Document title	Review of synopses on potential new actions for the updated BSAP
Code	3-6
Category	CMNT
Agenda Item	3 – Implementation and update of the Baltic Sea Action Plan
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Submitted by	Secretariat

Background

To support the selection of new measures and actions for the updated Baltic Sea Action Plan, an invitation to submit synopses on potential new HELCOM actions was put forward in spring 2019 with an indicative closing date by end of 2019. HELCOM 40-2019 agreed that such synopses could be submitted by the Contracting Parties, HELCOM subsidiary bodies, international projects and HELCOM Observers

The preparation of synopses has followed a common template with the aim to summarize information on proposed new actions in a format that can be used as background information for Working Group meetings and BSAP UP workshops. The template also requires data and information on the effect of proposed measures so that their contribution to reaching good status can be estimated as part of the analysis of sufficiency of measures. References to scientific articles, project deliverables and/or reports has also been requested to justify the proposals. Annex 1 includes the template and guidance that have been given for preparing synopses.

According to the workplan for the BSAP update, Working Groups are to review the synopses in the preparation for the BSAP workshops that will be held in May 2020 (see separate meeting document). This document includes the submitted synopses related to the Fish Group. It should be noted that some of the synopses are overlapping with the mandate of other HELCOM Groups, notably State and Conservation. Both Groups will consider these synopses and the BSAP UP workshop to be held 26-28 May 2020 gives an opportunity to discuss them jointly. Common guidance for the review will be submitted at a later stage.

Action requested

The Meeting is invited to consider the information and undertake a technical review of the synopses based on the common guidance.

Overview of proposals

An overview of proposals relevant for the Fish Group are set out in the table below. The full text of each proposal is available further below and can be reached by clicking the titles in the table. Some of the synopses also fall under the mandate of other HELCOM Working Groups. Proposals with titles in **bold text** are under the main responsibility of the Fish Group.

Title	Submitted by	Considered also by Working Group
A set of 7 measures for coastal fish: 1) Restoration of coastal spawning habitats 2) Restoration of lost stony reefs 3) Enhanced protection of coastal fish habitats **4) Establishment of no-take areas** **5) Seasonal closures** **6) Catch regulations** 7) Follow-up and knowledge sharing	SLU Aqua, Sweden	State&Conservation
Agree to collect fisheries data on both large and small-scale vessels	BirdLife, Thurid Otto (FISH)	
Analysis of pressures affecting fish stocks	Denmark	
Ban on import and sale of metallic lead in fishing equipment	Denmark	Pressure
Collect representative data on by-catch of birds, mammals and non-targeted fish species on species level	JWG Birds	State&Conservation
Development of national and regional ALDFG mitigation policy papers and recommendations on how to approach ALDFG problem in the Baltic Sea in a systemic way.	WWF Poland	Pressure
Development of strategies for preventing fishing gear loss in the Baltic Sea by analyzing the fishing strategic context and available options for fishing gear marking	WWF Poland	
Ensure effective implementation of the Landing Obligation (LO) as required by Common Fisheries Policy (CFP)	WWF Poland	
Establishment of a regionally agreed method for assessing in what ways loss and disturbance is causing negative effects on the marine environment.	CCB	State&Conservation, Pressure
Guidelines and regulation of the design and use of acoustic deterrent devices	HELCOM EN-Noise	Pressure, State&Conservation
Integration of work regarding mapping of ALDFG host areas and hot spots in the Baltic Sea region, based on the results of mapping activities held within national and international initiatives	WWF Poland	Pressure
Mandatory use of Acoustic Deterrent Devices or other effective mitigation measures to minimize bycatch of the Baltic Sea harbour porpoise (*Phocoena phocoena*)	CCB	State&Conservation
Phase out all recreational fishing on eel by 2022	CCB	State&Conservation

Prioritising mitigation measures in rivers for eel and other fish migration	CCB	State&Conservation
Restocking of marine areas with fry of European Eel (Anguilla anguilla)	National Marine Fisheries Research Institute in Gdynia (Poland).	

Title: A set of measures for coastal fish

Submitted by:

SLU Aqua, Swedish University of Agricultural Sciences, Sweden

This document contains eight tables, which are to be considered together. The first table gives a general overview, and the tables further down give more details on individual measures.
The document is submitted by the Swedish University of Agricultural Sciences, Department of Aquatic Resources (SLU Aqua). The text is provided by Lena Bergström (lead of SOM-Fish) together with Jens Olsson (Chair of Helcom Fish Pro III), Patrik Kraufvelin (HELCOM ACTION project), as well as Ulf Bergström and Stefan Larsson (Researchers on fish ecology and experts on environmental monitoring and assessment concerning nationally managed fish species, spatial planning and conservation).

Description of measure

To restore coastal fish communities, measures can aim to either support fish production (recruitment and/or growth) or reduce mortality. However, cumulative pressures typically impact coastal areas and different sets of pressures may predominate in different sub-areas. Based on species presence and locally identified need of measures, different actions may be advisable. Hence, for improving and sustaining the status of coastal fish in the Baltic Sea, a set of measures is suggested:

1) Restoration of coastal spawning habitats
2) Restoration of lost stony reefs
3) Enhanced protection of coastal fish habitats
4) Establishment of no-take areas
5) Seasonal closures
6) Catch regulations
7) Follow-up and knowledge sharing

A set of measures is advocated to facilitate synergistic effects, and take into account the presence of cumulative pressures and impacts on fish. The set allows for adapting to the local situation by focusing in each specific area on those measures that are most likely to be effective there. Implementing more than one of the measures in each area is advocated, as they are expected to enhance each other giving increased overall efficiency.

The measures included in the set are presented individually in tables below.

Activity:

(Various) see tables below for details on each of the measures

Pressure:

(Various) see tables below for details on each of the measures

State:

Fish – Coastal fish communities

Extent of impact:

(Various) see tables below for details on each of the measures

The status of coastal fish communities is assessed at HELCOM spatial assessment unit level 3. However, variation can be expected within each spatial assessment unit, concerning both status and the identity of the predominating pressures. Local environmental conditions, including prevailing pressures and future risks related to climate change, should be considered when identifying the most suitable combination of measures in a certain area.

Declines of piscivores and of large fish are associated with particularly high impacts. A decline of large fish is connected to a long-term lowered productivity and reproductive capacity of the populations, but a decline of large predatory fish is also connected to a reduced capacity for ecosystem services at sea (HELCOM 2018). One role that predatory fish fill in the ecosystem is to regulate the abundance of ephemeral species, which are otherwise attributed to poor environmental status and weakened food web stability. For example, the extraction of large predatory fish may contribute to predatory release that benefits smaller species of fish and ephemeral algae, enhancing symptoms of eutrophication (Bergström et al. 2016, Östman et al. 2016).

Effectiveness of measure

Based on a review conducted by HELCOM Fish Pro III (HELCOM 2018), scientific evaluation of the effectiveness of measures for coastal fish is only available for a few measures and for some areas.

The measures included in the proposed set of measures for coastal fish, numbered from 1 to 7 in the tables below, are selected based on the review by HELCOM (2018) in combination with additional information and scientific literature provided since then, where available. Based on these sources, the set identifies measures for which there is at least some scientific evidence that the measure is effective to improve status.

As different pressures may be decisive for the status in different parts of the Baltic Sea, the relative efficiency of the different measures is expected to vary between different geographical areas. On a general level, the strongest scientific evidence of effectiveness is available for no-take areas (permanent fishing closures, measure number 4). For measures numbered 1–3 and 5–6 there is either some certainty, or the effectiveness may depend on site-specific conditions or other conditional factors. The lack of certainty is to a considerable part attributed to a lack of follow-up studies. Measure 7 is suggested to remedy this knowledge gap in the future.

Implementing more than one of the measures in the same area is expected to lead to synergistic effects and increase efficiency. See tables below for details on each of the measures.

Cost, cost-effectiveness of measure:

See tables below for details on each of the measures

Feasibility:

Variable, depending on local conditions. See tables below for details on each of the measures

Follow-up of measure:

Projects to follow-up of the ecological effects of the measures are recommended to be amended to and integrated with the HELCOM coastal fish monitoring program (see measure 7).

Background material:

The set of measures for coastal fish is based on a review by experts in HELCOM Fish Pro III (HELCOM (2018), and supplemented by additional studies made available since then.

Information on the distribution of essential fish habitats from the Pan Baltic Scope project and national mapping efforts would be helpful to support the identification of most impacted areas and most feasible measures in these.

References

Bergström, U., L. Bergström, A. Bryhn, R. Fredriksson, J. Mattila, J. Olsson and Ö. Östman (2016) Role of fish management for mitigating eutrophication effects in shallow coastal waters. Working paper on commission by the Swedish Agency for Marine and Water Management, 2016-03-11. Department of Aquatic Resources, Swedish University of Agricultural Sciences

HELCOM (2018) Status of coastal fish communities in the Baltic Sea during 2011-2016 – the third thematic assessment. Baltic Sea Environment Proceedings N° 161

Östman Ö, J. Eklöf, B.K. Eriksson, P. Moksnes, J. Olsson and U. Bergström (2016) Meta-analysis reveals top-down processes are as strong as bottom-up effects in coastal food-webs. Journal of Applied Ecology 53: 1138–1147.

Pan Baltic Scope project **www.panbalticscope.eu**

Title: Coastal fish measure 1: Restoration of coastal spawning habitats

Submitted by:

See above

Description of measure

Restoration and revitalization of spawning and recruitment habitats for fish is a key priority in areas where these have previously been destroyed, to bring back the degraded habitat to a state where it can support the biodiversity and productivity of fish populations. The measure "restoration of coastal spawning habitats" aims to re-create natural fish spawning habitats in coastal tributaries and wetlands where these have been lost due to past human activities. The measure is relevant for freshwater-spawning coastal fish species in the Baltic Sea.

Activity:

Canalisation and other watercourse modifications (coastal dams, culverting, trenching, weirs, large-scale water deviation)
Land claim
This refers to past activities leading to loss of natural spawning habitat

Pressure:

Physical loss (due to permanent change of seabed substrate or morphology and to extraction of seabed substrate)

State:

Fish – coastal fish communities

Extent of impact:

Spawning and recruitment habitats for coastal fish have undergone substantial deterioration in many regions of the Baltic Sea (Engstedt et al. 2010; Nilsson et al. 2014). The measure is relevant to reduce this impact in coastal areas within the natural range of freshwater-spawning coastal fish species where the availability of natural spawning areas is limited due to human-induced habitat loss.

Effectiveness of measure

Wetlands can be recreated through e.g. impoundments enabling periods with flooding keeping the water longer in the system. These wetlands can promote the recruitment of pike, but also other fish species such as perch and cyprinids.

Experiences on the effectiveness of restoring wetlands and tributaries to support spawning habitats of coastal fish are available for the Baltic Sea coast of Sweden. Restoration of wetlands as reproduction areas for foremost pike have in many cases shown to result in a strong increase in the production of juvenile pike as a result of optimal spawning conditions, predation refuge and food production (Nilsson et al. 2014, Larsson et al. 2015, Hansen et al. 2019).

Effects on adult populations are not yet well established, but some studies are ongoing (Hansen et al. 2019, see also Fredriksson et al. 2013).

Cost, cost-effectiveness of measure:

For Sweden between 2010 and 2018, 281 hectare wetland/coastal lakes have been restored and 2 610 hectares have been made accessible for pike by 83 measures/projects by the Swedish Anglers Association (Hansen et al. 2019). The costs for one hectare restored wetland are estimated to 10 000 - 20 000 EUR (including planning and restoration, but excluding monitoring costs afterwards).

Globally, de Groot et al. (2013) present a range of 15 000 – 600 000 EUR per restored hectare for coastal wetlands.

Feasibility:

Follow-up of measure:

Background material:

Based on review presented by
HELCOM 2018. Status of coastal fish communities in the Baltic Sea during 2011-2016 – the third thematic assessment. Baltic Sea Environment Proceedings N° 161 and additional more recent studies.

