Monitoring programme: Biodiversity - Fish
Programme topic: Fish, shellfish and fisheries

SUB-PROGRAMME: OFFSHORE FISH

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REGIONAL COORDINATION

The monitoring of this sub-programme is: **fully coordinated.**

- Common monitoring guidelines: Monitoring is coordinated under ICES following the Manual for the Baltic International Trawl Surveys (BITS) and Manual for International Baltic Acoustics Surveys (BIAS).
- Common quality assurance programme: QA/QC and assessments are performed annually by ICES Baltic International Fish Survey Working Group (WGBIFS).
- Common database: hosted by ICES for sprat, herring and cod.

PURPOSE OF MONITORING (Q4K)

Follow up of progress towards:

Baltic Sea Action Plan (BSAP)	Segments	Biodiversity
	Ecological objectives	Thriving and balanced communities of plants and animals Viable populations of species
Marine strategy framework directive (MSFD)	Descriptors	D1 Biodiversity D3 Commercial fish and shellfish D4 Food webs
	Criteria (Q5a)	1.1 Species distribution 1.2 Population size 1.3 Population condition 3.1 Level of pressure of the fishing activity 3.2 Reproductive capacity of the stock 3.3 Population age and size distribution 4.1 Productivity (production per unit biomass) of key species or trophic groups 4.2 Proportion of selected species at the top of food webs 4.3 Abundance/distribution of key trophic groups/species
	Features (Q5c)	Biological features: Information on the structure of fish populations, including the abundance, distribution and age/size structure of the populations.
	Activities (Q7a, 7b)	Extraction of living resources: Fisheries
Other relevant legislation (Q8a)	Common Fisheries Policy (CFP - DCF)	

Assessment of: (Q4k)

State/Impacts	X	temporal trends, spatial distribution, status classification
Pressures		
Human activities causing the pressures	X	
Effectiveness of measures		

Scale of data aggregation for assessments: (Q10a)

HELCOM assessment unit Level 1: Baltic Sea	X
HELCOM assessment unit Level 2: Subbasin	
HELCOM assessment unit Level 3: Subbasins with coastal and offshore division	
HELCOM assessment unit Level 4: Subbasins with coastal WFD division	
Other	

MONITORING CONCEPTS TABLE

Coordination	**Elements** Q9a (Q5c)	**Parameter** Q9a (Q5c)	**Method** Q9c, Q9d	**QA/QC** Q9e, 9f	**Frequency** Q9h, 9i	**Spatial resolution** Q9g, 9i	**Link to HELCOM core indicators**	**Link to MSFD GES characteristics** Q5b	**Spatial scope** Q4i	**Monitoring started** Q4h	**CPs monitoring**
Regional (ICES)	Fish abundance & biology	Population size (abundance) Size of individuals (length or weight) Species distributional range/pattern Diet	Baltic International trawl survey - Q1 (see WGBIFS and WGBFAS) and HELCOM COMBINE manual	Other	Yearly	Stratified fixed station grid	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	EEZ	1992 (SE 1988)	All HELCOM Contracting Parties

Regional (ICES)	Fish abundance & biology	Population size (abundance) Size of individuals (length or weight) Species distributional range/pattern Diet	Baltic International trawl survey – Q4 (see WGBIFS and WGBFAS) and HELCOM COMBINE manual	Other	Yearly	Stratified fixed station grid	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	EEZ	1992	All HELCOM Contracting Parties
Regional (ICES)	Fish abundance & biology in water column	Population size (abundance) Size of individuals (length or weight) Species distributional range/pattern Migration patterns	Baltic International Acoustic Survey	Other	Yearly	Stratified acoustic transects	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	EEZ	1991	All HELCOM Contracting Parties
Regional (ICES)	Fish abundance & biology in water column	Population size (abundance) Size of individuals (length or weight) Species distributional range/pattern Migration patterns	Baltic International Spring Acoustic Survey	Other	Yearly	Stratified acoustic transects	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	EEZ	2001	All HELCOM Contracting Parties

Regional (ICES)	Fish abundance & biology in water column	Population size (abundance) Size of individuals (length or weight) Species distributional range/pattern Migration patterns	ICES coordinated acoustic survey for herring	Other	Yearly	Stratified acoustic transects	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	EEZ	1991	All HELCOM Contracting Parties
Regional (ICES)	Fish abundance & biology	Population size (abundance) Size of individuals (length or weight) Species distributional range/pattern Diet	International Bottom Trawl Survey – Q1	Other	Yearly	Stratified fixed station grid	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	EEZ	1983 (SE 1972)	DK, SE, SE
Regional (ICES)	Fish abundance & biology	Population size (abundance) Size of individuals (length or weight) Species distributional range/pattern Diet	International Bottom Trawl Survey (see WGBIFS and WGBFAS) – Q3	Other	Yearly	Stratified fixed station grid	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	EEZ	1991 (SE 1972)	DK, SE, SE

