



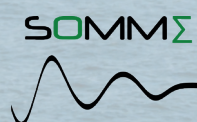
écosphère
DEDICATED TO BIODIVERSITY

OFFSHORE WIND ENERGY

BELIEF, RIGOR AND DIALOGUE
FOR A REASONED APPROACH OF BIODIVERSITY



TBM
environnement



www.ecosphere.fr

A team of recognised experts



One of France's leading groups specialising in the study of terrestrial, aquatic and marine biodiversity, with over 200 employees

- ▶ A 'Research & Development' department known internationally in the marine environment
- ▶ A specialist in wind energy and more generally renewable energies

ECOSPHERE STRENGTHS

SCIENTIFIC AND TECHNICAL

A highly qualified staff, covering a wide range of marine and terrestrial environments, with the expertise and mastery of maritime survey techniques. A strong R&D activity aiming to create and offer to our clients the best solutions from the latest technologies

GEOGRAPHY

Across their coastal agencies, Ecosphere, TBM and SOMME are present on all seafronts of mainland France, guaranteeing a complete knowledge of regional contexts and a rapid intervention

MANAGEMENT OF COMPLEX PROJECTS

The Ecosphere Group has been working with you on complex projects since 1988

SCIENTIFIC AND TECHNICAL PARTNERSHIPS

Our teams have developed permanent partnerships with laboratories specialized in marine ecology and technical survey tools (drones, radars, buoys, acoustics devices...)

A GOOD UNDERSTANDING OF CONSTRAINTS associated with deploying equipment and managing missions at sea

A RIGOROUS ORGANISATION

For each mission:

- setting up a person in charge of scheduling missions at sea according to our commitments, the weather, etc.
- management of authorisations and reservations for boats, planes and buoys...
- reservation and prior verification of equipment (radar, recorders, sampling equipment).

DIRECTOR

- Ensures quality control of the mission and validation of deliverables
- Acting as an advisor for all complex issues

PROJECT LEADER

- Ensures overall monitoring of operations
- Supports the client with all the steps involved
- Monitors the ecological assessments (issues, sensitivity, impacts and measures)

PROJECT RESEARCHER

Engineers and ecologists (fauna, flora, habitats)

- Carry out field surveys,
- Define the ecological issues
- Analyse the impacts and suggest mitigation measures that are realistic and adapted to the project
- Define and carry out post-implementation surveys

Environmental engineers

- Define the technical details of the mitigation measures
- Estimate the financial costs

GEOMATICIAN / GIS – DATABASE

- Manage the databases
- Create the GIS project and the maps



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Ecosphère, TBM Environment and SOMME are qualified in following safety procedures of sea, underwater and land operations

Application to the maritime prefectures
for authorisation to work on site and take samples

Employees possess all the skills required to carry out each step of a survey at sea (navigation certificates, sea safety diplomas – TIS, GWO, BOSIET & HUET). Furthermore, employees intervening on wind turbines have BZEE certification and electrical training (HOB0) for installations on wind masts and nacelles.

Equipment and information:

The employees are equipped with all required Personal Protective Equipment (PPE).

Our companies possess and write documents essential to the evaluation of professional risks: insurance plans, Health and safety procedures, hyper bare security manuals, security briefings before the beginning of each survey.

Our expertise at your service, from design to implantation

We are able to manage all stages of a project and in different environmental and institutional situations



SURVEY OBJECTIVES

UNDERWATER ACOUSTICS

- Ambient noise and marine mammal key reference document
- Current of anthropic noise pollution status
- Provisional studies of new projects acoustic emissions (acoustic modelling)
- Surveys during construction and operation (MRE projects and port development projects)

ENVIRONMENTAL QUALITY: water, sediments, biota

- Define the biosedimentary habitats and the physico-chemical composition of sediments: environmental quality, possible pollution
- Define the water's physico-chemical quality (quality, dynamics, nutrients, quantity/period)

MARINE HABITATS AND BENTHIC POPULATIONS: algae, fixed fauna, spawning grounds...

PELAGIC POPULATIONS: plankton, invertebrates, fish...

