



EMODnet Thematic Lot n° V – Biology

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Operational Phase

Final Progress Report

Reporting Period: 10/05/2023 – 09/05/2025



Contents

1	Introduction.....	3
2	Update on the Tasks.....	5
3	Work Package updates.....	16
4	Identified issues: status and actions taken	23
5	Allocation of project resources	25
6	User feedback.....	26
7	Meetings/events held/attended & planned	29
8	Communication assets	37
9	Monitoring indicators.....	44
10	Recommendations for follow-up actions by the EU	48
11	Annex: Other documentation attached	49

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1 Introduction

EMODnet Biology has, since its first implementation, worked towards freely and openly publishing marine biodiversity data that are essential to measure and study the ecosystem health of maritime basins. Additionally, the consortium has assembled individual datasets and processed them into interoperable biological data products that contribute to assessing the environmental state of overall ecosystems and complete sea basins and also engaged with various stakeholders either by hosting workshops or attending various events or meetings.

Phase V, which ran from 2023-05-10 to 2025-05-09 continued to focus on assembling marine species data and metadata from public and private organisations resulting from water column and sea-bed surveys, to process these data into interoperable formats which includes agreed standards, common baselines or reference conditions, to create a set of gridded abundance data products for a range of marine species and to develop and operate a data portal allowing public access and viewing of the available data, metadata and data products as well as tools and information relevant for various stakeholders.

The main trophic groups covered by EMODnet Biology are (macro)algae, angiosperms, benthos, birds, fish, mammals, phytoplankton, reptiles and zooplankton collected in the Baltic, Barents, Black, Mediterranean and North Seas, as well as North East Atlantic and the Caribbean Sea.

The specific objectives are divided in 9 tasks as included in the table below. Each task is also mapped to the corresponding WP and the organisations leading the work.

Tasks (EASME/EMFF/2016/006 tender specifications)	WP1 (VLIZ)	WP2 (VLIZ)	WP3 (INRAE)	WP4 (OGS)	WP5 (VLIZ)
T1: Maintain and improve a common method of access to data held in repositories		X			
T2: Construct products from one or more data sources that provide users with information about the distribution and quality of parameters in time and space			X		
T3: Develop procedures for machine-to-machine connections to data and data products					X
T4: Contribute data, data products and content to a central portal that allows users to find, view and download data and data products					X
T5: Contributing content to dedicated spaces in Central Portal	X			X	
T6: Ensure the involvement of regional sea conventions				X	
T7: Contribute to the implementation of EU legislation and broader initiatives for open data				X	
T8: Monitor quality/performance and deal with user feedback	X				
T9: Maintain the existing thematic web portal for a maximum of six months from the start of the projects					X

A consortium of 24 government agencies (HCMR, CEFAS, ILVO, IMR, INRAE, IPMA, NIMRD, OGS, SMHI, SYKE, UkrSCES), research institutes/academia (VLIZ, University of Sheffield, MBA, Aarhus University, Deltares, IEO, IH Cantabria, NIOZ, Pangaea, ULg), international organisations (ICES, IODE) and one SME (MARIS) was put in place. These partners have national and international expertise in marine biological data monitoring and data management and connections with the various regional sea commissions. With the inclusion of VLIZ, HCMR, MBA, UkrSCES it was also ensured that all European OBIS nodes as well the OBIS project office itself (hosted by IODE) were represented in the consortium. Additionally, and after the proposal was funded, we have included three more organisations to the consortium, BODC, BUP and IFREMER. The first two organisations will work on improving the semantic interoperability (WP5) and IFREMER will become a data provider in WP2. One external consultant (Maëlle Salmon) was also sub-contracted to support the activities within WP3, more specifically improving the robustness of the R packages developed in previous phases and ensuring their publication to CRAN.

The image below presents the structure approach, not that WP2, WP3 and WP4 are connected through their activities and/or outputs.

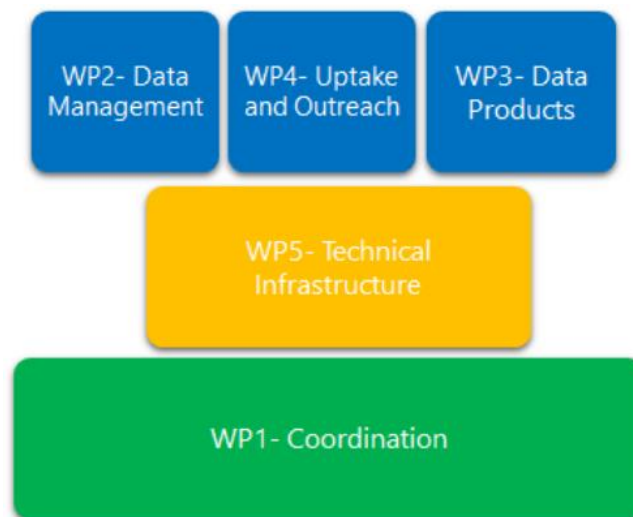


Figure 1: EMODnet Biology Phase V project organisation

2 Update on the Tasks

Task 1: Maintain and improve a common method of access to data held in repositories

The main WP2 objective is covered in this task, with the various activities described in detail in the section 3 under the WP2 updates. Overall, Phase V has added 222 new datasets and 81 updates of datasets to the EurOBIS database, covering all functional groups and all geographical regions, details can be found in the Quarterly Reports published in the EMODnet portal. At the end of Phase V, EMODnet Biology provides access (via the EMODnet Central Portal viewer) to 1,477 datasets, representing roughly 45,29 million occurrence records and 73 million Measurements or Facts (MoF). This translated to an addition of almost 10 million occurrence records during the Phase. In previous deliverables, the reported number of MoFs was much higher, as we were considering all existing records in the submitted datasets, the approach was reviewed and the number included in this report corresponds only to the information available via EMODnet Biology, which corresponds to data that have passed the quality criteria and mapping to relevant vocabularies and ensures that only high-quality data is accessible via the thematic lot.

It should be noted that the total number of occurrences available in EMODnet Biology is not fully accounted for in sheet 'Data' of the Indicators file. This is because the reporting is done on specific sub-themes (macro)Algae, Angiosperms, Benthos, Birds, Fish, Mammals, Phytoplankton, Reptiles, Zooplankton, but there are data that cannot be mapped to these (e.g. data from viruses, bacteria), and are not included in the spreadsheet.

The table in the Annexes (Task 1 section) includes a summary of the information for all datasets published during the reporting period. Figure 3 (in the Annexes) provide the summarised view of the records' geographic distribution.

In addition to upgrading the content and quality of existing data and making new data available, the 'FAIRness' of the metadata for each available dataset was assessed and improved where required. During the Phase, an automated procedure was designed to enrich the datasets metadata with its taxonomic distribution, the parameters measured and instruments used to collect its data. Alongside these updates, all metadata records were also reviewed to ensure that they align with INSPIRE guidance and, when applicable, changes were made to improve conformity.

As in previous phases, the collaboration framework with the consortium was strengthened by frequent communication and maintenance of the previously established or newly setup data flows for new partners. Monthly "Data Laundry" online sessions for consortium organisations were set up during this phase to address data related questions or remarks that the consortium members have, to ensure a smoother process for dataset reformatting Quality Control procedures and subsequent submissions. Additional connections with data providers and aggregators outside the project consortium, such as, but not limited to OBIS and GBIF nodes, were explored until the end of this Phase and will continue during the extension phase, with specific data flows pursued to increase the number of data available through the portal.

The link with [WoRMS](#) remains strong, and through it, additional attribute information is being linked to the downloaded data, allowing more targeted search functionalities by users.

The free, self-paced online OTGA course '[Contributing datasets to EMODnet Biology](#)' remained opened as a resource for data providers and has been used by several Mission Ocean funded projects to support with the data operations and submission. Throughout the Phase 155 learners used the course to support them with the data work, which falls under capacity building/training for the wider community and has been ongoing since previous phases and is considered a relevant part of this Task. The course has also been used by several Mission Ocean funded projects to support training actions to the project's data providers.

Figure 4 included in the Annexes summarises the % increase in data availability since EMODnet Biology was established in 2009. The thematic lot had a 15% increase requirement in data availability in Phase V and at the end of the period, the actual increase was more than double, adding up to 47%. This increase in data availability is variable within each Phase and depends not only on the efforts done by the consortium organisations but also in additional submissions from providers external to the consortium. The increased in data availability is dependent on the access constraints reported by the data providers. It is not uncommon that datasets that were openly available before will require a change in data access and those data will be “removed” from the total number of available to users. Another reason why the increase might be lower is due to dataset updates which will have better information and might include the removal of occurrence records that were previously incorrectly identified. These fluctuations are normal and the WP2 team monitored the evolution throughout the Phase ensuring that by the end of the reporting period, the overall trend is positive and meets (or exceeds) the required 15%.

Task 2: Construct products from one or more data sources that provide users with information about the distribution and quality of parameters in time and space

During Phase V, the consortium built a total of seven original data products addressing Task 2 which have been published in the EMODnet catalogue and map viewer. In addition to these distribution maps, which will be discussed in detail in the WP3 section, WP3 also contributed three analytical user products and a scientific publication in [Marine Policy](#). The publication, which was a pending deliverable from the previous Phase, highlights the potential of interoperable data products to improve the outlook for marine biodiversity, drawing on the lessons learned from EMODnet Biology. The analytical products include the R package [Bfiat](#), a bottom fishing impact assessment tool with which the user can model trawling effects on benthic ecosystem functioning and recovery (<https://github.com/EMODnet/Bfiat>), and the implementation of the DIVAnd interpolation method in R, previously only available in Julia (<https://github.com/gher-uliege/EMODnet-Biology-PhaseV>). The availability of DIVAnd for the R community is significantly broadening its application and impact for producing interpolated species distribution maps. In fact, one of our internally developed data products of this phase already relied on the DIVAnd R implementation, also underscoring its functionality. The third analytical product delivery is the fully revised R package [emodnet.wfs](#) that has undergone thorough revision by ROpenScience during this phase and is now ready for publication on CRAN, assuring highest possible exposure to the user community as well as ease and stability of use. The same procedure is planned for the R package [emodnet.wcs](#) during the coming two years as, due to the time of the revision process and unforeseen developments with anticipated subcontractors, it proved unfeasible to achieve during the reporting period. Once both EMODnet R packages are on CRAN, WP3 will provide a series of modular tutorials showcasing EMODnet data and providing training for the use of the EMODnetWFS, EMODnetWCS R packages.

The seven data products targeting the distribution of groups of species, presence/absence maps as well as trait information, on regional sea scales up to global distributions include:

- [Spatio-temporal interpolation of zooplankton alpha diversity in the greater Baltic sea region](#)
- [Community Temperature Index \(CTI\) for intertidal macroalgae in NW Spain](#)
- [Global predicted thermal distributions for intertidal macroalgae](#)
- [Habitat suitability maps for reef-forming species in the North Sea](#)
- [Biodiversity maps of European macrobenthos by EUNIS seabed habitat types \(a cross-lot product with Seabed habitats\)](#)
- [Biomass-weighted fish functional feeding trait distribution for the Northeast Atlantic](#)
- [Seabird distribution maps and interpolation product using DIVAnd in R](#)

In addition to the original work, WP3 has republished several relevant external products that are now hosted on the EMODnet Portal. These include, *inter alia*, habitat suitability and biomass maps of commercial Atlantic

fish species, also following modelled future scenario projections, decadal abundance of calanoid copepods within the North Atlantic, day and night zooplankton abundance maps in the North Atlantic, predictive distribution models of deep-sea elasmobranchs in the Azores EEZ, and density of Loggerhead Turtles in the Mediterranean Sea. These additions enrich the catalogue and exemplify the collaborative efforts of WP3 and external stakeholders.

However, integrating products that were not originally designed for hosting by EMODnet Biology is often challenging due to issues with data formatting and quality assurance, creating constraints that other thematic lots typically do not encounter. Even though there is established guidance to create biological products (e.g. [Climate and Forecast guidance](#) for NetCDF files, [COARDS](#), [OGC](#)), the systems used by the EMODnet Portal, more specifically GeoServer, has not fully implemented their own guidance properly, which results in the difficulties the thematic lot faces when publishing products. External data product publication is expected to increase significantly with many EU funded projects now requiring the publication of outcomes through the EMODnet Central Portal, which constitutes a non-negligible task for the workforce of WP3.

Task 3: Develop a complete and robust machine to machine (M2M) interface to transfer data and products in bulk, which is easily accessible for other machines and initiatives

During phase V, substantial work was undertaken to enhance and stabilize the machine-to-machine (M2M) interfaces and related infrastructure that support bulk data transfer and automated data accessibility for EMODnet Biology. The activities ranged from deep backend system upgrades to significant software improvements and optimizations, as well as enhancements to data publication workflows and semantic alignment efforts.

One of the core infrastructural improvements was the removal of outdated legacy tables and scripts required for the old EMODnet Biology portal. This measure led to a marked improvement in database performance, particularly by considerably reducing the PostgreSQL data indexing time. Furthermore, a series of database-level optimizations were implemented, including refining the links and primary key structures in the EurOBIS PostgreSQL tables. These steps strengthened relational data integrity and accelerated query performance for downstream M2M services.

To further improve system stability and user experience for large data requests, critical bugs were addressed in the GeoServer API, which serves as the main conduit for machine-to-machine downloads via the Central Portal. These fixes specifically resolved timeout errors that occurred during download requests exceeding one million records. In addition to the API work, multiple incremental GeoServer upgrades were carried out. Starting from version 2.23.2, the system was successively updated through versions 2.24.2, 2.25.1, 2.25.2, 2.26, and finally to 2.26.1, with each upgrade addressing known performance, stability, or security vulnerabilities, including CVE-2024-45748, a high-impact security issue. Parallel to the GeoServer upgrades, the team improved the technical Docker setup of the EurOBIS ERDDAP instance, which provides another key access point for M2M data retrieval. In addition, the Central Portal GeoServer virtual machine, which hosts many of the biology products, was migrated from Ubuntu 20.04 to 22.04. This operating system upgrade was necessary to facilitate a Tomcat upgrade to mitigate a severe security vulnerability (CVE-2023-46589).

The web service backend was also modernized. The PHP version of the webserver cluster was upgraded from 7.4 to 8.2 following the end-of-life of the older version. The data portal framework was migrated to Symfony 6 and later to 6.4 LTS, significantly improving performance, maintainability, and compatibility with newer tools. To address performance bottlenecks during downloads, a new download queue monitor service was deployed. This allows system administrators to receive alerts on stalled or slow download jobs, reducing service downtime. Furthermore, the data portal automated testing framework was reactivated. This ensures that all Geoserver API calls are correctly formatted and yield accurate results, safeguarding the integrity of M2M data deliveries. In a parallel move towards better development governance and traceability, all SQL

Server stored procedures involved in data migration workflows were added to a Git repository, enabling better version control, rollback options, and team collaboration.

The migration pipeline from SQL Server to PostgreSQL was also optimized, reducing total execution time by an additional 2-3 hours. This reduction is crucial in minimizing downtime during production database refreshes, thereby improving data availability through the M2M interfaces.

In the area of data publication and interoperability, a series of upgrades were performed on the Integrated Publishing Toolkit (IPT), a key tool for biodiversity data sharing used by the community and managed by GBIF. The IPT was upgraded from version 2.7.6 to 3.0.4 and later to 3.1.2. These updates resolved known issues and ensured continued compatibility with community data standards. In addition, three new IPT instances were installed and configured for external partner organizations (ILVO, IOLR, and CNR-ISP), further expanding the system's data publishing capacity.

Ongoing work on semantic alignment also progressed during this Phase. A scope and draft plan were agreed upon during internal progress meetings, leading to the achievement of a significant milestone: the first Linked Data Event Streams (LDES) feed was made available on top of the NVS SKOS terms, organized per collection. This development is essential for enabling better machine-readable access and semantic interoperability with other biodiversity data systems.

Efforts continued on enhancing the fitness-for-use labelling of datasets. The logic and code for evaluating dataset suitability were refined based on tests with sample datasets. However, progress on this subtask remained slow due to the complexity of the problem and the need for multi-team coordination.

Further improvements were made to the Darwin Core (DwC) harvester application, fixing several technical issues to stabilize the data harvesting pipeline. Similarly, MetaGIS, the system managing the layers in the EMODnet portal viewer, was updated to include new EMODnet Biology-specific fields while also addressing previously identified bugs.

To comply with INSPIRE metadata requirements, work also advanced on automatically updating relevant metadata fields (See Task 1). Improvements were made to the metadata records generated from the MarineInfo.org (IMIS) catalogue, which feeds into the Central Portal's Geonetwork catalogue. Additionally, a Web Map Service (WMS) endpoint for biology products was created within the Central Portal Geoserver to meet INSPIRE discoverability and metadataURL requirements.

Finally, and in line with the wider biodiversity community (i.e. GBIF), a number of new tables and fields were added into the database infrastructure, giving EMODnet Biology the ability to capture eDNA based data.

A tool to capture data and data product usage statistics for each lot has been in testing phase on the Central Portal infrastructure of VLIZ since mid-March 2025 and using EMODnet biology as a test case. The Biology numbers included in the table are provisional and are included for transparency. The tool needs further refinement and it is expected that the usage statistics become more accurate and representative.

