



Established in 1884

The Marine Biological Association

Incorporated by Royal Charter



Annual Report
2019-20



The Marine Biological Association (MBA) is one of the world's longest-running societies dedicated to promoting research into our oceans and the life they support. Since 1884, we have been providing a unified, clear, independent voice on behalf of the marine biological community and currently have a growing membership in over 40 countries. We also run a leading marine biological research laboratory where many eminent scientists - including twelve Nobel prize winners - have carried out their research.

This report showcases some of our achievements from April 2019 to March 2020.



Incorporated by Royal Charter

A Learned Society defined and recognised by Royal Charter
*Together we are **the** voice of marine biology*

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Cover images top left to right: Sean McTierney, Skipper of Research Vessel *MBA Sepia* repairing nets; a butterfly blennie; jewel anemones; Nadia Frontier, Research Assistant surveying kelp.

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Welcome, our President Dr Gill Rider



As I write this, my first Annual Report 'President's welcome' since being elected as MBA President, I am acutely aware

of what is ahead in the challenges the world is facing to achieve a sustainable future for our seas and oceans.

The UN Decade of Ocean Science for Sustainable Development (2021-2030) is soon to commence and countries around the world are looking at how to better understand and manage their marine environments. Discussions on how to manage the vast shared areas sometimes referred to as the 'High Seas' are currently underway.

It is little wonder that 2020 was billed as the 'Ocean Super-Year'. I feel privileged to have become President at such an important time.

Working with our Trustees and all our staff, my role as President is to help ensure the MBA, with its global membership and world-class research facility in Plymouth (UK),

"I feel privileged to have become President at such an important time"

continues to be at the forefront providing the scientific insights to inform these issues.

In my previous roles in the private and public sector I have worked in many countries and industry sectors.

I look forward to bringing that experience as I work with an organisation that itself has a wide footprint internationally and across academia, policy, industry and many others working in and with the marine environment.

I am proud of the MBA's long history of promoting the discipline of marine biology and look forward to helping strengthen our role in being the 'voice' for this community.

Dr Gill Rider CB
President

Looking forward



In our new 15-year Strategic Plan: 2020-34 "Charting 150 Years of the Marine Biological Association", we aspire to be *the*

voice of marine biology.

Over the past 135 years, the MBA has forged a path that reflects the ambitions of its beginnings and continually signals a thirst for further challenges in a more competitive and globalised future.

As marine biologists, we have a responsibility to bring the concept of marine biology into the modern age. This includes effectively communicating the value of our work and ensuring we have the ability to attract and retain the best talent. It is critical that we promote diversity and inclusion in marine biology through our membership and lead by example through our own workforce; this is a central theme of our Strategy.

Part of our modernisation is the development of a £20-million multi-phase masterplan to ensure

*"We aspire to be **the** voice of marine biology"*

we have world-class laboratory infrastructure at the MBA's iconic Citadel Hill Laboratory. The Phase One Marine Microbiome Centre of Excellence (MMCE) is already underway and we plan to build on the MBA's strengths in marine microbiology to create a new strategic research area that will focus on the marine microbiome's role in maintaining ocean health (akin to the human gut microbiome in its role in human health).

The new centre will enhance capacity for marine research across Plymouth's main research partners and help to establish Plymouth as the destination of choice for marine research nationally and internationally.

I hope you enjoy the highlights from MBA's voices in our Annual Report.

Professor Willie Wilson FMBA
Director

Trustee updates



The MBA is overseen by a Board of Trustees (MBA Council) who are responsible for ensuring we deliver on our responsibilities as outlined in our Royal Charter and Bylaws. Trustees are elected by members at the Annual General Meeting and serve for a period of three years.

President Dr Gill Rider CB

Governors

Dr Jennifer Ashworth FMBA	Professor Judith Petts CBE
Mr Richard Coombs	Professor Philip Rainbow FMBA
Professor Chris Frid FMBA	Professor John Raven FRS FRSE CBiol FRSB FMBA
Professor Paul J. B. Hart Mem.MBA	Professor Stuart Rogers CSci FIMarEST FMBA
Professor Patrick Holligan Mem.MBA	Professor Alison G. Smith FRSB FMBA
Professor Dan Laffoley BSc PhD FRSB FLS FRGS FMBA	Professor Michael Whitaker FMedSci FBS FRSA FMBA
Mr Bob Mills FCIM (Honorary Treasurer)	

Vice-Presidents

Professor Geoff A. Boxshall FRS; Professor Malcolm Burrows FRS; Sir Richard Carew Pole Bt DL; Sir Neil Chalmers Kt PhD; Professor Stephen J. Hawkins FMBA; Professor James E. Lovelock CH CBE FRS Hon.FMBA; Professor Geoff L.P. Randall OBE; Sir Crispin Tickell MA GCMG KCVO; Professor Michael Whitfield FRSC FGS.

In the last year we said goodbye to...

Professor Sir John Beddington and Professor Rory Wilson who completed their terms as MBA Trustees. Sir Beddington had served five years in the role of MBA President and Professor Wilson had served three years as part of the main council and the Research Committee. Both are thanked for their service.

And we said hello to...



Over 200 new members - welcome!
Dr Gill Rider, our new President, see page 2.
Professor Dan Laffoley (pictured left) who was nominated as a Trustee at the November 2019 AGM and who will serve on the Knowledge Exchange Committee. He is a leading global expert on ocean conservation; Principal Advisor for Marine Science and Conservation for the Global Marine and Polar Programme at the IUCN and has a global honorary role as Marine Vice Chair for the World Commission on Protected Areas.

Donations and legacies



We represent a community of individuals, passionate about marine biology and the marine environment. Each year we are very grateful to a variety of individuals and organisations who kindly donate or leave legacies to the MBA, enabling us to invest in everything from public engagement and science outreach, to investment into topical areas of research.

We would like to give our heartfelt thanks to the following:

Prof Geoff Millward Mem.MBA, Plymouth Ladies Probus Club and Plymouth City Probus Club who all provided charitable donations towards the 2019 Young Marine Biologist Summit. A number of other organisations also supported the event in kind and financially.

Their generosity made a great difference to the way we are able to support and engage with young marine biology enthusiasts.

Notable donations were also made by Vice President, the late Dr Eric D.S. Corner; by Professor Dan Laffoley FMBA and Honorary MBA Member Dr Eve Southward.

Dr Mark Corner also donated a number of items, books and papers to the Library; Mr Mark Stacey kindly provided archive material belonging to his father Ebenezer Ford to the collection, while Mrs Linda Mavin's monetary donation was also greatly appreciated.

