

TRACKING GREAT PELAGICS

BALEARIC ISLANDS NATURA 2000 SITES



Collaboration between OCEANCARE and the Cultural Association ALNITAK for the development of a shipboard acoustic and visual survey of great pelagics around the Balearic Islands.

Year 2016

THE RESEARCH SITE

The Balearic Islands, and very specially the continental shelf edge and abyss that connect the Alboran Sea, the Algero – Balearic Basin and the Gulf of Lyon, are a hot spot of biodiversity and a unique habitat for great pelagic species. Although several marine protected areas have been designed in this region, several risks to this extraordinary ecosystem require urgent management and monitoring. On the other hand, the Balearic Islands can be considered a laboratory for the development of innovative technological measures for mitigating the risks to marine biodiversity.

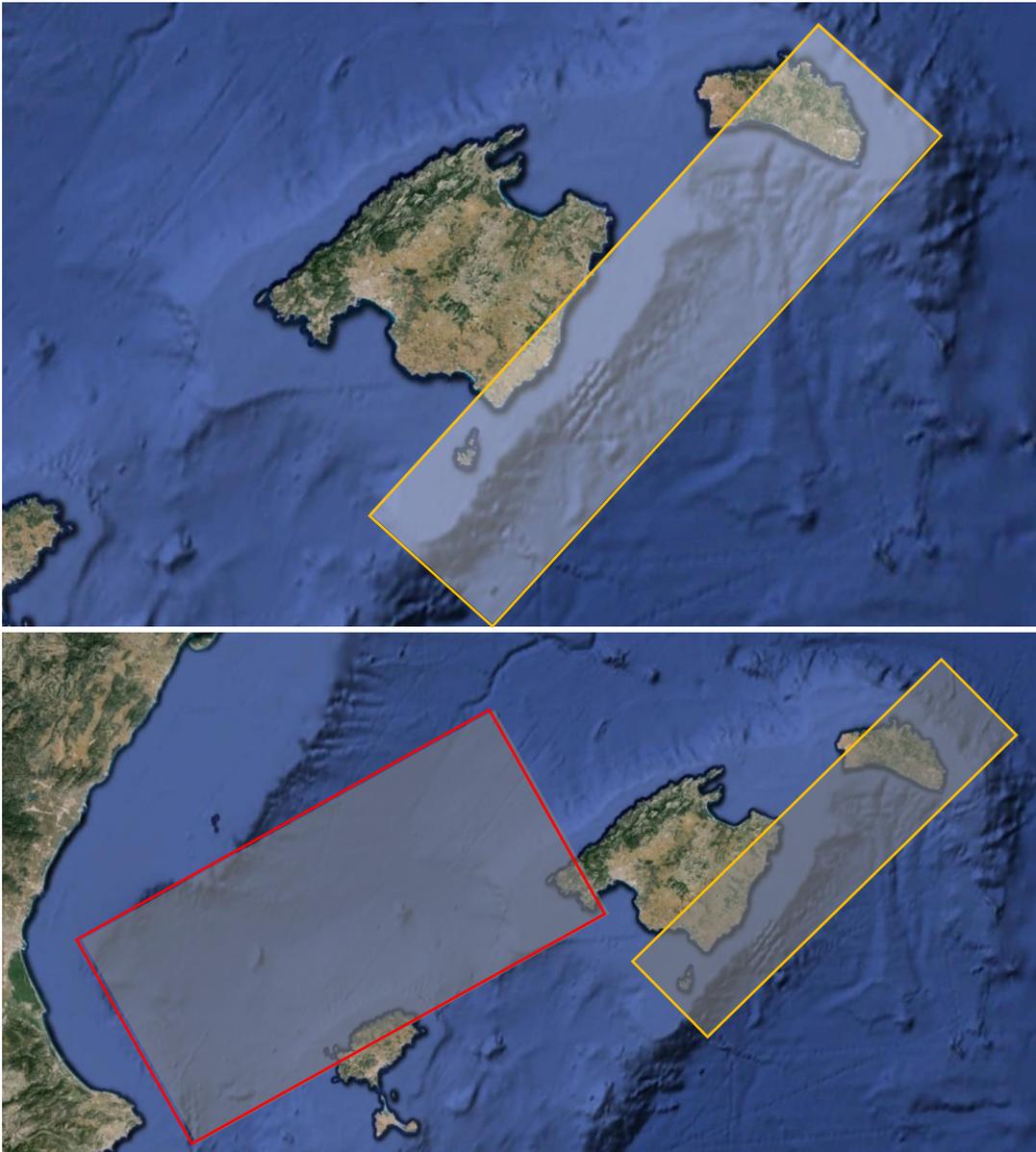


HOME PORTS:

In 2015 our home port was Mahón on the Island of Menorca. For our 2016 expeditions we move our centre of operations to the Island of Mallorca using the ports of Palma, Andratx, Porto Colom, Soller or Alcudia depending on the weather forecasts and oceanographic information (<http://www.socib.es/?seccion=modelling>).

