Baltic Marine Environment Protection Commission

Continuation of the project on Baltic-wide assessment of coastal fish communities in support of an ecosystem-based management

FISH-PRO II 5-2018

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Document title	Update of the coastal fish monitoring guidelines
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Background

The need to update and harmonize the HELCOM monitoring guidelines stems back from the second meeting of State and Conservation in 2015. That meeting discussed the review of the HELCOM COMBINE manual and the need to develop new monitoring guidelines and update existing ones. STATE & CONSERVATION 3-2015 agreed on using a new template for HELCOM monitoring guidelines for the harmonization of contents of all the different HELCOM monitoring guidelines.

FISH-PRO II 3-2016 noted that STATE & CONSERVATION 3-2015 accepted the template for HELCOM monitoring guidelines and agreed to use it when updating the monitoring guidelines for coastal fish in 2018.

The template is attached to this document as Annex 1. Annex 2 contains the current guidelines for the coastal fish monitoring, last updated in February 2015.

Action requested

The Meeting is invited to agree on the tasks and time schedule for updating the coastal fish monitoring guidelines in 2018 to the new template format (attached).

Annex 1 Template for HELCOM monitoring guidelines

1. Background

Length: 1/2–1 page.

1.1 Introduction

Short introduction of the topic/species/substance under monitoring, what is monitored, how and by whom and relevant definitions.

1.2 Purpose and aims

Brief description on why the monitoring is carried out and its aims.

2. Monitoring methods

2.1 Monitoring features

More detailed description on the monitoring in question (species/substance/target of monitoring), if relevant.

2.2 Time and area

Provide reference and direct links to the temporal and spatial information in the Monitoring Manual.

2.4 Monitoring procedure

2.4.1 Monitoring strategy

A general short description of the monitoring strategy e.g. why certain methods are used

2.4.2 Sampling method(s) and equipment

A description of the field sampling method(s) and equipment(s) used

2.4.3 Sample handling and analysis

A description of how samples are e.g. stored, pretreated and analytical methods

2.5 Data analysis

How tentative further treatment of data and calculations are executed e.g. equations, conversion factors, statistical analysis

3. Data reporting and storage

Format for data reporting, where the data is reported e.g. specific database

4. Quality control

4.1 Quality control of methods

4.2 Quality control of data and reporting

5. Contacts and references

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Annex 2

Guidelines for coastal fish monitoring sampling methods of HELCOM

ver 2014-10-13

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BACKGROUND

Coastal fish communities in the Baltic Sea generally harbour a mixture of species with a marine and freshwater origin. In the more western parts of the Baltic Sea (The Sound and Kattegat), however, the increasing salinity gradient renders a much lower segment of freshwater species. There is substantial variation over the year in the structure of the coastal fish communities (Olsson et al. 2012), where species of a freshwater origin that prefer higher water temperatures as perch (*Perca fluviatilis*) and fishes from the carp family (*Cyprinidae*) are dominating during the warmer period of the year (HELCOM 2012). During early spring, late fall and winter the segment of migratory species of a marine origin as herring (*Clupea harengus*) and cod (*Gadus morhua*), and those species preferring cooler waters as whitefish (*Coregonus maraena*) is usually higher (Olsson et al. 2012). There is also variation in species composition from the sheltered parts of the coastal zone to the more open and exposed parts. Species of a freshwater origin that prefer higher water temperatures generally dominates the fish community in the inner and more sheltered parts of the coastal zone, whereas marine and migratory species of fish become more common farther out from land. In the more western parts, marine species preferring higher wtaer temperatures dominates the fish community in more sheltered parts and during the summer, whereas those species preferring cooler waters are more abundant during fall, winter and spring and in more exposed areas. Truly coastal fish species in the eastern parts of the Baltic Sea are commonly demersal and of freshwater origin. They mainly reside in shallow coastal areas, are local in their appearance, and thus seldom migrates long distances, and are rather tightly bound to their preferred habitat (Saulamo & Neuman 2002; Laikre et al. 2005). As highlighted above, however, it is common with a significant segment of migratory and marine species in coastal fish communities in the Baltic Sea, dependent on the season and location in the coastal zone.

Fish are to an increasing extent studied in environmental science, with coastal fish representing no exception. One reason for this might be that the composition of the coastal fish community has a substantial effect on ecosystem functioning and services (Eriksson et al. 2011). Weak populations of predatory fish species might for example release smaller fish species from predation and trigger a trophic cascade causing blooms of ephemeral algae (Sieben et al. 2010; Eriksson et al. 2011). The structure and function of coastal fish communities might hence serve as good indicators of the environmental and ecological state of coastal ecosystems. Despite that the landings and hence economic revenue for the commercial fishery on coastal fish species represent only a fraction of the offshore pelagic and demersal fishery in the Baltic Sea (ICES 2014), the target coastal species are of high socio-economic importance in being highly valued in both the recreational and small-scaled coastal fishery. Standardized techniques for long-term monitoring and predictions of the size and productive capacity of fish populations, as well as continuous control of their health in a wide context are thus required.

With the implementation of international agreements and legislative acts and directives as the Baltic Sea Action Plan (BSAP, HELCOM 2007) and Marine Strategy Framework Directive (MSFD, Anon 2008), increased attention has been devoted to monitoring and assessment status the different ecosystem components of the Baltic Sea. Coastal fish communities comprise an important segment of this work, and indicators to assess the status of coastal fish communities with respect to the BSAP and MSFD has been proposed within HELCOM (HELCOM 2013). Harmonized and comparable monitoring and assessment strategies across the different parts of the Baltic Sea are hence a prerequisite for the implementation of the BSAP and MSFD.

Coastal fish monitoring in the Baltic Sea has a long tradition, dating back to the 1960s in some areas (Olsson & Andersson 2012). Today, monitoring of coastal fish is in some way undertaken in all Baltic countries (Figure 1). Since 2003, the HELCOM expert network for coastal fish has coordinated monitoring and assessments of coastal fish in the Baltic Sea. Over the years the network has existed on a project basis under the acronyms HELCOM FISH, HELCOM FISH PRO and HELCOM FISH PRO II, with the current project period lasting until mid 2018.

