



## Theme 1: Biodiversity



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### WP 1.2 Data-arrangements for birds, costal fish, and seal indicators

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## 1. Introduction

HELCOM has developed the following core indicators related to birds, coastal fish and seals:

### **Birds:**

- Abundance of waterbirds in the breeding season
- Abundance of waterbirds in the wintering season

### **Coastal fish:**

- Abundance of coastal fish key functional groups
- Abundance of key coastal fish species

### **Seals:**

- Distribution of Baltic seals
- Population trends and abundance of seals

In order for the above mentioned core indicators to be operational, BalticBOOST WP 1.2 supported the data format development together with thematic expert groups (HELCOM-OSPAR-ICES JWG Bird, HELCOM FISH PRO II, HELCOM SEAL EG), and has set up an arrangement for data reporting, and data access point for underlying data used in these indicators.

This enables transparency of the assessment and the indicator calculation process and user-friendly online access to data used for regional indicator-based assessments such as the 'State of the Baltic Sea' report being prepared by the HELCOM HOLAS II project. .

The databases are operational and data reporting for HOLAS II almost completed. The databases are hosted by HELCOM secretariat and will be made publically available at the HELCOM web-site once the data has been reviewed and approved for HOLAS II, a process that will take place in February 2017.

## 2. The databases

### 2.1 Birds

Data model for coastal breeding and wintering observation was drafted based on an existing format developed by Wetlands international which was fine-tuned and localized (using codelists for species only used for the core indicator) to the Baltic level (Annex 1, Coastal bird data model).

In BalticBoost the draft offshore data format resulting from the BALSAM project, based on ESAS format, was developed further and the new format was approved at the HELCOM-OSPAR-ICES JWG Bird 2016 meeting in October 2016 (Annex 2, Offshore bird data model). Based on the finalized data model, the database was established but not populated with data within the timeframe of the project.

The database was developed based on the coastal and offshore data models making it possible to store both coastal and offshore data and public and restricted in the defined format. The web application displaying data was developed to give access to public coastal breeding and wintering tabular data, including spatial component (count locations).

### 2.2 Coastal fish

A data model for the coastal fish database (Annex 3) was developed taking into account requirements of the HELCOM core indicators on key fish functional groups and key fish species. The initial data model was discussed in FISH PRO II 3-2016 meeting, approved and further developed as expert work in WP1.2. The database was developed based on data model that can be used for both indicators. The web application

was developed to provide access to the data collected and as coordinated by FISH PRO II and spatial component (location of coastal fish monitoring areas).

### 2.3 Seals

Seal data reporting format and data model (Annex 4) was outlined by WP1.2 based on the existing format utilized in the OSPAR region to produce synergy in reporting for those countries reporting to both OSPAR and HELCOM. The first outline of the data format was introduced in HELCOM SEAL 9-2015 and further developed data format in HELCOM SEAL 10 in October 2016. The SEAL 10-2016 meeting opened the data format for discussion, especially the appropriate spatial scale of reporting, and agreed to form intersessional drafting group to agree on appropriate reporting format for seal abundance data. The intersessional drafting group developed further the reporting format, and agreed on a format, which can be also used for reporting centroids of grid or other larger spatial objects using pointwise coordinates (centroid).

The project developed the database based on the agreed data model and web application for accessing the data from the database and displaying spatial component (location of count sites).

## 3. Outcome

The main outcomes and deliverables of WP 1.2 are electronic; thematic online databases for each topic that will be fully accessible online once that data has been approved (tentatively by end of February 2017).

### 3.1 Birds

The bird data collection results in different type of data for coastal and offshore observations, thus the data formats outlined for coastal and offshore monitoring are different. For the coastal data, the existing data model by Wetlands international was followed and utilized as Baltic specific version, with species codelist limited to species used for core indicators.

The main outcomes are:

- 1) Data model for
  - a. Coastal bird observations
  - b. Offshore bird observation
- 2) Database following the data models
- 3) Web application providing access to coastal data collected within HELCOM data collection framework.

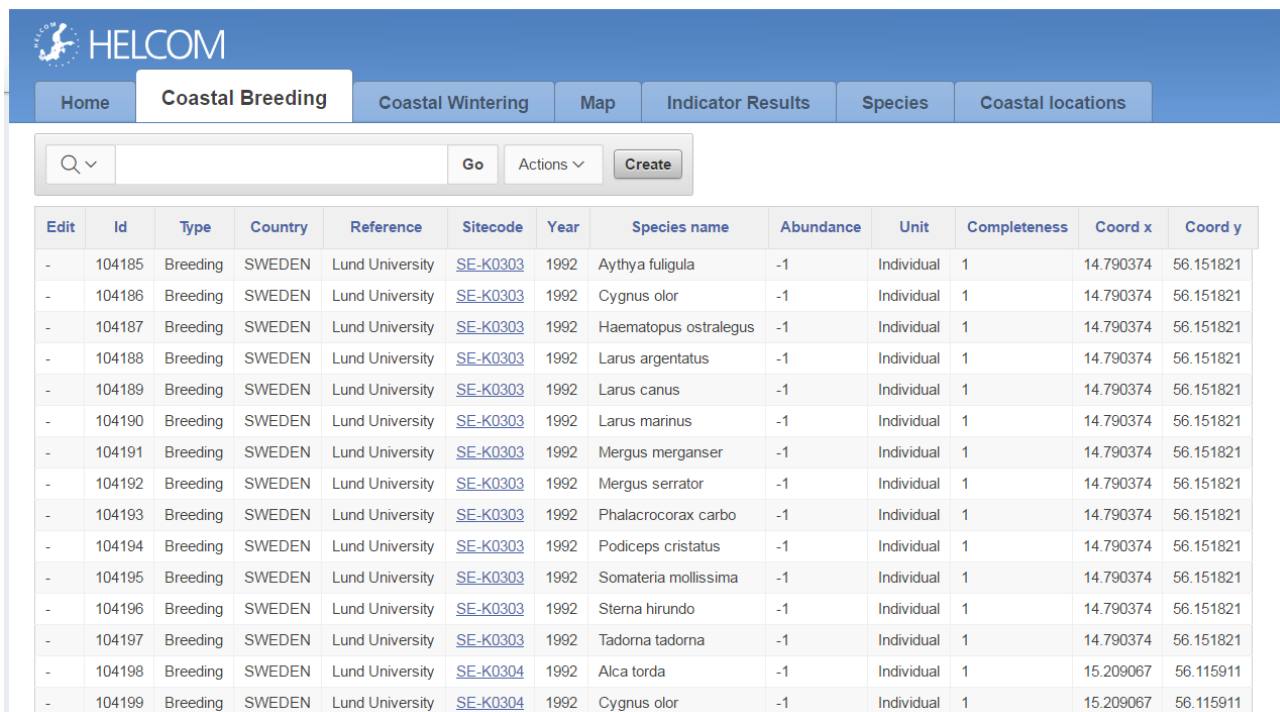
Following the heterogeneous source of data used for indicators (governmental monitoring data and nongovernmental research observations), the data was categorized to a dataset that can be made publicly available and a restricted part. Unrestricted data can be accessed from the database online web application.