There are several important logistical reasons for this and clear advantages both for the research team as for expeditioners.

From the Island of Mallorca we have access to the two main research sites for our expeditions. One is the SW Shelf Edge and Abyss the goes from the Island of Menorca to the Island of Cabrera, the seamount of Emile Baudot and the seamount of Palos. The other is the “Deep Balearic Sea”, from the Island of Dragonera east to the Island of Columbretes and south to the Canal de Ibiza and Cape of Palos.



The research site is of special interest to us both as critical habitat for our target species as for its relevance as new Mission Blue Hope Spot with the creation of new marine protected areas among which an offshore National Park.

Furthermore we must highlight its relevance in relation to the mitigation of risks in the sectors of tourism, transport and especially energy, as well as with respect to the management and monitoring of the risk of debris pollution.

BACKGROUND

The Cultural Association **ALNITAK** has been working in these waters since 1990, focusing on providing a scientific foundation for the establishment and management of marine protected areas. In fact, ALNITAK was founded by crewmembers of direct non-violent actions by Greenpeace for the establishment of the MPAs of Columbretes, Cabrera and Alboran, and actions to tackle problems of sea turtle bycatch, toxic waste discharges and mining of red coral.

From 1990 to 2011, ALNITAK had provided the Spanish Government and the EU with one of the largest data sets for the conservation of cetaceans, seabirds and marine turtles in the frameworks of the United Nations and the European Marine Strategy Framework Directive. In 2012, together with Stanford University – Tag a Giant, NOAA NMFS and National Geographic, ALNITAK initiated the “OASIS Programme” for the tracking of great pelagic species with novel non-invasive tracking systems. In this programme, the tracking of great pelagics is integrated in the modelling of the IMEDEA integrated oceanographic observation and forecasting system (IOOS) in order to work on a series of new services on the www.socib.es facility, as 3D bycatch risk zoning maps for fisheries, identification of potential debris pollution aggregation zones, and maps of underwater noise.

OCEANCARE has been working for the protection of marine mammals and oceans since 1989. With research and conservation projects, campaigns, environmental education as well as its contributions to a range of important international committees, OceanCare has undertaken concrete steps worldwide to improve the conditions of life in the world’s oceans. In 2011, OceanCare was granted Special Consultative Status with the Economic and Social Council of the United Nations to provide expert advice on questions surrounding the protection of the marine environment.

Further reading:

- www.oceancare.org
- www.alnitak.info

OTHER PROJECT PARTNERS

Since 1990, the SW Mediterranean Sea, and very especially the Toftevaag, has become a meeting place and international cooperation laboratory where some of the most renowned marine research and conservation institutions have come to explore the mysteries of marine ecosystems and the life history of cetaceans, seabirds, marine turtles and other great pelagics. Duke University Marine lab, Woodhole Oceanographic Institution, NOAA, SMRU – St. Andrews University, BBC Wildvision, National Geographic, etc.

Now, in this new phase and in the framework of the OASIS Programme, ALNITAK also counts on a long list of prestigious partners;

- a) NOAA NMFS (satellite tagging and bycatch mitigation trials,
- b) IFREMER (shark tagging and conservation study),
- c) IMEDEA SOCIB (Integrated Ocean Observation System),
- d) USFWS MTCA (fishermen capacity development and awareness),
- e) Stanford University – Tag a Giant (tuna tracking and conservation), and
- f) National Geographic (NG Crittercam tagging).

START-UP SURVEY OF 2015

In 2015 a start-up survey was conducted from July the 25th to August the 25th. Based on this experience a series of adaptations have been identified in terms of equipment and methodology. A report of this start-up survey and images can be found at the end of this document.