MEGAFAUNA AND BATS

- Birds
- Marine mammals
- Turtles

1

Derisking study

Reinforce our understanding of the local marine environment before any project and define the major ecological issues (Marine wildlife aerial surveillance protocol)

2

Support for candidate enterprise as part of the French government's competitive tendering process

Analysis of the local legal and ecological context, preliminary assessment of ecological issues and impacts on animal population and marine habitats, analysis of mitigation measures and assess needs for post-implementation surveys and their costs

3

Statutory studies

Complete impact assessment of marine and terrestrial environments (RTE connections), including ecological surveys under conventional protocols, N2000 studies, Wetland studies, protected species derogation studies

6

Up till dismantling or repowering

5

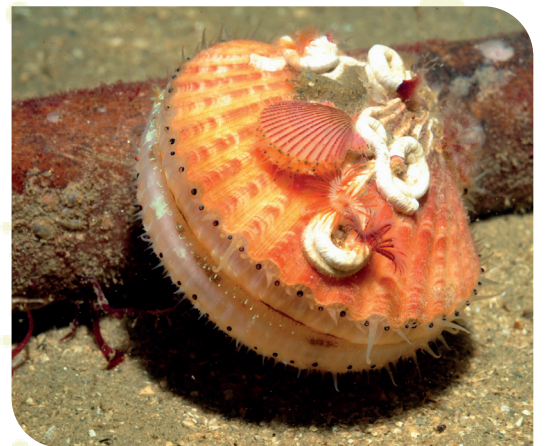
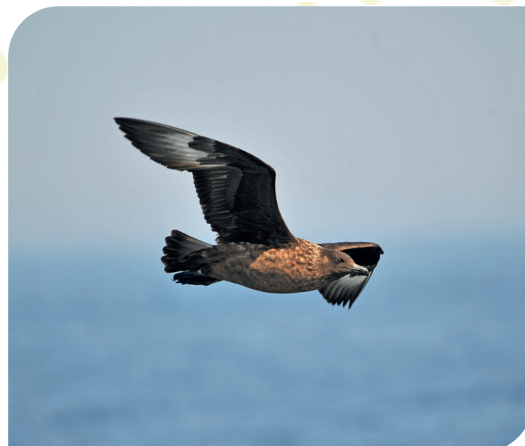
Surveys during operation

Specific surveys of marine habitat and fauna, survey of the correct implementation and effectiveness of mitigation measures

