%</td>
<td>44.7</td>
<td>31.4%</td>
<td>3</td>
<td>2.1%</td>
<td>13.8</td>
</tr>
</tbody>
</table>

Source: Annual Economic Report 2012

Due to the characteristics of the data collection framework (DCF) economic data is gathered in an aggregated way for the Baltic, North Sea and North East Atlantic areas. When looking at Member States, this is an issue for Denmark, Germany, and Sweden, where the value of landings from the Baltic Sea accounts for 11.2%, 12.5% and 45.2% of their total value of landings from the Baltic. Disaggregated figures for value of landings for the Baltic only refer highest values for Sweden (46.7 million euro), Denmark (42.3 million euro respectively) and Poland (40 mill. euro) followed by Finland (26.6 mill. euro). For the countries whose fleets operate mostly in the Baltic Sea, direct subsidies are highest in Poland (27% of total income), followed by Estonia (13.6%) and Finland (4.6%). Gross value added is greatest for Poland (21.8 mill. euro) followed by Finland (12.2 mill. euro) and Latvia (11.5 mill euro). It is difficult to make meaningful conclusions about particular gears at the European level, as only the fleets categorised as “polyvalent gear” make more than 50% of their value of landings in the Baltic.

Regarding the fleet characteristics, Latvia, Estonia and Finland present values in the same range for average horse power (52.3, 46.9 and 34.6 respectively in 2010), with Poland and the countries that also fish in other areas presenting higher values (from 92.2 for Denmark to 138.7 in Sweden). The comparatively higher values of Lithuania can be partially explained by those vessels catching approximately 10% of the national landings in non EU waters. Average horse power of vessels per country (in kW) is presented in the table below:
Table 3.2 Average horse power of vessels

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>100,6</td>
<td>96,6</td>
<td>92,2</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Estonia</td>
<td>52,2</td>
<td>47,7</td>
<td>46,9</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Finland</td>
<td>53,5</td>
<td>54,0</td>
<td>52,3</td>
<td>51,4</td>
<td>50,6</td>
</tr>
<tr>
<td>Germany</td>
<td>86,0</td>
<td>85,7</td>
<td>91,4</td>
<td>95,1</td>
<td>94,4</td>
</tr>
<tr>
<td>Latvia</td>
<td>39,9</td>
<td>40,2</td>
<td>34,6</td>
<td>33,6</td>
<td>34,6</td>
</tr>
<tr>
<td>Lithuania</td>
<td>267,2</td>
<td>267,6</td>
<td>299,0</td>
<td>318,1</td>
<td>n/a</td>
</tr>
<tr>
<td>Poland</td>
<td>123,0</td>
<td>121,3</td>
<td>111,4</td>
<td>109,4</td>
<td>104,9</td>
</tr>
<tr>
<td>Sweden</td>
<td>140,8</td>
<td>141,3</td>
<td>138,7</td>
<td>131,1</td>
<td>124,2</td>
</tr>
</tbody>
</table>

Source: Annual Economic Report 2012

There were twelve different gears distributed over 32 fleet segments operating in the Baltic Sea area in 2010. The most important gears in terms of value landed are demersal and pelagic trawlers. The most common target species include sprat (238000 mT.), herring (228000 mT.), cod (60000 mT.) and flounder (14 000 mT.)

In terms of harvested stocks, cod is considered to form two different stocks, one in the Eastern Baltic and another one in the western part. With respect to herring there are also different herring stocks, the main one being in the eastern basin and others in the Gulf of Bothnia, the Gulf of Riga and the Western Baltic. The stock of sprat is mainly situated in the Eastern Baltic. It is therefore important from a management perspective to take into account that many of these stocks overlap in their spatial distribution.

Key ecosystem considerations include the fact that cod predates on sprat and herring (the latter to a lesser extent) as well as the predation of herring and partially also sprat on the eggs of cod. Ecosystem modelling has taken place inside the project FishSTERN.

As the Baltic Sea is a brackish water ecosystem with a salinity gradient from west to east many fresh water species as for example trout or perch are also part of the fish community. Especially the small scale fishing vessels are targeting these species together with herring, sprat or cod. As the fisheries

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1. Impact Assessment of Baltic cod multi-annual plans (STECF 11-05). Edited by John Simmonds
on these species are not regulated via a TAC or quota regulation the total amounts of catches are not clear. However, especially for the coastal fleets it is obvious that they are dependent species not regulated by quotas.