References

de Groot, R.S., L. Brander, S. van der Ploeg, R. Costanza, F. Bernard, L. Braat, M. Christie, N. Crossman, A. Ghermandi, L. Hein, S. Hussain, P. Kumar, A. McVittie, R. Portela, L.C. Rodriguez, P. ten Brink and P. van Beukering (2012) Global estimates of the value of ecosystems and their services in monetary units. Ecosystem Services 1: 50–61.

Engstedt, O., P. Stenroth, P. Larsson, L. Ljunggren and M. Elfman (2010) Assessment of natal origin of pike (*Esox lucius*) in the Baltic Sea using Sr:Ca in otoliths. Environmental Biology of Fishes 89: 547–555.

Fredriksson, R., U. Bergström and J. Olsson (2013) *Riktlinjer för uppföljning av fiskevårdsåtgärder i kustmynnande våtmarker med fokus på gädda*. (Guidance for the follow-up of measures to restore freshwater tributaries with a focus on pike). Aqua Reports 2013:7. Department of Aquatic Resources, Swedish University of Agricultural Sciences, Öregrund, Sweden. 52 pp.

Hansen, J., H.C. Anderson, U. Bergström, T. Borger, D. Brelin, P. Byström, J. Eklöf, P. Kraufvelin, L. Kumblad, L. Ljunggren, O. Nordahl and P. Tibblin (2019) *Våtmarker som fiskevårdsåtgärd vid kusten. Utvärdering av restaurerade våtmarkers effekt på fiskreproduktion och kustekosystemet* (Wetlands as a measure to support coastal fish. Evaluation of the effect of restored wetlands on fish production and coastal ecosystems) Report to the Swedish government on development on national environmental objectives.

Larsson P., P. Tibblin, P. Koch-Schmidt, O. Engstedt, J. Nilsson, O. Nordahl and A. Forsman (2015) Ecology, evolution, and management strategies of northern pike populations in the Baltic Sea. Ambio 44: 451–461 doi: 10.1007/s13280-015-0664-6.

Nilsson, J., O. Engstedt and P. Larsson (2014) Wetlands for northern pike (*Esox lucius* L.) recruitment in the Baltic Sea. Hydrobiologia 721: 145–154.

Title: Coastal fish measure 2. Restoration of stony reefs

Submitted by:

See above

Description of measure

Restoration and revitalization of fish recruitment and feeding habitats is a key priority in areas where they have previously been destroyed, to bring back the degraded habitat to a state where it can support biodiversity and the productivity of fish populations. The measure "restoration of stony reefs" aims to re-create natural physical hard structures by the re-establishment of stones or boulders in areas where they have been lost due to past human activities, mainly in the southern and southwestern Baltic Sea.

Activity:

Extraction of minerals (rock, metal ores, gravel, sand, shell)
Restructuring of seabed morphology (dredging, beach replenishment, sea-based deposit of dredged material)
Transport – shipping infrastructure (harbours, ports, ship-building)

This refers to past activities

Pressure:

Physical loss (due to permanent change of seabed substrate or morphology and to extraction of seabed substrate)

State:

Fish – Coastal fish communities

Extent of impact:

Relevant to coastal areas where stony reefs have previously been present but are now depleted

Effectiveness of measure

The measure means placing out natural or blasted stones that can serve as underwater stony/boulder reefs to allow for colonisation of hard bottom macroalgal and macrofaunal assemblages and fish communities. The measure is expected to lead to more habitat for marine organisms, increased biodiversity, increased availability of essential fish habitats, preserved ecosystem services, improved coastal protection against erosion, sequestration of organic material and nutrients and more. Potential negative responses that should be considered during localization are effects on bottom structure and water circulation, and the risk of claiming space from other marine habitats. In areas of predominating soft bottoms introduced hard substrates can serve as stepping stones for non-indigenous invasive species. Promoting the attraction by individuals to certain areas can lead to overharvesting of fish unless fisheries is also managed.

Available experiences on the effects of re-establishing stony reefs in the Baltic Sea region are from Danish coastal waters. The restoration was applied to areas where the original hard substrate has historically been removed by stone fishing, leaving a soft, predominantly sandy substrate that could not support the natural biological community including fish. When artificial stone reefs were placed in such areas, it was seen that the biotic community changed as the new structures attracted species with a preference for rocky habitats. Monitoring in such areas have shown increased biodiversity, increased abundances of fish, including increased abundance of larger specimens of certain species of fish (Støttrup et al. 2014, 2017).

Similar indication on the effectiveness of the measure can be deduced from monitoring of fish in off shore wind farms in the Sound area, where boulders are deployed as scour protection around the turbine foundations (Stenberg et al. 2015, Bergström et al. 2015).

Similar examples can also be found from areas outside of the Baltic Sea (HELCOM 2018).

In some areas, the restoration of other types of hard substrates may be more relevant. Restoration of biogenic reefs of mussels have been observed to increase the structural complexity and biodiversity of the habitat and associated fauna, which may support an increased fish growth and diversity over time (Kristensen et al. 2015). The long-term effect of the measure is dependent on the persistence of the created habitat, why rocks are assumed to be more persistent, lasting and requiring less maintenance.

Whether the above-mentioned observations are the result of pure attraction effects of the fish or If they also reflect effects at the population abundance level, is to date not established due to a lack of long-term follow-up studies. However, it is relevant to recommend that the measure is combined with protection from fishing to facilitate the rapid re-establishment, and avoid over-fishing as fish are expected to become easier to catch in areas where they aggregate such as around restored stone reefs.

Cost, cost-effectiveness of measure:
Restoration of 7 hectare and stabilisation of 6 hectare stony reefs at Læsø Trindel in Denmark costed 4 800 000 euro (Støttrup et al. 2014, 2017)

Feasibility:

Follow-up of measure:

Background material:
The information is mainly based on a review presented in:
HELCOM 2018. Status of coastal fish communities in the Baltic Sea during 2011-2016 – the third thematic assessment. Baltic Sea Environment Proceedings N° 161

References

Bergström, L., Sundqvist, F., Bergström, U. (2013) Effects of an offshore wind farm on the local demersal fish community. Marine Ecology progress series 485: 199–210. doi: 10.3354/meps10344

Kristensen, L.D., C. Stenberg, J.G. Støttrup, L.K. Poulsen, H.T. Christensen, P. Dolmer, A. Landes, Røjbek, S.W. Thorsen, M. Holmer, M.V. Deurs and P. Grønkjær (2015) Establishment of blue mussel beds to enhance fish habitats. Applied Ecology and Environmental Research, 13: 783–798.

Stenberg, C., J.G. Støttrup, M. van Deurs, C.W. Berg, G.E. Dinesen, H. Mosegaard, T.M. Grome and S.B. Leonhard (2015) Long-term effects of an offshore wind farm in the North Sea on fish communities. Marine Ecology Progress Series 528: 257–265.

Støttrup, J.G., C. Stenberg, K. Dahl, L.D. Kristensen and K. Richardson (2014) Restoration of a Temperate Reef: Effects on the Fish Community. Open Journal of Ecology 4: 1045–1059.

Støttrup, J.G., K. Dahl, S. Niemann, C. Stenberg, J. Reker, E.M. Stamphoj, C. Goke and J.C. Svendsen (2017) Restoration of a boulder reef in temperate waters: Strategy, methodology and lessons learnt. Ecological Engineering 102: 468–482.

Title: Coastal fish measure 3. Enhanced protection of coastal fish habitats

Submitted by:
See above

Description of measure
The measure “enhanced protection of coastal fish habitats” aims to protect natural spawning and recruitment habitats for coastal fish from further deterioration due to human activities. It is applicable in the designation and management of MPAs as well as in spatial planning. Although there already is some extent of habitat protection in coastal areas, the current protected areas are only rarely designed with specific consideration of essential fish habitats.

Activity:

Restructuring of seabed morphology (dredging, beach replenishment, sea-based deposit of dredged material)
Tourism and leisure infrastructure (piers, marinas)
Tourism and leisure activities (boating, beach use, water sports, etc.)
Canalisation and other watercourse modifications (coastal dams, culverting, trenching, weirs, large-scale water deviation)
Coastal defence and flood protection (seawalls, flood protection)
Extraction of minerals (rock, metal ores, gravel, sand, shell)
Urban uses (land use)
Industrial uses (oil, gas, industrial plants)
Solid waste (land-based disposal of dredged material and, e.g. land-fill)

Pressure:

Physical loss (due to permanent change of seabed substrate or morphology and to extraction of seabed substrate)

State:

Fish - coastal fish communities

Extent of impact:

Coastal degradation is continuously increasing in coastal areas today, as the effect of physical modifications of seabed, tourism and boating activities, etc. lead to cumulative loss of habitat. The measure is relevant in all parts of the Baltic Sea coastline.

Effectiveness of measure

Safeguarding important habitats for the recruitment and production of juvenile fish is a basic step of sustaining adult populations of fish (Sundblad et al. 2014, Kraufvelin et al. 2018).

Protection of functional habitats is considerably more effective compared to restoration of deteriorated habitats, as there is no time lag before the effect of the implementation can be seen, and since restoration is likely to require more resources in terms of cost and time and a has a lower level of certainty in that all original functions and ecosystem services are recovered.

There is generally a lack of follow-up studies on the effect of habitat protection on coastal fish in the Baltic Sea. However, substantial indirect evidence is provided from studies showing how habitat deterioration reduces fish productivity (Kraufvelin et al. 2018). For example, Sundblad et al. (2014) showed that habitat limitation for early life stages of perch and pikeperch may restrict the abundance of later adult stage fish. There is evidence of long-term negative effects on fish reproduction habitats from physical development, boating and infrastructure related to boating (Sandström et al., 2005, Sundblad and Bergström 2014, Hansen et al. 2018, Sagerman et al. 2019), and studies have shown negative impacts on the habitat and the production of juvenile fish from recreational boating traffic (Sandström et al. 2005). The studies are from Swedish waters but the observed relationships can be assumed to also apply to other countries in the Baltic Sea.

Cost, cost-effectiveness of measure:

Feasibility:

Follow-up of measure:

Background material:

Based on review presented by
HELCOM 2018. Status of coastal fish communities in the Baltic Sea during 2011-2016 – the third thematic assessment. Baltic Sea Environment Proceedings N° 161 and additional more recent studies.

References

Hansen J.P., G. Sundblad, U. Bergström, Å.N. Austin, S. Donadi, B.K. Eriksson and J.S. Eklöf (2018) Recreational boating degrades vegetation important for fish recruitment. Ambio 48: 539-551

Kraufvelin, P., Z. Pekcan-Hekim, U. Bergström, A-B. Florin, A. Lehikoinen et al. (2018) Essential coastal habitats for fish in the Baltic Sea. Estuarine, Coastal and Shelf Science 204: 14-30.

Sagerman, J., J. Hansen and S.A. Wikström (2019) Effects of boat traffic and mooring infrastructure on aquatic vegetation: A systematic review and meta-analysis. Ambio 2019 doi: 10.1007/s13280-019-01215-9.

Sandström, A., B.K. Eriksson, P. Karås, M. Isæus and H. Schreiber (2005) Boating and navigation activities influence the recruitment of fish in a Baltic Sea archipelago area. Ambio 34: 125–130.

Sundblad, G. and U. Bergström (2014) Shoreline development and degradation of coastal fish reproduction habitats. Ambio 43: 1020–1028.

Sundblad, G., U. Bergström, A. Sandström and P. Eklöv (2014) Nursery habitat availability limits adult stock sizes of predatory coastal fish. ICES Journal of Marine Science 71: 672–680.

Title: Coastal fish measure 4. Establishment of no-take areas

Submitted by:

See above

Description of measure

The measure "Establishment of no-take areas" aims to protect populations of coastal fish from fishing mortality. No-take areas are currently implemented to only a minor extent in the Baltic Sea, although available evidence shows that they can be effective to rapidly restore local populations.

