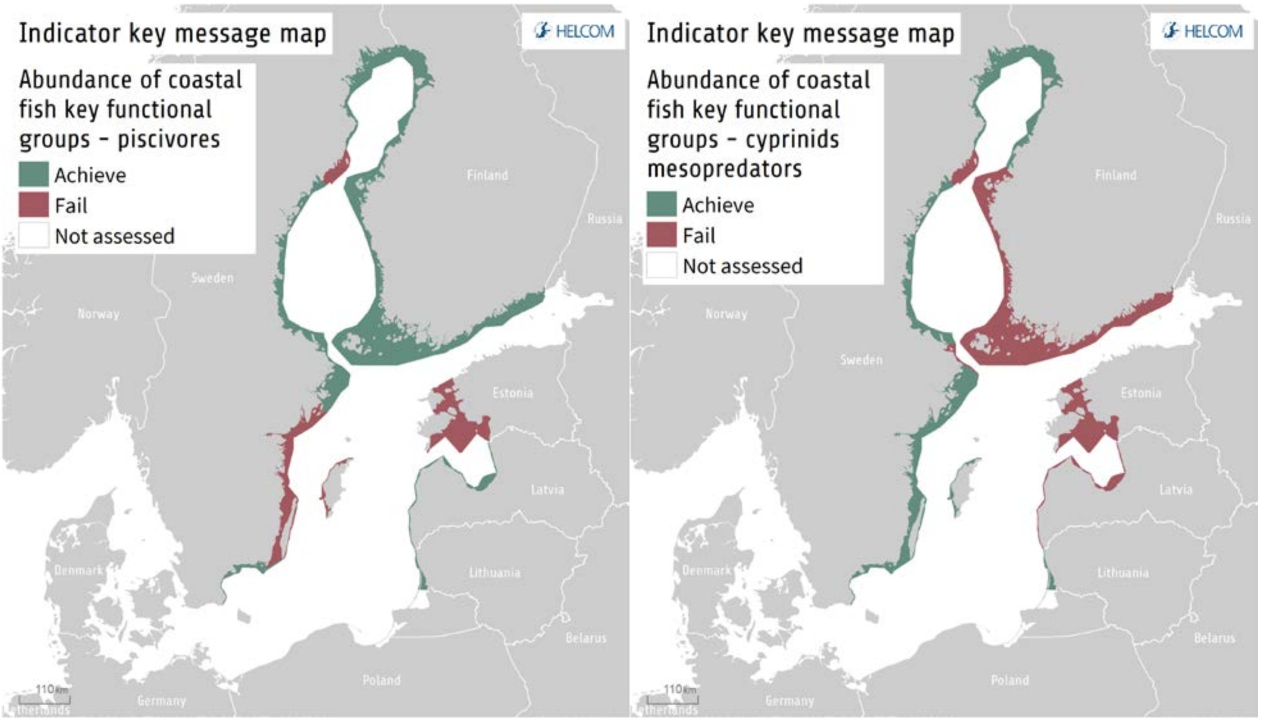
Abundance of coastal fish key functional groups

Key Message

This core indicator evaluates the abundance of selected functional groups of coastal fish in the Baltic Sea. As a rule, good status is achieved when the abundance of piscivores (i.e. fish that feed on other fish) is above a site-specific threshold value, and the abundance of cyprinids or mesopredators (i.e. mid trophic-level fish) is within an acceptable range for the specific site. The status of functional groups of coastal fish in the Baltic Sea has been evaluated by assessing the status of piscivores and cyprinids/mesopredators during the period 2011-2016.



Key message figure 1. Status assessment results based evaluation of the indicator 'abundance of coastal fish key functional groups', piscivores (left) and cyprinids/mesopredators (right). 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: piscivores and cyprinids/mesopredators.**

For piscivores, good status is achieved in 25 out of a total of 29 monitoring locations, resulting in good status in 13 coastal HELCOM assessment units out of the 16 that were evaluated. For cyprinids/mesopredators, good status is only achieved in 15 of the 27 monitored locations and thus in 7 of the 16 evaluated assessment units. In the locations classified as not good, the abundance of cyprinids was too high in all but one (Hiiumaa, Estonia) of the 12 locations.

The status of piscivores is hence slightly better compared to that of cyprinids. Generally, the status of piscivores is better in more northern areas compared to more central areas. For cyprinids/mesopredators, good status is not achieved in the Swedish part of the Quark and Åland Sea, in all Finnish coastal waters except for the Bothnian Bay, and in Estonian and Latvian coastal waters.

The level of confidence in the assessment differs between areas and regions due to differences in monitoring methodology as well due to lower temporal and spatial coverage of monitoring in some countries, the latter generally relating to resource availability. 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 for Latvian and Lithuanian coastal areas, and the confidence in spatial representability is the highest in Finnish coastal 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. In the future, in line with increasing knowledge, the indicator might undergo further development.

Relevance of the core indicator

The state of coastal fish communities reflects the ecological state of coastal ecosystems, as well as the effects of recreational and small-scale coastal commercial fishery activities. Changes in the long-term development of the abundance of coastal fish functional groups reflects the effects of increased water temperature and eutrophication in coastal areas, and/or changes in the level of human exploitation (fishing and habitat degradation) and natural predation pressure.

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	D4 Food webs D4C2. Trophic guilds, balance of total guild abundance
Secondary link	Hazardous substances • Healthy wildlife	
Other relevant legislation: In some Contracting Parties of HELCOM potentially also EU Habitats Directive		

Cite this indicator

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

ISSN 2343-2543

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Results and Confidence

The current evaluation of coastal fish environmental status covers the period 2011-2016. The evaluation uses either a 'deviation from baseline approach' or a 'trend based evaluation' depending on the time-series coverage. Evaluations have been carried out for 16 'scale 3 HELCOM assessment units' for both functional groups within this indicator. For more information on assessment units, see the Assessment protocol.

The status evaluation per monitoring location and assessment unit is summarized in the tables below. Data for mesopredators were only utilised for one area (Monciskes/Butinge, Lithuania), with cyprinids used in other respective assessments.

Piscivores

In more than 85 % of the evaluated monitoring locations (25 out of the total 29 locations) good status is achieved. In two assessment units (The Quark Swedish Coastal waters and Western Gotland Basin Swedish Coastal waters) there are differing status classifications in different monitoring locations within the same unit (see table below and assessment protocol), likely reflecting local differences in the coastal fish communities. When summarizing over assessment units at the level of coastal assessment units, good status is achieved in 13 out the 16 assessed units.

Some general patterns suggest that the status depends on the geographic area. In the more northern and southern areas the status is generally good, whereas in more central parts of the Baltic Sea the status is worse.

Results table 1. Piscivore evaluation results for the assessment period 2011-2016. GS = good status, nGS = not good status.