4. Management processes

4.1 Science

Scientific bodies specific to the Baltic include the BONUS3 programme and the Helsinki Commission (HELCOM4), both related to environment and fisheries in the Baltic Sea. Overall international bodies delivering advice for fisheries management include the International Council for the Exploration of the Sea (ICES) and the Scientific, Technical and Economic Committee for Fisheries (STECF, at European level).

At national level some relevant advice giving institutions are the Swedish Board of Fisheries (Sweden), the Finnish Game and Fisheries Institute (Finland), the Estonian Marine Institute (Estonia), the Thünen Sea Fisheries and Baltic Sea institutes (Germany), the Lithuanian Institute for Agrarian Economics (Lithuania), the Sea Fisheries Institute (Poland), the National Institute of Aquatic Resources – DTU-Aqua (Denmark) and the Institute of Food and Resource Economics, University of Copenhagen.

The biological advice process is organized through gathering of scientists throughout the year at different ICES meetings, which are then sometimes used in specific STECF expert working groups on advice. The STECF expert working groups also address other issues such as economic and social considerations which are not a part of the ICES advice. The results of the STECF working groups are then discussed at the STECF plenaries, that meet three times a year, giving rise to the STECF advice on, among others, reference points for the stock, recommended mesh sizes, and economic or social impact assessment and.). The advice takes the form of public reports available on the STECF website. The following diagram from the STECF website clearly explains the advice giving process:

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3 Decision No 862/2010/EU of the European Parliament and of the Council of 22 September 2010 on the participation of the Union in a Joint Baltic Sea Research and Development Programme (BONUS) undertaken by several Member States.

Diagram 4.1 Advice giving process from the STECF.


4.2 Operational policy

The connection between science and stakeholders regarding the Baltic Sea takes place at different levels, from STECF meetings to Regional Advisory Committee meetings (RACS) and research projects.

At STECF meetings stakeholders are invited as observers. RAC meetings also have the possibility of having scientists as observers. The communication between the European Commission, scientists involved in the STECF and stakeholder representatives is also assured through multilateral meetings throughout the year.

Several European research projects include stakeholder involvement at different levels, including among others RAC representatives, producer organizations and fishermen. Examples of such projects are the 7th Framework programme funded (FP7) VECTORS, SOCIOEC or MYFISH.

4.3 Decision-making

After the disappearance of the International Baltic Sea Fisheries Commission the management process in the Baltic Sea takes place either within the CFP framework or through the agreement between the EU and Russia. For cases where Russia is involved, the European Community and the Russian Federation signed the “Agreement on cooperation in fisheries and the conservation of the living marine resources in the Baltic Sea” on the 28th of May 2009. The agreement entered (provisionally) into force the day it was signed and has a duration of six years, renewing automatically in periods of 3 years unless one of the parties decides to suspend it and communicates its decision nine months in advance. The agreement also constituted a joint committee to observe its functioning.

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fulfillment by the contracting parties. The Helsinki Commission also includes Russia, and its aim is to coordinate, give recommendations and supervise initiatives regarding environmental issues in the Baltic. Inside the EU, the decisions are taken between the European Commission and the European Parliament as illustrated by diagram 4.2.


(Last accessed January 30th 2013)

### 5. Management objectives and principles

Overall in Europe, the objective for fisheries management is expressed in the proposal for a basic regulation as “The CFP shall ensure that fishing and aquaculture activities provide long-term sustainable environmental, economic and social conditions and contribute to the availability of food supplies.” The proposal further mentions the precautionary approach and ecosystem based management as guiding principles for fisheries management. Another relevant regulation at EU level, the Marine Strategy Framework Directive (MSFD) states its objective in its article 1.3 as being “enabling the sustainable use of marine goods and services by present and future generations”

At the scale of the Baltic Sea, the agreement between Russia and the EU a similar objective mentions in its article 4.2: “ensuring that the exploitation of the straddling, associated and dependent stocks in the Baltic Sea provides sustainable economic, environmental and social conditions.” Additional
principles mentioned in the agreement are the close cooperation between the two parties to achieve equitable and mutual benefit through management of stocks, the use of the best scientific advice and the application of the precautionary and ecosystem based management approaches. From the Baltic cod multiannual management plan the objectives also coincide, being “to ensure that Baltic cod stocks can be exploited under sustainable economic, environmental and social conditions”.