In absence of processed offshore monitoring data, the web application was not carried out in BalticBoost project, but the database is ready to accept data in this format.

The database web application can be accessed from <http://bio.helcom.fi/birds> (for the time being data is not approved and completed). The web application consists of following sheets (Figure 1):

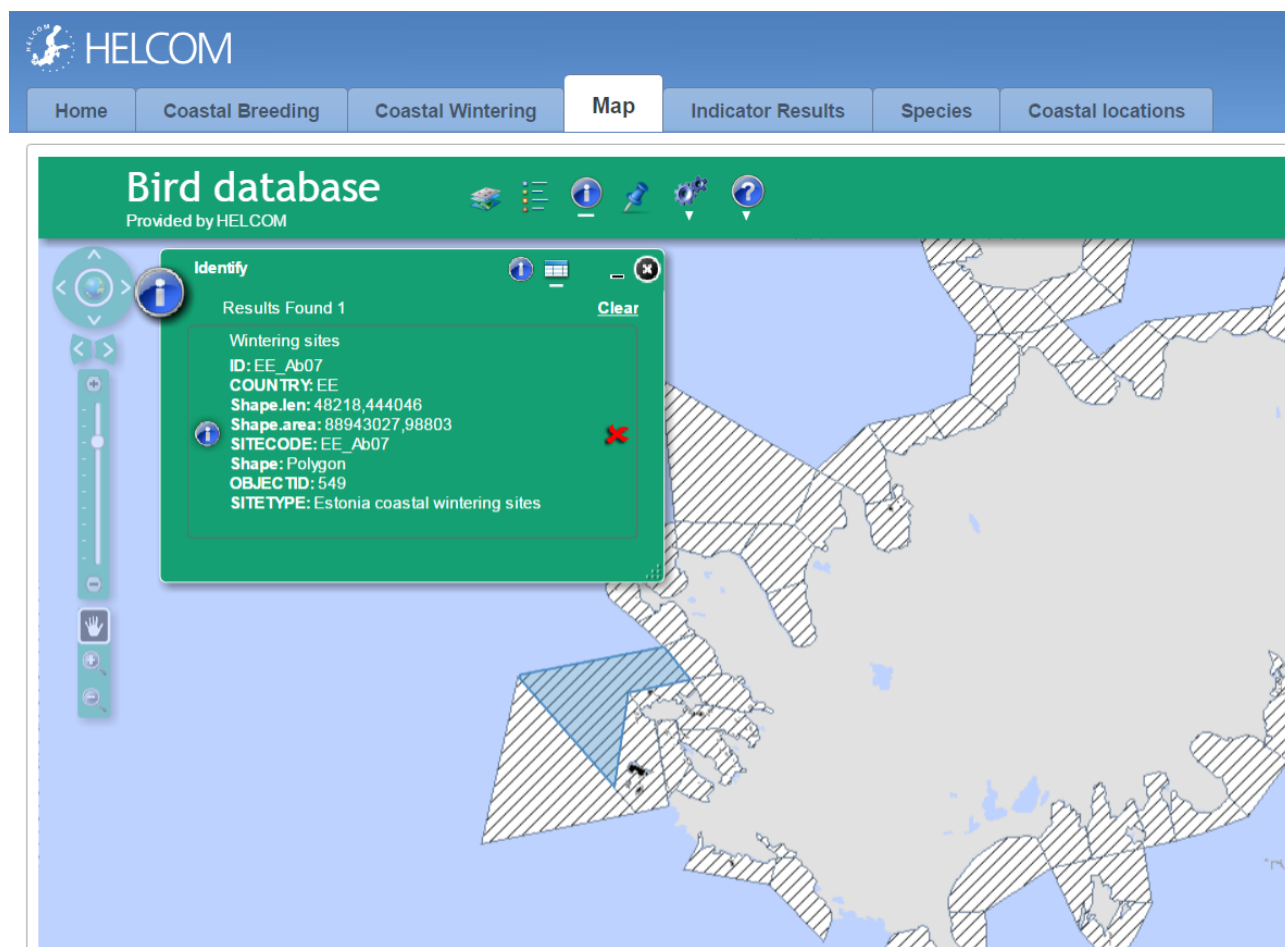
- **Home** (summary and links to indicators)
- **Coastal breeding** data table
- **Coastal wintering** data table

- **Map** displaying locations (Figure 2).
- **Indicator results** (to be filled in later when indicator results are finalized)
- **Species** (list of species used)
- **Coastal locations** table containing clickable link to interactive map viewer zooming to the location



