*Fin whale with calf. Photo Triton Research*

# LIFE Conceptu Maris

**CONservation of CEtaceans and Pelagic sea TUrtles in Med: Managing Actions for their Recovery**

## Layman's report

Final dissemination report on the project

**www.lifeconceptu.eu**

LIFE20 NAT/IT/001371
Co-funded by the European Union

# Table of contents

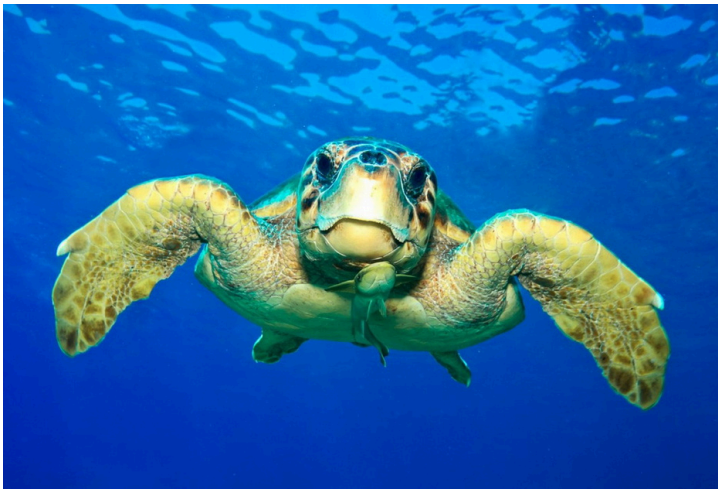


*Cuvier's beaked whale surfacing. Photo CIMA*

# Introduction to the project

**Duration**
10/01/2022 - 09/01/2026

The central and western Mediterranean represents a strategic area for the conservation of cetaceans and sea turtles. The oceanographic complexity of the area – with submarine canyons, wide temperature variations, Atlantic intrusions, and zones of high productivity – creates favourable conditions for the presence of dolphins, whales, and turtles. Unfortunately, the Mediterranean is also one of the seas most affected by human activities: **collisions with ships**, **plastic pollution**, **abandoned fishing nets**, and **climate change** put these animals at serious risk.



*Loggerhead turtle. Canva photo*

Understanding where they live, how they move, and what threats they face is therefore fundamental to protect them. For this reason, in 2021 LIFE Conceptu Maris was created, an international project that brought together **11 Italian**, **Spanish**, and **French partners** with an ambitious objective: to fill knowledge gaps, especially in the open sea, to better identify crucial areas for the life of Mediterranean cetaceans and sea turtles, and to develop concrete tools to protect them.

**Location**
Core area in the southern Tyrrhenian Sea; replication activities in the Adriatic and eastern Ionian, Pelagos Sanctuary, and in the Spanish Cetacean Migration Corridor, north of the Balearic Islands.

*Striped dolphins. Photo Triton Research*

# The objectives



LIFE Conceptu Maris collected new data on the distribution of large cetaceans and sea turtles in the Mediterranean, with particular attention to **offshore areas**. These animals spend much of their lives far from the coast, in environments difficult to explore, and the vastness of their habitat makes monitoring activities complex.
To obtain new data, LIFE Conceptu Maris introduced an innovative approach, transforming **commercial ferries** of several companies (*Grimaldi Lines, Minoan Lines, Corsica & Sardinia Ferries, Tirrenia, Balearia, Grandi Navi Veloci*) into **true research platforms**, combining traditional methods, such as visual monitoring, with cutting-edge technologies, to achieve a more complete and updated picture.

The project focuses on **eight species of cetaceans** and **three species of sea turtles**:

- **Fin whale**
  *Balaenoptera physalus*
- **Cuvier's beaked whale**
  *Ziphius cavirostris*
- **Sperm whale**
  *Physeter macrocephalus*
- **Risso's dolphin**
  *Grampus griseus*
- **Bottlenose dolphin**
  *Tursiops truncatus*
- **Striped dolphin**
  *Stenella coeruleoalba*
- **Common dolphin**
  *Delphinus delphis*
- **Long-finned pilot whale**
  *Globicephala melas*

- **Loggerhead turtle**
  *Caretta caretta*
- **Green turtle**
  *Chelonia mydas*
- **Leatherback turtle**
  *Dermochelys coriacea*

Once the data on **distribution** were collected and the ecological preferences of the species and the **areas potentially most suitable** for their presence were analyzed, researchers assessed the impact of the main risk factors according to the season, such as marine litter and ship traffic. This made it possible to identify priority **areas for conservation** and those most exposed to threats.
The information obtained will make it possible to develop **operational tools** to support effective decisions in conservation and mitigation of anthropogenic pressures, while at the same time promoting **international cooperation** in the protection of the large marine vertebrates of the Mediterranean.

# Key actions foreseen by the project

By using commercial ferries as true research vessels, the LIFE Conceptu Maris project has increased knowledge of the marine environment, thanks to well-defined actions.

### Monitoring from ferries

of marine fauna, floating litter, and maritime traffic, along 17 routes in the Central and Western Mediterranean.