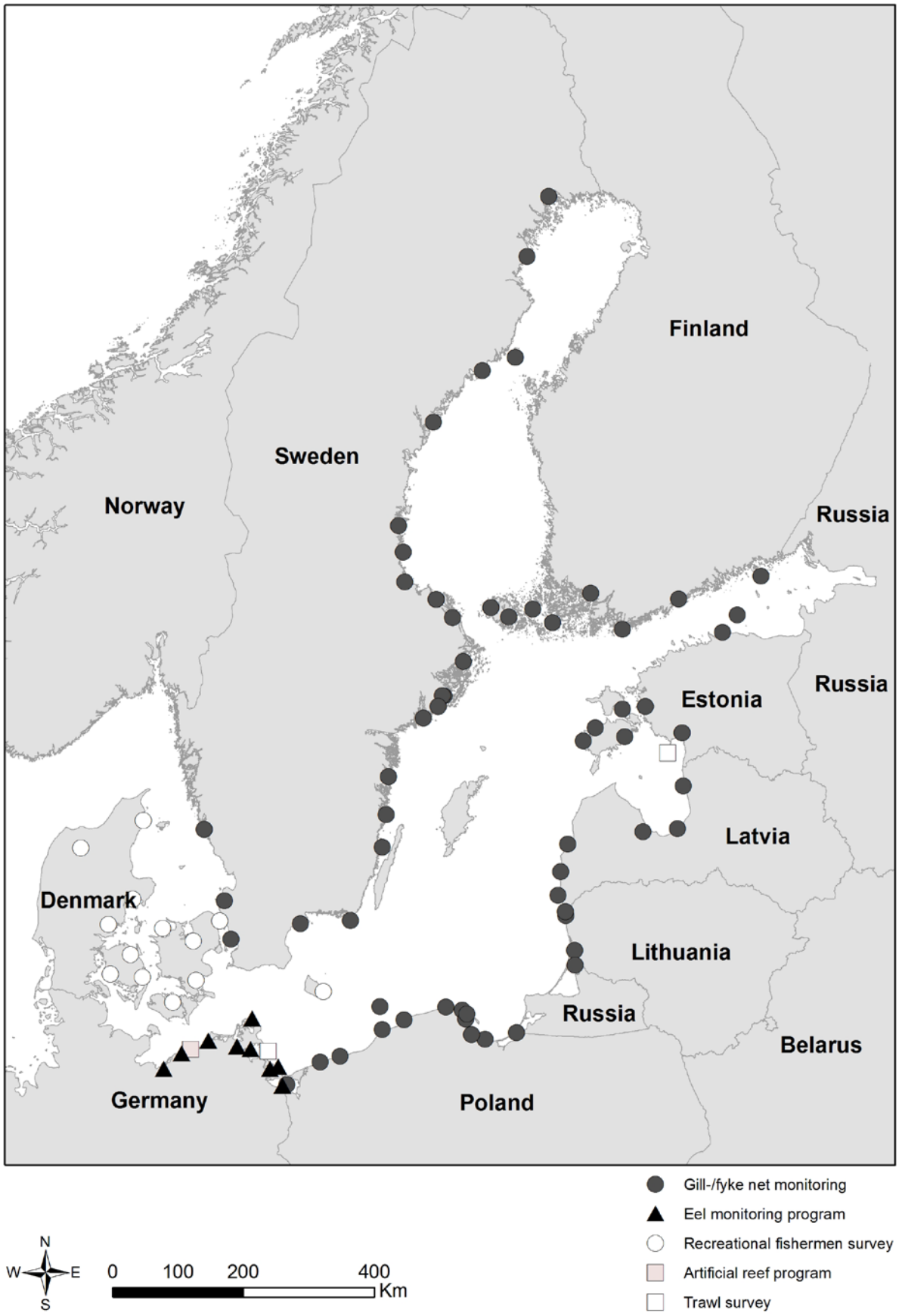

Figure 1. Map with coastal monitoring areas in the Baltic Sea. For areas along the Polish coast, the locations represents the pilot studies for the Polish coastal fish monitoring programme in 2011. Only some of these will be monitored in the actual monitoring program starting in 2014.

The last update of the HELCOM guideline for coastal fish monitoring was published in 2008, and a revision has been brought to focus with the establishment of new monitoring programs and the needs of the BSAP and MSFD. This document was produced to describe the methods and gears used, and variables monitored to study coastal fish populations in the HELCOM area of the Baltic Sea. Country-wise information about this are listed in tables. The guidelines of this document could also serve as a platform for an integration of biochemical/physiological data and contaminant concentrations with basic ecological data.

Monitoring strategy

Coastal fish communities are influenced by a plethora of impacting variables including overexploitation, large-scale climate forcing, eutrophication, pollution, habitat degradation, trophic interactions and alien species (Olsson et al. 2012). Despite that there is a general understanding of the impacts of all these variables little is known about their relative importance. The current monitoring strategy is designed to primarily monitor changes in the fish communiteis in relation to the impact of eutrophication, habitat alteration, climate change, toxic substances and fishing.

The common monitoring strategy is to monitor interannual changes at fixed stations, and to follow the relative abundance of different segments of the coastal fish community in each area (Thoresson 1996; Neuman et al. 1999). Monitoring is generally performed using passive gears, such as gill nets, fyke nets or trap nets, but active gears as bottom trawl is used in some areas. In monitoring the impact of toxic substances, an integrated approach including additional parameters and variables is preferred (Owens 1991, Sprague 1991, Munkittrick 1992).

The monitoring areas generally target reference areas where direct human impact is comparably small, with the aim of detecting large-scale changes in the environment. Focal species are generally those locally abundant and of a freshwater origin, with segments of marine and migratory species dependent on the season and geographic position as described above.

Coastal fish monitoring based on fisheries independent surveys are or have been undertaken in all countries around the Baltic Sea. Data for assessing coastal fish community status should hence preferentially be based on this source of data. In some region of the Baltic Sea, however, data from fisheries independent surveys are lacking. A potential solution to this is to make use of the data collected of coastal fish species in the data collection program that is nowadays implemented in all EU countries (Lappalainen 2014), or to use recreational fishermen surveys as undertaken in Denmark (Pedersen et al. 2005; Sparrevohn et al. 2009; Støttrup et al. 2012; Kristensen et al. 2014). In the methods description that follows, separate information is provided dependent on the source of data collected.

The fishery-dependent monitoring design presented in this guideline is, at first hand, aimed to produce information of the fish community status in rather local areas. When establishing a new coastal fish monitoring program it is advisable to use the information presented in this guideline. The design of the program should be adapted according to the specific conditions of the area in focus, but to make the data from the program as comparable as possible across areas and to hence facilitate common assessments in the future, it is advisable to use the Nordic coastal multi-mesh gillnets and the recommended sampling strategy as described below. Both Finland, Poland, Germany and Sweden use this gear in each of the recently established coastal fish monitoring programs. When planning to cover larger coastal areas, however, several illustrative examples of adequate sampling desings and approaches can be found in Gitzen et al. (2012). The strategies presented in this literature are though both very expensive and work-demanding, and currentlythere is no experience and application of these strategies and designs for coastal fish monitoring in the Baltic Sea.

Programme design

Responses at the community level are monitored by analysing relative changes in the abundances of populations. Populations and functional groups of a freshwater origin generally respond positively to increased water temperatures and decreased salinity levels, whereas the opposite is true for marine species and those

sensitive to higher water temperatures (Olsson et al 2012). Cyprinids are generally acting as sensitive indicators of coastal eutrophication in the Baltic (HELCOM 2006), whereas piscivores are sensitive to for example fishing and predation from apex predators (HELCOM 2012).