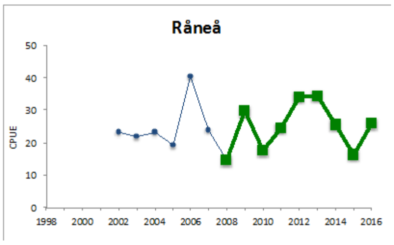
Sub-basin	Country	Coastal area name (assessment unit)	Coastal area code	Monitoring area/data set	Time period assessed	Identity of key piscivores	Monitoring method	Assessment method	Ref. period status	Threshold value	Current value	Status monitoring location	Status coastal area
Bothnian Bay	Finland	Bothnian Bay Finnish Coastal waters	1	Finnish ICES SD 31	1998-2016	Perch, pike, pikeperch	Commercial stats	Trend	GS	Slope p >0.1 (+)	P slope = 0.14	GS	GS
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Råneå	2002-2016	Perch, pike, burbot	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.56	GS	
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Kinnbäcksfjärden	2004-2016	Perch, pike, burbot	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, pike, pikeperch	Commercial stats	Trend	GS	Slope p >0.1 (+)	P slope = 0.0001 (+)	GS	
The Quark	Finland	The Quark Finnish Coastal waters	3	Finnish ICES rect 28	1998-2016	Perch, pike, pikeperch	Commercial stats	Baseline	GS	0.24	0.31	GS	GS
The Quark	Sweden	The Quark Swedish Coastal waters	4	Holmön	2002-2016	Perch, pike, burbot	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.56	GS	
The Quark	Sweden	The Quark Swedish Coastal waters	4	Norrbyn	2002-2016	Perch, pike, burbot	Gill net	Trend	nGS	Slope p <0.1 (+)	P slope = 0.63	nGS	nGS
Bothnian Sea	Finland	Bothnian Sea Finnish Coastal waters	5	Finnish ICES SD 30	1998-2016	Perch, pike, pikeperch	Commercial stats	Trend	nGS	Slope p <0.1 (+)	P slope = 0.01 (+)	GS	GS
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Gaviksfjärden	2004-2016	Perch, pike, burbot	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, pike, burbot	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, pike, burbot, pikeperch	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, pike, burbot, pikeperch	Gill net	Baseline	GS	11.63	59.23	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, pike, burbot, pikeperch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.15	GS	GS
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Finbo	2002-2016	Perch, pike, pikeperch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.83	GS	
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Kumlinge	2003-2016	Perch, pike, pikeperch	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, pike, pikeperch	Commercial stats	Trend	nGS	Slope p <0.1 (+)	P slope = 0.01 (+)	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, pike, burbot, pikeperch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.39	GS	
Northern Baltic Sea	Sweden	Northern Baltic Proper Swedish Coastal waters	11	Muskö	1998-2016	Perch, pike, pikeperch, cod	Gill net	Baseline	GS	4.39	6.89	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, pike, pikeperch	Commercial stats	Trend	nGS	Slope p >0.1 (+)	P slope = 0.2	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, pike, pikeperch	Gill net	Baseline	nGS	33.37	32.92	nGS	nGS
Gulf of Riga	Latvia	Gulf of Riga Latvian Coastal waters	17	Daugavgriva	1998-2015	Perch, pike, pikeperch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.54	GS	GS
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden	2002-2016	Perch, pike, pikeperch, cod, turbot	Gill net	Trend	nGS	Slope p >0.1 (+)	P slope = 0.39	nGS	
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, long time-series	1998-2016	Perch, pike, pikeperch, cod, turbot	Gill net	Trend	nGS	Slope p >0.1 (+)	P slope = 0.03 (+)	GS	
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, autumn	1998-2016	Perch, pike, pikeperch, cod, turbot	Gill net	Baseline	GS	6.74	6.31	nGS	
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Vinö	1998-2016	Perch, pike, pikeperch, cod, turbot	Gill net	Baseline	nGS	64.98	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	Perch, pike, pikeperch, cod, turbot	Gill net	Baseline	GS	7.48	24.86	GS	GS
Estern Gotland Basin	Lithuania	Eastern Gotland Basin Lithuanian Coastal waters	21	Mon/But	1998-2012	Perch, pikeperch, cod, turbot	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.54	GS	
Estern Gotland Basin	Lithuania	Eastern Gotland Basin Lithuanian Coastal waters	21	Curonian lagoon	1998-2012	Perch, pike, burbot, pikeperch	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.34	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, pike, pikeperch, cod, turbot	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.003 (+)	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	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	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
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	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
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	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
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	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kattegat	Sweden	Kattegat Swedish Coastal waters	41	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

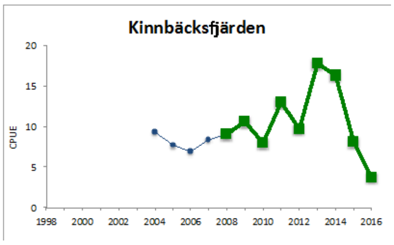
In the northern parts of the Baltic Sea (Bothnian Bay, The Quark, Bothnian Sea, Åland Sea and Archipelago Sea), the relative abundances of piscivores are generally high and stable, or increasing (see Results figure 1). Only in one location (Norrbyn) is the status failing to achieve the threshold, indicating a not good status.

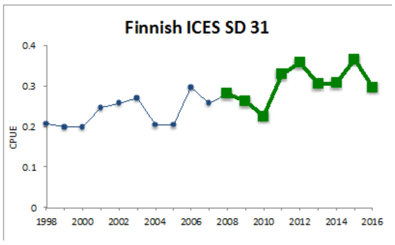
In the central parts of the Baltic Sea (Northern Baltic Sea, Gulf of Finland, Gulf of Riga and Gotland Basin), there are differences in the status across monitoring locations, and good status is only achieved in five out of seven assessment units (see Results table 1). Good status is achieved in the Northern Baltic Sea, Gulf of Finland, southern Gulf of Riga and Eastern Gotland Basin, whereas in the Estonian part of the Gulf of Riga and Western Gotland Basin the monitoring stations (Hiiumaa, Estonia and the Swedish locations Kvädöfjärden and Vinö), are classified as failing the threshold - although one data set (Kvädöfjärden, long time-series) achieved the threshold. In the two Lithuanian locations assessed, the status appears to be good, but no data is available after 2012.

In the more southern parts, assessment is only available for one Swedish location (Torhamn, Bornholm Basin) and the status here is good (see Results table 1).