### Analysis of stable isotopes of carbon and nitrogen

to clarify the structure of the marine food chain, along part of the aforementioned routes, through a series of sensors located in the engine room on board the ferries.

### Detection of environmental DNA (eDNA)

microscopic genetic fragments released by animals into the water, and environmental parameters along part of the aforementioned routes.

### Citizen science campaigns

to involve citizens and volunteers in monitoring activities.

### Training courses for ferry crew members

aimed at reducing the risk of collision with large cetaceans.

### Data analysis

with updates on the distribution and trends of the species involved, and the definition of key areas for the protection of cetaceans and sea turtles in the Central and Western Mediterranean, as well as in the Adriatic and Ionian Seas.

### Definition of a Decision Support System (DSS)

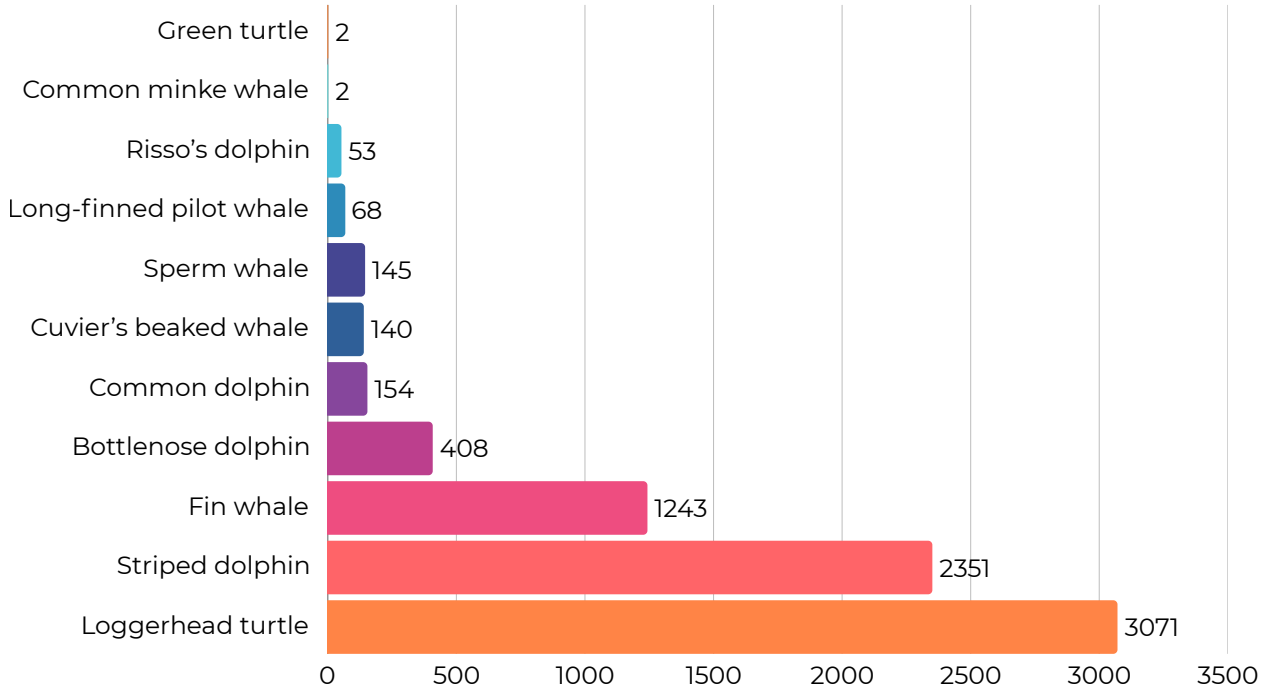
an operational tool designed to integrate biological and environmental information and provide useful guidance for the planning of conservation and mitigation measures.

# The results achieved

Open-sea monitoring campaigns conducted between **2022 and 2025** produced over 8,000 direct sightings, complemented by 496 **eDNA** samples, more than 1,000 **stable isotope** analyses, and environmental measurements. These data, analyzed up to 2024, provided a solid basis for assessing the distribution of cetaceans and marine turtles in the central and western Mediterranean.

*Scientists and volunteers engaged in monitoring. Photo Triton Research*

## Observations 2022-2025




*Green turtle. Photo Triton Research*

The **green turtle** and the **leatherback turtle** were observed in minimal numbers during the LIFE Conceptu Maris monitoring. Their presence, albeit very sporadic, is confirmed in the Mediterranean.

# Maps for the future



LIFE Conceptu Maris aims not only to identify the areas where cetaceans and turtles are currently present, but also those that offer **potentially suitable environmental conditions**, in which no monitoring activities have been carried out. For this reason, the observations of the different species at sea were related to the **environmental characteristics** of the stretch of sea where they occurred: water temperature, salinity, depth, productivity, currents, and other key factors.

LIFE Conceptu Maris has strengthened this approach by integrating environmental DNA (eDNA), which detects the presence of organisms through genetic traces left in the water. eDNA has also provided valuable insights into the nocturnal activity of animals, a time when direct observations are not possible. The other technique, stable isotope analysis, has made it possible to identify rich feeding areas in the southern Tyrrhenian Sea and in the Adriatic–Ionian region—vital, life-rich zones where these animals gather to feed.