Make a donation, make a difference

There are many ways of contributing to the work of the MBA. Perhaps you would consider a donation to enable a small bursary or award in your name?

For further information on making a contribution, including details on the range of areas that would benefit most, please contact [Alex Street membership@mba.ac.uk](mailto:Alex.Street.membership@mba.ac.uk) or visit

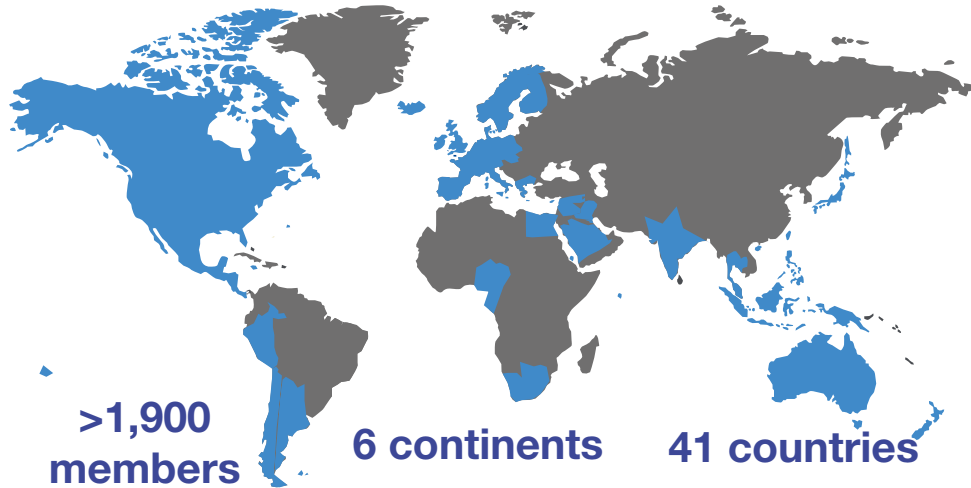
www.mba.ac.uk/support-marine-biology

Our members

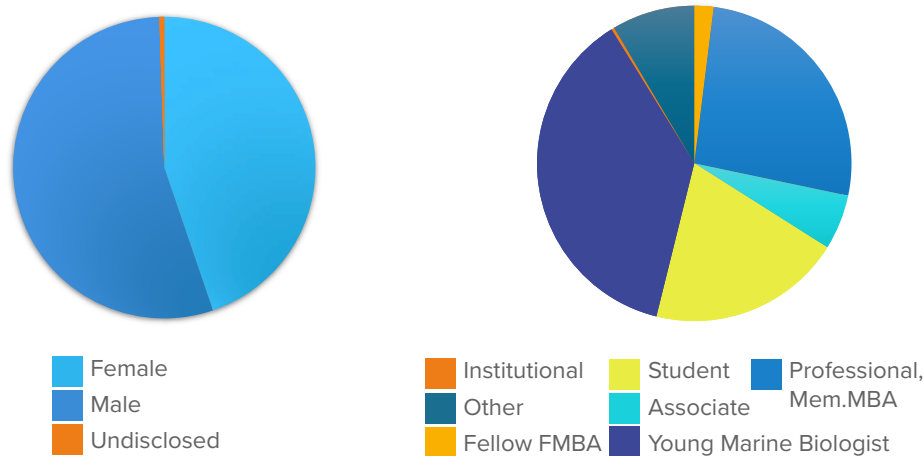


As members of the only Chartered Association that exists solely to support marine biology, together we strengthen the voice, and the future, of the ocean

Our members are global



Our members are diverse



We have seen an 11% increase in our members this year 'welcome to you all'

Our Fellows



Since establishing the MBA Fellow grade, 42 people have been honoured. These include academics, researchers, government scientists and advisors, environmentalists, science communicators, ecotourism and private sector workers and consultant marine biologists. We welcome suggestions for and applications from members.

Our Fellows have made a significant contribution to the profession that goes beyond their employment. They are senior practitioners in marine biology who have contributed to the discipline at the highest level

Admitted in 2019/20: Prof Chris Hauton, Prof Stuart Rogers, Dr Shubha Sathyendranath, Prof Geraint Tarling, Prof Alison Taylor

Current Fellows: Dr David Agnew, Dr Brad Amos, Dr Jennifer Ashworth, Prof Joseph Borg, Prof Colin Brownlee, Dr Matthew Bunce, Prof Alasdair Edwards, Prof Mike Elliott, Dr Zoe V. Finkel, Prof Chris Frid, Dr Paul Gilliland, Prof Steve Hawkins, Prof Alistair Hetherington, Prof Alan Hodgson, Prof Peter Holland, Prof John Humphreys, Dr Magnus Johnson, Prof Dan Laffoley, Prof Paul Leonard, Prof Jane Lewis, Dr Bev MacKenzie, Dr Shaun Nicholson, Dr David Ogden, Prof Nicholas Owens, Prof Chris Parsons, Prof David Paterson, Prof Siew-Moi Phang, Prof Nicholas Polunin, Prof Philip Rainbow, Prof John Raven, Prof David Schiel, Prof Alison Smith, Prof Michael Whitaker, Dr Michael White, Prof Ray Williams, Prof Willie Wilson



A Learned Society defined and recognised by Royal Charter
 Together we are *the* voice of marine biology

Our membership supports the lifelong journey of Marine Biologists



“Student membership at the MBA has enhanced my prospects, opening more opportunities for me to enrich my degree and better my understanding”

Caitlin McAndry, former Young Marine Biologist, current Student member (University of Plymouth) and MBA Beach Ranger 2019

We awarded 15 bursaries this year to members attending conferences around the world including online conferences



Members receive discounts off training courses

Professional Mem.MBA

For practising marine biologists and graduates

Associate

Available to all interested in marine biology

Student

For all students registered in full-time university education

We run exclusive member-only events

As members you steer the direction of the MBA

Young Marine Biologist

For our younger enthusiasts under 18 years



40 Young Marine Biologists attended the popular **YMB Summit**, in its 3rd year coming back to be hosted at the MBA in Plymouth

Our online remote participation for our AGM recorded a 300% increase in member engagement

Fellow FMBA

For senior practitioners in marine biology

Institutional Membership

Available to universities, corporations and other organisations with an interest in the marine sciences

Staying informed: our e-bulletins increased to fortnightly

Our member-only magazine is now produced quarterly



Honorary Fellow Hon.FMBA

For persons of distinction who have made a substantial contribution to the field of marine biology



“The future now is in the hands of those who understand the real importance of the blue part of the planet”
Dr Sylvia Earle
Hon.FMBA



Members were offered **exclusive discounts** on our **bespoke merchandise** themba.teemill.com
Pictured YMB member Bethan Griffiths

New! Look out for our **‘Deep Dives’** online talks delving deeper into marine biology

Interested in becoming a member? See www.mba.ac.uk/membership



Publications

Journal of the Marine Biological Association

This year we celebrated the 100th volume of the Journal of the Marine Biological Association (JMBA). First published in 1887, the JMBA is recognised as a key international journal for original research and reviews on all aspects of marine biology. From 2017-2019 the JMBA published articles from over 50 countries. The Editor in Chief, Prof Jane Lewis, continues to work on increasing the journal's long-standing reputation for supporting fundamental research.

