CELEBRATING 25 YEARS

AquaBioTech Group

CAPABILITY STATEMENT

Marine & Fisheries

Environmental Social Impact Assessments (ESIAs) | Marine Policy & Planning | Scientific Diving | Water and Sediment Analysis | Habitat Mapping | Fouling and Antifouling Poss. Testing | Marine Protected Area (MPA) management | Bathymetric and Oceanographic Surveys | Drone & ROV Operations | Fisheries assessments | Fish Biometrics | Otolith and spine ageing |

Contents

Introduction

AquaBioTech Group is an international aquaculture, fisheries and marine consultancy and engineering company with its headquarters strategically located in the centre of the Mediterranean, on the island of Malta, and with offices in five other countries. The location of **AquaBioTech Group** allows us to provide services to European partners, while keeping costs low. Our network includes global clients in over fifty-five countries.

AquaBioTech Group is made up of three Divisions: Design, Engineering, Technology Services (DETS); Testing, Research, Inspection and Certification (TRIC); and Consulting, Advisory and Teaching (CAT). Each Division within the company specialises in a field of work related to aquaculture development, aquatic sciences, engineering and technology. **AquaBioTech Group** is primarily involved in aquaculture, fisheries, environmental and other marine/oceanographic projects.

Marine & Fisheries is a department within the CAT Division providing advisory and consultancy services relating to the marine environment. Our services include a range of marine biology and ecology survey work, with capabilities covering: shallow water marine surveying; ecological studies; environmental monitoring; infrastructure development; and project management within the marine industry. Our expertise covers a wide range of disciplines relating to marine data acquisition. Our key areas of expertise include:

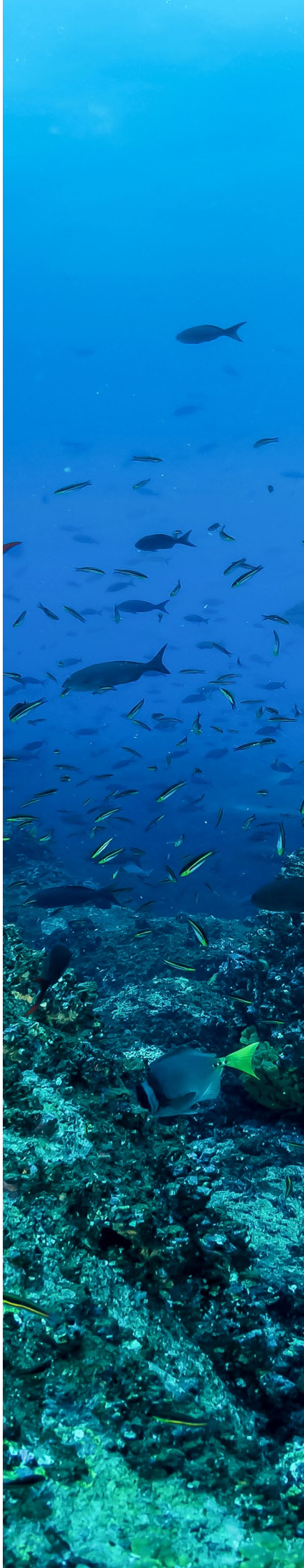
- Benthic habitat surveys and mapping, and ground-truthing surveys
- Remotely Operated Vehicle (ROV) inspections
- Unmanned Aerial Vehicle (UAV) surveys and remote sensing
- Fish otoliths and spines ageing
- On-board vessel observations
- Stakeholder consultations
- Scientific diving
- Environmental Impact Assessments (EIA) / Statements
- Marine Baseline Environmental Reports (MBES)
- Environmental Monitoring and Management Plans
- Marine Protected Areas (MPA) management
- GIS for marine applications and spatial planning