For specific countries, as Germany, particular objectives apply. For example the objective of the fisheries policy of the Federal Ministry for Nutrition, Agriculture, and Consumer Protection is to manage the stocks sustainably, to fight illegal fishing effectively and a proper labelling for consumers.

6. Management strategies

In the Baltic Sea areas the usual management measures of the CFP apply (namely TAC and quotas) for the species of highest commercial interest. In addition to this there are the various technical measures in regulation 2187/2005, which has been regularly updated and the long term cod management plan. The technical regulation includes minimum mesh sizes and landing sizes, as well as particular measures for some gears as for example the prohibition of trawling in the Gulf of Riga. The target from the cod long term management plan sets fishing mortality at 0,6 for ages 3 to 6 years for the cod stock in ICES subdivisions 22 to 24 (Western Baltic) and 0,3 for ages 4 to 7 years for the cod stock in ICES subdivision 25 to 32 (Eastern Baltic). The harvest control rule is based on TACs set at 10% yearly reduction of fishing mortality, and includes lower and upper bounds of 15% of reduction of TAC from one year to the next. However, if the fishing mortality reaches a value of the 15% upper bound of TAC reduction would not apply.

For the pelagic species no long term management plan is currently into force, and ICES advice uses the overall management objectives of the CFP: precautionary approach and MSY.

7. Management tools

7.1 Conservation measures

The cod long term management applies effort restrictions during closed seasons in April for the Eastern Baltic and July and August for the Central Baltic, in relation to some specific gears and mesh sizes: trawls, Danish seines or similar gear (mesh size equal to or larger than 90 mm), gillnets, entangling nets or trammel nets (mesh size equal to or larger than 90 mm), bottom set lines and longlines.

Outside the closed seasons some effort restrictions also apply in different areas. In 2013 the Total Allowable Effort (TAE) in ICES Subdivisions 22-24 corresponds to 163 days absent from port and in ICES Subdivisions 25-28, 160 days (Council Regulation 1088/2012). When a vessel fishes in both areas the total number of days shall not exceed the maximum allowed in any of the areas. A certain amount of days at sea is allowed to be exchanged among the vessels under the effort restrictions.

6 International Council for the Exploration of the Sea.
However, two conditions must be fulfilled for such an exchange to take place. The first condition is that the donor vessel is larger than the receiver. The second condition is that the number of receiving vessels does not exceed 15% of the total number of vessels under the effort restrictions.

Area closures apply to most gears on selected areas (mainly around the Bornholm island) from 1st May to 31st October. The aim of the closed areas is to protect spawning grounds for cod. A specific effect of closed areas of special interest to the Baltic Sea would be the protection of juveniles from early maturation (Miethe 2010), especially in the case of cod, by allowing local adaptation in their maturation strategy. In the particular case of the Baltic Sea cod, another relevant aspect to consider when aiming at protecting the stock is that recruitment has also been said to depend on other factors than SSB, such as the hydrophysical conditions of water allowing the survival of eggs and the development of larvae (Bastardie et al 2009).

The effects of MPAs are different depending on the mobility of the species, with best results obtained when protecting sedentary species or feeding grounds of anadromous species as salmon (Miethe 2011). Several other aspects of MPAs relevant to the Baltic Sea remain to be studied, some examples are the multispecies interactions, including those with herring regarding cod egg predation as well as competition for feeding on zooplankton (Blencker et al. 2011). In addition to these, the effects of spawning closures on protection of large, fecund females, and possible effort reallocation effects on sensitive nursery areas are other potential aspects regarding MPA success in the Baltic (Kraus et al 2009).

Administrative measures include the establishment of designated ports where catches of more than 750 kilograms of cod have to be landed, including the publication of the list of such designated ports. A landing declaration must be filled in by masters of vessels of more than 8 metres when fish is transported to a place other than its place of landing, and it is forbidden to operate in more than one area (considered as western, central or eastern Baltic) during the same fishing trip. Additionally, scales for weighting cod in designated ports before it can be transported elsewhere shall be approved by the member states.

There have been decommissioning schemes, for example in the German fleets, which could potentially have lead to a further decrease in the number of vessels due to the introduction of the cod management plan.