We have an excellent, long-standing relationship with Cambridge University Press (CUP), having published the JMBA together since 1937. We recently signed a new contract with CUP and look forward to continuing working with them, particularly on preparing for the global move towards Plan S, an initiative for open-access science publishing.



100th volume of the JMBA

The Marine Biologist

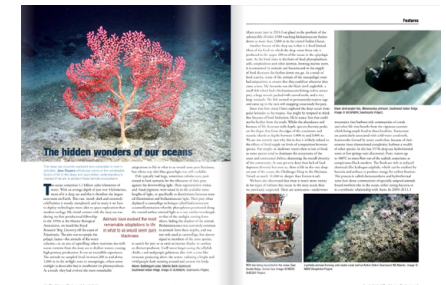
Our popular members magazine, The Marine Biologist (TMB), moved from biannual to quarterly production this year and published articles from a range of contributors.

Issue highlights



The hidden wonders of our oceans

This article in Issue 12, by Alex Rogers, has amazing images and is a wide-ranging look at the ecology of the deep sea and the threats it faces. This edition has been viewed more times online (2080 views) than any other issue.



Antarctic krill futures

This article in issue 13 by MBA Fellow Dr Matthew Bunce gives an overview of the management of living resources in Antarctica, and conveys the experience of working as a fisheries observer on a krill trawler in the Southern Ocean.



Marine Biodiversity Records

Our first Gold Open Access journal, Marine Biodiversity Records (MBR), continues to publish findings from around the world, documenting and reviewing changes in geographical ranges of marine species. One of the most talked about articles in MBR was on the first confirmed movement of humpback whales (*Megaptera novaeangliae*) between high-latitude feeding grounds and UK waters.

Also available at www.yumpu.com/user/marinebiologist



Policy



As an association with a Royal Charter, we offer an independent voice on policy matters on behalf of the marine biological community via our ever-expanding international membership

We provide a valuable pathway for evidence and advice to be passed from our members to decision makers.

This is achieved by: working with members to respond to consultations; leading committees who advise government directly or via reports and assessments; and establishing new working groups to address science-policy issues.

Ultimately, the sustainable use of the oceans is informed by the evidence and advice we provide.

This year we have:

- Worked with a range of international organisations, including the Commonwealth Secretariat and United Nations Unesco-IOC, producing advisory reports and developing actions towards ocean sustainability, e.g. the UN's Sustainable Development Goal 14: Life Below Water.
- Provided advice and evidence for Defra's consultations on Highly Protected Marine Areas and the Marine Strategy Part 1 among others.
- Chaired and are involved with several science-policy committees, including the Marine Climate Change Impacts Partnership (MCCIP), the Healthy and Biologically Diverse Seas Evidence Group (HBDSEG) and the International Working Group of the Marine Science Coordination Committee (MSCC).
- Established our own first Special Interest Group (SIG), the Mediterranean Special Interest Group, led by MBA member, Arianna Liconti.
- Contributed to the UNs consultation on the 'UN Decade societal outcomes' and attended key planning meetings.

Looking ahead

- We are currently working with countries around the world on the establishment of a new World Association of Marine Stations (WAMS). Dr Matt Frost is also working with a range of partners on the World Congress of Marine Stations in Moscow, which is also encouraging scientific links between the UK and Russia.
- We look forward to further engagement with a domestic policy issues as the UK environment and research landscapes alter in response to Brexit and other drivers.
- We will be pursuing further participation and international policy issues with the 'Ocean Super-year' combining with the official start of the UN Decade of Ocean Science for Sustainable Development.
- We will also be promoting diversity and inclusion as a key value in marine biology.



Public engagement and events

Outreach activities are at the heart of the MBA - to engage people with our fantastic marine world

1,500 People

Engaged by the Beach Rangers & MBA researchers in Plymouth schools & at local beaches

supported by



YMB

Young Marine Biologist our youth programme with more than **700** members. Third annual summit held at Citadel Hill Laboratory for over 40 12-18 year-olds



The MBA is a partner in the consortium, which provided learning resources for & **engaged 500 UK schools** in Ocean activities for World Ocean Day

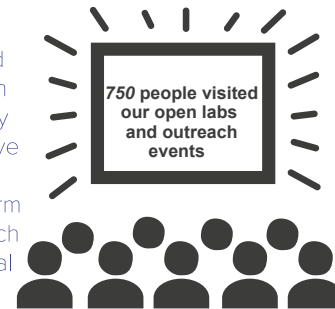


Reached an audience of **5,000+** in the Ocean Discovery Zone at the 2019 Devon County Show

>3,000 attended
SEA IN THE PARK!
events to develop ocean connections in communities



Working with Time and Tide Bell we have been developing a community led citizen science initiative to test the potential for community artworks to form effective points from which to monitor environmental change



Citizen Science

CRAB WATCH Project Lead

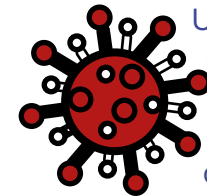
We celebrated our 10th Annual Coastal **BioBlitz** with a return to Wembury



Which featured heavily in a special episode of



We worked alongside developers to create an exhibit for Plymouth's new museum, art gallery and cultural centre



Unfortunately a number of our events had to be cancelled due to Covid-19

Training and postgraduate education

We seek to show the best in research, serve a vibrant membership and inspire the next generation

Marine environmental monitoring & management **training for statutory agency staff.** Includes Non-indigenous Species and Habitat sensitivity

2,000

course, conference, workshop & meeting participants hosted in our training facilities

6 Marine Summer camps with **FSC** over 100 young people attended



Contributed to **careers events**, promoting the MBA & Marine Biology careers to more than **1,500 young people.**

We took a CPR and plankton themed display 'Secret Seas' to the University of Plymouth's Science Showcase event

4,500 People

Engaged by NERC Engaging Environments Trained Researchers at events.

