HELCOM INDICATORS

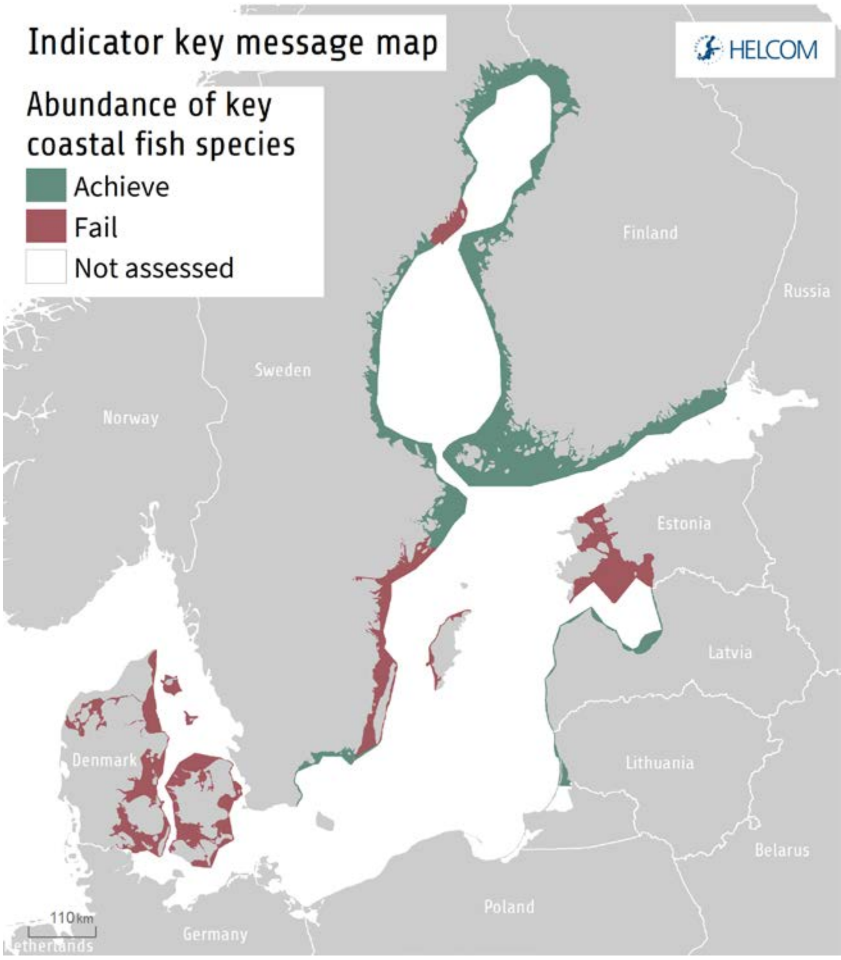
HELCOM core indicator report
July 2018

Abundance of key coastal fish species

Key message

This core indicator evaluates the abundance of typical species of fish, such as perch and flounder, in the coastal areas of the Baltic Sea, to assess environmental status. As a rule, good status is achieved when the abundance is above a set site- and species-specific threshold value.

The current evaluation assesses status during the period 2011-2016.



Key message figure 1. Status assessment results based evaluation of the indicator 'abundance of key coastal fish species'. The assessment is carried out using Scale 3 HELCOM assessment units (defined in the HELCOM Monitoring and Assessment Strategy Annex 4). **Click here to access interactive maps at the HELCOM Map and Data Service: Abundance of key coastal fish species.**

Good status is achieved in in 13 out of the 21 coastal HELCOM assessment units that were assessed (25 of 43 monitoring locations). Generally, good status is more often reached in areas in the northern and eastern parts of the Baltic Sea where perch is the key species (good status is achieved in 21 of 25 monitoring locations). In the western and southern areas where flounder is the key species, the status is more often not good (good status in four of 18 monitoring locations).

The level of confidence in the assessment differs between areas and regions as a result of differences in monitoring methodology, as well as lower temporal and spatial coverage of monitoring in some countries. The methodological confidence is **high** in all areas and the confidence in the accuracy of the assessment is **high** in the majority of the assessment units. The confidence in the temporal coverage is high in all areas except Latvian, Lithuanian and Danish coastal areas, and the confidence in spatial representability is highest in the Finnish and Danish areas but poorer in other countries.

The indicator is operational in the coastal waters of most countries bordering the Baltic Sea. For the time being, it is not applicable in some areas where coastal fish monitoring data are scarce and further studies as well as time series are needed to yield a reliable assessment of these areas. In the future, in line with increasing knowledge, the indicator might undergo further development.

Relevance of the core indicator

Coastal fish communities are of high ecological and socio-economic importance in the Baltic Sea, both for ecosystem functioning and for recreational and small-scale coastal commercial fishery activities. As such, the state of coastal fish communities generally reflects the ecological state in the coastal ecosystems.

Changes in the long-term development of the abundance of coastal fish species mainly reflects effects of changes in the level of human exploitation (fishing and habitat degradation), natural predation pressure, increased water temperature and altered hydrographical conditions, and eutrophication in coastal areas.

Policy relevance of the core indicator

	BSAP Segment and Objectives	MSFD Descriptors and Criteria
Primary link	Biodiversity • Natural Distribution and occurrence of plants and animals • Thriving and balanced communities of plants and animals • Viable populations of species	D1 Biodiversity D1C2 The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured D3 Commercial fish and shellfish D3C2 The spawning stock biomass of populations of commercially-exploited species are above biomass levels capable of producing maximum sustainable yield
Secondary link	Hazardous substances • Healthy wildlife	
Other relevant legislation: In some Contracting Parties of HELCOM potentially also EU Habitats Directive and EU Common Fisheries Policy		

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Abundance of key coastal fish species HELCOM core indicator 2018 (pdf)

Results and confidence

The current evaluation of environmental status using coastal fish covers the period 2011-2016. The evaluation is based on time series data dating back to 1998-2008 using a 'deviation from baseline approach' or a 'trend based assessment', depending on the time series coverage. Evaluations were carried out for 21 of the total 42 ‘scale 3 assessment units’. Data up to 2016 was available for 20 of the assessment units. For more information on assessment units, see Assessment protocol.

Good status is achieved in most of the monitoring locations (25 out of a total of 43 locations). Within some assessment units there are different results compared to the threshold value between monitoring locations, likely reflecting differences in the local appearance of coastal fish communities. When summarizing over HELCOM assessment units, good status is achieved in 13 out 21 assessed units, indicating an overall moderate environmental status of key coastal fish species in the Baltic Sea.

There are, however, some general patterns suggesting that the status depends on the geographic area and species assessed. In more northern and eastern areas, where perch represents the key species, the status is generally good (good status is achieved in 21 out of 25 monitoring locations where perch is the key species), whereas in more southern and western units where flounder represents the key species, status is generally not so good (good status achieved in only 4 out of 18 monitoring locations where flounder is the key species).

Result table 1. Status evaluation outcome per monitoring location and assessment unit for the assessment period 2011-2016. GS = good status, nGS = not good status.