### 7.2 Access regulations

According to the cod multiannual plan (chapter 4 article 1), all Community vessels having a length of eight metres or above carrying on board or using any gears for cod fishing in the Baltic Sea must hold a special permit for fishing for cod in the Baltic Sea. While the multiannual plan and, in a wider scale the CFP are the main regulatory framework for most countries in the Baltic Sea, the allocation of the national quota is still a responsibility of the national governments. Most member states apply individual rights in various form in the Baltic Sea. Table 7.2.1 gives an overview of the implementation of individual fishing rights for the EU member states around the Baltic Sea, for both larger vessels and coastal areas.
<table>
<thead>
<tr>
<th>Countries</th>
<th>Year</th>
<th>IQ</th>
<th>ITQ</th>
<th>Capacity/entry lim.</th>
<th>Comments for large vessels</th>
<th>Comments for coastal fisheries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>2000-2009</td>
<td>X</td>
<td>(X)</td>
<td>X</td>
<td>ITQ stepwise since 2003 (from open access through setting of quota) Newcomers can obtain specific extra allocation of quota.</td>
<td>Special regulations for small-scale fishermen (&lt;17m, normally one day trips, etc.). Quota may be bought only from larger vessels to prevent concentration.</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>after 2010</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>2000-2009</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Better transferability of IQs may be possible in the future. At present fishermen may lose their IQs if they are not used and IQs are then given to another fisherman.</td>
<td>Effort limitations apply, as length of gillnets, number of trapnets and hooks.</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>after 2010</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>2000-2009</td>
<td>X</td>
<td></td>
<td>X</td>
<td>ITQ for pelagic fisheries (2010), Effort limits in western waters/Baltic Sea, Two week cod quota (vessel length/gear type), kw days tradable.</td>
<td>Closed areas apply for certain fishing methods in coastal waters.</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>after 2010</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>2000-2009</td>
<td>X</td>
<td></td>
<td></td>
<td>Open cod quota for coastal vessels and for pelagic species in general, limited ITQ (can be swapped but not sold) in cod fishery, Heavy reduction in no. of vessels in 2009.</td>
<td>No quotas apply for coastal waters</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>after 2010</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithuania</td>
<td>2000-2009</td>
<td>X</td>
<td>(X)</td>
<td></td>
<td>Herring and sprat have open quota because of under-utilization.</td>
<td>Quota is allocated from records based on a 3 year period. 5% of quota is allocated to coastal fisheries. Special permit for coastal fisheries. Quota may be auctioned.</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>after 2010</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estonia</td>
<td>2000-2009</td>
<td>X</td>
<td></td>
<td></td>
<td>Generally ITQ now</td>
<td>Regulation specific to coastal waters</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>after 2010</td>
<td>X</td>
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<tr>
<td>Finland</td>
<td>2000-2009</td>
<td>X</td>
<td></td>
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<td>No IQ or ITQ in the fisheries in the open Baltic Sea</td>
<td>Permit for certain areas (including property rights for these areas)</td>
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</tbody>
</table>

Tables 7.2.1 Catch allocation mechanisms for large scale and coastal fisheries  **Source: adapted from Blenckner et a. 2011**
Every country around the Baltic Sea has special measures adopted for their fleets inside the territorial waters. In Germany the fishermen fishing in the areas which are of main interest for the SOCIOEC project have to have a special license which they can typically receive after a three-year training as fisherman. For larger vessels using mobile gear fishermen receive an individual quota for regulated target species from the BLE (German Agency for Agriculture and Nutrition) or their cooperative receives it. Smaller vessels using static gear need also a special allowance to fish with that gear in certain areas. In most cases the total length of gill nets or the number of trap nets is fixed for each individual fisherman. Historically fishing rights were linked with the regional provinces and especially in former eastern Germany the regional states still regulates the fisheries inside the territorial waters. In Denmark there are restrictions as to how much quota can be handled by one vessel and owner, including different percentages of the total quota for a species in an area. For example, a vessel can only have a maximum of 10% of the national annual quota for cod and 5% for plaice in the Baltic Sea within a year.