The coastal fish monitoring programs are also generally designed to sample within-population characteristics like age- and size structure, growth and reproduction. Whereas this information can readily be extracted for a sub-set of the species within the fishery independent surveys, the information collected from fishery dependent surveys is generally more limited in this respect, especially concerning size structure.

Independent of type of monitoring program, not all species and sizes within the coastal fish community are sampled representatively (HELCOM 2012). Within the fishery independent surveys monitoring typically occurs in August with good representation of demersal and benthopelagic species of a freshwater origin. Most frequently occurring species are perch, roach (*Rutilus rutilus*), ruffe (*Gymnocephalus cernuus*) and Baltic herring (*Clupea harengus*). In some areas monitoring is undertaken during the colder parts of the year, and as a result the occurence of marine species as cod and flounder (*Platichtys flesus*), but also freshwater species as whitefish are more abundant. Irrespective of season, the gears used typically only sample indivuduals above 12-14 cm (dependent on gear), representatively (HELCOM 2012). Small bodied species, those with eel-like body forms and sedentary behaviour (as for example pike, *Esox lucius*) are not sampled representatively in the gill nets used. On the west-coast of Sweden, a coastal bottom trawl survey has been carried out since 2001. Coastal areas in the Northern parts of Kattegat and two areas in Öresund are monitored, and the survey is a complement to IBTS-survey. Focal species in this survey are cod and plaice (*Pleuronectes platessa*).

In Germany, coastal fish are monitored in three programs; the artificial reef project in Nienhagen, the eel monitoring program, and the coastal trawl survey in the Pomeranian Bay carried out by the Univeristy of Rostock and the Sea Fisheries Institute. Niether of these programs has long-term secured financing and were established for other pruposes than environmental monitoring of coastal fish populations and communities. The data from the programs does nevertheless allows for status assessments of coastal fish in German waters.

The Danish Recreational Fish Monitoring Programme is based on voluntary catch and registration by recreational fishermen with fixed stations in most parts of the Danish coasts (Pedersen et al. 2005; Sparrevohn et al. 2009; Støttrup et al. 2012; Kristensen et al. 2014). The catches are performed with standard gillnets (one mesh size, 65 mm) and/or fyke nets with up to three samples monthly in the beginning of each month, and from around April to November. Most frequently occurring species in the combined database from the monitoirng program are flounder, eel (*Anguilla anguilla*), eel-pout (*Zoarces viviparus*) and cod. Because of the mesh size used, the gillnets sample mostly adults, whereas juveniles of flounder and cod may be caught in the fyke nets.

Fisheries-dependent monitoring typically samples a narrower spectrum of the coastal fish community compared to that of the fishery independent surveys. The abundance estimates is biased towards larger fish, the focal species within the fishery, and also to those species typically targeted by the type of gear used. Within the European Data Collection Framework Regulation (European Comission 2008) all species within the catch should be registered, but available evidence suggests that this is not consistently achieved for the functionally important group of cyprinids. Since the commercial fishery is not tightly restricted to certain time periods of the year, this source of data might, however, provide a higher temporal resolution of the changes in the abundance of certain coastal species. Commercial catches as such roughly indicate the changes in the fish stocks, if the effort is moderately stable. However, catches per unit of effort (CPUE) from the gear types that are targeted for a given fish species are much more useful and generally assumed to be linearly dependent on the density of the catchable stock, but in some cases the effort data (e.g. number of fishing days) may not be accurate enough or missing (Lappalainen 2014). In those cases, for instance the number of commercial fishermen might be used as a proxy for the effort. If the main fishing season is restricted to the spawning time, CPUE from that period is most reliable. Moreover, effort should be included only for those fisheries where the given species is included in the catch. For instance, in the calculation of perch CPUE, the whitefish gillnet effort should be ignored even if the mesh sizes are similar.

Other measurements on the individual level, which are outside the scope of the basic programme described here, such as contaminant analyses, biomarkers, physiology, pathology etc, can easily be added (see Neuman 1985). The basic programme can be (and in some countries already is) applied both in reference areas (i.e. areas without local anthropogenic influence), and in hot-spot monitoring. Moreover, monitoring of fish diseases could also be included in the basic monitoring programme (Thulin et al. 1989).

MONITORING METHODS

General

One of the main objectives in marine and coastal management and conservation is to retain a natural abundance and species composition of the fish community. Most methods for monitoring changes in fish abundance catch several species, and information on changes in the species composition of the community can thus also be extracted. The absolute density of a species or population can, however, not be measured directly. Instead, focus is on changes in the relative measure catch per unit of effort and in the species composition. For fishery independent data, information on the effort is readily available, but for fisheries-dependent data sources the reliability of the information on efforts is usually highly variable and relies heavily on the interest and accuracy of individual fishermen (Lappalainen 2014).

Abiotic ambient factors play an important role for the behaviour and metabolism in fish. Activity in fish, for example, normally increases with increasing temperature, something that could potentially influence the catches in passive nets. Activity may also be influenced by changes in the wind conditions, currents, salinity and water transparency. Moreover, since fish are poikilotherm organisms, their metabolism, and thus growth and survival, is strongly influenced by temperature. Growth capacity has for example a strong positive temperature dependency up to an optimum temperature depending on the species and size. Furthermore, survival during the first year of life is both directly and indirectly, via food uptake and growth, linked to temperature. Consequently, when analysing data from fish monitoring, it is essential to include temperature data. Variation in other important abiotic factors should also be registered since they are of importance for the interpretation of the catch data.

Below the information provided is divided into the three type of data sources available; fisheries independent data, recreational fishermen surveys and fishery dependent data.

Fishery independent data

Choice of gear

The choice of nets determines the part of the fish community and size- and age-distribution in focus for the study. Net sets have been extensively used by fisheries biologists to study fish communities. The basic unit in the recommended programme is a series of four nets with different mesh sizes, set in a locality – ”station”– with uniform (hydrographical) conditions. In the northern Baltic, however, depths and substrates often show a considerable small-scale variation, making it difficult to find uniform areas large enough for a representative use of four nets. A multi mesh-size coastal survey net was therefore developed to allow a representative sample of fish to be collected. Coastal survey nets have been widely used in the Gulf of Bothnia, along the Finnish coast of the Gulf of Finland, and along the Polish coast. In all other parts of the Baltic, net series or standard gillnets have been and are used. The Nordic coastal multi-mesh gillnets is a more recently developed multi mesh-size net, which since 2001 is used in Sweden, Åland, Finland, Germany and Poland (Appelberg et al. 2003, Söderberg et al. 2004, Söderberg 2006). In the southern (German coast) and western parts (Kattegat) of the Baltic Sea area, fyke nets, gillnets and trammel nets have been and are currently used to monitor coastal fish communities. Due to harsh environmental conditions in river mouths and exposed coastal areas, linked to strong currents and winds, as well as debiris in the water, bottom trawl is used in some coastal areas along the Polish and German coasts.