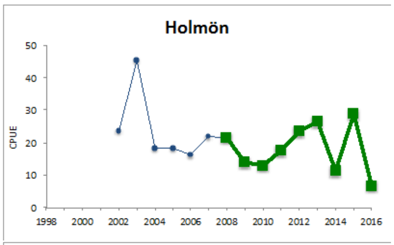
Bothnian Bay

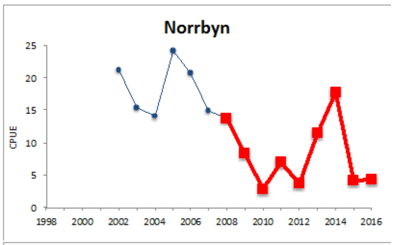


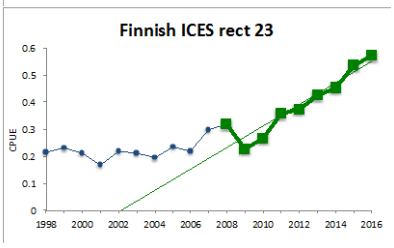


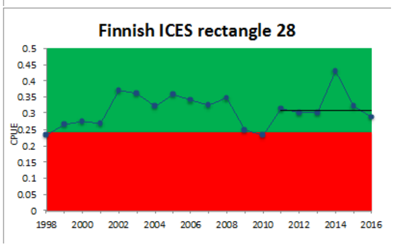


The Quark

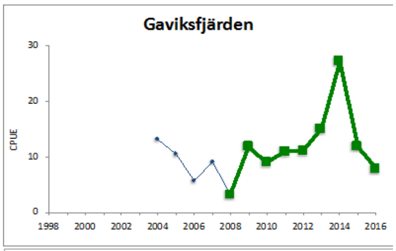


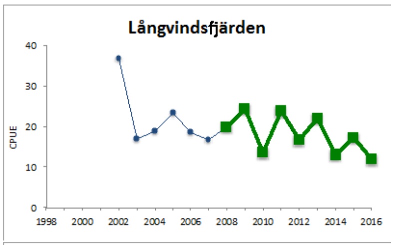


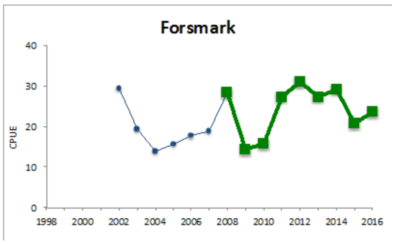


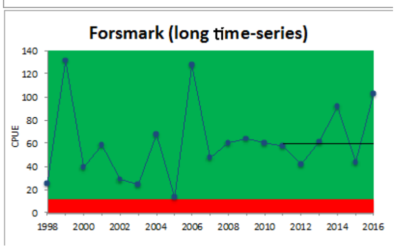


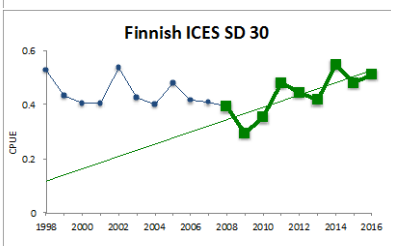
Bothnian Sea



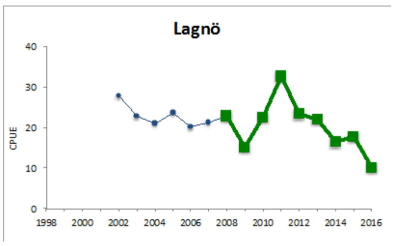




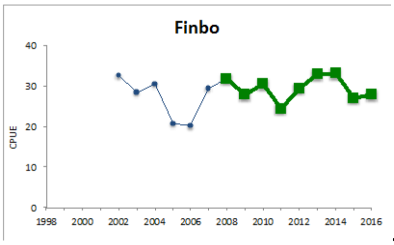


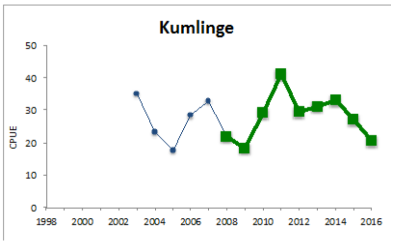


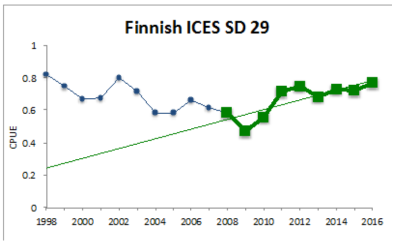
Åland Sea



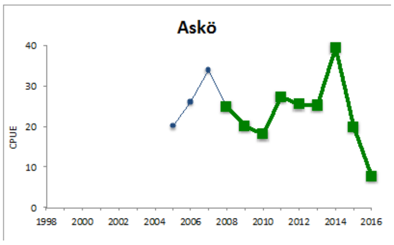
Archipelago Sea

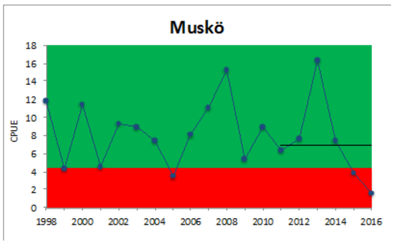




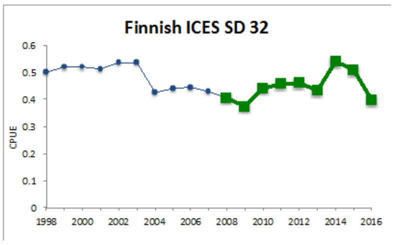


Northern Baltic Sea

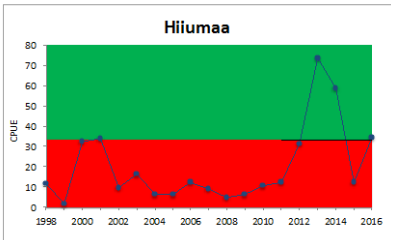


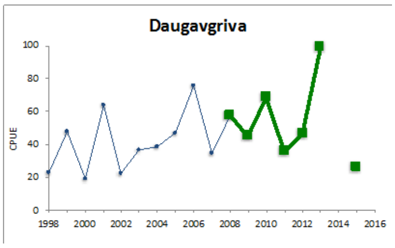


Gulf of Finland

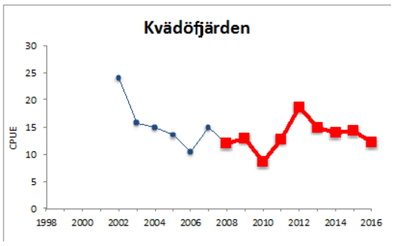


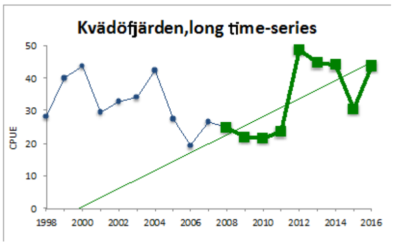
Gulf of Riga

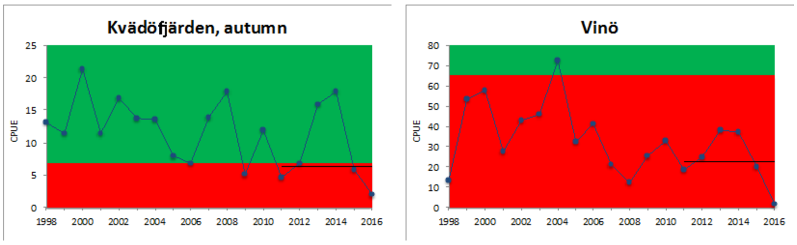




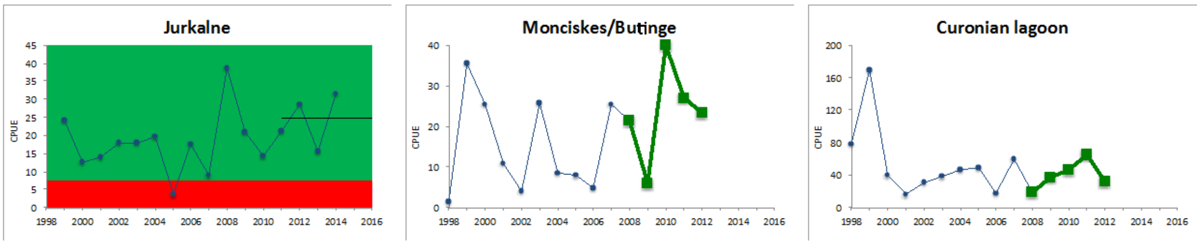
Western Gotland Basin



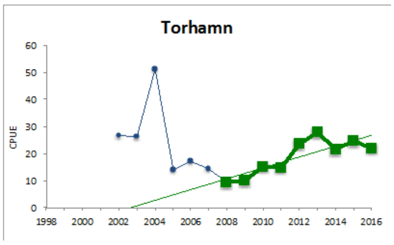




Eastern Gotland Basin



Bornholm Basin



Results figure 1. Piscivore status evaluation results. All evaluations are displayed per sub-basin for each monitoring location. In locations where the baseline approach is applied, the threshold value is displayed as the edge between the green (good) and red (not good) fields and the evaluation of good/not good status is given 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.

Cyprinids/mesopredators

The environmental status of cyprinids and mesopredator abundance is generally not good. Good status is only achieved in 52 % of the assessed monitoring locations (15 out of in total 27 locations), and only 7 out of 16 assessment units achieve good status (see table below). In the locations classified as having not good status (12 locations), the abundance of cyprinids was too high in all but one (Hiiumaa, Estonia).

There are some geographical patterns in the status of the cyprinids/mesopredators, and good status is not achieved in the Swedish part of the Quark and Åland Sea, in all Finnish coastal waters except for the Bothnian Bay, and in Estonian and Latvian coastal waters.

In all but one of the locations classified as not good status, the abundance of cyprinids/mesopredators was too high. However, in the only Estonian location assessed (Hiiumaa), the abundances appear to be too low to reflect good status.

Evaluations of the indicator were only carried out for cyprinids/mesopredators in the central and northern parts of the Baltic Sea since monitoring to support the indicator is currently lacking in Germany and Denmark.

Results table 2. Cyprinid/mesopredators evaluation results 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 indicator	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	Cyprinids	Commercial stats	Baseline	GS	0.092; 0.19	0.15	GS	GS
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Råneå	2002-2016	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.52	GS	
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Kinnbäcksfjärden	2004-2016	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.17	GS	GS
The Quark	Finland	The Quark Finnish Coastal waters	3	Finnish ICES rect 23	1998-2016	Cyprinids	Commercial stats	Trend	nGS	Slope p <0.1 (-)	P slope = 0.20	nGS	
The Quark	Finland	The Quark Finnish Coastal waters	3	Finnish ICES rect 28	1998-2016	Cyprinids	Commercial stats	Trend	nGS	Slope p <0.1 (-)	P slope = 0.23	nGS	nGS
The Quark	Sweden	The Quark Swedish Coastal waters	4	Holmön	2002-2016	Cyprinids	Gill net	Trend	nGS	Slope p <0.1 (-)	P slope = 0.0008 (+)	nGS	
The Quark	Sweden	The Quark Swedish Coastal waters	4	Norrbyn	2002-2016	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.16	GS	nGS
Bothnian Sea	Finland	Bothnian Sea Finnish Coastal waters	5	Finnish ICES SD 30	1998-2016	Cyprinids	Commercial stats	Baseline	nGS	0.14	0.21	nGS	nGS
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Gaviksfjärden	2004-2016	Cyprinids	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	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.95	GS	
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Forsmark	2002-2016	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.11	GS	
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Forsmark, long time-series	1998-2016	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.61	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	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.0014 (+)	nGS	nGS
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Finbo	2002-2016	Cyprinids	Gill net	Trend	nGS	Slope p <0.1 (-)	P slope = 0.016 (+)	nGS	
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Kumlinge	2003-2016	Cyprinids	Gill net	Trend	nGS	Slope p <0.1 (-)	P slope = 0.22	nGS	
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Finnish ICES SD 29	1998-2016	Cyprinids	Commercial stats	Baseline	nGS	0.10	0.22	nGS	nGS
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	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.90	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	Cyprinids	Commercial stats	Trend	nGS	Slope p <0.1 (-)	P slope = 0.37	nGS	nGS
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	Cyprinids	Gill net	Trend	nGS	Slope p <0.1 (+)	P slope = 0.04 (-)	nGS	nGS
Gulf of Riga	Latvia	Gulf of Riga Latvian Coastal waters	17	Daugavgriva	1998-2015	Cyprinids	Gill net	Trend	nGS	Slope p <0.1 (-)	P slope = 0.18	nGS	nGS
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden	2002-2016	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.93	GS	
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, long time-series	1998-2016	Cyprinids	Gill net	Baseline	GS	15.3; 53.67	43.60	GS	
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Vinö	1998-2016	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.91	GS	GS
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	1998-2015	Cyprinids	Gill net	Trend	nGS	Slope p <0.1 (-)	P slope = 0.51	nGS	nGS
Estern Gotland Basin	Lithuania	Eastern Gotland Basin Lithuanian Coastal waters	21	Mon/But	1999-2012	Mesopredatc	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.75	GS	
Estern Gotland Basin	Lithuania	Eastern Gotland Basin Lithuanian Coastal waters	21	Curonian lagoon	1998-2012	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.98	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	Cyprinids	Gill net	Trend	GS	Slope p >0.1 (+)	P slope = 0.50	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	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	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
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	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
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	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
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	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kattegat	Sweden	Kattegat Swedish Coastal waters	41	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

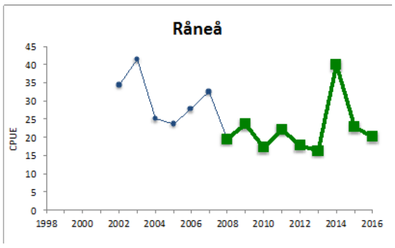
In the northernmost parts of the Baltic Sea, the status is generally good in the Bothnian Bay but bad in the Quark (Results table 2 and Results figure 3). In the Quark the abundance of cyprinids is high (two locations), increasing (Holmön, Sweden), or at a stable and acceptable level in one Swedish area (Norrbyn, Sweden).

