



Theme 4: Workspaces for data and information access



Partners: ¹ Baltic Marine Protection Commission (HELCOM), ²International Council for the Exploration of the Seas (ICES)

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Deliverables: Theme 4: Workspaces for data and information access

1. Summary

The HELCOM Secretariat has developed over time HELCOM Map and Data service to fulfill the requirement outlined in the [HELCOM Monitoring and Assessment Strategy](#) to provide open access to the general public to environmental information collected within HELCOM monitoring programmes and other activities. The Data and Map service is used to display quality assured and accepted assessment results and underlying spatial data sets, which are openly accessible and downloadable.

The use of electronic workspace sites to review and quality assure the tabular spreadsheet datasets and preliminary indicator and integrated assessment results has been piloted in the [EUTRO-OPER project](#), developed by the Secretariat, together with the HELCOM COMBINE data host ICES. Within this project a similar approach to making protocols and data accessible was utilized for other topics as well (hazardous substances, biodiversity and pressures and impacts). This procedure made it possible to use online tools for disseminating preliminary results for national approval for HELCOM Contracting Parties before the data was made publicly available. This ensures the correctness and quality of HELCOM Assessment products.

The content of the workspace, together with interactive assessment product maps were included to the new version of HELCOM Map and Data service, developed under this project and accessible for download via new HELCOM Metadata catalogue, also produced under activity of Theme 4. This supported their use in electronic publication of State of the Baltic Sea report (HOLAS II) outcomes. As the “roof report” needs to be compatible with MSFD reporting requirements and Article 19.3 to feed into the WISE-Marine, the project studied available documentation on suitability of this solution to meet requirements to make the underlying assessment data available by 2018.

ICES’s recent experience in developing new online tools for sharing and publishing GIS products, metadata and services proved to be useful to HELCOM’s efforts in further developing new online GIS infrastructure. ICES’s knowledge exchange and advice, provided a good starting point for in producing a very functional and user friendly GIS portal that will make it easier to interface to other information systems, such as WISE-Marine.

The aim of the Theme 4 objective was to establish and test workspaces on the HELCOM meeting portal as technical mean for making assessment data and information available for approval and quality assurance. The means for making quality assured and approved data openly available was developed in this project based on experience of project partners (HELCOM, ICES) gathered with earlier development. The experiences gained during this project was used to specify what further development is required in order to deliver compliancy in terms of data services and make a contribution to WISE-Marine, following relevant data sharing standards and practices. The main Theme 4 outcomes are online accessible platforms:

- <http://maps.helcom.fi>: New version of HELCOM Map and Data service
- <http://metadata.helcom.fi>: New HELCOM Metadata catalogue

2. HELCOM Map and Data service update

2.1 Analysis of HELCOM Map and Data service in terms of existing functionalities and INSPIRE compatibility and support for MSFD 2018 reporting

2.1.1 Technical specifications of previous version

The previous version of HELCOM Map and Data service (Figure 1) was developed using Adobe Flash Builder based on ESRI and ArcGIS Server infrastructure.

The old version of HELCOM Map and Data Service was based on map and feature services published on ArcGIS Server 10.1 SP1. All map data is stored in ESRI Enterprise Geodatabase in MS SQL Server 2012. The user interface is installed on Internet Information Services (IIS 8.0) server equipped with ArcGIS Web Adaptor controlling web traffic through firewall to the GIS and database server. The graphical user interface is based on ArcGIS Flexviewer version 3.3 (<http://resources.arcgis.com/en/communities/flex-viewer/>) which had been modified by the Secretariat. Many of the features were developed and shared by the ArcGIS Flex user community.