Regional (ICES)	Herring larvae abundance	Life history stage (e.g. egg, juvenile, adult) Size of individuals (length or weight) Population size (abundance) Reproduction rate	N20 larval survey, Greifswalder Botten	Other	Yearly	Stratified fixed station grid		1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	EEZ	1977	DE
Regional (ICES)	Fish abundance & biology	Population size (abundance) Size of individuals (length or weight) Species distributional range/pattern Diet	Havfisken – Q1	Other	Yearly	Stratified fixed station grid	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	Territorial waters	1996	DK
Regional (ICES)	Fish abundance & biology	Population size (abundance) Size of individuals (length or weight) Species distributional range/pattern Diet	Havfisken – Q4	Other	Yearly	Stratified fixed station grid	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	Territorial waters	1994	DK

Regional (ICES)	Fish abundance & biology	Population size (abundance) Size of individuals (length or weight) Species distributional range/pattern Die	Solea – Q4	Other	Yearly	Stratified fixed station grid	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	Territorial waters	1992	DE
Regional (ICES)	Commercial monitoring of catch	Composition and number of retained/landed catch Composition and number of discards Age at maturity Size of individuals (length or weight)	RDB- BALTIC	Other	Monthly or quarterly	Sampling metiers of the fishing fleet		1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	EEZ	1970s	All HELCOM Contracting Parties
Regional (ICES)	VMS of fishing fleet	Disturbance rates by human activities Mortality/damage rates to species from a pressure	ICES/HELCOM data call	Other	Monthly	Sampling metiers of the fishing fleet	Cumulative impact on benthic biotopes (pre-core)	3.1.1 Level of pressure of the fishing activity - Fishing mortality (F)	EEZ	2009	All HELCOM Contracting Parties

Regional (ICES)	Population dynamics cod, herring, sprat	Population size (biomass) Mortality rate Size of individuals (length or weight) Reproduction rate	Stock assessment	Other	Yearly	Fish stock time series	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	EEZ	Varies by stock - approx. 1970	All HELCOM Contracting Parties
Regional (ICES)	Population dynamics plaice, flounder, dab, brill, turbot	Population size (biomass) Mortality rate Size of individuals (length or weight) Reproduction rate	Stock assessment (data limited)	Other	Yearly	Fish stock time series	Proportion of large fish in the community (includes population size and individual size parameters)	1.1.1, 1.1.2, 1.2.1, 1.3.1, 3.2.1, 3.3.1, 3.3.2, 4.1.1, 4.2.1, 4.3.1.	EEZ	Varies by stock – approx. 2001	All HELCOM Contracting Parties

Brief description of monitoring

Detailed information on monitoring frequency and spatial resolution has not yet been collected from all countries but will be added.

Element / parameter	**Demersal fish communities/Abundance, distribution, size, age, maturity, sex ratios**
Method	The trawl surveys monitor the demersal fish community and some of the benthos. They are used to estimate the distribution and abundance of fish, the size and age of fish, the maturity and sex ratios. The sampling effort is standardised to provide input to stock assessments. The surveys are carried out by research vessels with fixed station or transect design. The monitoring of catches usually takes place at ports or in laboratories. Samples of the catch are sampled using a range of protocols which have all been documented by ICES PGCCDBS. The stock assessment methods are documented in stock annexes for each stock and the approach is determined by an internationally peer reviewed benchmark process. Bottom trawl surveys are not carried out north of Gotland-Hiiumaa line.

QA/QC	ICES ensures the quality assurance for the sampling methods through the use of protocols, technical blind exchanges, workshops, international peer review and stakeholder engagement in some of the processes.
Frequency	Almost all information collected gives input into the annual fisheries quota considerations. To ensure standardization, the surveys occur at the same time of year and are dependent on the life cycle of the fish and fish migrations.
Spatial Scope	The spatial scope varies and is dependent of the targeted fish stocks. Many surveys overlap and some, such as the herring larvae survey, are very specific to a particular site and season.
Spatial resolution	Surveys and monitoring of the catches offer the finest resolution, but these data integrate more observation noise into the time series. The stock assessments are considered more robust in terms of observation noise, but provide the coarsest time series in terms of spatial resolution.