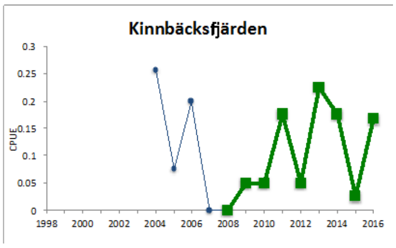
In the Bothnian Sea and Åland Sea along the Swedish coast the relative abundance of cyprinids is generally stable and acceptable (indicating good status), except for one location (Lagnö, Åland Sea) where the abundance is increasing. By contrast, the status is not good due too high or increasing abundances of cyprinids along the Finnish Bothnian Sea and Archipelago Sea coast (see Results figure 3).

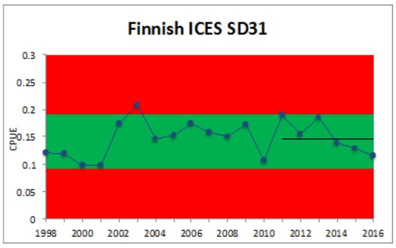
In the central parts of the Baltic Sea (Northern Baltic Sea, Gulf of Finland, Gulf of Riga and Gotland Basin) the status is good in all Swedish locations. Along the Finnish, Estonian and Latvian coasts, the status is not good in all locations as a result of too high or increasing abundances of cyprinids, except for in Hiiumaa (Estonia) where the abundances are too low to represent good status. In the two Lithuanian locations the status appears to be good, but no data is available for assessments after 2012.

In the southernmost locations (Torhamn, Bornholm Basin) the evaluation of cyprinid communities indicates good status.