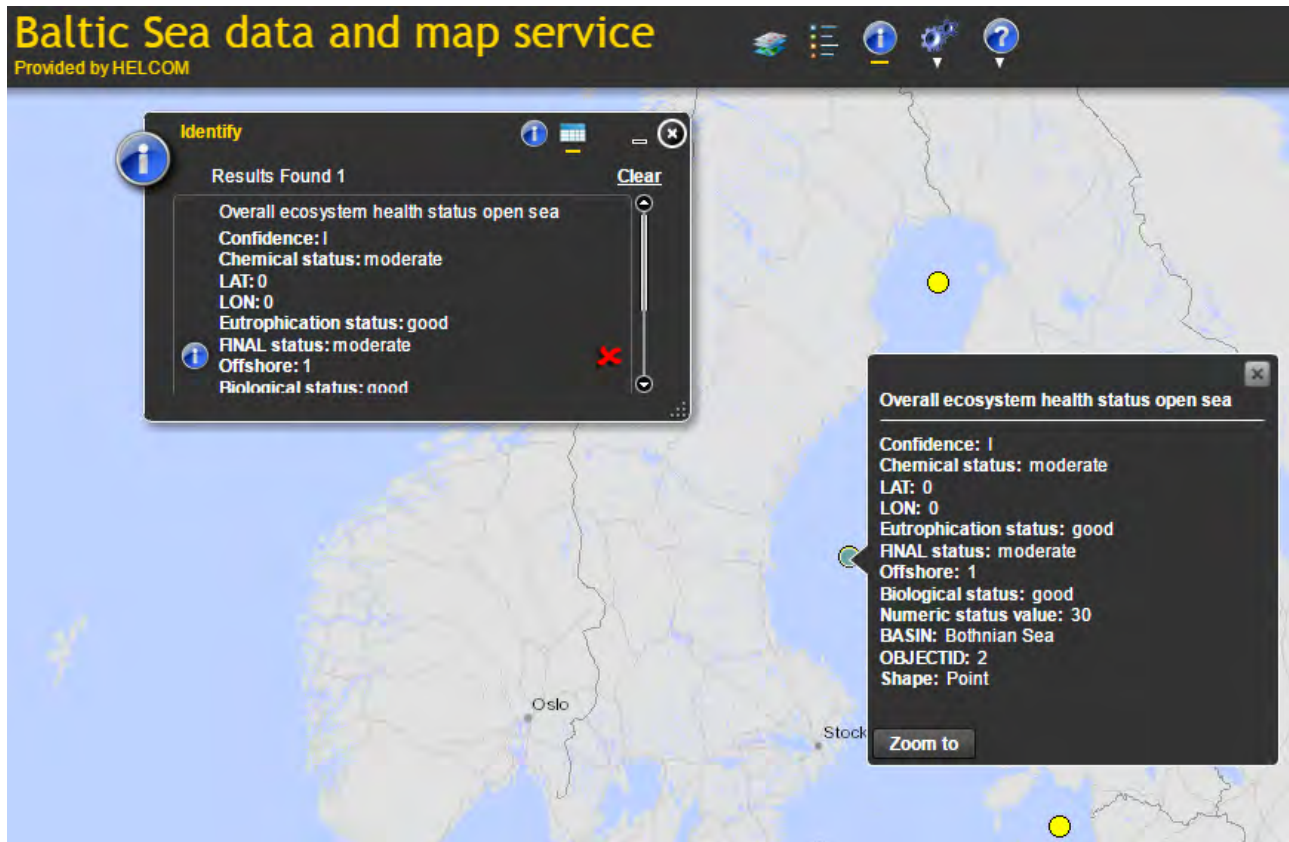


Figure 1. Old version of HELCOM Map and Data service.

2.1.2 Analysis of previous version in terms of compliance

ArcGIS Server-based infrastructure provides following functionalities, which should be taken into account in terms of compliance to INPISRE and MSFD 2018 reporting:

- Data is published by default in REST interface, and can be published as WMS or WFS. HELCOM Currently produces data in both REST and WMS, which can be utilized in WISE Marine via GIS map viewer. WFS can be established from the technical point of view, but further specification would be required in terms of parameters.
- WMS can be published as INSPIRE compliant service
- Metadata created in ArcCatalog as it was done in earlier version of HELCOM Map and Data service was not INSPIRE compliant and not made available according to directive as discovery service. The metadata xml was converted to html page (Figure 2) and manually inserted to web server, which does not make it possible to access, or search metadata in efficient way.
- INSPIRE Data specifications may exist for some part of the data in the service that fall under INSPIRE Themes I-III, but currently INSPIRE data specifications have not been applied for the data in the map service. The piloting of this activity will be done under other HELCOM work strands for upcoming dataset "Maritime Spatial Plan Areas", which fall under Area Management / restriction / regulation zone & reporting units.