Element / parameter	**Pelagic fish communities/Abundance, distribution, size, age, maturity, sex ratios**
Method	The acoustic surveys monitor the community in the water column. They are used to estimate the distribution and abundance of fish, the size and age of fish, the maturity and sex ratios. The sampling effort is standardized to provide input to stock assessments. The surveys are carried out by research vessels with fixed station or transect design. Methods should follow ICES survey protocols. The monitoring of catches usually takes place at ports or in laboratories. Samples of the catch are sampled using a range of protocols that have all been documented by ICES PGCCDBS. The stock assessment methods are documented in stock annexes for each stock and the approach is determined by an internationally peer reviewed benchmark process.
QA/QC	ICES ensures the quality assurance for the sampling methods through the use of protocols, technical blind exchanges, workshops, international peer review and stakeholder engagement in some of the processes.
Frequency	Almost all information collected provides input to the annual fisheries quota considerations. To ensure standardisation, the surveys occur at the same time of year and are dependent on the life cycle of the fish and the fish migrations.
Spatial Scope	The spatial scope varies and is dependent of the targeted fish stocks. Many surveys overlap, some, such as the herring larvae survey, are very specific to a particular site and season.

Spatial resolution	Surveys and monitoring of the catches offer the finest resolution, but integrate more observation noise into the time series. The stock assessments are considered more robust in terms of observation noise, but provide the coarsest time series in terms of spatial resolution.

Element / parameter	**Fish Larvae**
Method	The surveys of larvae specifically monitor the abundance and size of the larvae.
QA/QC	ICES ensures the quality assurance for the sampling methods through the use of protocols, technical blind exchanges, workshops, international peer review and stakeholder engagement in some of the processes.
Frequency	Almost all information collected gives input into the annual fisheries quota considerations. To ensure standardization, the surveys occur at the same time of year dependent on the life cycle of the fish and the fish migrations.
Spatial Scope	Pelagic is done through ICES, national do the demersal. The spatial scope varies dependent of the targeted fish stocks. Many surveys overlap, some, such as the herring larvae survey, are very specific to a particular site and season.
Spatial resolution	Surveys and monitoring of the catches offer the finest resolution, but these data integrate more observation noise into the time series. The stock assessments are considered more robust in terms of observation noise, but provide the coarsest time series in terms of spatial resolution.

Activity	**Commercial catch monitoring**
Method	The commercial catch monitoring takes place across the whole Baltic Sea and monitors the size, age and maturity status of caught fish. Sampling is distributed representatively across fleet metiers (segments). The monitoring of catches usually takes place at ports or in laboratories. Samples of the catch are sampled using a range of protocols which have all been documented by ICES PGCCDBS. The stock assessment methods are documented in stock annexes for each stock and the approach is determined by an internationally peer reviewed benchmark process.

QA/QC	ICES ensures the quality assurance for the sampling methods through the use of protocols, technical blind exchanges, workshops, international peer review and stakeholder engagement in some of the processes.
Frequency	Almost all information collected gives input into the annual fisheries quota considerations. To ensure standardization, the surveys occur at the same time of year dependent on the life cycle of the fish and the fish migrations. The monitoring of landings is monthly and usually raised to quarters to provide an overview of annual age/length composition.
Spatial Scope	The spatial scope varies dependent of the targeted fish stocks. Many surveys overlap, some, such as the herring larvae survey, are very specific to a particular site and season.
Spatial resolution	Surveys and monitoring of the catches offer the finest resolution, but integrate more observation noise into the time series. The stock assessments are considered more robust in terms of observation noise, but provide the coarsest time series in terms of spatial resolution.

Activity	**VMS-data**
Method	The VMS time series provides information on fishing fleet activity and distribution.
QA/QC	ICES ensures the quality assurance for the sampling methods through the use of protocols, technical blind exchanges, workshops, international peer review and stakeholder engagement in some of the processes.
Frequency	Continually (the data are collected every two hours by actual location)
Spatial Scope	Sampling metiers of the fishing fleet
Spatial resolution	0.05 x 0.05 aggregated grid within the EEZ

ASSESSMENT REQUIREMENTS

Monitoring requirements and gaps

Monitoring is to be carried out to fulfill assessment requirements of HELCOM ecological objectives that are specified through HELCOM core indicators. The requirements on monitoring can include number of stations, the sampling frequency and replication.

Monitoring requirements

There are annual Baltic wide (EEZ) ICES coordinated surveys taking place for offshore fish that support data collection for CFP (DCF). For territorial waters Member States carry out national surveys.

The trawl surveys (Baltic International trawl survey/ International bottom trawl survey) monitor the demersal fish community and some of the benthos. It is used to estimate the distribution and abundance of fish, the size and age of fish, the maturity and sex ratios. The sampling effort is standardized to provide input into stock assessments.