Sub-basin	Country	Coastal area name (assessment unit)	Coastal area code	Monitoring area/data set	Time period assessed	Identity of key species	Monitoring method	Assessment method	Ref. period status	Threshold value	Current value	Status monitoring location	Status coastal area
Bothnian Bay	Finland	Bothnian Bay Finnish Coastal waters	1	Finnish ICES SD 31	1998-2016	Perch	Commercial stats	Baseline	GS	0.07	0.15	GS	GS
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Råneå	2002-2016	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.55	GS	
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Kinnbäcksfjärden	2004-2016	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.53	GS	GS
The Quark	Finland	The Quark Finnish Coastal waters	3	Finnish ICES rect 23	1998-2016	Perch	Commercial stats	Trend	GS	Slope p >0.1 (+)	P slope = 0.0003 (+)	GS	
The Quark	Finland	The Quark Finnish Coastal waters	3	Finnish ICES rect 28	1998-2016	Perch	Commercial stats	Trend	GS	Slope p >0.1 (+)	P slope = 0.66	GS	GS
The Quark	Sweden	The Quark Swedish Coastal waters	4	Holmön	2002-2016	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.77	GS	
The Quark	Sweden	The Quark Swedish Coastal waters	4	Norrbyn	2002-2016	Perch	Gill net	Trend	nGS	Slope p<0.1	P slope = 0.64	nGS	nGS
Bothnian Sea	Finland	Bothnian Sea Finnish Coastal waters	5	Finnish ICES SD 30	1998-2016	Perch	Commercial stats	Baseline	GS	0.18	0.27	GS	GS
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Gaviksfjärden	2004-2016	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.19	GS	
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Långvindsfjärden	2002-2016	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.12	GS	
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Forsmark	2002-2016	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.49	GS	
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Forsmark, long time-series	1998-2016	Perch	Gill net	Baseline	GS	10.34	58.67	GS	GS
Åland Sea	Finland	Åland Sea Finnish Coastal waters	7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Åland Sea	Sweden	Åland Sea Swedish Coastal waters	8	Lagnö	2002-2016	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.16	GS	GS
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Finbo	2002-2016	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.78	GS	
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Kumlinge	2003-2016	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.68	GS	
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Finnish ICES SD 29	1998-2016	Perch	Commercial stats	Trend	GS	Slope p >0.1 (+)	P slope = 0.005 (+)	GS	GS
Northern Baltic Sea	Finland	Northern Baltic Proper Finnish Coastal waters	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Northern Baltic Sea	Sweden	Northern Baltic Proper Swedish Coastal waters	11	Askö	2005-2016	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.44	GS	
Northern Baltic Sea	Sweden	Northern Baltic Proper Swedish Coastal waters	11	Muskö	1998-2016	Flounder	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.1	GS	GS
Northern Baltic Sea	Estonia	Northern Baltic Proper Estonian Coastal waters	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gulf of Finland	Finland	Gulf of Finland Finnish Coastal waters	13	Finnish ICES SD 32	1998-2016	Perch	Commercial stats	Trend	GS	Slope p >0.1 (+)	P slope = 0.99	GS	GS
Gulf of Finland	Estonia	Gulf of Finland Estonian Coastal waters	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gulf of Finland	Russia	Gulf of Finland Russian Coastal waters	15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gulf of Riga	Estonia	Gulf of Riga Estonian Coastal waters	16	Hiiumaa	1998-2016	Perch	Gill net	Baseline	nGS	33.17	32.78	nGS	nGS
Gulf of Riga	Latvia	Gulf of Riga Latvian Coastal waters	17	Daugavgriva	1998-2015	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.67	GS	GS
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, perch	2002-2016	Perch	Gill net	Trend	nGS	Slope p <0.1 (+)	P slope = 0.70	nGS	
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, perch long time-series	1998-2016	Perch	Gill net	Trend	nGS	Slope p <0.1 (+)	P slope = 0.07 (+)	GS	
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, autumn	1998-2016	Flounder	Gill net	Baseline	nGS	11.74	4.24	nGS	
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Vinö	1998-2016	Perch	Gill net	Baseline	nGS	63.85	22.65	nGS	nGS
Estern Gotland Basin	Estonia	Eastern Gotland Basin Estonian Coastal waters	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Estern Gotland Basin	Latvia	Eastern Gotland Basin Latvian Coastal waters	20	Jurkalne	1999-2015	Flounder	Gill net	Baseline	GS	6.22	25.95	GS	GS
Estern Gotland Basin	Lithuania	Eastern Gotland Basin Lithuanian Coastal waters	21	Mon/But	1998-2012	Flounder	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.43	GS	
Estern Gotland Basin	Lithuania	Eastern Gotland Basin Lithuanian Coastal waters	21	Curonian lagoon	1998-2012	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.27	GS	GS
Estern Gotland Basin	Sweden	Eastern Gotland Basin Swedish Coastal waters	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Estern Gotland Basin	Russia	Eastern Gotland Basin Russian Coastal waters	23	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Estern Gotland Basin	Poland	Eastern Gotland Basin Polish Coastal waters	24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gdansk basin	Russia	Gdansk Basin Russian Coastal waters	25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gdansk basin	Poland	Gdansk Basin Polish Coastal waters	26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bornholm basin	Sweden	Bornholm Basin Swedish Coastal waters	27	Torhamn	2002-2016	Perch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.002 (+)	GS	GS
Bornholm basin	Poland	Bornholm Basin Polish Coastal waters	28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bornholm basin	Denmark	Bornholm Basin Danish Coastal waters	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bornholm basin	Germany	Bornholm Basin German Coastal waters	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Arkona basin	Sweden	Arkona Basin Swedish Coastal waters	31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arkona basin	Denmark	Arkona Basin Danish Coastal waters	32	Præstø Fiord	2005-2015	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.39	nGS	nGS
Arkona basin	Germany	Arkona Basin German Coastal waters	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mecklenburg bight	Germany	Mecklenburg Bight German Coastal waters	34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mecklenburg bight	Denmark	Mecklenburg Bight Danish Coastal waters	35	Area south of Zealand (Smålandsfarvandet)	2008-2016	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.33	nGS	nGS
Kiel Bight	Denmark	Kiel Bight Danish Coastal waters	36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kiel Bight	Germany	Kiel Bight German Coastal waters	37	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Belt Sea	Denmark	Belts Danish Coastal waters	38	The Great Belt	2005-2015	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.13	nGS	
Belt Sea	Denmark	Belts Danish Coastal waters	38	Southern Little Belt and the archipelago	2005-2016	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.22	nGS	
Belt Sea	Denmark	Belts Danish Coastal waters	38	Odense Fiord	2005-2016	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.35	nGS	
Belt Sea	Denmark	Belts Danish Coastal waters	38	Sejerø Bay	2005-2016	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.27	nGS	
Belt Sea	Denmark	Belts Danish Coastal waters	38	Århus Bay	2005-2016	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.85	nGS	
Belt Sea	Denmark	Belts Danish Coastal waters	38	Fiords of Eastern Jutland	2005-2014	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.29	nGS	nGS
The sound	Sweden	The Sound Swedish Coastal waters	39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
The sound	Denmark	The Sound Danish Coastal waters	40	The sound	2005-2014	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.14	nGS	nGS
Kattegat	Sweden	Kattegat Swedish Coastal waters	41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	Islefjord and Roskilde fjord	2005-2016	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.01 (+)	GS	
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	Northern Kattegat	2006-2016	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.81	nGS	
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	Northern Limfjord	2005-2016	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.27	nGS	
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	Skive Fiord and Lovns Broad	2008-2016	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.48	nGS	
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	Venø Bay and Nissum Broad	2005-2016	Flounder	Recreational	Trend	nGS	Slope p <0.1 (+)	P slope = 0.53	nGS	nGS

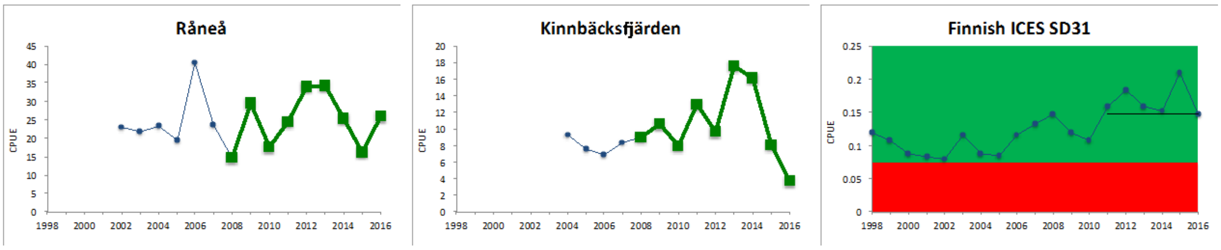
In the northernmost parts of the Baltic Sea (Bothnian Bay and The Quark), the status is generally good. In most monitoring locations the relative abundance of perch is high and stable or increasing. Only in one location (Norrbyn) is the status failing to achieve the threshold, indicating a not good status.

The relative abundances of perch are generally high and stable in the Bothnian Sea, Åland Sea and Archipelago Sea, and increasing in one area (Finnish ICES SD 29).

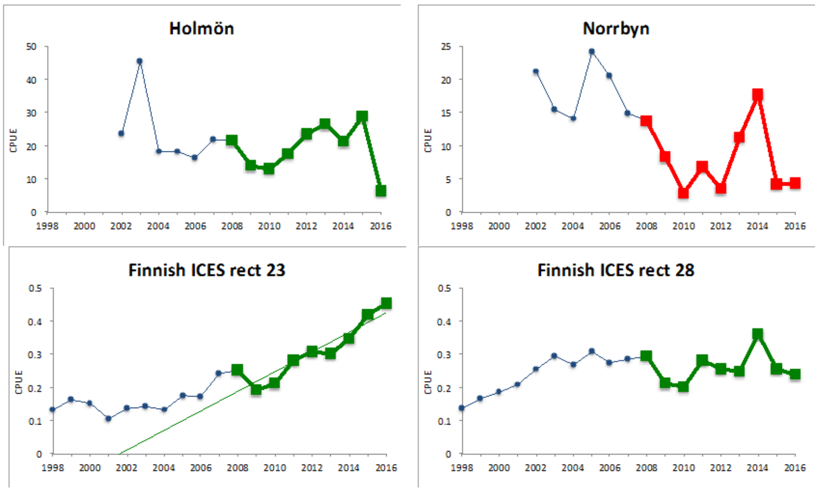
In the central part of the Baltic Sea (Northern Baltic Proper, Gulf of Finland, Gulf of Riga and Gotland Basin) there are differences in the status across the monitoring locations. In the more northern regions (Gulf of Finland and Northern Baltic Proper) and southern areas (Eastern part of the Gotland Basin) the threshold value is achieved, whereas one of the Gulf of Riga monitoring stations (Hiiumaa) and the Swedish locations in the Gotland Basin (Kvädöfjärden and Vinö) are generally assessed as failing the threshold.

In the Bornholm and Arkona Basins there is only data from one Swedish (Torhamn, Bornholm Basin) and one Danish (Præstø Fiord, Arkona Basin) location. The status is recognised as good in Torhamn and not good in Præstø Fiord. In the remaining assessment units and monitoring locations in Danish waters (where flounder is the key species), good status is generally not achieved, even though one location (Isefjord and Roskilde fjord) is characterized by good status.