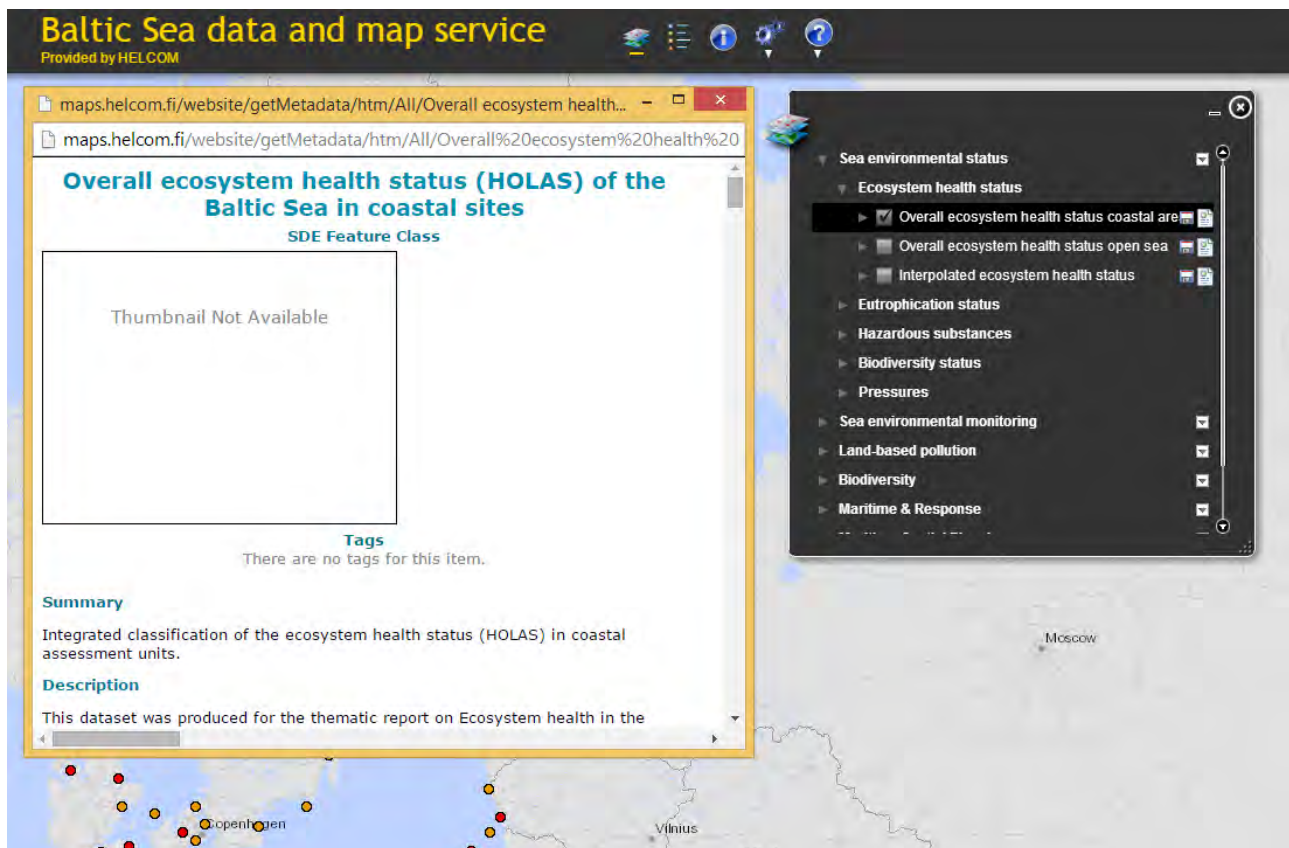


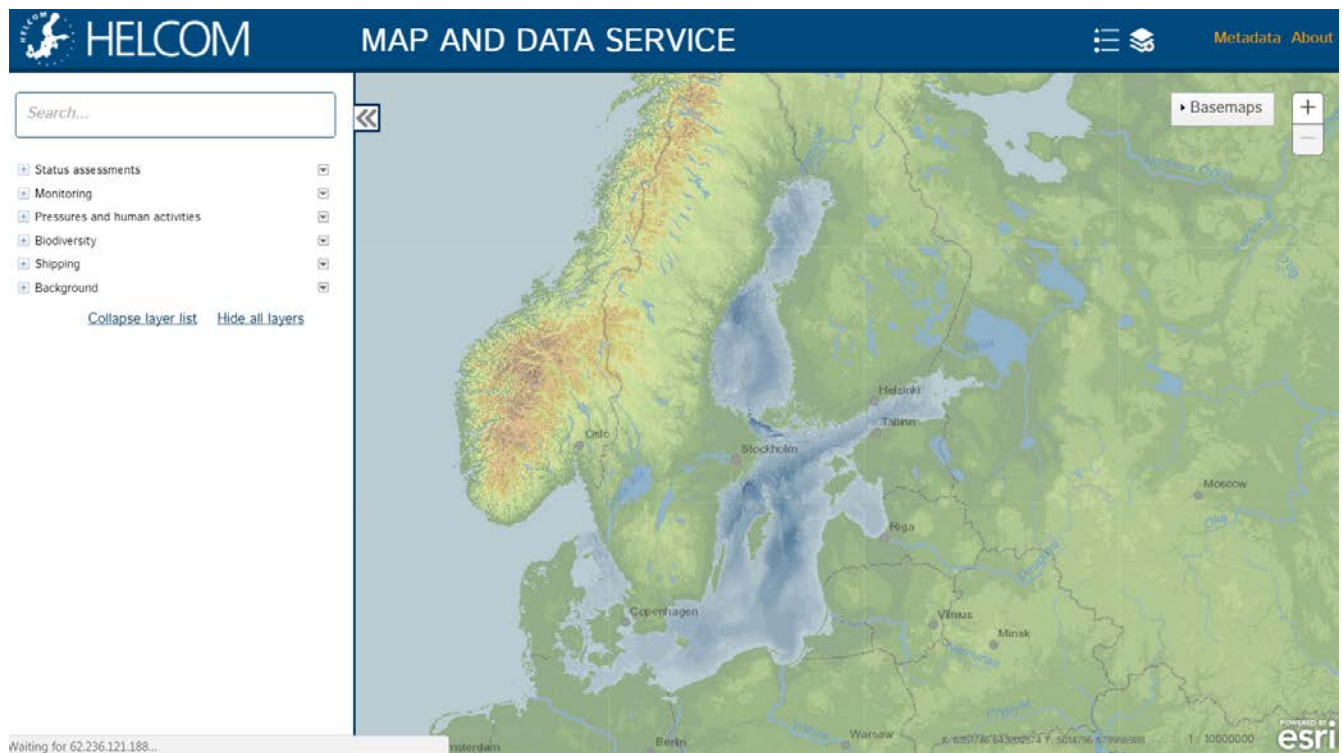
Figure 2. Metadata in the earlier version of HELCOM Map and Data service.