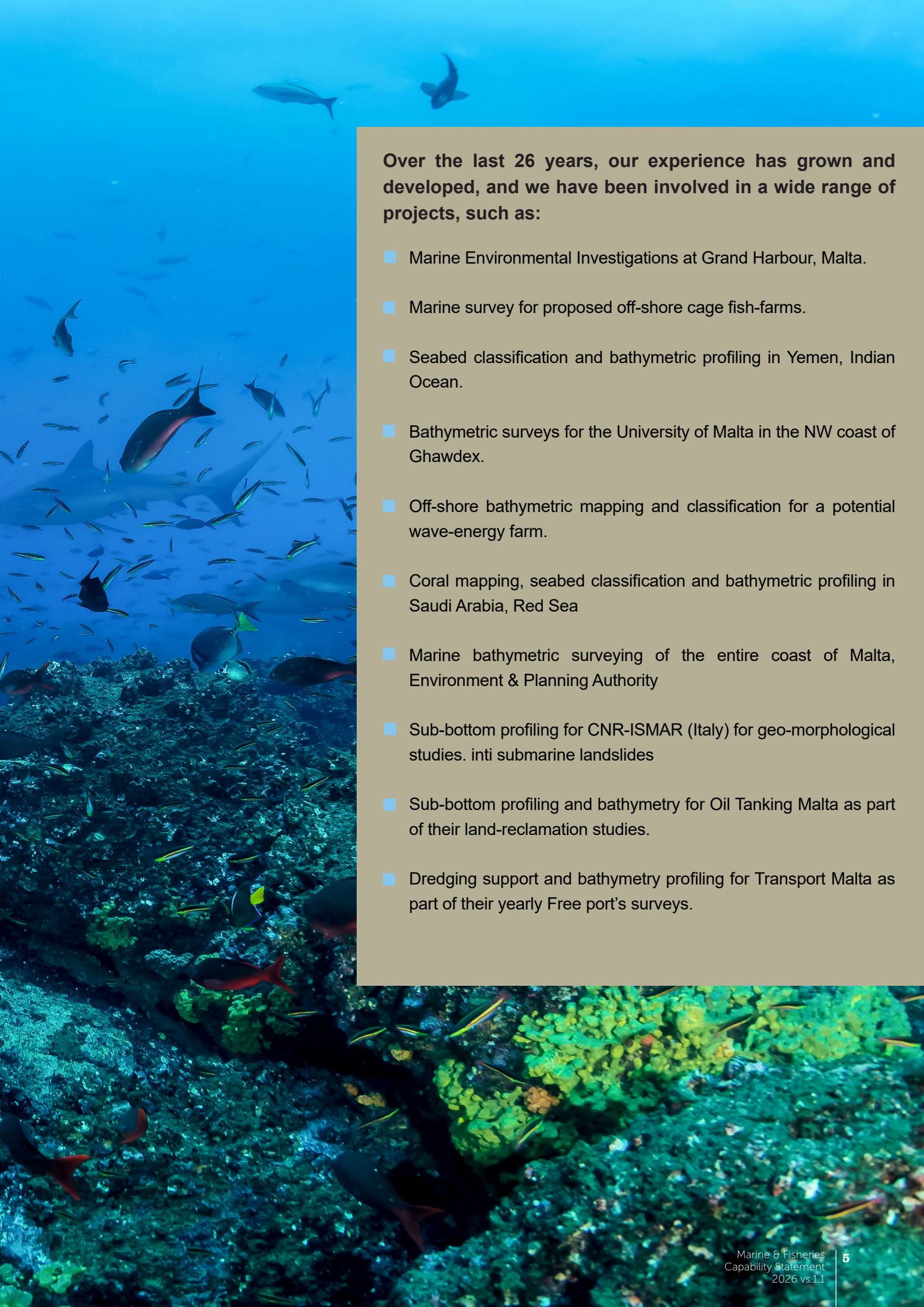
Marine & Fisheries

Company Experience

Marine & Fisheries is an established part of our Consulting Advisory and Training (CAT) activities and has undertaken assignments in the Mediterranean and Middle East. Projects recently undertaken include, but are not limited to:

- Environmental Impact Assessment for anchoring and mooring activities in Malta's territorial waters.
- Marine Baseline Environmental Reports for sites along the coasts of the Northern Red Sea and Gulf of Aqaba.
- Sediment quality assessment and classification for electric power plants.
- Otolith extraction, polishing and age-reading of commercially exploited fish.
- Biological studies-sampling for adults of the Atlantic-Wide Research Programme for Bluefin Tuna.
- Environmental Impact Assessment for brine discharges of SeaWater Reverse Osmosis (SWRO) plants across Maltese coastal waters.
- Preliminary Marine Route Survey and Post Survey Studies for the second electrical cable connection between Malta and Italy.
- The provision of monitoring and assessment of exploited marine species in Maltese waters.
- Potential Migratory Processes of Atlantic Bluefin tuna (PROMPT) collaborative project with Ifremer.
- Study on ecosystem-based approaches applied to fisheries management under the Common Fisheries Policy (CFP) for the Mediterranean and Black Seas.
- Marine bathymetric surveying of the entire coast of Malta.
- Coral mapping, seabed classification and bathymetric profiling in Saudi Arabia, Red Sea.