Edit	Id	Type	Country	Reference	Sitecode	Year	Species name	Abundance	Unit	Completeness	Coord x	Coord y
-	104185	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Aythya fuligula	-1	Individual	1	14.790374	56.151821
-	104186	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Cygnus olor	-1	Individual	1	14.790374	56.151821
-	104187	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Haematopus ostralegus	-1	Individual	1	14.790374	56.151821
-	104188	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Larus argentatus	-1	Individual	1	14.790374	56.151821
-	104189	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Larus canus	-1	Individual	1	14.790374	56.151821
-	104190	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Larus marinus	-1	Individual	1	14.790374	56.151821
-	104191	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Mergus merganser	-1	Individual	1	14.790374	56.151821
-	104192	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Mergus serrator	-1	Individual	1	14.790374	56.151821
-	104193	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Phalacrocorax carbo	-1	Individual	1	14.790374	56.151821
-	104194	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Podiceps cristatus	-1	Individual	1	14.790374	56.151821
-	104195	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Somateria mollissima	-1	Individual	1	14.790374	56.151821
-	104196	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Sterna hirundo	-1	Individual	1	14.790374	56.151821
-	104197	Breeding	SWEDEN	Lund University	<a href="#">SE-K0303</a>	1992	Tadorna tadorna	-1	Individual	1	14.790374	56.151821
-	104198	Breeding	SWEDEN	Lund University	<a href="#">SE-K0304</a>	1992	Alca torda	-1	Individual	1	15.209067	56.115911
-	104199	Breeding	SWEDEN	Lund University	<a href="#">SE-K0304</a>	1992	Cygnus olor	-1	Individual	1	15.209067	56.115911

**Figure 1. Bird database web application, coastal breeding sheet.**



**Figure 2. Map displaying coastal bird count locations.**

The content of the tables can be downloaded as csv files, filtered by parameters and displayed as figures using the built-in functionalities.

### 3.2 Coastal fish

The coastal fish monitoring data is based on catch per unit effort (CPUE) which is indicated per area (pointwise location or area) and the result is collected to the database either by species or by functional group. The WP1.2 designed a generic and flexible data model which can be used for both pointwise or area observation and either for functional group or key species, containing required metadata for method, gear type, season and data provider.

The main outcomes are:

- 1) Data model for coastal fish indicators:
  - a. Abundance of coastal fish key functional groups
  - b. Abundance of key coastal fish species
- 2) Database following the data model
- 3) Web application providing access to coastal fish data collected within HELCOM data collection framework (FISH PRO).

The database web application can be accessed from <http://bio.helcom.fi/coastalfish>. The web application consists of following sheets (Figure 3):

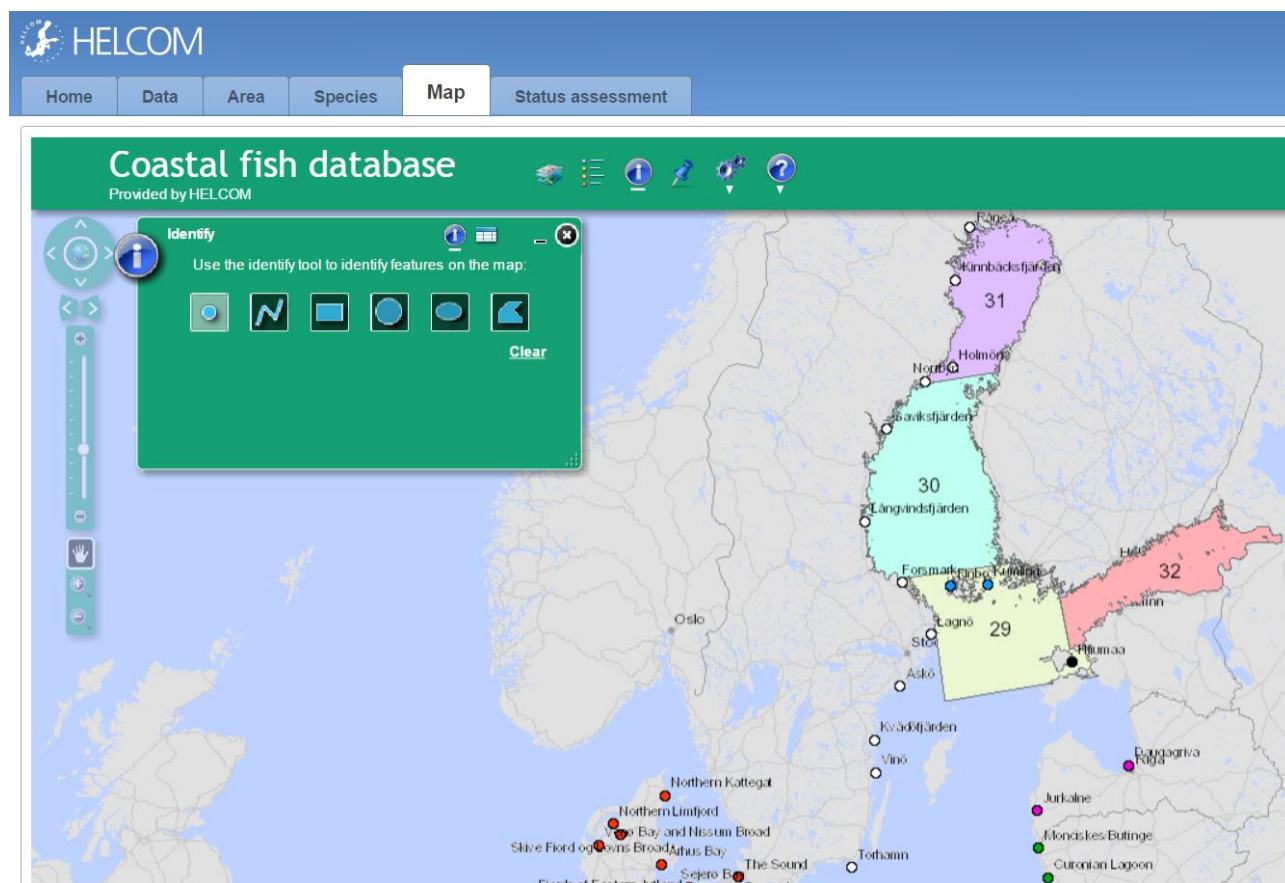
- **Home** (summary and links to indicators)

- **Data** table containing data for both indicators
- **Area** table containing pointwise and area location with clickable link to interactive map viewer zooming to the location
- **Species** (list of species used, including links to other source for further information on e.g. taxonomy)
- **Map** displaying areas in geographical hierarchical resolution, from monitoring area-coastal area-sub basin-region (Figure 4)
- **Status assessment** for each indicator and monitoring area