2.2 New version of HELCOM Map and Data service

New version of HELCOM Map and Data service, developed under Theme 4 was published in June 2017 and is available from <http://maps.helcom.fi>.

2.2.1 Technical specifications

New version of HELCOM Map and Data service (Figure 3) was developed from scratch based on ESRI Javascript API version 3. This enables better support for devices and more lightweight web application by developing only the required functionalities. The first attempt was made using ESRI WebAppBuilder, but that option was dismissed due to performance issues faces with multiple map layers, which is typical asset for HELCOM Map and Data services containing currently over 700 map layers published in 6 distinct services (Status assessments, Monitoring, Pressures and Human Activities, Biodiversity, Shipping and Background). The source code of the application is available from HELCOM Github page: <https://github.com/helcomsecretariat>



The new version of HELCOM Map and Data Service is based on map services published on ArcGIS Server 10.4. All map data is stored in ESRI File geodatabase. The user interface is installed on Internet Information Services (IIS 8.0) server equipped with ArcGIS Web Adaptor controlling web traffic through firewall to the GIS and server. The graphical user interface is based on ArcGIS Javascript API version 3, which had been modified by the Secretariat.

The new infrastructure is based on ESRI File geodatabase, which enables much faster map drawing since the data is copied to the GIS server in the publication phase, which on the other hand creates additional disk space requirement for the IT infrastructure.

All services published (Figure 4) are made available under:

<http://maps.helcom.fi/arcgis104/rest/services/MADS>

ArcGIS REST Services Directory

[Home](#) > [services](#) > [MADS](#) > [Sea environmental status \(MapServer\)](#)

[JSON](#) | [SOAP](#) | [WMS](#)

MADS/Sea_environmental_status (MapServer)

View In: [ArcGIS JavaScript](#) [ArcGIS Online map viewer](#) [Google Earth](#) [ArcMap](#) [ArcGIS Explorer](#)

View Footprint In: [ArcGIS Online map viewer](#)

Service Description:

Map Name: Layers

[Legend](#)

[All Layers and Tables](#)

Layers:

- [State of the Baltic Sea 2011-2015 \(HOLAS II\)](#) (0)
 - [Biodiversity](#) (1)
 - [Biodiversity assessment](#) (2)
 - [Integrated biodiversity status assessment - benthic habitats](#) (3)
 - [Integrated biodiversity status assessment - pelagic habitats](#) (4)
 - [Integrated biodiversity status assessment - fish](#) (5)
 - [Integrated biodiversity status assessment - seals](#) (6)
 - [Integrated biodiversity status assessment - ringed seal](#) (7)
 - [Integrated biodiversity status assessment - harbour seal](#) (8)
 - [Integrated biodiversity status assessment - grey seal](#) (9)
 - [Indicators](#) (10)
 - [Abundance of coastal fish key functional groups](#) (11)
 - [Abundance of coastal fish key functional groups cyprinids mesopredators](#) (12)
 - [Abundance of coastal fish key functional groups cyprinids mesopredators data point](#) (13)
 - [Abundance of coastal fish key functional groups cyprinids mesopredators data poly](#) (14)
 - [Abundance of coastal fish key functional groups piscivores](#) (15)
 - [Abundance of coastal fish key functional groups piscivores data point](#) (16)
 - [Abundance of coastal fish key functional groups piscivores data poly](#) (17)

Figure 4. Example of services directory for status assessments, where map layers on results and data can be accessed as REST interface or map images as WMS service.