17th course on Advanced Optical Microscopy for **65 participants**

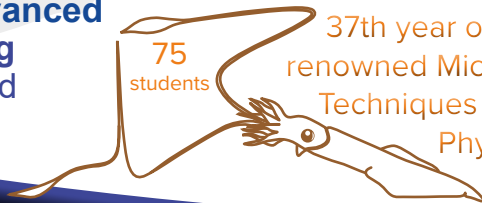
Ivybridge career fair engaged with **800 people**

5

 Internationally important **Advanced skills, training courses** hosted at Citadel Hill

75 students

37th year of our world renowned Microelectrode Techniques for Cell Physiology course



Over 45

 doctoral, masters & undergraduate students studying or on placement with the MBA

Marine Science Education Training Weekend. Funded by Plymouth University Marine Institute to work with the University's institute of education to deliver a course for trainee teachers and scientists

8

 Welcome to our new PhD students

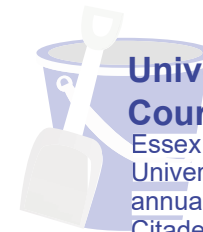
Partnered with three NERC doctoral training partnerships



PhD supervisory teams **collaborate** with academics across the UK from 14 Universities

"Our postgraduate programme teaches the future generation of scientists both at our world-leading laboratory and teaching on university courses"

17th year of our postgraduate conference with 100 attendees



University Field Courses Essex and Liverpool Universities ran an annual field trip at Citadel Hill



Our excellent research, aquarium and training facilities, including the Wolfson Training suite, attract a wide number of visitors each year

Our services and facilities

Research vessels

Our vessels are versatile for a range of training, education and research activities. Capable of operating from shallow river/ estuarine environments up to 60 miles offshore. In 2019 RV *MBA Sepia* underwent a major refit and is available to charter with bespoke packages for commercial and academic purposes.



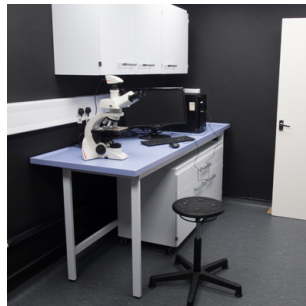
Aquaria facilities

Our versatile research aquarium offers a wide variety of tanks and facilities for keeping and working with temperate marine species, which provide unrivalled opportunities for scientists looking to conduct experimental projects. We offer unparalleled expertise on the distribution, acquisition and care of marine species.



Mary Parke Bioimaging Centre

We have developed a new centre of microscopy in laboratories once used for the Nobel prize winning work on the membrane current in the giant squid axon. Our world-class microscopy suite is generously equipped for live cell imaging, featuring a range of microscopes.



“World-class facilities in a unique environment”

National Marine Biological Library

One of the largest marine reference libraries in the world, holding thousands of scientific journal titles and books, historical literature, expedition reports, and a herbarium. We provide a hub for expertise relating to Open Access, Intellectual Property and Copyright.



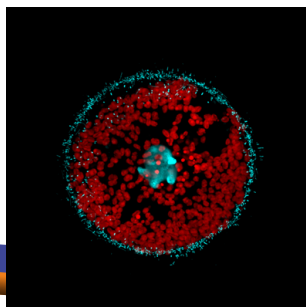
Media Services

Our vision is to communicate marine biological research to the public. We provide a service to journalists and media production companies. We draw on the expertise of our staff, members and our extensive facilities (e.g. sea water aquarium and Research Vessels) to produce high quality media content.



Marine Business Technology Centre

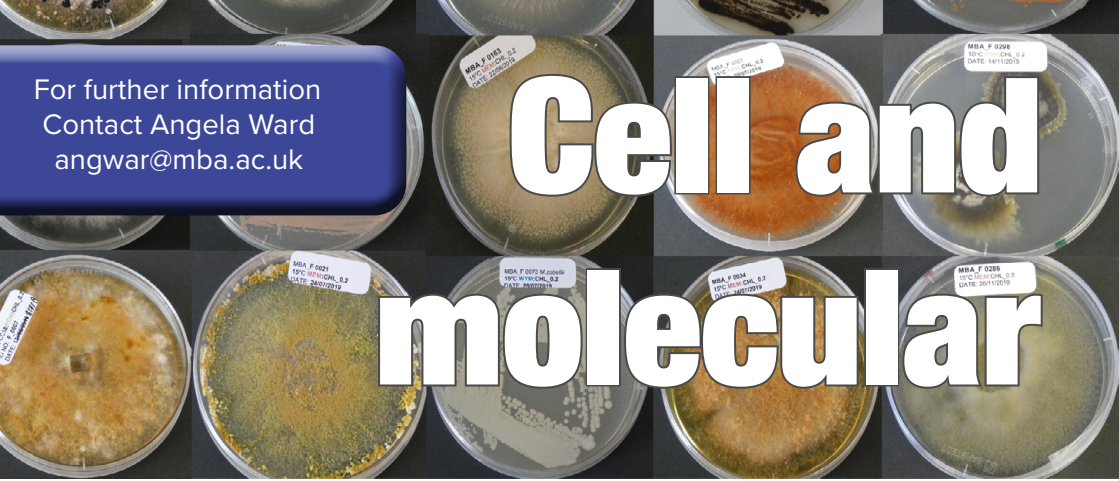
Where enterprise meets the ocean. This partnered project is the gateway for accessing comprehensive research and development support as well as cutting-edge facilities and expertise. We support Devon-based SMEs through research, testing, proving and production.





For further information
Contact Angela Ward
angwar@mba.ac.uk

Cell and molecular



Fast signalling algae?



Na⁺ (sodium) channels are used by animals to transmit electrical signals. We discovered calcifying marine algae (e.g. ecologically important coccolithophores) possess a novel type of Na⁺ channel used for fast signalling to their environment, demonstrating for the first time that the capacity for fast Na⁺ selective signalling is present outside of animal lineages.

Our discovery sheds important new light on the diversity and evolution of signalling mechanisms in eukaryotes.

*Helliwell, K., *Chrachri, A., *Wharam, S., *Wheeler G., *Brownlee C., *et al.*, A novel single-domain Na⁺-selective voltage-gated channel in photosynthetic eukaryotes. (2020). *Plant Physiology*. <http://www.plantphysiol.org/content/plantphysiol/early/2020/10/01/pp.20.00889>

Sensing in diatom blooms

We identified the molecular mechanisms enabling ecologically important bloom forming diatoms to sense the vital macronutrient, phosphorus.

Our work provides some of the first insights into how diatoms rapidly sense and respond to influxes of phosphorus into the environment.