Edit	Country	Subbasin	Area	Link	Year	Assessment unit	Indicator	Value	Species	Functional group	Method
-	Estonia	Gulf of Riga	Hiiumaa	<a href="#">go to monitored point or area</a>	1998	Gulf of Riga Estonian Coastal waters	Key functional group	11.58	-	Piscivores	Gill-fyke net monitoring
-	Estonia	Gulf of Riga	Hiiumaa	<a href="#">go to monitored point or area</a>	2015	Gulf of Riga Estonian Coastal waters	Key species	11.99	Perch	-	Gill-fyke net monitoring
-	Estonia	Gulf of Riga	Hiiumaa	<a href="#">go to monitored point or area</a>	2014	Gulf of Riga Estonian Coastal waters	Key species	58.28	Perch	-	Gill-fyke net monitoring
-	Estonia	Gulf of Riga	Hiiumaa	<a href="#">go to monitored point or area</a>	2013	Gulf of Riga Estonian Coastal waters	Key species	73.40	Perch	-	Gill-fyke net monitoring
-	Estonia	Gulf of Riga	Hiiumaa	<a href="#">go to monitored point or area</a>	2012	Gulf of Riga Estonian Coastal waters	Key species	31.10	Perch	-	Gill-fyke net monitoring
-	Estonia	Gulf of Riga	Hiiumaa	<a href="#">go to monitored point or area</a>	2011	Gulf of Riga Estonian Coastal waters	Key species	12.29	Perch	-	Gill-fyke net monitoring
-	Estonia	Gulf of Riga	Hiiumaa	<a href="#">go to monitored point or area</a>	2010	Gulf of Riga Estonian Coastal waters	Key species	10.36	Perch	-	Gill-fyke net monitoring
-	Estonia	Gulf of Riga	Hiiumaa	<a href="#">go to monitored point or area</a>	2009	Gulf of Riga Estonian Coastal waters	Key species	6.61	Perch	-	Gill-fyke net monitoring

**Figure 3. Coastal fish database web application, data sheet.**

The content of the tables can be downloaded as csv files, filtered by parameters and displayed as figures using the built-in functionalities.



**Figure 4. Map of coastal fish abundance monitoring points/areas.**

### 3.3 Seals

The starting point of the WP 1.2 seal part was exploring the OSPAR data format used for similar data collection and how it could be utilized in HELCOM area for HELCOM indicator data collection purposes. The aim was also to design a format that can be used for both abundance and distribution indicators. The differences between resulting HELCOM format developed in BalticBOOST and existing OSPAR data models are minor as in both formats the spatial element is based on pointwise coordinates in same coordinate system (WGS 84 decimal degrees) and identical species and country encoding.

The format also makes possible using grid-based reporting by utilizing well established grid-system and providing that information as supplementary parameter (centroid of a grid cell or circular area).

Based on the developed data format the database and web application was developed.

The main outcomes are:

- 1) Data model for abundance/distribution of seal counts, mostly compatible with OSPAR format
- 2) Database following the designed data model
- 3) Web application providing access to seal count data collected within HELCOM data collection framework.

The database web application can be accessed from <http://bio.helcom.fi/seals> (for the time being data is not approved and completed). The web application consists of following sheets (Figure 5):

- **Home** (summary and links to indicators)



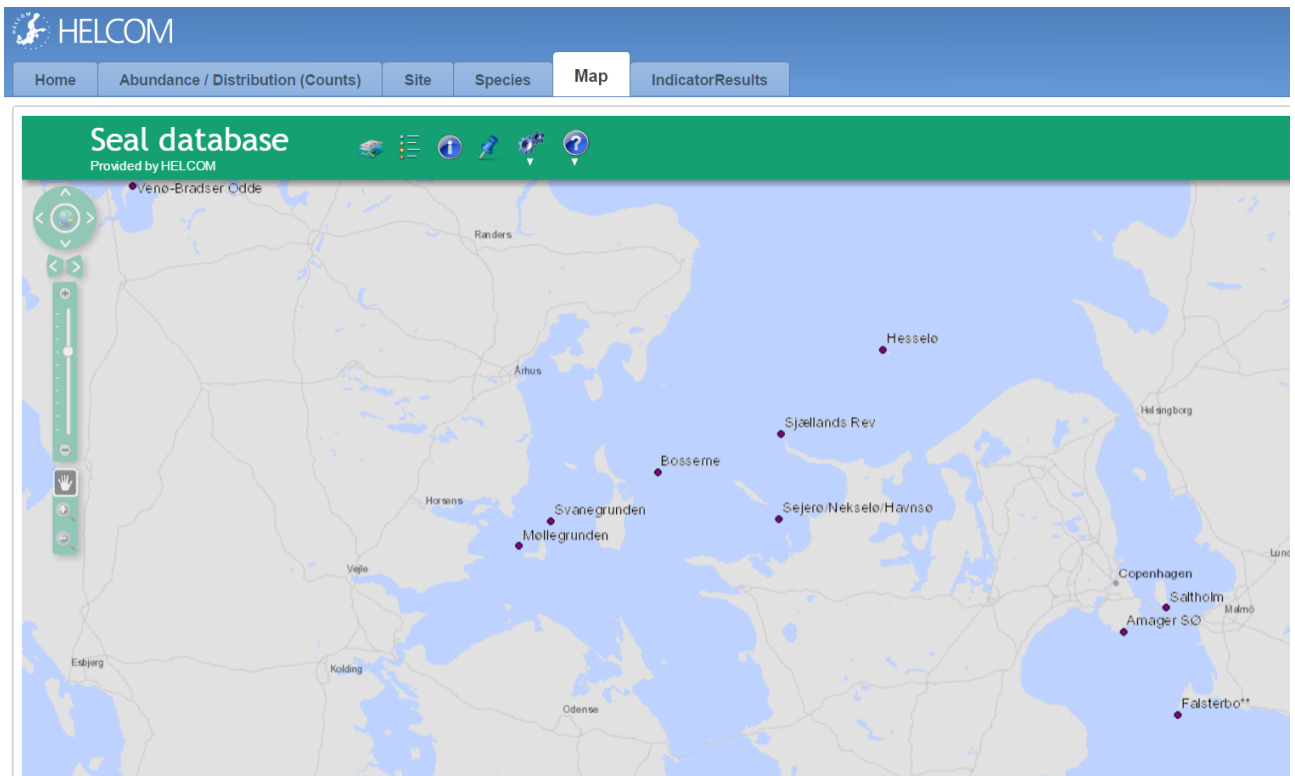
- **Abundance/Distribution (counts)** table containing count data
- **Site** table containing clickable link to interactive map viewer zooming to the location
- **Species** (list of species used, including links to other source for further information on e.g. taxonomy)
- **Map** displaying areas (Figure 6)
- **Indicator results** (to be filled in later when indicator results are finalized)