Description of the gears used

The coastal survey net consists of 3 m (10 feet) deep bottom gillnets. The height in the water is about 2.5 m and the length is 35 m. The lower net-rope (main line) is 10 % longer than the upper net-rope (=38.5 m). The nets are made up of five parts, each 7 m long. These have different mesh sizes and are placed in the following order: 17, 22, 25, 33 and 50 mm (mesh bar). The nets are made of green monofilament nylon of 0.20 mm diameter in the two largest mesh sizes and 0.17 mm in the others. The upper net-rope for coastal survey nets is net-rope and the lower is plastic net-rope (weight = 3.2 kg/100 m). The gear has been widely used in the Gulf of Bothnia and along the Finnish coast of the Gulf of Finland. Today they are only used in two areas on the Swedish coast.

The Polish coastal survey net consists of six 30 m long panels and one 10 m long panel. The total length of the net is hence 190 m and the height in the water about 1.8 m. Each panel is made up of a single mesh size: 10 (10 m long), 17, 22, 25, 30, 40 and 50 (all 30 m long) mm (knot to knot). The floatline weighs 0.9 kg/100m and the lower leadline 3.2 kg/100m. The net is made of green monofilament nylon of 0.12 to 0.20 mm diameter. The gear was used in the exposed coastal waters in Gulf of Gdańsk and Puck Bay during the pilot studies for the Polish coastal fish monitoring programme in 2011 in the summer season. Additional surveys were carried out in 2014. The gear will no longer be used fish monitoring in Poland.

The Polish coastal multi-mesh net consists of six 30 m long panels. The total length of the net is hence 180 m and the height in the water is about 3.0 m. Each panel is made up of a single mesh size: 25, 30, 38, 45, 50 and 60 mm (knot to knot). The floatline weighs 0.9 kg/100m and the lower leadline 3.2 kg/100m. The net is made of green monofilament nylon of 0.12 to 0.20 mm diameter. The gear was used in Vistula Lagoon, Gulf of Gdańsk, Puck Lagoon, Puck Bay and Szczecin Lagoon during the pilot studies for the Polish coastal fish monitoring programme in 2011 in the autumn season. Additional surveys in Puck Lagoon and Puck Bay were carried out in October 2013. The gear will no longer be used fish monitoring in Poland.

Table of where the coastal survey net has been/are used

Country/area	Gear used (YES or NO)	Comments/modifications
Finland	*YES*	The gear was used in some areas until 2004
Åland	*YES*	The gear was used in some areas until 2008
Estonia	NO	
Latvia	NO	
Lithuania	NO	
Poland	*YES*	Polish coastal survey nets and Polish coastal multimesh net used until 2014
Germany	NO	
Denmark	NO	
Sweden	YES	

The set of nets used in July-August consists of bottom set gillnets which are 1.8 m (6 feet) deep and made of spun green nylon. A net consists of a 60 m long stretched net bundle which is attached to a 27 m net-rope (35 cm between floats, buoyancy 6 g/m) and a 33 m lower net-rope (weight 2.2 kg/100 m). A set of nets is composed of four nets with mesh sizes 17, 21.5, 25 and 30 mm. Optionally nets with mesh sizes 14, 33 and 38 can be added to the standard set (the latter is used in Estonia). Yarn thickness is no. 110/2 for all mesh sizes except 33-50 mm (210/2), according to the Tex-system (e.g., 110/ 2 means 2 filaments each weighing 110 g per 10 000 m). The gear is not used in the Gulf of Bothnia.

The set of nets used in July-August

Country/area	Gear used (YES or NO)	Comments/modifications
Finland	NO	
Åland	NO	
Estonia	YES	14, 33 and 38 mm nets are added to standard nets. In some areas also additionally 42, 45, 50, 55, 60 mm monofilament gillnet sets are used.
Latvia	YES	In some areas also additionally 42, 45, 50, 55, 60 mm monofilament gill net sets are used.
Lithuania	YES	In some areas also additionally 45 and 70 mm monofilament gill net sets are used.
Poland	NO	
Germany	NO	
Denmark	NO	
Sweden	YES	The mesh size used is 17, 21.5, 25 and 30 mm.

The set of nets used in October consists of bottom set gillnets that are 1.8 m (6 feet) deep and made of spun green nylon. A net consists of a 60 m long stretched net bundle which is attached to a 27 m net-rope (buoyancy 6 g/m) and a 33 m lower net-rope (weight 2.2 kg/100 m). A set of nets is composed of five nets with mesh sizes 21.5, 30, 38, 50 and 60 mm. Yarn thickness is no. 210/3 for mesh size 60 mm, no. 212/2 for 50–38 mm and no. 110/2 for the other sizes, according to the Tex-system (e.g., 110/ 2 means 2 filaments each weighing 110 g per 10 000 m). The gear is not used in the Gulf of Bothnia.

The set of nets used in October

Country/area	Gear used (YES or NO)	Comments/modifications
Finland	NO	
Åland	NO	
Estonia	YES	
Latvia	NO	
Lithuania	NO	
Poland	NO	
Germany	NO	
Denmark	NO	
Sweden	YES	

The Nordic coastal multi-mesh gillnets consists of 1.8 m (6 feet) deep bottom gillnets with a length of 45 m. The lower net-rope (main line) is 10% longer than the upper net-rope (=38.5 m). The nets are made up of nine parts, each 5 m long. These have different mesh sizes and are placed in the following order: 30, 15, 38, 10, 48, 12, 24, 60 and 19 mm (mesh bar). The nets are made of transparent monofilament nylon of 0.15 mm diameter in the

seven smallest mesh sizes, 0.17 mm in mesh size 48 mm and 0.20 in mesh size 60 mm. The upper net-rope has a buoyancy of 6 g/m and the lower net-rope weigh 22 g/m. The net is used along the Swedish, Finnish and German coast, and was used in transitional waters in Poland (Szczecin Lagoon, Vistula Lagoon, Puck Lagoon, Puck Bay, Kamieński Lagoon) during the pilot studies for the Polish coastal fish monitoring programme in 2011. The newly established coastal fish monitoring program will use the Nordic coastal multi-mesh gillnet as the focal gear. In Germany, Nordic multi-mesh gillnets with a slightly different set up of mesh-sizes are used in the artificial reef program. The net is 49 m long and 2 m deep with the following mesh sizes; 6.5, 15, 20, 26, 35, 50, 70 mm

Table of where Nordic coastal multi-mesh gillnet has been/are used

Country/area	Gear used (YES or NO)	Comments/modifications
Finland	YES	
Åland	YES	
Estonia	NO	
Latvia	NO	
Lithuania	NO	
Poland	YES	Since 2014
Germany	YES	Modified mesh-size (see above)
Denmark	NO	
Sweden	YES	

The trammel- and monofilament gill-nets. These gears are used only in Germany in the artificial reef program. The two-panel trammel net is 50 m lomg with a heigt of 2 m, where the inner wall of net has a mesh-size of 60 mm and the outer wall 350 mm. The mono-mesh gill-nets are 45 m long with a height of 2.4 m and either with a mesh size of 60 mm or 55 mm. In the Pärnu Bay area (Estonia), monofilament gill-nets with mesh sizes 16, 22, 25, 30, 38, 45, 48, 50 and 60 are used.