Activity:

Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:

Extraction of target fish and shellfish species and incidental fish catches

State:

Fishcoastal fish communities

Extent of impact:

There is scarce information about in which coastal areas fishing pressure is the highest, as coastal fish are mainly captured by small-scale fisheries and recreational fishing which are not obliged to report on their spatial locations, or which do not report in spatial detail. Comparative studies between no-take areas and areas where fishing is allowed indicate that coastal fish populations in the Baltic Sea are widely constrained by fishing pressures.

Effectiveness of measure

No-take marine reserves, where no fishing is allowed, have been recommended as a general tool for an ecosystem approach to fisheries management, including to support the reaching of environmental objectives (Halpern 2003, Halpern et al. 2010, Fenberg et al. 2012). The measure is expected to result in a more balanced size-structure of the fish community and higher prevalence of larger individuals and larger species, and enable exploited populations to recover. The effects within the areas can usually be seen within just a few years, showing that the response is fast.

No-take areas may also have spill-over effects of adult fish, pelagic eggs and larvae to adjacent areas and systems, so that they are also benefitted (Abesamis and Russ 2005, Halpern et al. 2010), and positive effects on other parts of the food-web besides the targeted fish populations (Thrush and Dayton 2010, Baskett and Barnett 2015, Bergström et al. 2016). However, these subsequent effects might be slower and they depend on a long-term and sufficiently scaled protection (e.g. Gårdmark et al. 2006).

European marine reserves have been shown to promote key biological functions, and variables such as species richness, biomass, density, and body size of targeted populations (Fenberg et al. 2012). No-take areas can also benefit other functional groups than the exploited fish community by similar increases in biomass, density, individual size or diversity (Halpern 2003; Halpern et al. 2010).

Available studies from Swedish coastal waters of the Baltic Sea (Bergström et al. 2016) show higher density and older individuals of flounder and turbot (see also Florin et al. 2013), increased abundance and individual size of pike, pikeperch and perch (see also Bergström et al. 2019), and increased abundance of whitefish, in studies where no-take areas dedicated to each of these species were compared to a reference area. In such newly implemented no-take areas, positive effects were seen within a few 1–3 years, based on the follow-up studies.

Cost, cost-effectiveness of measure:

[*Free text: indicate any known or likely sources of cost and/or effectiveness data of the measure*]

Feasibility:

Follow-up of measure:

Background material:

Based on review presented by
HELCOM 2018. Status of coastal fish communities in the Baltic Sea during 2011-2016 – the third thematic assessment. Baltic Sea Environment Proceedings N° 161 and additional more recent studies.

References

Abesamis, R.A. and G.R. Russ (2005) Density-dependent spillover from a marine reserve: long-term evidence. Ecological Applications 15: 1798–1812.

Baskett, M.L. and L.A. Barnett (2015) The ecological and evolutionary consequences of marine reserves. Annual Review of Ecology, Evolution and Systematics 46: 49–73.

Bergström, L, M. Karlsson, U. Bergström, L. Pihl and P. Kraufvelin (2019) Relative impacts of fishing and eutrophication on coastal fish assessed by comparing a no-take area with an environmental gradient. Ambio, 48: 565-579. DOI 10.1007/s13280-018-1133-9

Bergström, U., M. Sköld, H. Wennhage and A. Wikström (2016) *Ekologiska effekter av fiskefria områden i Sveriges kust- och havsområden*. (Ecological effects of the implementation of no-take areas in Swedish coastal and sea areas) Aqua reports 2016:20. Department of Aquatic Resources, Swedish University of Agricultural Sciences, Öregrund, Sweden. 207 pp.

Fenberg, P. B., J.E. Caselle, J. Claudet, M. Clemence, S.D. Gaines, J.A. García-Charton, E.J. Gonçalves, E. J., K. Groud-Colvert, P. Guidetti, S.R. Jenkins, P.J.S. Jones, S.E. Lester, R. McAllen, E. Moland, S. Planes and T.K. Sørensen (2012) The science of European marine reserves: status, efficacy, and future needs. Marine Policy 36: 1012–1021.

Florin, A.-B., U. Bergström, D. Ustups, K. Lundström and P.R. Jonsson (2013) Effects of a large northern European no-take zone on flatfish populations. Journal of Fish Biology 83: 939–62.

Gårdmark, A., N. Jonzen and M. Mangel (2006) Density-dependent body growth reduces the potential of marine reserves to enhance yields. Journal of Applied Ecology 43: 61–69.

Halpern, B.S. (2003) The impact of marine reserves: Do reserves work and does reserve size matter? Ecological Applications 13: 117–137.

Halpern, B.S., S.E. Lester and J.B. Kellner (2010) Spillover from marine reserves and replenishment of fished stocks. Environmental Conservation 36: 268–276.

Thrush, SF and P.K. Dayton (2010) What can ecology contribute to ecosystem-based management? Annual Review of Marine Science 2: 419–441.

Title: Coastal fish measure 5. Seasonal closures

Submitted by:
See above

Description of measure
The measure "Seasonal closures" aims to protect populations of coastal fish from fishing mortality under critical periods of their reproduction cycle, mainly during spawning. The measure aims to ensure sustainable populations of species and populations that are in need of further protection but can be fished to a certain extent. Critical periods of the reproduction cycle typically refers to the spawning season but may also refer the growth period of juvenile life stages of target species or by-catch.

Activity:
Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:
Extraction of target fish and shellfish species and incidental fish catches

State:
Fish coastal fish communities

Extent of impact:
There is scarce information on in which coastal areas fishing pressure is the highest, as coastal fish are mainly captured by small-scale fisheries and recreational fishing which are not obliged to report on their spatial locations, or which do not report in spatial detail. Comparative studies between no-take areas and areas where fishing is allowed indicate that coastal fish populations in the Baltic Sea are widely constrained by fishing pressures. Fishing extraction may have particularly high population effects if it takes place during seasons when the fish aggregate to spawn.

Effectiveness of measure
Seasonal fishing closures involve prohibiting fishing in an area during a specific time in order to reduce the mortality of exploited populations during particularly vulnerable seasons. The effectiveness of the measure depends on that the temporal as well as spatial extent of the closure are adequately defined and that the closure is sufficiently sized. If compared at the same spatial scale, seasonal closures are expected to be less effective than complete no-take areas (measure number 4). However, as the seasonal closures can be more feasible to implement at a wider geographical scale, it could be effective in combination with other measures.

Direct evidence of the efficiency of the measure is not available for Baltic Sea coastal fish. Some studies are ongoing in the Stockholm archipelago of Sweden and preliminary results from this area indicate positive effects at least for pike.

Outside of the Baltic Sea, seasonal closures have been considered beneficial for restoring commercial shellfish (e.g., shrimp, lobster fisheries; reviewed by Everson 1986) and fish (Gwinn & Allen 2010, Sammy-Kamal et al. 2015).

Cost, cost-effectiveness of measure:

Feasibility:

Follow-up of measure:

Background material:
Based on review presented by
HELCOM 2018. Status of coastal fish communities in the Baltic Sea during 2011-2016 – the third thematic assessment. Baltic Sea Environment Proceedings N° 161

References

Everson, A., 1986. Closed season as a management policy in lobster fisheries. NOAA. Southwest Fisheries Center, Administrative Report H-86-7.

Gwinn, D.C. and M.S. Allen, 2010. Exploring population-level effects of fishery closures during spawning: an example using largemouth bass. Transactions of the American Fisheries Society, 139: 626–634.

Sammy-Kamal, M., A. Forcada and J.L. Sánchez-Lizaso, 2015. Effects of seasonal closures in a multi-specific fishery. Fisheries Research 172: 303–317.

Title: Coastal fish measure 6. Catch regulations

Submitted by:
See above

Description of measure
The measure “catch regulations” aims to promote selective fisheries in coastal waters and reduce fishing pressure on populations which are in need of further protection, but which can be fished to a certain extent. A main aim is to ensure that the size structure of the population is maintained or restored, including large specimens of fish.

Activity:
Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:
Extraction of target fish and shellfish species and incidental fish catches

State:
Fish coastal fish communities

Extent of impact:
Comparative studies between no-take areas and areas where fishing is allowed indicate that coastal fish populations in the Baltic Sea are widely constrained by fishing pressures, affecting population sizes as well as size structures and reproductive capacity in the future. The absence of large fish has also been connected to impacts further down in the food web, including the capacity of the ecosystem to buffer from other environmental impacts such as symptoms of eutrophication.

Effectiveness of measure
Catch regulations can aim at reducing the mortality of fish populations in general or with respect to certain size classes. Regulations to reduce overall mortality can be enforced by limiting the number of

gears or vessels in the fishery, as well as by restrictions in fishing licences and allowable catch. In recreational fisheries, bag limits may be introduced so that only a limit number of fish are allowed per angler or per day. To maintain or restore population size structure, catch regulations targeting certain size classes may include mesh size restrictions of the gears used, or limits to the catchable size of the fish so that only a sub-section of the exploited populations and communities are captured. Such regulation may include minimum allowed length limits or slot-length limits (including both a minimum and maximum allowed size).

Several regulations relating to this measure are already in place for coastal fish in the Baltic Sea, but to date there is a lack of follow-up studies on the effects of the measures on recipient fish populations and communities.

According to a bio-economic simulation model, mesh size regulations may have a positive effect on the biological sustainability of the pikeperch fishery in the Archipelago Sea, Finland. The model indicated that a larger mesh size would double the spawning stock biomass of pikeperch, which in turn would benefit the fishery in the long term (Heikinheimo et al. 2006).

Evidence from freshwaters suggest that implementation of slot-length limits (with both a minimum and a maximum allowed size) are more ecologically effective than minimum length limits (with only a minimum allowed size), as this enables large specimens to stay in the system (Pierce 2010, Tiainen et al. 2017). However, the results assume that the growth rate of fish is not very low and that the overall intensity of fishing is not too high, as these factors enhance the risk that fish are caught before reaching the length beyond the upper limit. Hence, unless combined with overall catch limits, implementation of size limits is expected to have an effect on population size structure but not on the abundance of fish (see for example Vainikka et al. 2017).

Cost, cost-effectiveness of measure:

Feasibility:

Follow-up of measure:

Background material:

Based on review presented by
HELCOM 2018. Status of coastal fish communities in the Baltic Sea during 2011-2016 – the third thematic assessment. Baltic Sea Environment Proceedings N° 161 and additional later references.

References

Heikinheimo, O., J. Setälä, K. Saarni and J. Raitaniemi (2006) Impacts of mesh-size regulation of gillnets on the pikeperch fisheries in the Archipelago Sea, Finland. Canadian Journal of Fisheries and Aquatic Sciences 77: 192–199

Pierce, R.B. (2010) Long-term evaluations of Northern pike experimental regulations in Minnesota lakes. Minnesota Department of Natural Resources Investigational Report 556, February 2010

Tiainen, J., M. Olin, H. Lehtonen, K. Nyberg and J. Ruuhijärvi (2017) The capability of harvestable slot-length limit regulation in conserving large and old northern pike (Esox lucius). Boreal Environment Research 22: 169–186

Vainikka, A., M. Olin, J. Ruuhijärvi, H. Huuskonen, R. Eronen and P. Hyvärinen (2017) Model-based evaluation of the management of pikeperch (*Sander lucioperca*) stocks using minimum and maximum size limits. Boreal Environment Research 22: 187–212

Title: Coastal fish measure 7. Follow-up and knowledge sharing

Submitted by:
See above

Description of measure
The measure "Follow-up and knowledge sharing" aims to enhance the evidence-base on efficiency of measures over time by mutual sharing of existing and ongoing experiences among countries. To support an adaptive management, it might also be beneficial to apply measures as test with the dual aim of improving environmental status and learning. The set of measures for coastal fish measures reflects those measures (out of a larger group of potential measures) for which there is at last some level of support today, albeit often spatially limited. Hence, they represent measures that are likely to have a positive effect and that are expected to involve a low to minor risk of negative environmental impacts, why they are advocated as suited to be included in an adaptive learning approach.