edit	Country	Site	Helcom subbasin	Area	Management unit	Source	Species	Year	Month	Day	Count	Age
-	Denmark	<a href="#">Rønholm, Nibe Bredning</a>	Kattegat	Limfjorden	-	Aarhus University	Grey seal	2015	8	18	0	-
-	Denmark	<a href="#">Rønholm, Nibe Bredning</a>	Kattegat	Limfjorden	-	Aarhus University	Grey seal	2015	8	19	0	-
-	Denmark	<a href="#">Rønholm, Nibe Bredning</a>	Kattegat	Limfjorden	-	Aarhus University	Grey seal	2015	8	20	0	-
-	Denmark	<a href="#">Rønland Sando</a>	Kattegat	Limfjorden	-	Aarhus University	Grey seal	2015	3	26	0	-
-	Denmark	<a href="#">Rønland Sando</a>	Kattegat	Limfjorden	-	Aarhus University	Grey seal	2015	4	17	0	-
-	Denmark	<a href="#">Rønland Sando</a>	Kattegat	Limfjorden	-	Aarhus University	Grey seal	2015	8	18	0	-
-	Denmark	<a href="#">Rønland Sando</a>	Kattegat	Limfjorden	-	Aarhus University	Grey seal	2015	8	19	0	-
-	Denmark	<a href="#">Rønland Sando</a>	Kattegat	Limfjorden	-	Aarhus University	Grey seal	2015	8	20	0	-
-	Denmark	<a href="#">Saltholm</a>	The Sound	WesternBaltic	-	Aarhus University	Grey seal	2015	8	18	0	-
-	Denmark	<a href="#">Saltholm</a>	The Sound	WesternBaltic	-	Aarhus University	Grey seal	2015	8	26	0	-
-	Denmark	<a href="#">Saltholm</a>	The Sound	WesternBaltic	-	Aarhus University	Grey seal	2015	8	29	0	-
-	Denmark	<a href="#">Sjællands Rev</a>	Kattegat	Kattegat	-	Aarhus University	Grey seal	2015	6	15	0	-
-	Denmark	<a href="#">Sjællands Rev</a>	Kattegat	Kattegat	-	Aarhus University	Grey seal	2015	8	21	2	-

**Figure 5. Seal database web application, abundance/distribution sheet.**

The content of the tables can be downloaded as csv files, filtered by parameters and displayed as figures using the built-in functionalities.





**Figure 6. Map of seal abundance count sites.**

## Annex 1. Coastal bird data model

This annex describes coastal bird observation database model developed in BalticBOOST WP1.2 (tables with datatype, relation and description). The database is shared for both coastal and offshore data.

**Table COASTAL\_OBSERVATIONS**

Column	Data type	Relation	Comment
ID	Number	PK	
COUNTRY	Text	FK to COUNTRY	
TYPE	Text		Breeding or Wintering
SITECODE	Text	FK to COASTAL_LOCATIONS	
YEAR	Number		
SPECIES	Text	FK to SPECIES	Euring code as text
ABUNDANCE	Number		
UNIT	Text		
WEIGHT	Number		optional
FACTOR1	Number		optional
FACTOR2	Number		optional
FACTOR3	Number		optional
UNIT	Text		Individual / Pair

**Table COASTAL\_LOCATIONS**

Column	Data type	Relation	Comment
SITECODE	Text	PK	
COORD_X	Number		
COORD_Y	Number		
MAPLINK	URL		

**Table SPECIES**

Column	Data type	Relation	Comment
EURING_CODE	Text	PK	Numeric values but stored as text because it contains zeros like postal cod, e.g. "00140"
SPECIES_NAME	Text		
ENGLISH_NAME	Text		
ABB2PLUS3	Text		
ABB3PLUS2	Text		
WORMS_LINK	URL		Link to worms fact sheet for the species

**Table COUNTRY**

Column	Data type	Relation	Comment
ID	Text	PK	
COUNTRY	Text		

## Annex 2. Offshore bird data model

This annex describes offshore bird observation database model used in database developed in BalticBOOST WP1.2 (tables with datatype, relation and description) based on guidelines developed in BALSAM project and updated with OSPAR-HELCOM-ICES JWG Bird meeting 2016 outcome.

The database is based on the structure of the original ESAS database along with the extensions to it used in the FTZ database.

Additions to the original ESAS structure (including those used in FTZ database) are printed red. The mandatory fields are marked bold.

**Trip data table:** contains the main characteristics of each survey reported. Has 1-to-many relationship with the Position data table.

Column	Data type	Relation	Description (from BALSAM guideline)
<b>Tripkey</b>	<b>LongInteger</b>	<b>Primary Key</b>	Unique number to identify each record in the trip tables.
<b>Year</b>	<b>Integer</b>		The year, four digits
<b>Month</b>	<b>Integer</b>		The month (1 - 12)
<b>Day</b>	<b>Integer</b>		The day of the month (1 - 31)
<b>Base_type</b>	<b>Integer</b>	<b>Foreign key (list)</b>	The platform used for carrying out observations (1 – Ship, 2 – Helicopter, 3 – Aeroplane).
<b>Platform_code</b>	<b>Integer</b>	<b>Foreign Key?</b>	Ship name if the Base type = 1 The call sign (the unique identifier of the aircraft) if the Base call = 2 or 3  The names and call signs appear in a separate relational table. The structure of the relational table should be: Platform code (the link) Platform type (the same as Base type) Platform name (the name of ship, or code of plane or helicopter)
<b>Transect_width</b>	<b>Number</b>		The width of the strip transect in metres
<b>Cruise_key</b>	<b>LongInteger</b>	<b>Foreign Key?</b>	Aggregates parts of a survey, i.e. different sides of the platform and/or counts in different parts covered of an area on different days or by different platforms. Tripkey of the 1 <sup>st</sup> entry of the particular
<b>Route</b>	<b>Text</b>		Short description of area covered or route followed
<b>Count_type</b>	<b>Integer</b>	<b>Foreign Key (list)</b>	The type of observation being carried out in an observation period. 1 Full ship transect method with snapshot for flying birds; 2 On water transect, no snapshot for flying birds; 3 All observations, but no transect operated; 4 Presence / absence data; 5 Full ship transect, but no scan data for outside the transect 6 Standard aerial survey method