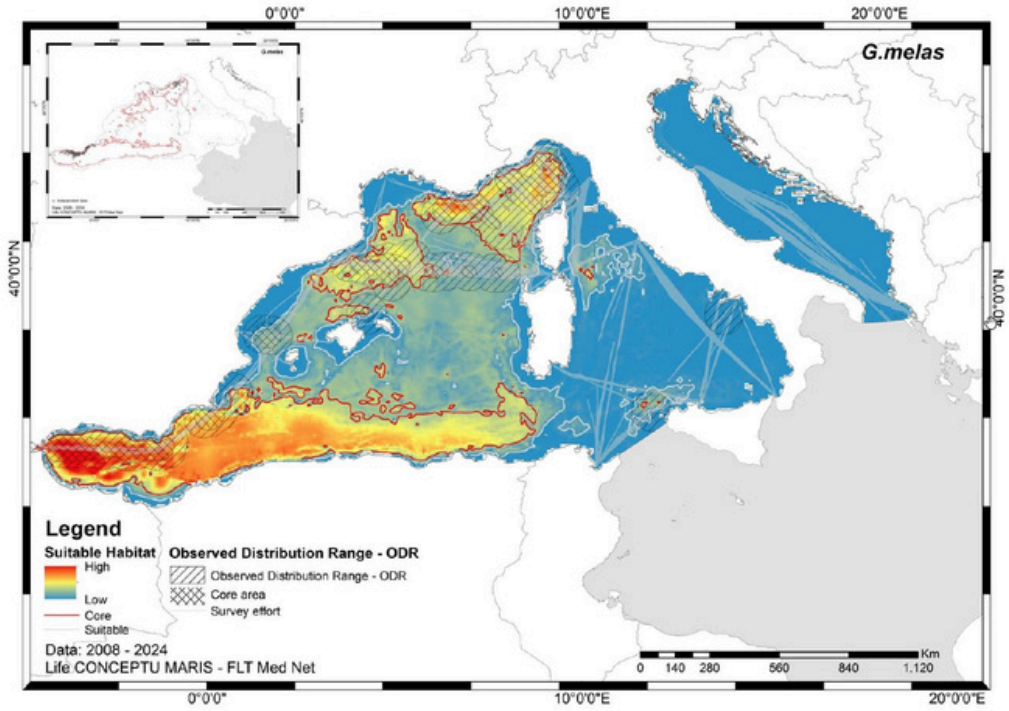
One of the most significant results achieved through the use of environmental DNA was the first detection of the **pygmy sperm whale** (*Kogia breviceps*) in the Mediterranean Sea. The presence of the species is supported by 10 positive molecular detections, attributable to at least 5 independent events, distributed from the Strait of Gibraltar to the Tyrrhenian Sea.

A particularly interesting finding is that the signals were more frequently detected in samples collected at night, suggesting a possible increase in surface activity during nighttime. Moreover, in some of the areas and periods where the DNA indicated the species' presence, visual sightings of unidentified small cetaceans had also been recorded, potentially providing consistent supporting evidence for this occurrence.

