Impact Report 2025

SAMS
Scottish Association for Marine Science

A partner of UHI

www.sams.ac.uk

World-leading science for a healthy ocean and thriving people

Saidheans aig ìre chruinneil airson cuan fallain agus daoine soirbheachail

Contents

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Diana Murray (Chair, Jan to Mar)

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Gillian Bruton

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Jessica Craven

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Our Vision, Mission & Purpose

OUR VISION

World-leading marine science for a healthy ocean and thriving people

OUR MISSION

We broaden and share knowledge of the marine environment, and pioneer solutions to environmental challenges

OUR PURPOSE

- Delivering fundamental and applied research
- Communicating our knowledge through education, training and outreach
- Commercialising our innovations for real-world impact and income generation

RESEARCH

115 scientific studies published

NATIONAL FACILITY

3,199 living cultures maintained in CCAP, enabling **551** new publications & **17** patents

CPD COURSES

229 professionals upskilled in biotech, robotics & aquaculture

HIGHER EDUCATION

Educating **198** UHI marine science students from BSc to PhD | **New** MSci Applied Marine Science launched

COMMUNICATIONS

48,000 social media followers | **145,000+** unique website visitors

ENTERPRISE

40 new SIMBA units improve safety in cold places

SAMS Scottish Association for Marine Science in 2025

SAMS is a community & our achievements depend on the whole team

GOVERNANCE

Ocean appointed to SAMS Board

OUTREACH

Ocean Explorer Centre & public events engaged **15,108** people

SCHOOL EDUCATION

Ocean workshops reach **5,274** school children

FINANCE

Largest income in SAMS history **£12.55 million**

PUBLIC HEALTH

SAMS-trained AI robotic system monitors Shetland's seafood producing areas for toxic algae, analysing **32,000** water samples, taking **34 million** plankton images

ESTATE SUSTAINABILITY

24 kW solar PV installed on Ocean Explorer Centre roof

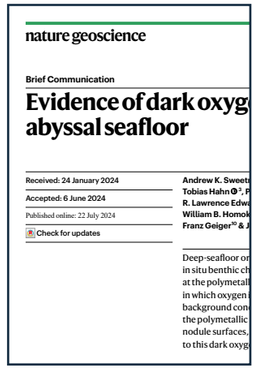
2025 OUTSTANDING...

RESEARCHER

Marine ecologist and climate researcher Prof Michael Burrows is a Clarivate highly cited researcher (top 0.1%) for the sixth consecutive year, demonstrating significant and broad influence.

PUBLICATION

The July 2024 publication *Evidence of dark oxygen production at the abyssal seafloor* by Prof Andrew Sweetman's team had been downloaded 500k times by the end of 2025, making it the 752nd most read of over 30M papers tracked on Altmetric.



STUDENT

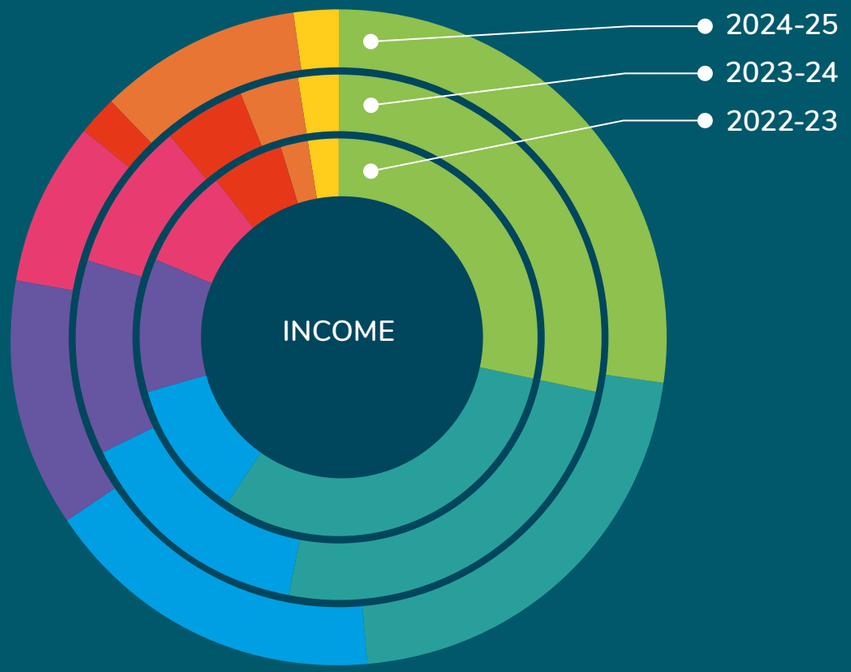
PhD researcher Tim Awbery comes top out of 32,000 UHI students, winning both SAMS and UHI student of the year awards.