Over the last 26 years, our experience has grown and developed, and we have been involved in a wide range of projects, such as:

- Marine Environmental Investigations at Grand Harbour, Malta.
- Marine survey for proposed off-shore cage fish-farms.
- Seabed classification and bathymetric profiling in Yemen, Indian Ocean.
- Bathymetric surveys for the University of Malta in the NW coast of Ghawdex.
- Off-shore bathymetric mapping and classification for a potential wave-energy farm.
- Coral mapping, seabed classification and bathymetric profiling in Saudi Arabia, Red Sea
- Marine bathymetric surveying of the entire coast of Malta, Environment & Planning Authority
- Sub-bottom profiling for CNR-ISMAR (Italy) for geo-morphological studies. inti submarine landslides
- Sub-bottom profiling and bathymetry for Oil Tanking Malta as part of their land-reclamation studies.
- Dredging support and bathymetry profiling for Transport Malta as part of their yearly Free port's surveys.

Marine & Fisheries

Services

Ecological studies and scientific diving

We are able to cover a wide range of baseline studies in temperate and tropical marine ecosystems, benthic ecology, Environmental Impact Assessments (EIA), management and monitoring plans, water and sediment sampling and analysis, and desktop-based work, ranging from literature reviews, GIS and seabed classification, and statistical analysis.

Our equipment capabilities include (but it is not limited to): a multi-parameter sonde capable of accurately collecting physical data up to 100 meters in the water column (pH, RDO, conductivity, turbidity); a Niskin bottle for deep water sampling; two Van Veen grab samplers for sediment and macro-fauna sampling; and a vibratory sieve shaker for granulometric analysis.

In addition to standard fieldwork techniques, through rigorous training and adherence to safety protocols, **Marine & Fisheries** scientific divers are equipped to perform various tasks, including conducting photo and video surveys on transects and plots, habitat mapping and ground-truthing surveys, collection of sediment and macro-benthic samples.

Artificial reefs studies

Artificial Reefs (ARs) are increasingly recognised for their importance in marine environments, serving as vital structures that promote biodiversity and enhance ecological resilience via habitat creation, biodiversity enhancement, and ecosystem restoration.

Our specialties on ARs include biodiversity assessments and colonisation dynamics, ecosystem functioning, impact of design and materials on local biota, pre-deployment ecological surveys, deployment planning and site-selection, management plans, post-deployment annual and seasonal monitoring.

ROV and UAVs surveys and monitoring

Remotely Operated Vehicles (ROVs) and Unmanned Aerial Vehicles (UAVs) have become essential tools in marine ecology, providing innovative solutions for surveys and monitoring.

These technologies offer cost-efficient, safe, and comprehensive methods for data collection, ultimately supporting conservation efforts and sustainable management of marine resources.

Our light and portable Deep Trekker Pivot Expert ROV is equipped with a SubSea USB-L, 330° view camera, auxiliary lighting, a two-function grabber arm and four vector thrusters to enhance stability and movements. The main applications include underwater exploration, habitat assessment and mapping, environmental monitoring, construction monitoring and infrastructure inspection, and detection of obstructions.

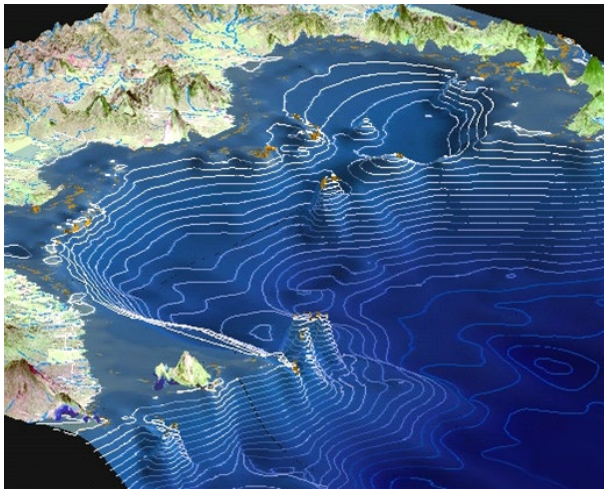
Similarly, our drones, DJI Mavic 2 Pro and DJI Mavic 3E, can be deployed for drone operations to perform aerial surveys, habitat mapping for shallow-water habitats (e.g., coral reef, seagrass meadows), plastic and micro-plastic detection and monitoring, species survey and monitoring (e.g., marine mammals), and infrastructure monitoring.