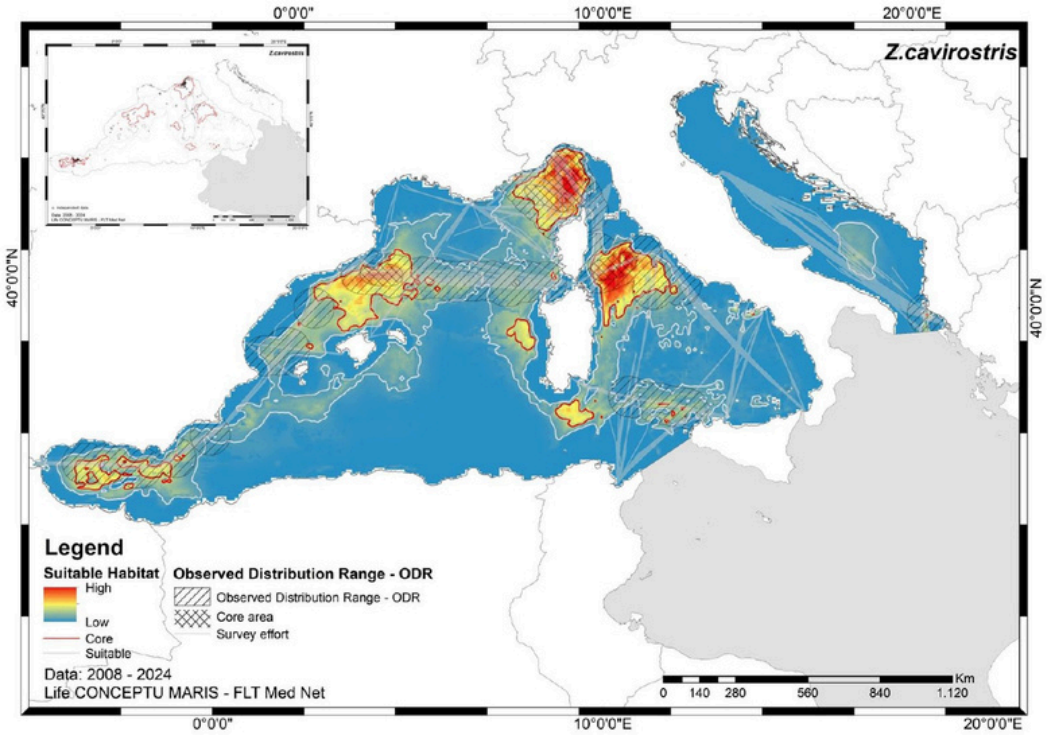

*Collection of stable isotopes and environmental DNA.*
*Photo Triton Research*

The result of this process is **species distribution models** (**SDM**), which do not provide a simple map, but an actual forecast: they indicate which areas offer the **ideal conditions for individual species**, even if in some cases they have not yet been observed, and above all they make it possible to imagine **how their habitat will change in the future**, for example in response to sea warming or the increase in maritime traffic.

The cartography, developed for each target species of the project, highlights two main aspects: the **Observed Distribution Range**, meaning the area in which the species has actually been observed, and the **Suitable Habitat**, which indicates the areas potentially suitable for its presence according to the distribution models developed by LIFE Conceptu Maris.




*Example of cartography developed for the Long-finned pilot whale.*




*Example of cartography developed for the Cuvier's beaked whale.*

# Details on individual species

Thanks to the information collected, it was possible to define the distribution and trends of individual species. The **core areas** are the zones where a species was observed more frequently or regularly during the project; in practice, they define the most relevant areas for the species. The **potential habitat**, on the other hand, is the result of a mathematical model (SDM – Species Distribution Model) that indicates where a species could live, even if it has not yet been observed in that stretch of sea.

## Loggerhead turtle (*Caretta caretta*)

- **Core area**: Southern Adriatic, Strait of Sicily, Central Ionian.
- **Suitable habitat**: broad and well distributed throughout the central-eastern Mediterranean, on continental shelves and also in pelagic areas, with summer expansion towards northern areas, such as the Northern Adriatic.

Recent data suggest that the loggerhead turtle frequents pelagic environments much more than previously thought. According to the traditional model, after hatching, young turtles spend a long period in the open sea, then move towards coastal areas once they reach maturity, using them for feeding and reproduction. However, the evidence collected during the LIFE Conceptu Maris campaigns highlighted a surprising presence of adults in the open sea, even observed during courtship and mating activities.

## Striped dolphin (*Stenella coeruleoalba*)

- **Core area**: Ligurian Sea, Central and Southern Tyrrhenian, Alboran Sea.
- **Suitable habitat**: extended along the deep waters of the Western Mediterranean. Seasonality is well marked: in summer, suitable areas expand significantly. The striped dolphin is showing good recovery after the morbillivirus epidemic of 2016. A progressive increase in sightings has been recorded, accompanied by a rise in the number of individuals in each group.

## Fin whale (*Balaenoptera physalus*)

- **Core area**: Gulf of Lion, Western Corsica, Central Tyrrhenian, and Ligurian Sea.
- **Suitable habitat**: deep and productive waters, between the Balearic Islands, Sardinia, and the Ligurian Sea. Models suggest a slight seasonal variation, with an expansion in summer and autumn, when plankton productivity is higher. In general, fin whale sightings show cycles with years of abundance alternating with others of relative scarcity, as highlighted by historical series since 2007.

## Sperm whale (*Physeter macrocephalus*)

- **Core area**: present in the Tyrrhenian, in the Strait of Sicily, and in the Alboran Sea, with preference for areas characterized by canyons and strong bathymetric features.
- **Suitable habitat:** includes a wide band mainly in the north-western Mediterranean and between Sicily, Tunisia, and the Balearic Islands. Sightings at sea show modest variations over the years, starting from 2007.

## Common dolphin (*Delphinus delphis*)

- **Core area**: concentrated in the Alboran Sea, with occasional presence in the rest of the basin.
- **Suitable habitat**: the model confirms a high probability of presence in the Alboran Sea and along the African coast, but also identifies suitable areas in the Tyrrhenian and south of the Balearic Islands, confirming a range confined to the southern and western parts of the basin.

### Risso's dolphin (*Grampus griseus*)

- **Core area:** in the Central Tyrrhenian and in the Alboran Sea, especially in correspondence with submarine canyons.
- **Suitable habitat:** includes the deep areas of the Ligurian Sea, the Sardinian-Balearic basin, and the marine space between Corsica and Sardinia, with wide distribution.

### Long-finned pilot whale (*Globicephala melas*)

- **Core area**: in the Alboran Sea and between the Balearic Islands and the French coast.
- **Suitable habitat**: in winter and spring prefers areas with strong currents; in summer it moves to areas of high productivity; in autumn it concentrates almost exclusively in the Alboran Sea, following Atlantic inflow. It's one of the species showing the most marked seasonal patterns.