The measure "Follow-up and knowledge sharing" is further expected to support engagement and acceptance of the general public, recreational and commercial fishermen concerning the needs of the measures and their objectives, if supported by dedicated campaigns for these groups.

Activity:
Not applicable

Pressure:
Not applicable

State:
Fish coastal fish communities

Extent of impact:
Even though a wide range of measures has already been implemented for fish in the Baltic Sea, there is generally a lack of scientific evaluations and evidence on the effects of many of the measures. This lack of knowledge significantly limits the work with restoring and supporting coastal fish communities and stocks, through impacts on the capacity of society to carry out measures.

Effectiveness of measure
Based on a review conducted by HELCOM Fish Pro III (HELCOM thematic assessment of coastal fish, 2018), scientific evidence to follow-up on the effectiveness of measures for coastal fish is only available for a few measures and for some areas. An effective way to support an increased evidence-base would be to encourage adaptive learning and the mutual sharing of experiences among countries.

To gain stronger support for these measures and for those not yet suggested in this report, it is of outmost importance that past, on-going and future measures for coastal fish are scientifically evaluated, something that unfortunately is seldom undertaken (HELCOM 2018).

Designed in a proper manner and applied for a specific coastal area, the measures included in the coastal fish package are likely to have positive effects on targeted populations and communities by directly reducing mortality and supporting reproduction. This, in turn, might enhance species diversity and mediate a more balanced size-structure of the targeted population and community. If designed properly, a measure taken is likely also beneficial for the whole ecosystem since fish are key elements with regulatory roles in marine food webs. The best effects on recipient systems likely comes from a combination of a measures targeting the fishery and protecting the essential habitats of the fish (HELCOM 2018).

Cost, cost-effectiveness of measure:

Feasibility:

Follow-up of measure:

Background material:
Based on review presented by HELCOM (2018) and subsequent discussions in HELCOM meetings and workshops including HELCOM Fish Pro III 1-2019 and HELCOM SOM Fish WS 1-2019.

References
HELCOM 2018. Status of coastal fish communities in the Baltic Sea during 2011-2016 – the third thematic assessment. Baltic Sea Environment Proceedings N° 161

Title: Agree to collect fisheries data on both large and small-scale vessels

Submitted by:
BirdLife International and Thurid Otto, expert at the Helmholtz Centre for Ocean Research Kiel and member of HELCOM FISH.
This submission was not submitted as a contracting party and does not represent a national agreed document.

Description of measure
The implementation of this measure includes the collection of data on total fishing effort per métier in meaningful units, such as net length combined with soaking time in the case of gillnets, not only on large but also on small scale fishing vessels. Small-scale fishing vessels make up a large part of the Baltic Sea fishing fleet and need to be included in fishery monitoring.

Activity:
Fish and shellfish harvesting (bottom-touching towed gears, professional, recreational)
Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:
Extraction of target fish and shellfish species and incidental fish catches

State:
Pelagic habitats
Fish
Seabed habitats
This measure will ensure that fishing effort can be fully assessed rather than estimated for smaller vessels. These make up a large part of the Baltic fleet and their effort is currently not assessed in a scientifically sound manner. This is however required from those contracting parties being EU member states under Art. 25 (1) b) of the Common Fisheries Policy (EU 1380/2013).

Extent of impact:
This measure does not necessarily have a direct effect on fish stocks but will encourage compliance with European and national jurisdiction and thus benefit stocks Baltic wide. Furthermore, measuring fishing effort is also important to estimate the impact of the fisheries on the ecosystem – in particular to estimate the levels bycatch of birds and mammals – as per EU regulations.

Effectiveness of measure
Monitoring and assessing fishing effort has been in place for larger vessels and continues to be a valuable source of knowledge for pressure analysis on stocks, compliance checks etc. More than half of the fishing fleet in the Baltic Sea are vessels <12m. That means that a large part of fishing pressure cannot be assessed until this gap is filled. The thorough assessment of fishing pressure is one of the obligations of the CFP, DCMAP, MSFD for those contracting parties which are also EU member states. It is a data requirement to calculate the total amount of bycatch, which is a requirement of the afore listed EU obligations and the Birds and Habitats Directive.

Cost, cost-effectiveness of measure:

Feasibility:

This action is technically feasible. Possible methods include self reporting via app by fishermen, compulsory AIS use also on vessel smaller than 12m, electronic log books etc.

Follow-up of measure:

Background material:

The background material is mainly policy based, focusing on the legal obligations regarding the assessment of the data required by this measure.

References

- Draft HELCOM Roadmap on fisheries data in order to assess incidental bycatch and fisheries impact on benthic biotopes in the Baltic Sea (as presented to HOD 57-2019, Document 4-18)
- Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC http://data.europa.eu/eli/reg/2013/1380/oj
- Commission Implementing Decision (EU) 2016/1251 of 12 July 2016 adopting a multiannual Union programme for the collection, management and use of data in the fisheries and aquaculture sectors for the period 2017-2019 (notified under document C(2016) 4329) http://data.europa.eu/eli/dec_impl/2016/1251/oj (accessed 13.12.2019 15:20)
- Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC http://data.europa.eu/eli/reg/2013/1380/oj (accessed 13.12.2019 15:20)
- Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) (Text with EEA relevance) http://data.europa.eu/eli/dir/2008/56/oj (accessed 13.12.2019 15:20)
- https://ec.europa.eu/fisheries/cfp/fishing_rules/fishing_fleet_en (acessed 17.12.19 11:50)
- https://www.thuenen.de/en/topics/competitiveness-and-structural-change/the-german-fishing-fleet/ (acessed 17.12.19 11:50)
- ICES (2018) ICES Fisheries Overviews Baltic Sea Ecoregion, Published 30 November 2018 https://doi.org/10.17895/ices.pub.4648

Title: Analysis of pressures affecting fish stocks

Submitted by:

Denmark
Contact: Lonnie Mikkelsen, Ministry of Environment and Food, lomik@mfvm.dk

Description of measure

Several fish stocks are in poor condition in the Baltic Sea. The cod is just one example of this, also being assessed as vulnerable on HELCOMs red list of threatened species. Commercially important fish stocks in the majority of the Baltic Sea are managed through The EU Common Fisheries Policy (CFP) and for several species here, including cod, management plans already exist in the EU. However, several factors other than fisheries impact the status of fish stocks, these include lack of oxygen in the breeding area, pollution, altered food resources, predation from grey seals and the infection from liverworms. How these different factors are influencing the status of populations in the different life stages is not well understood. Apart from the fisheries management through the CFP, insufficient knowledge exists on which measures are effective in improving the conditions of fish stocks.
An analysis should be conducted to gather existing knowledge and increase the knowledge base on factors such as population abundance, prey availability, health status and distribution in relation to pressures other than fisheries. In addition, on the basis of this analysis, measures should be taken to improve conditions for e.g. cod stocks, which go beyond the management of cod and other fish stock under the CFP. Improvement of fish stocks will benefit the entire ecosystem in the Baltic Sea.

Activity:

Natural and anthropogenic theats to fish populations

Pressure:

- *Eutrophication*
- *Oxygen deficiency*
- *Acidification*
- *Increasing sea temperature*
- *Predation by grey seals*
- *Infection of lung worm*
- *Input or spread of non-indigenous species*
- *Input of microbial pathogens*
- *Input of genetically modified species and translocation of native species*
- *Loss of, or change to, natural biological communities due to cultivation of animal or plant species*
- *Extraction of target fish and shellfish species and incidental fish catches*
- *Physical disturbance to seabed (temporary or reversible and recovers within 12 y)*
- *Physical loss (due to permanent change of seabed substrate or morphology and to extraction of seabed substrate)*
- *Changes to hydrological conditions*
- *Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) — diffuse sources, point sources, atmospheric deposition, acute events*
- *Input of litter (solid waste matter, including micro-sized litter)*
- *Input of anthropogenic sound (impulsive, continuous)*

State:

- *Fish*
- *Ecosystem*

Extent of impact:

Several threatened species in the Baltic will benefit from improved conditions, and may apply to the entire extent of the Baltic Sea.

Effectiveness of measure

Efforts on all levels are required to improve the status of the Baltic Sea. An improve knowledge base is needed to ensure best practices and an ecosystem based approach. The aim of this measure is to identify effective management measures to help improve fish stocks by gaining a better understanding of the pressures and factors affecting the populations of fish. This applies in particularly to cod stocks in the entire region, and may e.g. include a common management plan for the grey seal. Such a management plan (any plan) will be most effective if agreed on between all Baltic nations.

Cost, cost-effectiveness of measure:

Cost-effectiveness will depend on the measures being identified as effective to work with.

Feasibility:

Feasibility will depend on the measures being identified as effective to work with.

Follow-up of measure:

Follw up will depend on the measures being identified as effective to work with.

Background material:

ICES advice on the commercial fish stocks give an overview on the development of fish stocks in the Baltic Sea.

References

ICES advice for cod:
http://ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/cod.27.21.pdf
http://ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/cod.27.24-32.pdf
http://ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/cod.27.22-24.pdf

Title: Ban an on import and sale of metallic lead in fishing equipment

Submitted by: Denmark

Ministry of Environment and Food of Denmark, anmch@mfvm.dk

Description of measure

A Baltic-wide ban on import and sale of fishing equipment containing lead. The Danish Statutory Order (no. 856 of 5th September 2009) prohibits the import and sale of products containing lead. In the case of metallic lead, there is a ban on the import and sale of the products listed in Annex 2 of the statutory order. This includes among others equipment for commercial fishing (sinkers, sinker lines and cables) and fishing equipment for sports fishing.
There is no valid English translation of the regulation. At the website of the Danish Environmental Protection Agency you can find a translation of the statutory order (but be aware that this is not the latest version):
https://eng.mst.dk/media/mst/69075/Blybekendtg%C3%B8relse%20%20BEK%20nr%201082%20af%202007%2009%2013%20oversat%20til%20engelsk.pdf

Activity:

Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:
Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) — diffuse sources, point sources, atmospheric deposition, acute events

State:
Hazardous substances

Extent of impact:
Baltic wide impact. The measure covers areas where commercial and sports fishing takes place. This is both in coastal waters and in open sea areas where commercial fishing takes place.

Effectiveness of measure
There is bad status for lead in large areas of the Baltic sea, this covers the matrices water, sediment and biota where concentrations above the threshold limits are found. In order to achieve good status then input of lead must be stopped. Loss of fishing equipment to the Baltic Sea is a direct emission source, which causes unacceptable effects on the marine life. As there is a bad status for lead in large areas of the Baltic sea then input of lead must be stopped on a regional scale in order to improve the status.

Cost, cost-effectiveness of measure:

A number of reports have been made which are looking into lead free alternatives. Most reports are only available in Danish language.

Report from 2014 on economic and technical evaluations of sinker lines without lead (https://www2.mst.dk/Udgiv/publikationer/2014/03/978-87-93178-14-4.pdf)

Professional fishing using yarn has been reduced about 40% within the last 10 years, thereby also reducing the amount of lead being used in sinker lines. As a consequence, many professional fishers have big storages of old lead containing sinker lines, which reduce the demand of new (lead free) sinker lines. With price levels of 2014, a fishing vessel will have additional costs of 0.8% of their earnings if replacing old sinker lines with new lead free alternatives. This requires though that the new lead free alternatives have the same life expectancy and reusability as the lead containing sinker lines. Experiences from 4 fishing vessels using lead free alternatives are overall positive but the additional weight and space the new alternatives take up, resulting from a less favorable weight to volume ratio, makes their use more difficult for certain types of sinker machinery.

Report from 2015 on the consequences of lead free sinker lines for fishing vessels (English summary available) https://www2.mst.dk/Udgiv/publikationer/2015/04/978-87-93352-04-9.pdf

In general it can be concluded that a large part of the Danish net fishing fleet will experience problems in one or more of the following ways in the transition from using nets with lead sinking lines to using alternative zinc sinking lines:

1. Poorer working environment as a result of less deck space and more difficult working conditions 2. Problems with space on board the vessel as nets using alternative sinking lines take up more than a 1/3 more space than nets with lead sinking lines.