In order to declare areas of conservation or species of special interest under the Natura 2000 framework, each member state often needs to assess whether additional fisheries management measures are needed for the area. Some suggestions are gear substitution, gear modification and temporal and spatial zoning (Pedersen et al. 2008). The European Commission then needs to evaluate this fisheries management measures requests, and does it under scientific consultation (see for example effort distribution of different gears in the annex) and other stakeholder consultation, especially with the RACs8. In addition to this, the member state has to provide for monitoring and control measures for these fisheries management measures in the Natura 2000 areas. As an example, fisheries management measures in relation to Natura 200 areas has been proposed by the German government in addition to the closed areas in the cod management plan. A summary of the proposed measures can be seen in Table 7.2.3 on the next page.

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8 European Commission, Fisheries measures for marine Natura 2000 sites.
<table>
<thead>
<tr>
<th>Reefs</th>
<th>Sandbanks</th>
<th>Harbour porpoise</th>
<th>Sea birds</th>
</tr>
</thead>
</table>
| Fehrmarnn belt       | 1. Exclusion of fisheries with mobile bottom-contacting gear in sandbanks and reef areas | 1. Exclusion of fisheries with mobile bottom-contacting gear in sandbanks and reef areas | 2a : Year-round exclusion of fisheries with gillnets and entangling nets in the entire area (BfN)  
2b : Year-round use of pingers in all gillnets and entangling nets irrespectively of vessel size. (vTI) |
| Kadetrinne           | 1. Exclusion of fisheries with mobile bottom-contacting gear in sandbanks and reef areas | 2a : Year-round exclusion of fisheries with gillnets and entangling nets in the entire area (BfN)  
2b : Year-round use of pingers in all gillnets and entangling nets irrespectively of vessel size. (vTI) |
| Western Rönne bank  | 1. Exclusion of fisheries with mobile bottom-contacting gear in sandbanks and reef areas | 2a : Year-round exclusion of fisheries with gillnets and entangling nets in the entire area (BfN)  
2b : Year-round use of pingers in all gillnets and entangling nets irrespectively of vessel size. (vTI) |
| Adlergrund           | 1. Exclusion of fisheries with mobile bottom-contacting gear in sandbanks and reef areas | 1. Exclusion of fisheries with mobile bottom-contacting gear in sandbanks and reef areas | 2a : Year-round exclusion of fisheries with gillnets and entangling nets in the entire area (BfN)  
2b : Year-round use of pingers in all gillnets and entangling nets irrespectively of vessel size. (vTI) |
| Pomeranian Bight with Odra Bank | 1. Exclusion of fisheries with mobile bottom-contacting gear in sandbanks and reef areas | 2a : Year-round exclusion of fisheries with gillnets and entangling nets in the entire area (BfN)  
2b : Year-round use of pingers in all gillnets and entangling nets irrespectively of vessel size. (vTI) |
| Pomeranian Bay Nature Conservation Area | 1. Exclusion of fisheries with mobile bottom-contacting gear in sandbanks and reef areas | 1 : Spatially differentiated year-round and seasonal exclusion of fisheries with gillnets and entangling nets Area 1 (Odra Bank) Year-round closure Area 2 (Adlergrund) Seasonal closure (Nov-April) |

Source: Proposed measures for fisheries management in Natura 2000 sites in the German EEZ of the North Sea and the Baltic Sea, 2011.
7.3 Compliance monitoring measures

The Member States must control and enforce that the effort restrictions and the area closures are complied with. Any vessel operating in the Baltic Sea with the gears considered in the regulation of the multiannual cod plan must transmit an effort report to the Fisheries Monitoring Centre (FMC) when entering or exiting the Baltic Sea area. Vessels with vessel monitoring system (VMS) shall have their information cross checked with the logbook data and store it in electronic format for at least three years.

The multiannual cod plan defines the requirements for National action control plans to be designed by each country, which include among others inspections in ports, in markets, on board and from the air. Inspection levels include for example 20% of the cod landed and 5% of cod sold at the auction.

8. Management performances

8.1 Conservation

In overall terms, the spawning stock of biomass (SSB) in the Baltic has remained relatively unchanged, fluctuating between 2 and 2.5 million tonnes. The composition of the spawning biomass has experienced changes, for example from high values of pelagic stocks in the 1970’s to a dominance of higher values of cod in the next decade, decreasing until 1990 (this can be traced by the evolution of landings). Another more recent evolution is the increase in the stock of sprat together with lower levels of cod in 1997-1998, with finally limited increases in the total SSB from increases in western cod and herring in the Bothnian Sea.