4

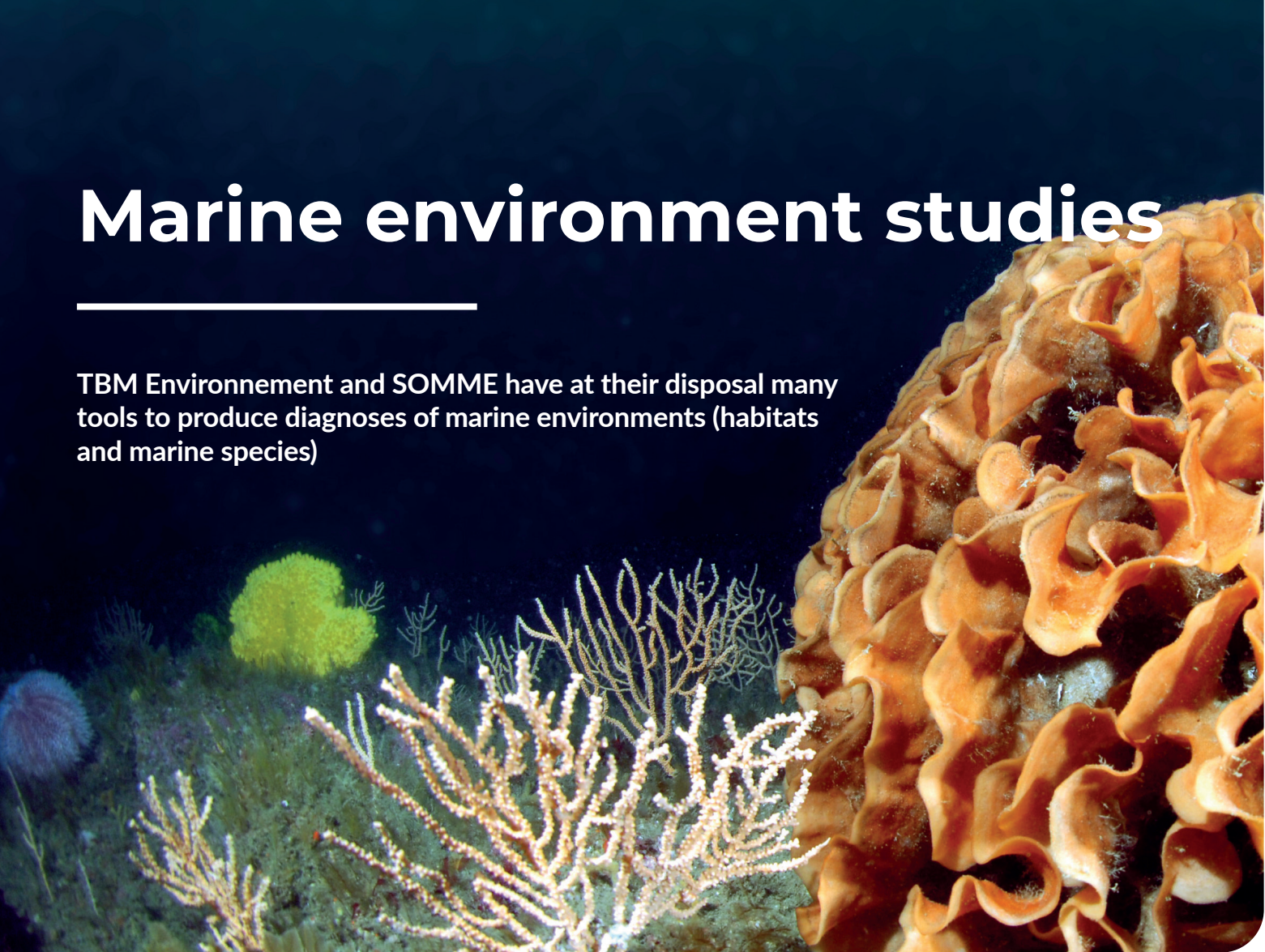
Ecological site monitoring

During the construction phase of the parc and project management assistance on measures to mitigate or compensate impacts on wildlife



Marine environment studies

TBM Environnement and SOMME have at their disposal many tools to produce diagnoses of marine environments (habitats and marine species)



THE GROUP R&D DIVISION

STUDY OF BIOINDICATORS

using living organisms (bivalve shells) as indicators of these changes (anthropic activities...)

WORK ON THE IMPACT OF UNDERWATER CABLES

on the benthic compartment

IMPACT OF UNDERWATER SOUND ON ECOSYSTEMS

improving the knowledge base of the impact of sound pollution, particularly those created by Marine Renewable Energy (MRE) projects on marine mammals via telemetric studies, as well as on benthic invertebrates and fish, via experimentations in controlled environments and natural settings (human activities...)

WORK IN DEVELOPMENT

- Definition of the impact of sacrificial anodes and research on new pollution indicators
- Definition of protocols for the measurement of underwater vibrations.

1 Samples collected with grab samplers/ dredgers adapted to the studies and the environment

2 Samples collected via diving for flora and in rocky environments

3 Camera: wide scale description of habitats

4 Sonar: delimitation of seagrass beds



5 Water samples and deployment of sensors / probes

6 ROV: underwater exploration with autonomous machines

7 Survey of fish via different techniques from fishing boats (trawl, net and trap campaigns, ...)

8 Bongo net expeditions for plankton

9 Surveys and cartography in intertidal environments

Some figures

- **6 R&D projects** with 'France Energies Marines' (Benthoscope I and II, SPECIES program), with 'Agence Nationale de la Recherche' (GAAP), IMPAIC project, with RTE (OASICE program)
- **2 CIFRE thses (industrial training through research)**
 - Study of the effects of magnetic fields on marine fauna
 - Study of the impact of anthropic noise on the behaviour and movements of harbour seals
- **50 publications** on these subjects

Behaviour studies, growth analysis, chemical markers



Marine megafauna studies

Ecosphere, TBM environment and SOMME have associated with technical partners and propose different tools enabling them to produce diagnostics on marine megafauna



MEGAFAUNA SURVEYS BY BOAT

- **Target species:** birds, marine mammals, bats, etc.
- **Period:** over the complete biological cycle
- **Expected results:** species diversity, abundance, localisation and associated behaviours, bat activity
- **Specific features:** possibility to embark with multi-instruments, strong autonomy

MULTI-STUDY BUOYS WITH LIDAR/RADAR/ACOUSTIC

- **Target species:** birds, marine mammals, bats
- **Period:** over the complete biological cycle of the species
- **Expected results:** species diversity, trajectory (3D radar), flux and abundances, verticality and horizontality. Underwater and aerial bioacoustics
- **Specific features:** possibility to embark with multi-instruments, strong autonomy



TELEMETRIC MONITORING OF SEALS

- **Target species:** grey seals and harbour seals
- **Period:** outside the breeding and moulting season
- **Expected results:** spatial distribution and movements of individuals, diving behaviour
- **Specific features:** GPS/GSM beacons and acoustic D-TAG beacons