3. Reduced vessel stability as a result of the increased weight of nets, eventually leading to exceeding what is allowed according to rules by the Danish Maritime Authority.

The obvious solution to the problems named would be to reduce the number of nets that are transported on board the vessels, either by reducing the number of nets used or by transporting fewer nets at a time when sailing to and from fishing areas. These solutions will lead to considerable continual costs and most probably an unacceptable reduction in their economy. Other solutions include rebuilding or rearranging the deck area, increasing the ballast attached to the keel, increasing vessel buoyancy, or extending the length of a vessels etc. These solutions in most cases will lead to considerable costs, which do not contribute to a better operational economy

The problems regarding stability and working conditions on board vessels will further increase due to the implementation of restrictions regarding discard (ban on the discard of bycatch/undersized fish), which demands a greater amount of fish to be sorted and stored on the vessel. This could affect conditions outlined by the Danish Maritime Authority regarding the maximum weight allowed on deck in such a way that less weight (including nets) would be allowed on deck.

Report from the working group on fishing equipment without lead from 2005 (https://mst.dk/media/92391/Rapport%20endelig%20fra%20Tina%20wissendorff.pdf)

Lead in fishing equipment can be substituted with iron or zinc alloys. There are already iron alternatives on the market for sink for fishing nets that are available for approximately the same price as lead maybe even cheaper. The alternatives are in use in Denmark with satisfying results. A downside of using iron in fishing equipment is the development of rust with is a problem for some applications but no problem for others. For other types of equipment, zinc alloys can be used. Additional costs from Danish produced zinc alloys are estimated to be 9-15 DKK/kg (ZAB Danmark). These prices are estimates as the production was not establishes at the time the report was published. Other companies estimate prices to be much higher with probably depends on production costs, materials and costs of tailoring production to the new materials.

Feasibility:

For sports fishing, lead free alternatives are in place and used in Denmark.
For commercial fishing, the Danish Environmental Protection Agency holds the opinion that alternatives containing iron or zinc instead of lead are available, but have the disadvantage that they take up more space (1/3rd more) on a fishing vessel and are heavier. This has a big impact on vessel stability and the amount of fishing gear that can be carried per vessel. The amount of fishing equipment that can be carried per vessel has a direct impact on the vessel's economy, and thereby a negative impact additionally to the purchasing costs. Besides that, the working space is more limited, and thus having a negative impact on the working environment of fishermen.
Based on the availability of suitable lead free alternatives evaluated in 2014, lighter sinker lines have been illegal to import and sell after 2014, while the ban has been waved for heavier sinker lines of more than 7kg/100m until 2017. In 2016 the waver was reevaluated based on a report of experiences by the Danish Fishermen PO (DFPO). The report stated that no fishermen have started using the lead free alternatives as a result of problems in the handling of the alternatives and probably because the national ban only restricts import and sale and not use and reuse of sinker lines already in use. As a result, a waiver was granted for a 5-year period this time including all sinker lines. A new Baltic wide ban has the potential to drive development of lead free alternatives that are easier to handle for fishermen.

Follow-up of measure:

In Denmark, the Chemical Inspection inspects that such products are not sold to private or professional users. Similar inspections are proposed to take place in all Baltic countries. Also there are certain notification obligations according to REACH for production, use, import and sales of metallic lead.

Background material:

Reference to the text above.

References

- Statutory order in Danish: https://www.retsinformation.dk/Forms/R0710.aspx?id=126138 English translation of the statutory order (this is not the latest version): https://eng.mst.dk/media/mst/69075/Blybekendtg%C3%B8relse%20-%20BEK%20nr%201082%20af%202007%2009%2013%20oversat%20til%20engelsk.pdf
- Report from 2014 on economic and technical evaluations of sinker lines without lead (https://www2.mst.dk/Udgiv/publikationer/2014/03/978-87-93178-14-4.pdf)
- Report from 2015 on the consequences of lead free sinker lines for fishing vessels (English summary available) https://www2.mst.dk/Udgiv/publikationer/2015/04/978-87-93352-04-9.pdf Report from the working group on fishing equipment without lead from 2005 (https://mst.dk/media/92391/Rapport%20endelig%20fra%20Tina%20wissendorff.pdf)

Title: Collect representative data on by-catch of birds, mammals and non-targeted fish species on species level

Submitted by:

BirdLife International and OSPAR/HELCOM/ICES Joint Working Group on Marine Birds (JWGBIRD)

Description of measure

Establishment of monitoring of bird, mammal and non-targeted fish species by-catch in fisheries. These should be monitored with a sufficient coverage and reported at species level and in relation to total

fishing effort per métier in meaningful units, such as net length combined with soaking time in the case of gillnets.

Activity:

Fish and shellfish harvesting (bottom-touching towed gears, professional, recreational)
Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:

Extraction of target fish and shellfish species and incidental fish catches
Incidental catches of birds and mammals

State:

Birds
Mammals
Fish
Red listed species and habitats

Extent of impact:

The impact of this, when fully implemented, would be Baltic wide.

Effectiveness of measure

Recalling the previous BSAP measure: This measure would be a first necessary step to enable assessments of this pressure. The results gained from this measure will supply scientifically sound data to base policy decisions and management actions on. It would enable a robust base for effective protective measures for red listed species such as harbour porpoise, ringed seal, red-throated diver, long-tailed duck and velvet scoter. It could be used to support the development of alternative, more selective fishing gear and introduce compulsory rules or setting incentives where most needed. It would fulfil the obligations for those contracting parties which are also EU member states under the Birds Directive, Habitats Directive, Marine Strategy Framework Directive, Common Fisheries Policy, Data Collection Regulation and Technical Measures Regulation. A prerequesite for the effectiveness of the measure is that also small vessels (<12 m) are included which comprise the major part of the Baltic Sea gillnet fishing fleet. Also total fishing effort per métier must be monitored in order to extrapolate numbers of bycaught animals on vessels participating the monitoring programme to catches of the whole fleet. This measure relies on the involvement of other management bodies such as BALTFISH.

Cost, cost-effectiveness of measure:

Monitoring using onboard CCTV cameras is a more cost-effective way of fulfilling obligations under DC-MAP compared to onboard observers. The measure is eligible for EMFF funding.

Feasibility:

CCTV cameras are technically advances and pilot projects have shown their feasibility to reliably collect bycatch data, and in the case of birds and mammals also to identify the species. Even specimens slipping out of the net during hauling can be recorded when using cameras which is not always the case for observers.

Follow-up of measure:

Monitoring must be reviewed to ensure that it produces the desired results. In other cases, the monitoring must be readjusted. Another follow-up would be to identify conservation measures in areas and for fisheries where actions are needed the most.

Background material:

The background material is mainly policy based, focusing on the legal obligations regarding the assessment of the data required by this measure.

References

- Draft HELCOM Roadmap on fisheries data in order to assess incidental bycatch and fisheries impact on benthic biotopes in the Baltic Sea
- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds. OJ L 20, 26.1.2010, p. 7–25

http://data.europa.eu/eli/dir/2009/147/oj
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. OJ L 206, 22.7.1992, p. 7–50
  http://data.europa.eu/eli/dir/1992/43/oj
- Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) (Text with EEA relevance)
  http://data.europa.eu/eli/dir/2008/56/oj (accessed 13.12.2019 15:20)
- Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC
  http://data.europa.eu/eli/reg/2013/1380/oj (accessed 13.12.2019 15:20)
- Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 http://data.europa.eu/eli/reg/2017/1004/oj (accessed 13.12.2019 15:20)
- Regulation (EU) 2019/1241 of the European Parliament and of the Council of 20 June 2019 on the conservation of fisheries resources and the protection of marine ecosystems through technical measures, amending Council Regulations (EC) No 1967/2006, (EC) No 1224/2009 and Regulations (EU) No 1380/2013, (EU) 2016/1139, (EU) 2018/973, (EU) 2019/472 and (EU) 2019/1022 of the European Parliament and of the Council, and repealing Council Regulations (EC) No 894/97, (EC) No 850/98, (EC) No 2549/2000, (EC) No 254/2002, (EC) No 812/2004 and (EC) No 2187/2005. PE/59/2019/REV/1. OJ L 198, 25.7.2019, p. 105–201
  http://data.europa.eu/eli/reg/2019/1241/oj
- Commission Implementing Decision (EU) 2016/1251 of 12 July 2016 adopting a multiannual Union programme for the collection, management and use of data in the fisheries and aquaculture sectors for the period 2017-2019 (notified under document C(2016) 4329)
  http://data.europa.eu/eli/dec_impl/2016/1251/oj (accessed 13.12.2019 15:20)
- Kindt-Larsen, L., Berg, C.W., Tougaard, J., Sørensen, T.K., Geitner, K., Northridge, S., Sveegaard, S., Larsen, F., 2016. Identification of high-risk areas for harbour porpoise *Phocoena phocoena* bycatch using remote electronic monitoring and satellite telemetry data. Mar. Ecol. Prog. Ser 555, 261-271.
- Kindt-Larsen, L., Dalskov, J., Stage, B., Larsen, F., 2012. Observing incidental harbour porpoise *Phocoena phocoena* bycatch by remote electronic monitoring. Endang. Species Res 19, 75-83.
- Scheidat, M., Couperus, B., Siemensma, M., 2018. Electronic monitoring of incidental bycatch of harbour porpoise (*Phocoena phocoena*) in the Dutch bottom set gillnet fishery (September 2013 to March 2017), Wageningen University, IJmuiden, p. 78.

Title: Development of national and regional ALDFG mitigation policy papers and recommendations on how to approach ALDFG problem in the Baltic Sea in a systemic way.

Submitted by:
WWF Poland

Description of measure
Practical strategies for mitigation of ALDFG problem in the Baltic Sea (e.g. technical recommendations regarding search and retrieval operations, mapping activities) should be complemented with national and regional ALDFG problem mitigation policy papers and introduced to national and regional policymakers, to ensure introduction of systemic solution to national and regional law.

Activity:
Fish and shellfish harvesting (bottom-touching towed gears, professional, recreational)
Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:
Input of litter (solid waste matter, including micro-sized litter)

State:
Litter

Extent of impact:
Introduction of this measure to national and regional law would allow for a proper execution of requirements regarding mapping of ALDFG host areas, retrieval of ALDFG, waste management of retrieved ALDFG and prevention.

Effectiveness of measure
Reduction of negative impact of ALDFG in the Baltic Sea

Cost, cost-effectiveness of measure:
The cost is difficult to estimate at this stage

Feasibility:
The feasibility of the following measure depends on the status of work on national mitigation policy papers in certain countries and further involvement in the process of regional work.

Follow-up of measure:
Monitoring of fishing gear loss rate, including information regarding the type of net, exact location and possible cause of gear loss.

Background material:

https://www.marelittbaltic.eu/documentation (THE BALTIC SEA BLUEPRINT – a step by step roadmap on how to approach Derelict Fishing Gear).

References

Title: Development of standards for quality of seafloor habitat mapping and products

Submitted by:
Denmark
Contact: Marie-Louise Krawack, Ministry of Environment and Food, makra@mfvm.dk

Description of measure

In order to effectively and acurately assess and manage the seabed habitats representative and reliable, seabed habitat maps containing the necessary information are required. Measures should be taken to standardise the quality of habitat mapping procedures (such as coverage, resolution, accuracy, etc.). The standards required will depend on the purpose of the maps, following the purpose of the mapping endeavour. Similarly, a measure is also required to standardise the quality and confidence of the produced habitat maps which equally depends on the purpose for production and use of the maps. Quantitative indicators are required to estimate the quality of both the habitat mapping procedure and the confidence of the habitat maps. The proposed measure is to produce habitat mapping quality standards accompanied by habitat map confidence estimations.