The fyke nets used in the western parts (Kattegat) of the HELCOM area are 55 cm high with a semi-circular opening and a leader or wing that is 5 m long. They are made of 17 mm mesh in the arm and 10 mm in the crib of yarn quality no. 210/12 in twisted nylon. The fyke net system used in the eel monitoring program along the German coast consist of an external leader net weir (hight 1.8 m, length 100 m, mesh size 10 mm) with a fyke net chamber in each corner. The net square encloses a fished area of 1 ha. In addition, 6 chains of eel traps (4 double chamber fyke nets with an 8 m leader net) are placed inside the 100m x 100 m net square. The leader of the fyke nets are 3 m long and contains chambers with the mesh size of 17, 14 and 11 mm (from the opening to the end of the fyke net).

Table of where Fyke net has been/are used

Country/area	Gear used (YES or NO)	Comments/modifications
Finland	NO	

Åland	NO	
Estonia	YES	
Latvia	NO	
Lithuania	NO	
Poland	NO	
Germany	YES	
Denmark	NO	
Sweden	YES	

Bottom trawl was used during the pilot studies for the Polish coastal fish monitoring programme in 2011. For this purpose four types of bottom trawls with a different mesh bar length in the codend (from 11 up to 30 mm) was used. From 2014 sampling will be performed using a commercial fishery bottom trawl equipped with standardized 10 mm mesh bar length in the codend. The towing speed will be 3.0 knots. Duration of each haul depends on local circumstances, but should be no shorter than 10 minutes. From 2017 sampling involving bottom trawl will be undertaken in estuarian waterbodies characterized by relatively strong river currents. In the Pomeranian Bay, between the Usedom Island and the Oder Bank, Germany used a special bottom trawl (eel-trawl) between 2003 and 2011. The total length (wing and bag) of the trawl is 16.6 m, the minimum mesh size in the codend is 14 mm, and the distance between the wings 10 m. From then the international standard bottom trawl TV3-520/40-10 have been used. In addition to this, a shrimp trawl is used in the survey to catch smaller sized fish and larger evertebrates. The shrimp trawl has a dredge frame with an opening of 2 m, a minimum mesh size in the codend of 5 mm (from knot to knot). Since 2009 bottom trawl surveys have been carried out in Pärnu Bay, Estonia. Demersal trawl (working depth 0.3 m from the bottom) is pulled with the speed of 3 knots for 30 minutes on fixed transects during spring (April/May) and autumn (September-December). The trawl mouth is 2 m high and 6 m wide, distance between doors is 20m and maximum distance between the 8.2 m long trawl wings is 12 m. Mesh size is 60 mm (knot to knot), at the tip of the trawl wings, 45mm at the trawl mouth and decreases gradually to 10 mm at the codend.

Table of where bottom tawl has been/are used

Country/area	Gear used (YES or NO)	Comments/modifications
Finland	NO	

Åland	NO	
Estonia	YES	
Latvia	NO	
Lithuania	NO	
Poland	YES	
Germany	YES	
Denmark	NO	
Sweden	YES	

Sampling strategy and localities

Coastal nets and net series The smallest geographical unit is a *station* at which either a net set or two coastal survey nets are placed. A group of neighbouring stations with similar conditions (depth, exposure, etc.) and similar influence of environmental disturbance forms a *section*. An *area* is a denominated geographical area within which there may be one or more sections. The recommended number of stations and the number of visits per station may vary depending upon the morphometric characters of the area and the abundance of fish. To select stations for trend monitoring a predesign study has to be made. A large number of stations (>20) are visited once to provide a mapping of spatial variability. About 10 stations are then selected for a continued three year evaluation period. Based on these experiences, the number of stations may be further reduced after performing statistical tests of homogeneity. Monitoring of abundance trends, using net sets or survey nets, is generally possible by sampling a minimum of six stations per area.

Exceptions

Estonia uses fixed stations only in Hiiumaa and Kõiguste, and in the cold water (October) monitoring in the area of Küdema. In all other areas, random sampling inside the section(s) is conducted. The number of stations in most areas is at least 30. In Matsalu the number of stations is 40. Near the tiny island Vaindloo, which is in the central part of Gulf of Finland 26 km from mainland, six stations are monitored. In Germany, two artificial reef stations “Nienhagen” and “Rosenort” and two nearby reference stations are continuously monitored using mono-mesh gillnets and trammel nets. Each year, eight to ten surveys throughout the year (January, March (April) May, (July), August, September, October, November, December) are carried out.

Nordic coastal multi-mesh gillnets The sampling strategy is based on depth-stratified random sampling using up to 45 net stations distributed in different depth intervals (Söderberg *et al.* 2004). The smallest geographical unit is a *station* at which one Nordic coastal net are placed. A group of stations within the same depth interval (0-3 m, 3-6 m, 6-10 m or 10-20 m), forms a *section*. An *area* is a denominated geographical area within which there are a number of sections (depth intervals). The recommended number of stations is at least 45 but it may vary depending upon the morphometric characters of the area and the abundance of fish. In Poland, fewer stations per area aree used and the nets are set parallell to the shore in exposed coastal areas. As for the trammel nets and mono-mesh gillnets in the artificial reef program in Germany as described above, eight to ten surveys are carried out throughout the year.

Fyke nets on the Swedish west-coast the smallest geographical unit is a *station* at which two fyke nets joined leader to crib are placed. A group of neighbouring stations with similar conditions (depth, exposure, etc.) and exposed to the same influence of environmental disturbances, forms a *section*. Within a section the bottom depth at the nets must not differ more than 2 metres between stations. An *area* is a named geographical area

within which there may be one or more sections. The recommended number of stations and the number of visits per station may vary depending upon the morphometric characters of the area and the abundance of fish. To select monitoring stations a predesign study has to be made. A large number of stations are visited once to provide a mapping of spatial variability. About 20 stations are then selected for a continued three year evaluation period according to the routines described above. Based on these experiences, the number of stations may be further reduced after performing statistical tests of homogeneity. In Germany, nine areas are monitored, and within each area there are six stations with a geographical coverage of 100 x 100 m.