Marine & Fisheries

Services

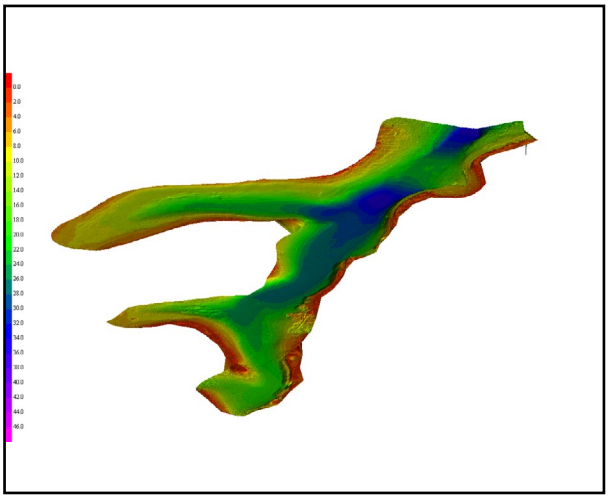
Water and sediment quality studies

Marine & Fisheries provides analysis services of seawater and freshwater for physical and chemical quality including temperature, salinity, density, dissolved oxygen, pH, turbidity, colour, nitrites, nitrates, phosphates, sulphides, and heavy metals. These main quality parameters can affect certain human activities such as aquaculture development including site selection studies. Additionally, physical and chemical composition analysis of sediment, including pollutant levels, can be carried out using granulometric analysis.

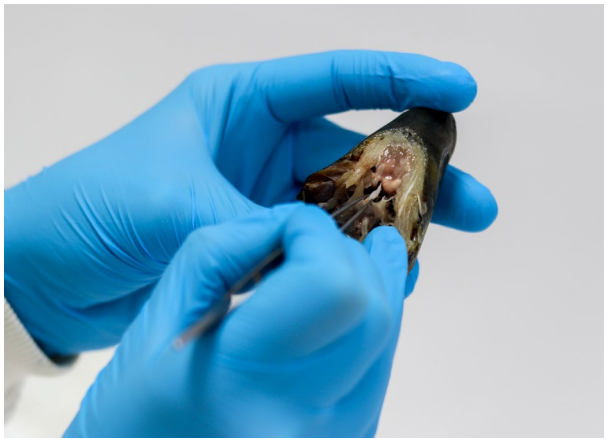


Otoliths and spine processing and ageing

Age data, when combined with fish size, is essential for calculating growth and mortality rates, which are critical components of national stock assessments for commercially exploited fish species. These assessments ultimately estimate the total number of fish available in wild stocks. To determine the age of individual fish, otoliths (or ear stones) are extracted from the cranial cavity, meticulously cleaned, and polished. Researchers can then ascertain age by counting the concentric rings that accumulate on the otolith throughout the fish's life.



This methodology has been successfully applied to several species within the Mediterranean Integrated Trawl Survey (MEDITS) program on behalf of local ministries following their annual sampling campaigns. Furthermore, our team is equipped to analyse large pelagic species, including swordfish and Atlantic bluefin tuna, utilising fin spines and specialised precision cutting tools to obtain accurate age data.



On-board vessel observations

The collection of fisheries-dependent data, including bycatch information, biometric measurements, and sex identification, is conducted through collaboration with local fishing vessels and processing ships. Our scientific observers are trained to assess interactions with marine mammals, sea turtles, seabirds, and other animals tagged for research purposes.

Data recorded onboard ensures that information provided by fishing vessels is accurate, thoroughly quality-checked, and includes documentation of any incidents involving bycatch and the capture of protected species. Additionally, observations contribute to minimizing Illegal, Unreported, and Unregulated (IUU) fishing activities. The data collected are essential for national fish stock assessments, evaluating experimental fishing gear, and monitoring endangered species.