As indicative of the evolution of its biomass, the Baltic has delivered fish in a scale between 150000 tonnes in the early 1950’s to 1000000 tonnes in a peak in the mid 1990’s, staying mostly within a range between 600000 and 900000 tonnes since the late 1960’s. Most of the landings correspond to the seven species assessed by ICES (herring, cod, sprat, flounder, plaice, turbot and dab) with a wide variety of non assessed species adding up to around 60000 tonnes at the most. The evolution of the main species, with cod and herring decreasing since the 1980’s and a marked peak for sprat in the late nineties can be seen in figure 8.1. The trend for the non assessed species was increasing since 1980 until it reached a peak around 2002 and then by 2010 it had decreased to levels seen in the 1950’s; the evolution of the non assessed species can be seen in figure 8.2.
Figure 8.1 Annual landings (tonnes) of species assessed by ICES

Source: STECF report on Ecosystem Approach to Fisheries Management (EAFM) 2012, with data from the ICES Statlant data base.

Figure 8.2 Annual landings (tonnes) of species not assessed by ICES

Source: STECF report on Ecosystem Approach to Fisheries Management (EAFM) 2012, with data from the ICES Statlant data base.
The current fishing mortality has been assessed by ICES by means of estimators of the precautionary approach (both fishing mortality, $F_{pa}$, and biomass, $B_{pa}$) and the maximum sustainable yield ($F_{MSY}$) for three stocks: herring in the Bothnian Sea and in the Gulf of Riga as well as western cod. For the three stocks the biomass is above the reference point for the precautionary approach, but only the herring stock in the Bothnian Sea is well inside the safety limits for all indicators, as for the western cod and Gulf of Riga stocks the fishing mortality goes beyond the $F_{pa}$ reference point. Considering the evolution across time, the stocks have remained in acceptable levels regarding biomass but on the other hand safe levels in fishing mortality have been an exception (during five years before 1995) only to increase rapidly and go beyond the $F_{pa}$ limit in 1997. In recent years fishing mortality has fluctuated between $F_{MSY}$ and $F_{pa}$.

Habitat degradation (considering the environment for fisheries) occurs in the Baltic as a natural phenomenon involving both hydrological and chemical conditions, that are then influenced by anthropogenic eutrophication. The hydrological conditions, mainly low levels of temperature and North Atlantic Oscillation (NAO), evolved significantly towards higher levels in 1989, resulting in positive condition for fisheries. Phosphate and silicate levels moved from values representing favourable chemical conditions in the mid 1980’s to lower values between 1987 and 1990 and back to favourable, higher values between 2001 and 2009.

Due to the particular topographic conditions of the Baltic Sea, characterized by deep basins and shallow sills there are deep areas where the amount of oxygen is limited by the inflow from the North Sea and the lack of vertical mixing in the water columns, with differentiated salt and fresh water strata. This phenomenon complicates the feeding and spawning of cod, among others, especially in the Gotland Deep and the Gdansk basin. Together with anthropogenic eutrophication from the coast and low spawning stock biomass due to fishing this natural conditions influence negatively the evolution of fishing stocks in the Baltic Sea. Nevertheless, the HELCOM regulations and the multiannual cod plan have improved the situation.

Particular habitats that are more sensitive to fisheries are reefs and sandbanks in the southern Baltic Sea, protected by the European Habitats Directive. The shallower areas are dominated by short lived benthic species, while the deeper areas give shelter to longer lived benthic species. The impact of fishing on these species and the sediments is expected to be lower than that in the North Sea, considering that the vessels operating in the Baltic Sea are smaller and with lower horsepower.