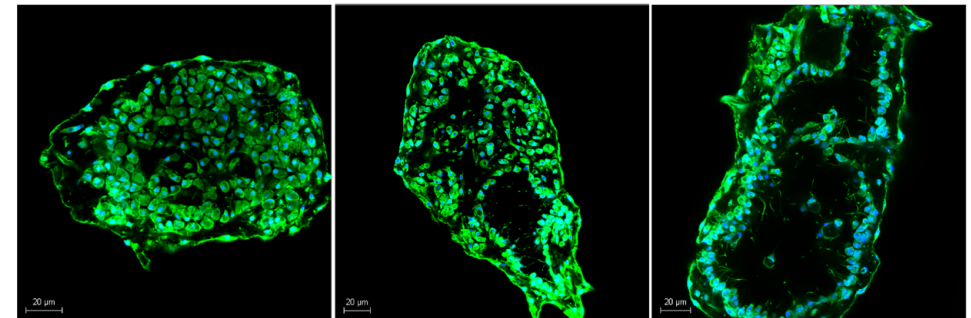
*Helliwell, K., *Harrison, E., *Downe, J., *Brownlee, C., *Wheeler, G., *et al.*, A novel Ca²⁺ signalling pathway co-ordinates environmental phosphorus sensing and nitrogen metabolism in marine diatoms. (2020). *bioRxiv*. <https://doi.org/10.1101/2020.05.13.090282>



*Indicates a MBA researcher

“We are training the next generation of marine scientists and informing understanding of important issues such as algal bloom formation and toxicity”

Sponge cell regeneration



Fluorescent microscopy image of a sponge cell regenerating

Sponges are exceptional organisms, able to re-develop even when completely dissociated into cells. This makes the sponge a powerful model system for understanding the molecular and evolutionary underpinnings of regeneration. We observed dissociated sponge cells (*S. ciliatum*) develop in a way that mimics embryonic and post-larval development.

Our observations shed light on our understanding of the molecular and evolutionary underpinnings of regeneration, which researchers have been trying to understand for more than a century.

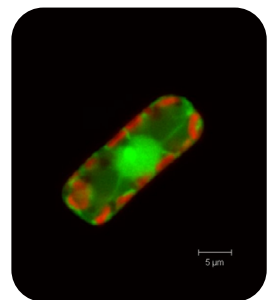
Soubigou, *Touhami, *Christmas, *Modempalli *et al.*, Regeneration in sponge *Sycon ciliatum* mimics postlarval development. (2020). *bioRxiv*. <https://doi.org/10.1101/2020.05.04.061218>

Genetic tools in microalgae

Our ability to study many important phytoplankton species has been hampered by a lack of available molecular biology techniques commonly used in other model organisms. We contributed to a large multi-national project, funded by the Gordon and Betty Moore Foundation, aimed at developing genetic tools in a wide range of single-celled algae.

The new tools will allow the development of synthetic biology approaches in diverse microalgae to help us to understand their physiology.

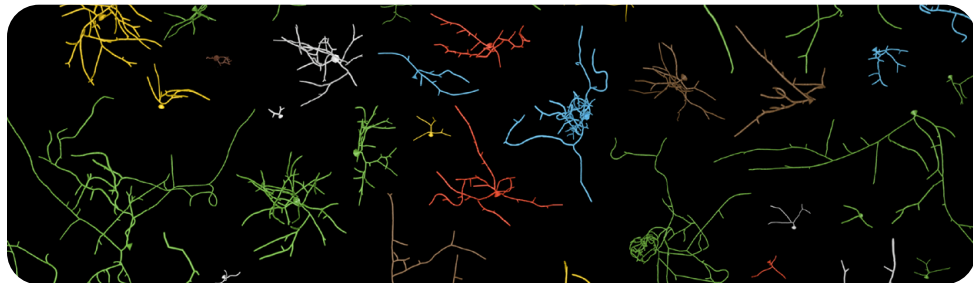
Faktorová, D., *Wheeler, G., *Highfield, A., *Stern, R., *Brownlee, C., *et al.* Genetic tool development in marine protists: Emerging model organisms for experimental cell biology. (2020) *Nature Methods* 17 (5), 481-494 <https://www.nature.com/articles/s41592-020-0796-x>



Confocal microscopy image of the centric diatom Thalassiosira weissflogii

“Microorganisms form and sustain global biogeochemical cycles, underpin food webs and maintain ecosystem health. Our research provides better understanding of these complex roles of marine microbes”

Fungal evolution



Chytrids are microscopic aquatic fungi that attach to substrates and feed using filamentous structures called rhizoids. We have discovered that chytrid rhizoids are remarkably similar to hyphae in multi-cellular fungi, suggesting a linked evolutionary origin. We also found that chytrid rhizoids are highly adaptive, able to change shape in response to variation in substrate availability.

Our study sheds new light on fungal evolution and the biology of chytrids.

*Laundon, D., *Christmas, N., *Wheeler, G & M. *Cunliffe. Chytrid rhizoid morphogenesis resembles hyphal development in multicellular fungi and is adaptive to resource availability. (2020) Proceedings of the Royal Society B 287: 20200433.

Role of Fungi in the ocean

Fungi are widespread components of marine ecosystems, yet the full extent of their functional roles remain poorly known. We have revealed an abundance of transcribed fungal glycoside hydrolases in the open ocean, demonstrating that fungi are active saprotrophs.

Our work paves the way for future research into the roles of fungi in oceanic carbon cycling.

*Christmas, N. & *Cunliffe, M. Depth-dependent mycoplankton glycoside hydrolase gene activity in the open ocean—evidence from the Tara Oceans eukaryote metatranscriptomes. (2020) ISME Journal. doi.org/10.1038/s41396-020-0687-2



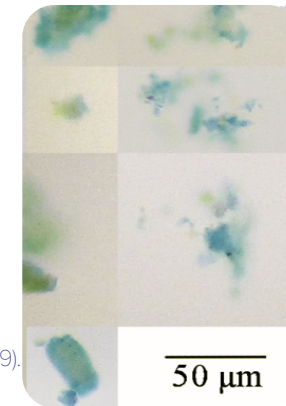
Sampling aboard the RV James Clark Ross in the Barents Sea

*Indicates a MBA researcher

Sampling marine snow

Biogenic particles, such as marine snow (right), have important roles in carbon cycling in the oceans. We have developed an approach to sample individual particles and assess particle-attached microbial community diversity using molecular tools. *Our approach is now being applied to understand single-particle ecology and biogeochemistry.*

*Zäncker, B., Engel, A., & *Cunliffe, M. Bacterial communities associated with individual transparent exopolymer particles (TEP). (2019). Journal of Plankton Research. <https://doi.org/10.1093/plankt/fbz022>



Bacteria killing phytoplankton

Recent studies have shown the existence of algicidal bacteria capable of killing phytoplankton. We successfully isolated several algicidal bacterial isolates from the Western English Channel and are investigating the role of these bacteria in controlling natural diatom populations.