INNOVATION

Our expertise in marine biology and AI enabled us to develop a tool that provides a step change in measuring marine growth on submerged infrastructure. At the Scottish Green Energy Awards, SAMS received the Judges Award for this innovation by Drs John Halpin, Joe Marlow & Tom Wilding.

Financial performance

1 Apr 2024 to 31 Mar 2025



INCOME	2024-25	2023-24	2022-23
Research income (other)	3.42m	3.12m	3.17m
UK Government grants/NERC	2.70m	2.72m	3.46m
Education income	2.11m	1.64m	1.26m
Consulting activities	1.54m	1.31m	1.25m
Trading activities	1.02m	0.99m	0.90m
European/EU grants	0.26m	0.55m	0.66m
Charitable income (other)	1.24m	0.41m	0.23m
SIMBA unit and components	0.26m	0.26m	0.27m
TOTAL	£12.55m	£11.01m	£11.2m

EXPENDITURE	2024-25	2023-24	2022-23
Cost of raising funds	0.03m	0.01m	0.01m
Charitable activities	12.16m	11.81m	11.82m
TOTAL	£12.19m	£11.82m	£11.84m

ASSETS	2024-25	2023-24	2022-23
Fixed assets	15.37m	14.32	14.36m
Other assets	2.47m	2.77m	3.96m
TOTAL	£17.84m	£17.08m	£18.31m

RESERVES

The total funds held by The SAMS Group at the year-end amount to £13,241k (2024 - £12,877k). This consists of unrestricted funds in surplus of £7,768k (2024 surplus £8,813k), and restricted funds of £5,473k (2024 - £4,064k). The £7,768k unrestricted funds consists of cash available of £429k (2024-£491k), other net current liabilities of £4,398k (2024 £5,416k) and fixed assets of £11,737k (2024 £13,738k).

Unrestricted funds reflect the amount of reserves available to spend on any of the charity's purposes. The restricted funds balance at the year-end date consists of a fixed asset fund relating to assets acquired with funds for which ongoing restrictions continue to apply. The Board has noted the Net Current Liabilities of £2,119k (2024 - £1,442k Net Current Liabilities) which are considered the main part of the unrestricted funds obligation. SAMS is satisfied that this does not affect the sustainability of the Group.

Full accounts available at www.shorturl.at/rJnRq

Top job swap

By Prof Nicholas Owens, SAMS Director

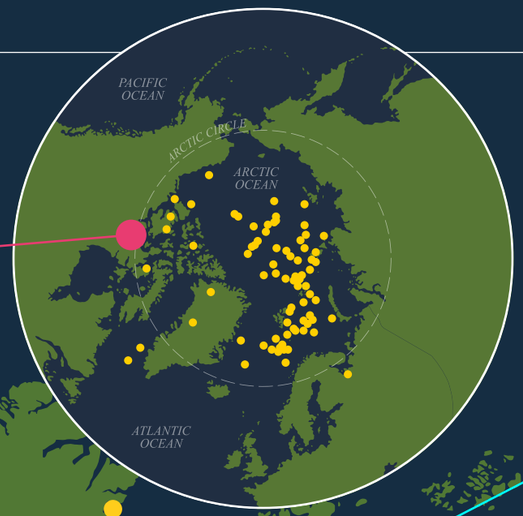
2025 saw the change of the top job at SAMS: the Chair of our Board. After six years at the helm, the longest period our constitution allows, **Diana Murray CBE** retired. **Professor Stuart Monro OBE** took over the burden of responsibility.

Diana, an archaeologist, oversaw the building and consolidating of an increasingly diverse governance structure that makes SAMS wiser, fairer and more resilient. As we navigate a more complex world with ever growing scrutiny of corporate governance, Diana instigated the development of new sub-committees which provide an opportunity for nuanced guidance of more facets of SAMS business beyond research and education. Diana's time as Chair saw the introduction of a development and fundraising element and the growing importance of more commercially useful research through SAMS Enterprise Ltd. Under her steady leadership the staff, Executive and Board developed a 5-year-strategy that was realised through our first operating plan.