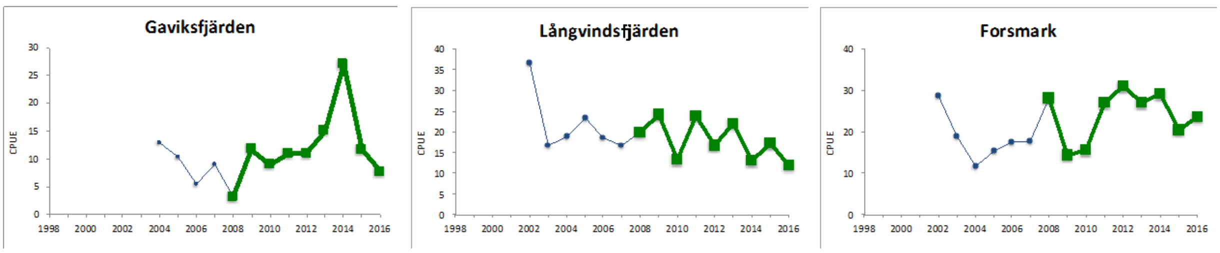
Bothnian Bay

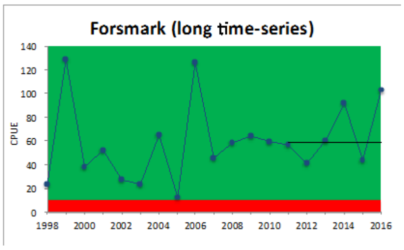


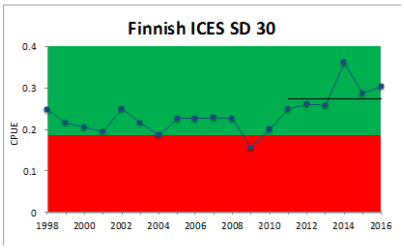
The Quark



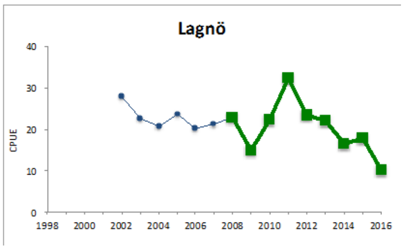
Bothnian Sea



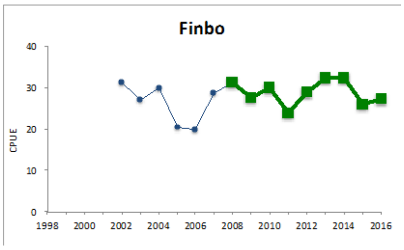


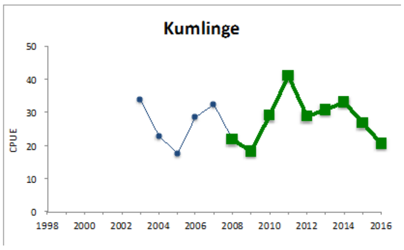


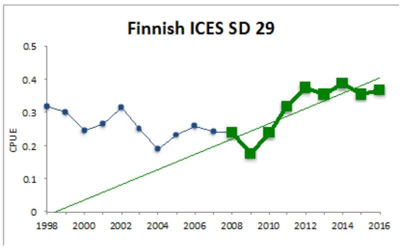
Åland Sea



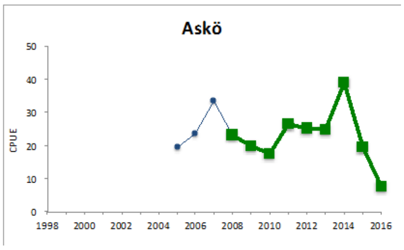
Archipelago Sea

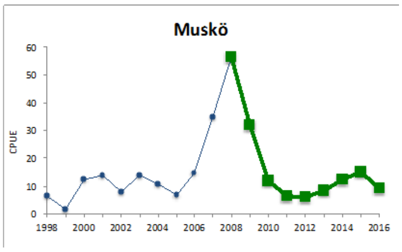




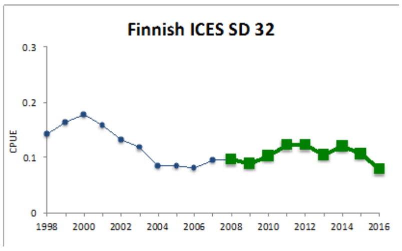


Northern Baltic Sea

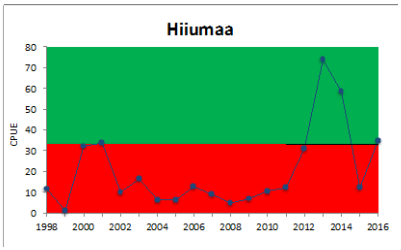


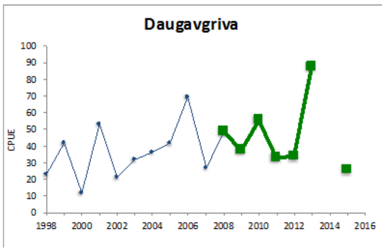


Gulf of Finland

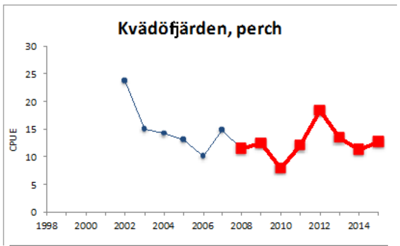


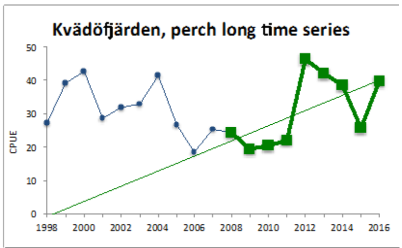
Gulf of Riga

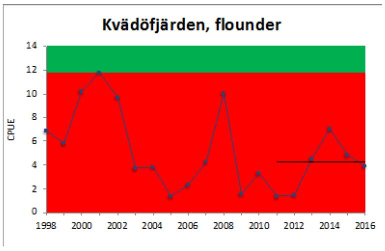


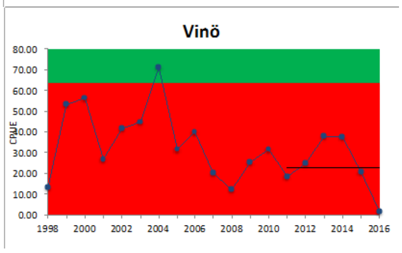


Western Gotland Basin

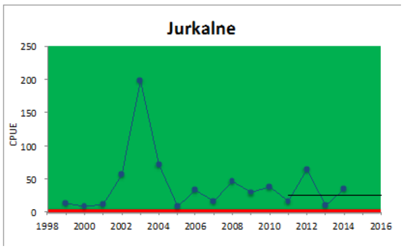


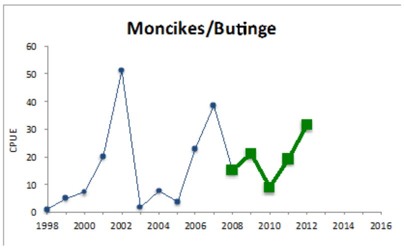


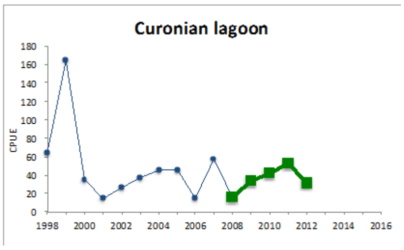




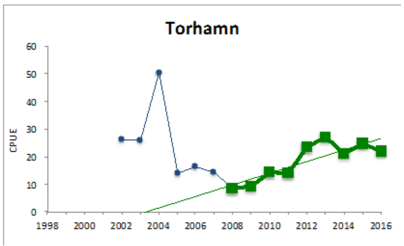
Eastern Gotland Basin



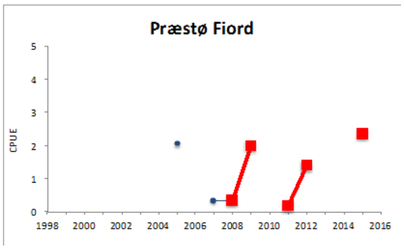




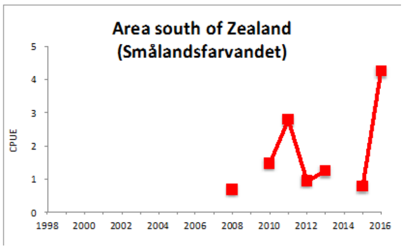
Bornholm Basin



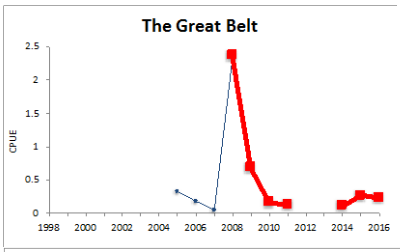
Arkona Basin

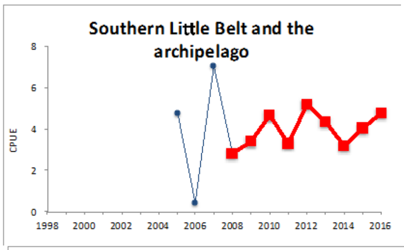


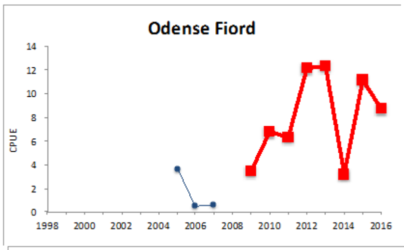
Mecklenburg Bight

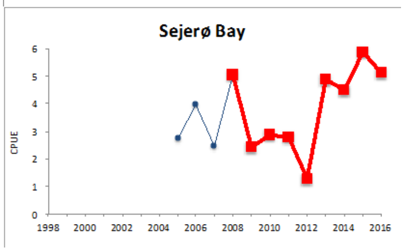


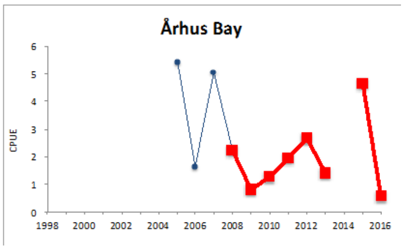
Belt Sea

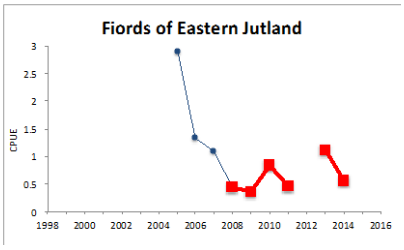




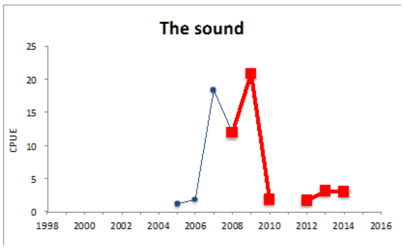




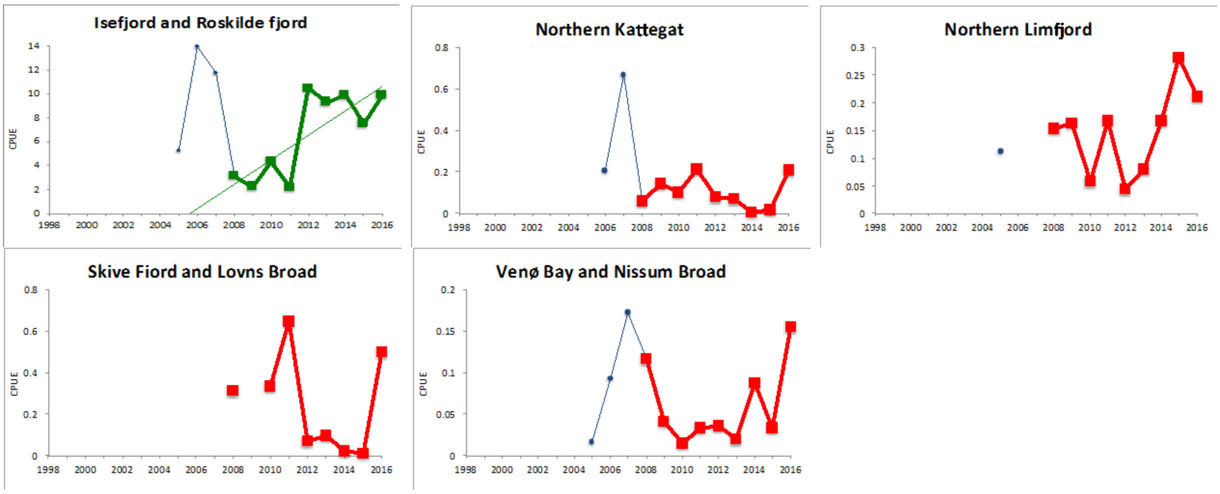




The Sound



Kattegat



Results figure 1. Status evaluations are displayed per sub-basin for each monitoring location. In locations where the baseline approach is applied, the threshold value is displayed as a green and a red field and the evaluation of good status/not good status is made for each point in time. The black lines indicate the median of the evaluated period. For assessment units where the available data only allowed for a trend based evaluation, a green line denotes a good status evaluation outcome whereas a red line denotes a not good status evaluation outcome. The trend-line indicates a significant positive (green) and negative (red) trend at $p < 0.1$ during 2008-2016 for the times-series in each location.