BALEARIC ISLANDS EXPEDITION 2016

GLOBAL GOALS

Through this collaboration, OCEANCARE and ALNITAK initiate a second phase in a cooperation that focuses on the global goal of the OASIS programme of working towards the integration of cetacean, sea turtle and other great pelagics monitoring data in the IOOS. The shipboard visual and acoustic surveys and tracking data from photo-ID and tagging (acoustic, kinetic, satellite, National Geographic Crittercam) constitute a “zoom-in” that can be integrated in IOOS to generate models and maps for MPA management and the development of technological measures to mitigate the main risks that threaten the biological diversity and productivity of the open seas ecosystem. The surveys provide important information on abundance, distribution, habitat use and behavioural response of the target species *Thunnus thynnus*, *Caretta caretta*, *Physeter macrocephalus*, *Ziphius cavirostris*, *Grampus griseus*.

This information is necessary for the assessment, management and monitoring of the main risks that the OASIS Programme focuses on:

- Interactions with fisheries (bycatch, depredation)
- Interactions with shipping and yachting (ship strikes, harassment and noise)
- Noise from other sources (seismic surveys, SONAR, explosions)
- Debris pollution

SPECIFIC OBJECTIVES FOR 2016

The specific objectives established for the survey of 2016 and hereafter are:

Research objectives

- The assessment of the conservation status and monitoring of the sperm whale, through the development of data bases including photo identification of flukes, naturally shed skin samples and acoustic recordings
- The study of sea turtle movements, diving patterns and ecology, through tagging (satellite and kinetic tags) and “oasis” and “gliding turtle” experiments
- The mapping of cetaceans, sea birds, turtles and human activities
- Sampling of noise pollution and development of an Electronic Monitoring scheme for NATURA 2000 sites
- Sampling of debris pollution and development of a debris pollution modelling tool through the IOOS

Conservation applications

The results of the survey will be incorporated in the conservation actions conducted by ALNITAK and OCEANCARE with regards to the European Maritime Strategy Framework Directive, and more specifically:

- The NATURA 2000 site management plans
- The development of electronic monitoring services in collaboration with www.socib.es including:
 - Mapping of debris pollution aggregation fronts for mechanical recovery at sea or ashore
 - Mapping of noise from an array of VEMCO and SOUNTRAP listening stations
 - Mapping of bycatch risk hot spots
 - The development of active training and collaboration workshops with fishermen to enhance positive attitudes and empower positive leadership in the sector

Outreach

This will include scientific and technical presentation of the project in diverse for a (ICES, ISTS, ICMMPA, ECS, ACCOBAMS, GFCM, etc.), and also materials for raising public awareness.

SURVEY METHODOLOGY, ITINERARY AND DAILY ROUTINE

One working platform for several purposes: Keeping a ship out at sea is both a logistical and economical challenge. Yet it is essential to “get out there” to obtain essential data for monitoring the conservation status of species and their habitat. Citizen science has proven to be one of the solutions in this challenge, as can be clearly seen in the OBIS Seamap (<http://seamap-dev.env.duke.edu/species/>) that highlights how most data for the conservation of great pelagics comes from programmes run by organisations as OCEANCARE and Alnitak.

The primary method used by the Toftevaag in the OASIS Programme is acoustic and visual surveying. This is firstly necessary for detecting our target species, and secondly also to obtain data for the modelling of abundance and distribution of these species and human activities and impact.

Planning our transects: Visual surveys can be conducted regardless of visibility and sea state, but visual surveying requires good visibility and a sea state of either calm or small waves that do not reduce the detectability of cetaceans and sea turtles too much. In order to optimize our time at sea, we therefore need to carefully plan our transects in each expedition. Fortunately, for us, modern day weather forecasting has greatly improved over the last decades, making it possible to have reasonably good wind and wave forecasts for 2, 3 and even up to 7 days sometimes.

This is why in our expedition programme we have several homeports. This allows us to concentrate our work in those areas that are likely to have better working conditions and therefore more and better data.

Itinerary: Every evening after dinner, the crew will meet to download a “fresh” forecast and readjust the plan for the following day. In a seven-day expedition, we typically hope for two or three perfect calm sea days, two or three breezy days, and maybe one or two days of bad weather. Ideally, we would be able to choose in which order these different types of days come, but we can’t, so it is impossible to present a 7 day itinerary. What we do know is that we can expect three types of day:

CALM SEAS ☺ - With no wind or with very light breezes we have our best survey conditions, so we want to be out there making the most of it. We wake up just before sunrise, preparing breakfast, setting up the computers and research equipment boxes to be ready and “on survey effort” as soon as the light is right. With such conditions the detectability of cetaceans is of around 2 to 3 nautical miles. Also, with calm seas, the loggerhead sea turtles get ready to take a rest and recover body heat basking on the surface. We can therefore expect an exciting and productive day, but also a tough day under a hot sun.