Asset	Webservice	# Downloads	Unit
Data	WMS	8800	records
	WFS	66729	
Data Products	WMS	22265	records
	WFS	34477	
	WCS	2728	

Task 4: Contribute data, data products and content to a central portal that allows users to find, view and download data and data products

The EMODnet Biology connectivity map was updated using the HighCharts application as a support action for WP4 (Task 5).

Initially, work continued on syncing MetaGIS product layers metadata to GeoNode, enabling harvesting by the Central Portal via a CSW endpoint. Later on, this path was left in favour of VLIZ' MarineInfo's (IMIS) ability to publish INSPIRE compliant metadata and Geonetwork being able to read a WAF (Web Accessible Format) publication. This made the Geonode setup redundant (see below). Metadata for EMODnet Biology products hosted on the CP GeoServer is now automatically harvested into the CP catalogue, using INSPIRE-required fields. This auto-sync was previously only available for the VLIZ Geoserver. Eventually, synchronization between the EMODnet Biology catalogue and the EMODnet Central Portal catalogue (JIRA EM-78) was completed, adding 1308 new metadata records linked to existing EMODnet Biology datasets. Also, work began to describe the EMODnet Biology download and subsetting service using DCAT (Data Catalogue Vocabulary), to meet FAIR data principles under the Blue Cloud 2026 project.

Technical updates were implemented to support datasets without traditional taxonomic classifications (e.g., Seabed Habitats Occurrence records). This required changes across all components of the workflow, including harvester, indexing scripts, export tools, and Geoserver.

The Biodiversity records data layer filter was enhanced to reinstate previous filtering options from the Biology portal, including species traits, start/end year, dataset selection, and MeasurementOrFacts filters.

A fix was implemented to improve the display of individual metadata records in the Central Portal GeoNetwork catalogue by ensuring proper UUID formats and limiting to one contact per record.

A formal development environment for the Central Portal and EMODnet Biology products was established, including Geoserver, PostgreSQL, and ERDDAP, which allows for pre-production testing to avoid production issues.

A monitoring plugin was installed on Geoserver, enabling EMODnet Biology to capture usage statistics on data/products accessed through the Central Portal. Later on, this was overruled by the Central Portal webservice monitoring system (see above, Task 3)

A new filter was implemented in the staging database to control when data is exported to EMODnet Biology, allowing differentiation between immediate exports and those requiring QC completion. The November 2024 harvest (in collaboration with WP2) included technical changes to support omics data publication. This involved implementing an eMoF-like database structure for DNA-derived data, following Darwin Core Standard extensions. (see also Task 3), as a consequence, omics data are now findable, they can be subset and downloaded via the Central Portal map viewer.

As part of WP5, a **roadmap for marine biodiversity data** was explored. A short summary is listed below:

Building on the 20+ years of proven history of managing marine biological data through the work within the EuroBIS and EMODnet Biology frameworks, the upcoming phase of development will reinforce its foundational principle—biodiversity = a species in time and space—while embracing new data types and modern software paradigms. The objective is to evolve EMODnet Biology into a more flexible, interoperable, and future-ready marine biodiversity data infrastructure.

1. Modernization of the Technical Infrastructure
 - Adopt Microservices Architecture
 - Use Docker-based containers for each component.
 - Enable modular deployment, improved fault isolation, and better resource utilization.
 - Position infrastructure for potential cloud-native deployments for cost-effective scalability.
 - CI/CD and Automated Testing
 - Implement Continuous Integration/Continuous Deployment (CI/CD) pipelines.
 - Integrate automated testing suites to ensure robust, error-resilient deployments.
 - Facilitate rapid iteration and reduce downtime during updates.

2. Data Expansion and Interoperability

- Dealing with the data deluge
 - Use the correct technologies to work with “true” big data
- Support for New and Emerging Data Types
 - Sampling events
 - Measurements and environmental facts
 - eDNA records
 - Imagery and multimedia
 - But, maintain backward compatibility with core biodiversity data model.
- Semantic Interoperability via Knowledge Graphs
 - Investigate and implement knowledge graph technologies.
 - Develop a marine biodiversity ontology aligned with existing standards (e.g., Darwin Core, OBIS vocabularies).
 - Facilitate intelligent querying and linkage of data across systems.

3. Quality Control and Data Management

- Centralized Quality Control (QC) Framework
 - Consolidate and standardize QC scripts (technical and content-based).
 - Maintain a centrally managed repository with version control.
 - Implement routine auditing to ensure compliance with evolving data standards.
- Metadata Enrichment and Provenance Tracking
 - Ensure all datasets are accompanied by rich, machine-readable metadata.
 - Track provenance, ownership, and versioning to support transparency and trust.

4. Compliance and Strategic Integration

- Align with EU Policy and Data Initiatives
 - Ensure system compliance with the EU Open Data Directive.
 - Prepare for integration with:
 - European Data Spaces
 - Digital Twins of the Ocean
 - Green Deal Data Space

Task 5. Contributing static content to dedicated spaces in the Central Portal

At the start of Phase V, a number of updates and additions were made to the thematic lot static pages due to a change in partnership and an update on how the work was organised within the different Work Packages. Throughout the first year, guidance information regarding the use of webservices, the data QC tool and leaflets with information catered for the various Regional Sea Conventions, as well as updated links to the training course and webservices as and four use cases were published.

Throughout the project, informative material based on the activities dedicated to collect and share information on data and product needs by multiple stakeholders, as collected by questionnaires and during workshops, has been published on the CP. A comprehensive list of the updates made can be found in the Annexes.

Task 6: Ensure the involvement of Regional Sea Conventions (RSC)

Several actions have been carried out to ensure the involvement of Regional Sea Conventions. These included: identification of the stakeholder community of interest and of the key experts of RSC; update of the connectivity map among EMODnet Biology partners and key stakeholder communities; preparation of an engagement plan to propose an efficient approach to ensure stakeholder involvement; design of a survey aimed to raise awareness of EMODnet and to collect feedbacks and needs from RSCs; organization of internal

meetings to agree on approaches and share responsibilities. EMODnet Biology survey was distributed to over 75 stakeholders, including representatives of all RSC, in the last quarter of 2023 and results were analysed and presented within the partnership, in order to identify the main requirements and opportunities for EMODnet Biology. EMODnet partnership has organized a workshop dedicated to RSC involvement, which was a hybrid physical and online event, back to back to the first annual meeting and was hosted at the National Institute for Marine Research and Development “Grigore Antipa” in Constanta, Romania on April 18, 2024. Representatives of all RSC have participated to the workshop to present the major needs in terms of data, products and tools for the assessment of environmental quality at regional sea basin scale. A report on the workshop content and outcomes was published on the CP and shared with the RSCs.

Task 7: Contribute to the implementation of the EU legislation and broader initiatives for open data

Throughout the reporting period, various projects have contacted the thematic lot to provide feedback towards their work. A list of all projects and a summary of the support/feedback done is included in the Annexes.

Various contacts with EU institutions have taken place, and requests for feedback on data publication, gaps and expert knowledge have been made. Additionally, after a long hiatus, the TG DATA group restarted its meetings and workplan.

An inventory of biodiversity-related environmental indicators associated to Marine Strategy Framework Descriptors 1 (Biodiversity), 2 (Non-indigenous species), 4 (Food web integrity) and 5 (Eutrophication) has been made to assess how EMODnet Biology data and products can support EU legislation.

By the end of the first reporting period, a deliverable addressing the progress for the publication of fisheries survey data was submitted to CINEA and DG MARE for feedback. The deliverable was published on the CP in June 2024.

A Workshop with representatives of major recent and current European Research Projects and initiatives was organised as a two-half days online event to share experience and knowledge in biodiversity monitoring and assessment and in data, tools and services. Before the workshop, an additional questionnaire was designed and distributed to collect needs to support open data initiatives among several EU Mission Ocean projects.

Lastly, a report on the activities to support EU Member States regarding their reporting obligations has been finalized and published on the CP.

Task 8: Monitor quality/performance and deal with user feedback

Ongoing monitoring for the quality and performance of the Biology services is provided by Central Portal’s [GeoHealthCheck tool](#). During the reporting period, EMODnet Biology’s WCS, WMS and WFS services were compliant with INSPIRE guidelines, as can be seen in the Figure 5 included in the Annexes.

Dealing with user feedback is another continuous task undertaken by the thematic lot. All feedback received during the reporting period, and follow up actions, is included in the table in section 6.

Status of the Milestones and Deliverables listed in the workplan					
Milestone/Deliverable in numerical order	WP	Date due	Status (To do/ Delivered/ Delayed)	Date delivered	If Delayed: reason for delay and expected delivery date
1.1.1 Quarterly Progress reports	WP1	2023-07-15	Delivered	2023-07-14	
		2023-10-15		2023-10-13	
		2024-01-15		2023-01-15	
		2024-04-15		2024-04-15	
		2024-07-15		2024-07-15	
		2024-10-15		2024-10-15	
		2024-01-15		2025-01-15	

		2025-01-15 2025-04-15 2025-07-15		2025-03-15 2025-04-15 2025-07-15	
1.1.2 Interim report	WP1	2024-05-10	Delivered	2024-06-28	
1.1.3 Final Report	WP1	2025-05-09	Delivered	2025-06-15	
1.2.1 Update of EMODnet Biology data products via the EMODnet CP catalogue	WP1	2024-05-10 and 2025-05-09	Delivered		
1.3.1 Monitoring user feedback via EMODnet JIRA	WP1	2023-05-10 to 2025-05-09	Delivered		
1.3.2 Operation of the EMODnet CP helpdesk	WP1	2023-05-10 to 2025-05-09	Delivered		
1.4.1 Minutes from the three project meetings (kick off, annual and final)	WP1	2023-06-10 2024-05-10 2025-05-09	Delivered	2023-06-30 2024-05-09 2025-05-12/13	
1.5.1 Participation in the EMODnet Steering Committee meetings	WP1	2023-05-10 to 2025-05-09	Delivered	2023-12-01 2023-04-29/30 2024-10-07 and 2024-11-13 2025-05-07/08	
1.5.2 Participation in the EMODnet Open Conference	WP1	2023-05-10 to 2025-05-09	Delivered	2023-11-29/30	
1.6.1 Appropriate mechanisms and guidelines for handover	WP1	2025-05-09	Delivered		
2.1.1 Maintenance of adequate mechanisms to ensure data are interoperable	WP2	2023-05-10 to 2025-05-09	Delivered		
2.1.2 Report on the standardisation and integration of datasets published during the Phase	WP2	2025-05-09	Delivered	2025-05-07	
2.2.1 Summary on consortium data flows	WP2	2023-11-10	Delivered	2023-11-10	
2.3.1 Plan to optimise procedures to make restricted data available to users	WP2	2023-05-10 to 2025-05-09	Delivered		
2.4.1 Workshop on use of Zooniverse for data digitisation through citizen science	WP2	2023-11-10	Delivered	2023-11-15	
2.4.2 Data training workshop for Mediterranean organisations	WP2	2023-11-10	Delivered	2023-11-13/14	
2.4.3 Report on the availability of data following the workshops	WP2	2025-03-10	Delivered	2025-03-18	

2.5.1 Guidance for data management practices applied to omics data	WP2	2023-05-10 to 2025-05-09	Delivered	2025-05-07	
3.1.1 Internal WP3 and WP4 Workshop	WP3	2023-09-10	Delivered	2023-09-11	
3.2.1 Quarterly community calls	WP3	2023-08-10 2023-12-10 2024-03-10 2024-05-10 2024-08-10 2024-12-10 2025-03-10	Delivered	2023-06-08 2023-09-14 2023-12-04 2024-03-04 2024-04-16 2024-07-17 2024-10-03 2025-01-28	
3.3.1 Liaison with external entities targeting seabird and cetacean migration outputs	WP3	2023-05-10 to 2025-05-09	Delivered		
3.3.2 Data product creation	WP3	2023-05-10 to 2025-05-09	Delivered		
4.1.1 Update connectivity maps and identification of stakeholder community	WP4	2023-09-10	Delivered	2023-09-28	
4.1.2 Informative material based 4.2.2 published in the EMODnet CP	WP4	2024-05-10	Delivered	2024-05-10	
4.1.3 Informative material based on the 4.2.3 outcomes	WP4	2024-07-10	Delivered	2024-07-05	
4.1.4 Informative material based on the 4.3.1 outcomes	WP4	2025-05-09	Delivered	2025-04-01	
4.1.5 Publication of four Use Cases	WP4	2023-11-10 2024-05-10 2024-11-10 2025-05-10	Delivered	2023-11-27	
4.1.6 Publication of written documents	WP4	2023-05-10 to 2025-05-09	Delivered		
4.2.1 Engagement plan for each RSC	WP4	2023-11-10	Delivered	2023-10-03	
4.2.2 Questionnaire to inform about what data & products EMODnet Biology offers and to collect stakeholder needs	WP4	2023-11-10	Delivered	2023-10-04	
4.2.3 Workshop with RSCs to understand major needs	WP4	2024-05-10	Delivered	2024-04-18	
4.2.4 Report on progress for the publication of fisheries survey data	WP4	2025-05-09	Delivered	2024-06.11	
4.3.1 Workshop with representatives of major	WP4				

recent and current European Research Projects and initiatives to share experience and knowledge in biodiversity monitoring and assessment and in data, tools and services		2024-11-10	Delivered	2024-11-20	
4.3.2 Participation in TG DATA meetings	WP4	2023-05-10 to 2025-05-09	Ongoing	2024-05-14 2024-09-27 2024-10-08 2025-01-28 2025-03-18	
4.4.1 Ensure compatibility with INSPIRE Directive (data, metadata, data products)	WP4	2023-05-10 to 2025-05-09	Delivered		
4.4.2 Report on the activities to support EU Member States regarding their reporting obligations	WP4	2025-05-10	Delivered	2025-04-30	
5.1.1 Streamlining semantic interoperability	WP5	2023-05-10 to 2025-01-10	Delivered	2025-05-09	
5.1.2 Integration of omics data into the data model	WP5	2024-09-10	Delivered		
5.1.3 Roadmap for marine biodiversity data	WP5	2025-05-09	Delivered		
5.2.1 M2M communication plan and solutions	WP5	2023-05-10 to 2025-05-09	Delivered		
5.3.1 Operational web services	WP5	2023-05-10 to 2025-05-09	Delivered		
5.3.2 Technology stack upgrades	WP5	2025-05-09	Delivered		
5.3.3 Technical maintenance of procedures for ingestion of data from the data providers	WP5	2023-05-10 to 2025-05-09	Delivered		
5.3.4 Development and implementation of procedures to publish omics data	WP5	2025-05-09	Delivered		
5.4.1 Synchronisation of all data and data products metadata to the EMODnet CP catalogue (GeoNetwork)	WP5	2023-05-10 to 2025-05-09	Delivered		
5.4.2 All data and products available through the EMODnet CP	WP5	2023-07-10 to 2025-05-09	Delivered		

5.4.3 Participation in the EMODnet TWG meetings	WP5	2023-05-10 to 2025-05-09	Delivered	2023-10-18 2024-03-12 2025-04-08	
5.4.4 Maintenance and development of API used to query EMODnet Biology layers available via the EMODnet CP viewer	WP5	2023-05-10 to 2025-05-09	Delivered		

3 Work Package updates

WP1 – Coordination

Covering Task(s): Task 8: Monitor quality/performance and deal with user feedback

WP1 is dedicated to the project coordination and is coordinated by VLIZ and the leads for WP2 (VLIZ), WP3 (INRAE), WP4 (OGS) and WP5 (VLIZ).

The main activities include: 1. General project coordination and supervision, 2. Budget Management, 3. Responsibility to deliver the reporting deliverables to the Commission, 4. Organisation of project meetings, 5. Liaise with external organisations on behalf of the project consortium and 6. Operate the helpdesk.

In general terms, the coordinator is responsible for:

- Act as the intermediary between the consortium and the European Commission.
- Ensure appropriate communication and, where viable, collaboration between the consortium and the remaining lots
- Organise project meetings
- Chair the Coordination Board meetings
- Participate in the EMODnet Steering Committee and EMODnet Technical Coordination Group meetings
- Participate, on behalf of the consortium, in events (workshops, webinars, discussion groups, etc.) relevant to the project
- Liaise with the EMODnet Secretariat on behalf of the consortium

The outcomes of the WP1 activities are included in the following Deliverables:

- D1.1.1 Quarterly Progress reports
- D1.1.2 Interim report
- D1.1.3 Final Report
- D1.2.1 Update of EMODnet Biology data products via the EMODnet CP catalogue
- D1.3.1 Monitoring user feedback via EMODnet JIRA
- D1.3.2 Operation of the EMODnet CP helpdesk
- D1.4.1 Minutes from the three project meetings (kick off, annual and final)
- D1.5.1 Participation in the EMODnet Steering Committee meetings
- D1.5.2 Participation in the EMODnet Open Conference
- D1.6.1 Appropriate mechanisms and guidelines for handover

Despite the occasional delays with specific deliverables, most notably the use cases, Phase V concluded with 100% delivery of all planned work. A detailed list can be found in the table 'Status of the Milestones and Deliverables listed in the workplan' available in the previous section

WP2 – Data Management

Covering Task(s): Task 1: Maintain and improve a common method of access to data held in repositories

The main objective for WP2 is covered in Task 1: Maintain and improve a common method of access to data held in repositories. The data primarily include the following groups, macroalgae, angiosperms, benthos, birds, fish, mammals, reptiles, phytoplankton and zooplankton in six European seas, more specifically: Arctic, Atlantic, Baltic Sea, Black Sea, Mediterranean Sea and North Sea, including their coastal and estuarine zones as well as the Caribbean Seas (where EU countries have overseas territories). Data from other regions are also ingested when available, even though it is not the main focus of the proposed work.