PASSIVE ACOUSTICS FOR MARINE MAMMAL SURVEYS

- **Target species:** cetaceans (ex: bottlenose dolphins, common dolphins, harbour porpoises)
- **Period:** over the year
- **Expected results:** presence and species identification, seasonality, acoustic behaviour
- **Specific features:** instruments and mooring adapted to the needs of the study and the site's characteristics (harbour, offshore)

MEGAFAUNA SURVEY VIA PLANE AND AUTOMATED FLYING WING

- **Target species:** birds, marine megafauna
- **Period:** complete biological cycle
- **Expected results:** species diversity and abundance, localisation, and function (fishing grounds, resting grounds, etc...)
- **Specific features:** possibility to embark with multi-instruments (photos, videos)

MARINE AND TERRESTRIAL ORNITHOLOGICAL RADAR

- **Target species:** birds (passerines, medium and large species)
- **Period:** coastal prenuptial and postnuptial migration, wintering grounds, breeding
- **Expected results:** trajectory (3D radar), abundance and flux (verticality and horizontality)
- **Specific features:** ornithological studies on coast or at sea

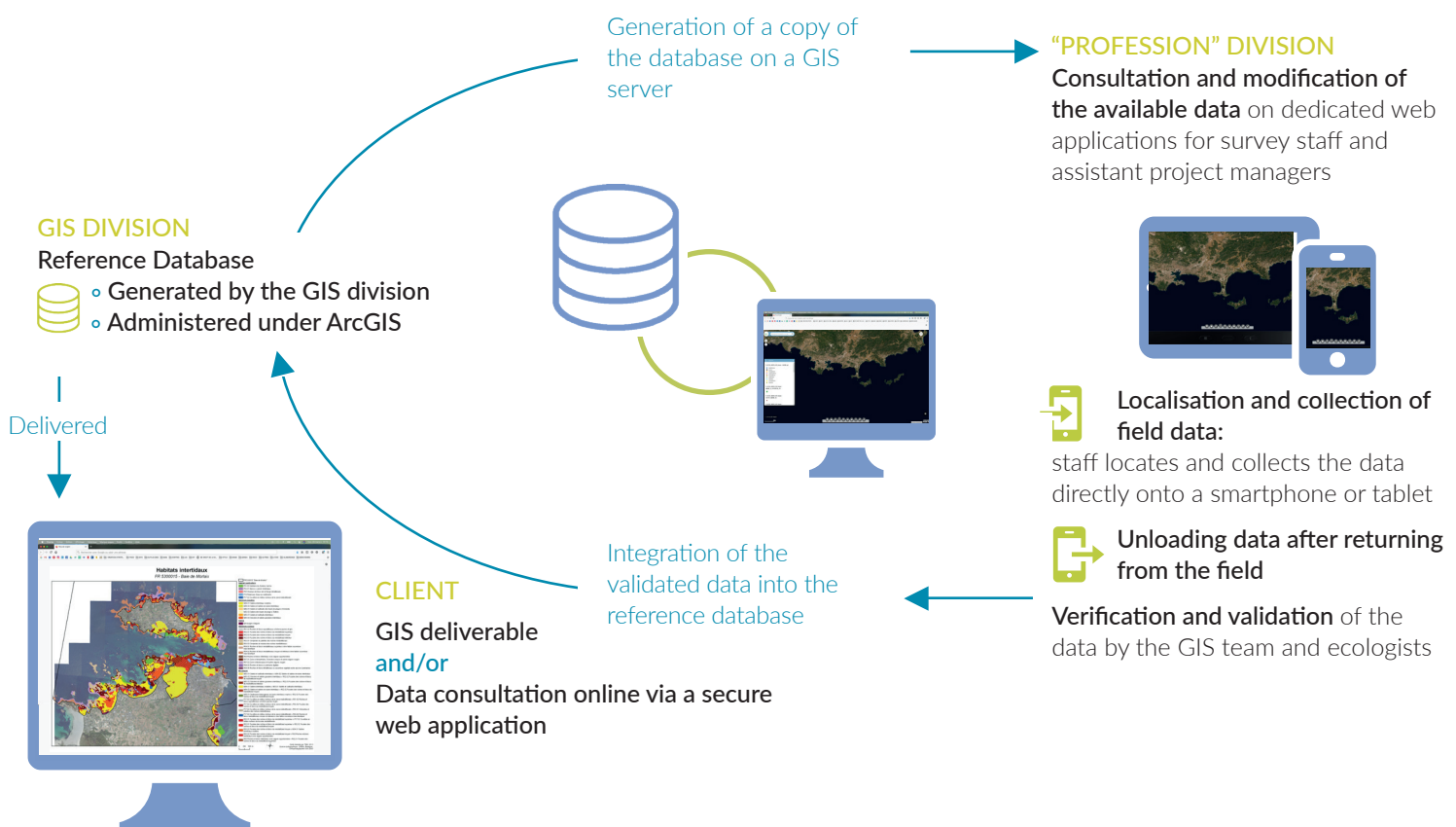
The automated flying wing is added to the various surveys via boat or plane: improved autonomy, multiplication of precise transects on the survey site, contains video and photography equipment. Thanks to artificial intelligence, the automated post-treatment analysis can identify species and population numbers. Finally, the use of this tool decreases the carbon footprint while limiting risks to the staff.