2.2.2 Required functionalities

The new version of HELCOM Map and Data service was built based on requirement specifications outlined for the earlier version, but extending with following functionalities:

- Ability to point single map in the map service with unique URL
- Seamless interaction between metadata record and map service: Ability to navigate from individual map layer to respective metadata record and vice versa

- Searchable table of contents, with predictive text suggestions
- Access to features by simple click on a map

3. HELCOM Metadata catalogue

3.1 Analysis of requirements and selecting suitable platform

The analysis of HELCOM Map and Data service compatibility (Section 2.1 of the document) and consultation with project partner ICES revealed the need for setting up a separate solution for metadata management, which was in previous system connected with each dataset (ESRI Enterprise Geodatabase).

This requirement poses a data management challenge since the data and metadata will be disconnected and two different management systems and user interfaces are required for proper display and sharing.

General requirements for a metadata solution were following:

- User friendly and intuitive user interface for accessing metadata records, containing search functionality
- Seamless interaction between metadata record and map service: Ability to navigate from individual metadata record page to map layer and vice versa
- Possibility to store datasets enabling download functionality
- INSPIRE compliancy for metadata records

When analysing suitable platform for metadata, following options were studied:

- ESRI Geoportal. Open source tool for storing metadata records. Has been utilized by HELCOM cooperating organisations, e.g. Finnish Environment Institute.
- ESRI Geoportal with Geoportal Genie extension, which is proprietary software.
- GeoNode. Proprietary software used for spatial data and metadata management, utilized by HELCOM cooperating organisations, e.g. OSPAR in their ODIMS system, which is equivalent to HELCOM Map and Data service.
- Geonetwork. Open source tool for storing metadata. Has been utilized by project partner ICES.

After consideration of options and possible costs and availability for support, Geonetwork was decided to be the metadata solution for HELCOM.

Geonetwork was installed to HELCOM ICT infrastructure (Web server with apache Tomcat and SQL Server for storing metadata records). ICES provided support for the installation and configuration of Geonetwork to SQL server environment.

3.2 New HELCOM Metadata catalogue

HELCOM Metadata catalogue (Figure 5) was published in June 2017 and can be accessed from URL <http://metadata.helcom.fi>.