Bottom trawl was used during the pilot studies for the Polish coastal fish monitoring programme in 2011 in the Gulf of Gdańsk, Puck Bay, Vistula River Mouth, Dziwna River Mouth and Świna River Mouth. The German bottom trawl survey covers a wider sea area. The hauls are located in the area from the near shore up to the offshore on the Oder Bank. Dependent from the environmental conditions, 10 to 35 stations are covered per year. In Estonia six fixed trawl transects are situated three to eight km from shore (water depth five to nine m) to cover the entire length of the Pärnu Bay.

Fishing performance

Fishing techniques

Coastal nets and net series (July-August) are set lightly stretched from an anchored buoy kept at a fixed position during the fishing period. The direction of the net (the set) should be constant when fishing in shallow water. A main rule is that the nets are set parallel to the shore. Before the fishing is started each station must be carefully documented with regard to the type of bottom and position (longitude, latitude). Occasional broken meshes are tolerated. Checks must be made on every occasion when the nets are emptied.

Coastal nets and net series (October) are set lightly stretched from an anchored buoy kept at a fixed position during the fishing period. Before the fishing is started each station must be carefully documented with regard to the type of bottom and position (longitude, latitude). Occasional broken meshes are tolerated. Checks must be made on every occasion when the nets are emptied.

Nordic coastal multi-mesh gillnets are set lightly stretched. The direction of the net should be constant between years when fishing in shallow water. Before the fishing is started each station must be carefully documented with regard to the depth and position (longitude, latitude). Occasional broken meshes are tolerated. Checks must be made on every occasion when the nets are emptied.

Fyke nets along the Swedish west-coast are set tightly stretched at right angles to the shore. The fyke nets are placed in pairs with leader to crib. Stones with buoys are attached with short lines to the inner leader and the outer crib. Before the fishing is started each station must be carefully documented with regard to the type of bottom and position (longitude, latitude). Occasional broken meshes are not tolerated in fyke nets. Checks must be made on every occasion when the nets are emptied. Before the fyke nets are used, they must be checked on land to ensure that during stretching all parts should be extended. In Germany, six randomly selected stations per area are used. After fishing, each station an underwater sonar and videocamera survey is carried out to determine the bottom structure (sandy bottom, stones and algea cover).

Bottom trawl In Germany the trawl is towed with a speed of about two knots, and a standard haul is 30 minutes for the trawl and 20 minutes for the shrimp trawl. From 2014 sampling in Poland using this gear will be performed using a commercial fishery bottom trawl equipped with standardized 10 mm mesh bar length in the codend. The towing speed will be three knots. Duration of each haul depends on local circumstances, but should be no shorter than 10 minutes.

Exposure

The nets are set in the afternoon/eveening and lifted in the morning the following day. Within each area the times for setting and lifting should vary as little as possible between fishing efforts. The time when the nets are

set and collected during October could differ from the time in August due to shorter day-length in October. In Germany the nets are set during the mid day (10-11 am) and lifted 24 hours later.

Fyke nets are emptied daily between 7 and 10 along the Swedish west-coast. They are replaced immediately after being emptied. In Germany, the fyke nets are emptied after 48 hours.

Bottom trawl In Germany the trawl survey is carried out in the fall (September) each year during day time. A standard haul is 30 minutes for the trawl and 20 minutes for the shrimp trawl. In Poland the trawl survey is carried out in the summer (July 25th – August 31th) each year during day time (in the period between sunrise and twilight). A haul is minimum 10 minutes (depending on the local circumstances and abundance of fish caught).

Fishing period

The nets Fishing is done during the period from mid July to mid/end of August, if possible within a 14-day period. Areas to be compared should be fished with as short time difference as possible. In Estonia some areas (Kihnu, Vilsandi, Kõiguste) are fished during the first half of July and the area Pärnu is fished during the spring (May-June) and autumn (October-November). In areas in the Gulf of Finland in the second half of August. In Sweden, some test fishing with nets is conducted later than August 15, but not later than August 31. In Poland fishing is carried out during the period July 25th – August 31th, over a seven day period. In Finland and Åland, the fishing is carried out between the latter half of July and the end of August, each area in about the same week annually. In Germany, fishing is carried out during eight to ten surveys throughout the year (January, March (April) May, (July), August, September, October, November, December).

Fyke nets Fishing is done during the period mid October to mid November, in Sweden, if possible within a 14-day period. Areas to be compared should be fished with as short time difference as possible. In Germany, monitoring is conducted from May to October at water temperatures above 10 °C.

Exceptions

In Estonia fyke nets are used parallel to nets during the summer monitoring to collect data about the eel (*Anguilla anguilla*).

Bottom trawl In Poland sampling season is July 25th – August 31th. In Germany trawling is conducted during September.

Frequency

Coastal nets and net series At least six fishing efforts are conducted at each station yearly. All stations within a section are fished on the same day. If all sections cannot be fished on the same day, the fishing is continued in the remaining sections before returning to the first section.

Exceptions

In Estonia except in Hiiumaa and cold water fishing in Küdema (October), fishing is conducted in 5 to 40 random stations.

In Sweden and Åland the fishing effort are reduced from six nights to three nights from year 2006.

Nordic coastal multi-mesh gillnets One fishing efforts are done at each station each year. For Germany, one visit per station eight to ten times throughout the year (January, March (April) May, (July), August, September, October, November, December) are carried out.

Fyke nets At least six fishing efforts are conducted at each station in Sweden. All stations within a section are fished on the same day. If all sections cannot be fished on the same day, the fishing is continued in the remaining sections before returning to the first section.

Bottom trawl In Germany, the trawl survey covers between 10 to 35 stations per year. In each station, one haul is conducted. Trawling in Poland is strictly limited to the areas of river mounths (Vistula River - three stations, Dziwna River - one station, and Świna River - three stations). Each station will be fished twice (minimum 24 hours between hauls).

Recreational fishermen survey

This type of data collection is currently unique to Denmark. Recreational fishermen are contracted to carry monitoring of coastal fish. The "Key-fishermen project" was initiated in 2005, and is currently covering 18 areas along the Danish coast (Pedersen et al. 2005; Sparrevohn et al. 2009; Støttrup et al. 2012; Kristensen et al. 2014). There is voluntary registration of all fish caught using gillnets and fyke nets on fixed monitoring stations monitored all year around (three times/month). The gillnet used is a standard (commercial) gillnet of mesh size 65 mm, with a total lenght of 45 m. The fyke net is DBL: 80/7 with 8 m net between the two traps. In each area xxx stations are fished, and for each gear type, the total catch is registered by species, numbers per species and length distribution. Effort is registered so CPUE is available for both gear types. This type of catch data dates back to 2005, and the project in its current form will continue until 2016. The nets are set between in the afternoon and lifted the following day in the morning. Exposure time of the gears are always registered.