We thank Diana for her dedication and commitment to SAMS, and her calm and sensitive, yet steely and determined leadership. I found working with Diana an enjoyable and rewarding experience and I am personally very grateful for her support and guidance.

As we say goodbye to Diana we welcome in Professor Stuart Monro, who took over as Chair on 1 April 2025. Stuart, a geologist, brings a wealth of experience in Scottish Higher Education leadership, governance and science communication. He joins us at a time of great turbulence in the Higher Education and research sectors in Scotland, the UK and beyond and we look forward to navigating the choppy waters ahead under his leadership. Welcome Stuart!

Global impact



ARCTIC CANADA

Developing eDNA monitoring for invasive species **(p. 35)**

WALES

St Davids, Pembrokeshire: community perspectives on the local coastal environment and seaweed farming **(p. 19)**

FRANCE

Speaking up for seaweed @ the UN Oceans Conference 2025 in Nice **(p. 27)**

NOVA SCOTIA

Developing new links in education, outreach and science **(p. 36)**

GHANA

Beauty products linked to microplastic pollution in Ghanaian mangroves **(p. 17)**

PACIFIC OCEAN

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Muddy squid discovery **(p. 39)**

SIMBA LOCATIONS

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GREENLAND

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ICELAND BASIN

Studying the changing North Atlantic Current **(p. 27)**

NORTH SEA

Assessing the impacts of floating wind farms **(p. 30)**

25% OF THE WORLD

A decade of aquaculture education benefits 25% of world countries **(p. 24-25)**

MALAYSIA

Helping Malaysian seaweed farmers prepare for climate change **(p. 34)**

NAMIBIA

Fisheries management approaches in Namibia **(p. 41)**

ANTARCTIC PENINSULA

Discovery of a lush new ecosystem **(p. 18-19)**

Giving the Ocean a voice on the Board

By Professor Stuart Monro, Chair of SAMS Board

On an early morning swim in the fresh, clear waters of the sea near the Slate Islands, Nick Owens, the Director of SAMS, wondered about decision making and the dominance of a human-centric perspective. Even the ocean science community collectively adopts an anthropocentric approach as it strives to deliver 'the science we need for the ocean we want' (the tagline for the UN Decade of Ocean Science for Sustainable Development).

Immersed, he considered how humans could reach more equitable decisions that serve the Ocean's needs as much as ours. And then he wondered if we should experiment how to do this and to bring this way of Ocean thinking into the governance of the marine research and education charity he directs.

And so emerged the concept of putting the Ocean on the Board of SAMS to make sure that the voice of the Ocean cannot be forgotten in our human decision-making.

To those with a more cynical disposition, the idea that the Ocean should be represented in our governance may initially seem gimmicky, trivial or even as greenwashing. But after months of discussion and deliberation, the trustees of SAMS, with advise from external experts on such matters, concluded that even with strong empathy for ocean conservation and a well-informed understanding of marine environmental matters, our decision-making was still anthropocentric. Human interests were given precedence, and concerns were limited to the impact our actions have on the marine world rather than guided by the interests of the Ocean.

This way of thinking of nature as a partner rather than a commodity has survived in indigenous cultures but is new in our time. It is now leading to legal innovations such as bringing nature into governance structures, as well as legal 'personhood' status recognition of rivers and ecosystems in countries such as Ecuador and New Zealand.

On the other side of the North Atlantic, Two-Eyed Seeing is a Mi'kmaw concept that means learning to see from one eye with the wisdom and philosophy of Indigenous knowledge and with the other eye from the understanding of contemporary science. As SAMS is growing its engagement with Atlantic Canada, we are privileged to be able to learn from Mi'kmaw culture as we re-define our ethical relationship with the Ocean.

Putting the "Ocean on the Board" requires us to experiment and innovate. How will the voice of the Ocean be heard on SAMS Board and who speaks on its behalf? We are challenging the paradigm of the conventional boardroom. The Ocean to us is no longer a passive resource, but an entity deserving of advocacy, with a voice and with influence at the top table. As a Board we challenge ourselves with balancing the needs of the Ocean with the potentially conflicting commercial demands of running an academic business.