GeoEcosphere

The needed quality of GIS data for an environmental assessment depends on the processing methods that transform an on-site observation into a finalised data point

HOW DOES GEOECOSPHERE WORK?



A POWERFUL MULTIPLATFORM TOOL

Ecosphere has deployed a GIS infrastructure based upon an ArcGIS server: GeoEcosphere. The result is a powerful and multi-platform tool that can access the GIS data of a study at any moment: when collecting data on the field with a mobile application, in the office to map out or analyse via a desktop application, or anywhere else via a web application.

DATA STORAGE

Wind farm projects, and in particular offshore wind farm projects, are developed over a lengthy period. Data storage and traceability monitoring become major concerns. Data security (from office documents to radar or acoustic recordings) is assured throughout all our studies. Data is backed up to guarantee for our clients a storage and a secured distribution for the long term.



SPECIALISED STUDIES

Ecosphere, TBM Environment and SOMME, with the assistance of their scientific partners, have put in place study protocols and innovative solutions for each request, for example:

- studies and cartography of particularly important habitats: seagrass, maerls, reefs... for the French Office for Biodiversity,
- inventory of marine mammals and birds on the discharge sector of the La Hague nuclear reprocessing plant for ORANO.

Examples of projects

Support for tendering procedures

- Strategic support and writing the environmental note for the bidders offer for the Dunkirk wind farm (AO3)
- Analysis of ecological issues, definition of priorities and support for the eco-conception of the project (land, localisation, measures...)
- Defining and costing the ecological studies for authorisation requests
- Analysis of the potential impacts and definitions of the mitigation measures during construction, operation and dismantling
- Defining and costing the bidder commitments regarding environmental surveys and the implementation of new procedures

Mandatory studies

Integral impact assessments for RTE on electricity connection projects for the wind farms of Dieppe-Le Tréport, St-Nazaire, Courseulles and Dunkirk

Derisking studies

Bibliographical studies for the DGEC (French Ecological Ministry) with other various experts (IFREMER, OFB) on sector AO4 (Cotentin) and AO5 (south Brittany) to define the zones of minimal risk

Studies post-implementation

- Surveys during construction (building of electric connectors): for RTE, wind farm of St Brieuc, wind farm of St Nazaire, installation of cables for the England-France interconnection (IFA2)
- Survey during the operation of the England-France interconnection (IFA2) for RTE

Acoustic Monitoring

- Acoustic survey on the wind farm of St Brieuc during the drilling operation for Ailes Marines
- Acoustic surveillance (PAM system in real time) and marine mammals (MMO operators) on the wind farm for Dieppe Le Tréport during pile-driving operations
- Acoustic survey (ambient sound, marine mammals and vibration measurements) on the wind farm of St Nazaire during the operation phase

OUR AGENCIES ON COASTAL AREAS

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Offshore wind farm projects

-  Wind farm on seabed
-  Floating wind farm
-  Tidal turbine
-  Interconnection

Status

-  Commercial farm
-  Pilot farm
-  Testing site

Terrestrial wind

Number of orders by department

-  30 à 80
-  14 à 29
-  4 à 13
-  1 à 3

KEY PARTNERS

Scientific

- Centre d'Études Biologiques de Chizé
- LEMAR (Université de Bretagne Occidentale/ CNRS à Brest)
- ULCO (à Boulogne et Dunkerque)
- Observatoire de l'IUEM
- Laboratoire international BeBEST
- PELAGIS (Université de La Rochelle)

Technical

- Radars : Diadès Marine
- Buoys : Akrocéan
- Drones : Prodrone
- Acoustic sensors/meters : RTSYS, SERCEL

THEY TRUST US



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