Activity:

Research, survey and educational activities (seismic surveys, fish surveys)

Pressure:

Not applicable

State:

Seabed habitats

Extent of impact:

The meassure can be used on a Baltic wide scale.

Effectiveness of measure

HELCOM held a mapping workshop in November 2019. Here, the need for methodological descriptions and the need for mapping standards were identified. Lack of adequate maps are mentioned as a stumbling block in assessment and management of the seabed by HELCOM. Collecting enough data for producing detailed and high confidence habitat maps is costly and time consuming. However, the purpose of the map determines the required detail. The level of detail in a map depends on the survey plan, collected data type and method, and of the number of validation data points. Habitat maps can easily be misused and misinterpreted if the reader is unaware of the quality and the confidence of the maps. A common HELCOM standard with quantitative estimates for habitat mapping, habitat map production, metadata content, and a confidence assessment measure is required. Habitat maps produced with the proposed standard will effectively show areas with information and data gaps that exhibit low confidence, and where more data is required. The produced maps will equip the stakeholders and end users with quantitative information and data-based knowledge of the area they are working on. The resulting habitat maps with their confidence layers can be used to produce fairly reliable, and confident assessment, and management for the status of the marine environment, and the activities at sea. Standardising the habitat maps' production quality and confidence, underpins HELCOM efforts to identify areas where actions are required, also enabling the prioritisation of these areas with respect to funding initiatives and meassures.

Cost, cost-effectiveness of measure:

Cost for the meassure is mainly related to collecting the required experts on seabed mapping (inlcuding geologists and biologists) to propose a set of standards.

Feasibility:

The measures requires only limited ressources. However, the possibility to set and implement standards, may be the main stumbling block for this measure.

Follow-up of measure:

Background material:
The background material listed below show a relevant subset of material for the synopsis proposal.

References

1) Kenny, A. J., Cato, I., Desprez, M., Fader, G., Schuttenhelm, R. T. E. and Side, J. (2003). An overview of seabed-mapping technologies in the context of marine habitat classification.. ICES Journal of Marine Science, 60(2): 411–418.

2) Coggan, R., Populus, J., White, J., Sheehan, K., Fitzpatrick, F. and Piel, S. (eds.) (2007). Review of Standards and Protocols for Seabed Habitat Mapping. MESH.

3) Winter, C. , Backer, V. , Adolph, W. , Bartholomä, A. , Becker, M. , Behr, D. , Callies, U. , Capperucci, R. , Ehlers, M. , Farke, H. , Geimecke, C. , Grayek, S. , Hass, C. , Heipke, C. , Herrling, G. , Hillebrand, H. , Hodapp, D. , Holler, P. , Jung, R. , Krasemann, H. , Kröncke, I. , Kwoll, E. , März, J. , Meyerdierks,
4) D. , Mielck, F. , Millat, G. , Reimers, H. C. , Reuter, R. , Schmidt, A. , Staneva, J. , Stanev, E. , Beusekom van, J. and Wirtz, K. (2016). Wissenschaftliche Monitoringkonzepte für die Deutsche Bucht (WIMO) - Abschlussbericht , [Miscellaneous] doi: 10.2314/GBV:860303926. (in German).

5) Baker, E.K. and Harris, P.T. (2020). Habitat mapping and marine management. In P.T. Harris and E.K. Baker (eds) Seafloor Geomorphology as Banthic Habitat – Geohab Atlas of Seafloor Geomorphic Features and Benthic Habitats. Elsevier, Amsterdam, p. 17-33.

Title: Development of strategies for preventing fishing gear loss in the Baltic Sea by analyzing the fishing strategic context and available options for fishing gear marking

Submitted by:
WWF Poland

Description of measure

Strategies for preventing gear loss should be developed and tested in the Baltic Sea region in different conditions based on the information regarding various fishing gear contexts. Fishing gear marking options, such as the one based on the radio-frequency identification system (RFID), initially tested under the MARELITT Baltic project, should be tested on a larger scale. An analysis regarding currently available systems for reporting of fishing gear loss and possible improvements should be executed and provide grounds for the development of national and regional recommendations in this respect.

Activity:
Fish and shellfish harvesting (bottom-touching towed gears, professional, recreational)
Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:
Input of litter (solid waste matter, including micro-sized litter)

State:
Litter

Extent of impact:
Development and implementation of strategies for preventing fishing gear loss should ensure a decrease of ALDFG problem in the Baltic Sea. Implementation of unified systems regarding fishing gear marking and reporting loss could contribute to the increase of the knowledge regarding amounts of fishing gears, both being currently in use and lost.

Effectiveness of measure

Quantitative information regarding amounts of fishing gears.
Reduction of negative impact of ALDFG in the Baltic Sea.

Cost, cost-effectiveness of measure:

The full cost is difficult to estimate at this stage and will depend on the scale of fishing gear marking system trials, however, e.g. the single cost of the RFID set to mark one net is relatively low

Feasibility:

RFID marking system was examined and initially tested during the MARELITT Baltic project, thus the generated knowledge base, lessons learned and recommendations should make further trials in new areas and conditions more efficient.

Follow-up of measure:

Monitoring of fishing gear loss rate, including information regarding the type of net, exact location and possible cause of gear loss..

Background material:

https://www.marelittbaltic.eu/documentation (*Strategies for preventing gear loss during fishing in Baltic Sea – Report 2*; *Development of a fishing gear marking system based on passive RFID technology – Report 3*).

References

Title: Ensure effective implementation of the Landing Obligation (LO) as required by Common Fisheries Policy (CFP)

Submitted by:

WWF Poland

Description of measure

Landing obligation required by CFP (Article 15) aims to end wasteful discard practice in European seas. In the Baltic Sea LO is in place as of 2015, covering commercially exploited fish stocks which are subject to EU catch limits. Nevertheless a so called “discard ban” is not yet implemented in a sufficient way. European Commission in its report from 2019: COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on the State of Play of the Common Fisheries Policy and Consultation on the Fishing Opportunities for 2020 recognises that compliance with the LO in the EU remains poor.
Discarding practice which still occurs in the Baltic Sea (see references below) causes additional fishing mortality and thus contributes to the poor state of Baltic fish stocks.
What is needed to successfully implement landing obligation is among others:
a) adequate monitoring, control and enforcement to ensure compliance with LO
b) testing and development of new fishing gears, techniques and methods to minimize and avoid discards (and by-catch)
c) address landing obligation properly when setting Total Allowable Catches (TACs) by taking into account additional fishing mortality related to discards when setting TACs

While most of these measures are under responsibilities of EU Fisheries Council (or of both together: EU Fisheries Council and European Parliament), it is essential that BSAP also recognizes the importance of and the need of full implementation of the landing obligation in order to secure healthy Baltic fish stocks.

Activity:

Fish and shellfish harvesting (bottom-touching towed gears, professional, recreational)
Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:

Extraction of target fish and shellfish species and incidental fish catches

State:

Fish

Extent of impact:
Opportunity to involve different stakeholders from the Baltic Sea: fishers, scientists, ministerial officials, NGOs in work to develop new fishing gears, techniques and methods to minimize and avoid discards as well as to exchange and share knowledge on this topic
2) Opportunity to develop a joint "tool kit" on this topic which could be helpful and adapted in other sea basins

Effectiveness of measure
1) Information regarding available methods and techniques which work in the Baltic Sea to successfully avoid or minimize by catch of fish (discards).
2) Analysis of which techniques and methods can be implemented under current fisheries law (without the need to change the law ie. without the need of changing the current technical measures)

Cost, cost-effectiveness of measure:
Costs could be covered using funds from European Maritime and Fisheries Fund (EMFF).

Feasibility:
Initial mapping activities were held during various ALDFG initiatives, including the MARELITT Baltic project, thus the generated knowledge base, lessons learned and recommendations should make further work on this measure more efficient.

Follow-up of measure:
1. Collecting information about new fishing gears, techniques and methods to minimize and avoid discards (and by-catch), being used by fishers.
2. Collecting information about the impact of the developed new fishing gears, techniques and methods to minimize and avoid by-catch of fish on discarding practice (on the level of discards)..

Background material:
1) COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on the State of Play of the Common Fisheries Policy and Consultation on the Fishing Opportunities for 2020 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019DC0274&from=EN
2) Fitzpatrick & Nielsen (2019) - DISCARDLESS: Fourth policy brief on guidelines for the implementation of the discard policy in European regions. http://www.discardless.eu/deliverables/

References

Title: Establishment of a regionally agreed method for assessing in what ways loss and disturbance is causing negative effects on the marine environment.

Submitted by:
CCB (observer)

Description of measure
Sediment extraction and disturbance is frequent in the Baltic Sea. It ranges from direct and indirect activities such as and and gravel extraction, dredging to disturbance from trawl fisheries. A collapsed cod stock is now a reality. The few left are starving, are small and all measures having impact on cod and other fish stocks is more critical than ever to consider. Bottom integrity and benthic habitats are key to the cod and disturbances imparing benthic health must be considered as serious and a key part of the food web dynamics. Without a common framework and agreed assessment method, sea floor disturbances will continue to be handled via a piecemeal approach without considering wider and cumulative implications.

Activity:
Extraction of minerals (rock, metal ores, gravel, sand, shell)

Restructuring of seabed morphology (dredging, beach replenishment, sea-based deposit of dredged material)
Coastal defence and flood protection (seawalls, flood protection)
Solid waste (land-based disposal of dredged material and, e.g. land-fill)

Pressure:

Physical disturbance to seabed (temporary or reversible and recovers within 12 y)
Physical loss (due to permanent change of seabed substrate or morphology and to extraction of seabed substrate)
Input of anthropogenic sound (impulsive, continuous)
Disturbance of species: Other (e.g. barriers, collission)

State:

Seabed habitats
Red listed species and habitats
Noise

Extent of impact:

A better assessment of the long and short term effects of bottom disturbing activities will provide managers with more options locally, regionally and on Baltic wide scale as well.

Effectiveness of measure

A full understading of the permanent loss, disturbance, sealing and relocated materials is key to reach GES. A common approach and agreed methodology to assess impacts and building such a coherent assessment should provide a better understanding of the long and short term effects of bottom disturbing activities will provide managers with more options to consider both in relation to giving permits but also to safeguard and support recovery of e.g. fish stocks at sea and on the coast.

Since the linkages and cumulative impacts are not currently being assessed on a coherent way, a new methodology will likely be more effective and especially if handled by the same authority instead of divided up based on type of activity. All impacts on the sea floor, in open sea and all the way to the coast should be seen as a collective impact and assessed jointly.

In light of the cod stock collapse and the very clear signal from fisheries ministers, specifically pointing to an updated BSAP, as well as the Commission in October 2019, all measures to address the wider environmental problems related to cod must be taken. More resilient benthic habitats and its part in the food web dymanics in the Baltic should be of primary concern.

Cost, cost-effectiveness of measure:

A joint approach to assessing sea floor integrity would likely save resources.