Confidence of the indicator status evaluation

In general, the confidence varies across assessment units, countries and monitoring programmes since, for example, the number of years for which coastal fish monitoring has been carried out varies between locations, as does the spatial coverage of monitoring within assessment units, and thus the confidence in the actual assessment. Generally, the confidence of the evaluation is higher in locations where monitoring started before 1999 and where data is available for all years during the assessment period (2011-2016), where there is good spatial coverage of monitoring and where the monitoring is fisheries independent and targeting the focal species of the assessment.

The confidence scoring followed the principles as outlined in the HELCOM integrated biodiversity assessment. Confidence was scored using four criteria with three different levels (1= high, 0.5 = intermediate, and 0 = low). The criteria used was:

Confidence in the accuracy of the estimate (ConfA). Level 1 = fisheries independent monitoring, 0.5 = fisheries dependent monitoring (commercial catch data and recreational catch registration) targeting focal species, and 0 = fisheries dependent monitoring not targeting focal species (commercial catch data for cyprinids).

Confidence in the temporal coverage of assessment (ConfT). Level 1 = data for all years during 2011-2016, 0.5 = one or two years of data missing during 2011-2016, and 0 = three or more years of data missing during 2011-2016.

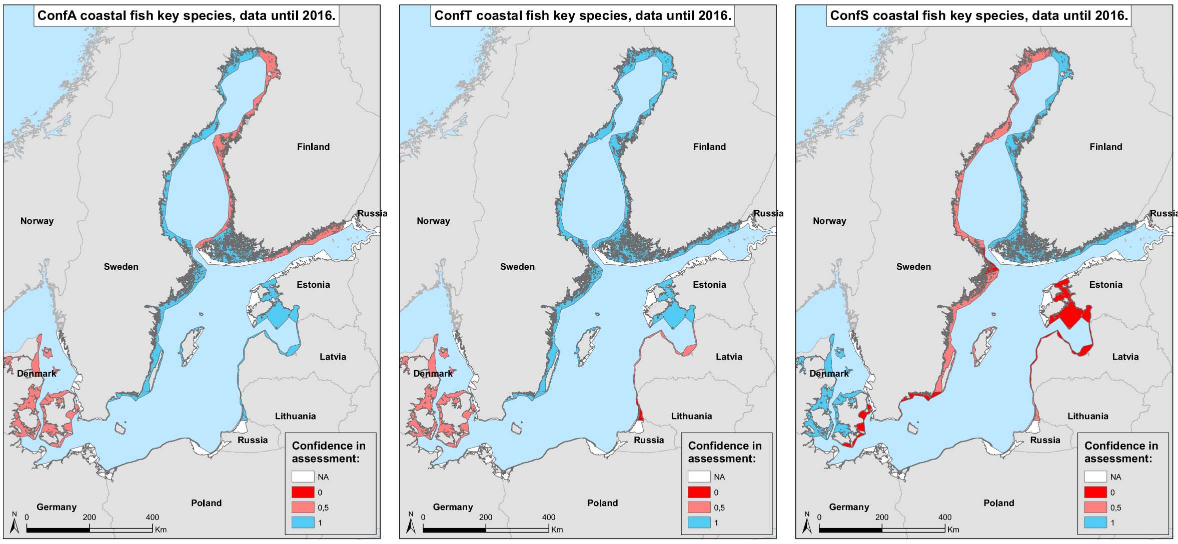
Confidence in spatial representability of the assessment (ConfS). Level = 1 full coverage/several monitoring locations per assessment unit given its size, 0.5 = two or more monitoring locations per assessment unit, and 0 = one monitoring location per assessment unit.

Methodological confidence (ConfM). For coastal fish all assessment units reach level 1 since all monitoring programs included in the assessment are described in the coastal fish monitoring guidelines .

Results table 2. Confidence in the status assessment according to the criteria developed within HELCOM for the integrated biodiversity assessment.