Within the single task of WP2, several deliverables (8 in total) are clearly defined and will be discussed below, with specific details on their status and general progress.

Deliverable 2.1.1 (Maintenance of adequate mechanisms to ensure data are interoperable) is being achieved by constant communication with the project partners/sub-contractors, as well as with the promotion of the FAIR data principles applied to all data, metadata and services following the previously described data standards and controlled vocabularies. In addition, since the beginning of Phase V a new collaboration framework has been established in order to promote and optimise collaboration between the partners/sub-contractors. This collaboration framework consists of i) dedicated Data Laundry Q/A sessions once a month where data providers can bring and resolve questions regarding any aspect of the data flow to EMODnet Biology, from metadata completeness to format adequacy and publication optimisation and ii) an EMODnet Biology dedicated forum internal to the consortium where questions and doubts can be asked and solved by any of the partners/sub-contractors at any time. The channels of the forum are divided by the most common topics/issues encountered while processing marine biodiversity occurrence datasets. These two new collaboration mechanisms together with the traditional communication channels (meetings and email communication) have shown to optimise data quality and communication between the partners and subcontractors while speeding up the data submission process. **Deliverable 2.1.2** (Report on the standardisation and integration of datasets published during the Phase) was achieved by carefully tracking the standardisation and integration process, ensuring all datasets followed the required Darwin Core Archive standard, WoRMS taxonomy alignment, and BODC vocabularies. As described in the table of Annex (Task 1 section) by the end of Phase V, a total of 303 datasets had been processed where special attention was given to increasing the use of the Darwin Core Event Core format and incorporating new data types such as eDNA-derived occurrences.

A full “Summary on consortium data flows” was already made available in the early stages of Phase V as **Deliverable 2.2.1** where the data flow tools and mechanisms are made explicit for each partner/sub-contractor, highlighting the relevance of the Integrated Publishing Toolkit (IPT) as a generalised method to publish data. A data rescue effort was also studied in the form of a “Plan to optimise procedures to make restricted data available to users” as **Deliverable 2.3.1**, where strategies such as geographic masking of sensitive species occurrences and protected bathymetric data, temporary moratorium periods or increasing data literacy among the data providers and users were proposed and used throughout the reporting Phase to either open data, or to negotiate a future partial opening of it.

Capacity development has been an integral part of Phase V in order to account for thematic and geographic data gaps within EMODnet Biology but also to inform about the project and to connect with currently disconnected networks. With this intention **Deliverable 2.4.1** (Workshop on use of Zooniverse for data digitisation through citizen science) and **Deliverable 2.4.2** (Data training workshop for Mediterranean organisations) were carried out during November 2023. The first workshop aimed to mobilise historical and citizen science data. Participants were trained on how to design and implement citizen science projects, with practical sessions covering project setup, volunteer engagement, and data quality control, specifically for digitising biodiversity records from historical sources. The second workshop addressed geographic gaps in the southern Mediterranean region. Here, participants were guided through the complete data management process—from standardisation to publication. Each participant was required to bring relevant datasets for EMODnet Biology and, with support from the EMODnet Biology team, work them through to a publishable stage. Following the two workshops, **Deliverable 2.4.3** (Report on the availability of data following the workshops) was achieved summarizing the number and types of datasets mobilised. It also provided recommendations for future capacity-building activities, based on feedback collected through polls and participant evaluations. The workshops led to the successful publication of seven new and historical datasets from the Mediterranean region.

Within the same capacity development scope, a dedicated “Guidance for data management practices applied to omics data” was published as **Deliverable 2.5.1** in close collaboration with the wider biodiversity informatics community (being the Ocean Biodiversity Information System and the Global Biodiversity Information Facility).

This deliverable aimed to bring into EMODnet Biology biodiversity occurrences derived from environmental DNA sampling techniques, especially eDNA metabarcoding, following the community best practices for data publication. Several adaptations to the EMODnet Biology database were made to allow for publication of these types of data and by the end of Phase V, five omics datasets had been successfully published through EMODnet Biology.

WP3 – Data Products

Covering Task(s): Task 2: Construct products from one or more data sources that provide users with information about the distribution and quality of parameters in time and space

WP3 had three main objectives during this phase:

1. Maximizing uptake of existing and new data products by end users
2. Include products targeting species migration routes
3. Creating new products targeting groups of species and presence/absence maps, which can be queried, subset and downloaded via the EMODnet Central Portal viewer, as well as the creation of analytical tools that end-users can apply to own data and individual needs

Each of these objectives is addressed by actions that resulted in essentially four deliverables. During phase V, WP3 has completed eight scheduled community calls (**Deliverable 3.2.1**). These calls form the fundament to strengthen knowledge exchanges and collaboration within WP3, discuss internal progress and possible arising challenges as well as to provide feedback and updates. The community calls proved again to be highly appreciated by WP3 members and supported their work and coordination throughout this phase.

Objective 1 links to **Deliverable 3.1.1** (delivered in M4), an internal cross-WP workshop to boost collaboration and awareness of previous work done by WP3 and WP4 and to facilitate coordinated joint efforts in maximising the uptake of existing as well as newly developed data products. Emphasis was put on possible ways of how EMODnet Biology can support Regional Sea Convention (RSC) needs in the future. To further add to achieving objective 1, all metadata records of Biology data products have been added to the Central Portal catalogue. Additionally, during the extension period of phase V, WP3 will provide training materials in form of tutorials to manipulate and visualize EMODnet products using the existing R packages developed, refined and revised in phases III and IV and V, EMODnetWFS and EMODnetWCS.

Efforts are still ongoing to establish collaborations with seabird and cetacean experts to address the impact of coastal human infrastructures for migratory species, which forms objective 2 through **D3.3.1**. For instance, WP3 offers to host any existing products tackling such information. Several seabird and cetacean experts have been identified and contacted. However, so far, liaison with external entities has shown that such products are to date extremely rare. The reason for this is that information on the impact of coastal infrastructure on migration routes does either not exist, projects tackling these are just ongoing and not ready to be shared, or stakeholders are not willing to share the information. There have been connections made with external entities where discussions and expert input are still ongoing. The main feedback received highlighted that assessing impacts on migrating birds remains particularly challenging, as it depends on radar-based monitoring. Unfortunately, ongoing technical issues with radar systems mean that the limited data currently available is of little practical value. Although some data exists for resident seabird populations, this information alone does not meet the core objective of Deliverable 3.3.1, which is to address migration routes specifically. At present, either the relevant data for the planned products does not yet exist, or expert groups have only recently begun efforts to collect it. Despite these limitations, WP3 remains actively engaged and committed to progressing toward Deliverable 3.3.1. WP3 will continue its efforts in establishing connections to address objective 2. WP3 internal efforts are investigating the possibility to create seabird sensitivity maps to wind parks in the North Sea, which would also be in the scope of the objective.

Objective 3 is at the core of WP3 and is addressed by developing new data products, as well as by extending and updating existing products as part of **Deliverable 3.3.2**, data product creation. This phase has resulted in a diverse array of new products, including distribution maps covering zooplankton, benthos, macroalgae fish and birds. Some of these focus on individual species presence/absences, while others showcase habitat suitability indices, seabed habitat associations, feeding guilds, biodiversity indices, or the currently very timely CTI index to assess thermal affinities at the community level. At the same time, this phase delivered classic distribution maps (7) as well as analytical tools for end-users (3).

Below is a summary of the various products that have been developed and published during this phase:

- [Spatio-temporal interpolation of zooplankton alpha diversity in the greater Baltic sea region:](#) Developed by *SMHI*, this product provides a spatial-temporal interpolation of zooplankton biodiversity patterns across the Greater Baltic Sea region, including the Skagerrak and Kattegat. It is based on observed Shannon diversity indices derived from Swedish and Finnish environmental monitoring data. Using the DIVAnd (Data-Interpolating Variational Analysis in n-Dimensions, an EMODnet Biology product) method, the product generates a three-dimensional interpolation across longitude, latitude, and seasonal time dimensions.
- [Community Temperature Index \(CTI\) for intertidal macroalgae in NW Spain:](#) *IHCantabria* has developed this product with the aim to understand how warmer thermal affinities of species are influencing intertidal macroalgal assemblages in north-western Spain. To investigate this, the Community Temperature Index (CTI) was calculated using field sampling data sourced from EMODnet Biology. The dataset comprises information from 18 sites distributed along a longitudinal thermal gradient in NW Spain, covering two intertidal zones (Low and Mid) and two time points (2011 and 2017).
- [Global predicted thermal distributions for intertidal macroalgae:](#) In the same context of assessing the thermal affinities of macroalgal species, as explored through the CTI product, *IHCantabria* has also developed a global predicted distribution map based on the thermal preferences of intertidal macroalgae. Given the extensive geographic and taxonomic scope of this product, it provides highly valuable information for calculating Community Temperature Indices (CTIs) in other regions around the world, as well as supporting a wide range of additional ecological analyses.
- [Habitat suitability maps for reef-forming species in the North Sea:](#) Developed by *Deltares*, this product identifies suitable reef habitat areas in the North Sea based on the predicted occurrence of key reef-building species and environmental variables such as bathymetry, grain size, temperature, and salinity. The aim was to map where these species are most likely to form stable populations, considering both environmental and human-use gradients.
- [Biodiversity maps of European macrobenthos by EUNIS seabed habitat types \(a cross-lot product with Seabed habitats\)](#) Developed by the *University of Sheffield*, this cross-lot product provides the means to link zoobenthos taxa with their associated EUNIS habitats. Users can select a species and query in which habitats this species is found in based on the European Seabed habitat map, and conversely, select a habitat type and query a list of all species being found in selected habitat type. Additional features include visualizations of species richness, and the number of surveys conducted.
- [Biomass-weighted fish functional feeding trait distribution for the Northeast Atlantic:](#) Developed by *Cefas*, this product reveals spatial and temporal changes in marine ecosystem structure and functioning across the Northeast Atlantic shelf seas. It represents the relative contribution of fish biomass based on their prey preferences, mapped along two feeding trait axes: benthic versus zooplankton prey, and small versus large prey.
- [Seabird distribution maps and interpolation product using DIVAnd in R:](#) Developed by the *University of Liège*, this product is based on the European Seabirds at Sea (ESAS) dataset and provides the first EMODnet Biology product that addresses sea bird distributions. Gridded distribution fields were

generated using the DIVAnd method, accompanied by relative error fields that indicate data reliability (higher errors reflect areas with limited observational coverage).

- [Implementation of DIVAnd in R](#): Building on the success of the DIVAnd tool for spatial-temporal interpolation, previously only available in *Julia*, this product, *also developed by the University of Liège*, implements the DIVAnd method in R. This supports integration into workflows for EMODnet data products and enable users to perform gridded interpolation of environmental and biodiversity data directly within R, using open and reproducible methods.
- [‘Bfiat’ New software tool to model the impact of bottom trawling on the benthos](#): Developed by NIOZ, the new R package **Bfiat** features a mechanistic model that predicts the condition of benthic species during and after trawling disturbances
- [emodnet.wfs R package fully reviewed \(ROpenScience\) and revised - ready to be publish on CRAN](#): The goal of *emodnet.wfs* is to allow interrogation of and access to EMODnet’s geographic vector data in R through the EMODnet Web Feature Services. This package has now been reviewed and revised and will be made available on CRAN to ensure broad accessibility and usability across the scientific community.

WP4 – Uptake and Outreach

Covering Task(s): Task 5. Contributing static content to dedicated spaces in the Central Portal, Task 6: Ensure the involvement of Regional Sea Conventions RSC and Task 7: Contribute to the implementation of the EU legislation and broader initiatives for open data

WP4 has the objectives to promote EMODnet Biology data, products and services and to engage relevant actors (e.g. RSC) and contribute to implementation of EU legislation. The activities involve following actions: provide and update content to the EMODnet Central Portal (for Task 5: Contributing static content to dedicated spaces in the Central Portal), promote interaction with the RSCs and ICES (for Task 6: Ensure the involvement of Regional Sea Conventions RSC), liaison with relevant EU initiatives, projects and parties and ensure compatibility with INSPIRE Directive (Task 7: Contribute to the implementation of the EU legislation and broader initiatives for open data).

Within the project duration WP4 has dedicated efforts to:

- Update the connectivity maps among EMODnet partners and relevant stakeholder communities and identify the stakeholder community
- Propose an engagement plan designed to optimize the involvement of Regional Sea Conventions and of other relevant stakeholders
- Design and distribute an online questionnaire aimed to collect information on how EMODnet Biology can support the assessment of marine ecosystem status and on what are the major needs in terms of data and products
- Organize a workshop addressed to RSCs aimed to: promote the awareness of EMODnet Biology data, tools and products and collect information on how we can support Region Sea Conventions activities related with environmental status assessment at sea basin scale
- Design and distribute an additional questionnaire, not foreseen in the proposal, dedicated to EU projects invited to EMODnet Biology workshop for EU Mission Ocean projects which aimed to collect information on data collected by the projects, on data management practices and on major challenges in terms of data management and sharing
- Organize a two-half days workshop for representatives of EU Mission Ocean focused on marine biodiversity data
- Document the progress of the publication of fisheries survey data

- Publish informative material based on the above listed activities to share information on data and product needs by multiple stakeholders, as collected by questionnaires and during workshops
- Publish Use Cases focused on EMODnet Biology on EMODnet Central Portal
- Participate to multiple meetings (e.g. TG DATA) also to support EU Member States regarding their reporting obligations

List of completed deliverables:

- 4.1.1 Update connectivity maps and identification of stakeholder community
- 4.1.2 Informative material based on 4.2.2 (Questionnaire)
- 4.1.3 Informative material based on 4.2.3 (RSC Workshop)
- 4.1.4 Informative material based on the 4.3.1 outcomes (Workshop for EU Mission Ocean Projects)
- 4.1.5 Publication of four Use Cases
- 4.1.6 Publication of written documents
- 4.2.1 Engagement plan for each RSC
- 4.2.2 Questionnaire to inform about what data & products EMODnet Biology offers and to collect stakeholder needs
- 4.2.3 Workshop with RSCs to understand major needs
- 4.2.4 Report on progress for the publication of fisheries survey data
- 4.3.1 Workshop with representatives of major recent and current European Research Projects and initiatives to share experience and knowledge in biodiversity monitoring and assessment and in data, tools and services
- 4.3.2 Participation in TG DATA meetings
- 4.4.1 Ensure compatibility with INSPIRE Directive (data, metadata, data products)
- 4.4.2 Activities to support EU Member States regarding their reporting obligations

WP5 – Technical infrastructure

Covering Task(s): Task 3: develop a complete and robust machine to machine (M2M) interface to transfer data and products in bulk, which is easily accessible for other machines and initiatives and Task 4: Contribute data, data products and content to a central portal that allows users to find, view and download data and data products

WP5 objectives are related with the technical infrastructure required to ensure data and data products, as well as their associated metadata are published seamlessly and in compliance with the requirements of the Central Portal team. A brief summary of the performed tasks presented below.

One of the core infrastructural improvements was the removal of outdated legacy tables and scripts used by the old EMODnet Biology portal. This measure led to a marked improvement in database performance, particularly by considerably reducing the PostgreSQL data indexing time. Furthermore, a series of database-level optimizations were implemented, including refining the links and primary key structures in the EurOBIS PostgreSQL tables. These steps strengthened relational data integrity and accelerated query performance for downstream M2M services.

To further improve system stability and user experience for large data requests, critical bugs were addressed in the GeoServer API, which serves as the main conduit for machine-to-machine downloads via the Central Portal. These fixes specifically resolved timeout errors that occurred during download requests exceeding one million records. In addition to the API work, multiple incremental upgrades of GeoServer were carried out. Arriving at version 2.26.1 at the end of Phase V

Parallel to the GeoServer upgrades, the team improved the technical Docker setup of the EurOBIS ERDDAP instance, which provides another key access point for M2M data retrieval. In addition, the Central Portal GeoServer virtual machine, which hosts many of the biology products, was migrated from Ubuntu 20.04 to

22.04. This operating system upgrade was necessary to facilitate a Tomcat upgrade to mitigate a severe security vulnerability

The PHP version of the webserver cluster was upgraded from 7.4 to 8.2 following the end-of-life of the older version. The data portal framework was migrated to Symfony 6.4 LTS (Long Term Support), significantly improving performance, maintainability, and compatibility with newer tools. To address performance bottlenecks during downloads, a new download queue monitor service was deployed. This allows system administrators to receive alerts on stalled or slow download jobs, reducing service downtime.