Our work will help to understand how diatoms sense and respond to mitigate the impact of such harmful bacteria.

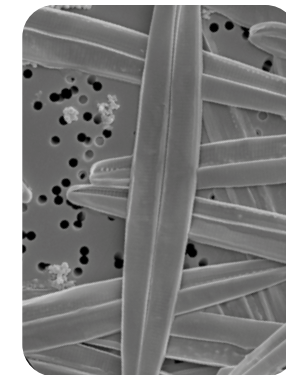


PhD student Laura Branscombe sampling in Plymouth

Toxicity of diatoms

We have recently isolated strains of the toxic diatom *Pseudo-nitzschia* (right). We are using this strain to gain insight of the abiotic and biotic factors governing toxicity of this species.

Our research will provide important insights of the nature and toxicity of Pseudo-nitzschia populations found in local Plymouth waters, and could therefore help mitigate against the damaging consequences of harmful algal blooms in the UK.



Looking ahead

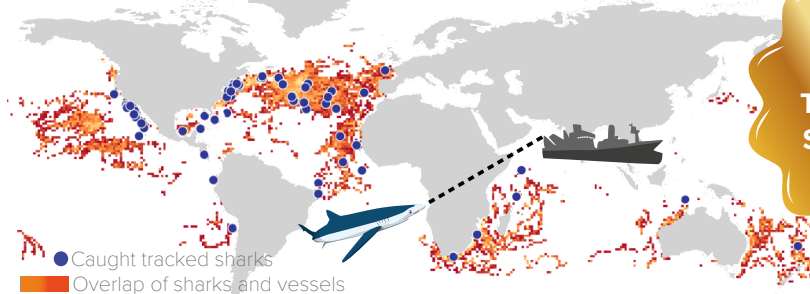
Future work includes research on metabolic potential of ‘Marine Stramenopiles’ and the inclusion of unique strains of marine fungi into the Darwin Tree of Life project.



Interested in finding out more? Contact
Alix Harvey alilec@mba.ac.uk

Ecology

Fishing footprints on sharks



Ranked in the Future Earth Top 30 Global Sustainability papers of 2019

First global estimate of spatial overlap of pelagic shark hotspots, and industrial long-line fishing fleets, showed nearly one quarter of space shark use each month was overlapped by long-line fishing effort.

Our research indicates a relatively limited refuge for pelagic sharks from fishing.

Queiroz, N., *Humphries, N., *Southall, E., and *Sims, D., *et al.*, Global spatial risk assessment of sharks under the footprint of fisheries (2019). *Nature*. <https://doi.org/10.1038/s41586-019-1444-4>

Tracking temperatures

Average thermal affinities of intertidal macroalgae and invertebrates track patterns in sea surface temperatures (SST) across large latitudinal gradients whilst rocky intertidal communities in southwest Britain showed declining thermal affinities across a period of modest temperature decline.

MarClim is the most spatio-temporally extensive time-series for intertidal systems globally, funded and used by UK government bodies.

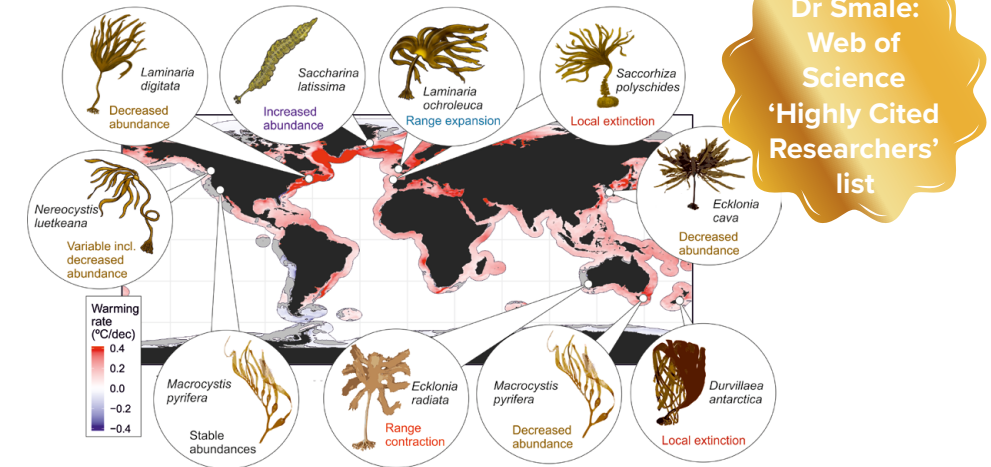
Burrows, M., *Hawkins, S., *Adams, L., *Mieszkowska, N., *et al.*, Global-scale species distributions predict temperature-related changes in species composition of rocky shore communities in Britain. (2020). *Global Change Biology*. <https://doi.org/10.1111/gcb.14968>.



*Indicates a MBA researcher

Our oceans are under unprecedented stress from numerous threats, our research aims to better understand responses of marine species and ecosystems to climatic changes, to improve our ability to predict and manage biodiversity including shifts in the biogeographic distributions of many species

Winners and losers?



Dr Smale: Web of Science 'Highly Cited Researchers' list

Multidisciplinary work shed new light on drivers, characteristics and impacts of extreme climatic events in our oceans as well as fundamental ecological processes within kelp forests.

Our research aims to understand better responses of marine species and ecosystems to climatic changes, to improve our ability to predict and manage biodiversity.

*Smale, D. Impacts of ocean warming on kelp forest ecosystems (2020). *New Phytologist*. <https://doi.org/10.1111/nph.16107>

Looking ahead

Our ongoing research includes climate change impacts on marine ecosystems and organisms, Non-Indigenous Species distributions and impacts on global shark populations.

We will launch the Ocean Deoxyfish project to investigate deoxygenation effects on threatened sharks.

We are the lead Genome Acquisition Laboratory for marine species in the UK Darwin Tree of Life Project for which we will provide samples from 1,800 species for genome sequencing.