Fishery dependent data

All commercial fishermen – including also "small-scale fishermen" using vessels under 10 m long – are nowadays obliged to report their fishing activities in EU countries on daily or monthly basis. In the Mecklenburg-Western Pomeranian territorial waters of Germany, however, vessels under 10 m fishing for non-quoted species are not obligied to report landings or efforts. The catch by species and gear, as well as efforts and fishing areas as ICES statistical rectangles (55*55 km grids) are via a log-book reported to national or regional fisheries administration. In the Finnish coast, for example, the catch data has been collected in this form since 1980, and in 2010 over 1300 fishermen reported their catches. Among the several gear-types used in the Finnish log-book for small scale fishery, the gillnet (36-60 mm bar length) is likely the most suitable to provide data for fish abundance indexes.

Since Finland lacks fisheries independent monitoring of coastal fish in many areas along the coastline, alternative data (catches per unit of effort) based on commercial gillnet fishing (36-60 mm bar length) or trapnet fishing is used as indices of the abundance of the target species. The method is most suitable for e.g. perch, pikeperch (*Sander lucioperca*), whitefish, but less useful for bycatch species of no interest for the fishermen, since they may be incompletely reported. Recently commercial exploitation of cyprinids (common bream (*Abramis brama*) and roach) with trap nets has started in the coastal waters of Finland, which will enable the use of CPUEs as abundance indices for these species as well.

QUALITY ASSURANCE AND DATA STORAGE

Currently, the quality of the data collected within the diffrent coastal fish monitorig programs is assured on a national level. Each contracting party has its own quality assurance system within which all data used for common assessments of coastal fish community status has been considered.

Due to lack of financial support there is currently no common data storage system for coastal fish monitoring data in the Baltic Sea. Data is instead stored in national databases from where extratcions are made for common assessments.

DATA COLLECTION

In the following tables every measured parameter (data about the station, ambient data and catch data) are marked with a cross (x) if measured.

Coastal net, net series and Nordic coastal multi-mesh gillnets

x = measured

Parameter		Finland	Åland	Estonia	Latvia	Lithuania	Poland	Germany	Sweden
Station	Latitude and longitude	x	x	x	x	x	x	x	x
	Water depth	x	x	x	x	x	x	x	x
	Bottom type						x	x	
	Disturbance						x		x
Ambient data	Water depth	x	x	x	x	x	x	x	x
	Water temperature, surface	x	x	x	x	x	x	x	x
	Water temperature, bottom	x	x	x	x		x	x	x
	Wind direction	x	x	x	x	x	x	x	x
	Wind velocity	x	x	x	x	x	x*	x	x
	Water current direction								
	Salinity		x		x		x	x	x
	Visibility (Secchi depth)	x	x	x		x	x	x	x
	Air pressure								
	Oxygen concentration				x			x	
Catch	Species	x	x	x	x	x	x	x	x
	Length, 1 mm			x	x	x			
	Length, 1 cm	x (2001-)	x (2001-)				x**	x	x (2001-)
	Length, 2.5 cm	x (-2001)	x (-2001)						x (-2000)
	Weight			x	x	x	x	x	x
	Diseases	x	x	x	x	x	x	x	x
	Stomach content						x***	x	

	Sex						x	x	

* according to Beaufort scale

** standard measurment for most of the fishes; in case of *Gasterosteidae* and *Gobiidae* (excluding round goby) 1 mm precision is required; in case *Clupeidae, Syngnathidae*, smelt and round goby 0.5 cm precision is required

*** in scale (five grades) describing percentage of stomach filing (0 – empty -> 4 - full)

Fyke nets

x = measured

Parameter		**Germany**	**Sweden**
Station	Latitude and longitude	x	x
	Water depth	x	x
	Bottom type	x	
	Disturbance		x
Ambient data	Water depth	x	x
	Water temperature, surface	x	x
	Water temperature, bottom	x	x
	Wind direction	x	x
	Wind velocity	x	x
	Water current direction		
	Salinity	x	x
	Visibility (Secchi depth)	x	x
	Air pressure		
	Oxygen concentration		
Catch	Species	x	x
	Length, 1 mm		
	Length, 1 cm	x	x (2001-)
	Length, 2.5 cm		x (-2000)

	Weight	x	x
	Diseases	x	x

This type of gear is not used in following countries;

Finland, Åland, Estonia, Latvia, Lithuania and Poland

LIST OF MONITORING AREAS

Overview of the where coastal fish monitoring is undertaken. Given is the country, station/area of monitoring, starting and ending year of monitoring, season of monitoring, type of gear used, and type of monitoring program.

COUNTRY	STATION/AREA	STARTING YEAR	ENDING YEAR	SEASON/MONTH	GEAR	TYPE OF MONITORING
Denmark	Limfjord	2005	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	Northern Kattegat coast	2008	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	Western Kattegat fjords	2005	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	Århus Bay	2005	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	Odense Fjord	2005	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	West and south of Funen	2005	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	Great Belt	2005	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	Sejerø Bay	2006	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	Isefjord and Roskilde fjord	2005	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	Sound	2005	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	Præstø Fjord	2005	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	Lolland-Falster	2006, 2009, 2010	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Denmark	Bornholm	2010	Still running	Spring-Autumn	Gill net, fyke net	Recreational fishermen survey
Estonia	Pärnu Bay	2009	Still running	Spring-Autumn	Bottom trawl	Trawl survey
Estonia	Hiiuma	1991	Still running	Summer	Set of nets	Gill-/fyke net monitoring
Estonia	Käsmu	1997	Still running	Summer	Set of nets, fyke nets	Gill-/fyke net monitoring
Estonia	Vaindloo	1997	Still running	Summer	Set of nets	Gill-/fyke net monitoring
Estonia	Kõiguste	2005	Still running	Summer	Set of nets, fyke nets	Gill-/fyke net monitoring
Estonia	Kihnu Island	1997	Still running	Summer	Set of nets, fyke nets	Gill-/fyke net monitoring
Estonia	Vilsandi	1993	Still running	Summer	Set of nets, fyke nets	Gill-/fyke net monitoring
Estonia	Matsalu	1993	Still running	Summer	Set of nets, fyke nets	Gill-/fyke net monitoring
Estonia	Pärnu Bay	2005	Still running	Autumn	Set of nets	Gill-/fyke net monitoring
Estonia	Pärnu Bay	2001	Still running	Spring	Set of nets	Gill-/fyke net monitoring