We hope that our governance experiments at SAMS will contribute usefully to a rapidly swelling movement. Given the pervasive impact of the decisions of corporate boards and policymaking bodies, embedding ecological considerations into the heart of these decisions could have a profound effect.

In an era of ecological crisis, this bold move is not just symbolic, it is essential. By giving the Ocean a seat at the table, SAMS acknowledges its profound debt to this life-sustaining entity. More importantly, it signals a commitment to the Ocean not just for today, but for generations to come.

Meet Helen Mitcheson, the voice of the Ocean on SAMS Board

The Trustees of SAMS elected Helen Mitcheson as the first ever spokesperson for the Ocean on the SAMS Board following an open recruitment process. Helen is an environmental solicitor with extensive experience advising on environmental and marine law across a diverse range of sectors. Before she became a lawyer, Helen had a career as a marine mammal scientist.

Our research

for a healthy Ocean and thriving people

- Ocean currents
- Polar seas
- Carbon cycling
- Climate change
- Ecosystem health
- Marine mammals
- People and the sea
- Marine conservation
- Biotechnology
- Marine energy
- Algae
- Deep sea
- Robotics
- Aquaculture
- Food security
- Marine litter
- Restoration
- Dark oxygen production

Robots can monitor protected species & habitats

Autonomous underwater vehicles (AUVs) are effective for monitoring mobile species in deeper waters found marine science undergraduate student Jonathan Taylor in his BSc dissertation.

An Autonomous Underwater Vehicle photographically surveyed the seabed of the Firth of Lorn in water depths of 110-165m for the existence and identification of sharks, rays and skates. In four survey days the AUV took 43k seabed photographs, from which the team identified 42 individuals and seven egg cases from five different species.

While the study area was small and the survey was only conducted over four days, the results indicate that AUVs are useful tools to study the spatial ecology and movements of mobile animals living on or near the seabed.

The student advisory team were **Prof John Howe**, **Dr Clive Fox** and **Petra Rybanska** from SAMS with external contributions from Drs James Thorburn and Christopher McGonigle.

January

Turning kelp into biofuel

Once upon a time it was only in fairy stories that straw could be spun into gold. Thanks to the magic of science we increasingly learn how to transform low-value resources into high-value products in the real world.

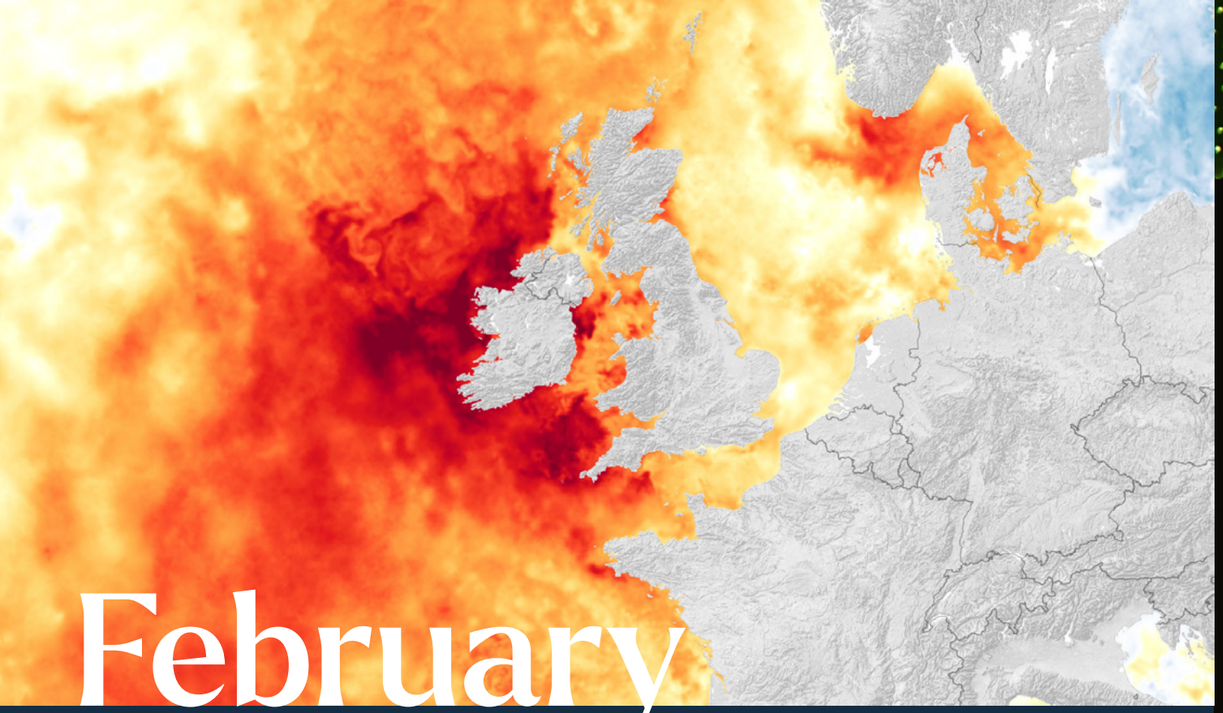
We investigated how turning kelp into energy can become a serious renewable energy source. Experimenting with ensiling to enable year-round uninterrupted production, our study looked at changes in microbial and chemical composition and pH fluctuations. We found ensiled kelp lost less than 2% of its total mass over a year and continued to yield biogas. (**Ditchfield** *et al* 2024)