Sub-basin name	Country	Coastal area name (assessment unit)	Coastal area code	Monitoring area	Time period assessed	Identity of key species	Monitoring method	ConfA	ConfT	ConfS	ConfM
Bothnian Bay	Finland	Bothnian Bay Finnish Coastal waters	1	Finnish ICES SD 31	1998-2016	Perch	Commercial stats	0.5	1.0	1.0	1.0
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Råneå	2002-2016	Perch	Gill net				
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Kinnbäcksfjärden	2004-2016	Perch	Gill net	1.0	1.0	0.5	1.0
The Quark	Finland	The Quark Finnish Coastal waters	3	Finnish ICES rect 23	1998-2016	Perch	Commercial stats				
The Quark	Finland	The Quark Finnish Coastal waters	3	Finnish ICES rect 28	1998-2016	Perch	Commercial stats	0.5	1.0	1.0	1.0
The Quark	Sweden	The Quark Swedish Coastal waters	4	Holmön	2002-2016	Perch	Gill net				
The Quark	Sweden	The Quark Swedish Coastal waters	4	Norrbyn	2002-2016	Perch	Gill net	1.0	1.0	0.5	1.0
Bothnian Sea	Finland	Bothnian Sea Finnish Coastal waters	5	Finnish ICES SD 30	1998-2016	Perch	Commercial stats	0.5	1.0	1.0	1.0
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Gaviksfjärden	2004-2016	Perch	Gill net				
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Långvindsfjärden	2002-2016	Perch	Gill net				
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Forsmark	2002-2016	Perch	Gill net				
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Forsmark, long time-series	1998-2016	Perch	Gill net	1.0	1.0	0.5	1.0
Åland Sea	Finland	Åland Sea Finnish Coastal waters	7	NA	NA	NA	NA	NA	NA	NA	NA
Åland Sea	Sweden	Åland Sea Swedish Coastal waters	8	Lagnö	2002-2016	Perch	Gill net	1.0	1.0	0.0	1.0
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Finbo	2002-2016	Perch	Gill net				
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Kumlinge	2003-2016	Perch	Gill net				
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Finnish ICES SD 29	1998-2016	Perch	Commercial stats	1.0	1.0	1.0	1.0
Northern Baltic Sea	Finland	Northern Baltic Proper Finnish Coastal waters	10	NA	NA	NA	NA	NA	NA	NA	NA
Northern Baltic Sea	Sweden	Northern Baltic Proper Swedish Coastal waters	11	Askö	2005-2016	Perch	Gill net				
Northern Baltic Sea	Sweden	Northern Baltic Proper Swedish Coastal waters	11	Muskö	1998-2016	Flounder	Gill net	1.0	1.0	0.5	1.0
Northern Baltic Sea	Estonia	Northern Baltic Proper Estonian Coastal waters	12	NA	NA	NA	NA	NA	NA	NA	NA
Gulf of Finland	Finland	Gulf of Finland Finnish Coastal waters	13	Finnish ICES SD 32	1998-2016	Perch	Commercial stats	0.5	1.0	1.0	1.0
Gulf of Finland	Estonia	Gulf of Finland Estonian Coastal waters	14	NA	NA	NA	NA	NA	NA	NA	NA
Gulf of Finland	Russia	Gulf of Finland Russian Coastal waters	15	NA	NA	NA	NA	NA	NA	NA	NA
Gulf of Riga	Estonia	Gulf of Riga Estonian Coastal waters	16	Hiiumaa	1998-2016	Perch	Gill net	1.0	1.0	0.0	1.0
Gulf of Riga	Latvia	Gulf of Riga Latvian Coastal waters	17	Daugavgriva	1998-2015	Perch	Gill net	1.0	0.5	0.0	1.0
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, perch	2002-2016	Perch	Gill net				
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, perch long time-series	1998-2016	Perch	Gill net				
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, autumn	1998-2016	Flounder	Gill net				
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Vinö	1998-2016	Perch	Gill net	1.0	1.0	0.5	1.0
Estern Gotland Basin	Estonia	Eastern Gotland Basin Estonian Coastal waters	19	NA	NA	NA	NA	NA	NA	NA	NA
Estern Gotland Basin	Latvia	Eastern Gotland Basin Latvian Coastal waters	20	Jurkalne	1999-2015	Flounder	Gill net	1.0	0.5	0.0	1.0
Estern Gotland Basin	Lithuania	Eastern Gotland Basin Lithuanian Coastal waters	21	Mon/But	1998-2012	Flounder	Gill net				
Estern Gotland Basin	Lithuania	Eastern Gotland Basin Lithuanian Coastal waters	21	Curonian lagoon	1998-2012	Perch	Gill net	1.0	0.0	0.5	1.0
Estern Gotland Basin	Sweden	Eastern Gotland Basin Swedish Coastal waters	22	NA	NA	NA	NA	NA	NA	NA	NA
Estern Gotland Basin	Russia	Eastern Gotland Basin Russian Coastal waters	23	NA	NA	NA	NA	NA	NA	NA	NA
Estern Gotland Basin	Poland	Eastern Gotland Basin Polish Coastal waters	24	NA	NA	NA	NA	NA	NA	NA	NA
Gdansk basin	Russia	Gdansk Basin Russian Coastal waters	25	NA	NA	NA	NA	NA	NA	NA	NA
Gdansk basin	Poland	Gdansk Basin Polish Coastal waters	26	NA	NA	NA	NA	NA	NA	NA	NA
Bornholm basin	Sweden	Bornholm Basin Swedish Coastal waters	27	Torhamn	2002-2016	Perch	Gill net	1.0	1.0	0.0	1.0
Bornholm basin	Poland	Bornholm Basin Polish Coastal waters	28	NA	NA	NA	NA	NA	NA	NA	NA
Bornholm basin	Denmark	Bornholm Basin Danish Coastal waters	29	NA	NA	NA	NA	NA	NA	NA	NA
Bornholm basin	Germany	Bornholm Basin German Coastal waters	30	NA	NA	NA	NA	NA	NA	NA	NA
Arkona basin	Sweden	Arkona Basin Swedish Coastal waters	31	NA	NA	NA	NA	NA	NA	NA	NA
Arkona basin	Denmark	Arkona Basin Danish Coastal waters	32	Præstø Fiord	2005-2015	Flounder	Recreational	0.5	0.5	0.0	1.0
Arkona basin	Germany	Arkona Basin German Coastal waters	33	NA	NA	NA	NA	NA	NA	NA	NA
Mecklenburg bight	Germany	Mecklenburg Bight German Coastal waters	34	NA	NA	NA	NA	NA	NA	NA	NA
Mecklenburg bight	Denmark	Mecklenburg Bight Danish Coastal waters	35	Area south of Zealand (Smålandsfarvandet)	2008-2016	Flounder	Recreational	0.5	0.5	0.0	1.0
Kiel Bight	Denmark	Kiel Bight Danish Coastal waters	36	NA	NA	NA	NA	NA	NA	NA	NA
Kiel Bight	Germany	Kiel Bight German Coastal waters	37	NA	NA	NA	NA	NA	NA	NA	NA
Belt Sea	Denmark	Belts Danish Coastal waters	38	The Great Belt	2005-2015	Flounder	Recreational				
Belt Sea	Denmark	Belts Danish Coastal waters	38	Southern Little Belt and the archipelago	2005-2016	Flounder	Recreational				
Belt Sea	Denmark	Belts Danish Coastal waters	38	Odense Fiord	2005-2016	Flounder	Recreational				
Belt Sea	Denmark	Belts Danish Coastal waters	38	Sejerø Bay	2005-2016	Flounder	Recreational				
Belt Sea	Denmark	Belts Danish Coastal waters	38	Århus Bay	2005-2016	Flounder	Recreational				
Belt Sea	Denmark	Belts Danish Coastal waters	38	Fiords of Eastern Jutland	2005-2014	Flounder	Recreational	0.5	0.5	1.0	1.0
The sound	Sweden	The Sound Swedish Coastal waters	39	NA	NA	NA	NA	NA	NA	NA	NA
The sound	Denmark	The Sound Danish Coastal waters	40	The sound	2005-2014	Flounder	Recreational	0.5	0.5	0.0	1.0
Kattegat	Sweden	Kattegat Swedish Coastal waters	41	NA	NA	NA	NA	NA	NA	NA	NA
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	Islefjord and Roskilde fjord	2005-2016	Flounder	Recreational				
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	Northern Kattegat	2006-2016	Flounder	Recreational				
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	Northern Limfjord	2005-2016	Flounder	Recreational				
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	Skive Fiord and Lovns Broad	2008-2016	Flounder	Recreational				
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	Venø Bay and Nissum Broad	2005-2016	Flounder	Recreational	0.5	0.5	1.0	1.0

In general, the confidence in the accuracy of the assessment (ConfA) is high in majority of the assessment units. It is somewhat lower in the units depending on fisheries dependent monitoring in Finland and Denmark. The confidence in the temporal coverage (ConfT) is high in all areas except for the Latvian, Lithuanian and Danish areas due to missing data in one or more of the years in the assessment period. The confidence in spatial representability (ConfS) is highest in the Finnish and Danish areas where there is full coverage of sampling in the assessment units. It is poorer in all other countries where fisheries independent monitoring is carried out with a few monitoring locations per assessment unit.



Results figure 2. Maps of confidence of the current assessment. See Results table 2 for details.

The confidence concept as developed for the purposes of the integrated biodiversity assessment is not fully applicable to coastal fish as further assessment of the precision in data and the congruence in status across monitoring locations within assessment units would provide additional information that is needed.

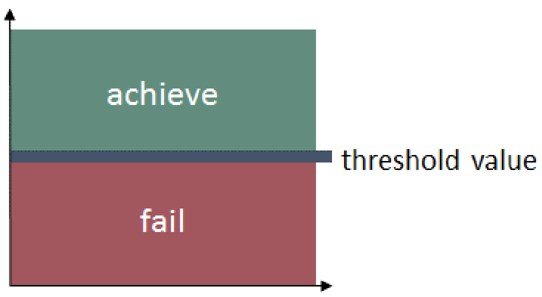
Thresholds and Status evaluation

Good Status is achieved when key species abundance is above a specified threshold value. The quantitative threshold values for coastal fish are based on location-specific baseline conditions where time series covering more than 15 years are available (ten year baseline + five or more years evaluation period). In areas where shorter time series are available, a trend based approach (<15 years) is used. The specific approach used in the various monitoring locations is presented in the Results section.

A baseline needs to be defined for determining the threshold value. The period used to define the baseline needs to cover at least ten years in order to extend over more than twice the generation time of the typical species represented in the indicator and thus cater for natural variation in the indicator value, due for example to strong and weak year classes. For the period used to determine the baseline to be relevant, it must also be carefully selected to reflect time periods with stable environmental conditions, as stated within the MSFD (European Commission 2008). Substantial turnovers in ecosystem structure in the Baltic Sea were apparent in the late 1980s, leading to shifts in the baseline state (Möllmann et al. 2009), and for coastal fish communities substantial shifts in community structure have been demonstrated in the late 1980s and early/mid 1990s (Olsson et al. 2012; Bergström et al. 2016a). In some areas, there have also been minor shifts in fish community structure later (see environmental fact sheets for further background).

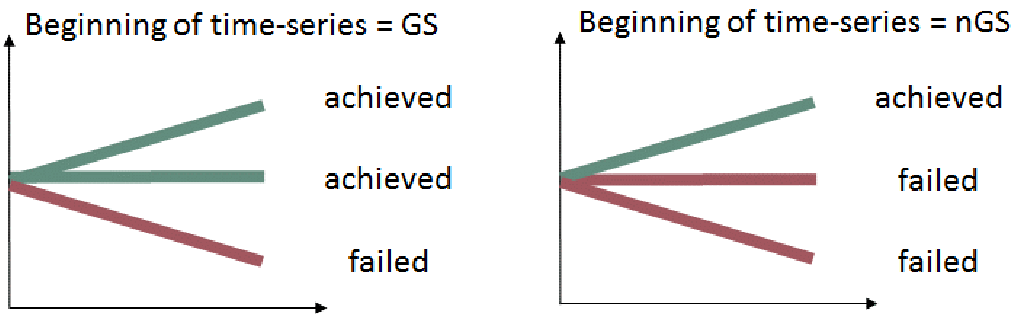
Estimates of the relative abundance and/or biomass of key coastal fish species are used to evaluate whether the threshold value is achieved or not. These estimates are derived from fishery independent monitoring, recreational catch registration and/or commercial catch statistics. Since there are strong environmental gradients in the Baltic Sea and coastal fish communities and stocks are typically local in their appearance and respond mainly to area specific environmental conditions, the evaluations for coastal key fish species are carried out on a relatively local scale.