COUNTRY	STATION/AREA	STARTING YEAR	ENDING YEAR	SEASON/MONTH	GEAR	TYPE OF MONITORING
Estonia	Küdema	1992-97, 2000	Still running	Autumn	Set of nets	Gill-/fyke net monitoring
Finland	Finbo	1991	Still running	Summer	Coastal survey net, Nordic survey net	Gill-/fyke net monitoring
Finland	Brunskär	1991	Still running	Summer	Coastal survey net, Nordic survey net	Gill-/fyke net monitoring
Finland	Hapaasaret	2003	2006	Summer	Nordic survey net	Gill-/fyke net monitoring
Finland	Lumparn	1999	Still running	Autumn	Set of nets, Nordic survey net	Gill-/fyke net monitoring
Finland	Kumlinge	2003	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Finland	Tvärminne	2005	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Finland	Helsinki	2005	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Finland	Kaitvesi	2005	2011	Summer	Nordic survey net	Gill-/fyke net monitoring
Germany	Börgerende	2003	Still running	Year around	Gill net, Nordic survey net, Trammel net	Artificial reef program
Germany	Wismar Bight and Salzhaff	2008	Still running	Spring-Autumn	Fyke net	Eel monitoring program
Germany	North of Kühlungsborn city	2008	Still running	Spring-Autumn	Fyke net	Eel monitoring program
Germany	Northeast of Ruegen Island	2008	Still running	Spring-Autumn	Fyke net	Eel monitoring program
Germany	East of Usedom Peninsula	2008	Still running	Spring-Autumn	Fyke net	Eel monitoring program
Germany	Darß-Zingst Bodden chain	2008	Still running	Spring-Autumn	Fyke net	Eel monitoring program
Germany	Strelasund	2008	Still running	Spring-Autumn	Fyke net	Eel monitoring program
Germany	Greifswalder Bodden	2008	Still running	Spring-Autumn	Fyke net	Eel monitoring program
Germany	Peene river / Achterwasser	2008	Still running	Spring-Autumn	Fyke net	Eel monitoring program
Germany	Stettin Lagoon (German part)	2008	Still running	Spring-Autumn	Fyke net	Eel monitoring program
Germany	Usedom Island/Oder bank	1992	Still running	Autumn	Bottom trawl, shrimp trawl	Trawl survey
Latvia	Daugavgriva	1995	Still running	Summer	Set of nets	Gill-/fyke net monitoring
Latvia	Jūrkalne	1999	Still running	Summer	Set of nets	Gill-/fyke net monitoring
Latvia	Salacgiva	2005	Still running	Summer	Set of nets	Gill-/fyke net monitoring
Latvia	Plienciems	2005	Still running	Summer	Set of nets	Gill-/fyke net monitoring
Latvia	Liepaja	2005	Still running	Summer	Set of nets	Gill-/fyke net monitoring
Lithuania	Monciskes	1993	Still running	Summer	Set of nets	Gill-/fyke net monitoring
Lithuania	Butinge	2000	Still running	Summer	Set of nets	Gill-/fyke net monitoring

COUNTRY	STATION/AREA	STARTING YEAR	ENDING YEAR	SEASON/MONTH	GEAR	TYPE OF MONITORING
Lithuania	Dreverna (Curonian lagoon)	1993	Still running	Summer	Set of nets	Gill-/fyke net monitoring
Lithuania	Atmata (Curonian lagoon)	1993	Still running	Summer	Set of nets	Gill-/fyke net monitoring
Poland	Polish coastal area*	2011	2011, 2015	Summer	Polish coastal survey net**	Polish coastal fish monitoring
Poland	Szczecin Lagoon	2011	2011, 2014-2015	Summer/Autumn	Nordic coastal multi-mesh gillnet /Polish coastal multi-mesh net	Polish coastal fish monitoring
Poland	Kamieński Lagoon	2011	2011	Summer	Polish coastal survey net	Polish coastal fish monitoring
Poland	Dziwna River mouth	2011	2011	Summer	Bottom trawl	Polish coastal fish monitoring
Poland	Świna River mouth	2011	2011	Summer	Bottom trawl	Polish coastal fish monitoring
Poland	Vistula Lagoon	2011	2011, 2014-2015	Summer/ Autumn	Nordic coastal multi-mesh gillnet /Polish coastal multi-mesh net	Polish coastal fish monitoring
Poland	Puck Bay	2011	2011, 2013-2015	Summer/Autumn	Polish coastal survey net, Nordic coastal multi-mesh gillnet, Bottom trawl/ Polish coastal multi-mesh net	Polish coastal fish monitoring
Poland	Puck Lagoon	2011	2011, 2013-2015	Summer/Autumn	Polish coastal survey net /Polish coastal multi-mesh net	Polish coastal fish monitoring
Poland	Vistula River mouth	2011	2011, 2014-2015	Summer	Bottom trawl	Polish coastal fish monitoring
Poland	Słupsk Bank (offshore site)	2011	2011	Summer	Polish coastal survey net	Polish coastal fish monitoring
Sweden	Råneå	1991	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Sweden	Kinnbäcksfjärden	2004	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Sweden	Holmön	1989	Still running	Summer	Coastal survey net, Nordic survey net	Gill-/fyke net monitoring
Sweden	Norrbyn	2002	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Sweden	Gaviksfjärden	2004	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Sweden	Långvind	2002	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring

Sweden	Forsmark	1983	Still running	Summer	Coastal survey net, Nordic survey net	Gill-/fyke net monitoring
COUNTRY	**STATION/AREA**	**STARTING YEAR**	**ENDING YEAR**	**SEASON/MONTH**	**GEAR**	**TYPE OF MONITORING**
Sweden	Lagnö	2002	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Sweden	Asköfjärden	2005	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Sweden	Kvädöfjärden	1989	Still running	Summer, Autumn	Set of nets, Nordic survey net	Gill-/fyke net monitoring
Sweden	Torhamn	2002	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Sweden	Kullen, Skälderviken	2002	Still running	Spring, Summer	Fyke net	Gill-/fyke net monitoring
Sweden	Barsebäck	1999	Still running	Spring, Summer	Fyke net	Gill-/fyke net monitoring
Sweden	Vendelsö	1976	Still running	Spring, Summer	Fyke net	Gill-/fyke net monitoring
Sweden	Mönsterås	1995	Still running	Summer	Set of nets	Gill-/fyke net monitoring
Sweden	Askviken	2009	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Sweden	Lännåkersviken	2009	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Sweden	Galtfjärden	1995	Still running	Autumn	Set of nets, Nordic survey net	Gill-/fyke net monitoring
Sweden	Muskö	1991	Still running	Autumn	Set of nets	Gill-/fyke net monitoring
Sweden	Hanöbukten	2012	Still running	Summer	Nordic survey net	Gill-/fyke net monitoring
Sweden	Vallviksfjärden	2010	Still running	Autumn	Nordic survey net	Gill-/fyke net monitoring
Sweden	Gävlebukten	2011	Still running	Autumn	Nordic survey net	Gill-/fyke net monitoring
Sweden	Vinö	1995	Still running	Summer	Set of nets	Gill-/fyke net monitoring

*Includes a set of monitoring stations in ten water bodies along Polish open coast. During the fish monitoring programme in years 2013-2016 surveys will be carried out in only two chosen stations.

**Since 2014, Nordic coastal multi-mesh gillnet will be used as a standarised fishing gear in each area, except for the Vistula River mouth. The surveys are conducted only in the summer season.

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