Policy research

The Common Fisheries Policy (CFP) and related regulations significantly influence national and regional commercial and sport fisheries, aquaculture, and processing sectors, shaping the operational framework for fisheries and aquaculture. The Water Framework Directive (WFD) plays also a crucial role in water resource management across Europe, aiming at protecting all surface and groundwater bodies, and promoting sustainable water management practices.

The Marine Strategy Framework Directive (MSFD) aims to achieve Good Environmental Status (GES) of the EU's seas and oceans and to protect the resource base upon which marine-related economic and social activities depend. **AquaBioTech Group** supports clients and stakeholders in navigating these policies' complexities to ensure sustainable practices that benefit both the environment and the economy.

Marine & Fisheries

Services

Plastic and micro-plastic pollution detection and monitoring

The survey and monitoring of plastic and microplastic pollution in marine environments have become increasingly critical due to the pervasive threat these pollutants pose to aquatic ecosystems. Our KC Denmark Manta net equipped with a digital flowmeter, specifically designed for microplastic sampling, can effectively collect surface water samples, capturing various sizes of plastic debris, including microplastics. This method is particularly valuable for assessing the abundance and distribution of microplastics umulation and monitor changes over time, enhancing our understanding of how plastic pollution affects marine habitats.

Together, Manta nets and drones represent a powerful combination for comprehensive monitoring efforts, facilitating data collection that informs conservation strategies and policy decisions aimed at mitigating plastic pollution in our oceans.

Oceanographic studies

Marine & Fisheries employs advanced technologies to conduct comprehensive oceanographic studies, which are essential for understanding marine environments. These studies utilise various data acquisition techniques to assess the physical characteristics of the ocean and its seabed, supporting marine spatial planning and construction projects

Bathymetric studies

3D bathymetric surveys are critical for accurate representations of seabed elevation. By utilising side-scan sonar and sub-bottom profiling technologies, **Marine & Fisheries** can provide detailed bathymetric data that is essential for marine construction, dredging works, aquaculture installations, environmental assessments, and wind farm site selection. The bathymetric data is presented in either 2D or 3D formats, offering a clear depiction of seabed topography.

Side-scan sonar technology

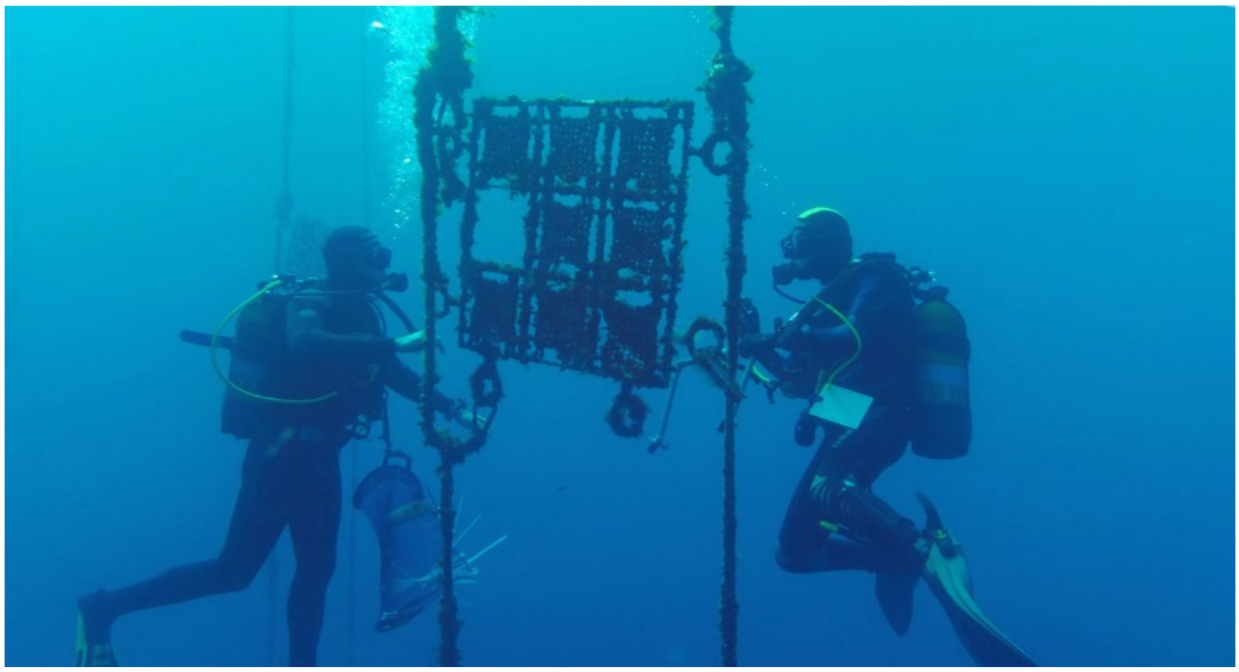
Side-scan sonar is the industry-standard technology for detecting wreckages, obstructions, and underwater objects. **Marine & Fisheries** utilises side-scan sonar with effective working depths down to 300 m and high image resolutions. This technology aids in locating lost equipment, detached mooring structures, geological features, and other objects resting on the seafloor.