Furthermore, the data portal automated testing framework was reactivated. This ensures that all GeoServer API calls are correctly formatted and yield accurate results, safeguarding the integrity of M2M data deliveries. In a parallel move towards better development governance and traceability, all SQL Server stored procedures involved in data migration workflows were added to a Git repository, enabling better version control, rollback options, and team collaboration.

The migration pipeline from SQL Server to PostgreSQL was also optimized, reducing total execution time by an additional 2-3 hours. This reduction is crucial in minimizing downtime during production database refreshes, thereby improving data availability through the M2M interfaces.

In the area of data publication and interoperability, a series of upgrades were performed on the Integrated Publishing Toolkit (IPT). It was upgraded from version 2.7.6 to 3.1.2. These updates resolved known issues and ensured continued compatibility with community data standards. In addition, three new IPT instances were installed and configured for external partner organizations (ILVO, IOLR, and CNR-ISP), further expanding the system's data publishing capacity.

Ongoing work on semantic alignment also progressed during this quarter. A scope and draft plan were agreed upon during internal progress meetings, leading to the achievement of a significant milestone: the first Linked Data Event Streams (LDES) feed was made available on top of the NVS SKOS terms, organized per collection. This development is essential for enabling better machine-readable access and semantic interoperability with other biodiversity data systems.

Efforts continued on enhancing the fitness-for-use labelling of datasets. The logic and code for evaluating dataset suitability were refined based on tests with sample datasets. However, progress on this subtask remained slow due to the complexity of the problem and the need for multi-team coordination.

Further improvements were made to the Darwin Core (DwC) harvester application, fixing several technical issues to stabilize the data harvesting pipeline. Similarly, MetaGIS was updated to include new EMODnet Biology-specific fields while also addressing previously identified bugs.

To comply with INSPIRE metadata requirements, work also advanced on automatically updating relevant metadata fields. Improvements were made to the metadata records generated from the MarineInfo.org (IMIS) catalogue, which feeds into the Central Portal's GeoNetwork catalogue. Additionally, a Web Map Service (WMS) endpoint for biology products was created within the Central Portal GeoServer to meet INSPIRE discoverability and metadataURL requirements.

Finally, and in line with the wider biodiversity community (i.e. GBIF), a number of new tables and fields were added into the database infrastructure, giving EMODnet Biology the ability to capture eDNA based data.

4 Identified issues: status and actions taken

A. Priority issue(s) identified and communicated by CINEA/ DG MARE/ SECRETARIAT				
Priority issue	Status (Pending/ Resolved)	Action(s) taken/ remaining actions planned	Date due	Date resolved
Assessment of Performance (from last Phase IV QR)				
Task 2: Phase V position paper	Resolved		QR27	2025-01-08
Observations in view of Section 1.7 of the Tender Specifications on Performance and Quality Requirements				
Progress solving identified issues				
EM-78: Biology to report on status or plans to support INSPIRE Compliant CSW	Resolved	EMODnet Biology publishes products via two Geoserver instances, one belonging to VLIZ and the other to EMODnet. Metadata records are harvested by the EMODnet Geonetwork following synchronisation procedures with the VLIZ owned metadata catalogue (IMIS).		
EM-83 - Biology - Web Services MetadataUrl and DataUrl	Resolved	Further updates done following feedback from the EMODnet Secretariat. Pending confirmation, by the EMODnet Secretariat, that these changes addressed all remaining issues		
EM523: EMODnet Biology Phase IV layers for European Atlas of the Sea	Pending	Ticket created by Coordinator, was considered low priority due to centralisation work and subsequently the end of Phase IV and start of Phase V		End of Phase V
EM524: IUCN red list Near Threatened category layer	Pending	Ticket created by Coordinator, was considered low priority due to centralisation work and subsequently the end of Phase IV and start of Phase V		End of Phase V
EM577: Update of zooplankton layers in the European Atlas (if available)	Pending	Ticket created by the EMODnet Secretariat, was considered low priority due to centralisation work and subsequently the end of Phase IV and start of Phase V		End of Phase V
EM-957: EMODnet lots to check if filter values are displayed in the preferred order	Resolved	Biology's filters are implemented and displayed in their preferred order. No updates are needed		

A. Issues / challenges identified by the thematic assembly group itself				
Priority issue / challenge	Status (Pending/ Resolved)	Action(s) taken / remaining actions planned	Date due	Date resolved
Users do not have access to absence occurrences	Ongoing	Species' absence in surveys can provide invaluable information for data product creation and overall ecosystem knowledge. Within the thematic lot, there are several datasets where data providers have reported true absences (species were looked for but not found) or derived absences (i.e a list of species was defined for the project and systematically used throughout. When a species is absent from the data submitted, we know that this is because such individuals were absent from the samples). Work is underway to allow for these data to be available to users	QR22	
Users do not have access to genomics data	Resolved	In the Phase IV workplan it was stated that the thematic lot would endeavour efforts to implement procedures to handle and publish genomics data. This work is not meant to be done in isolation with the international community therefore most actions have been limited to accompanying the situation and internally assessing what changes need to occur in the DB so that these data can be properly managed.	Phase V	
Delays due to situation in the Ukraine	Ongoing	UkrSCES is slowly picking up the work and interacting again with the planned activities, including those related with data provision. Further updates will be given in subsequent reports		
Users do not have access to extended measurements and facts data	Resolved	Due to centralisation users querying the EurOBIS observations layer only have access to occurrence data and no associated parameters. Technical developments are needed to ensure that the Central Portal viewer replicates the same functionalities and provides access to the same data as via the Biology portal		
Users do not have access to habitat data if the data are not linked to species occurrences	Ongoing	This is a new development that is required due to the continuous publication of Seabed Habitats point data. Technical developments will be needed as the database and associated data publication procedures are based on the assumption that all datasets have species occurrences	QR28	

5 Allocation of project resources

Information on the allocation of project resources	
Categories	Resource usage ¹ (%)
Making data and metadata interoperable and available	35.7%
Preparing data products	17.3%
Preparing web-pages, viewing or search facilities	13.8%
Managing user feedback	1.2%
Project management	18.0%
Outreach and communication activities	14.0%
Others	NA

The different categories included in the table above are spread across the different Work Packages.

6 User feedback

Overview of user feedback and/or requests received in this project phase							
Date	Organisation	Type of user feedback (e.g. technical, case study, etc.) and short description of the feedback received	Means of contact	Response time	Status of user query (Resolved/Pending)	Measures taken to resolve the query	Status: if not (yet) resolved/pending, explain reason why and expected timeline
2025-02-13	Taltech	Inquiry Regarding Estonian Marine Biodiversity Data in EMODnet Biology	<i>Helpdesk</i>	1 day	Resolved	Provided requested information	
2025-01-31	WUR	Presence/absence data of macrozoobenthos in the European Seas	<i>Helpdesk</i>	10 day	Resolved	Provided information available at this point. Files are not retrievable	Delay occurred due to misuse of the internal/reply to customer functionality.
2024-11-08	University of Genova	info shapefile [EMODnet Posidonia oceanica meadows distribution]	<i>Helpdesk</i>	10 day	Resolved	Provided information on where to find the data files	Delays in the reply were due to absence of the colleague that had this information
2024-11-18	VLIZ	Emodnet Rpackage - data retrieval	<i>Helpdesk</i>	1 day	Resolved	Provided alternative information on how to find data via the EurOBIS R package instead	
2024-11-04	Sensfish	Request for Data Access	<i>Helpdesk</i>	2 day	Resolved	Provided information on how to download data from the viewer (Enquiry shared by the EMODnet Secretariat on Nov 12 th)	

2024-09-26	IMMA Network	We would like to add IMMAAs to your Map Viewers	Helpdesk	1 day	Resolved	Under assessment for inclusion in the Biology thematic lot	
2024-08-07	Fordham University	EMODnet Biology data access	Helpdesk	1 day	Resolved	Information provided on how to search and download data via the viewer	
2024-08-01	eDNAQUA-Plan	eDNAqua-plan survey on Biodiversity Data Publishers and Service Providers	Helpdesk	1 day	Resolved	Survey had been answered	
2024-05-15	VLIZ	Reporting an issue	Helpdesk	1 day	Resolved	The issue with the metadata link was resolved and explanation was given on how to download data via the portal	
2023-10-31	Ifremer	benthic/seabed imagery database	Helpdesk	1 day	Resolved	Provide information alternative to the use of fathomnet for image archiving. Enquiry shared with EMODnet Seabed Habitats	
2023-10-13	UAC	technical issue biology occurrence data	Helpdesk	1 day	Resolved	Clarified the meaning of the QC values included in the data output files and directed user to a link where the QC is explained	
2023-09-20	MOi	Fish and fishery data need for NECCTON	Email forwarded by Secretariat head	1 day	Resolved	Informed user that official fisheries data are not publicly available and provided instructions on how to access existing fisheries data from the mapviewer	

2023-09-08	ILVO	GBIF and EMODnet	Email sent to Biology colleague	1 day	Resolved	Directed user to the Biology reports and provided detailed information for April 2021 and April 2023	
2023-07-15	UMA	Cetacean presence absence data	Helpdesk	1 day	Resolved	Sent information on how to search and download data from the viewer	
2023-06-28	Belobog	Data marine life vertical distribution	Email sent to Coordinator	1 day	Resolved	We could not support the user with the query as the information requested is not something we can provide	
2023-06-26	n/a	Enquiry about EMODnet Biology WFS R package	Email sent to Biology		Resolved	Provided information on how to use webservice	
2023-04-23	Student at Lund University	Raster data for study use	Helpdesk	1 day	Resolved	Referred user to the available webservice	
2023-03-20	n/a	shape-files of Mediterranean marine subdivisions	Helpdesk	1 day	Resolved	Referred the user to the VLIZ Marine Regions team	
2023-02-23	AQUA DTU	participating in Horizon project B-USEFUL: co-creation of biodiversity indices	Helpdesk	2 days	Resolved	Accepted invitation, no further information sent by user	
2022-07-26	Deep Wind Offshore	Information on where to find bird data for the Baltic sea	Helpdesk	1 day	Resolved	Directed user to other possible sources of data	

7 Meetings/events held/attended & planned

A. Meetings/events organised and attended in this project phase					
Date	Location	Type event (internal or external meeting; training/workshop)	Was a presentation given? (yes/no + short description)	Meeting attended (A) / organised (O)	Short description and main results (# participants, agreements made, etc.)
07/08-05-2025	Online	Meeting	Yes	A	22 nd EMODnet Steering Committee meeting
08-04-2025	Online	Meeting	Yes	A	17 th EMODnet Technical Working Group meeting
04-05-2025	Online	Meeting	No	A	2 nd CINEA/DG MARE Coordination meeting with EMODnet coordinators
25/28-03-2025	Online	Hackathon	No	A	EMODnet OSL4.0
19-03-2025	Online	Webinar	Yes	A	Satellite states of art solutions to map Posidonia and pressures
18-03-2025	Online	Meeting	No	A	TG DATA
10/11-03-2025	Online	Conference	No	A	IODC-III Conference (poster available via https://oceandataconference.org/wp-content/uploads/2025/03/EMODnet_Biology.pdf)
07-03-2025	Brussels, Belgium	Event	No	A	European Ocean Days

04-03-2025	Leiden, The Netherlands	Meeting	No	A	Biodiversity Meets Data kick off meeting
19-02-2025	Brussels, Belgium	Meeting	No	A	OSL 4.0: Coach/mentor meeting
05-02-2025	Online	Meeting	Yes	A/O	Meeting with PI from Biodiversity Meets Data project
28-01-2025	Online	Meeting	NO	A	TG DATA
15-01-2025	Online	Webinar	No	A	Ocean-Driven Solutions for a Sustainable Economy and Resilient Communities
31-01-2025	Online	Meeting	No	A	1 st CINEA/DG MARE Coordination meeting with EMODnet coordinators
30-01-2025	Oostende, Belgium	Meeting	No	A	FPS-Biodiversity Beyond National Jurisdiction
28-01-2025	Online	Meeting	No	A	EU TG DATA
15-01-2025	Online	Webinar	No	A	Ocean-driven solutions for a sustainable economy and resilient communities
04-12-2024	Online	Workshop	No	A	Enhancing EMODnet user-friendliness: Ocean data for policy support under EU marine directives
27-11-2024	Online	Webinar	Yes https://blue-cloud.org/events/webinar-fair-data-principles-2-applying-fair-principles-through-ocean-data-management-value	A	FAIR data principles: Applying FAIR Principles across the (ocean) data management value chain
27-11-2024	Online	Meeting	No	A	EMODnet 4 th Vision Draft Group meeting

19-11-2024	Online	Workshop	Yes (presentations and minutes are available in the form of a report on the CP)	O	Workshop with representatives of major recent and current European Research Projects – EMODnet Biology workshop
04/07-11-2024	Sitges, Spain	Workshop	No	A	Marine Biodiversity Monitoring Harmonisation workshop
29-10-2024	Online	Meeting	No	A	EMODnet expert dialogue on Vision 2035
23/25-10-2024	Constanta, Romania	Conference	Yes https://www.marblue.ro/Book_of_Abstracts_MARBLUE_2024.pdf	A	MARBLUE 2024
16-10-2024	Online	Webinar	No	A	OBPS: Best Practices for enhancing data and services
14-18.10.2024	Palermo, Italy	Congress	Yes Poster on EMODnet Biology data	A	43 rd CIESM Congress
15-10-2024	Online	Workshop	No	A	OBPS: Marine Life 2030: Advancing Biology and Ecosystem Ocean Observations and Forecasting
08-10-2024	Brussels, Belgium	Meeting	Yes	A	16 th EMODnet Technical Working Group meeting
07-10-2024	Brussels, Belgium	Meeting	Yes	A	21 st EMODnet Steering Committee Meeting
27-09-2024	Online	Meeting	No	A	EU TG DATA
17/18-09-2024	Ispra, Italy	Meeting	No	A	Marine Biodiversity Monitoring Harmonisation
24-06-2024	Online	Meeting	No	A	EMODnet Vision Draft Group Meeting

12/13-06-2024	Brussels, Belgium	Conference	No	A	Digital Ocean Forum
04/06-06-2024	Online	Workshop		A	The State of Marine Biodiversity Monitoring in Europe
28/30-05-2024	Bergen, Norway	Conference	Yes <ul style="list-style-type: none"> • A Comprehensive Approach to Marine Biodiversity Data Validation: The Biocheck Tool: https://youtu.be/iMMmbbiduoA • EMODnet Biology: an EU service for the marine biology community and beyond: https://youtu.be/yFA9vH4uHmY • Interpolation of Plankton Continuous Recorder data using a neural network technique: https://youtu.be/pO6gUrtAi4 	A	IMDIS- International Conference on Marine Data and Information Systems
23-05-2024	Online	Workshop (external)	No	A	1 st MARCO BOLO Co-design/co-creation workshop making Marine and Coastal Biodiversity Observations Policy Relevant
14-05-2024	Online	Meeting (external)	No	A	EU TG DATA
29-30/04/2024	Online	Meeting (external)	Yes	A	20 th EMODnet Steering Committee Meeting
18/04/2024	Constanta, Romania	Workshop	Yes (presentations and minutes are available in the form of a report on the CP)	O	EMODnet Biology workshop for the Regional Sea Conventions

16-17/04/2024	Constanta, Romania	Meeting (internal)	Yes	O	EMODnet Biology annual meeting
03-05/04/2024	Malta	Meeting (external)	Yes	A	EMODnet Ingestion final meeting
21/03/2024	Liège, Belgium	Meeting (external)	No	A	Consolidating the NECCTON network and delivery: one year+ of results
13/03/2024	Online	Webinar (external)	Yes	A	Iliad webinar: Digital Twins of The Ocean and Biodiversity
12/03/2024	Online	Meeting (external)	Yes	O	15 th EMODnet Technical Working Group Meeting
06/03/2024	Oostende, Belgium	Conference	No	A	VLIZ Marine Science Day
29/02/2024	Online	Meeting (external)	No	A	Meeting with EuroStat
28/02/2024	Online	Webinar (external)	Yes	A	EMODnet webinar for EU Mission: Restore our Ocean and Waters and Horizon Europe Recording available via the link
05-08/02/2024	Delft, The Netherlands	Meeting (external)	No	A	MARCO BOLO General Assembly
01/12/2023	Brussels, Belgium	Meeting (external)	No	A	19 th EMODnet Steering Committee Meeting Minutes available via the link
27-30/11/2023	Brussels, Belgium	Conference/Jamboree	Yes EMODnet Biology EMODnet Ocean best Practices, global data sharing and interoperability session	A (O)	EMODnet Jamboree and Open Conference Information and presentations available via the link