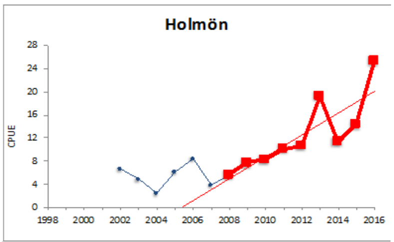
Bothnian Bay

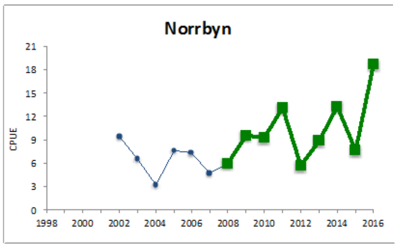


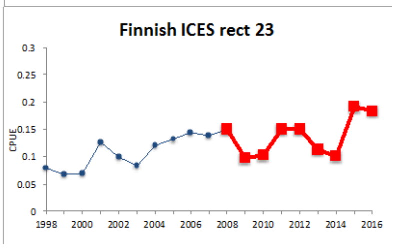


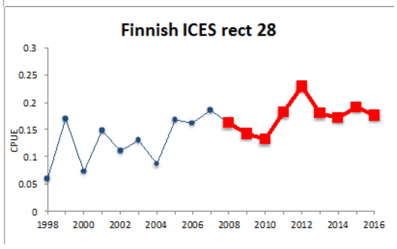


The Quark

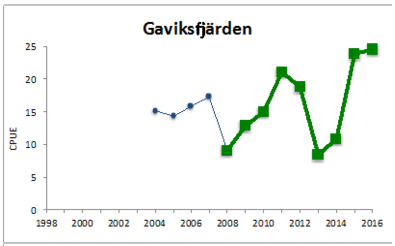


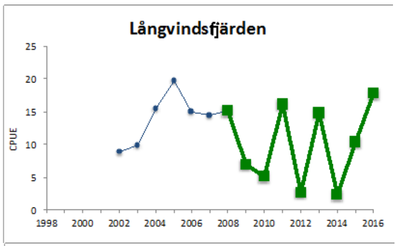


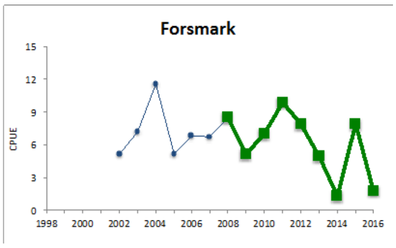


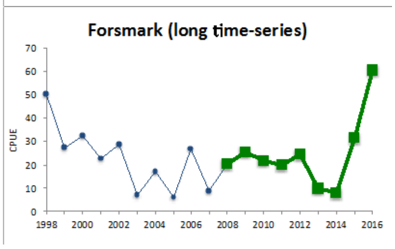


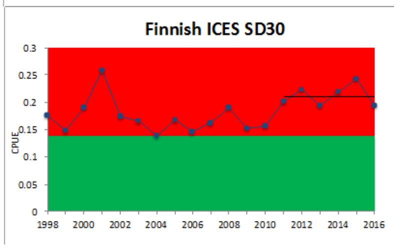
Bothnian Sea



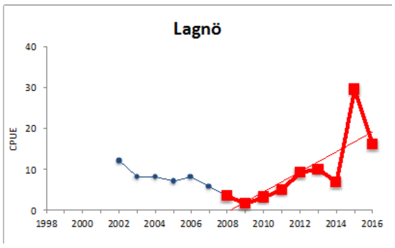




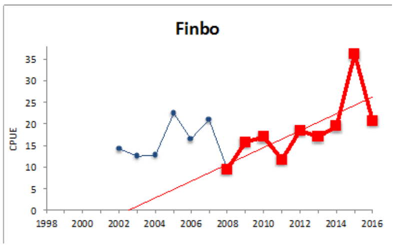


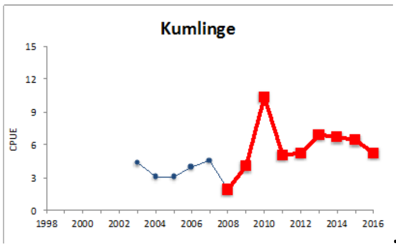


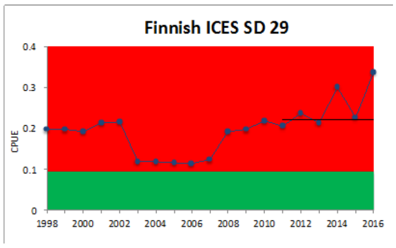
Åland Sea



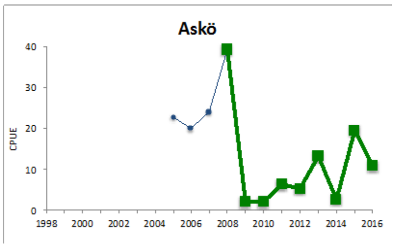
Archipelago Sea



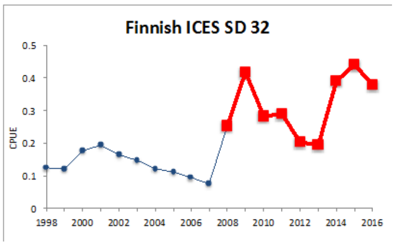




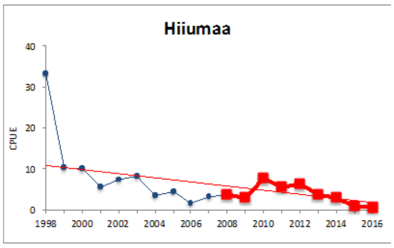
Northern Baltic Sea

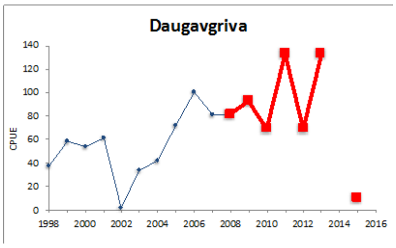


Gulf of Finland

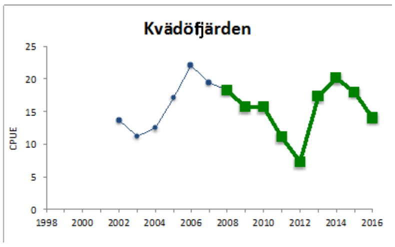


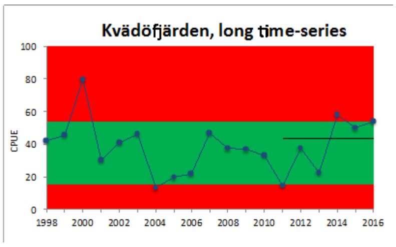
Gulf of Riga

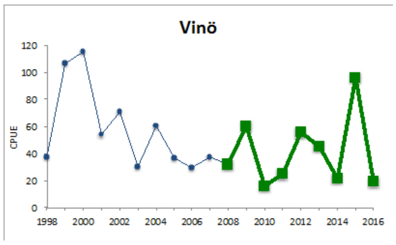




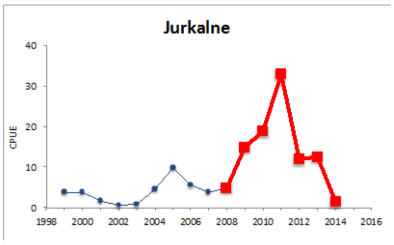
Western Gotland Basin

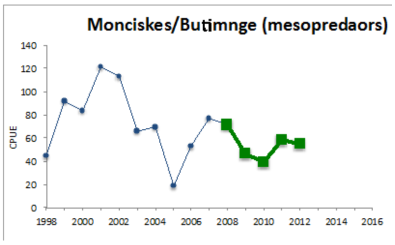


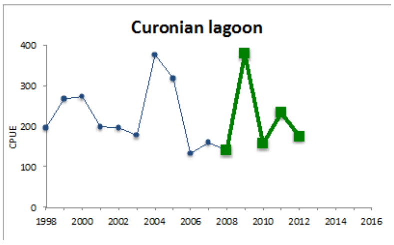




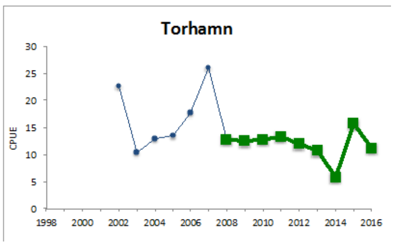
Eastern Gotland Basin







Bornholm Basin



Results figure 2. Cyprinid/mesopredator evaluation outcome. All evaluations are displayed per sub-basin for each monitoring location. In locations where the baseline approach is applied, the threshold value is displayed as the edge between the green (good status) and red (not good status) fields and the evaluation of status is given 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 denote a good status evaluation outcome whereas a red line denotes a not good status evaluation outcome. The trend-line indicates a significant 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 between 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. 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 were:

Confidence in the accuracy of the estimate (ConfA). Level 1 =fisheries independent monitoring, 0.5 = fisheries dependent monitoring (commercial catch data) 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 = data missing for one or two years during 2011-2016, and 0 = data missing for three or more years 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 (http://helcom.fi/action-areas/monitoring-and-assessment/manuals-and-guidelines/coastal-fish-guidelines).

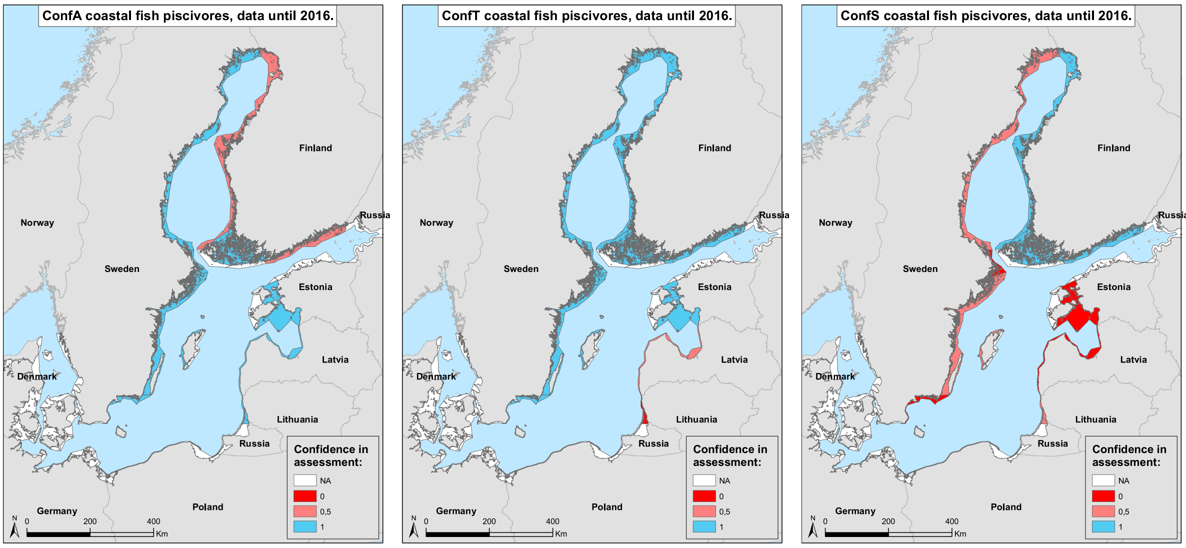
Results table 3. Confidence in the status assessment of the piscivores indicator according to the criteria developed within HELCOM for the integrated biodiversity assessment.

Sub-basin name	Country	Coastal area name (assessment unit)	Coastal area code	Monitoring area	Time period assessed	Identity of key piscivores	Monitoring method	ConfA	ConfT	ConfS	ConfM
Bothnian Bay	Finland	Bothnian Bay Finnish Coastal waters	1	Finnish ICES SD 31	1998-2016	Perch, pike, pikeperch	Commercial stats	0.5	1.0	1.0	1.0
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Råneå	2002-2016	Perch, pike, burbot	Gill net				
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Kinnbäcksfjärden	2004-2016	Perch, pike, burbot	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, pike, pikeperch	Commercial stats				
The Quark	Finland	The Quark Finnish Coastal waters	3	Finnish ICES rect 28	1998-2016	Perch, pike, pikeperch	Commercial stats	0.5	1.0	1.0	1.0
The Quark	Sweden	The Quark Swedish Coastal waters	4	Holmön	2002-2016	Perch, pike, burbot	Gill net				
The Quark	Sweden	The Quark Swedish Coastal waters	4	Norrbyn	2002-2016	Perch, pike, burbot	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, pike, pikeperch	Commercial stats	0.5	1.0	1.0	1.0
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Gaviksfjärden	2004-2016	Perch, pike, burbot	Gill net				
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Långvindsfjärden	2002-2016	Perch, pike, burbot	Gill net				
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Forsmark	2002-2016	Perch, pike, burbot, pikeperch	Gill net				
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Forsmark, long time-series	1998-2016	Perch, pike, burbot, pikeperch	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, pike, burbot, pikeperch	Gill net	1.0	1.0	0.0	1.0
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Finbo	2002-2016	Perch, pike, pikeperch	Gill net				
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Kumlinge	2003-2016	Perch, pike, pikeperch	Gill net				
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Finnish ICES SD 29	1998-2016	Perch, pike, pikeperch	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, pike, burbot, pikeperch	Gill net				
Northern Baltic Sea	Sweden	Northern Baltic Proper Swedish Coastal waters	11	Muskö	1998-2016	Perch, pike, pikeperch, cod	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, pike, pikeperch	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, pike, pikeperch	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, pike, pikeperch	Gill net	1.0	0.5	0.0	1.0
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden	2002-2016	Perch, pike, pikeperch, cod, turbot	Gill net				
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, long time-series	1998-2016	Perch, pike, pikeperch, cod, turbot	Gill net				
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, autumn	1998-2016	Perch, pike, pikeperch, cod, turbot	Gill net				
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Vinö	1998-2016	Perch, pike, pikeperch, cod, turbot	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	Perch, pike, pikeperch, cod, turbot	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	Perch, pikeperch, cod, turbot	Gill net				
Estern Gotland Basin	Lithuania	Eastern Gotland Basin Lithuanian Coastal waters	21	Curonian lagoon	1998-2012	Perch, pike, burbot, pikeperch	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, pike, pikeperch, cod, turbot	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	NA	NA	NA	NA	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	NA	NA	NA	NA	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	NA	NA	NA	NA	NA	NA	NA	NA
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	NA	NA	NA	NA	NA	NA	NA	NA
Kattegat	Sweden	Kattegat Swedish Coastal waters	41	NA	NA	NA	NA	NA	NA	NA	NA
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	NA	NA	NA	NA	NA	NA	NA	NA

Results table 4. Confidence in the status assessment of the cyprinids indicator according to the criteria developed within HELCOM for the integrated biodiversity assessment.