Sub-bottom profiler technology

Sub-bottom profiling surveys are conducted using powerful low-frequency echo-sounding technology that provides information about the upper layers of the seafloor, extending as far down as 40m below the seafloor for accurate sub-benthic analysis. This technology is crucial for obtaining sub-bottom information necessary for various marine applications. It can be used independently or in conjunction with bathymetric and side-scan sonar surveys to deliver comprehensive insights into seabed characteristics

Support services

In addition to our hydrographic services, **Marine & Fisheries** offers a range of solutions to complement data acquisition activities. Data post processing, data quality control and GIS mapping can be performed in-house while ground ground-truthing surveys including precise positioning, in -situ sampling and SCUBA/ROV investigations can be used to confirm previously acquired data in the field.



Marine & Fisheries

Survey Platforms

ABT Marine and Fisheries utilises a couple of marine survey and research vessels and has access to others vessel types should this be required. These vessels enable us to cover all types of shallow-water and off-shore surveys. All vessels are capable of good cruising speeds for rapid deployment and economical survey speeds for good fuel efficiency. A work area at the stern provides space for easy deployment of all types of equipment and direct access to the interior where the topside units and laptops are located.

Suitable Uses of the Vessels

- SCUBA diving operations
- Multi-parameter sonde
- Sediment grabs and Niskin rosette deployment
- Hydrographic survey support
- ROV inspections (recoveries, filming)
- Drone surveys and habitat mapping
- Environmental studies (trawling, benthic)
- Resource recovery
- Metocean equipment deployment
- Positioning services
- Seabed classification
- Bathymetric mapping
- Side-scan sonar surveys
- Marine heritage / Archaeological services

Deep Trekker ROV

AquaBioTech Group houses a Deep Trekker ROV, which allows our qualified staff to perform various underwater observations at ease. The Deep Trekker ROV can be used in a variety of sectors including aquaculture monitoring and net inspections, marine biodiversity and salvage surveys, and water and sediment sample collection.

The ROV is fitted with 330° range of view camera, auxiliary lighting, a two-function grabber arm and four vector thrusters to enhance lateral movement. The unit is connected to a topside hand-held control module. This system is very portable and has a small footprint, making it easy to mobilise and incorporate into any project if needed.

Vessel 1

MV "SAHARA Z 11

PRINCIPAL FEATURES:

Vessel Type: Rigid Inflatable Boat Length Overall: 7.3 m
Vessel use: Survey / Research / Supply

NAVIGATIONAL EQUIPMENT:

Furuno colour echo sounder Garmin GPS with integrated AIS

REGISTRATION:

Port of Registry: Valetta, Malta Official Number: 9307
Gross: 2.67 tons
Built: 2004

ACCOMODATION:

Passengers: 5
Crew: 1

Vessel 2

MV "WILFRED

PRINCIPAL FEATURES:

Vessel Type: Glass Fiber, Length Overall: 11m
Vessel use: Survey / Research / Supply

NAVIGATIONAL EQUIPMENT:

Simrad radar Robertson Autopilot
Furuno colour echo sounder Garmin GPS with integrated AIS

REGISTRATION:

Port of Registry: Valetta, Malta Official Number:11682
Gross: 14.11 tons
Built: 2001

ACCOMODATION:

Berths: 5
Seating Capability: 12

Marine & Fisheries

Laboratory and Analytical Capabilities

Internal analysis and practices

- General biometry
- Otolith and spine processing and ageing
- Stomach content
- Granulometric analysis
- Examination via gross necropsy
- Optical microscopy
- Microbiology

With partner laboratories and research centres

- Taxonomy
- RT PCR
- Proximate composition of whole body or target organs
- Water and sediment physical-chemical analysis

Marine & Fisheries

National, EU and Global Research Initiatives

AquaBioTech Group is actively involved in research and academic activities at both National and European level. Our Research and Development and Innovation (RDI) department are involved either in collaborations with local universities and public institutions or participate in larger EU funded consortia.

National & EU: These national and European research projects enable **AquaBioTech Group** to benefit from early innovations and scientific discoveries related to the marine environment. Our collaborative projects utilise our diving and survey techniques and capabilities combing our data with new and emerging technologies such as artificial intelligence and machine learning. Should you wish to find out more about our Research and Development and Innovation portfolio please visit our website for more project specific information: https://aquabt.com/rdi/research-development-and-innovation/.

International: **AquaBioTech Group** collaborates at an international level with various stakeholders under the MarTERA, PRIMA Initiative (ERA-NETs), JPI Ocean, Eureka-Eurostars Programme and other initiatives focusing on research, business and technology co-operation.

Education and Training

As part of its sustained commitment to increase training and educational opportunities in themes related to marine biology and ecology, **AquaBioTech Group** can offer several short, intensive, hands-on courses in marine sciences tailored to the needs of our clients. Should you or your organisation wish to organise a bespoke training session please contact bdd@aquabt.com. Below are a few examples of courses that we can provide, but we would be more than happy to discuss your training needs with you and build a programme suitable for your needs.

Marine biology introductory courses

A stimulating intensive course organised by **AquaBioTech Group** in Malta, including lectures on marine biology, ecology, and zoology. SCUBA diving and snorkelling sessions with certified divers and marine biologists can also be incorporated into this course

Marine ecology advanced courses

AquaBioTech Group offers interactive courses including classroom theory and in-field equipment deployment experiences to offer a comprehensive understanding of the most relevant surveying and monitoring techniques available. During the classroom sessions, students will learn about fieldwork preparation, survey and monitoring design and planning, fieldwork operations (such as species detection and identification, pollutions monitoring, habitat mapping, ecological baseline studies, etc.), data and statistical analysis, and reporting.

The field component will incorporate the applications of marine surveying used in Malta's marine environment. Participants were able to visit **AquaBioTech Group**'s field test sites and perform semi-quantitative assessment of fouling communities on coatings for the shipping and aquaculture industry.

Internships

The facilities at **AquaBioTech Group** offer a unique experience for undergraduates and post-graduate students to gain valuable exposure to the aquaculture and aquatic research industry. **AquaBioTech Group** encourages anyone seeking to explore a career in aquaculture and/or the marine environment to enquire about one of the organised training sessions noted above. Alternatively, **AquaBioTech Group** provides ample opportunity for students and trainees to develop skills and know-how in the various fields of activity in which it operates: fish rearing, aquaculture engineering, water chemistry, fish health and nutrition, toxicology, marketing, project management, business development, etc.

We offer a range of short to long term internship or placement opportunities (3 - 12 months) where you can get hands-on skills and practical training. Should you wish to enquire about such an opportunity submit your query along with your CV to Recruitment (**recruitment@aquabt.com**). We are familiar with the EU framework and the Erasmus+ program and are ready to provide the necessary help regarding the administrative and scholarship requirements. Interns and students can secure placements in any division or department within the company. The below highlights some of the opportunities specific to hands-on aquatic experiences:

ABT Innovia offers the chance to be involved in and experience commercial contract research services. To understand the processes involved in supporting the development of: vaccines; functional feeds; alternative protein sources; culture technologies; and production techniques across a wide range of commercially important species.

The **Labs** department offers students the opportunity to flex their laboratory and analytical skills, bringing their undergraduate experience into real life practice. You will have the opportunity to learn how to culture a range of algae, perform ecotoxicology testing, gain knowledge and understanding in techniques and equipment used within microbiological and ecotoxicological laboratories as well as the methodologies used and the regulatory requirements of working within a commercial laboratory.

