

## Supporting the essential - Recommendations for the development of accessible and interoperable marine biological data products

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We outline stakeholder-led approaches in the development of data products based on marine biological observations to support effective conservation, management and policy development.

The European Marine Data and Observation Network (EMODnet) Biology project has undertaken unparalleled activity in the collation and standardisation of marine biological data from all European seas and the wider North East Atlantic region since 2009. EMODnet Biology has collated and standardised in excess of 25 million species observations as of April 2020. Significant efforts have been invested in the adoption and further development of standards, guidelines and best practices for the initial acquisition of biological and biodiversity observations, their curation, and publication. A major focus are strategies to meet future, as yet unknown, challenges.

We showcase and analyse EMODnet Biology efforts in the development of stakeholder-led data products to support conservation, management, and advisory decisions by regulators, industry and policy makers. Following a definition of the term “Data Product”, we explain the steps taken to ensure the resultant products are meeting specific use-cases. These are derived from a range of stakeholder engagement exercises and through a review of the availability and applicability of marine biological data. We outline the process to develop these products and illustrate possible improvements.

The EMODnet Biology Engagement Lifecycle (Fig. 1) summarises the ongoing approach and methodology.

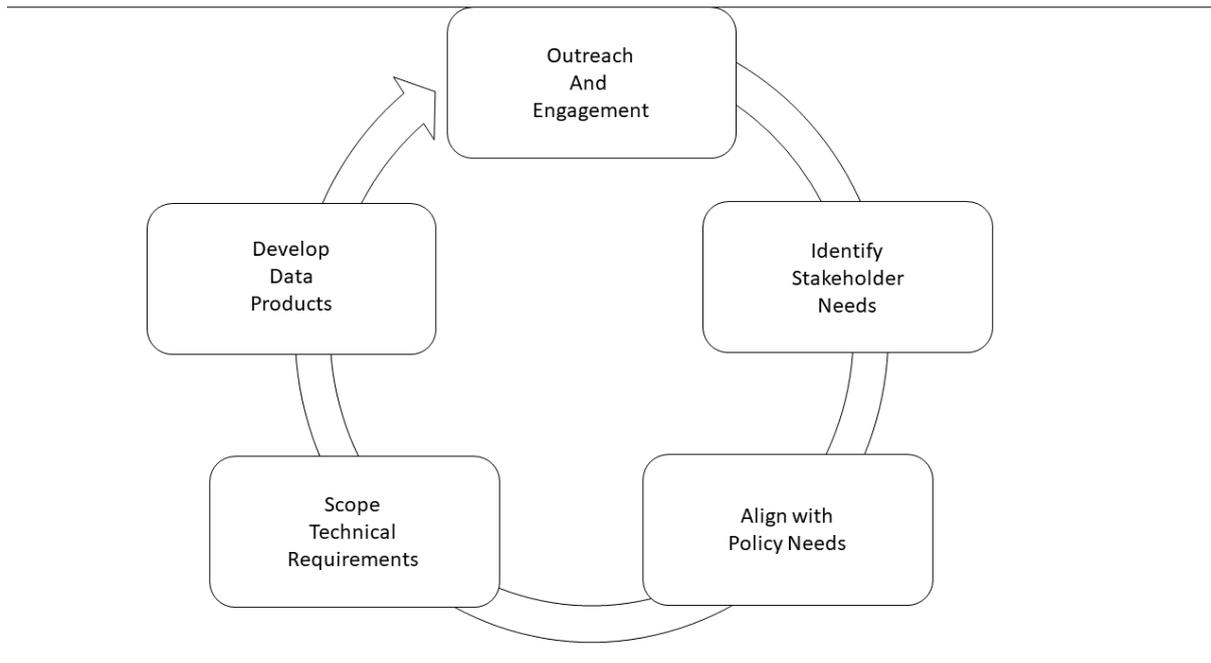


Fig.1 EMODnet biology data product engagement lifecycle

The requirements of a broad range of stakeholders and iterative, structured processes framed the development of tools, models and maps that support the FAIR (Findable, Accessible, Interoperable, Reusable) data principles. The products are also based on open data and are openly distributed. By structuring the resultant data products around the emerging biological Essential Ocean Variables (EOVs) of the Global Ocean Observing System (GOOS), and through the engagement with a broad range of end-users, the EMODnet Biology project has delivered a suite of demonstration data products. These products are presented in the European Atlas of Marine Life, an online resource demonstrating the value of open marine biodiversity data and help to answer fundamental and policy-driven questions related to managing the natural and anthropogenic impacts in European waters. Examples of products available in the Atlas include: Phytoplankton community analysis in the Northern Adriatic, Thermal affinities for European marine Species groups, Neural network modelling of Baltic zooplankton abundances, and two products relating to invasive species in European harbours and specifically within the Baltic Sea.