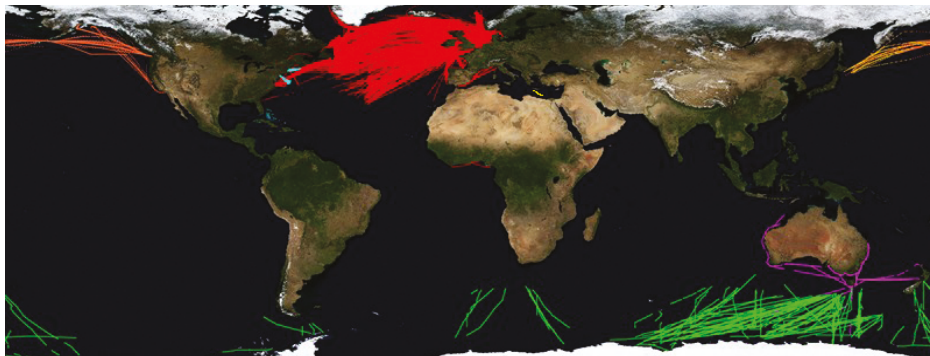
Interested in finding out more? Contact cprsurvey@mba.ac.uk

CPR Survey



The Continuous Plankton Recorder (CPR) Survey is one of the world's longest running and most geographically extensive marine ecological survey in the world. With changes in our ocean happening at an unprecedented rate, it is more important than ever that we are able to monitor the health of our marine environment using plankton as an indicator.

A Global Plankton Monitoring Program



Plankton are the base of marine food webs, essential to sustaining fisheries and other marine life. CPR's have sampled plankton for decades in both hemispheres and several regional seas. We reviewed how the CPR can contribute to global plankton diversity monitoring, being cost-effective over large scales and providing taxonomically resolved data.

Our review showed how a network of CPR Surveys can help advance understanding of plankton dynamics and inform policy and management decisions on a global scale.

*Batten, S., *Edwards, M., *Graham, G., *Ostle, C., *Wilson, W. *et al.* A Global Plankton Diversity Monitoring Program. (2019). <https://doi.org/10.3389/fmars.2019.00321>

*Indicates a MBA researcher

Satellites measuring ocean productivity

Using modelled isoscapes, based on satellite data, our research enabled modelling of secondary productivity to investigate links between zooplankton, fish and seabirds.



Our approach can be used to provide a qualitative estimate which, can be particularly valuable in regions where few data are available.

Espinasse, B., *Batten, S., *et al.* Defining isoscapes in the Northeast Pacific as an index of ocean productivity. (2019). *Global Ecology and Biogeography*, 2019,00:1-16

Plastics in open ocean

Our research, confirming a significant increase in open ocean plastics since the 1990s, received national media coverage featuring in over 100 news outlets.

*Ostle, C., *Broughton, D., *Gregory, L., *Wootton, M. *Johns, D., *et al.*, The rise in ocean plastics evidenced from a 60-year time series. (2019). *Nature Communications* doi.org/10.1038/s41467-019-09506-1



BBC Springwatch

We featured on BBC Springwatch, introducing plankton and the CPR Survey to several million UK viewers.



93% Success rate

On towed CPR's this year: our success relies heavily on the goodwill and support of all our volunteers, from ships and their crew, to road transport companies and their drivers. We are particularly grateful to those involved during the severe storms in February 2020 (storm Dennis), who continued to collect samples despite the challenging conditions.

Looking ahead

2020 sees the start of a number of new projects – iCPR and two H2020 projects; AtlantECO and Mission Atlantic. These will allow us to set up the first CPR tow between South Africa and Brazil; continue to investigate AI and image analysis to complement traditional plankton identification methods. These open up a number of new and exciting collaborations.

Consultancy

Our work addresses questions around sustainable management of the marine environment through evidence and assessments. Outputs benefit conservation of habitats and species, while supporting sustainable use and maintenance of socio-economic goods and services to people.

Supported by MBA experts, our network of academics and other partners, our Consultancy Team undertook a wide range of projects, highlights include:

Impacts of seine fishing gear on Marine Protected Areas (MPA's)

Demersal seine fisheries target mobile sediment habitats where there are few robust attached species or obstructions. Therefore they may remove attached species, reducing structural complexity through snagging in nets and warps.

Our review of seine fisheries has increased understanding of the impacts and management issues of this activity.



A coarse sediment habitat with the polychaete worm *Sabella pavonina*.

Our track record and commitment to producing high quality outputs means we are increasingly approached by other consultancies to partner on bids and have been identified as preferred bidders for projects from the Statutory Nature Conservation Bodies.

Alien invaders

Our surveys revealed non-indigenous species (NIS) have become more prevalent on shores close to marinas, highlighting the role marinas play in the leakage of NIS onto designated natural shores.

Our data contributed to Natural England's management of Special Areas of Conservation and Special Protected Areas, plus feeds directly into indicators of environmental status including the annual JNCC/Defra UK Biodiversity Indicators and the Descriptor of Good Environmental Status for the Marine Strategy Framework Directive.

Taylor, *Wood and *Bishop. ENG_2578 - Mapping invasive alien species in intertidal habitats within Natura 2000 sites in the Solent. (2020). Report to the Marine Management Organisation.



The colonial ascidian *Botrylloides diegensis* is one of the NNS now frequent on open shores and in marinas.

Alien settlers

Our study for Natural Resources Wales (NRW) found the non-indigenous species *Magallana gigas*, the Pacific Oyster, to be one of the most detrimental to MPA's through its impacts on intertidal habitats. This species can also negatively affect the recreation value of shores as the sharp edges can inflict cuts and it also interferes with shellfish aquaculture.

Our review of non-indigenous species will enable NRW to develop management plans and engage with site users to limit spread within MPA's.

*Tillin, *Sewell, *Wood, *Bishop, et al. Assessing the impact of key marine invasive non-native species on Welsh MPA habitat features, fisheries and aquaculture. (2020). Report to Natural Resources Wales.



A population of the invasive Pacific Oyster *Magallana gigas* on the banks of an estuary



Interested in our data products or using our services? Contact Dan Lear dbler@mba.ac.uk

Data and information services

At the MBA, we have a long and respected history of data management and information provision, from the establishment of the Library in 1887 to the groundbreaking step into the digital realm with the launch of the Marine Life Information Network (MarLIN) in 1999. More recently, the national role of the UK Archive for Marine Species and Habitats (DASSH) has been recognised on the global stage, becoming an accredited data centre of the global marine biodiversity infrastructure, Ocean Biodiversity Information System (OBIS).

We continue to align our digital data and information services with the development of synergistic services between MarLIN, DASSH and the digital elements of the National Marine Biology Library (NMBL), through shared core infrastructure and integrated information platforms.



The MarLIN sensitivity dataset includes **98%** of the biotopes in the UK's Marine Habitat Classification of shallow seas



Consultancy developed **~12,500** assessments for species, habitats and ecosystem services to support management of coastal and marine ecosystems



More than **730 million records** have been downloaded from DASSH in the last 6 months from over 10,000 individual data requests



The NMBL provided access to over **13,500** Wiley online journal articles from more than 350 journals

Highlights

MarLIN developed new sensitivity assessments for climate related pressures (e.g. global warming) in liaison with national experts and the Joint Nature Conservation Committee (JNCC). The new approach contributed to the Defra-funded JNCC '[Climate SMART MPAs](#)' project.