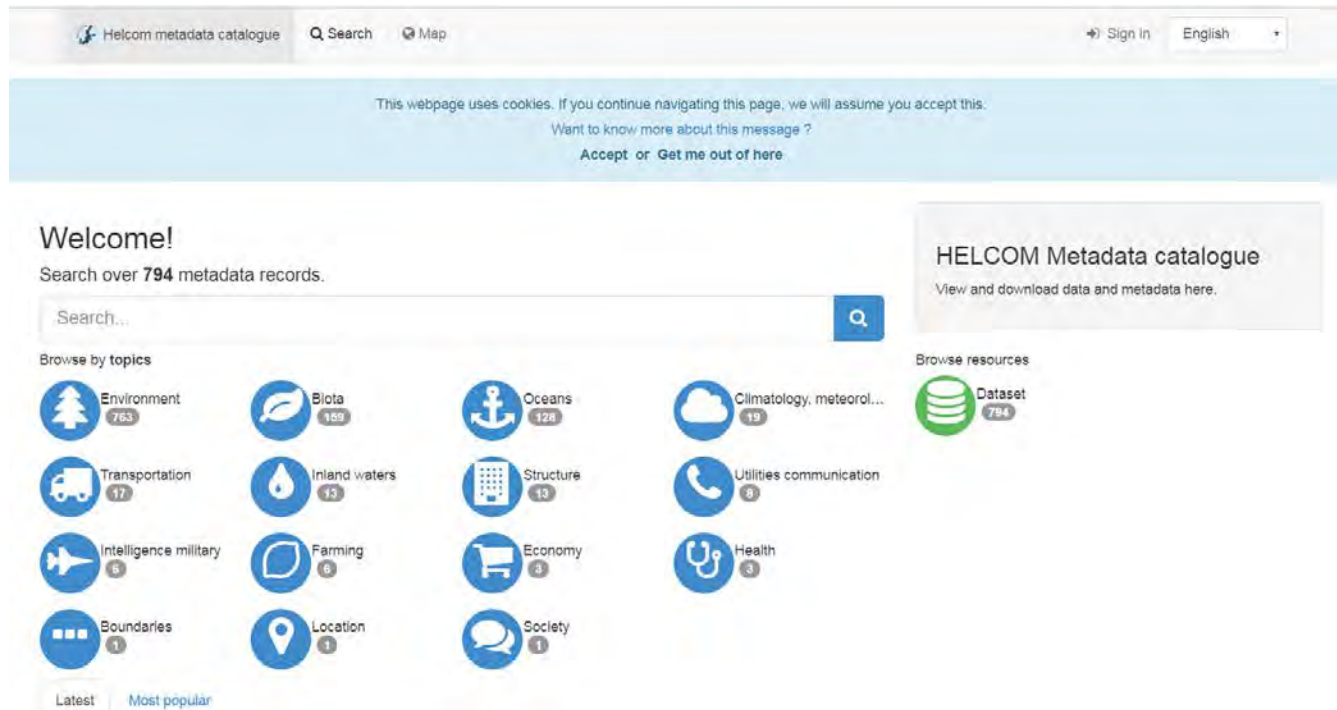


Figure 5. HELCOM Metadata catalogue entry page.

In the process of taking HELCOM Metadata catalogue to production use, all HELCOM metadata records had to be transferred from old format stored in XML and imported to Geonetwork. In this process, mapping from old metadata format (ISO 19115) to INSPIRE compliant format was carried out and the imported metadata records were tested to pass the INSPIRE metadata validator.

All new metadata records are from now on created using the metadata catalogue. The connection between Metadata catalogue and Map and Data service happens via the unique identified created in the metadata catalogue, e.g. for dataset “Zooplankton mean size and total stock (MSTS)”, the unique ID is 45132641-bd5d-41af-b172-6c1ea99a1f7a, which is passed as URL parameter either to metadata catalogue or map service:

<http://metadata.helcom.fi/geonetwork/srv/eng/catalog.search#/metadata/45132641-bd5d-41af-b172-6c1ea99a1f7a>

<http://maps.helcom.fi/website/mapservice/?datasetID=45132641-bd5d-41af-b172-6c1ea99a1f7a>

The metadata record (Figure 6) contains the URL link to map viewer, which can be accessed by clicking “Open Link” next to heading “Open link in mapviewer”

[Back to search](#)
[Previous](#)
[Next](#)

Zooplankton mean size and total stock (MSTS)


Updated: 3 months ago


This core indicator evaluates zooplankton community structure to determine whether it reflects good environmental status. Quantitative thresholds are used to evaluate if core indicators status is Good, Not good or Not assessed. As a rule, good status is achieved when large sized zooplankters occur abundantly in the plankton community. Due to strong environmental gradients, size distribution and total stock of the zooplankton corresponding to good status vary between the Baltic Sea sub-basins.

This dataset displays the result of the indicator in HELCOM Assessment Scale 2 (Division of the Baltic Sea into 17 sub-basins).


"SB_Code" = Code of the Helcom subbasin
 "Name" = Name of the Helcom scale 2 assessment unit
 "AREAKM2" = Area of the Helcom scale 2 assessment unit
 HELCOM_ID = Helcom id of the Helcom scale 2 assessment unit
 Threshold_v = Threshold value for this indicator
 "Ind_value" = Value for the indicator in Helcom scale 2 assessment unit
 Status = Status of the Indicator ("Good", "Not good" or "Not assessed")
 Info = additional info

Download and links

 Open in Map Viewer

 Download

Spatial extent



Temporal extent

Publication date
 2017-06-30

Period
 Fri Dec 31 2010 02:00:00 GMT+0200 ▶ Wed Dec 30 2015 00:00:00 GMT+0200

Figure 6. Metadata record of HELCOM indicator “Zooplankton mean size and total stock (MSTS)” result, containing link to map viewer and download functionality (Download zipped shapefile with described parameters).

4. Workspaces

4.1 Purpose of workspaces in HOLAS II approval process

The purpose of workspaces in the State of the Baltic Sea report (HOLAS II) process was to make a first initial display of data used in the assessment and display assessment results (indicator maps) for core indicators and human activities and pressures related data and results. The first phase of data display was done behind a password protected workspace in HELCOM Meeting portal (<https://portal.helcom.fi/default.aspx>), which is based on Microsoft Sharepoint 2013 server. Workspace sites:

BSII - Aggregated pressures and human activities datasets: <https://portal.helcom.fi/workspaces/HOLASII-DATA1-116/default.aspx>

BSII Ecosystem components: <https://portal.helcom.fi/workspaces/HOLASII-DATA2-117/default.aspx>

HOLAS II core indicator results and data review (Figure 7): <https://portal.helcom.fi/workspaces/HOLASII-DATA3-125/default.aspx>