15/11/2023	Lecce, Italy	Training (internal)	Yes	O	EMODnet Biology Autumn Data School - Data rescue via citizen science platforms
13/11/2023	Lecce, Italy	Training (internal)	Yes	O	EMODnet Biology Autumn Data School- Mediterranean organisations
14,16/11/2023	Hybrid	Workshop (external)	No	A	EuropaBON workshop
13/11/2023	Hybrid	Webinar (external)	No	A	EuropaBON Webinar: Stakeholder consultation
20/10/2023	Brussels, Belgium	Meeting (external)	No	A	8th EMODnet-CMEMS Coordination meeting Information and minutes available via the link
18/10/2023	Online	Meeting (external)	Yes Presentation available via the link	O	14 th EMODnet Technical Working Group Meeting Minutes available via the link
25-29/09/2023	Online	Workshop (external)	Yes	A (O)	G7 FSOI-GOOS Plankton Workshop Report available via the link
18/09/2023	Hybrid	Meeting (external)	No	A	MARCO BOLO & GOOS BioEco Panel meeting
08/09/2023	Online	Webinar (external)	No	A	Marine Biodiversity Networking Friday: Celebrating Black Voices in Marine Science Recording available via the link

19/07/2023	Online	Webinar (external)	No	A	Green Deal Data Space (Marine Biodiversity Networking Fridays GREAT) Stakeholder Forum Recording available via the link
23/06/2023	Online	Webinar (external)	No	A	Networking Friday with SENACYT Recording available via the link
14-15/06/2023	Brussels, Belgium	Meeting (external)	No	A	Digital Ocean Forum Information about the event, including a recording is available via the link
13/06/2023	Online	Meeting (external)	No	A	MSFD Expert Network on Marine Biodiversity meeting (Incidental Bycatch Threshold Values)
08/06/2023	Heraklion, Crete	Meeting (internal)	Yes	O	EMODnet Biology Phase V kick off Meeting minutes available via the link
07/06/2023	Heraklion, Crete	Meeting (internal)	Yes	O	EMODnet Biology Phase IV final meeting
02/06/2023	Online	Meeting (external)	No	A	EMODnet for the Ocean Decade Coordination Implementation Group
23/05/2023	Brest, France	Meeting (external)	Yes	A	18th EMODnet Steering Committee Meeting
15/05/2023	Online	Workshop (external)	No	A	Green Deal Data Space (GREAT) Marine Data Task Force

10,17,31/05/2023	Online	Webinar (external)	No	A	UN Global Compact Working Meeting on Net Biodiversity Positive Offshore renewables
10/05/2023	Online	Webinar (external)	No	A	Green Deal Data Space (GREAT) Biodiversity webinar Information and presentations available via the link
SUM				O	Total # of meetings organised = 11
SUM				A	Total # of meetings attended = 60

B. Meetings/events planned in the future					
Date	Location	Type event (meeting, training (workshop), etc.)	Meeting to be attended (A) / organised (O)	Short description and main expected outcomes	
23-05-2025	Cork, Ireland	European Maritime Day	A	Participating as panel speaker in Workshop 24: Ocean Observation – Foundation of Marine Knowledge	
09/13-06-2025	Nice, France	UN Ocean Conference	A	Participated as speaker to the side event The Future of Marine Biodiversity Monitoring	
21/24-10-2025	Bogotá, Colombia	Living Data 2025	A	Several abstracts accepted for oral presentation	
25/26-11-2025	Brussels, Belgium	EMODnet Conference	Open	A	

8 Communication assets

A. Communication products developed				
Date	Communication material	Short description (of the material, title, ...) of the asset	Main results	Name of event at which material was disseminated (if applicable)
10-05-2023 to 09-05-2025	Social media posts	Various posts (on X and BlueSky) about dataset publication, events attended, general information about the project	Raise awareness Inform stakeholders about activities	NA
07-05-2025	News item	EMODnet Biology publishes a New software tool to model the impact of bottom trawling on the benthos		
08-04-2025	News item	New EMODnet Biology product: Evolution of zooplankton biodiversity patterns in the Baltic Sea region		
02-04-2025	News item	EMODnet Biology publishes new data products analyzing the evolution of the Community Temperature Index (CTI) of intertidal macroalgae in NW Spain.		
02-04-2025	News item	EMODnet Biology's new product: Biomass-Weighted Fish Functional Feeding Traits for the Northeast Atlantic		
31-03-2025	News item	EMODnet Biology report on the data availability following the Autumn Data school		
31-03-2025	News item	EMODnet Biology new data publication		
27-02-2025	News item	EMODnet Biology is wrapping up two years of Phase V and preparing for the next phase		
13-02-2025	News item	New EMODnet Biology product: Habitat suitability of reef-forming species in the North Sea		
31-01-2025	News item	EMODnet Biology paper "Realizing the potential of interoperable data products to improve the outlook for marine biodiversity: Lessons from EMODnet"		
17-01-2025	News item	EMODnet Biology Data Management Training Course for Mediterranean organisations		

19-12-2024	News item	EMODnet increases its marine biodiversity data holdings by over 1.2 million new occurrence records!		
28-11-2024	News item	EMODnet Biology workshop for European Research and Innovation, and Mission: Restore our Ocean and Waters biodiversity projects		
31-10-2024	News item	EMODnet Biology Activities		
14-10-2024	News item	New data product published by EMODnet Biology		
17-09-2024	News item	EMODnet Biology congratulates EurOBIS for its 20th anniversary		
04-09-2024	News item	EMODnet Biology launches new survey targeting EU funded projects working on biodiversity		
17-07-2024	News item	EMODnet Biology supports the biodiversity community by republishing products		
17-07-2024	News item	EMODnet Biology new data publication		
08-07-2024	News item	EMODnet Biology reports on Fisheries survey data publication		
04-07-2024	News item	EMODnet Biology latest technical developments		
26-06-2024	News item	Strengthening Global Marine Biodiversity Data Collaboration		
31-05-2026	News item	EMODnet Biology reflects on one year of Phase V		
08-05-2024	Training	Managing your Scientific Code using Git and GitHub Course (organised by a consortium partner)		
18-04-2024	Workshop	EMODnet Biology workshop for the Regional Sea Conventions		
27-03-2024	News item	EMODnet Biology first data harvest of 2024		
27-03-2024	News item	EMODnet presents EDITO-Infra at the European Iliad project webinar series		
19-03-2024	Training	Introduction to Programming in R course between 19-21 March 2024, Early Bird Prices available until the end of January (organised by a consortium partner)		

18-12-2023	News item	EMODnet Biology joined the G7 Future of the Seas and Oceans Initiative (FSOI) workshop		
18-12-2023	News item	EMODnet Biology last data publication of 2023		
07-12-2023	News item	DTO-BioFlow Open call to help unlock sustained and long-term marine biodiversity data and foster publication through EMODnet Biology		
07-12-2023	News item	Contributing datasets to EMODnet Biology OTGA course- New version		
15-11-2023	Training	EMODnet Biology Autumn Data School - Data rescue via citizen science platforms		
13/14-11-2023	Training	EMODnet Biology Autumn Data School- Mediterranean organisations		
09-11-2023	News item	Marco Bolo's data call for time series from European marine ecosystems and fosters data publication via EMODnet Biology		
30-10-2023	News item	EMODnet Biology invites input to stakeholder survey		
21-09-2023	News item	EMODnet Biology summer data harvest		
21-09-2023	News item	EMODnet Biology and LifeWatch ERIC Autumn Data School, Citizen Science Workshop		
23-08-2023	News item	EMODnet Biology concludes new data harvest and plans data training workshops		
20-06-2023	News item	EMODnet Biology transitions from Phase IV to Phase V		
24-05-2023	News item	EMODnet Biology Phase V and data updates		

B. Planned communication products

Date	Communication material	Short description (of the material, title, ...) and/or link to the asset	Main results expected
10-05-2024 to 09-05-2025	Social media posts	Various posts (on X) about dataset publication, events attended, general information about the project	Raise awareness
	News items		Inform stakeholders about activities
	Informative material		

C. (Co-)Authored peer-reviewed publications in this project phase					
Date of publication	Type of publication	Full reference	ISBN	DOI	Is it open access? Yes/No
22-12-2023	Paper	Olivier Beauchard, Clare Bradshaw, Stefan Bolam, Justin Tiano, Clément Garcia, Emil De Borger, Pascal Laffargue, Mats Blomqvist, Irimi Tsikopoulou, Nadia Papadopoulou, Christopher Smith, Jolien Claes, Karline Soetaert and Marija Sciberras, 2023. Trawling-induced change in benthic effect trait composition - A multiple case study. Front. Mar. Sci., 22 December 2023 Sec. Marine Ecosystem Ecology Volume 10 - 2023		https://doi.org/10.3389/fmars.2023.1303909	Yes
21-11-2023	Paper	Dos Santos A, Marques R, Pires RFT. 2023. Zooplankton biodiversity and temporal dynamics (2005–2015) in a coastal station in western Portugal (Northeastern Atlantic Ocean)		http://doi.org/10.7717/peerj.16387	Yes
04-11-2023	Report	Pires, R.F.T., Froufe, E., Secci-Petretto, G., Dos Santos A., Report on the occurrence of the hydromedusa <i>Odessia maeotica</i> (Ostroumoff, 1896) in the north-eastern Atlantic revealed by citizen science and		https://doi.org/10.1007/s10452-023-10071-5	No

		integrative taxonomy. <i>Aquat Ecol</i> (2023).			
10-07-2023	Paper	Montanyès, M., Weigel, B. and Lindegren, M. (2023), Community assembly processes and drivers shaping marine fish community structure in the North Sea. <i>Ecography</i> e06642.		https://doi.org/10.1111/ecog.06642	Yes
13-06-2023	paper	Maioli, F., Weigel, B., Chiarabelli, E. <i>et al.</i> Influence of ecological traits on spatio-temporal dynamics of an elasmobranch community in a heavily exploited basin. <i>Sci Rep</i> 13 , 9596 (2023)		https://doi.org/10.1038/s41598-023-36038-y	Yes

D. Other/non-peer reviewed types of publications (co-)authored in this project phase

Date of publication	Type of publication	Full reference	ISBN	DOI	Is it open access? Yes/No
24/08/2023	Conference abstract	Ramos, E., Guinda, X., de la Hoz, C.F., Puente, A., Juanes, J.A. KEYNOTE “Macroalgal monitoring challenges under the climate-driven community changes”. 8 th European Phycological Congress. SYMPOSIUM 20 “Coastal and freshwater systems under human pressure: status assessment, management and conservation”. 20-26 August, Brest (France)	-	-	Yes https://epc8.sciencescofn.org/data/pages/EPC8_BOOK_of_ABSTRACTS_2.pdf
02/09/2023	Conference Abstract	Perez Perez R, Beja J, Vandepitte L, Lipizer M, Weigel B, Vanhoorne B (2023) EMODnet Biology: Unlocking European marine biodiversity data. <i>Biodiversity Information Science and Standards</i> 7: e112147.		https://doi.org/10.3897/biss.7.112147	Yes
29/10/2023	Preprint	Maioli, F., Weigel, B., Lindmark, M., Manfredi, C., Zupa, W., Bitetto, I., Russo, T., Casini, M. Assessing the overlap between fishing activities and chondrichthyans distribution exposes high-risk areas for		https://doi.org/10.1101/2023.10.25.563919	Yes

		bycatch of threatened species. bioRxiv 2023.10.25.563919;			
29/11/2023	Conference poster	Naumann MS, Wittmann AC, Behnken A, Collart T, Damaske D, Delaney C, Felden J, Huber R, Larkin K, Schindler U, Glöcker FO (2023) Four bridges to cross– Linking PANGAEA data resources with four EMODnet themes. EMODnet Open Conference, 29-30 November, Brussels, Belgium			Yes Poster: https://drive.google.com/file/d/1U1mqQYa0ymhfMmuA8RRml5Bmf64m0_Sz/view page 33
29/11/2023	Conference poster	Figuroa-Ashforth C, Gough C, Lear D, Paxman K; DASHH: Unlocking Ocean Secrets through FAIR biodiversity data; (2023); EMODnet Open Conference, 29-30 November, Brussels, Belgium			Yes Poster: https://drive.google.com/file/d/1myJayarqlbOqLuFnIbNIRQ_hvCfPQKEH/view?usp=drive_link page 10
29/11/2023	Conference poster	Sarafidou G, Paragkamian S; (2023); Digging up the oceans' past: A Citizen Science project for Historical Scientific Papers; Digging up the oceans' past: A Citizen Science project for Historical Scientific Papers			Yes Poster: https://drive.google.com/file/d/1CKjLUqG1f3yX7gvBbnbrdaun36lvDHd4/view?usp=drive_link page 12
29/11/2023	Conference poster	Perez R, Vanhoorne B, Delgat L, Beja J, Vandepitte L; (2023);The Biocheck Tool: Enhancing data quality in marine biodiversity research			Yes Poster: https://drive.google.com/file/d/1H6ge0JUG1oon8xAADlgoNEU_KDpxJqCo/view?usp=drive_link page 13
29/11/2023	Conference poster	Beja J, Fernández S, Krystalli A, Salmon M, Blondel E, Webb T; (2023); EMODnet Biology develops tools for EMODnet users			Yes Poster: https://drive.google.com/file/d/15Eywycu16L5UUI6w8tbugUv_gbUqM4xu/view?usp=drive_link page 17
29/11/2023	Conference poster	Paragkamian S, Loulakaki M, Kalaitzaki L, Minadakis N, Sarafidou G, Pafilis E, Gerovasileiou V, Mavraki D; (2023); Text mining advances in the framework of EMODnet Biology			Yes Poster: https://drive.google.com/file/d/1OISMZci4qIFZz-qQQQWhHVFKNHCyenlQ/view?usp=drive_link page 43

29/11/2023	Conference poster	Principe S C, Provoost P, Appeltans W; (2023); OBIS/EMODnet biology: high quality data, but not the complete picture			Yes Poster: https://drive.google.com/file/d/1gB0a1PqF5FizgzNVPHEMFZvRV2EN5fZ7J/view?usp=drive_link page 47
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For a comprehensive overview of publications referring to/making use of EMODnet data and/or data products, please consult Google Scholar.

9 Monitoring indicators

Comments on the progress indicators in the indicators spreadsheet		
Progress indicator	Means of collecting figures	Comment
<p>1. Current status and coverage of total available thematic data</p> <p>A) Volume and coverage of available data</p>	In house tools	<p>"Phase V was incredible rich in data publication, with all sub-themes exhibiting a significant increase in the amount of available data. This was no doubt due not only to the consortium effort but also data made available by EU funded projects and other ad-hoc providers.</p> <p>When looking at the quarterly reports, it is possible to understand that the EMODnet Biology data publication is not reflected in ever increasing number of records, this is due to the nature of the data sharing licenses and data provider requirements and also due to the fact that, when updating datasets, providers might have better quality information which leads to a reorganisation of the previously submitted data and occasional removal of records. In fact throughout the Phase, requests were received to remove/replace datasets and those were usually accompanied by a decrease in the number of available data. Despite the constraints encountered by the providers are the Biology consortium, the overall number of available records has increased significantly, exceeding the 15% threshold imposed by the contracting authority. Further information is included in the narrative document.</p> <p>The distribution of the data across the different geographic regions is not homogenous, something that was previously identified but has been consistent for basins. The values of 0% actually reflect very small numbers added or available, they do not mean there are no data for those sub-themes/regions. When no data are available for a particular sub-theme/region., the cells are left empty (e.g. the case for Reptiles in the Arctic or the Baltic Sea. The Caribbean data are not shown in columns P and Q as these data are grouped in the Atlantic</p>

Comments on the progress indicators in the indicators spreadsheet		
Progress indicator	Means of collecting figures	Comment
		region, an approach that has been consistent since reporting in this region started in the previous Phase.
What is your opinion on the data coverage within EMODnet for your thematic?		The approach to the data gaps (Arctic, Black Sea and Mediterranean) has not changed from what was reported previously. The majority of data originating from these regions are submitted by consortium members. Other mechanisms to encourage data providers from the Black and Mediterranean Seas to submit data were pursued, as an example through the DTO-BioFlow project data grants or data training workshops targeting data providers from these regions. This work will continue during the extension period
B) Usage of data since the start of the project phase		The systems to capture this information are not yet operational, nor do they provide a correct representation of the usage of data throughout the reporting period, as collection has started only in mid-March 2025, therefore a decision was made to not include the existing information in this report
2. Current status and coverage of total number of data products A) Volume and coverage of available data products	In house tools	<p>9 internal products were created and 7 external products were published during the Phase V, adding up to an additional 16 products available in the EMODnet catalogue and 11 in the EMODnet viewer. The geographic coverage was quite heterogenous, with some products covering the world and others presenting a regional, European basin coverage.</p> <p>The product coverage table includes information on the number of products that fully or partially cover each Sea Basin, a few products are not included in this table as the information they contain does not fit in any of the sub-themes used for reporting, e.g the mixoplankton product developed in 2021 and also all those with 'NA' in column A of Table 2.A.</p> <p>In Phase V, no products were developed or published for the Angiosperms, Mammals and Phytoplankton sub-themes. There is also a clear discrepancy in the geographic coverage, with more products covering, for example the Atlantic and North Seas and fewer covering the Arctic or the Black Seas,</p>

Comments on the progress indicators in the indicators spreadsheet		
Progress indicator	Means of collecting figures	Comment
		something that is mainly due to availability of data in different basins and the expert advice from WP3 that any products built for the areas/sub-themes where not much data are available would not be scientifically relevant or adequate for most uses.
B) Usage of data products since the start of the project phase		The systems to capture this information are not yet operational, nor do they provide a correct representation of the usage of data throughout the reporting period, as collection has started only in mid-March 2025, therefore a decision was made to not include the existing information in this report
3. Internal and external organisations supplying/approached to supply data and data products since start of the project phase	In house tools	Various organisations provided new or updates to existing datasets and covered not only EMODnet Biology consortium organisations, but data submitted via EMODnet Ingestion as well as via the EU funded project DTO-BioFlow and also OBIS SEAMAP and GBIF. The data covered all European Seas and all functional groups. Most data were supplied through web services and with various licenses. Some providers represent repositories, data originators are varied
4. Online 'Web' interfaces to access or view data		There was no change since the last reporting period
5.1. Daily number of page views of EMODnet Thematic entry page since the start of the contract	Europa Analytics	There isn't a clear trend in the number of page views during the reporting period, other than the seasonal decrease during August and December possibly due to the holiday period.
5.2. Total number of visitors, page views, unique page views and percentage of returning visitors, since the start of the contract	Europa Analytics	The comparison between January 2023 and May 2024 denotes an increase in the visitors and unique page views trend and a decrease in the page views and % of returning visitors.