Feasibility:

Follow-up of measure:

Background material:

ICES advice on a seafloor assessment process for physical loss and physical disturbance on benthic habitats, 2019
http://ices.dk/sites/pub/Publication%20Reports/Advice/2019/Special_Requests/eu.2019.25.pdf

Evaluating impacts of bottom trawling and hypoxia on benthic communities, ICES Journal of Marine Science, fsz219, https://doi.org/10.1093/icesjms/fsz219

References

Outcome of Ocotber Fisheries Council and statement made by Minsters and Commission.
https://data.consilium.europa.eu/doc/document/ST-13250-2019-INIT/en/pdf

Title: Guidelines and regulation of the design and use of acoustic deterrent devices
Submitted by: HELCOM EN-Noise
Description of measure: Establishment of common HELCOM guidelines for the design and use of acoustic deterrent devices. Such guidelines should include a list of contexts where deterrent devices have been demonstrated to be efficient in mitigating other impact on marine mammals, or proven to be efficient in preventing undesired behaviour of marine mammals (in particular depredation and destruction of fishing gear). The guidelines should include specifications for recommended frequency ranges, maximum source levels and other relevant parameters, separated into the different uses of the devices and target species.
Activity: Renewable energy generation (wind, wave and tidal power), including infrastructure Aquaculture – marine, including infrastructure Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)
Pressure: Input of anthropogenic sound (impulsive, continuous)
State: Noise. Measure will reduce undesired impact on marine mammals Mammals. Measure will reduce disturbance of non-target species and reduce disturbance on target species to the level required for the desired mitigation effect.
Extent of impact: Various types of acoustic deterrent devices are used to deter marine mammals from installations, fishing gear etc. Some of this use is voluntary; some is mandated by legislation, such as mandatory use of pingers on gill nets in some fisheries to avoid bycatch and the use of seal scarers as mitigation device prior to pile driving and other loud impulsive noise. However, despite well-documented undesired effects of some of these deterrent devices, such as risk of inflicting damage to the hearing of marine mammals, excessive disturbance of non-target species, and use of the devices in cases where the positive effects are undocumented, there are no upper limits to how loud these devices can be and where and when they can be used. On the other hand, there are numerous studies, which have demonstrated large unintended effects of for example seal scarers on harbour porpoises, and there are several suggested changes to the design, which could alleviate the unintentional effects. This includes changing the frequency range and decrease the source level of the signals.
Effectiveness of measure As the measure regulates the use and output from pressure source directly (the deterrence devices), the measure is very effective, given that guidelines are implemented and enforced in national legislation. Deterrent devices, in particular seal scarers, are known to be capable of disturbing seals and porpoises more than 10 km away (Gordon *et al.* 2015, Dähne *et al.* 2017, Mikkelsen *et al.* 2017), which is far more than required to mitigate hearing loss for impulsive sources (pile driving) and for deterrence from fishing gear. Reduction of these unwanted disturbance distances will drastically reduce the pressure on the marine mammals of the Baltic.
Cost, cost-effectiveness of measure: As the measure involves changes in design and use of devices, which are already in use the cost to users is limited and the cost-effectiveness is therefore very high.
Feasibility: High. There is nothing preventing establishment of such guidelines.

Follow-up of measure:
The use of the various types of acoustic deterrent devices should be monitored and the effectiveness of the measure then evaluated by the extent of the use of the different types. Progress would thus be indicated by a decrease in use of the most disturbing types of deterrent devices.

Background material:
The HELCOM Ministerial Declaration (2013) states that the level of ambient and distribution of impulsive sounds in the Baltic Sea should not have a negative impact on marine life. Further it was agreed that human activities that are assessed to result in negative impacts on marine life should be carried out only if relevant mitigation measures are in place.

References

Dähne, M., J. Tougaard, J. Carstensen, A. Rose and J. Nabe-Nielsen. 2017. Bubble curtains attenuate noise from offshore wind farm construction and reduce temporary habitat loss for harbour porpoises. Marine Ecology Progress Series 580:221-237.
Gordon, J., C. Blight, E. Bryant and D. Thompson. 2015. Tests of acoustic signals for aversive sound mitigation with harbour seals. Report to Scottish Government Marine Mammal Scientific Support Research Programme MMSS/001/11. SMRU. pp.
Mikkelsen, L., L. Hermannsen, K. Beedholm, P. T. Madsen and J. Tougaard. 2017. Simulated seal scarer sounds scare porpoises, but not seals: species-specific responses to 12 kHz deterrence sounds. R Soc Open Sci 4:170286.

Title: Integration of work regarding mapping of ALDFG host areas and hot spots in the Baltic Sea region, based on the results of mapping activities held within national and international initiatives (such as the MARELITT Baltic project).

Submitted by:
WWF Poland

Description of measure
Mapping of DFG host areas and hot spots improves the transparency around the ghost fishing issue and is an efficient and practical tool for visualizing the problem. The map as a tool substantially improves the strategic planning of crucial activities at sea, thus it should be standardized and implemented in the entire Baltic Sea region to help to determine cost-efficient retrieval operations and subsequently, improve the reception capacity at strategic harbours. Through improved transparency, the integrated map could help during spatial planning of marine activities, e.g. to avoid DFG clean-up actions to be held in sensitive or cultural heritage areas.

Activity:
Fish and shellfish harvesting (bottom-touching towed gears, professional, recreational)
Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:
Input of litter (solid waste matter, including micro-sized litter)

State:
Litter

Extent of impact:
Mapping of DFG host areas and development of a common platform to share knowledge and collect data could improve the efficiency of DFG operations at sea. Implementation of an unified template for collecting data regarding operations at sea could be useful to summarize outcomes and verify the effectiveness of methodologies used during certain operations.

Effectiveness of measure
Information regarding ALDFG distribution.
Information regarding the effectiveness of the methodologies used during certain operations.
Reduction of the negative impact of ALDFG in the Baltic Sea.

Cost, cost-effectiveness of measure:
If it turns out that it is possible to use the Helcom Map And Data Service as a base for the integration of work regarding mapping, the biggest cost of this measure will be a server maintanance, handling and a technical support.

Feasibility:
Initial mapping activities were held during various ALDFG initiatives, including the MARELITT Baltic project, thus the generated knowledge base, lessons learned and recommendations should make further work on this measure more efficient.

Follow-up of measure:
Monitoring of ALDFG distribution, collecting information regarding retrieved nets.

Background material:
https://www.marelittbaltic.eu/documentation (*Derelict fishing gear mapping and retrival methodologies – Report 1*).
http://marelittbaltic-map.eu/

References

Title Mandatory use of Acoustic Deterrent Devices or other effective mitigation measures to minimize bycatch of the Baltic Sea harbour porpoise (*Phocoena phocoena*)

Submitted by:
CCB (observer)

Description of measure
Contracting parties should agree on mandatory use of Acoustic Deterrent Devices (ADDs), or correspondingly effective mitigation measures, in all gillnet and trammel net fisheries east of E13.5° and north to the Finnish Archipelago Sea at N 60.0°, to minimise and where possibly eliminate harbour porpoise bycatch in the entire range of the Baltic Sea harbour porpoise population. The use of ADD should not be linked to size of boat etc but to the gear type in use. Potentially, if in the relevant areas, also recreational gears should have ADDs.

Activity:
Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational) Fish and shellfish harvesting (bottom-touching towed gears, professional, recreational)

Pressure:
Extraction of bird and mammal species
Incidental catches of birds and mammals

State:
The measure will contribute to the status of a species (harbour porpoise) and mainly to the abundance and population condition of the Baltic Sea harbour porpoise population.
Mammals
Red listed species and habitats

Extent of impact:
This measure could potentially be crucial in saving the Baltic Sea population of harbour porpoise. Although bycatch of harbour porpoises is rare in the Baltic today, given the very small population, the impact at the population level of catching and killing even one fertile female would be devastating. If this measure is applied as suggested in the entire range of the Baltic Sea harbour porpoise population, it has the potential to tip the scales for the population.

Effectiveness of measure

Acoustic deterrent devices, also known as pingers, have been proven to significantly reduce the bycatch rate of harbour porpoises (see for example
Friis, 2017; Kraus et al., 1997; Larsen and Eigaard, 2014). It has previously been a problem to use ADDs in the Baltic Sea since they have attracted seals who learned that the sound of the ADD meant easy access to prey caught in the nets. However, in recent years ADDs have been developed that only emits sound above the hearing frequency of seals, while still being audible to the harbour porpoise which uses high frequency sounds for its echolocation and hence has its main hearing around 120 kHz. Trials in the UK has shown these ADDs to work as intended, and the first tests in the Baltic seem to show the same thing.

Given the concerns of ADDs excluding harbour porpoises from important areas, if other as effective bycatch mitigation methods become available, those should also be considered.

Cost, cost-effectiveness of measure:

The effectiveness of ADDs in preventing harbour porpoise bycatch is high (see for example
Friis, 2017; Kraus et al., 1997; Larsen and Eigaard, 2014), and given the critically endangered state of the Baltic Sea harbour porpoise population cost-effectiveness should be considered high.

Costs related to this measure would be:

- Costs for ADDs
- Costs to replace batteries regularly
- Working time for fishermen dealing with devices, putting them on the nets, checking that they are working, changing batteries etc.

Feasibility:

There are ready technical solutions on the market, and seal-safe ADDs that are not audible to seals and hence do not induce the so-called dinner-bell effect, are readily available from at least two companies. ADDs cost approximately 60€ per unit, so can become quite costly for the individual fisherman, but should be feasible to find funding through for example EMFF. Socially, there might be some resistance to use of ADDs in some groups of fishermen, but trials in active fisheries show that devices are relatively easy to work with and fishermen are not hindered in their work on board.

If other mitigation methods become available there may be similar or completely new challenges.

Follow-up of measure:

It is essential, as highlighted by several instances including the European Commission and ASCOBANS, and as stated in the document compiled by the HELCOM FISHDATA group, that data on fishing effort and bycatch is collected at a much higher level than what is currently done. Such bycatch monitoring should include information on whether or not nets had ADDs or other mitigation measures, and would be essential as monitoring and follow-up for this measure.

Background material:

The HELCOM Recommendation 17/2 on the protection of harbour porpoise states (exact wording is not yet decided on) that bycatch of harbour porpoises shall be significantly reduces aiming at entirely eliminating bycatch in the Baltic Proper. This means that mitigation measures have to be taken both within and outside Marine Protected areas (MPAs).

Measures within MPAs are currently being discussed, and there is a process through Art 11 of the CFP to set joint recommendations on fisheries measures within MPAs where this is necessary to fulfil the conservation objectives of the area. However, there is currently no dialogue to set measures to protect the critically endangered Baltic Sea harbour porpoise outside MPAs. Given the small and declining (North Atlantic Marine Mammal Commission and the Norwegian Institute of Marine Research, 2019) size of the population and the effects that the loss of a fertile female could have on population survival, measures have to be taken in its entire range.

Threats to the Baltic Sea harbour porpoise include, besides bycatch in fishing nets, underwater noise, environmental contaminants and ecosystem changes. Bycatch is an acute threat where interaction between a harbour porpoise and a fishing net often leads to the death of the animal. Bycatch is also the one threat where there are ready solutions. In the long-term, nets should be changed to other types of gear, however, before those alternative fishing methods can show commercial viability, nets will continue to be a direct threat to the Baltic Sea harbour porpoise population.

It should be noted that ADDs have been shown to deter porpoises away from nets, at distances up to approximately 1 km but more often a few hundred meters. Therefore, in areas of high fishing effort and in areas that are important for the Baltic Sea harbour porpoise population, the use of ADDs should be carefully considered. However, strict fisheries regulations such as closures can be implemented in MPAs designated for harbour porpoise, but there is still a need to implement mitigation measures outside MPAs, and ADDs or similar mitigation methods is likely to be the best available solution at present.

References

Friis, C.L., 2017. Deterrent effect of a “Seal-safe” pinger on wild harbour porpoises (Phocoena phocoena) (Masters thesis). Linköpings universitet.

Kraus, S.D., Read, A.J., Solow, A., Baldwin, K., Spradlin, T., Anderson, E., Williamson, J., 1997. Acoustic alarms reduce porpoise mortality. Nature 388, 525.

Larsen, F., Eigaard, O.R., 2014. Acoustic alarms reduce bycatch of harbour porpoises in Danish North Sea gillnet fisheries. Fish. Res. 153, 108–112. https://doi.org/10.1016/j.fishres.2014.01.010

North Atlantic Marine Mammal Commission and the Norwegian Institute of Marine Research, 2019. Report of Joint IMR/NAMMCO International Workshop on the Status of Harbour Porpoises in the North Atlantic. Tromsø, Norway

Title: Phase out all recreational fishing on eel by 2022

Submitted by:

CCB (observer)

Description of measure

The European eel is critically endangered. Currently most countries around the Baltic Sea still allow fishing for eel and including recreational fishing. ICES has repeated since 2003 that all anthropogenic induced mortality must be reduced to zero or as close to zero as possible. Under such circumstances, to allow for the taking of a critically endangered species for recreational purposes is simply unprecedented and unacceptable. It is a matter of national jurisdiction to close all recreational fisheries for eel and all CP in HELCOM should agree collectively to implement such a measure to further the survival of the species before the end of 2022.