Column	Data type	Relation	Description (from BALSAM guideline)
<b>Species_observed</b>	Integer	Foreign Key (list)	The species groups which were being observed in this observation session. 1 All species recorded, 2 All species except Larus Gulls, 3 All species except Fulmars, 4 All species except Larus Gulls, Fulmars and Kittiwakes, 5 Auks only, 6 Auks and Seaduck only, 7 All species except Eiders and Gulls, 8 All species except Gannets, 9 Auks and unusual seabirds only 10 all species except auks and divers 11 all species except small gulls (Little, Black-headed, Common, Kittiwake) 12 all species except Lesser Black-backed Gulls 13 all species except sea ducks and divers (loons) 14 all species except Gannets, Fulmars and Kittiwakes 99 other
<b>Use_of_binoculars</b>	Integer	Foreign Key (list)	The extent to which binoculars were used to detect birds 1. No binoculars used for detection of birds ; 2. Binoculars used for detection of birds far ahead of the ship (e.g. for seaduck and diver surveys); 3. Binoculars used extensively for scanning ahead and to the side, naked eye used for close observations)
<b>Behaviour_type</b>	Integer?	Foreign Key (list)?	Indicates if behaviour has been recorded: 0 – behaviour not recorded 1 – complete behaviour recording 2 – typical airplane behaviour recording 3 – no information on behaviour recording
<b>Setnet_count</b>	Integer?		Indicates if setnets were counted? 0 no set net flags recorded, 1 set net flags recorded, 2 recording of whole set nets (not single flags)
<b>Ship_count</b>	Integer?		Indicates if Ships were counted? 0 no ship count, 1 ship traffic (somehow) recorded, no further information available
<b>Base_side</b>	Integer?		Side of platform used for survey (ship) or seat of the observer (plane). For ship counts (Base_type = 1): 0 no record, 1 left side, 2 rights side For plane counts (Base_type = 3): 1 – co-pilot, 2 – behind the pilot 3 – behind the co-pilot
<b>Observer_role</b>	Integer		Indicates the role of the observer. Important for surveys using the double observer platform. Default is 1 (Primary). 1 – Primary (the only observer(s) on the side of the platform or if double observer approach used, the observer who's recordings should be used in the data analyses where data from one observer can be used 2 – Secondary (the additional observer to the primary observer in the double observer platform) If there are more than 2 observers used (e.g. triple observer approach), each additional observer is assigned an increasing integer (3, 4, etc.)
<b>Origin</b>	Text		Origin of data (e.g. data owner or supplier)

Column	Data type	Relation	Description (from BALSAM guideline)
Direction_of_travel_type	Text		The way how directions of ships is recorded: A absolute, R relative (to direction of platform), Z number, P arrow, K none
Number_of_observers	Number		Number of observers producing the data stream under this Tripkey The number of observers does not include the other observers if each of them record his/her observations separately (= produce different data streams that are included in the database under different Tripkey(s)). Count in only the additional observers assisting to the 1 <sup>st</sup> observer (Observer1).
Observer1	Text		Observer name
Observer2	Text		Observer name Report only the observers assisting the Observer1 in the fields Observer2 and Observer3. Do not report the other observers producing their own data streams.
Observer3	Text		Observer name See description of the Observer2
Notes	Text		Additional details related to the survey

**Position data.** Position data table contains all locations visited during the survey (GPS records) and their attributes. Has many-to-1 relationship with Trip data table and 1-to-many relationship with Species data table. Separate table has to be submitted for each survey. The table structure includes the relevant position specific parameters including the code to link with the Trip table:

Column	Data type	Relation	Description (from BALSAM guideline)
Poskey	Number	Primary Key	A unique number to identify each record in the Position table
Tripkey	Number	Foreign Key to Tripkey.Trip table	The link to the trip information for the position record
Time_hour	Number		The hour component of the time (0 - 23)
Time_minute	Number		The minutes component of the time (0 - 59)
Time_second	Number		The seconds component of the time (0 - 59)
Latitude	Double		The latitude of the position in the middle of the observation period in decimal degrees (geographic coordinate system WGS84; EPSG code: 4326) using maximum precision as recorded by GPS or calculated.
Longitude	Double		The longitude of the position in the middle of the observation period in decimal degrees (geographic coordinate system WGS84; EPSG code: 4326) using maximum precision as recorded by GPS or calculated.

Column	Data type	Relation	Description (from BALSAM guideline)
Transect_ID	Text	Foreign Key? Link to an attribute in a GIS dataset	Name or number of the transect with a leading 2-letter country code. Format: XX_YYYYYYYYYY, where XX is a 2-letter country code and YYYYYYYYYY is a transect ID according to the national classification. This field serves as a link (Foreign key) to the GIS dataset with the monitoring transects. For the surveys not using the monitoring transects, this field should be left blank. The national monitoring programmes have a layout of transects with their nomenclature. Each transect reported in this database should have a unique code across the countries.
Area_surveyed (km <sup>2</sup> )	Double		The area of sea surveyed during the observation period in km <sup>2</sup> . Can be calculated by multiplying km_travelled with „transect_width“ from the TRIP-Table
km_travelled	Double		The distance travelled during the observation period in km (as recoded by GPS)
Seastate	Number	Foreign key (list)	Sea state according to Beaufort scale. Default = 9 (for entries with no value in this field) 0 Sea like mirror; 1 Ripples with appearance of scales, no foam crests; 2 Small wavelets, crests of glassy appearance, not breaking; 3 Large wavelets, crests begin to break, scattered whitecaps; 4 Small waves becoming longer, numerous whitecaps; 5 Moderate waves, many whitecaps, some spray; 6 Larger waves, whitecaps everywhere, more spray; 9 No data
Visibility	Text	Foreign key (list)	Visibility code 0 No data; A Poor; B Fair / moderate; C Good / very good; D Excellent / infinity; 0.1 - 9.9 visibility in km; 10 visibility >= 10 km)
Glare	Text?	Foreign key (list)	Glare affecting the observer: 0 no glare, 1 weak glare, 2 medium glare, 3 strong glare
Sun_angle	Number?	Foreign key (list)	Angle of the sun in relation to the observer (angle) Value 0 to 360
Cloud_cover	Integer		Cloud cover expressed as x/8 (the eights; octas) Value 0 – 8
Precipitation	Number?	Foreign key (list)	Precipitation: 0 none, 1 rain, 2 snow, 3 fog
Ice	Integer		Ice cover of survey area: 999 no data, 0 no ice, 1 – 100 – Ice cover in % (only full numbers, no decimals)
Notes	Text		Additional details related to the position