### Bottlenose dolphin (*Tursiops truncatus*)

- **Core area**: present in numerous coastal and insular areas, in particular Central and Southern Tyrrhenian, Tuscan Archipelago, Eastern Sardinia, Southern Adriatic, and Northern Ionian.
- **Suitable habitat**: very broad along continental shelves, islands, and coasts. The model highlights suitable habitats even in areas without sightings, particularly along the African coast and in the Strait of Sicily.

### Cuvier's beaked whale (*Ziphius cavirostris*)

- **Core area**: localized in four main deep and complex topographic areas, such as the Alboran Sea, Southern Tyrrhenian, Ligurian Sea, Strait of Messina, Northeastern Sicily.
- **Suitable habitat**: associated with submarine canyons; high suitability also in the Ionian arc and in poorly monitored zones. Models suggest stable occupation throughout the year, without evident seasonal variations. Monitoring results indicate a significant increase in sightings starting from 2020, especially in Italian waters.

# Key areas for conservation

From the analysis of the collected data, the importance of some **key areas of the Central and Western Mediterranean** for the conservation of cetaceans and sea turtles has emerged.


## The Pelagos Sanctuary

Between Corsica and Liguria, it is the most important area: **almost 50% of all observations** are concentrated here.

- Significant for **fin whale**, **sperm whale**, and **Cuvier's beaked whale**, with important presence of **striped dolphin** and **bottlenose dolphin**.
- Other rarer species are also present, specialized in deep diving: **Cuvier's beaked whale**, **Risso's dolphin**, **long-finned pilot whale.**

## Alboran Sea and Strait of Gibraltar

A true **crossroads** of marine life between Spain and Morocco.

- High densities of **striped dolphins, bottlenose** and **common dolphins**. **Long-finned pilot whales** and **sperm whales** are also present.
- The **common dolphin** has its stronghold in the Western Mediterranean in the Alboran Sea, with juveniles and adults present all year round.

## Spanish Cetacean Migration Corridor

Between the Spanish coast and the Balearic Islands, it represents a fundamental passage route.

- Frequented by **striped dolphins** and **bottlenose dolphins**.
- Significant sightings also of **fin whales** and **sperm whales**.

## Other significant areas

- Spanish continental coast.
- Northwestern Mediterranean and Central Tyrrhenian.
- Adriatic, mostly for **loggerhead turtles**.