Our **Marine & Fisheries** department provides a range of services including marine surveying, construction support and mapping/GIS. The techniques we employ include bathymetric and side scan sonar surveys, bottom type assessments, sub-bottom assessments, data confirmation and site inspections using both remote sensing and underwater video techniques

Who we are

Divisions within **AquaBioTech Group**

Within **AquaBioTech Group** there are various divisions that focus on different business areas such as:

Testing, Research, Inspection & Certification (TRIC)

With over 20 years of experience carrying out contracted research for the aquaculture industry, **ABT Innovia** continues to offer its services to companies from all over the world needing to develop and test their products for an ever expanding aquaculture industry..

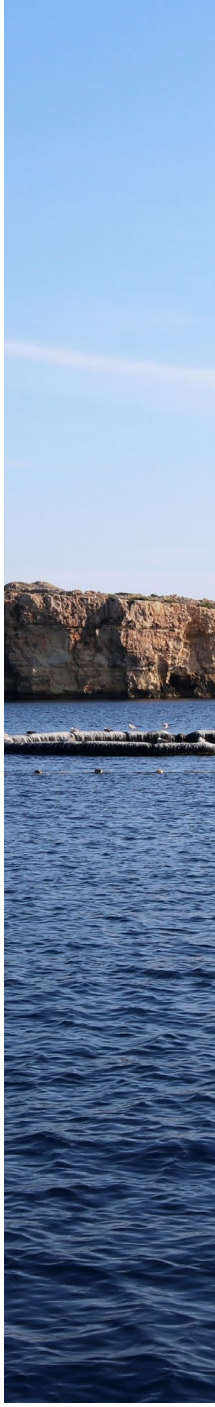
ABT Innovia carries out research services to support the development and eventual commercialisation of vaccines, functional ingredients, alternative protein sources, culture technologies and production techniques, amongst others, for a wide range of commercially important species under any combination of culture conditions, in its fully licensed and biosecure R&D facilities.

ABT Innovia continues to expand its capabilities to cater for an ever-widening range of research requirements.

Consulting, Advisory & Training (CAT)

Our CAT Division provides consultancy and advisory services for aquaculture, fisheries and other marine / oceanographic projects We undertake projects in collaboration with international research institutions, governmental agencies, NGO'S as well as the private sector. We are experienced with working globally at an international scale and participate in a range of sector related networks with clients in over fifty-five (55) countries.

Aquaculture provides due-diligence and risk assessments for all forms of aquaculture operations, as well as consulting on operational issues and improvements in hatcheries, fish farms, research facilities and processing facilities. For new developments we undertake complete assessments for projects such as site selection, financial reviews, risk assessments and technical/ non-technical surveys. Additionally, we provide sustainable business planning for all businesses at any level to assist in their next stage of growth.



For the marine environment, **Marine & Fisheries** offers a broad range of services. Our expertise encompasses several disciplines enabling us to carry out research, conservation, and commercial activities. We provide a complete set of multilevel field surveys, and is specialised in offshore and inshore collection, processing, and analysis of fisheries data, samples and fish aging critical for assessing national stock levels for commercially exploited fish species.

Design, Engineering & Technology (DETS)

Our company undertakes a variety of different RAS projects including full project engineering, with all projects including an online monitoring system for continuous monitoring from our head office.

AquaCirc™ has developed several highly efficient and cost-effective Recirculation Aquaculture Systems (RAS). Combining numerous state-of-the-art recirculation apparatus, such as specifically designed tanks, Glass Reinforced Plastic (GRP) fibreglass products, specialist products and saturation cones.

With almost twenty years of experience of RAS experimental research, with many different species of fish (and other aquatic animals) in our R&D facility in Malta, **AquaBioTech Group** has gained vast knowledge on fish nutrition, fish health, fish behaviour, and in-depth understanding of fish husbandry. As a result, **AquaBioTech Group** developed **ExperiRAS™** which is customised to match client needs. The **ExperiRAS™** system design is a result of the work of **AquaBioTech Group**'s engineers and architect, each offering a wide variety of skills, including mechanical engineering, industrial automation and wastewater treatment.

CAPABILITY STATEMENT

Marine & Fisheries

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CELEBRATING 25 YEARS

AquaBioTech Group

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