**Species data.** Separate table containing all observations of birds at the particular survey has to be submitted for each survey. This table should contain only the sites with observations, no entries for sites without observations are needed as the survey effort is already given in the Position data table. The table structure includes the relevant observation specific parameters:

Column	Data type	Relation	Description (from BALSAM guideline)
Species_key	Integer	Primary Key	A unique number for each record in the species files
Poskey	Integer	Foreign Key to Poskey.Position_table	The link to the position table for a species record. Note that each position record may relate to a number of species records, but that each species record may relate to only one position record.
Transect	Integer		States whether the observation is in transect (1 Out of transect; 2 In transect - also used when no birds are seen during an observation period.)
Euring_species_code	Integer	Foreign key?	The species code. Relational lookup table with EURING species codes, their English and Latin names as well as other commonly used codes
Number_of_birds	Integer		The number of birds counted or estimated for each record.
Distance	Text	Foreign key?	This is the distance at which birds were observed. Different codings used for ship and plane surveys: <b>For Ship surveys (Base_type = 1):</b> A 300m transect is assumed for codes A-E, which are for birds on the water only. If other transect widths have been used, code this field as Blank. 0 – Bird on the water in transect, but distance not recorded; Blank - No data; A - 0 - 50m; B - 50 - 100m; C 100 - 200m; D 200 - 300m; E > 300m; F Use for Flying birds, both in and out of transect W other side of ship, where no counts are performed U unknown (default; used if no value provided) <b>For Plane surveys (Base_type=3):</b> A or G – 44 – 163 m A1 or L – 44 – 91 m A2 or M – 91 – 163 m B or J – 163 – 432 m C or K – 432 – 1000 m D – beyond 1km 9 – in transect, no band given U unknown (default; used if no value provided) The field is left blank for the total counts
Activity (behaviour)	Integer	Foreign key?	What the species was doing when observed: 0 – no data 1 – on water/swimming 2 – diving 3 – flushing 4 – flying



Column	Data type	Relation	Description (from BALSAM guideline)
Age_class	Text?		Age class in any of the 2 coding systems: 1 – juvenile 2 – immature 3 – adult OR A - adult, IM - immature J – juvenile N – not adult X – primary moult (only fulmar, auks, divers, seaduck) Y – definitely no active primary moult (use only for fulmar, auks, divers and seaduck)
Age_year	Integer		Age (calendar-year) of immature birds
Plumage	Text		Plumage types: B breeding/summer plumage, T transient plumage, W winter plumage, L Normal light morph of Fulmar (typical for North Sea birds), C coloured morph of Fulmar, L light morph of skuas, I intermediate morph of skuas, D dark morph of skuas
Sex	Text?		Sex class: M male, F female
Group	Integer		Marking of aggregations of individuals of one or several species. Number assigned to each group is unique among all observations from the same Tripkey
Direction_of_travel	Integer		The code represents the direction in which the bird is travelling. For animals reacting to the ship, the direction is that when leaving the ship, and not the direction of travel to the ship.
Prey	Foreign key		Default=0. For ship counts only. Relational table with codes and descriptions
Association	Integer		A field which allows associations between related individuals to be coded.
Behaviour (detailed)	Text		Relational lookup table with double-digit codes from ESAS+FTZ additions Or 0 if no data
Notes	Text		Additional details related to the observation

**Abiotic table:** This table was not included in the BALSAM guideline so descriptions were not available from there.

Column	Data type	Relation	Description
Object_key	Number	Primary Key	A unique number for each record in the Abiotic table
Poskey	Number	Foreign Key to Poskey.Position_table	The link to the position table for an object record. Note that each position record may relate to a number of object records, but that each object record may relate to only one position record.
Object_type	Number	Foreign Key	Code for the observed object. Use the code either from the simplified code list: 1000                    Fishing gear (nets, traps, etc.) 2000                    Undefined ships and boats 3000                    Fishing vessel 4100                    Ferry 4200                    Freight/cargo 4300                    governmental or other administrative ships 4400                    Leisure boat/yacht, etc. 5000                    Marine species other than those reported in the species table 6000                    Hydrographic structures 7000                    Other potential disturbances / hazards: pollutants, structures, etc.  Or use the detailed coding system as applied in FTZ (see attached coding system (in German))
Number_of_objects	Number?		Number of objects
Distance_km	Number?		Estimated or measured distance from the survey platform (rectangular)
Side_of_base	Text?		1 left of survey platform, 2 right of survey platform

Column	Data type	Relation	Description
Activity_of_object	Text?		Activity of objects (mostly ships), e.g. trawling, steaming, working etc. Activity codes in a relational table: 1 inactive 2 anchoring 3 steaming 4 angling all fishing activities 5 net shooting all fishing activities 6 towing all fishing activities 7 hauling all fishing activities 8 sorting all fishing activities 9 discarding all fishing activities 10 net at surface all fishing activities 11 cleaning all fishing activities 12 handles set net all fishing activities 20 wind turbine operating wind turbine 21 wind turbine out of action wind turbine 22 work boat operating Excavators / suction vessels, wind farms, construction platforms 23 flying planes / helicopters
Direction_of_travel	Number?		Travel direction of object (degrees)
Direction_of_travel_type	Number?		The way how travel directions of object is recorded: A absolute, R relative (to direction of platform)
Direction_obs_plattform	Number?		Travel direction of the observation platform (needed for calculating the absolute travel direction of birds if recorded relative to the direction of the platform)
Ship_followers	Text		Description field where the number and species of birds following ships (mostly fishing vessels) can be given
Notes	Text		Notes related to object

### Annex 3. Coastal fish data model

This annex describes coastal fish abundance database model developed in BalticBOOST WP1.2 (tables with datatype, relation and description).