Measuring climate change on Scottish shores

An increase in the temperature of Scotland's seas over the last decade is changing the types of animals and plants found on rocky shores in Scotland to those that favour warmer waters, according to a report by NatureScot and SAMS.

The study found clear evidence of warming in rocky shore communities. The shift towards warm-water species was shown by an increase of 0.14 degrees Celsius in the average temperature preference of the community, at the same time as a small increase in average sea temperature around Scotland of 0.20 degrees Celsius was recorded.

While these temperature rises may seem small, they translate into significant changes in the natural world, said lead author **Prof Michael Burrows**, a highly influential climate scientist who featured for the sixth consecutive year on Clarivate's global list of Highly Cited Researchers.



February

10% of global Ocean suffers heatwaves

A study in *Nature Climate Change* found that there were nearly 3.5 times the number of marine heatwave days in the summers of both 2023 and 2024 compared to any other year on record.

In the past two years climate change, exacerbated by El Niño, caused multiple record-breaking marine heatwaves - which did billions of dollars of damage around the world.

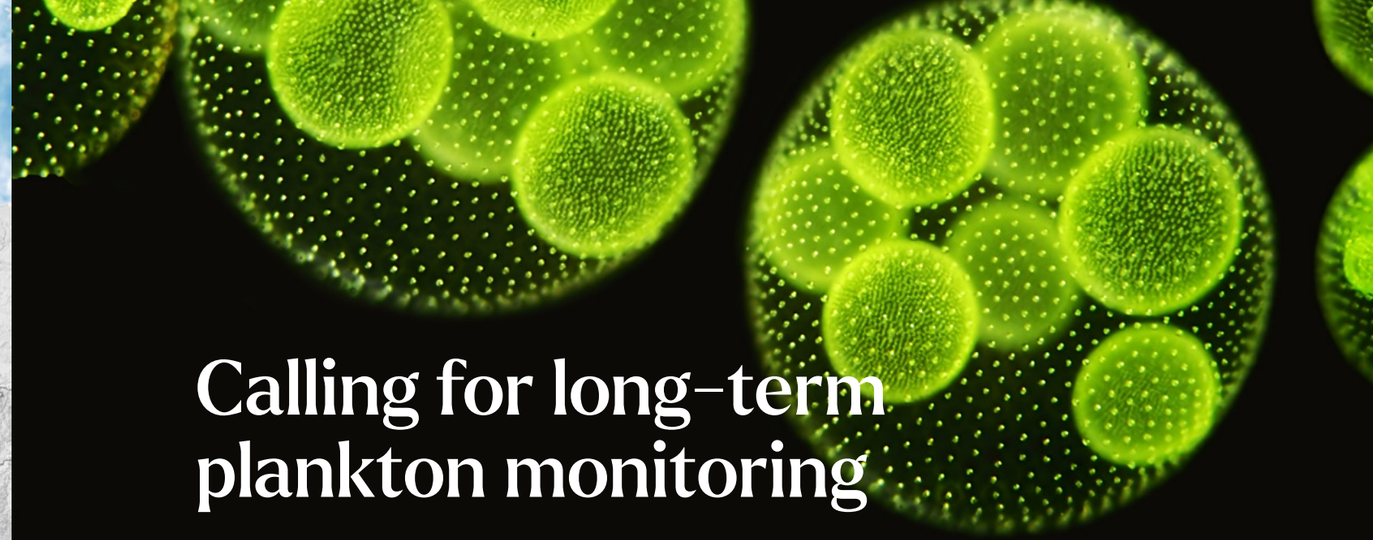
Professor Michael Burrows was an author on the study, which found that, in 2023-24, nearly 10% of the Ocean hit record-high temperatures.