The acoustic surveys monitor the community in the water column. It is used to estimate the distribution and abundance of fish, the size and age of fish, the maturity and sex ratios. The sampling effort is standardised to provide input to stock assessments.

The surveys of larvae specifically monitor the abundance and size of the larvae.

The commercial catch monitoring takes place across the Baltic and monitors the size, age and maturity status of caught fish. Sampling is distributed representatively across fleet metiers (segments).

The VMS time series provides information on fishing fleet activity and distribution.

The stock assessments should be seen as a synthesis of monitoring information to inform on the trends in population size and productivity and the exploitation impact. These assessments are used to inform decision makers for setting TACs and quotas. WGBFAS meets annually to assess the state of Baltic stocks. For stocks with sufficient data this leads to a forecast of catch options in the next year, while with data limited stocks, other approaches will be used, such as an analysis of trends in abundance estimates or catches.

The 14 fish stocks presently covered by the working group are:

- 3 cod stocks (Kattegat, western, and eastern Baltic)
- 3 herring stocks (SD25-32, SD30, and SD31)
- 2 plaice stocks (SD21-23 and SD24-32)
- Sprat stock (SD22-32)
- Sole stock in 21-32
- 4 flounders stocks (SD22-23, SD 24-25, SD26 and 28, and SD 27nad 29-32)
- brill stock (SD22-32)
- dab stock (SD22-32)
- turbot stock (SD22-32

Gaps	The Large fish indicator (LFI) for the Baltic Sea has been developed for both the pelagic and the demersal community, but as with all LFIs it is developed using trawl survey information only. The trawl survey of the Baltic Sea covers the area inhabited by cod (the southern and western Baltic) as the survey is used to create indices for commercial demersal fish and all fish species are measured. The acoustic survey of the Baltic covers a greater area. However, there are no methods for combining trawl surveys and acoustic surveys to determine an LFI index for the entire fish community or Maximum Mean Length (MML). Also, the spatial distribution of commercial catches needs to be better quantified. At present there is no central database for acoustic surveys (both for trawl information and acoustic signals). ICES is developing a database to hold this information.

Adequacy for assessment of GES (Q5d)

Monitoring should provide adequate data and information to enable the periodic assessment of environmental status, and distance from and progress towards GES as required by MSFD under Article 9 and 11.

Adequate data?	Yes for D3. No for D1 and D4.
Established methods for assessment?	Yes for D3. No for D1 and D4.
Adequate understanding of GES?	Yes for D3. No for D1 and D4.
Adequate capacity to perform assessments?	Yes for D3. No for D1 and D4.

Assessment of natural variability (Q5e)

Quantitative and Expert opinion. The programme (ICES advices EU through a Memorandum of Understanding) uses internationally accepted methods for monitoring and assessing fish stocks. These focus on the population dynamics of individual fish stocks and the pressure of fishing. The weakness in this approach is that the methods are not so well developed for considering D1, D3 and D4.

DATA PROVIDERS AND ACCESS

Data access point	ICES databases (DATRAS, ichthyoplankton, BALTIC RDB, secure VMS database, ICES standard graphs).
Data type (Q10c)	Unprocessed/raw Data Processed Data sets Data Products Modelled data
Data availability (Q10c)	DATRAS ICES Datasets ICES Data Portal: HELCOM
Data access (Q10c)	Open access for survey and stock assessment time series (covered by ICES data policy) Restricted by specific licence licence for monitoring of commercial catches and the VMS data (excluded from ICES data policy and covered by DCF). Data only available for agreed specific tasks and agreement of national data collection bodies is required to access and use the data.
INSPIRE standard (Q10c)	Species distribution
When will data become available? (Q10c)	Data are available annually at different times for different surveys
Data update frequency (Q10c)	Yearly
Describe how the data and information from the programme will be made accessible to the EC/EEA	The data are available through the ICES data centre with the data access limitations as described above
Contact points in the Contracting parties	Contact point to national monitoring programmes will be added.

Has the data been used in HELCOM assessments?	Yes

REFERENCES

Baltic International Fish Survey Working Group (WGBIFS)

Baltic Fisheries Assessment Working Group (WGBFAS)

Herring assessment working group (HAWG)

International Bottom Trawl Survey Working Group (IBTSWG)

Planning Group on Commercial Catches, Discards and Bio-logical Sampling (PGCCDBS)

Report of the Regional Co-ordination Meeting for the Baltic (RCM Baltic) 2013

Stock assessment output data

Working Group of International Pelagic Surveys (WGIPS)