**Table DATA**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Automatically triggered	Counter
DataProvider	Integer	Foreign Key to DataProviderTable	Yes	Eg. SLU, FK to DataProviderTable
Areald	Integer	Foreign Key to AreaTable	Yes	FK to Areatable
Year	Integer		Yes	Year for indicatorvalue
IndicatorId	Integer	Foreign Key IndicatorTable	Yes	FK to Indicatoretable
SpeciesId	Integer	Foreign Key to SpeciesTable	No	Fk to Speciestable, but should be able to be empty.
FunctionalGroup	Integer		No	
IndicatorValue	Double		Yes	Numeric, CPUE.
IndicatorStatusId	Integer	Foreign Key to StatusTable	Yes	
Method	Integer	Foreign Key to MethodTable		
GearType	Integer	Foreign Key to GearTypeTable		
RegistrationDate	Date		Automatically triggered	Log of registration

**Table AREA**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Automatically triggered	Counter
AreaName	Text		Yes	
Latitude	Double		Yes	Coordinates
Longitude	Double		Yes	Coordinates
AssessmentUnit	Integer	Foreign Key to AssessmentUnitTable	Yes	FK to AssessmentUnitTable
AreaLink	Text(URL)		No	For assessment unit
Subbasin	Integer	Foreign Key to SubbasinTable	Yes	Fk to SubbasinTable
SubbasinLink	Text(URL)		No	For subbasin
Country	Integer	Foreign Key to CountryTable	Yes	Fk to CountryTable

**Table SPECIES**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Automatically triggered	Counter
SpeciesNameEng	Text		Yes	Text, English name
SpeciesNameLat	Text		Yes	Text, Latin name
WoRMSLink	Text/URL		No	
FishbaseLink	Text/URL		No	
RedListID	Integer	Foreign Key	No	

SISLink	Text/URL		No	
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**Table INDICATOR**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Yes	
Name	Text		Yes	
HELCOMID	Text		No	

**Table DATAPROVIDER**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Yes	
Country	Integer	Foreign Key to CountryTable	Yes	
Organisation	Text		Yes	
ContactName	Text		Yes	
ContactEmail	Text		Yes	
ContactPhone	Text		Yes	

**Table ASSESSMENTUNIT**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Yes	
AssessmentUnit	Text		Yes	
HELCOMID	Text		No	

**Table SUBBASIN**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Yes	
Subbasin	Text		Yes	
HELCOMID	Text		No	

**Table COUNTRY**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Yes	
Country	Text		Yes	

**Table STATUS**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Yes	
Status	Text		Yes	Indicator status (GES / subGES)

**Table METHOD**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Yes	
Method	Text		Yes	Method description

**Table GEARTYPE**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Yes	
Name	Text		Yes	Gear type description

**Table REDLISTSTATUS**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Yes	
Status	Text		Yes	Red List status

**Table ASSESSMENT**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Automatically triggered	Counter
Assessor	Text	Foreign Key to DataProviderTable	Yes	Expert making the assessment
Areald	Integer	Foreign Key to AreaTable	Yes	FK to Areatable
AssPeriodStartYear	Integer		Yes	Assessment period start year, e.g. 2011
AssPeriodEndYear	Integer		Yes	Assessment period end year, e.g. 2016
IndicatorId	Integer	Foreign Key IndicatorTable	Yes	FK to Indicatoretable
SpeciesId	Integer	Foreign Key to SpeciesTable	No	Fk to Speciestable, but should be able to be empty.
FunctionalGroup	Integer	Foreign Key to FunctionalGroupTable	No	
IndicatorStatusId	Integer	Foreign Key to StatusTable	Yes	
RegistrationDate	Date		Automatically triggered	Logg of registration

## Annex 4. Seal abundance/distribution data model

This annex describes seal abundance/distribution database model developed in BalticBOOST WP1.2 (tables with datatype, relation and description).

**Table ABUNDANCE**

Column name	Data Type	Relation	Required	Comment
ID	Integer	Primary	Automatically triggered	Unique id needed for the table
SpeciesID	String	Foreign key to SpeciesTable	Yes	Harmonised with OSPAR code list
Country	String	Foreign key to CountryTable	Yes	European union two character country designation (e.g. UK, FR, DE, NL), harmonised with OSPAR code list
Site	Integer	Foreign key to SiteTable	Yes	Site table would contain all info related to location, coordinates, areas and assessment units.
Year	Integer		Yes	
Month	Integer		Yes	
Count	Integer		Yes	
Estimate_type	Integer		Yes	Maximum/modelled, harmonised with OSPAR code list
CV_Estimate	Integer		No	Harmonised with OSPAR code list
Number_surveys	Integer		Yes	
Method	Integer	Foreign key to MethodTable	Yes	
Source	Text		No	Harmonised with OSPAR.

**Table SITES**

Column name	Data Type	Relation	Required	Comment
Id	Integer	Primary Key	Yes	
Site	Text		Yes	
Area	Text		Yes	
ManagementUnit	Text		Yes	
HELCOM Subbasin	Text		Yes	
Latitude	Double		Yes	
Longitude	Double		Yes	
CountryID	Text	ForeginKey	Yes	
Natura2000_ID	Text		No	
Natura2000_Link	URL		No	
HELCOMMPA_ID	Text		No	
HELCOMPA_Link	URL		No	



**Table SPECIES**

Column name	Data Type	Relation	Required	Comment
ID	Text	Primary	Automatically triggered	
EnglishName	Text		Yes	
ScientificName	Text			
HELCOM_RedList	Text			
SISLink	TURL			
WoRMSLink	URL			

**Table COUNTRY**

Column name	Data Type	Relation	Required	Comment
ID	Text	Primary	Automatically triggered	Unique id needed for the table
Country	Text		Yes	

**Table METHOD**

Column name	Data Type	Relation	Required	Comment
ID	Integer	Primary	Automatically triggered	Unique id needed for the table
Method	Text		Yes	