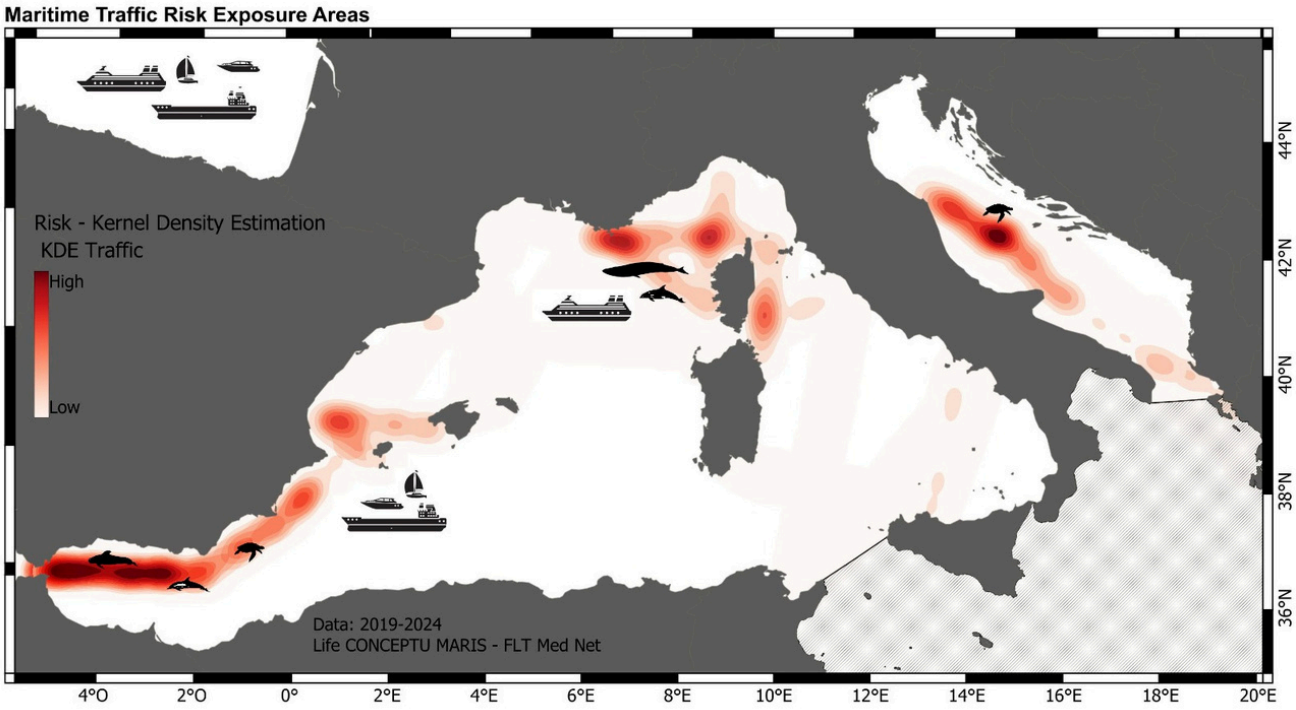
# Risk assessment

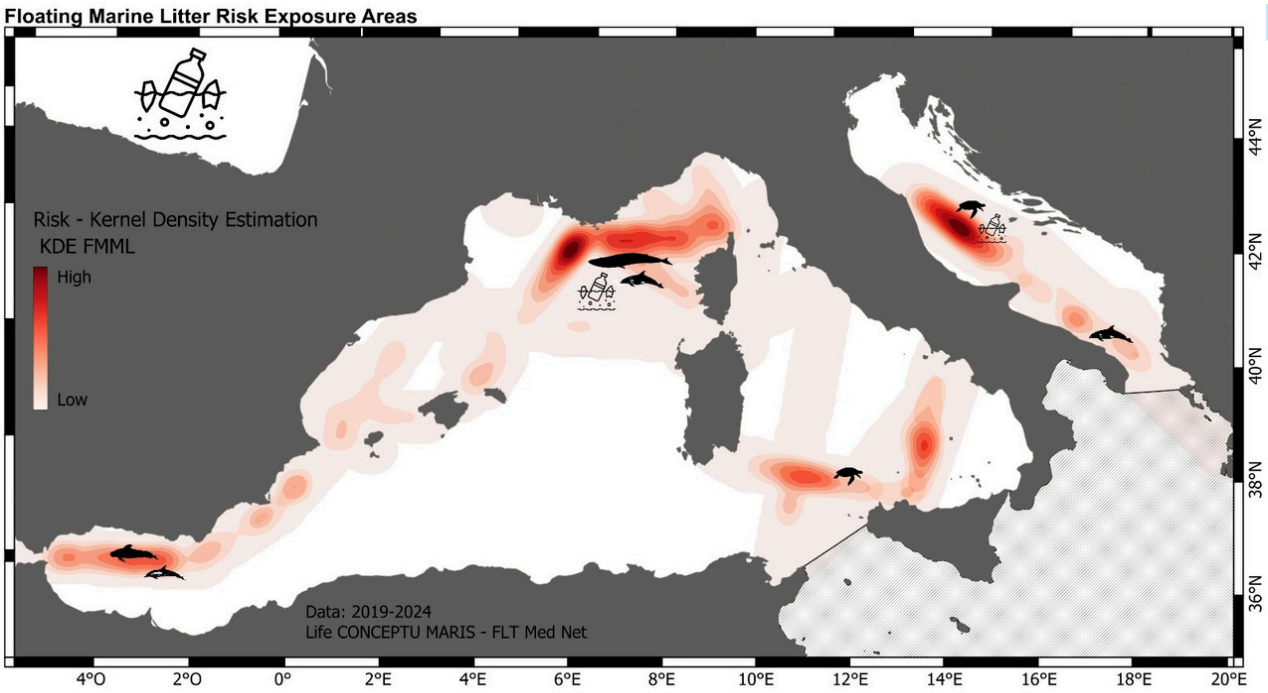
To protect whales, dolphins, and sea turtles, it is not enough to know where they live: it is also important to understand what threats they face.

Thanks to field monitoring and the use of **ship traffic** tracking systems, such as AIS (*Automatic Identification System*), the project identified the areas of the Mediterranean where animals are most exposed to collisions with ships and to floating litter (*marine litter*).

## Ship traffic – Most critical areas

- **Alboran Sea**
  High presence of cetaceans (common dolphins, striped dolphins, long-finned pilot whales, sperm whales), with very intense traffic between Gibraltar and the Mediterranean.
- **Strait of Sicily**
  Crossing of merchant routes and potential habitat for *Caretta caretta*, sperm whale, and bottlenose dolphin.
- **Northwestern Mediterranean**
  Important area for almost all cetacean species, with high concentrations especially in the summer season.
- **Central and Southern Tyrrhenian**
  Zones heavily frequented by striped dolphins, Risso's dolphins, Cuvier's beaked whales and fin whales, subject to traffic between Italian and insular ports.
- **Cetacean Migration Corridor**
  High risk especially along the strait between Valencia and the Balearic Islands, due to increased traffic intensity in the presence of a high number of cetaceans.






## Floating litter – Areas of highest exposure

The risk from **floating litter**, particularly for sea turtles and cetaceans that feed at the surface or ingest plastic, is highest in these areas.

- **Northern and Southern Adriatic**
  High density of waste, coinciding with potential habitat for Loggerhead turtles and bottlenose dolphin.

- **Strait of Sicily and Tunisian coasts**
  High presence of sea turtles and cetaceans, in an area with large accumulations of floating plastic.