The monitoring numbers reported as part of the progress monitoring of EMODnet performance are collected through Matomo and/or Europa Analytics, unless reported otherwise.

10 Recommendations for follow-up actions by the EU

- The requirement to have at least a 15% increase in data publication might prove difficult to achieve in the future. This is because we occasionally receive requests to unpublish data or because the 15% increase is always based on the total occurrences, meaning that the amount needed is also increasing with time.
- EMODnet Biology has been providing training for data providers for many years. Although our actions are well received and ensure support to data providers and also capacity building, it would be good to see that the EU encourages this type of activity by providing specific financial resources to it. This would allow for a broader plan and concerted action between Biology and other thematic lots focusing on data deficient areas or providers from specific sectors.
- During the Data training workshop for non-EU Mediterranean organisations, an activity that was not included in the original workplan, it was clear that there is a willingness for colleagues within certain countries to have support and connections with EMODnet. We would like to request that the EU considers a target activity between EMODnet and the non-EU countries bordering the Mediterranean basin so we could all work collaboratively in making data available for this sea basin.
- The involvement of Regional Sea Conventions (RSCs) in EMODnet activities presents a mix of strengths, weaknesses, opportunities, and threats that we would like the EU to take into consideration. Strengths include a progressively better awareness of EMODnet among RSCs and the existence of consolidated connections with some of them. These provide a strong foundation for deeper collaboration. Additionally, the forthcoming EMODnet Open Conference offers a valuable opportunity to strengthen engagement and visibility. However, several weaknesses need to be addressed. Participation in surveys by RSCs remains low, and follow-up activities after the initial contact are often limited. Furthermore, the specific needs of the RSCs are not clearly defined, and there is a general lack of clarity about what EMODnet can offer them. Among the key threats is the frequent turnover of contact persons within RSCs, which necessitates rebuilding relationships and establishing communication from the beginning. Moreover, limited resources and/or commitment on the side of the RSCs may hinder effective long-term collaboration. Addressing these issues proactively will be essential to ensuring the successful and sustained involvement of RSCs in EMODnet's future developments.

11 Annex: Other documentation attached

Task 1: Maintain and improve a common method of access to data held in repositories

The table below includes a summary of all Phase V datasets published via EMODnet Biology, including the dataset title, license and whether it was a new or an update to an existing dataset.

Dataset	License	New/Update
Pola Expedition: Mollusks, in the Eastern Mediterranean and the Adriatic Sea, 1890-1894	Attribution (CC BY)	New
1975 University of London Kent Ficopomatus enigmaticus collections	Attribution (CC BY)	New
1999-2001 University Marine Biological Station Millport (UMBSM) Clyde Sea Rapid Methodologies Survey	Attribution (CC BY)	New
2011 RIVIERPRIK - Acoustic telemetry data for river lamprey (Lampetra fluviatilis) in the upper Scheldt river (Belgium)	CC 0 (No Rights Reserved)	New
2012 LEOPOLDKANAAL - Acoustic telemetry data for European eel (Anguilla anguilla) in a polder area in Flanders (Belgium)	CC 0 (No Rights Reserved)	New
2013 ALBERTKANAAL - Acoustic telemetry data for European eel (Anguilla anguilla) and hatched Salmon (Salmo salar) in the Albert canal (Belgium)	CC 0 (No Rights Reserved)	New
2014 Marine Biological Association (MBA) Yealm River non-native species timed search	Attribution (CC BY)	New
2014 Marine Biological Association of the UK (MBA) Noss Mayo Yealm Estuary Transect Survey of Crassostrea gigas	Attribution (CC BY)	New
2014 DEMER - Acoustic telemetry data for four fish species in the Demer river (Belgium)	CC 0 (No Rights Reserved)	New
2015 Marine Biological Association of the UK (MBA) Wembury South Devon Introduction to Seaweeds course sightings	Attribution (CC BY)	New
2015 Scottish Environment Protection Agency (SEPA) Eden Estuary Intertidal Seagrass Survey	Attribution (CC BY)	New
2015 DIJLE - Acoustic telemetry data for five fish species in the Dijle river (Belgium)	CC 0 (No Rights Reserved)	New
Abundance and Distribution of Temora turbinata and Temora stylifera in Mochima National Park, Venezuela	Attribution-NonCommercial (CC BY-NC)	Update
Abundance data of large microzooplankton collected during the ABRACOS 1 and 2 surveys performed along the northeast Brazilian continental shelf, slope and open ocean	Attribution (CC BY)	New
Abundance data of planktonic cnidarians collected during the Camadas Finas III survey performed along the North Brazilian continental shelf and open ocean	Attribution (CC BY)	New
Abundance of young mullet Mugil liza Valenciennes, 1836 in the surf zone along the southern coast of Brazil	Attribution-NonCommercial (CC BY-NC)	Update

Dataset	License	New/Update
Acoustic detections from research cruises in the Med sea, 1994-2001	Attribution (CC BY)	Update
Acoustic detections in Northeast and South Atlantic	Attribution-NonCommercial (CC BY-NC)	New
Acoustic telemetry data for Atlantic cod (<i>Gadus morhua</i>) in the C-Power wind farm in the southern North Sea (Belgium)	Attribution (CC BY)	New
Acoustic telemetry data for Atlantic cod (<i>Gadus morhua</i>) in the Scheldt estuary and southern North Sea (Belgium)	CC 0 (No Rights Reserved)	New
Acoustic telemetry data for European eel (<i>Anguilla anguilla</i>) in the Scheldt estuary and southern North Sea (Belgium)	CC 0 (No Rights Reserved)	New
Aegean Polychaetes	Attribution (CC BY)	Update
Aerial sightings of beluga in the Russian Arctic seas 2010	Attribution (CC BY)	New
Albunea paretii	Attribution-NonCommercial (CC BY-NC)	New
Amphipod distribution data from the North Atlantic and Arctic waters compiled from literature records published in 1931-2018	Attribution (CC BY)	Update
Andalusia, Spain. Small loggerheads from a nest at Pulpi (Almería)	Attribution-NonCommercial (CC BY-NC)	Update
ARMS-MBON data on long-term monitoring of hard-bottom communities: 18S results from 2018-2020	Attribution (CC BY)	New
ARMS-MBON data on long-term monitoring of hard-bottom communities: COI results from 2018-2020	Attribution (CC BY)	New
ARMS-MBON data on long-term monitoring of hard-bottom communities: ITS results from 2018-2020	Attribution (CC BY)	New
Baltic international trawl surveys	Attribution (CC BY)	Update
Belgian recreational fisheries monitoring	Attribution (CC BY)	Update
Benthic intertidal BRUVs in Galway Bay	CC 0 (No Rights Reserved)	New
Benthos Grevelingen 1960-2004	CC 0 (No Rights Reserved)	New
Benthos Oosterschelde 1959-2015	CC 0 (No Rights Reserved)	Update
Benthos Westerschelde 1963-2012	CC 0 (No Rights Reserved)	Update
Biodiversity data from rocky intertidal zones, surveyed from Scotland to Morocco in 2022 and 2023	Attribution (CC BY)	New
Biodiversity of the upper-mesophotic octocoral habitats at Sporades Archipelago (Aegean Sea)	Attribution (CC BY)	New
BIOMAERL.Maerl Biodiversity.Functional Structure And Antropogenic Impacts (1996-1998).	Attribution (CC BY)	Update
Bird observations at Borsele off shore wind farm	Attribution (CC BY)	New
BLM CETAP OPP Sightings	Attribution-NonCommercial (CC BY-NC)	Update

Dataset	License	New/Update
Bottom fishing impacts 2017-2018	CC 0 (No Rights Reserved)	New
CAN-MAR: DATRAS Canadian Maritimes Trawl Survey	Licence	New
Canary Islands	Attribution-NonCommercial (CC BY-NC)	Update
CARESAT (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	Update
Casale Project (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
CeNoBS: Birds sightings in the Black Sea recorded by CeNoBS Aerial Expedition in 2019	Attribution-ShareAlike (CC BY-SA)	New
Cetacean sightings of PELACUS surveys: Continental shelf of Galicia and Bay of Biscay - Database of the Spanish Institute of Oceanography (IEO-CSIC)	Attribution-NonCommercial (CC BY-NC)	New
Cetacean sightings in North Sea	Attribution-NonCommercial (CC BY-NC)	New
CHALIST survey catch data: Benthic-demersal assemblages of the Gulf of Lion (North-western Mediterranean) from 1983 to 1992	Attribution (CC BY)	New
Circalittoral faunal turf occurrences on the Azores shelves (central north Atlantic) from 2005 to 2018	Attribution-NonCommercial-NoDerivatives (CC BY-NC-ND)	Update
Citizen Science based jellyfish observations along the Israeli Mediterranean coast in 2011-2024	Attribution (CC BY)	New
CODA cetacean sightings on primary platform of vessel surveys 2007	Attribution-NonCommercial (CC BY-NC)	Update
CODA cetacean sightings on tracker platform of vessel surveys 2007	Attribution-NonCommercial (CC BY-NC)	Update
Conservación y preservación de tortugas marinas	Attribution-NonCommercial (CC BY-NC)	Update
Counts of seabirds, marine mammals and other megafauna during POLARSTERN cruise ANT-XXIX/1	Attribution (CC BY)	New
Counts of seabirds, marine mammals and other megafauna during POLARSTERN cruise ANT-XXVIII/1	Attribution (CC BY)	New
Counts of seabirds, marine mammals and other megafauna during POLARSTERN cruise ANT-XXVIII/5	Attribution (CC BY)	New
Counts of seabirds, marine mammals and other megafauna during POLARSTERN cruise PS83 (ANT-XXIX/10)	Attribution (CC BY)	New

Dataset	License	New/Update
Cover of intertidal macroalgae along the N and NW coast of the Iberian Peninsula in 2011	Attribution-NonCommercial (CC BY-NC)	Update
CURLEW VLAANDEREN - Eurasian curlews (<i>Numenius arquata</i>, Scolopacidae) breeding in Flanders (Belgium) [subsamped representation]	CC 0 (No Rights Reserved)	Update
Cyprus 2018 (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Danish benthic marine monitoring data from ODAM	Attribution (CC BY)	Update
Dataset from <i>Zostera noltei</i> stationary monitoring in French coastal waters (Atlantic) since 2011	Attribution-NonCommercial (CC BY-NC)	Update
DATRAS: ICES Database of trawl surveys, survey: DWS	Licence	Update
DATRAS: ICES Database of trawl surveys, survey: SP-PORC	Attribution (CC BY)	Update
DATRAS: ICES Database of trawl surveys, survey: SCOWCGFS	Licence	Update
Decapod larvae off Portuguese southern coast, August 2010	Attribution-NonCommercial (CC BY-NC)	New
Dolphins validated sightings reported in the Mediterranean Sea from 2019 onwards by avvistAPP users	Attribution-NonCommercial (CC BY-NC)	Update
Dutch long term monitoring of phytoplankton in the Dutch Continental Economical Zone of the North Sea (2000-2018)	CC 0 (No Rights Reserved)	Update
Edward Forbes. Report on the Mollusca and Radiata of the Aegean Sea, and on their distribution, considered as bearing on Geology. 13th Meeting of the British Association for the Advancement of Science, London, 1844.	CC 0 (No Rights Reserved)	Update
Epibenthos and demersal fish monitoring at long-term monitoring stations in the Belgian part of the North Sea	Attribution (CC BY)	Update
Epibenthos and demersal fish monitoring in function of aggregate extraction in the Belgian part of the North Sea	Attribution (CC BY)	Update
Epibenthos and demersal fish monitoring in function of dredge disposal monitoring in the Belgian part of the North Sea	Attribution (CC BY)	Update
Epibenthos and demersal fish monitoring in function of wind energy development	Attribution (CC BY)	Update
European Seabirds At Sea (ESAS)	Attribution (CC BY)	Update
Events with orcas - AnavNet	Attribution (CC BY)	New
Expedition of Melita 1892, Molluscs collected on the coasts of Tunisia and Algeria	Attribution (CC BY)	New
Explore Your Shore	Attribution (CC BY)	Update
FAMOSO Zooplankton	Attribution (CC BY)	New
Finnish Baltic Sea benthic monitoring, POHJE database	Attribution (CC BY)	Update

Dataset	License	New/Update
Finnish Baltic Sea phytoplankton monitoring, KPLANK database	Attribution (CC BY)	Update
Finnish Baltic Sea zooplankton monitoring	Attribution (CC BY)	Update
Finnish macrophyte monitoring data	Attribution (CC BY)	Update
Fishery survey in 1949 in the Tunisia (South-West Mediterranean)	Attribution (CC BY)	New
Fondazione Cetacea	Attribution-NonCommercial (CC BY-NC)	Update
Frisian Front 2017	CC 0 (No Rights Reserved)	New
Gelatinous zooplankton validated sightings reported in the Mediterranean Sea from 2019 onwards by avvistAPP users	Attribution-NonCommercial (CC BY-NC)	Update
Georgia Aquarium/DomSeTCO Leatherback's of Dominica (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	Update
Green Balkans Cetacean monitoring surveys in the Bulgarian Black Sea waters	Attribution (CC BY)	New
Green Balkans cetacean strandings on the Bulgarian Black Sea coast	Attribution-NonCommercial (CC BY-NC)	Update
Green Turtles in Syria (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Green turtles in the Canary Islands	Attribution-NonCommercial (CC BY-NC)	Update
Grey seals ARGOS telemetry in Molene Archipelago	Attribution-NonCommercial (CC BY-NC)	Update
Grey seals GPS telemetry in Baie de Somme	Attribution-NonCommercial (CC BY-NC)	Update
Grey seals GPS telemetry in Molene Archipelago	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Atlantic gray seal in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Atlantic spotted dolphin in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Atlantic white-sided dolphin in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New

Dataset	License	New/Update
Happywhale - Bearded seal in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Bearded seal in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Beluga in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Blue whale in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Bowhead in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Bowhead in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Common bottlenose dolphin in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Common bottlenose dolphin in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Common minke whale in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Common minke whale in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Cuvier's beaked whale in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - False killer whale in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Fin whale in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Fin whale in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Harbor porpoise in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New

Dataset	License	New/Update
Happywhale - Harbor porpoise in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Harbor seal in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Harbor seal in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Humpback whale in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Indian humpback dolphin in Indian Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Killer whale in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Long-finned pilot whale in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Long-finned pilot whale in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Northern bottlenose whale in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Northern bottlenose whale in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Polar bear in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Polar bear in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Pygmy killer whale in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Ringed Seal in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Ringed Seal in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New

Dataset	License	New/Update
Happywhale - Risso's dolphin in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Rough-toothed dolphin in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Sea otter in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Sei whale in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Sei whale in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Short-beaked common dolphin in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Short-finned pilot whale in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Sowerby's beaked whale in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Sperm whale in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Striped dolphin in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Walrus in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - Walrus in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - White-beaked dolphin in Arctic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Happywhale - White-beaked dolphin in North Atlantic Ocean	Attribution-NonCommercial (CC BY-NC)	New
Harbour seals GPS telemetry in Baie de Somme	Attribution-NonCommercial (CC BY-NC)	New