The evaluation period applied when using the baseline approach should cover at least five years to cater for natural variability. Good status is evaluated based on the deviation of the median value of the indicator during the assessment period in relation to the threshold value (Thresholds figure 1).



Thresholds figure 1: Acceptable deviation from baseline is used to define the threshold value between good status and not good status.

When using the trend-based approach, environmental status is evaluated based on the direction of the trend towards good status, over the time period of the indicator assessment (Thresholds figure 2).



Thresholds figure 2: Application of the trend-based approach for evaluating environmental status where the status is defined based on the direction of the trend of the indicator compared to the desired direction of the indicator over time. GS = good status, nGS = not good status. See description in the assessment protocol.

Typical species considered in the context of this indicator are perch (*Perca fluviatilis*), flounder (*Platichthys flesus*) and cod (*Gadus morhua*), depending on the sub-basin. Perch is generally the key species in coastal fish communities in the less saline eastern and northern Baltic Sea (Sweden, Finland, Estonia, and Latvia), and in more sheltered coastal areas in Lithuania, Poland and Germany. In the more exposed coastal parts of the central Baltic Sea and in its western parts the abundance of perch is generally lower and flounder is used as key species. Cod is the representative species in the western and more saline parts of the region. In the current assessment, however, cod is not included.

Assessment Protocol

This indicator uses two different approaches for evaluating whether good status is achieved. The approach used depends on the data used for the evaluation. If certain criteria are met, then the baseline approach is used. If not, then the trend-based approach is used.

Baseline approach

Coastal fish datasets must meet certain criteria in order to be able to apply an evaluation of good status using the baseline approach:

1. The time period used to determine the baseline should cover a minimum number of years that is twice the generation time of the species most influential in the indicator evaluation. This is to ensure that the influence of strong year classes are taken into account. For coastal fish, this is typically about ten years. In this evaluation, the time period used to determine the baseline period against which good status is evaluated spans the years 1998-2010.
2. The dataset used to determine the baseline must not display a linear trend within itself ($n \geq 10$, $p > 0.1$), as the baseline for evaluation should optimally reflect the community structure at stable conditions and not a development towards a change in the environmental status.
3. Before evaluating good status, it should also be decided whether or not the baseline reflects good status. This can be done either by using data dating back earlier than the start of the period used to determine the baseline, using additional information, or by expert judgment. For example, if data from time periods preceding the period used for determining the baseline have much higher indicator values, the baseline might represent not good status (in case of an indicator where higher values are indicative of a good environmental state) or good status (in case of an indicator where higher values are indicative of an undesirable state).

Once the baseline status has been defined, threshold values are defined as the value of the indicator at the X^{th} percentile of the median distribution of the dataset used for determining the baseline. The median distribution is computed by resampling (with replacement) from the dataset used to determine the baseline. In each repetition, the number of samples should equal the number of years in the assessment period. In order to improve precision, a smoothing parameter may be added in each repetition. The smoothing parameter is computed as the normal standard deviation of the re-sampled dataset divided by the number of years resampled. To evaluate whether the threshold value is achieved during the evaluation period, the median value of the indicators during the evaluation period is compared with the specific threshold value (see Thresholds figure 1 and decision tree in Assessment protocol figure 1):

1. In situations where the baseline conditions represent good status, the median of the years in the assessment period should be above the 5^{th} percentile of the median distribution of the dataset used to determine the baseline in order to reflect good status.
2. In situations where the baseline conditions represent not good status, the median of the years in the assessment period should be above the 98^{th} percentile of the median distribution of the dataset used to determine the baseline in order to reflect good status.

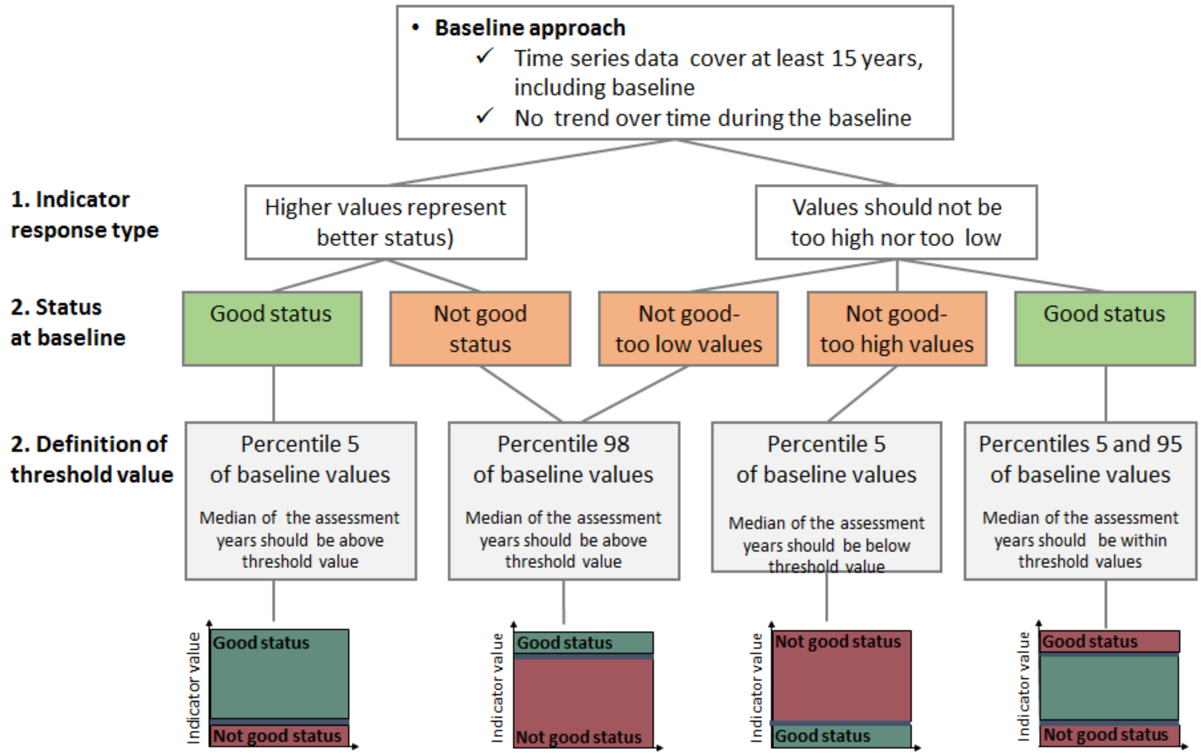
Trend-based approach

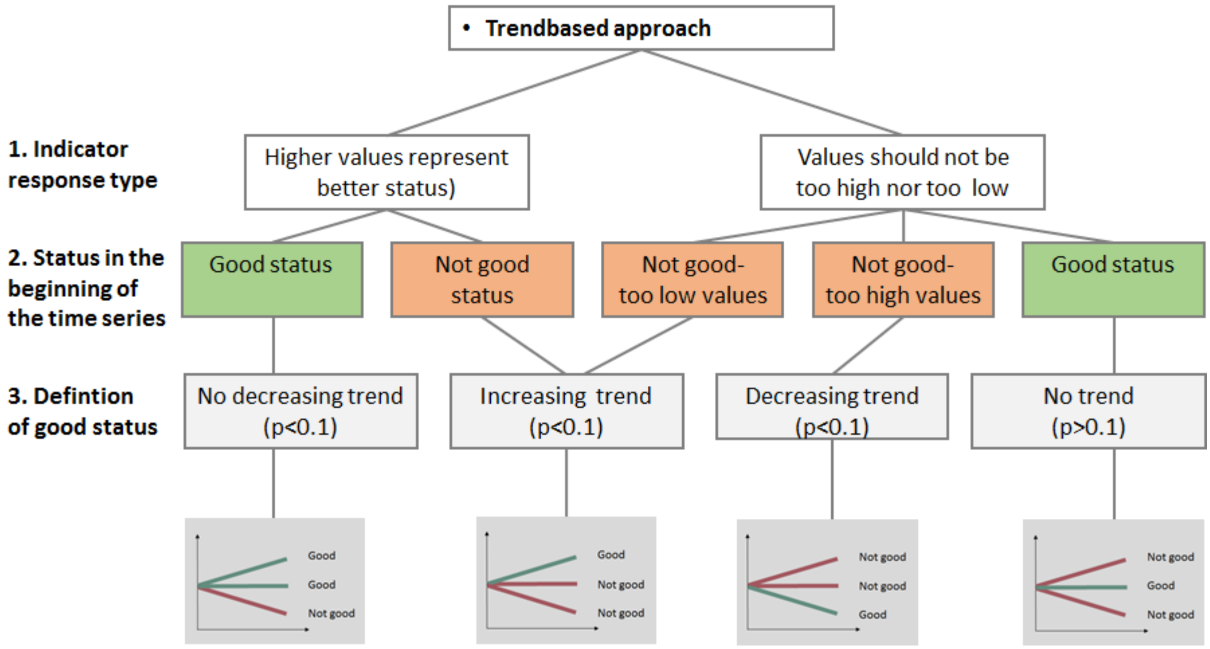
If the requirements for defining quantitative baseline conditions are not met (e.g. short time series, or a linear development during the period used to determine baseline conditions), then a trend based evaluation should be used. Data should date back to the early/mid-2000s to be included in the evaluation, and data should be ln-transformed to enhance linearity.