- **Central Ionian**
  Litter concentrated along pelagic routes, in potential habitat for Loggerhead turtles and Cuvier's beaked whale.

*Fin whale injured by a boat's propellers. Photo CIMA*

# Data sharing and future conservation actions

The overall picture that emerges is not a fixed photograph, but a **dynamic tool** that serves to act in a targeted way: it identifies the **areas to be protected** and can support **choices in maritime spatial management**. All the collected data and indicators have been merged into a **shared database**, which feeds a **Decision Support System (DSS)**, designed to provide operational support to public authorities in the planning of **conservation interventions**, integrating environmental information, anthropogenic pressures, and the presence of target species.

*Long-finned pilot whales at the surface. Photo by CIMA*

Alongside the scientific activities, the project also strongly focused on **involving key stakeholders for the conservation of large marine vertebrates**, through the Advisory Board. This body brings together about forty relevant entities: Ministries of the Environment of Italy, France, and Spain, Regions, Marine Protected Areas, representatives of the maritime sector, the scientific community, and the conservation world at the international level.

*LIFE Conceptu Maris scientists during visual monitoring. Photo Triton Research*

Their contribution is fundamental: from the scientific information collected, the next step will in fact be the definition of **practical measures for the protection** of whales, dolphins, and turtles in the Mediterranean.

# Citizen science and crew training

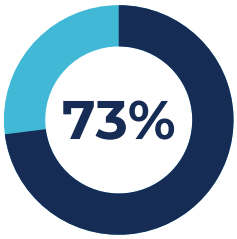
*Volunteers engaged in onboard training activities. Photo Triton Research*

The **citizen science activities on board ferries** represented one of the most impactful initiatives for public involvement in the LIFE Conceptu Maris project. From the very beginning of the project, a campaign was launched to **recruit and train volunteers**, with the objective of **supporting researchers** in monitoring cetaceans and sea turtles along 17 routes operated by ferries in the Central and Western Mediterranean.

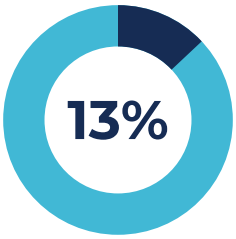
By the end of 2024, the project had received more than **477 applications from 13 countries**. Of these, 225 people completed the online theoretical training and **184 completed the entire course**, which also included the practical session on board.

## Origin of participants

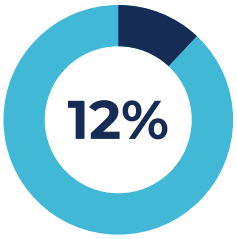
**Italy**




**Spain**




**France**




In addition to the impact in terms of collected data, one of the most important results of this experience was the **creation of an international community of volunteers** dedicated to the conservation of cetaceans and sea turtles in the Mediterranean, with the potential to continue and grow even beyond the duration of the project.

**71%**
**Women**

**66%**
**Between 18 and 29 years old**

Among the actions foreseen by LIFE Conceptu Maris, the **training of the personnel of shipping companies** operating in the Mediterranean also played an important role, enabling them to promptly identify from the bridge whales and sea turtles at risk of collision.

Since 2022, a biodiversity conservation and collision risk course has also been activated, dedicated to the crew members of the shipping companies collaborating with the project (Grimaldi Lines, Minoan Lines, Corsica & Sardinia Ferries, Tirrenia, Balearia, Grandi Navi Veloci), involving more than **300 participants**.

*Certificates being handed out aboard a Corsica Ferries ship. Photo Triton Research*

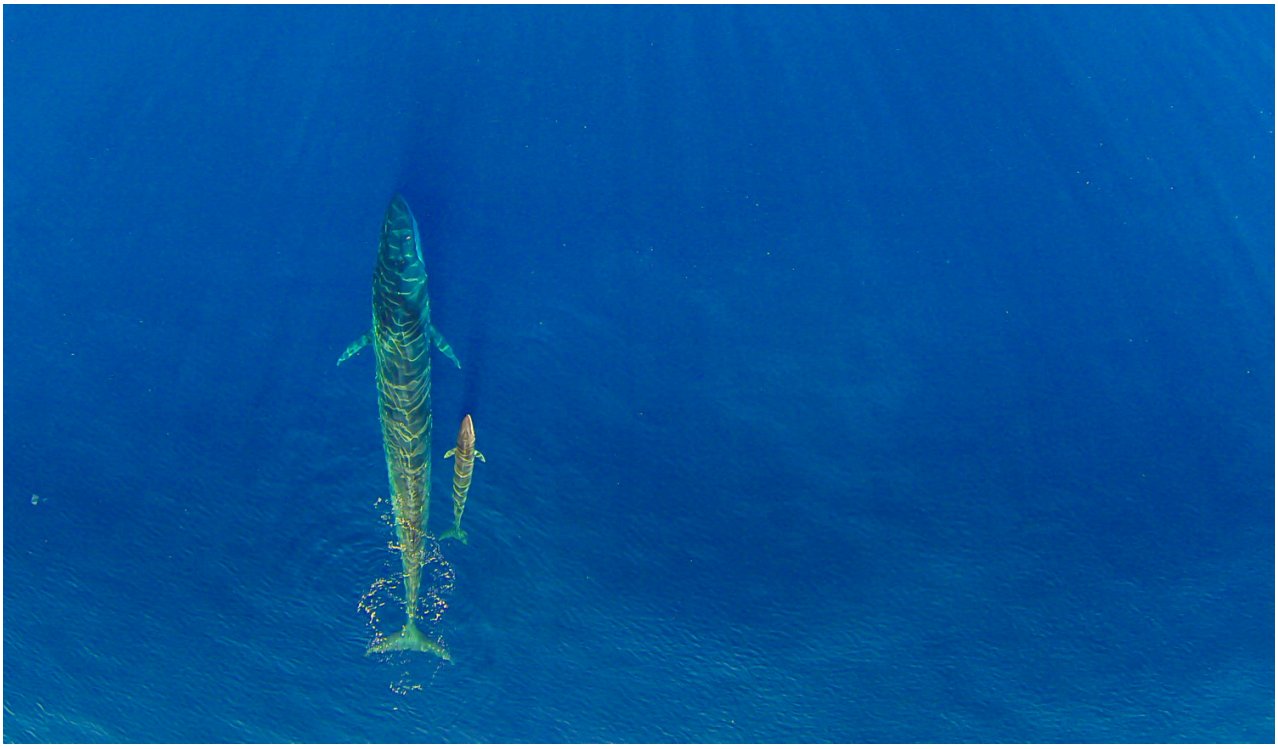
# Communication and awareness-raising activities