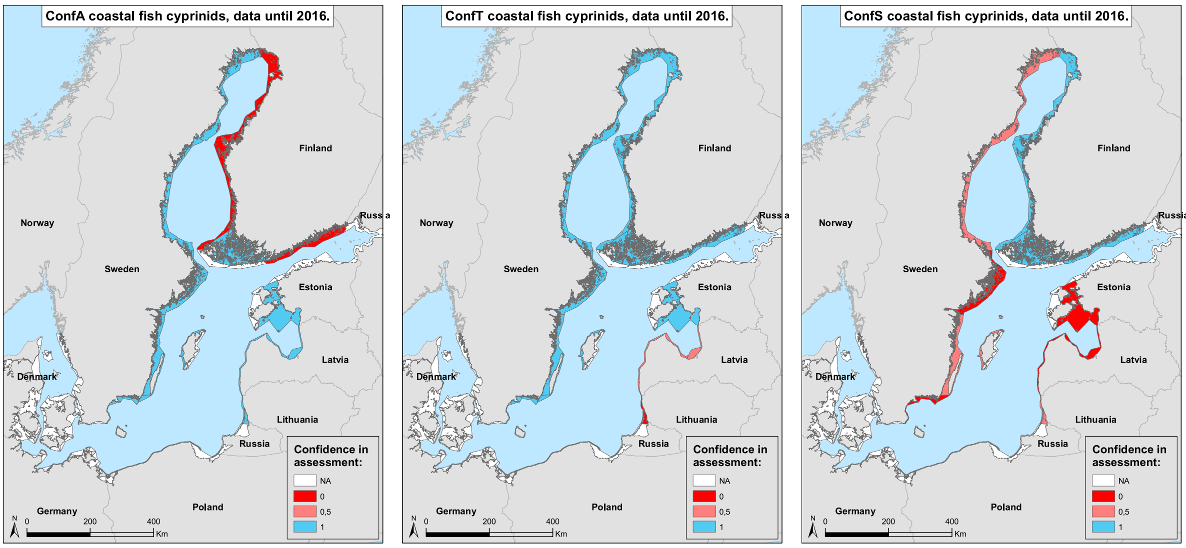
Sub-basin name	Country	Coastal area name (assessment unit)	Coastal area code	Monitoring area	Time period assessed	Identity of indicator	Monitoring method	ConfA	ConfT	ConfS	ConfM
Bothnian Bay	Finland	Bothnian Bay Finnish Coastal waters	1	Finnish ICES SD 31	1998-2016	Cyprinids	Commercial stats	0.0	1.0	1.0	1.0
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Råneå	2002-2016	Cyprinids	Gill net				
Bothnian Bay	Sweden	Bothnian Bay Swedish Coastal waters	2	Kinnbäcksfjärden	2004-2016	Cyprinids	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	Cyprinids	Commercial stats				
The Quark	Finland	The Quark Finnish Coastal waters	3	Finnish ICES rect 28	1998-2016	Cyprinids	Commercial stats	0.0	1.0	1.0	1.0
The Quark	Sweden	The Quark Swedish Coastal waters	4	Holmön	2002-2016	Cyprinids	Gill net				
The Quark	Sweden	The Quark Swedish Coastal waters	4	Norrbyn	2002-2016	Cyprinids	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	Cyprinids	Commercial stats	0.0	1.0	1.0	1.0
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Gaviksfjärden	2004-2016	Cyprinids	Gill net				
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Långvindsfjärden	2002-2016	Cyprinids	Gill net				
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Forsmark	2002-2016	Cyprinids	Gill net				
Bothnian Sea	Sweden	Bothnian Sea Swedish Coastal waters	6	Forsmark, long time-series	1998-2016	Cyprinids	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	Cyprinids	Gill net	1.0	1.0	0.0	1.0
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Finbo	2002-2016	Cyprinids	Gill net				
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Kumlinge	2003-2016	Cyprinids	Gill net				
Archipelago Sea	Finland	Archipelago Sea Coastal waters	9	Finnish ICES SD 29	1998-2016	Cyprinids	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	Cyprinids	Gill net	1.0	1.0	0.0	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	Cyprinids	Commercial stats	0.0	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	Cyprinids	Gill net	1.0	1.0	0.0	1.0
Gulf of Riga	Latvia	Gulf of Riga Latvian Coastal waters	17	Daugavgriva	1998-2015	Cyprinids	Gill net	1.0	0.5	0.0	1.0
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden	2002-2016	Cyprinids	Gill net				
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Kvädöfjärden, long time-series	1998-2016	Cyprinids	Gill net				
Western Gotland Basin	Sweden	Western Gotland Basin Swedish Coastal waters	18	Vinö	1998-2016	Cyprinids	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	1998-2015	Cyprinids	Gill net	1.0	0.5	0.0	1.0
Estern Gotland Basin	Lithuania	Eastern Gotland Basin Lithuanian Coastal waters	21	Mon/But	1999-2012	Mesopredatc	Gill net				
Estern Gotland Basin	Lithuania	Eastern Gotland Basin Lithuanian Coastal waters	21	Curonian lagoon	1998-2012	Cyprinids	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	Cyprinids	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	NA	NA	NA	NA	NA	NA	NA	NA
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	NA	NA	NA	NA	NA	NA	NA	NA
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	NA	NA	NA	NA	NA	NA	NA	NA
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	NA	NA	NA	NA	NA	NA	NA	NA
Kattegat	Sweden	Kattegat Swedish Coastal waters	41	NA	NA	NA	NA	NA	NA	NA	NA
Kattegat	Denmark	Kattegat Danish Coastal waters, including Limfjorden	42	NA	NA	NA	NA	NA	NA	NA	NA

For the piscivore indicator, the confidence in the accuracy of the assessment (ConfA) is high in the majority of the assessment units. It is somewhat lower in the units depending on fisheries dependent monitoring in Finland. The confidence in the temporal coverage (ConfT) is high in all areas except for the Latvian and Lithuanian areas due to missing data in one or more of the years in the assessment period. The confidence in spatial representability (ConfS) is the highest in the Finnish 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 3. Maps of confidence of the current assessment of the piscivore indicator. See Results table 3 for details.

For the cyprinids/mesopredators indicator, the confidence in the accuracy of the assessment (ConfA) is high in all assessment units except for the units in Finland depending on fisheries dependent monitoring. The confidence in the temporal coverage (ConfT) is high in all areas except for the Latvian and Lithuanian areas due to missing data in one or more of the years in the assessment period. The confidence in spatial representability (ConfS) is the highest in the Finnish 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 4. Maps of confidence of the current assessment of the cyprinids/mesopredators indicator. See Results table 4 for details.

The confidence concept as developed for the HELCOM 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.

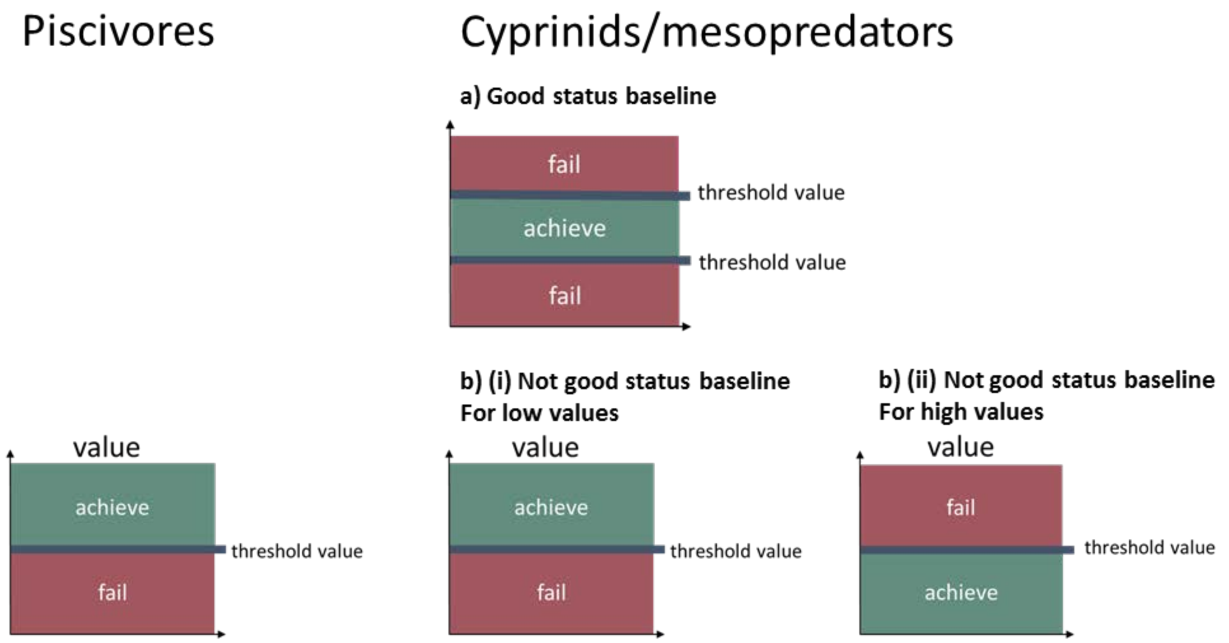
Thresholds and Status evaluation

Good status is achieved when the abundance of piscivores is above a specified threshold value and the abundance of cyprinids is within an acceptable range. 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 (<15 years) are available, a trend-based approach 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 sheet for further background).