Dataset	License	New/Update
Harbour seals GPS telemetry in Baie des Veys	Attribution-NonCommercial (CC BY-NC)	New
Harbour seals GPS telemetry in Baie du Mont Saint-Michel	Attribution-NonCommercial (CC BY-NC)	New
HELCOM/OSPAR Finland ports water sampling	CC 0 (No Rights Reserved)	New
HELCOM/OSPAR Sweden ports water sampling	CC 0 (No Rights Reserved)	New
HELCOM/OSPAR UK ports water sampling	CC 0 (No Rights Reserved)	New
HG OOSTENDE - Herring gulls (<i>Larus argentatus</i>, Laridae) breeding at the southern North Sea coast (Belgium) [subsamped representation]	CC 0 (No Rights Reserved)	Update
Historical occurrence of whales in Scottish Waters inferred from whaling records	Attribution-NonCommercial (CC BY-NC)	New
ICES Biodiversity - Cetaceans (JCDP)	Attribution (CC BY)	New
ICES Eggs and Larvae	Attribution (CC BY)	New
ICES Fish predator/prey data	Attribution (CC BY)	Update
ICES historical plankton dataset	Attribution (CC BY)	Update
ICES Vulnerable Marine Ecosystems	Attribution (CC BY)	Update
IE-IAMS: DATRAS Irish Anglerfish and Megrim Survey	Licence	New
IFCB Utö 2021 JERICO-RI Gulf of Finland Pilot Supersite	Attribution (CC BY)	Update
IMR Occurrences of fish from research and rental vessels 2000-2023	Attribution (CC BY)	New
Irish ground fish survey	Attribution (CC BY)	Update
Islas Canarias (Proyecto Aegina): juvenile loggerheads	Attribution-NonCommercial (CC BY-NC)	Update
Isle of Lewis Benthic Ecology Drop-down Video Survey - Envision (2011)	Attribution (CC BY)	New
Israel Sea Turtle Tracking Project 2008: Loggerhead & Green Turtles (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Israel's sea turtle monitoring program	Attribution-NonCommercial (CC BY-NC)	Update
JNCC/Cefas Barmade Bank MCZ Verification survey (CEND0412) - Seabed Still Analyses	Attribution (CC BY)	New
Kenya Marine and Fisheries Research Institute - Marine Species	Attribution (CC BY)	Update
KMFRI literature records	Attribution (CC BY)	Update
Kongsfjorden/Spitsbergen - soft bottom fauna	Attribution-NonCommercial (CC BY-NC)	Update

Dataset	License	New/Update
Koster historical biodiversity assessment	Attribution (CC BY)	New
KYMA boat-based surveys in Thyrrhenian Sea and Ionian Sea	Attribution-NonCommercial (CC BY-NC)	New
LBBG ADULT - Lesser black-backed gulls (Larus fuscus, Laridae) breeding in Belgium	CC 0 (No Rights Reserved)	New
LBBG JUVENILE - Juvenile lesser black-backed gulls (Larus fuscus, Laridae) hatched in Zeebrugge (Belgium) [subsamped representation]	CC 0 (No Rights Reserved)	Update
LBBG ZEEBRUGGE - Lesser black-backed gulls (Larus fuscus, Laridae) breeding at the southern North Sea coast (Belgium and the Netherlands) [subsamped representation]	CC 0 (No Rights Reserved)	Update
LifeWatch observatory data: Permanent Cetacean passive acoustic sensor network in the Belgian Part of the North Sea	Attribution (CC BY)	Update
LifeWatch observatory data: phytoplankton observations by imaging flow cytometry (FlowCam) in the Belgian Part of the North Sea	Attribution (CC BY)	Update
LifeWatch observatory data: zooplankton observations in the Belgian Part of the North Sea	Attribution (CC BY)	Update
List of marine species observed during diving in Monastir area, Tunisia, 2023	Attribution (CC BY)	New
Littoral Monitoring Network of Cantabria (Fishes)	Attribution (CC BY)	New
Littoral Monitoring Network of Cantabria (Invertebrates)	Attribution-NonCommercial (CC BY-NC)	Update
Loggerhead satellite tracking data from Rethymno, Crete, Greece	Attribution-NonCommercial (CC BY-NC)	New
Loggerheads in the Tyrrhenian Sea (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Long-Distance Movement of a Sei Whale in the North Atlantic, 2005	Attribution (CC BY)	New
Long-term cetacean monitoring in the Azores based on whale watching observations (2009-2020)	Attribution-ShareAlike (CC BY-SA)	Update
Macro- and megafauna from the North Aegean Sea from 1997-1998	Attribution (CC BY)	Update
Macrobenthos monitoring at long-term monitoring stations in the Belgian part of the North Sea from 2001 on	Attribution (CC BY)	Update
Macrobenthos monitoring in function of aggregate extraction activities in the Belgian part of the North Sea	Attribution (CC BY)	Update
Macrobenthos monitoring in function of dredge disposal monitoring in the Belgian part of the North Sea	Attribution (CC BY)	Update
Macrophytes occurrence data within French Mediterranean Lagoon since 2006	Attribution (CC BY)	Update

Dataset	License	New/Update
Macrozoobenthos-North Adriatic-Gulf of Trieste, C1-LTER time-series 2014-2018	Attribution-NonCommercial (CC BY-NC)	New
Manx Basking Shark Watch 2017-2018 (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
MAREANO - Base-line mapping of epifauna obtained with Beamtrawl	Attribution (CC BY)	Update
MAREANO - Base-line mapping of fauna obtained with grab	Attribution (CC BY)	Update
MAREANO - Base-line mapping of hyperbenthic crustacea fauna obtained with RP-sledge	Attribution (CC BY)	Update
Marine benthic-pelagic fauna and flora of Blue Flag coasts in northern Crete	Attribution (CC BY)	Update
Marine impactful cryptogenic and alien species in the Greek Seas: A georeferenced dataset (1893-2020)	Attribution (CC BY)	New
MEDGULL ANTWERPEN - Mediterranean gulls (Ichthyaeus melanocephalus, Laridae) breeding near Antwerp (Belgium) [subsamped representation]	CC 0 (No Rights Reserved)	Update
Microzooplankton-North Adriatic-Gulf of Trieste, C1-LTER time-series 1986-1990	Attribution-NonCommercial (CC BY-NC)	New
Microzooplankton-North Adriatic-Gulf of Trieste, C1-LTER time-series 1998-2010	Attribution-NonCommercial (CC BY-NC)	New
Migration and foraging ecology of Greater Shearwater (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
MILZON - BENTHOS	CC 0 (No Rights Reserved)	New
Mollusca fauna from the Mediterranean reef ecosystem (1170 habitat)	CC 0 (No Rights Reserved)	Update
Monitoring data of Posidonia oceanica meadows along the French Mediterranean coasts since 2007	Attribution (CC BY)	Update
Movements and distribution of loggerheads from Amvrakikos Gulf, Greece 2013 (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Network Monitoring phytoplankton	Attribution (CC BY)	Update
NICO 10 campaign 2018	CC 0 (No Rights Reserved)	New
North Cyprus 2015 - Green Turtles	Attribution-NonCommercial (CC BY-NC)	Update
North Cyprus 2017 (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New

Dataset	License	New/Update
Northern Cyprus 2004: Loggerhead & Green Turtles (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Northern Cyprus 2005: Loggerhead Turtles (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Northern Cyprus 2006-08: Loggerhead Turtles (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Northern Cyprus 2009 (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Northern Cyprus 2010 (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Northern Cyprus 2012 (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Northern Elephant Seals Post-Breeding 2016	Attribution-NonCommercial (CC BY-NC)	Update
Northern Elephant Seals Post-Molting 2016	Attribution-NonCommercial (CC BY-NC)	Update
NSSS: DATRAS North Sea Sandeel Survey	Licence	New
O AMELAND - Eurasian oystercatchers (Haematopus ostralegus, Haematopodidae) breeding on Ameland (the Netherlands) [subsamped representation]	CC 0 (No Rights Reserved)	Update
O ASSEN - Eurasian oystercatchers (Haematopus ostralegus, Haematopodidae) breeding in Assen (the Netherlands) [subsamped representation]	CC 0 (No Rights Reserved)	Update
O BALGZAND - Eurasian oystercatchers (Haematopus ostralegus, Haematopodidae) wintering on Balgzand (the Netherlands) [subsamped representation]	CC 0 (No Rights Reserved)	Update
O SCHIERMONNIKOOG - Eurasian oystercatchers (Haematopus ostralegus, Haematopodidae) breeding on Schiermonnikoog (the Netherlands) [subsamped representation]	CC 0 (No Rights Reserved)	Update
O VLIELAND - Eurasian oystercatchers (Haematopus ostralegus, Haematopodidae) breeding and wintering on Vlieland (the Netherlands) [subsamped representation]	CC 0 (No Rights Reserved)	Update
O WESTERSCHELDE - Eurasian oystercatchers (Haematopus ostralegus, Haematopodidae) breeding in East Flanders (Belgium) [subsamped representation]	CC 0 (No Rights Reserved)	Update

Dataset	License	New/Update
Observatoire Pelagis - Réseau National Echouage (French stranding network) strandings 1934-2015	Attribution-NonCommercial (CC BY-NC)	Update
OceanCare cetacean sightings in Sicily, Italy 2016-2019	Attribution-NonCommercial (CC BY-NC)	New
On the Radiata of the Eastern Mediterranean. Part I. Ophiuridae, by Edward Forbes	CC 0 (No Rights Reserved)	Update
Opportunistic macroalgae blooms (green tides) monitoring along the North and Atlantic French coasts since 2008	Attribution (CC BY)	Update
Phytoplankton abundance and composition and physico-chemical parameters in the Ebro delta embayments (Alfacs Bay and Fangar Bay, North Western Mediterranean) during 1990-2019.	Attribution-NonCommercial (CC BY-NC)	Update
Phytoplankton and environmental data at the LTER "MareChiara" site (Gulf of Naples, Mediterranean Sea) 1995-2015	Attribution-NonCommercial (CC BY-NC)	New
Phytoplankton North Adriatic-Gulf of Trieste C1 – LTER time-series from 2010 onwards	Attribution-NonCommercial (CC BY-NC)	Update
Phytoplankton variability on the Portuguese coast	Attribution-NonCommercial (CC BY-NC)	New
Phytoplankton, National Pilot Monitoring Studies Phyllophora July 2017, EMBLAS II Project	CC 0 (No Rights Reserved)	Update
Plankton community in Bongo net, MOOSE-GE cruises, North-Western Mediterranean Sea	Attribution (CC BY)	Update
Plankton community in Juday-Bogorov (330µm) net, Point B, Villefranche-sur-Mer, France	Attribution (CC BY)	Update
Plankton community in Régent (680µm) net, Point B, Villefranche-sur-Mer, France	Attribution (CC BY)	Update
Plankton community in WP2 net (200µm), DYFAMED point, Ligurian Sea, France	Attribution (CC BY)	Update
Plankton community in WP2 net (200µm), PNMIR cruises, Parc Naturel Marin d'Iroise, France	Attribution (CC BY)	Update
Plankton community in WP2 net (200µm), Point B, Villefranche-sur-Mer, France	Attribution (CC BY)	Update
Plankton Diversity Along the Portuguese Coast in the 1970s	Attribution-NonCommercial (CC BY-NC)	New
Polychaeta distribution data from: Deep-sea fauna of European seas - an annotated species check-list of benthic invertebrates living deeper than 2000 m in the seas bordering Europe	Attribution (CC BY)	Update
Polychaetes from major ports in Greece in 2020-2021	Attribution (CC BY)	Update

Dataset	License	New/Update
PONTUS-BIOFAC Black sea bottlenose dolphin sightings	Attribution (CC BY)	New
Population estimate and distribution pattern of Indian Ocean humpback dolphin in northwestern Persian Gulf	Attribution-NonCommercial (CC BY-NC)	New
Progetto Egadi (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	Update
RADIALES NW Spain Phytoplankton	Attribution (CC BY)	Update
RADIALES NW Spain Zooplankton	Attribution (CC BY)	Update
Records of fish species in coastal lagoons and sea shore that belong to Municipality of Preveza, for the period 2002-2011	Attribution (CC BY)	Update
Red king crab survey data from Finnmark Northern Norway in the period 1994 -2016	Attribution (CC BY)	Update
Rehabilitated loggerhead from southern Italy - 2 (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	Update
Relative abundance of potentially pathogenic bacteria in treated wastewater and coastal water, Adriatic Sea time-series 2019-2020	Attribution-NonCommercial (CC BY-NC)	New
Report on the Danish Oceanographical expeditions 1908-1910 to the Mediterranean and adjacent seas. Vol II Biology. A.8 Lepadogaster By Frederic Guitel (1919)	CC 0 (No Rights Reserved)	Update
Rethymno Nesting Turtle (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Rhodolith occurrences in the Azores (central north Atlantic) between 1998 and 2018	Attribution-NonCommercial-NoDerivatives (CC BY-NC-ND)	Update
Rockall survey ICES Vib	Attribution (CC BY)	Update
Romanian Black Sea Phytoplankton data from 2001 to 2005	Attribution-NonCommercial (CC BY-NC)	New
Romanian Black Sea Zooplankton data from 1981 to 2000	Attribution-NonCommercial (CC BY-NC)	New
Romanian Black Sea Zooplankton data from 2001 to 2010	Attribution-NonCommercial (CC BY-NC)	Update
Romanian Black Sea Zooplankton data from 2011 to 2015	Attribution-NonCommercial (CC BY-NC)	New
Rotterdam Harbour sampling 2nd Maasvlakte	CC 0 (No Rights Reserved)	New

Dataset	License	New/Update
Satellite tracking of rehabilitated juvenile loggerhead, green, and Kemp's ridley turtles in the northeastern USA	Attribution-NonCommercial (CC BY-NC)	New
Satellite-tracking of loggerhead sea turtles tracked from western Mediterranean	CC 0 (No Rights Reserved)	Update
SCOROC: DATRAS Scottish Rockall Groundfish Survey	Licence	New
Sea Turtles of Dominica	Attribution-NonCommercial (CC BY-NC)	Update
Sea Turtles of Dominica	Attribution-NonCommercial (CC BY-NC)	Update
Sea turtles validated sightings reported in the Mediterranean Sea from 2019 onwards by avvistAPP users	Attribution-NonCommercial (CC BY-NC)	Update
Seabirds sightings of PELACUS surveys: Continental shelf of Galicia and Bay of Biscay - Database of the Spanish Institute of Oceanography (IEO-CSIC)	Attribution-NonCommercial (CC BY-NC)	New
Seagrass meadow and macrofauna communities in Southern coast of Algerian Basin (El Mellah Lagoon), 2019	Attribution (CC BY)	New
Seguimiento de 10 crías de tortuga boba nacidas en 2016 en el litoral valenciano, en el marco del Proyecto LIFE 15 IPE ES 012 (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
SHARK - National and regional marine environmental monitoring of Picoplankton in Sweden since 2002	CC 0 (No Rights Reserved)	Update
SHARK - National environmental monitoring of Grey seal in Sweden since 1989	CC 0 (No Rights Reserved)	Update
SHARK - National Epibenthos monitoring in Sweden since 1992	Attribution (CC BY)	Update
SHARK - National marine bacterioplankton monitoring in Sweden since 1989	CC 0 (No Rights Reserved)	Update
SHARK - National marine environmental monitoring of Harbour porpoise in Sweden	CC 0 (No Rights Reserved)	New
SHARK - National marine environmental monitoring of jellyfish in Sweden since 2007	CC 0 (No Rights Reserved)	New
SHARK - National marine environmental monitoring of Seal pathology in Sweden	CC 0 (No Rights Reserved)	New
SHARK - National marine environmental monitoring of zooplankton in Sweden since 1979	CC 0 (No Rights Reserved)	Update
SHARK - National phytoplankton monitoring in Sweden since 1983	CC 0 (No Rights Reserved)	Update
SHARK - Regional monitoring and monitoring projects of Epibenthos in Sweden since 1994	Attribution (CC BY)	Update
SHARK - Regional monitoring, recipient control and monitoring projects of phytoplankton in Sweden since 1985	CC 0 (No Rights Reserved)	Update

Dataset	License	New/Update
Soft-bottom macrozoobenthos from the coastal Bulgarian Black Sea collected in 2022 by IBER-BAS, BRIDGE-BS project	Attribution-NonCommercial (CC BY-NC)	New
SOMLIT-Wimereux (French research infrastructure ILICO) Long Time series in coastal and offshore waters of the eastern English Channel	Attribution (CC BY)	New
Spain-Balearic Is. 2015 Loggerhead Turtles	Attribution-NonCommercial (CC BY-NC)	Update
Spatial and temporal distribution of phytoplankton off the coast of Portugal	Attribution-NonCommercial (CC BY-NC)	New
Spatial distribution of plankton in the Cabo Frio Upwelling System in the South Brazilian Shelf	Attribution (CC BY)	New
SPOONBILL VLAANDEREN - Eurasian spoonbills (Platalea leucorodia, Threskiornithidae) in Flanders (Belgium)	CC 0 (No Rights Reserved)	New
Stationary visual census of commercial fishes in Mayotte (2023)	CC 0 (No Rights Reserved)	New
Status and occurrence of the non-indigenous <i>Mulinia lateralis</i> (Say, 1822) in the central Wadden Sea (southern North Sea)	Attribution (CC BY)	Update
Stellwagen Shearwater Tagging 2018 (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Syllidae (Polychaeta) from the North Mediterranean Coast of Egypt	Attribution (CC BY)	Update
TARTACare Calabria: monitoring and conservation of the loggerhead turtle nesting activity along the Ionian coast of Calabria (Southern Italy) (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Telemetry of loggerhead turtles in Amvrakikos Bay (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Texel sand wave June 2017	CC 0 (No Rights Reserved)	New
Total phytoplankton inventory in the North Sea and the river Scheldt in 1972	Attribution (CC BY)	Update
Total phytoplankton inventory in the Southern Bight of the North Sea between 1973 and 1974	Attribution (CC BY)	Update
Toxic phytoplankton dynamics on the Portuguese Coast	Attribution-NonCommercial (CC BY-NC)	New
Tracking of Arctic tern migrations 2007-2008	Attribution-NonCommercial (CC BY-NC)	Update
Tracking small loggerheads from spanish nests	Attribution-NonCommercial (CC BY-NC)	Update