BREEZY DAYS – With winds of Force 3 to 4 our sea state will increase with small waves and white caps. The detectability under such conditions comes right down to a couple of hundred meters! Therefore, you can imagine the added difficulty in detecting the animals and obtaining good data. However, we can still spot turtles close to the ship, and a group of playful dolphins or a breaching whale, so it is still worth getting out there to do the work.

STRONG WINDS AND SWELLS – Such conditions are unsuitable for developing our methodologies, so we stay in the shelter of the coast in port or preferably at anchor. These days we may use for catching up with data organisation, ship maintenance or simply resting.

Visual and acoustic sampling: Once the ship is underway and our crew and equipment is set, we can go “on effort”. If the conditions are perfect we will have a lookout post both on deck (starboard and portside) and in the crow’s nest, 12 meters high. Lookouts will scan the horizon combining naked eye and 7x50mm binoculars, looking for blows, splashes, fins, shadows or any other sign of cetaceans, turtles, birds, fish and human activities.

Every 20 minutes (approximately 2 nautical miles), we conduct a “point sampling”, recording all observations. This data, as well as any changes in sea state is automatically recorded in the computer that uses LOGGER, a special software produced by IFAW and shared with most cetacean research groups around the world. Another computer, connected to the towed hydrophone array (2 Benthos AQ4 elements), records the acoustic sampling on PAMGUARD, the “passive acoustic monitoring” software of IFAW.

The data recorded on both these softwares is at a later stage statistically treated to generate numbers and maps for management.

Debris sampling: Every hour (approximately 5-6 nautical miles), one lookout post will be set for 15 minutes at the bow to count macro plastic debris within a bandwidth of 30 meters. In addition, a series of microplastic samplings will be made using a net and filter.

But what happens when we spot something special?

Cetacean photo-id: Once cetaceans are spotted, and after the first sighting data is recorded, the ship alters course to approach the pod in an appropriate angle.

At a distance of around 60 meters, the ship slows down or halts to establish the species and try to count the number of individuals. If the pod is indifferent or evasive, we leave them alone. Chasing cetaceans is not only invasive and potentially dangerous for the animals, but also useless for obtaining good quality data.

On the contrary, if the cetaceans “accept” or even show interest in the presence of the ship, we prepare to start the photo identification methodology. In some cases, this is best done from the boat itself, but sometimes we made also use the RHIB. The aim is to find a harmonic navigation between vessels and dolphins which will provide us a good opportunity to shoot photographs and video to “catch fins” at a 90° angle.

On the bad weather days in shelter, we will revise the video and photo material of each sighting to select those images that can allow us to complete our photo id catalogue. This catalogue allows us to track individuals based on the shape, scars and colouring of their fins. We can use such a catalogue to calculate abundance and also analyse the social structure of pods.

Sperm whale! This is one of our top priority species. Usually we hear them before we see them. If so, we start an “acoustic homing in” on the animal(s) with the help of PAMGUARD. Spermwhales typically spend around 40 minutes underwater and 10 on the surface to recover and prepare for their next dive. The loud “clicks” allow us in most cases to get the ship within

one mile of their next surfacing. As soon as the spermwhale(s) goes silent, we know it is coming to the surface. All “eyes on deck” scan the horizon looking for the first blow. The RHIB is ready beside the Toftevaag to go fast if the whale(s) is spotted far away. Our first aim is to get close to the animal(s) from behind in order to get a good photograph of the fluke just as the whale dives down. Our second aim is to dive where the whale went down to find a piece of skin that can be useful for genetic analysis. In addition, the entire acoustic recording will allow us to sample the acoustic signature of the whale(s) that we call CODAS.

