



DTO-BioFlow

Integration of biodiversity monitoring
data into the Digital Twin Ocean



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**EXPLORE MORE
USE CASES**



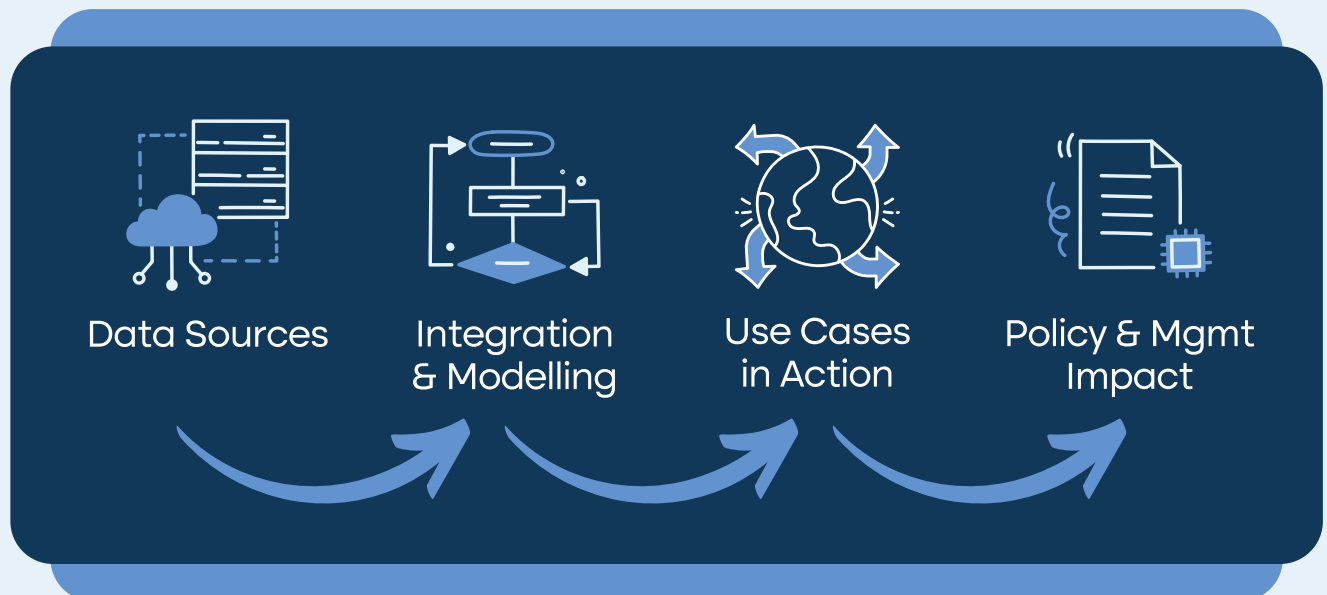
From Data to Decisions: DTO-BioFlow Use Cases

DUC 2 - Assessing the Ecological
Impact of Offshore Infrastructures



Funded by
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From Insight to Impact



The Demonstrator Use Cases (DUCs) are at the heart of the DTO-BioFlow initiative, translating complex scientific capabilities into tangible digital solutions for marine biodiversity monitoring and management.

Designed to showcase the power of an **end-to-end digital approach**, these use cases connect cutting-edge biodiversity observations with AI-enhanced models, analytical tools, and the infrastructure of the Digital Twin of the Ocean (DTO).

Each DUC serves as a living example of how real-world marine challenges can be addressed through integrated digital workflows. They all address a pressing challenge for ocean sustainability and propose an integrated, evidence-based solution.



DUC 2 focuses on the impact from offshore infrastructures.

The expansion of offshore infrastructure (such as wind farms, energy cables, and subsea installations) introduces new pressures on marine biodiversity. This use case explores how these human-made structures affect species movement, connectivity, and behavior, especially for mobile species like fish and marine mammals. The goal is to support **adaptive planning** and **low-impact infrastructure development** by integrating biodiversity knowledge into the early stages of marine spatial planning

Challenge

Offshore infrastructure impacts on marine species are unknown and overlooked in planning.

Without reliable data on species presence, migration, and sensitivity, infrastructure projects risk disrupting key habitats and migration routes—**potentially undermining biodiversity targets.**



Solution

This DUC develops a spatial decision-support tool that combines biologging, acoustic, environmental, and human activity data

It models species movements and habitat use, using Lagrangian simulations to predict interactions with offshore infrastructure, **supporting smarter, biodiversity-aware planning.**

Data and monitoring networks used

Fish telemetry, marine mammal acoustic data, environmental layers, EMODnet, stock data, species distributions.

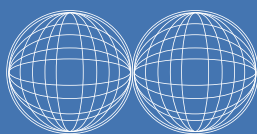


Expected Outputs

A decision support Platform

Optimised marine spatial planning

Data uncertainty assessment



The use case also highlights essential Digital Twin capabilities.

- **Response anticipation:** Predicts how marine species react to offshore infrastructure and activity
- **Spatial intelligence:** Supports biodiversity-informed planning through dynamic ecological modelling
- **Gap analysis:** Identifies missing data and model limitations in species distribution and movement

Useful for

- Marine spatial planners and regulators
- Energy developers and infrastructure operators
- Environmental agencies

Learn more on development and read the publications





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Consortium



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