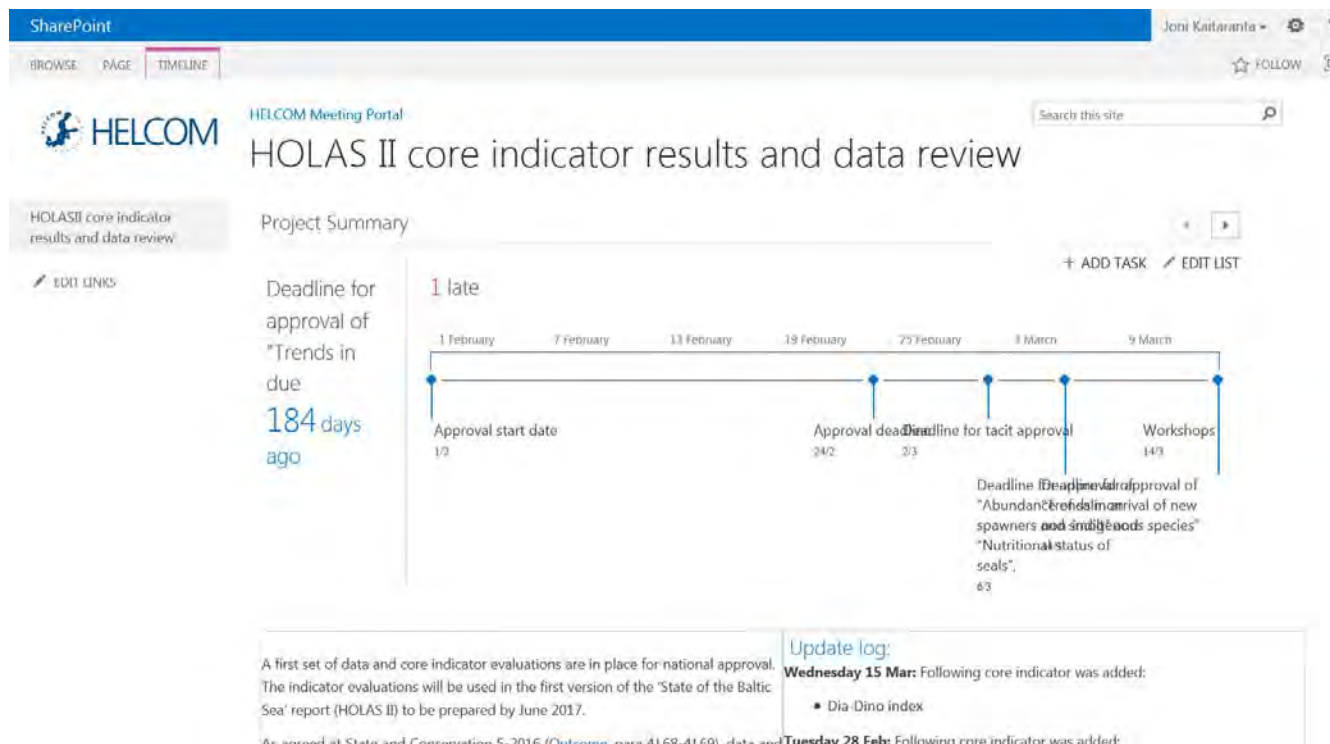


Figure 7. Core indicator results and data review workspace front page containing project timeline.

The access to the workspace was given to nominated contacts of HELCOM Contracting Parties by State & Conservation group. The nominated contacts were requested to carry out a review of their national data in consultation with national experts. For this purpose, a set of user accounts were established providing access to data and nominated contact were given rights to approve data for respective Contracting Party.

A workflow was started for each approval and each Country representative filled in table for Core indicator workspace (Figure 8) as well as human activities and pressures data (Figure 9). Based on the review responses, required actions were taken to process the data (e.g. exclude false data and include missing observations or replace data with alternative source).

It should be noted that the workspaces should be considered as an interim phase in the process of collecting data, quality assuring it, calculating indicator results/data product, quality assuring the result and publishing assessment datasets (Table 1). The datasets that were made available for restricted review were in some cases not in spatial format and with preliminary draft metadata record that was not according to INSPIRE specification.

Table 1. Assessment workflow from data collection to assessment data product utilized in HOLAS II.

	Phase	Tool
1	Data collection and quality assurance	Specific tools/process depending on theme
2	Analysis	Specific tools/process depending on theme
3	Data and result quality assurance	Workspace
4	Assessment result and data publishing	HELCOM Map and Data service & HELCOM Metadata catalogue

Requirements set out for publishing data in conformant way are not accomplished with the Sharepoint-based workspace solution, but tools developed in this project are designed for that use, namely HELCOM Map and Data service and HELCOM Metadata catalogue.