Dataset	License	New/Update
Tunisian Polychaetes by 2022	Attribution (CC BY)	New
TunSea, 2023. Cryptogenic, Rare and Non-indigenous marine species in Tunisian coastline, recorded by Citizen Scientists	Attribution (CC BY)	New
Type locality distributions from the World Register of Marine Species	Attribution (CC BY)	Update
WWF Italy (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
WWF Italy - Manfredonia (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Zakynthos 2007: Loggerhead Turtles (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Zakynthos Nesting Turtles (aggregated per 1-degree cell)	Attribution-NonCommercial (CC BY-NC)	New
Zooplankton data at the LTER "MareChiara" site (Gulf of Naples, Mediterranean Sea) 1995-2015	Attribution-NonCommercial (CC BY-NC)	New

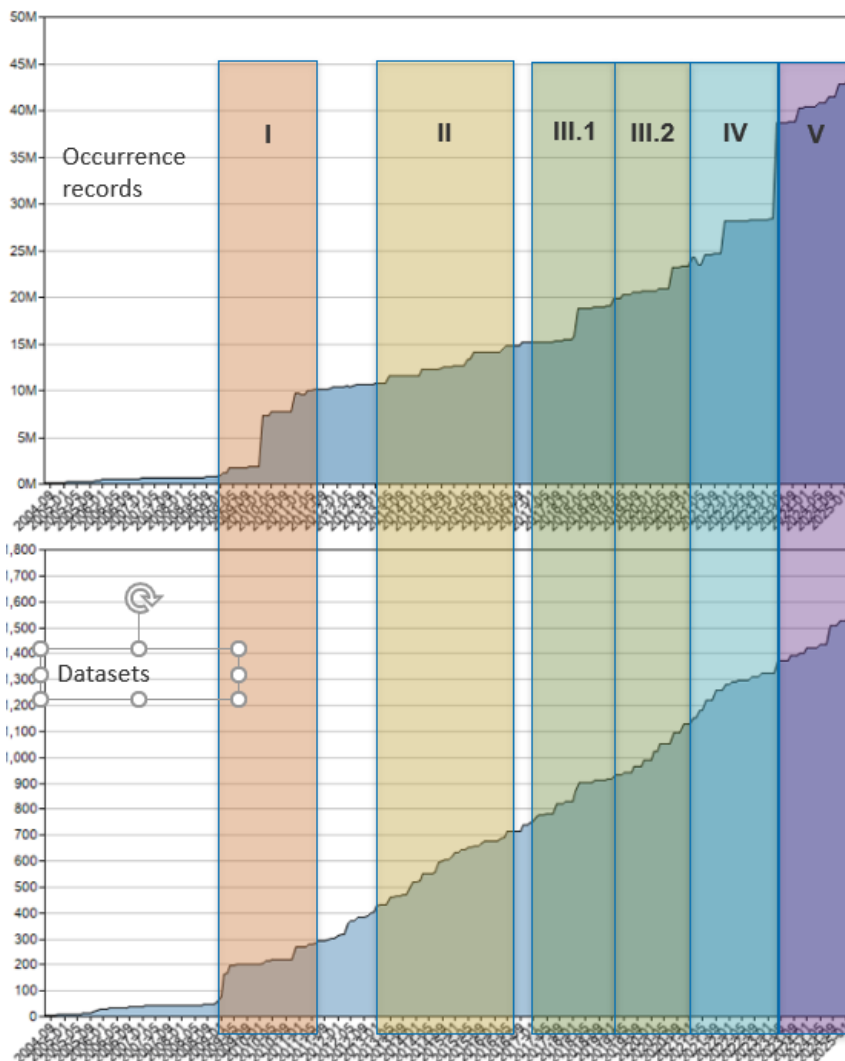


Figure 2: Overview of growth in number of occurrence records (top) and number of datasets (bottom) since the setup of the biodiversity database hosted at VLIZ, with indication of the different EMODnet Biology Phases.

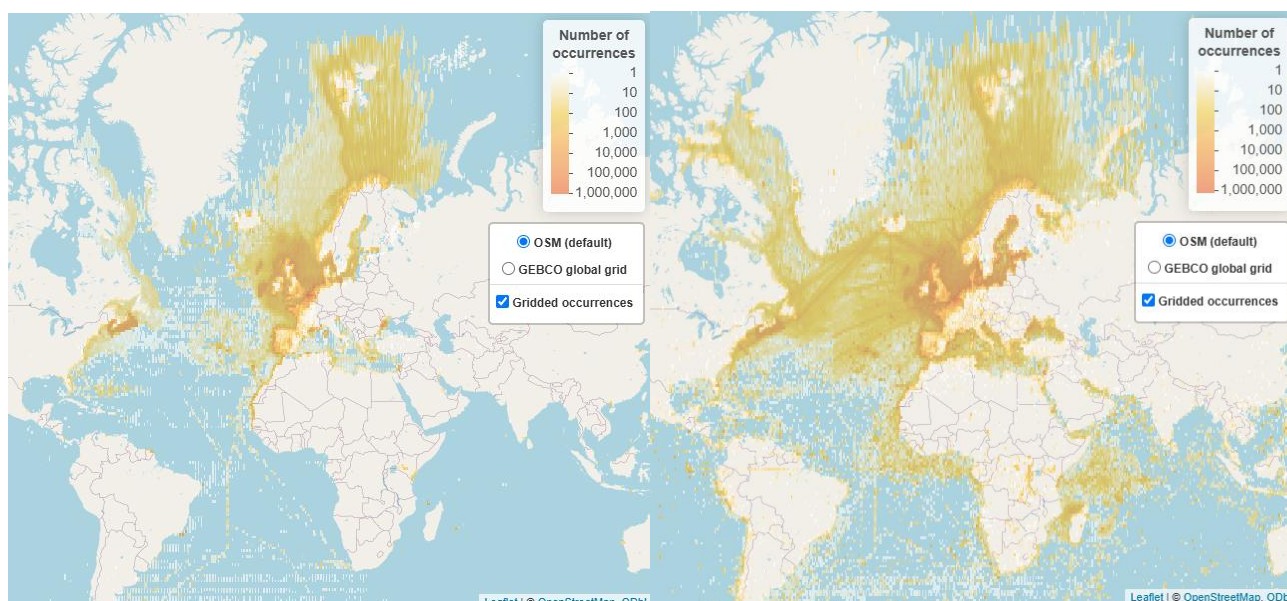
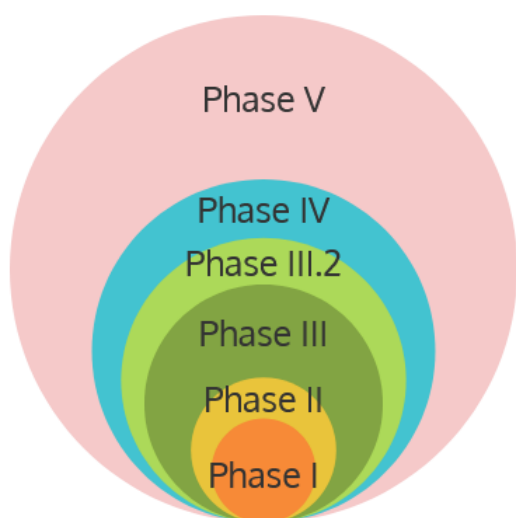


Figure 3: Comparison in available occurrence records from a geographical perspective. Records added during Phase V(left) versus total of records in EMODnet Biology (right).



Phase	% increase in data availability
I	520%
II	37%
III	62%
III.2 (extension period)	19%
IV	20%
V	47%

Figure 4: % increase in data availability since EMODnet Biology’s establishment. The % increase is calculated based on the number of available records at the end of each Phase. The % increase in Phase I was calculated based on the previously available data and that which was published during that Phase.

Task 5. Contributing static content to dedicated spaces in the Central Portal

- Updates to partnership page: <https://emodnet.ec.europa.eu/en/partners-list> (select Biology from the EMODnet Component)

- Updates to the thematic page to reflect the workplan for Phase V: <https://emodnet.ec.europa.eu/en/biology>
- Updated EMODnet Biology connection network with additional information and new partners: <https://emodnet.ec.europa.eu/en/biology#biology-background> (dynamic diagram at the end of the section)
- Updated information in the Key services section: <https://emodnet.ec.europa.eu/en/biology#biology-key-services>
 - QC tool- updated text and added a link to a video tutorial
 - Online course (MOOC)- updated link to the course (new version that now includes information on how to reformat habitat data)
- Updates to the Data and Webservices page: <https://emodnet.ec.europa.eu/en/emodnet-web-service-documentation>
- Published informative material catered to the different Regional Sea Conventions: <https://emodnet.ec.europa.eu/en/biology#Communication>
- New use cases published: https://emodnet.ec.europa.eu/en/use-cases?field_portal_taxonomy_tid=23
- Events added to the calendar: https://emodnet.ec.europa.eu/en/events?field_organised_by_tid=47&field_start_value2_1%5Bvalue%5D%5Byear%5D=

Task 7: Contribute to the implementation of the EU legislation and broader initiatives for open data

The table below lists the engagement with various EU funded projects during the reporting period:

Project	Summary
Biodiversity Meets Data	Member of the External Expert Advisory Board
DTO BioFlow	Guidance and input provided, from the EMODnet Biology perspective, for the DTO Blueprint deliverable, publication of data that was made available through data grants and also from the consortium partners
EuropaBON	Participated in workshops and provided feedback for the Biodiversity Monitoring Coordination Centre deliverable (links to draft version)
iAtlantic	Contacted by Pangaea (project data managers) to provide support with data submission
Iliad	Presented EMODnet Biology and how it connects to the DTO in a Biodiversity focused webinar
Marco Bolo	Member of the Community of Practice group that is meant “to serve as a mechanism to bring generators and users of biodiversity data together to co-design and co-develop anticipated biodiversity tools and services and ensure they are fit for purpose and suit the needs of users.”
NECCTON	Participation in project workshop focused on Biodiversity products and how to improve standardisation across the community

SUMMER	Contacted by Pangaea (project data managers) to provide support with data submission
Marine Biodiversity Monitoring Harmonisation	Contacted by consortium partner to contribute to a stakeholder interview that will be included in a report, participation in both project workshops with other marine experts
Mission Atlantic	Published various products created under this project
OEMC	Provided guidance to data providers and published data funded under the project
ASSEMBLE PLUS	Provided guidance to data providers and published data funded under the project

Task 8: Monitor quality/performance and deal with user feedback

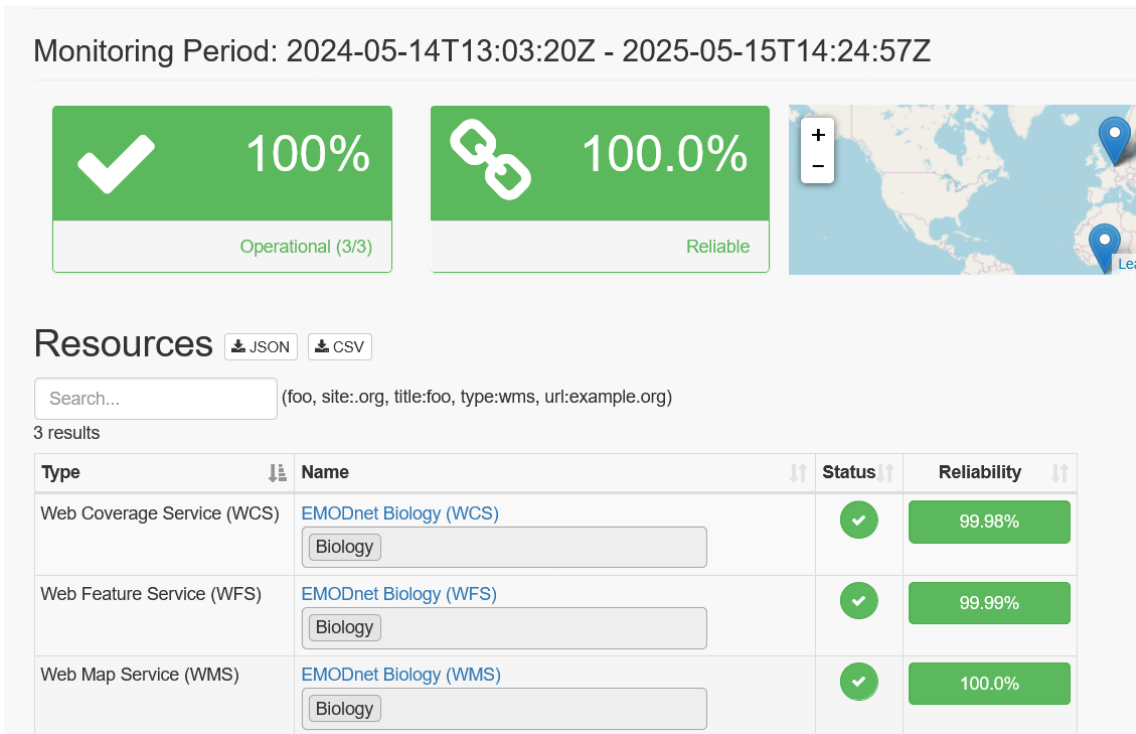


Figure 5: GeoHealthCheck webservices monitoring tool displaying the period from 2024-05-14 to 2025-05-15. Note that the tool does not allow for the selection of the Phase V period

Acronym list

The following list includes all acronyms not defined in the text, presented in the same order as they are found in the document.

HCMR- HELLENIC CENTRE FOR MARINE RESEARCH

CEFAS- Centre for Environment, Fisheries and Aquaculture Science

ILVO- Instituut voor Landbouw-, Visserij- & Voedingsonderzoek (Flanders Research Institute for Agriculture, Fisheries and Food)

IMR- Institute of Marine Research (Havforskningsinstituttet)

INRAE- Institut national de recherche pour l'agriculture, l'alimentation et l'environnement (National Research Institute for Agriculture, Food and Environment)

IPMA- Instituto Português do Mar e da Atmosfera (Portuguese Institute for Sea and Atmosphere)

NIMRD- National Institute for Marine Research and Development “Grigore Antipa” (Institutul Național de Cercetare – Dezvoltare Marină “Grigore Antipa”)

OGS- Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (National Institute of Oceanography and Applied Geophysics)

SMHI- Sveriges meteorologiska och hydrologiska institut (Swedish Meteorological and Hydrological Institute)

SYKE- Suomen ympäristökeskus (Finnish Environment Institute)

UkrSCES- Ukrainian Scientific Center of Ecology of the Sea (Український науковий центр екології моря)

VLIZ- Vlaams Instituut voor de Zee (Flanders Marine Institute)

MBA- Marine Biological Association

IEO- Instituto Español de Oceanografía (Spanish Institute of Oceanography)

IH Cantabria- Instituto de Hidráulica Ambiental Universidad de Cantabria

NIOZ- Koninklijk Nederlands Instituut voor Zeeonderzoek (Royal Netherlands Institute for Sea Research)

ULg- Université de Liège (University of Liège)

ICES- International Council for the Exploration of the Sea

IODE- International Oceanographic Data and Information Exchange

SME- Small and Medium Enterprise

OBIS- Ocean Biodiversity Information System

BODC- British Oceanographic Data Centre

IFREMER- Institut Français de Recherche pour l'Exploitation de la Mer (French Research Institute for Exploitation of the Sea)

CRAN- Comprehensive R Archive Network

GBIF- Global Biodiversity Information Facility

WoRMS- World Register of Marine Species

OTGA- Ocean Teacher Global Academy

EEZ- Economic Exclusive Zone

NetCDF- Network Common Data Format

COARDS- Cooperative Ocean/Atmosphere Research Data Service

OGC- Open Geospatial Consortium

EU- European Union

API- Application Programming Interface

EurOBIS- European node of OBIS

LTS- Long-Term Support

SQL- Structured Query Language

IOLR- Israel Oceanographic and Limnological Research

CNR-ISP- Consiglio Nazionale delle Ricerche Istituto di Scienze Polari (National Research Council Institute of Polar Sciences)

NVS- NERC Vocabulary Server (NERC- Natural Environment Research Council)

SKOS- Simple Knowledge Organization System

IMIS- Integrated Marine Information System

eDNA- Environmental Deoxyribonucleic acid

CSW- Catalogue Service for the Web

FAIR- Findable, Accessible, Interoperable, Reusable

UUID- Universally Unique Identifier

WMS- Web Map Services

WFS- Web Feature Services

Q/A- Question/Answer

CTI- Community Temperature Index

TG DATA- Technical Group DATA

QC- Quality Control

MOOC- massive open online course