In the trend based approach, good status is defined based on the direction of the trend of the indicator compared to the desired direction of the indicator over time (Thresholds figure 2). When the first years of the time series assessed represent good status, the trend of the indicator over time should not be negative in order to represent good status. If the first years of the time series assessed represent not good status, the trend in the indicator should be positive in order to represent good status. The level of significance for these trends should be $p < 0.1$.

Decision tree for evaluation using coastal fish community structure

The assessment protocol is found in figure 1.





Assessment protocol figure 1. Decision tree for evaluation using coastal fish community structure. The baseline approach (top figure) and trendbased approach (bottom figure) are presented.

Assessment units

Due to the local appearance of typical coastal fish populations, status evaluations of coastal fish communities are representative for rather small geographical scales. In this evaluation the HELCOM assessment unit scale 3 'Open sub-basin and coastal waters' has been applied. The indicator is not evaluated for the open sea sub-basins since the species in focus are coastal.

Evaluations were carried out for 21 of the 42 assessment units and data up to 2016 was available for all but one assessment unit. The number of units evaluated is currently restricted by the availability of monitoring programs.

In assessment units with several monitoring locations and data sets, the summed status (representing the majority of monitoring locations within the unit) is used to determine the status of the assessment unit. If equal numbers of monitoring locations/data sets have good status and not good status, then the one-out-all-out procedure is applied.

The assessment units are defined in the HELCOM Monitoring and Assessment Strategy Annex 4.

Data analyses

The data used for the evaluations are derived from fishery independent monitoring, recreational catch registration and/or commercial catch statistics.

Fishery independent monitoring

The analyses are based on catch per unit effort (CPUE) data from annual averages of all sampling stations in each area. To only include species and size-groups suited for quantitative sampling by the method, individuals smaller than 12 cm (Nordic Coastal multimesh nets) or 14 cm (other net types) were excluded from the assessment. Abundance is calculated as the number of individuals of the species included in the indicator per unit effort (CPUE).

Commercial catch data

Analyses were based on catch per unit effort data (CPUE) in the form of kg/gillnet day, and each data point represents total annual CPUE per area. The gillnets used have mesh sizes between 36-60 mm (bar length) and hence target a somewhat different aspect of the fish community in the area. In addition, fishing is not performed at fixed stations nor with a constant effort across years. As a result, the estimates from the gillnet monitoring programmes and commercial catch data are not directly comparable, and only relative changes across data sources should be compared.

Recreational catch registration

As for the other surveys, analyses were based on CPUE data (number of fish per effort) from monofilament gill nets or fyke nets. Voluntary recreational fishermen undertake fishing during the period April to November. For comparability only data from August was used in the current assessment. The fishermen fish at fixed stations and during the first half of each month throughout the season. This mediates the comparability of the data with fisheries independent monitoring programs using gill nets or fyke nets.

Relevance of the indicator

Biodiversity assessment

The status of biodiversity is assessed using several core indicators. Each indicator focuses on one important aspect of the complex issue. In addition to providing an indicator-based evaluation of the abundance of key coastal fish species, this indicator also contributes to the overall biodiversity assessment along with the other biodiversity core indicators.

Policy relevance

The core indicator on abundance of coastal fish key species addresses the Baltic Sea Action Plan's (BSAP) Biodiversity and nature conservation segment's ecological objectives 'Natural distribution and occurrence of plants and animals', 'Thriving and balanced communities of plants and animals' and 'Viable population of species'.

The core indicator is relevant to the following specific BSAP actions:

- 'to develop long-term plans for, protecting, monitoring and sustainably managing coastal fish species, including the most threatened and/or declining, including anadromous ones (according to the HELCOM Red list of threatened and declining species of lampreys and fishes of the Baltic Sea, BSEP No. 109), by 2012', and
- ‘develop a suite of indicators with region-specific reference values and targets for coastal fish as well as tools for assessment and sustainable management of coastal fish by 2012'.

The core indicator also addresses the following qualitative descriptors of the MSFD for determining good environmental status:

Descriptor 1: 'Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions'

Descriptor 3: 'Populations of commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock'

and the following criteria of the Commission Decision:

- Criterion D1C2 (population size),
- Criterion D3C2 (reproductive capacity of the stock),

In some Contracting Parties the indicator also has potential relevance for implementation of the EU Habitats Directive.

Role of key coastal fish species in the ecosystem

Coastal fish, especially piscivorous species, are recognized as being important components of coastal food webs and ecosystem functioning (Eriksson et al. 2009; Baden et al. 2012; Olsson et al. 2012; Östman et al. 2016). Moreover, since many coastal fish species are rather local in their appearance (Saulamo & Neuman 2005; Laikre et al. 2005; Olsson et al. 2011; Östman et al. 2017a), the temporal development of coastal fish communities might reflect the general environmental state in the monitoring locations (Bergström et al. 2016b).

Key fish species in coastal ecosystems generally have a structuring role in the ecosystem, mainly via top-down control on lower trophic levels. Also, viable populations of key coastal fish species are generally considered to reflect an environmental status with few eutrophication symptoms and balanced food webs (Eriksson et al. 2011; Baden et al. 2012; Östman et al. 2016). Key coastal fish species are generally piscivores and/or benthivores.

Human pressures linked to the indicator

	General	MSFD Annex III, Table 2a
Strong link	Several pressures, both natural and human, acting in concert affect the state of coastal key fish species. These include climate, eutrophication, fishing, and exploitation and loss of essential habitats. To date, no analyses on the relative importance of these variables have been conducted.	Biological - Extraction of, or mortality/injury to, wild species (e.g. selective extraction of species, including incidental non-target catches) - Disturbance of species (e.g. where they breed, rest and feed) due to human presence Physical - Physical disturbance to seabed (temporary or reversible) - Changes to hydrological conditions Substances, litter and energy - Inputs of nutrients – diffuse sources, point sources, atmospheric deposition
Weak link	There might also be effects of hazardous substances and non-indigenous species on the state of key coastal fish species	Substances, litter and energy - Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) Biological *- Input or spread of non-indigenous species*

The state of key coastal fish species in the Baltic Sea is influenced by multiple pressures, including climate, eutrophication, fishing mortality and exploitation of essential habitats, but also by natural processes such as food web interactions and predation from apex predators.

Climate change generally has a large effect on the species considered here (Möllman et al. 2009; Olsson et al. 2012; Östman et al. 2017b) as have alterations in the food web (Eriksson et al. 2009; 2011; Östman et al. 2016). Stressors related to human activities, mainly exploitation of essential habitats (Sundblad et al. 2014; Sundblad & Bergström 2014; Kraufvelin et al. 2018) and fishing (Edgren 2005; Bergström et al. 2007; Fenberg et al. 2012; Florin et al. 2013) also impact the state of coastal fish species. For obligate coastal species such as perch, the outtake comes from both the recreational and small-scale commercial fisheries sector and in some countries to a larger extent in the former (HELCOM 2015b), whereas cod and flounder are exploited both in the offshore and coastal commercial fishery. In some areas of the Baltic Sea, flounder and cod is also targeted by recreational fisheries.

The effect of eutrophication on the state of coastal fish species is also of importance (Bergström et al. 2016b) and might increase with higher latitudes (Östman et al. 2017b).

The abundance of key species of coastal fish (such as perch and flounder) is influenced by recruitment success and mortality rates, which in turn might be influenced by ecosystem changes, interactions within the coastal ecosystem and abiotic perturbations. An increased abundance of perch may, for example, be governed by increasing water temperatures, moderate eutrophication, availability of recruitment habitats, low fishing pressure and low predation pressure from apex predators (Böhling et al. 1991; Edgren 2005; Bergström et al. 2007; Linlokken et al. 2008; HELCOM 2012; Olsson et al. 2012; Östman et al. 2012; Bergström et al. 2016b; Östman et al. 2017b). As for the majority of coastal species, exploitation of recruitment areas has a negative impact on the development of perch populations (Sundblad et al. 2014; Sundblad & Bergström 2014). Changes in the long-term development of the abundance of perch could hence reflect effects of increased water temperature and eutrophication in coastal areas and/or changes in the level of exploitation or predation pressure.

The abundance of flounder is favoured by somewhat increasing water temperatures, moderate eutrophication and low fishing pressure (Olsson et al. 2012; Florin et al. 2013). Increased presence of ephemeral macroalgae due to eutrophication reduces the suitability of nursery habitats (Carl et al. 2008), and increases in the level of predation from avian predators negatively affect the abundance of juvenile flounder with unfavourable consequences to recruitment (Nielsen et al. 2008). Changes in the long-term abundance of flounder thus may reflect effects of eutrophication and/or changes in the level of predation pressure and fishing mortality in coastal areas. Recent studies have also suggested an impact of the invasive species round goby on the abundance of flounder (Ustups et al. 2016).

Natural interactions such as predation pressure from apex predators, foremost cormorants (*Phalacrocorax carbo*), could at least locally impact the state of coastal fish communities (Vetemaa et al. 2010; Östman et al. 2012; Hansson et al. 2017). In some areas the outtake of coastal fish by cormorants exceeds, or is of a similar magnitude, to that of the commercial and recreational fisheries (Östman et al. 2013). However, the natural mortality from other sources such as predatory fish can be much higher than the mortality caused by cormorants in some areas (Heikinheimo et al. 2016), and compensatory mechanisms may counteract the effects of predation. In the Archipelago Sea, for example, there was no change in the mortality of perch during the period when the cormorants invaded the area, compared to earlier decades (Heikinheimo and Lehtonen 2016). Further, no connection was found between commercial perch and pikeperch CPUEs and numbers of breeding cormorants along the Finnish coast (Lehikoinen et al. 2017).