Additional negative effects related to fisheries in the Baltic Sea include the bycatch of seabirds and harbour porpoises. The bycatch of seabirds is an environmental issue for the gillnet fishery, with attempts to reduce it by the use of management measures such as temporary area closures at seasons when gillnets and seabirds coincide. Additional management measures being considered are the reduction on the number and/ or the height of gillnets. The use of dissuasion devices (pingers) is under research with the purpose of avoiding harbour porpoises being entangled in a gillnet. Areas

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9 STECF report on Ecosystem Approach to Fisheries Management (EAFM) 2012
10 Wege zu einer natur-und ökosystemverträglichen Fischerei am Beispiel ausgewählter Gebiete der Ostsee. Döring et al 2005
11 Peter Breckling „Grün und Rot ist des Fischern Tod“ Minister Habeck plant existenzgefährdende Beschränkungen für Nord-und Ostseeküste“ Fischerblatt 12, 2012
closures for fisheries can potentially occur for these reasons in environmentally protected areas. The management plan for Natura 2000 sites is still under discussion but foreseen measures could include the closure of areas in the western Baltic Sea for the gillnets with the aim to preserve the population of harbor porpoises. A map of the Baltic Sea protected areas under Natura 2000 and HELCOM Baltic Sea Protected Areas (BSPA) can be seen in figure 8.3 below.

Figure 8.3 Baltic Sea protected areas of the Helsinki Convention

Source: Bundesamt für Naturschutz (BfN) website (Last access 12nd February 2013)

8.2 Economics

The economic evolution of the fishing sector can be traced using the latest data available which corresponds to 2008 and 2009, the latest complete figures under the Data Collection Framework (DCF). In the Baltic two clear patterns appear, with larger vessels as demersal and pelagic trawlers obtaining lower profits (though sometimes with high income) and smaller vessels as gillnets and polyvalent gears with higher profitability. The volume of income seemed not to be decisive, as segments with similar income levels, such as vessels using polyvalent gears and demersal trawlers, can have very different profit patterns. Altogether the sector yields a pictures of lower profits but
slightly higher income and higher cash flow (GCF) and gross value added (GVA).

The available data on economics of the fleets operating in the Baltic Sea has been plotted with respect to 2008 and 2009, the years for which there is best data available (Data collection framework) and with the caveats mentioned above on fleets operating both in the North and Baltic seas (see section 3.1).

![Figure 8.4 Evolution of economic performance of Baltic fleets.](image)


8.3 Social aspects

The analysis of social aspects of fisheries in the Baltic shows a picture of decreasing crews per vessels, with an increase in seasonality (more people to cover the work of one full time equivalent, or FTE). However, these quantitative measures must be considered with caution in the case of demersal trawlers, as total effort is lower in comparison to the North Sea and this distorts the figures for both FTE and related indicators.

A proxy for remuneration has been considered to be the landings value per FTE, given that in the Baltic the income of the crew is mainly based on crew share. This indicator shows a positive evolution
in all segments, but again it can only be considered an approximation.

Figure 8.5 Evolution of social aspects of the main Baltic Sea fleet segments


9. Conclusions

Management in the Baltic Sea has delivered some successful results (as in the eastern stock of cod) but there is still room for improvement in multispecies advice. Some uncertainties remain as to the effect of fishing pressure on the stocks through the trophic interactions, where there is scope for development in the science and the delivery of better harvest control rules. In this respect the impact assessment of the cod plan was considered positive, but it advises the consideration of additional measures such as explicit discard rules and the inclusion of recreational fisheries.

With respect to the management strategies, in addition to better science and measures an effort in simplification and coordination would be needed in order to better match economic and social aspects of the fleet, that is, among others, the need to deal with an increasing complexity of environmental regulation and a decreasing amount of alternative fishing grounds where to operate, due to the wide array of current and planned uses of marine space.

10. References

Agreement between the European Community and the Government of the Russian Federation on cooperation in fisheries and the conservation of the living marine resources in the Baltic Sea. L 129/2


Council Regulation (EU) No 1088/2012 of 20 November 2012 fixing for 2013 the fishing opportunities for certain fish stocks and groups of fish stocks applicable in the Baltic Sea.


Scientific, Technical and Economic Committee for Fisheries (STECF) - The 2012 Annual Economic


Annex:

Evolution of fishing effort distribution in the Baltic

Figure A.1 Spatial distribution of effective effort (trawled hours) of regulated otter trawls (r-OTTER) for the period 2003-2011. There was no data reported on the spatial distribution from Finland.
Figure A.2 Spatial distribution of effective effort (fishing hours) of regulated gill nets (r-Gill) for the period 2003-2011. There was no data reported on the spatial distribution from Finland.
Figure A.3 Spatial distribution of effective effort (fishing hours) of pelagic trawls for the period 2003-2011. There was no data reported on the spatial distribution from Finland.