HELCOM Meeting Portal
Approval_EE

HCLASII core indicator results and data review

+ new item or edit this list

All Items Find an item

EDIT LINKS	✓ Edit	Theme	Core indicator	Results and data	Result approval	Data approval	Exceptions
		Biodiversity	Abundance of coastal fish key functional groups	Link to file	Yes	Yes	
		Biodiversity	Abundance of key coastal fish species	Link to file	Yes	Yes	
		Biodiversity	Abundance of salmon spawners and smolt	Link to file	Yes	Yes	
		Biodiversity	Abundance of waterbirds in the breeding season	Link to file	Yes	Yes	
		Biodiversity	Abundance of waterbirds in the wintering season	Link to file	Yes	Yes	
		Biodiversity	Dia-Dino index	Link to file	Yes	Yes	

Comment by an expert: *some EE coastal waters stations seem not to qualify into Eastern Gotland Basin (=open sea) assessment as the conditions are different in coastal waters compared to open sea area. Should be discussed for 2018 assessment version, is it correct to include coastal waters data for open sea assessments.*

Results of the Dia/Dino index should be presented separately only in the 'State of

Figure 8. Core indicator results and data review, example of Estonian data and result approval response form.

HELCOM Meeting Portal
Acceptance_SE

BSII - Aggregated pressures and underlying human activities datasets

+ new item or edit this list

All Items Find an item

EDIT LINKS	✓	Type	Theme	Dataset title	Data source	Metadata	Accepted	Exceptions	Actions taken	Modified By
		Human activity	Cultivation of living resources	Shellfish mariculture	National request	Link to metadata	Yes	-	-	Agnes Ytreberg
		Human activity	Cultivation of living resources	Finfish mariculture	National request	Link to metadata	Yes	- Minor notes sent by email	-	Agnes Ytreberg
		Human activity	Extraction of living resources	Scallop and blue mussel dredging	National request	Link to metadata	Yes	-	-	Agnes Ytreberg
		Human activity	Extraction of living resources	Maerl and bryozoaria harvesting	National request	Link to metadata	Yes	-	-	Agnes Ytreberg
		Human activity	Extraction of living resources	Game hunting of seabirds	National request	Link to metadata	Yes	- We have not received comments on this dataset	-	Agnes Ytreberg
		Human activity	Extraction of living resources	Predator control of seabirds	National request	Link to metadata	Yes	-	-	Agnes Ytreberg
		Human activity	Extraction of non-living resources	Pipelines	National request within Maritime assessment	Link to metadata	No	- According to the Swedish Maritime Administration the Swedish data on eg cables, pipelines and bridges seem to be incomplete. More detailed and complete data should be available in their own chart system. Cables and bridges however this	Restricted data can't be used, therefore no corrections possible.	Joni Kaitaranta

Figure 9. Human activities review, example of Swedish data acceptance form.

4.2 Procedure for publishing approved datasets

After datasets were approved, the datasets were processed to be ready for public display and release via HELCOM Map and Data service and HELCOM Metadata catalogue. A bulk release of HOLAS II datasets were carried out in 11 July 2017 synchronized with a news release on the HELCOM website: <http://www.helcom.fi/news/Pages/First-version-of-the-HELCOM-%E2%80%98State-of-the-Baltic-Sea%E2%80%99-report-is-now-available.aspx>

5. Set of recommendations for future needs and development

A set of recommendations for HELCOM Map and Data service and overall HELCOM Data and information systems were outlined based on information obtained for the foreseeable development of WISE-Marine to enable linkage to that system. According to available documentation of MSFD Reporting Guidance and initial WISE Marine Business plan, it could be following:

1. Produce standard metadata enabling discovery of services and data.
 - This should be now achieved by producing INSPIRE Compatible metadata records using searchable HELCOM metadata catalogue.
2. Expose data using standard services such as OGC WMS and OGC WFS.
 - To date it has not been defined in which interface data to WISE-Marine will be harvested, but technical readiness is in place due to existing infrastructure.
3. A need to convert HELCOM Indicator report contents to common indicator structure.
 - This converting exercise requires that HELCOM core indicator report structure is slightly restructured and information is ordered according to common indicator schema. This process should also facilitate more structured way of storing HELCOM Core indicator reports in the HELCOM Secretariat
4. Make available indicator reports as XML according to common indicator schema
 - Following implementation of HELCOM indicator to common indicator structure, the output should be indicator information in machine readable format (XML) enabling harvesting of indicators from HELCOM to MSFD reporting purposes.