*Some of the winning images of the photo contest: Risso's dolphin by Angel Crudo and common dolphin by Aixa Morata.*

To promote LIFE Conceptu Maris to the general public, an **active communication campaign** was carried out mainly in Italy, with initiatives also in Spain and France, which produced the following results:

- An estimated audience of more than 5 **million people reached** overall through website, social media, and traditional media.
- **More than 280 media mentions** (press, online, TV, and radio).
- **More than 40 public events**, including science communication festivals and international conferences.
- **Two documentaries**: In defense of the giants of the Mediterranean and Without borders, in addition to more than **10 short thematic videos**.
- Four **photography contests** with awards, dedicated to cetaceans and turtles in the open sea.

# Urgent protection for the most threatened areas of the Mediterranean



*Fin whale with calf, captured by a drone. Photo CIMA*

The LIFE Conceptu Maris project collected and analyzed thousands of field data, combining **direct observations** and **predictive models**. Thanks to these tools, it was possible to identify the areas of the Mediterranean **where cetaceans and sea turtles are most present**, but also **most exposed to risks** caused by human activities, in particular ship traffic and floating litter.

Below are some key elements.

- The **Alboran Sea**, the **Strait of Gibraltar**, the **Adriatic**, and even protected areas such as the **Pelagos Sanctuary** or the waters around the **Spanish Cetacean Migration Corridor** are among the most critical zones.

- More than 100 cases of "**near miss**" have been documented, meaning situations in which large cetaceans, such as fin whales and Cuvier's beaked whales, passed dangerously close to moving ships, often without reacting to their presence.

- Ship traffic follows fixed and heavily traveled routes that cross crucial areas for marine fauna. The increase in the **speed of ferries and merchant ships** raises the risk of collisions, and the data confirm this: not even protected areas today offer real safety.

*Fin whale near a vessel. Photo CIMA*

**Floating litter** also represents a concrete risk. In spring–summer it is particularly concentrated in the Adriatic Sea, Tyrrhenian Sea, and Ligurian Sea. This litter can be ingested by sea turtles and small cetaceans, causing serious or lethal damage. The overlap between species presence areas and waste accumulation areas is one of the most alarming signals that emerged from the analysis.

The **richest areas of life** must therefore become an **absolute priority for conservation**, and those that show high potential deserve further investigation.

At its conclusion, LIFE Conceptu Maris nevertheless leaves a concrete **legacy**:

A **replicable methodology**, ready to be adopted by other ships and institutions.

A **large shared database**, available to the scientific community.

An **international network** of volunteers and aware citizens.

# LIFE Conceptu Maris

info@lifeconceptu.eu

www.lifeconceptu.eu

LIFE Conceptu Maris

life.conceptumaris

LIFE20 NAT/IT/001371
Co-funded by the European Union

## Coordinating beneficiary

ISPRA - Istituto Superiore per la Protezione e la Ricerca Ambientale

## Associated beneficiaries

Area Marina Protetta "Capo Carbonara"
CIMA Research Foundation
Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC)
ÉcoOcéan Institut
Stazione Zoologica Anton Dohrn
Triton Research
Università degli Studi di Milano Bicocca
Università degli Studi di Palermo
Universitat de València
Università degli Studi di Torino

Author: Francesco Tomasinelli - Triton Research
Text revision: Antonella Arcangeli - ISPRA, Antonella Servidio - Triton Research
Graphics: Giulia Luzi - Triton Research
Photo credits: Triton Research, CIMA Foundation Archive, Canva Archive