Assessing climate tipping points

Climate tipping points are thresholds in the climate system. When crossed, they trigger drastic and probably irreversible changes such as flooding, extinctions, and threats to food security. Cascading effects further accelerate global warming.

The ARIA-GIANT project (Greenland Ice sheet to AtlaNtic Tipping points from ice loss) explores how the melting of Greenland's glaciers releases freshwater to the North Atlantic, and how that freshening may affect ocean circulation and global climate.

SAMS contributes with our fleet of robotic platforms and sensors, our oceanographic modelling and photogrammetry expertise and our long history of Arctic observations. The project is part of the Advances Research + Invention Agency's £81M Forecasting Tipping Points programme.



Calling for long-term plankton monitoring

Advances in technology – such as microscopic imaging and molecular techniques – should not be used at the expense of long-term monitoring programmes, warn some of Europe's leading plankton experts including SAMS microbial ecologist **Dr Callum Whyte**.

While modern methods can transform our understanding of global ocean health, traditional monitoring programmes remain irreplaceable in tracking how our seas are shifting in the face of a changing global climate.

The scientists favour the integration of old and new programmes and call for greater efforts to retain the specialist taxonomic skills needed to accurately identify plankton species and assess microbial diversity.

Beauty products linked to microplastic pollution in Ghanaian mangroves

Microplastic was found in 65% of sediment and water samples in mangroves from Ghana's western and central regions. The source of most microplastic was synthetic hair, textiles, water sachets and small plastic bags.

To reduce microplastic pollution **Dr Geslaine Gonçalves**, **Prof Bhavani Narayanaswamy** and Ghanaian colleagues from the University of Cape Coast suggest reducing single-use plastics, improving waste management and providing clean drinking water to the population. (Gonçalves *et al*, 2025)

Seeding seaweed success

A global research centre established to advance the use of seaweed in the global supply chain is benefiting from SAMS expertise on algae.

Some senior leaders of the International Bioeconomy Macroalgae Center (IBMC) at UC Berkeley were hosted by **Prof Michele Stanley** to learn about SAMS' expertise in seaweed cultivation, genomics and environmental impacts.

The $13M centre is tasked with boosting foundational knowledge, technological approaches, supply chain designs, policy frameworks, community engagement, and educational materials for businesses and consumers to build sustainable macroalgal-based bioeconomies. The current value of the global seaweed industry is estimated to be between $12billion and $19billion.

March

Coastal voices acceptability of seaweed farming

Social scientists **Drs Maria Wilke** and **Suzi Billing** and filmmaker **Andy Crabb** produced a 37-minute-long community voice method film, *Coastal Voices*, about how people in the St Davids area of Pembrokeshire connect with their coast and sea, the place it holds in their lives, and how seaweed farming may fit into their busy coastal space.

The Welsh/English bilingual film shows extracts from interviews with 22 inhabitants. The researchers hope it will make viewers reflect on what the sea means to them.

The Unlocking the Power of Seaweed project was supported by the National Lottery's Community Fund.

Watch the film using the QR Code.

Antarctic ecosystem of algae

SAMS scientists discovered a vast ecosystem, largely made up of photosynthetic algae, on the Robert Island ice cap in Antarctica.

The algae, which produce vibrant red and purple pigments, are likely to include new species to science and are covering more of the ice cap surface than scientists had expected.

Because of their dark colour absorbing more heat than the ice around them, the algae also added to melting of the ice caps in the region.

The research team led by **Dr Matthew Davey** of SAMS spent two months studying algal and plant communities on the Robert Island ice cap, a remote part of the northern tip of the Antarctic Peninsula.

Their survey, published in *Nature Communications*, found that photosynthetic algae grew across up to 20% of the ice in the area mapped - an area equal to nearly 6% of known photosynthetic-life in Antarctica.