TORTUGA! As with the spermwhale sightings, the call for turtles also send a shiver down the spine of the crew. The first priority is to avoid that the basking turtle is awoken by the ship. Sometimes the turtle is awake and close to the ship. In such circumstances, the “turtle catchers” may need to go straight in the water to try to catch the animal. But in normal conditions, the Toftevaag has a very particular methodology with regards to these amazing reptiles. With the ship at stop sometimes over 200 meters away, two divers slowly approach the basking turtle. Everyone remain silent on board, as noise travels far on a flat calm sea surface could alarm the turtle. The divers approach the turtle until they are within a few meters. First, they use Gopro cameras to film the “oasis effect”. After this, if the animal is appropriate for the gliding turtle experiment, it is gently caught and taken on board for tagging with a satellite transmitter.

Film and photograph: In complement to the scientific methodologies, outreach is also a key element of our work. Video recording, sound recordings and photographs are an essential element for the production of materials for raising public awareness, education and capacity building.

LIFE ON BOARD

Team spirit

On board the Toftevaag, or other survey vessels used, the typical ratio is of four researchers to eight expeditioners. In our expeditions there is no “*us & them*”, as both house hold duties, navigation and survey shifts are split between all of us. Everyone on board is essential.

Our team has a great experience in combining the focus their research responsibilities require with the capacity and enthusiasm of sharing our passion about their work with expeditioners. We value this as a unique learning experience for all of us, and a fantastic opportunity to make new friends sharing perspectives.

The life on board a historical ship as the Toftevaag does the rest to catalyse the strongest team spirit.

Expedition planning - personal contact - expectations

One of the most fascinating steps in any expedition is in the planning and preparation. Checking out books and documents, studying maps, getting equipped, etc. This phase also includes a lot of dreaming.

We consider this phase critical and dedicate time to making it constructive and fun. It is not only about becoming personal and appreciating those that are interested in our work, or about basic logistical details.

It is also a matter of adjusting the expectations and pre expedition dreaming. It furthermore gives us an opportunity of starting up the team dynamics prior to the expedition.

These are the details that can make a difference!

When you sign up, you will receive an **expedition briefing**. As you enjoy reading it, we will be in touch with you and the other team members in order to get to know each other and answer questions you may have.

Safety first & “a clean ship is a happy ship”

Most of the people who have sailed with us on board Toftevaag had never stepped on a sailing boat before. Indeed, in most of our surveys we do not require any sailing or navigation experience. We have therefore 25 years of experience on running ships with novel crews and making it a safe and enjoyable experience for everybody.

Safety starts as early as the planning phase, with the equipment and the travel logistics. First thing on board once you have been assigned a bunk, the skipper makes an introduction talk to safety, including all aspects, from the more dramatic “abandon ship” situations to “little” details that can make a difference. Among these, we can highlight protection from the heat and dehydration or maintaining the ship clean, two key aspects very closely related to safety.

In addition to the safety protocol, expeditioners will be asked to sign our alcohol and drug policy. As external assistance, the expedition counts on an efficient maritime rescue service and major hospitals within 55’ helicopter flying distance.

Accommodation and food

The Toftevaag is first of all a working boat. This is not the yacht you would choose for a luxurious honey moon! There are no private cabins, just an old fish hold with good bunks, a simple galley and 3 simple toilets. Instead, the Toftevaag offers a very special magic made up of Norwegian wood, canvas, hemp and oil lamps. It recreates a unique maritime environment that catalyses team spirit and the pleasures of being in harmony with the sea. In our research expeditions we use the latest technologies of remote sensing, as satellite tags, hydrophones, gliders, etc. Yet you could take a black and white picture during your expedition and it could pass for a photograph of 1910.

During the summer expeditions, most of the crew will actually take their mattress out on deck and sleep under the stars. We call it the “one million star hotel”. But maybe the most interesting aspect of life on board is the respect we need to have with regards to water, electricity and waste management.

This takes us to ALNITAK’s **sustainability policy**. The Toftevaag is not only a working platform. When we anchor in a cove or when we enter port, the Toftevaag plays an important role in the outreach of our programme, and in setting the example of how simple every day gestures can make a difference.

We have no cooks on board; instead, we have a good time sharing the cooking in teams. We have a healthy diet on board, taking advantage of the great variety of good quality Mediterranean markets.

BALEARIC ISLAND EXPEDITIONS DATES 2016

TEAMS:

- I – 23 to 28 March – KAI OPEN OCEAN COURSE*
- II – **21 to 27 May**
- III – 4 to 10 June – KAI OPEN OCEAN COURSE*
- IV – **11 to 17 June**
- V – **18 to 24 June**
- VI – **2 to 8 July**
- VII – **9 to 15 July**
- VIII – **16 to 22 July**
- IX – **23 to 29 July**
- X – 30 July to 5 August – KAI OPEN OCEAN COURSE*

* KAI OPEN OCEAN COURSE – These expeditions are reserved exclusively for University Students taking this course that accounts for two credits under the EU Bologna Process. The course adds a series of theory sessions to the practical survey workhours of the expedition. Expeditioners in other teams interested in this course can request all or part of the course theory sessions.