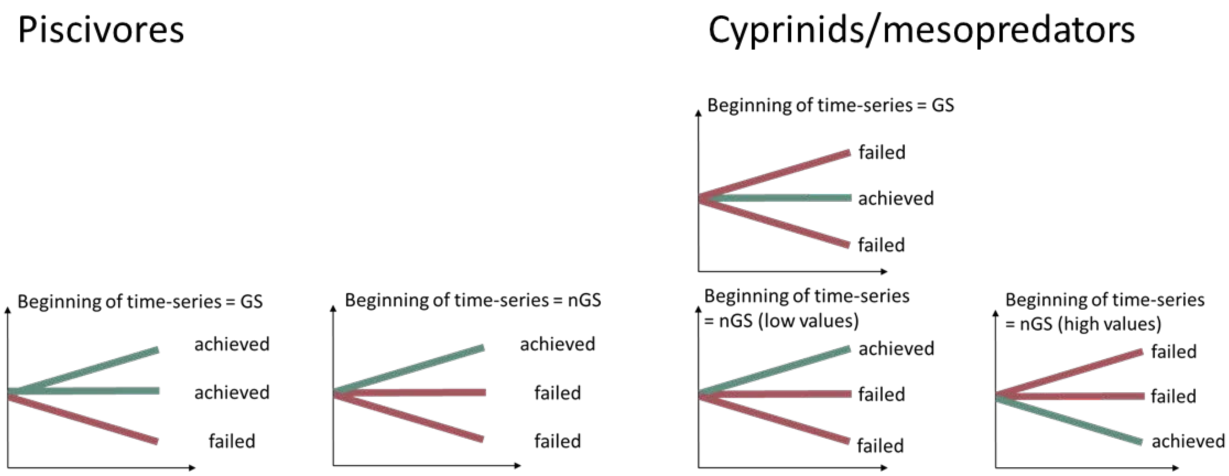
Estimates of the relative abundance and/or biomass are used to determine whether coastal fish key functional groups in the Baltic Sea achieve good status or not. These estimates are derived from fishery independent monitoring and/or commercial catch statistics. Since there are strong environmental gradients 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 fish key functional groups 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. Determination of acceptable deviation from baseline (>15 years) for piscivores (left) and acceptable range from baseline for cyprinids (right). See description in the Assessment protocol.

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 for piscivores (left) and cyprinids (right). 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.

The functional groups used in this indicator are piscivorous fish species and members of the cyprinid family. In areas where cyprinids do not exist naturally, mesopredatory fish species could be used e.g. any mid-trophic level species that are not piscivorous. Due to the absence of cyprinids in one area, mesopredators assessed in this single area (Monciskes/Butinge in Lithuania). Piscivorous coastal fish species are typically represented by perch (*Perca fluviatilis*), pike (*Esox Lucius*), pikeperch (*Sander lucioperca*) and burbot (*Lota lota*) in the less saline eastern and northern Baltic Sea (Sweden, Finland, Estonia, Latvia and Lithuania) and in sheltered coastal areas in Poland and Germany. In the more exposed coastal parts of the central Baltic Sea and in its western parts, piscivores are typically represented by cod (*Gadus morhua*) and turbot (*Scophthalmus maximus*). A similar division can be made for members of the cyprinid family (*Cyprinidae*), e.g. roach (*Rutilus rutilus*) and bream (*Abramis sp.*) that are the most abundant species in the less saline eastern and northern parts of the Baltic Sea, whereas mesopredatory fish are representative of the more exposed coastal parts of the central Baltic Sea and in its more saline western region.

Assessment Protocol

This indicator uses two different approaches for evaluating whether Good Status is achieved. The approach used depends on the availability of data. If there is sufficient data (at least 15 years' time series), then the baseline approach is used. If the criteria for applying the baseline approach are not fulfilled, then the trend-based approach is used.

Baseline approach

In order to be able to apply the baseline approach for evaluation of good status, coastal fish datasets must meet certain criteria:

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 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 period used to determine baseline reflects a period of good status. This could be done either by using data dating back earlier than the start of the period used to determine the baseline, by using additional information, or by expert judgment. For example, if data preceding the period used to determine the baseline have much higher indicator values, then 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 determined, 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 re-sampled. To evaluate whether the threshold value is achieved during the assessment period the median value of the indicators during the assessment period is compared with the specific threshold value (see Thresholds figure 1 and the decision tree in Assessment Protocol figure 1):

1. For piscivores, in situations where the baseline state reflects 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. For cyprinids and mesopredatory fish species, the median of the years in the assessment period should be above the 5^{th} percentile and below the 95^{th} percentile to reflect good status.

2. For piscivores, in situations where the baseline state reflects not good status, the median of the years in the assessment period should be above the 98th percentile of the median distribution of the dataset used to determine the baseline in order to reflect good status. For cyprinds and mesopredatory fish species, in order to reflect good status the median of the years in the assessment period should be above the 98th percentile if the baseline status is indicative of too low abundances, and below the 5th percentile if the baseline status is indicative of too high abundances.

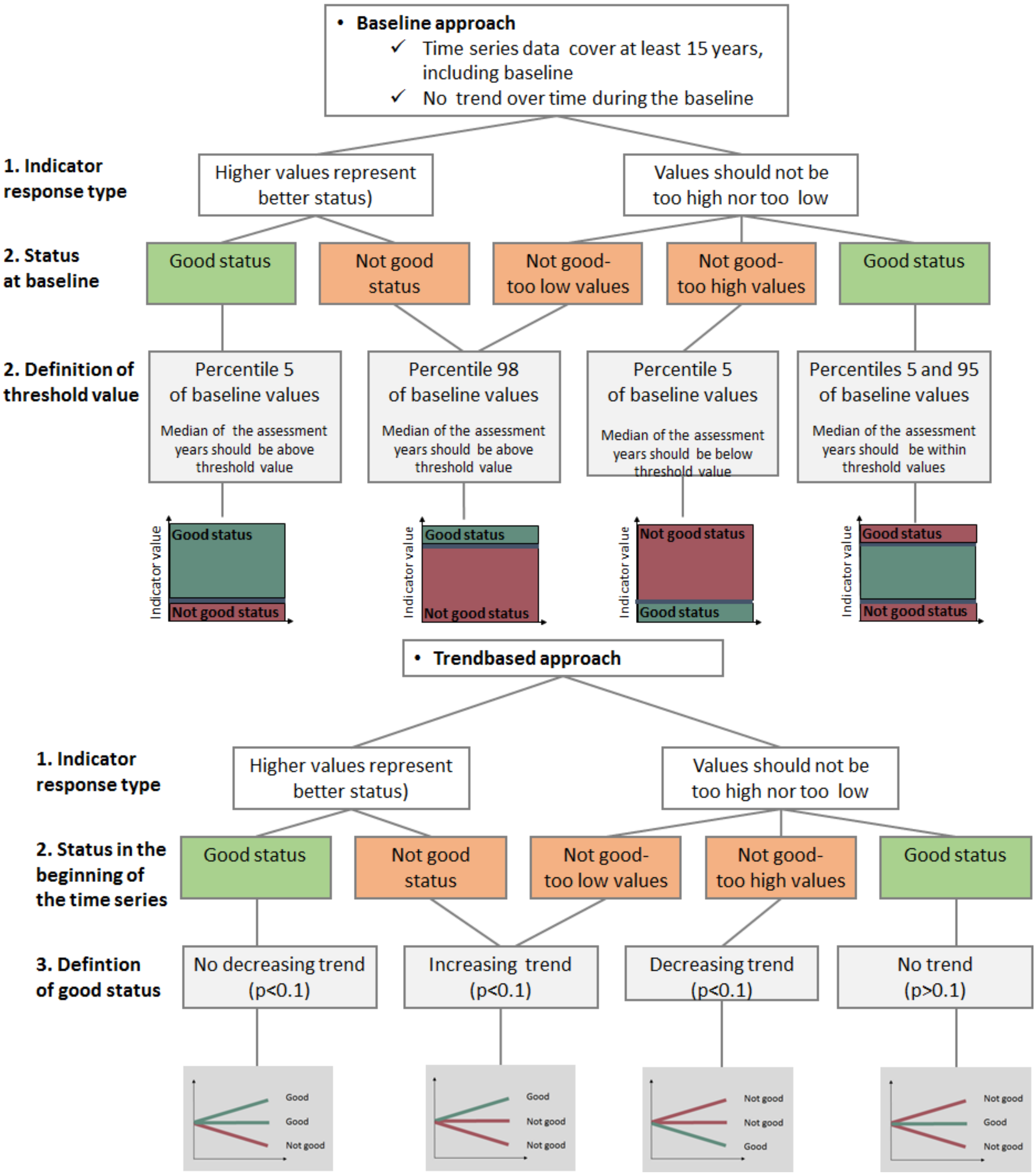
Trend-based approach

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 compared to the desired direction of the indicator over time (see Thresholds figure 2). Where the first years in the evaluated time series represent good status, for piscivores the trend of the indicator over time should not be negative in order to represent good status. For cyprinids and mesopredatory fish, the trend of the indicator over time should not exhibit any direction in order to reflect good status. If, on the other hand, the first years of the assessed time series represent not good status, then for piscivores the trend in the indicator should be positive in order to represent good status, and for cyprinids and mesopredatory fish the trend should be in the desired direction to reflect good status. The significance level 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 status evaluation using coastal fish community structure. The baseline approach is defined (top figure) and the threndbased approach (bottom figure).

Assessment units

Due to the local appearance of typical coastal fish populations, status evaluations of coastal fish communities are representative of 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 for both indicators were carried out for 16 coastal HELCOM assessment units. The number of units evaluated is currently restricted by the availability of monitoring data.