Monitoring requirements

Monitoring methodology

The HELCOM common monitoring on coastal fish is described on a general level in the **HELCOM Monitoring Manual in the sub-programme: Coastal fish.**

The HELCOM common monitoring on coastal fish is described in guidelines that were adopted in 2014.

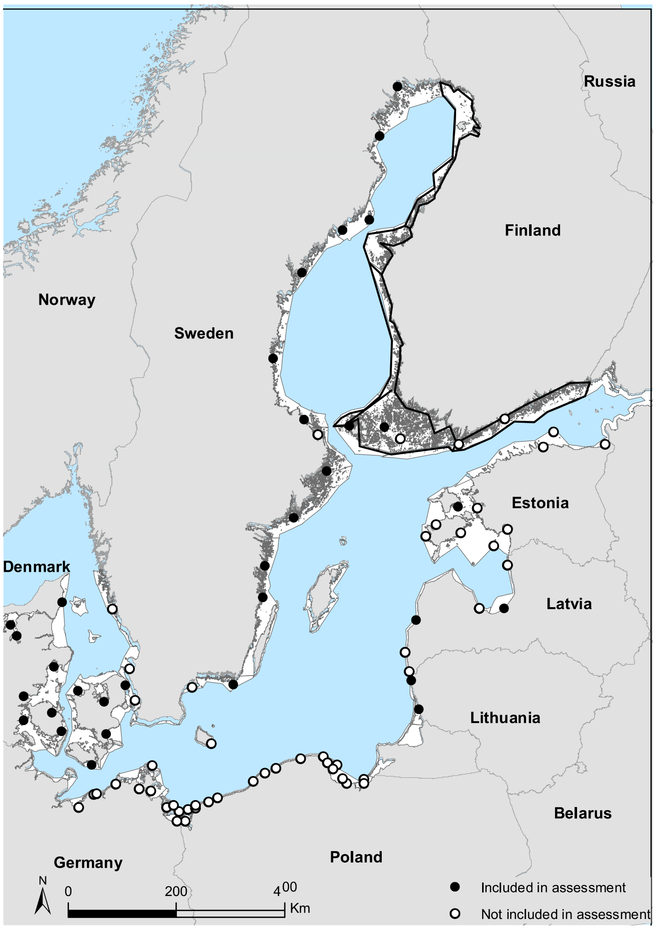
Current monitoring

The monitoring activities relevant to the indicator that are currently carried out by HELCOM Contracting Parties are described in the **HELCOM Monitoring Manual** in the Monitoring Concepts table as well as in the guidelines for coastal fish monitoring.

Sub-programme: Coastal fish

Monitoring Concepts table

Coastal fish monitoring is rather widespread in the Baltic Sea, and at present covers 34 of the total 42 scale 3 HELCOM coastal assessment units (Monitoring figure 1). The current monitoring where information on Key species can be extracted to date is less extensive, covering 21 assessment units.



Monitoring figure 1. Coverage of current coastal fish monitoring by HELCOM assessment unit scale 3. Dots denotes areas included (black) and not included (white) in the assessment as presented in this report. The white areas represent the assessment units applied in the status assessment. Note that in Finnish coastal areas, status is assessed based on catch statistics from the small-scaled coastal commercial fishery (marked in black frames), which is obtained at sub-basin scale in the Bothnian Sea, The Quark, Bothnian Sea, Åland Sea and Gulf of Finland.

There are spatial and temporal gaps in the current monitoring. The current monitoring of coastal fish in the Baltic Sea represents a minimum level of effort and serves as a first step for evaluating the status of coastal fish communities. The current monitoring likely yields insights into major and large-scale changes in coastal fish communities in the Baltic Sea, but unique and departing responses are possible in some areas.

Since monitoring and assessments in Lithuania ceased in 2012, the current assessment only includes data from Lithuania until 2012. In Estonia, coastal fish monitoring is carried out at several locations, but the assessment has only been made for one location (Hiiumaa). In Poland, monitoring has been undertaken since 2014 but no assessment is currently undertaken for Polish waters due to limitations in the assessment approach (requires time-series). No update of data and approval of coastal indicators are available from Germany, hence an assessment of coastal fish in German waters is currently not included. In addition, to this date no data from Russia is included in the assessment.

Description of optimal monitoring

Due to the presence of natural environmental gradients across the Baltic Sea and the rather local appearance of coastal fish communities (and hence their different structures and responses to environmental change), the spatial coverage of monitoring should be improved in some areas in order to enhance the confidence of the evaluation outcome. When designating new potential monitoring programmes, it should be considered that the levels of direct human impact on the coastal fish communities in many of the existing monitoring locations are low, and future locations should include more heavily affected areas.

Moreover, the current monitoring in the northern and eastern parts of the Baltic Sea is designed to target coastal fish species that prefer higher water temperatures and that dominate coastal areas during warmer parts of the year, typically those with a freshwater origin such as perch. Monitoring of species like whitefish, herring, flounder and cod that dominate coastal fish communities in more exposed parts of the coast and during colder parts of the year are, however, rather poorly represented. Monitoring of these species and components should be considered in the future establishment of coastal fish monitoring programmes.

Data and updating

Access and use

The data and resulting data products (tables, figures and maps) available on the indicator web pages can be used freely given that the source is cited. The indicator should be cited as following:

HELCOM (2018) Abundance of key coastal fish species**.** HELCOM core indicator report. Online. [Date Viewed], [Web link].

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Metadata

Result: Abundance of key coastal fish species

Data polygon: Abundance of key coastal fish species data poly

Data point: Abundance of key coastal fish species data point

Data are typically collected annually in August by national and regional monitoring programmes. Catch per unit effort from commercial catch statistics in Finland represent total annual catches. See HELCOM (2015a) for details. For future updates of this evaluation, data should be collected in each location on an annual basis.

A few time series of coastal fish began in the 1970s (Olsson et al. 2012), whereas others were started in the 1980s (HELCOM 2015a). The majority of the available time series of coastal fish community structure was initiated in the mid-1990s. In Finland and Sweden a new coastal fish monitoring programme with a higher spatial resolution was established in the early 2000s. For more information, see HELCOM 2012.

Data from 1998 and onwards have been included in the current assessment to cater for shifting baselines, while including as much data as possible.

The raw data on which this assessment is based, are stored in national databases. Each country has its own routines for quality assurance of the stored data. From 2017, each country calculates indicator values for their monitoring locations from the raw data from fish monitoring. The indicator data and values are then during the first half of the year uploaded to the HELCOM database for coastal fish core indicators, COOL (http://www.helcom.fi/baltic-sea-trends/data-maps/biodiversity/) as hosted by the HELCOM secretariat. Indicator data for status assessments are extracted from the COOL database, and the assessment undertaken by the lead country (Sweden) according to the assessment protocol outlined in this report.

Data source

Coastal fish monitoring is coordinated within the HELCOM FISH PRO II expert network. The network compiles data from fisheries independent monitoring in Finland, Estonia, Latvia, Lithuania, Poland, Germany, Denmark and Sweden. Coastal fish communities in the Baltic Sea areas of Russia are to some extent monitored as well. In Poland, a fishery independent coastal fish monitoring programme was established in 2014, while earlier investigations have also been performed. Data series cover period 2011-2016 for different coastal areas, therefore there is no continuous 5-year data series for coastal areas as required by method and they are not included in the assessment. In Germany, data are derived from coastal fish monitoring within national projects such as the artificial reef programme outside Rostock/Warnemünde off the summer resort Nienhagen (since 2002), the eel monitoring programme along the coastline of Mecklenburg-Western Pomerania (since 2008), and the coastal trawl survey in the Pomeranian Bay by the University of Rostock (since 2003). None of these three projects has long-term secured funding, and due to lack of national support and approval, data from German coastal waters are not included in the current assessment. In Denmark, there is no coastal fish monitoring programme and the data provided relies on voluntary catch registration by recreational fishermen through the "key-fishermen" project, which has no long-term secured funding (initiated in 2005). Due to lack of geographical coverage, the state of coastal fish communities in Finland is monitored using estimates of catch per unit effort (CPUE) from the small-scaled coastal commercial fishery. There are some additional monitoring locations (see HELCOM 2015a), which were not included in this assessment due to lack of funding in some countries for carrying out status assessments.

The institutes responsible for sampling are: Natural Resources Institute Finland (Luke) (Finland), Provincial Government of Åland Islands (Finland), Estonian Marine Institute (Estonia), University of Tartu (Estonia), Institute of Food Safety, Animal Health and Environment "BIOR" (Latvia), Nature Research Center (Lithuania), National Marine Fisheries Research Institute, Gdynia (Poland), Association Fish and Environment Mecklenburg-Vorpommern e.V. (Germany), University of Rostock (Germany), National Institute of Aquatic Resources, Technical University of Denmark (Denmark), Department of Aquatic Resources, Swedish University of Agricultural Sciences (Sweden).

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Archive

This version of the HELCOM core indicator report was published in July 2018:

Abundance of key coastal fish species HELCOM core indicator 2018 (pdf)

Earlier versions of the core indicator report include:

HOLAS II component - Core indicator report – web-based version July 2017 (pdf)

Core indicator report – web-based version October 2015 (pdf)

Extended core indicator report – outcome of CORESET II project (pdf) (2015)

2013 Indicator report (pdf)

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