PARTICIPATION COST 980 Euros

KAI OPEN OCEAN COURSE FEE 250 Euros

Minimum of 6 volunteers per team to cover basic cost of expedition

PARTICIPATION COST TO EXPEDITION: ALNITAK membership/participation to cost of 980 Euros / Expedition / Expeditioner, covering the expenses (ship / food / port / fuel / insurance / research equipment).

Survey vessel Toftevaag: Ketch, length over all 18 metres / 1 single cabin incl. messroom – galley / 3 toi-lets.

Accommodation: dormitory style in one big cabin – “one million star hotel”.

Personal Insurance: ALNITAK Expeditions recommends taking a personal and travel insurance for the expedition.



What to bring: Try to reduce your luggage as much as possible given that we are in a boat where space is limited. Backpacks are more appropriate than suitcases.

In an expedition of this kind, clothes should be comfortable. Important: bring one pair of foot ware with white sole to be used only on the ship. For the day we recommend t-shirts or long-sleeved shirts for sun protection, shorts, bathing suit and towel (or similar), slippers, warm clothes for the nights (long pants and a jersey) and clothing for outdoor dining at port, if necessary.

Bedding; sheet or summer sleeping bag and washcloth.

The sun protection is extremely important. Do NOT forget sunscreen, sunglasses and a cap or similar to protect yourself from the sun.

Bag & cabinet; Personal hygiene and medications should be provided by each Expeditioner; the boat has a first aid kit, but the Expeditioner should take his own medications, especially those that will help to avoid seasickness.

MENORCA 2015 – GREAT PELAGICS SURVEY

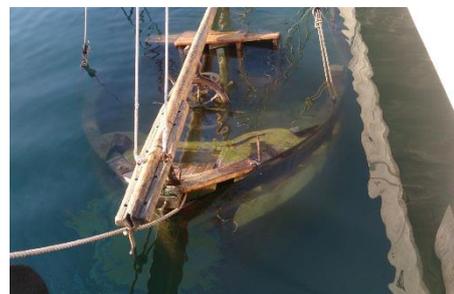
ALNITAK and OCEANCARE conducted a 30-day survey in waters of the Balearic Islands setting the first steps for a long-term great pelagics monitoring programme that will serve as laboratory for the establishment of best practice guidelines for the management of marine protected areas and the conservation of marine ecosystems under the EU Maritime Strategy Framework Directive, the CMS Regional Seas Programme and the UNEP's Mediterranean Action Plan.



The historical fishing boat Toftevaag at anchor in Menorca

Exactly one year ago the emblematic nature conservation ship Toftevaag was sunk by a careless shipyard in the port of Mahon on the Island of Menorca Facebook Toftevaag . Now with the active and economic support of OCEANCARE and 30 volunteers the Toftevaag has come to life again, successfully accomplishing a 30-day survey in waters of Menorca.

<https://www.facebook.com/groups/164329225291/>



A team of five researchers has led this initiative; Ricardo Sagarminaga as skipper and survey coordinator, Ana Tejedor as programme coordinator and liaison with conservation and management frameworks, Silvia Frey as OCEANCARE programme coordinator and debris pollution, water noise and spermwhale specialist, Bruno Claro as visual survey coordinator and sea turtle tagging coordinator, and Salvador Sanchez as acoustician and spermwhale specialist.



The crew

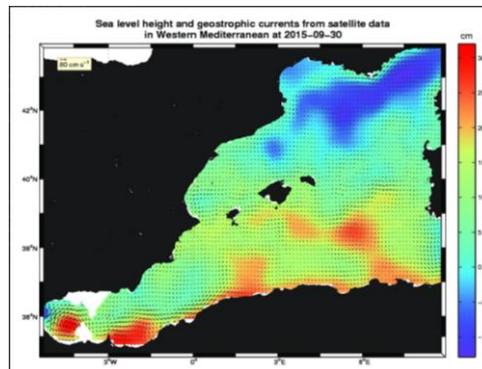
Working hand in hand with this research team, 30 volunteers have participated actively and economically to make this survey possible, totalling over 30.000 Euros, 3000 hours of work and a lot of positive energy.