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 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. In order to only include species and size groups suited for quantitative sampling by 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

The 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.

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.

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 selected functional groups of coastal fish, 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 functional groups addresses the Baltic Sea Action Plan's (BSAP) Biodiversity and nature conservation segment's ecological objectives 'Natural distribution and occurrence of plants and animals' and 'Thriving and balanced communities of plants and animals'.

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 4: 'All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity'.

and the following criteria of the Commission Decision:

- Criterion D4C2. (Trophic guilds, balance of total guild abundance)

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

Role of key functional groups of coastal fish 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) in having a structuring role in the ecosystem, mainly via top-down control on lower trophic levels. Viable populations of piscivorous species are generally considered to reflect an environmental status with few eutrophication symptoms and balanced food webs (Eriksson et al. 2011; Östman et al. 2016).

As a contrast, high abundances of cyprinids and mesopredatory fish are generally indicative of poorer environmental conditions in the coastal ecosystem (Eriksson et al. 2009; Baden et al. 2012; Bergström et al. 2016b; Östman et al. 2016). High abundances of cyprinids and mesopredators might reflect lack of top-down regulation, elevated eutrophication and increased water temperatures.

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).

Human pressures linked to the indicator

	General	MSFD Annex III, Table 2
Strong link	Several pressures, both natural and human, acting in concert affect the state of key functional groups of coastal fish. 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.	<u>Biological</u> *Extraction of, or mortality/injury to, wild species* (e.g. selective extraction of species, including incidental non-target catches) <u>Physical</u> *Physical disturbance to seabed* (e.g. abrasion and selective extraction) *Physical loss* (e.g.sealing) *Changes to hydrological processes* (e.g. significant changes in thermal and/or salinity regime) <u>Substances</u> *Inputs of nutrients* (e.g. inputs of fertilisers and other nitrogen and phosphorus-rich substances)
Weak link	There might also be effects of hazardous substances and non-indigenous species on the state of coastal fish key functional groups	<u>Substances</u> *Input of other substances* (e.g. synthetic substances, non-synthetic substances, radionuclides) <u>Biological</u> *Input or spread of non-indigenous species*

The state of key functional groups of coastal fish 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.

The functional groups considered in this indicator are generally heavily affected by the impacts of a changing climate (Möllman et al. 2009; Olsson et al. 2012; Östman et al. 2017b) including alterations in the food web (Eriksson et al. 2009; 2011; Östman et al. 2016), the impact of increased water temperature and, for cyprinids in particular, also lowered salinity (Härmä et al. 2008; Östman et al. 2017b).

Among pressures related to human activities, exploitation of essential habitats (Sundblad et al. 2014; Sundblad & Bergström 2014; Kraufvelin et al. 2018) impact both piscivores and cyprinids/mesdopredators, whereas fishing generally affects mainly piscivores in the western and northern parts (Edgren 2005; Bergström et al. 2007; Fenberg et al. 2012; Florin et al. 2013), and cyprinids in the Baltic States. Coastal piscivorous species, such as perch, pike and pikeperch, are targeted in both the recreational and small-scale commercial fisheries sector and in some countries to a larger extent in the former (HELCOM 2015b), whereas cod is both exploited in the offshore and coastal commercial fisheries.

The effect of eutrophication on the state of coastal fish communities do mainly affect cyprinids (Härmä et al. 2008; Bergström et al. 2016b) and might increase with higher latitude (Östman et al. 2017b).

The abundance of piscivorous coastal fish (such as perch, pike, pikeperch, turbot and cod) 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 piscivorous fish might reflect increasing water temperatures and moderate eutrophication (perch and pike), availability of recruitment habitats (all), low fishing pressure and low predation pressure from apex predators (all), but also high eutrophication (pikeperch) as well as colder and more saline conditions (cod) (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. 2013; Bergström et al. 2016b; Östman et al. 2017b; Hansson et al. 2017). As for the majority of coastal piscivorous fish species, exploitation of recruitment areas has a negative impact on the development of perch populations (Sundblad et al. 2014; Sundblad & Bergström 2014; Kraufvelin et al. 2018).

Cyprinids and mesopredatory fish species typically represent lower trophic levels in being planktivores and benthivores. As such, these groups of species are both impacted by bottom-up mechanisms such as eutrophication (Härmä et al. 2008; Östman et al. 2016) as well as by top-down regulation by piscivorous fish species (Eriksson et al. 2011; Baden et al. 2012; Casini et al. 2012; Östman et al. 2016) and apex predators (Östman et al. 2012). Hence, whereas abundant and strong populations of piscivorous coastal fish species are indicative for a functioning ecosystem in good environmental status, high abundances of cyprinids and mesopredators often characterize systems in an undesirable environmental state.

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; Hansson et al. 2017). The state of groups of mesopredatory fish species such as wrasses, sticklebacks and gobies, and potentially also cyprinids, could be affected by the food web structure in coastal areas and neighbouring ecosystems (Eriksson et al. 2011; Baden et al. 2012; Casini et al. 2012). Especially decreased predation pressure from declining stocks of piscivorous fish species might favour the increase in abundance of mesopredatory fish species (Östman et al. 2016). On the other hand, the mesopredators are an important part of the diet of cormorants, which may locally compensate the lack of predatory fish.

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**.

Monitoring guidelines specifying the sampling strategy are adopted and published.

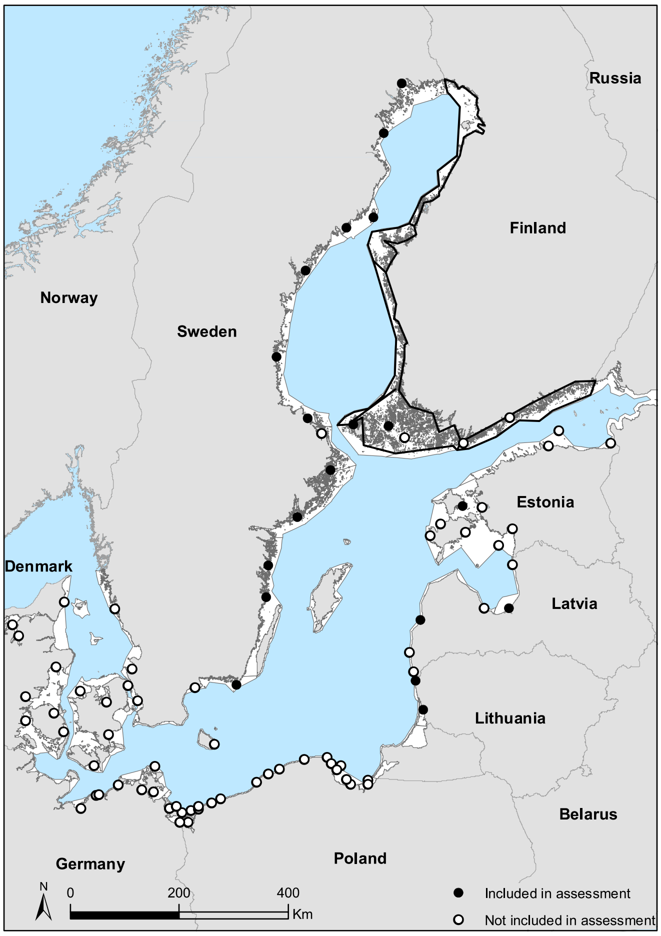
Current monitoring

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 assessment units' (Monitoring figure 1). The current monitoring where information on piscivores and cyprinds/mesopredators can be extracted to date is less extensive, covering 16 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. Click to enlarge.

There are spatial and temporal gaps in the current monitoring and in the present status evaluation some areas are assessed based on alternative data sources such as analyses of catch per unit effort (CPUE) data from commercial fisheries. 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 due to limitations in the assessment approach (requires time-series) no assessment is currently undertaken for Polish waters. In Denmark, no data is available to support the indicators. 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.

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 differing 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 areas are low, and future locations should also 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 preferring higher water temperatures and that dominate coastal areas during warmer parts of the year, typically those with a freshwater origin. Monitoring of species like whitefish, herring 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 coastal fish key functional groups. HELCOM core indicator report. Online. [Date Viewed], [Web link].

ISSN 2343-2543

Metadata

Result: piscivores

Result: cyprinids or mesopredators

Data: point – Abundance of coastal fish key functional groups

Data: polygon - Abundance of coastal fish key functional groups

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 monitoring 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 were 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 and since no time series data exist, data from Poland was not included in the current 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). Since the monitoring programme in Finland has limited geographic coverage, the state of coastal fish communities is assessed 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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Collection of data for the Swedish area of Forsmark using Coastal survey nets (Forsmark long time-series) was financed by Department of Aquatic Resources, Swedish University of Agricultural Sciences, FORMAS Contract no. 217-2013-1315 2015 and Department of Aquatic Resources, Swedish University of Agricultural Sciences, Quantitative Fish- & Fisheries ecology in 2016

Archive

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

Abundance of coastal fish key functional groups 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)

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HELCOM core indicator report

ISSN 2343-2543