Activity:

Fish and shellfish harvesting (bottom-touching towed gears, professional, recreational)
Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:

Extraction of target fish and shellfish species and incidental fish catches

State:

Fish
Red listed species and habitats

Extent of impact:

In all waters and regions in the entire Baltic catchment, throughout the year and on all life stages of eel

Effectiveness of measure

The data situation given at HELCOM WS 20171129 from all CP, and as reported by ICES eel advice etc. points to a situation where the regional recreational catches are likely the same amount as the commercial catch.

This should mean, using estimates, that a closed recreational fishery will likely lead to some 400t-700t eels saved. More importantly, the recreational catches often take place inland in freshwater and EU measures in most cases have not addressed this.

Cost, cost-effectiveness of measure:

Initiating a ban can lead to increased costs of control. However, since most angling organisations in the EU support a ban, the costs of informing anglers can likely be alleviated by such organisations member magazines, websites etc. helping both with informing and controlling anglers. The few countries that have closed this fishery should be able to share information regarding increased costs, problems etc.

Feasibility:

Considering the support for a ban on recreational fishing from angler organisations, a total ban is possible and feasible.

Follow-up of measure:

Background material:

European Anglers Alliance support to EU wide ban on recreational catches of eel:
https://www.eaa-europe.org/positions/eel-2018.html

CCB report on recreational fishing in the Baltic region:
https://ccb.se/wp-content/uploads/2018/02/ccb_recreational_fishing.pdf

HELCOM FISH-M eel meeting 20171129: outcomes and presentations available on HELCOM site.
https://portal.helcom.fi/meetings/FISH-M%205-2017-492/MeetingDocuments/Outcome%20of%20Regional%20Baltic%20Sea%20eel%20WS%20(FISH-M%205-2017).pdf

References

ICES eel advice 2019:
http://ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/ele.2737.nea.pdf

Title: Prioritising mitigation measures in rivers for eel and other fish migration

Submitted by:

CCB (observer)

Description of measure

Besides the preferable option to remove dams completely, mitigation measures to secure eel and other species migration up and downstream dams and hydropower stations have been designed, tested and verified to function well. Efforts upstream is seriously lagging behind in relation to fish in general but for weak swimmers and eel in particular. All CP should set a timeline to mitigate all major obstacles in most important rivers and either remove dams of install functioning mitigation measures such as sloped spaced bars for out migrating fish, and upstream passage for glass eel. Without such measures installed, no releases of relocated glass eel can be allowed and using public funds for such releases above

hydropower stations without functioning mitigation must be considered wasteful and to deliberately inflict harm to eel.

Activity:
Canalisation and other watercourse modifications (coastal dams, culverting, trenching, weirs, large-scale water deviation) Not applicable

Pressure:
Disturbance of species: Other (e.g. barriers, collission)

State:
The eel population is still in critical state and ICES has repeated its advice since 2003 to keep all mortality as close to zero as possible. It is evident that upstream efforts regarding migration barriers has not matched the efforts to reduce fishing.
Fish
Red listed species and habitats

Extent of impact:
The potential increase in out-migrating silver eel is substantial. However, the measures must be coupled with safe passage downstream and out through the Baltic Sea, such as a stopped fishery. Several of the Baltic salmon and sea trout population cannot reach good status unless migration and habitats upstream are secured. More and more habitats are improved but migration barriers and short term regulation of water levels represents a major obstacle to reach good ecological status.

Effectiveness of measure
Tested and verified solutions in several rivers have shown high to very high reduction of mortalities on eels passing hydropower stations, reaching reduction of almost 100%. Both upstream and downstream mitigation that mimics natural river conditions has proven to be effective, but regarding eel, measures for downstream migration is more particular but it does also benefit other species.

Cost, cost-effectiveness of measure:
Mitigation measures such as installing a barrier consisting of an angled/sloped narrowly spaced metal bars with escape hatches is expensive but costs vary depending on each site. Solutions such as barriers to steer the fish to safe passage can be used also at medium or large dams but costs increase dramatically. However, the polluter pays principle must apply and dam owners simply must install such solutions be able to meet the requirements of the WFD as well as the targets set for migratory species /salmon/sea trout) set under HELCOM and for the recovery of the eel. However, installation of expensive mitigation must be linked with a complete protection downstream the dams. If not the costs/price of individual eels for example fished downstream in rivers or on the coast reach rather astronomical numbers.

Feasibility:
Technically, the solutions are known, tested and verified. Removing dams can have social/cultural impacts if dramatically changed landscapes cannot be avoided. Installing steel grids to steer fish to pass safely has little or no such impacts. The major challenge is costs.

Follow-up of measure:
Monitoring of functionality is crucial for any mitigation or compensation measures. Far too many water ways have on paper fish migration contractions installed that do not work at all.

Background material:
The Swedish programme “Krafttag ål” conducted over several years 2015-2017. Programme had two components: protective measures and research and development. The project made a concluding report in English
https://www.energiforsk.se/program/krafttag-al/rapporter/hydro-power-and-eel-2018-505/

BSAC has discussed the need to address upstream efforts related to eel and has noted that HELCOM should be the right forum to address the matters: http://www.bsac.dk/getattachment/Meetings/BSAC-

meetings/Ecosystem-based-management-working-group/FinalreportBSACWGEBM1819092019.pdf.aspx?lang=en-GB

References

Calles et al 2013, Success of a low-sloping rack for improving downstream passage of silver eels at a hydroelectric plant, Freshwater Biology

Piotr Dêbowski et al 2016, Mortality of silver eel (Anguilla anguilla) migrating downstream through a small hydroelectric plant on the Drawa River in northern Poland

Title: Restocking of marine areas with fry of European Eel (Anguilla anguilla)

Submitted by:

Poland, The National Marine Fisheries Research Institute in Gdynia
(contact details: Joanna Szlinder-Richert, jszlinder@mir.gdynia.pl),
based on the Polish Eel Management Plan

Description of measure

Increasing eel stocks in the Baltic Sea, mainly in coastal areas

Activity:

Fish and shellfish harvesting (pelagic towed gears, stationary gears, professional, recreational)

Pressure:

Extraction of target fish and shellfish species and incidental fish catches

State:

[Fish

Extent of impact:

Impact on the population living in the entire Baltic Sea coastal area. Increasing the runoff of silver eels from the catchment basins.

Effectiveness of measure

At present, due to low natural recruitment, the long term objectives of the Eel Management Plans in the Baltic Sea countries can only be achieved by glass eel stocking or pre-grown eels. The efficiency of stocking will be measured on the basis of indicators that have been determined by the Working Group on Eels (WGEEL). These are mortality rates (ΣA, ΣF) and biomass (B0, Bbest, Bcurrent). So far, it has not been possible to introduce a Baltic Resource Management Plan, however, this is the subject of discussions by HELCOM.

Cost, cost-effectiveness of measure:

The cost is estimated by the EU countries on the basis of the stocking density calculated for each of the river basins/coastal waters. The current price for glass eels is around 200 €/kg.

Feasibility:

Follow-up of measure:

On the basis of Council Regulation (EC) No 1100/2007 each country monitors the state of the eel stock and sends the results to the EC every 3 years. Currently mortality rates and biomass are required.

Background material:

References

HELCOM Workshop on Eel and the Baltic Sea (FISH –M 5 2017)
Council Regulation (EC) No 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel

ICES. 2019. Joint EIFAAC/ICES/GFCM Working Group on Eels (WGEEL). ICES Scientific Reports. 1:50. 177 pp. http://doi.org/10.17895/ices.pub.5545
Polish Eel Management Plan

Annex 1. Format for synopses on potential new measures/actions for the updated Baltic Sea Action Plan

To support the selection of new measures and actions for the updated Baltic Sea Action Plan, submission of synopses on potential new HELCOM actions is invited. HELCOM 40-2019 agreed that synopses on potential new HELCOM measures and actions can be submitted by the Contracting Parties, HELCOM subsidiary bodies, international projects and HELCOM Observers.

The aim is that the synopses should summarize existing information in a format that can be used as background information for BSAP update workshops and working group meetings. The information should also provide data and information that can be used to incorporate the potential new measures as part of the model that will be developed to analyse sufficiency of measures. They should thus be relatively short, but still provide technical information i.e. on the target of the measures (e.g. activity, pressure or state component) and information on the potential effect of the measure. References to scientific articles, project deliverables and/or reports should be given to allow the reader to find further information and justification on the potential of the measure to contribute to achieving good environmental status in the Baltic Sea.

The synopses on potential new HELCOM measures/actions should be submitted to the Secretariat (ullali.zweifel@helcom.fi) by end of 2019 at the latest, but it is encouraged that they are submitted as soon as possible. This document provides guidance and a template for the preparation of the synopses.

Guidelines for preparation of synopses:

Topics: there is no fixed list but a list of potential topics is provided in document 4, section 2, HELCOM SOM Platform 1-2019.

Focus: potential new measures/actions, or strengthening or improvement of existing measures, to reduce pressures on the Baltic Sea or to protect biodiversity. “New measures” refer to measures that are new to HELCOM and could thus include measures that are already implemented at a national level in one/some of the countries. “Strengthening” refers e.g. to setting stricter limit values, more stringent spatial restrictions to activities, to existing measures. “Improvement” refers e.g. to technical improvements of existing measures based on recent developments.

Length: the proposed length is one page per potential measure. In case the syntheses/synopses include information on a set of related measures, the length can be increased accordingly.

Disposition: the information provided should be evidence-based, objective and comprehensive i.e. to give factual information on the measure/action based on existing research and case studies, and to assemble information from several sources as relevant.

Template and guidance

Title
[*Provide a title that gives immediate understanding of the measure (e.g. recycling of agricultural waste by use of on-farm anaerobic digestion, use of gypsym to reduce phosphorus loads from agricultural land, improved river restoration for migratory fish)*]

Submitted by:
[*Specify e.g. country, HELCOM network/working group/expert group etc, HELCOM observer, international project, and contact information*]

Description of measure
[*Free text.* ***Indicative length: 100 words****. Description should be short and succinct*]

Activity:
[Drop-down list: Activity that the measure is addressing. Additional drop-down lists can be copy/pasted as necessary.]
Choose an item.

Pressure:
[*Drop-down list: Pressure that the measure is addressing. Additional drop-down lists can be copy/pasted as necessary.*]
Choose an item.

State:
[*Drop-down list: State component that the measure is addressing. Additional drop-down lists can be copy/pasted as necessary.*
Add further specification as free text e.g. if the measure will contribute to an improvement 1) of a specific element (e.g. species, habitat, substance, type of litter) and 2) of a specific parameter/feature (e.g. abundance, concentration, amount, population condition)]
Choose an item.

Extent of impact:
[*Free text. Include, as relevant, information on the extent of impact of the measure, e.g. if the impact is local, within coastal waters, sub-basins, Baltic wide scale. Provide physical units if possible*]

Effectiveness of measure
[*Free text:* ***Indicative length 300 words****. Summary of results of testing/implementing the measure and any quantitative information on its effectiveness. In the case of conservation measures; indicate which species, habitats, functions etc that the measure will contribute to preserving. Include if available estimations on the effect of implementing the measure on a region-wide scale*.]

Cost, cost-effectiveness of measure:
[*Free text: indicate any known or likely sources of cost and/or effectiveness data of the measure*]

Feasibility:
[*Optional: provide views on feasibility of implementing the actions e.g. technical, economic, social*]

Follow-up of measure:
[*Optional: indicate information potential or existing follow-up system for the measure, e.g. indicators, monitoring programme*]

Background material:
[*Free text: Clarify choice of background material for the synopses, e.g. does it represent a comprehensive overview of results with regard to the measure or a sub-selection*]

References
[*As many references as needed to support the information summarized in the document*]