Images of volunteers

The survey this year had two main points of focus. The first was a pioneering experiment of satellite tracking of loggerhead sea turtles in conjunction with SOCIB (www.socib.es), NOAA NMFS and IFREMER / GTMF to develop technological measures to mitigate the risk of bycatch of turtles in fisheries. The second primary objective was the initiation of a spermwhale population monitoring scheme collecting photo identification data, genetic samples from discarded skin and an acoustic library of CODAS¹. Furthermore, the survey included several other data samplings of human activities, underwater noise and sampling of micro plastic and macro plastic.

This map shows the transects conducted and different sightings of sea turtles and cetaceans. Although the overall objective for establishing the protocols for a long-term programme were successful, the oceanographic conditions made it extremely difficult to conduct the turtle tagging, given that the divergence zones where these tend to aggregate were very far offshore.



www.socib.es sample map

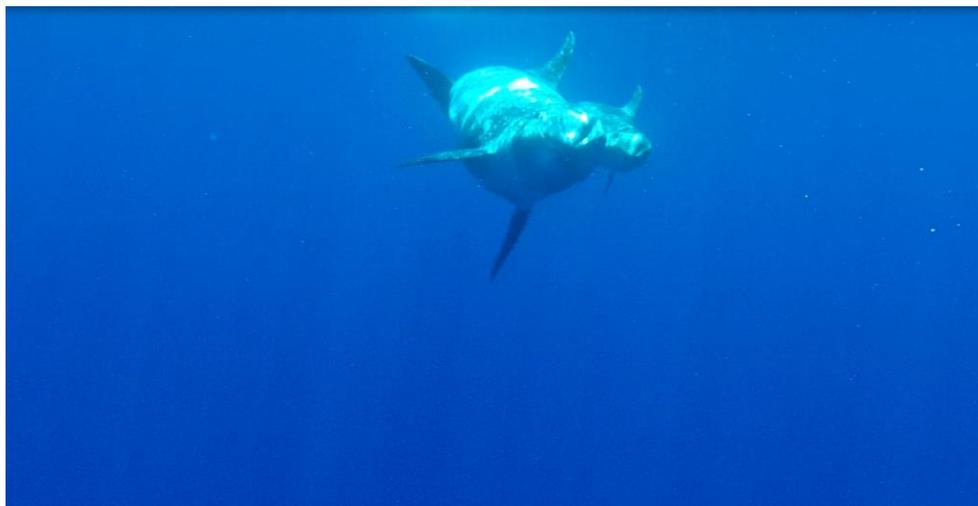
This, together with the adverse weather conditions resulted in only being able to reach the adequate area on one day. This day was extremely productive, with 12 turtle sightings and the tagging of two juvenile turtles which can now be followed by the public and researchers on www.seaturtle.org and <http://seaturtle.socib.es/ca/turtle-viewer/>

¹ CODAS – Each spermwhale population has its own characteristic rhythmic sound called CODA.



Images of turtle tagging

Unfortunately, for the purpose of the innovative tagging experiment the survey has not been successful. However, over the next few months the ALNITAK and SOCIB crews will be on stand-by to conduct new tagging transects as soon as conditions are favourable. In contrast, and for the pleasure of the Toftevaag crews, the month of August's lack of turtles, plankton, jellyfish and other associated species, resulted in abnormally clear waters that allowed us to enjoy fantastic conditions for filming and photographing deep-sea squid eating odontocetes as the sperm whale and the Risso's dolphin.



Risso's dolphins mother and calve checking out the Toftevaag



Spermwhale filming and skin sampling

The Toftevaag is now back in the port of Mahon ready to start the second phase of her restoration. If 2015 has been a challenging year in terms of getting her ready to work again, now prospects for 2016 look very good for getting the Toftevaag in complete “ship shape” for this new phase of research and conservation of marine biodiversity in one of Europe’s hot spots of great pelagics.

This new programme of applied science follows the tracks of previous projects, bringing together a partnership of institutions that have very clear goals with regards to working together with sectors of transport, fishing, energy, tourism and defence to find solutions to some of the most important risks for the conservation of the biological diversity and productivity of our oceans. The technological measures developed here to mitigate risk are then taken to other biodiversity hotspots and high risk areas of the Atlantic, Pacific and Indian Ocean.