The [MarESA dataset](#) has been used by several projects, including the 'Marine Pioneer' project in North Devon, a benthic sensitivity mapping project and mapping of natural capital assets and risk from inshore fisheries in the Isles of Scilly.

Working with the Sea Mammal Research Unit Consultancy we developed an Individual-Based Sensitivity Assessment (IBSA) approach for Scottish Natural Heritage to improve the sensitivity assessment for large mobile marine species such as sea mammals, sharks and rays.

Sinclair, *Tyler-Walters,*Tillin et al.. [Developing FeAST for mobile marine species](#), 2020. Scottish Natural Heritage, Inverness, Research Report No. 1175.

As part of our role within EMODnet Biology, we led an international workshop alongside the European Maritime Day events in Lisbon. The meeting featured key policy stakeholders from across Europe and formally launched the [European Atlas of Marine Life](#).

DASSH facilitated access to a huge number of biodiversity datasets from a wide variety of data providers and provided technical expertise and data resources to European and International initiatives, including EMODnet Biology and OBIS.

Looking ahead

Improvement of the physical infrastructure of the NMBL will ensure previously inaccessible material is more readily available to members. We are exploring new ways to access and integrate species and habitat information held within MarLIN, and are actively involved in supporting the data management needs of the UK's reporting under the Marine Strategy Framework Directive.

Providing evidence for policy

With changes in our oceans happening at an unprecedented rate, it is more important than ever that we monitor the health of our marine environment. The expertise of our research staff at Citadel Hill is relevant to and impacts on a wide range of global policy instruments.

Data

Plankton are an ideal indicator for sustainably managing our oceans; CPR data are used extensively in a variety of policy instruments, helping to increase our understanding of the health of the marine ecosystem. These include the UK Marine Strategy, EU Marine Strategy Framework Directive, ICES fisheries work and the Marine Climate Change Impacts Partnership (MCCIP).

MarClim continues to be the most spatio-temporally extensive time-series for intertidal systems globally, and contributes to monitoring and assessment programmes for UK Regional Seas.

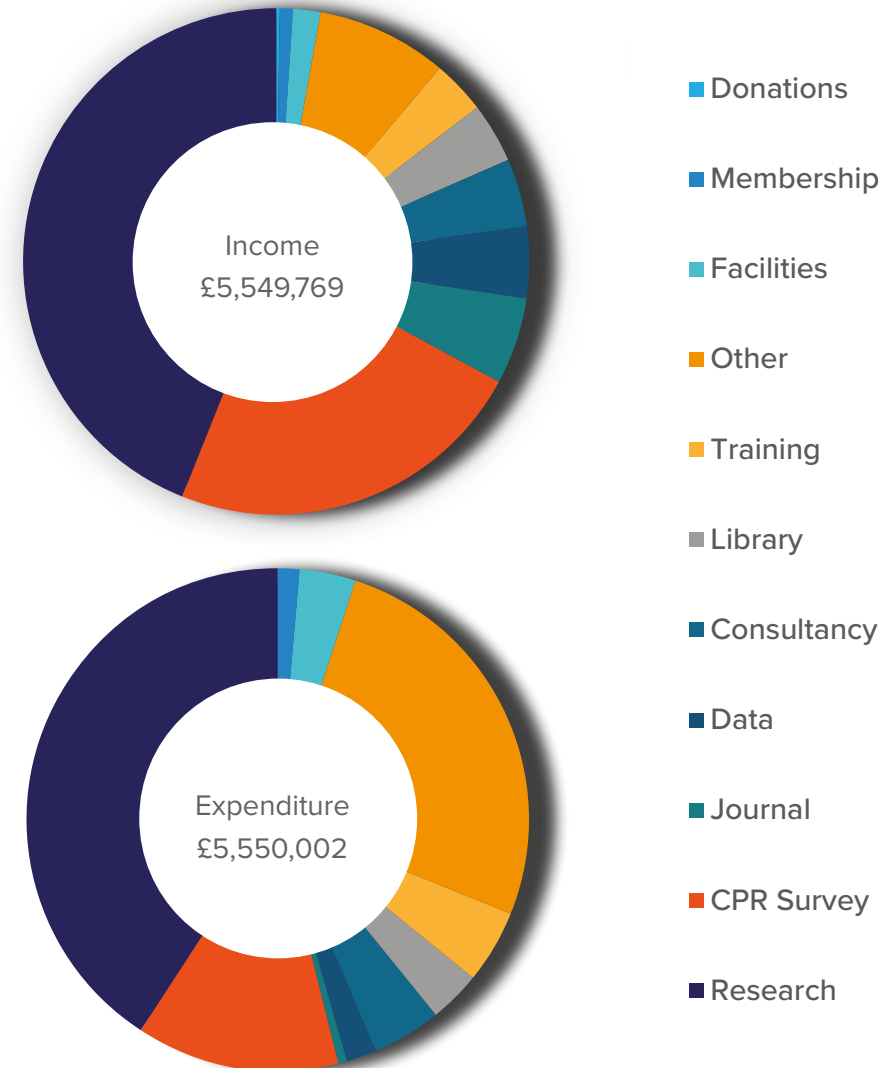
Our Data Team supports the data management needs of the UK's reporting under the Marine Strategy Framework Directive, and provides guidance on compliance with UK and international legislation relating to data governance.

Knowledge and expertise

Members of our Ecology Group contributed to key reports such as the Intergovernmental Panel on Climate Change (IPCC) Special Report on the Ocean and Cryosphere in a Changing Climate (2019) and the MCCIP Annual Report Card 2020.

We also addressed issues relating to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) with our research on trade in mislabelled endangered sharks.

Finance





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and become part of a dynamic worldwide community

Members of the MBA are part of a global community of marine biologists. Whether you are a student, a professional, or just passionate about marine biology, we have a membership package for you, all with a fantastic range of exclusive benefits. Stay up to date with the latest news and events.

- ✓ Free subscription to our quarterly 'The Marine Biologist' magazine
- ✓ Discounts off MBA training courses, events and conferences
- ✓ Discounts off titles from leading publishers
- ✓ Opportunities for career progression
- ✓ Take part in science and networking
- ✓ Exclusive post-nominal letters
- ✓ Steer the future of marine biology

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A Learned Society defined and recognised by Royal Charter
*Together we are **the** voice of marine biology*