April

Facial recognition supports flapper skate conservation

The flapper skate, a critically endangered giant of UK waters, has been thrown a conservation lifeline thanks to a project that uses technology similar to facial recognition to help monitor the species.

Rate A Skate is a collaboration between NatureScot and SAMS that uses artificial intelligence to recognise individual skate in thousands of flapper skate photos. Identifying individual skates allows researchers to estimate the size of the population in the MPA and continued monitoring will allow us to see how this changes over time.

The new project builds on the existing SkateSpotter monitoring programme that has collated a database of 5,500 images, mainly taken by catch-and-release anglers in the Loch Sunart to the Sound of Jura Marine Protected Area. For this project marine ecologist **Dr Steven Benjamins**, long-term lead scientist at SAMS on flapper skate, recruited image analyst **Dr John Halpin** to devise the machine learning programme, who delivered it with help from a multidisiplinary team of **Dr Alan MacDonald**, **Dr Joseph Marlow**, **Steve Gontarek** and **Dr Thomas Wilding**.

For more on SAMS' flapper skate research, listen to our Ocean Explorer Podcast episode: **www.buzzsprout.com/1080152/episodes/15909025**

Unforgettable outreach inside a whale

A 13 m long and 8 m wide inflatable humpback whale (called Hope by its Whale & Dolphin Conservation proprietors) filled a gym hall at Oban High School as the impressive centrepiece to the Whale of a Time event for primary school pupils organised by SAMS outreach officer **Mia Leng**.

The event celebrated the conclusion of the GENESIS project that explored intergenerational attitudes and responses to climate change and marine conservation in some of Scotland's remote coastal and island communities. The project was funded by the Scottish Government's Climate Engagement Fund and worked with primary schools on Barra and Tiree, and in Benderloch.

European biobanking call

A European-wide effort is under way to preserve the continent's native seaweed species as the effects of climate change, ocean warming and acidification threaten biodiversity.

Algae researchers from 18 global research institutes including SAMS' **Cecilia Rad Menendez** and **Dr Mikey Ross** co-authored. a report published in the *European Journal of Phycology* that highlights the need for a co-ordinated European effort to preserve seaweed genetic diversity against a backdrop of rapid species loss.

The report recommends a European-wide biobanking strategy in order to ensure food security, biosecurity and conservation of biodiversity. This would include the formation of a European Board of Macroalgal Genetic Resources to link existing biobanks.

Sabbatical @ SAMS

SAMS and CCAP hosted Prof Irmi Horst, a microbiologist from the Technical University of Applied Sciences in Nürnberg, Germany, for a 6-month-long sabbatical within Dr Matthew Davey's research group.

Irmi's research focussed on increasing growth rate, biomass production, and synthesis of valuable compounds like the carotenoid astaxanthin from the microalga *Chromochloris zofingiensis*. To improve the economic feasibility and circularity of the process, she explored the potential for utilising by-products from the food and drink industry. This work built on research by former PhD student Eleanor Wood.

THE NEXT CHAPTER

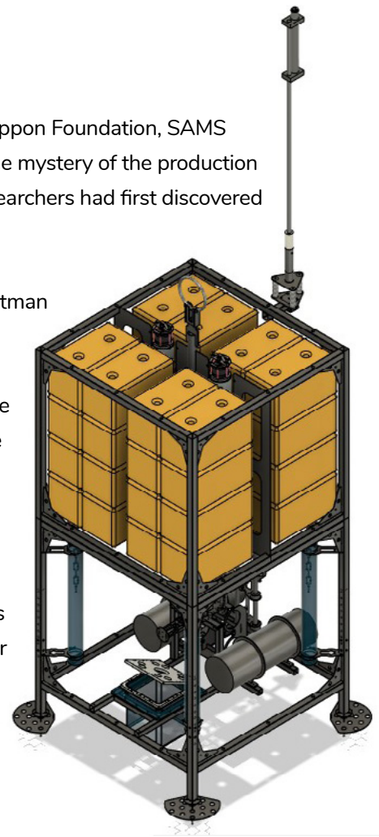
Dark oxygen production (DOP)

In 2024, a team led by SAMS' **Prof. Andrew Sweetman** published evidence of oxygen production in the deep sea. The discovery was cited during deliberations by the International Seabed Authority - the UN organisation responsible for the global seabed - over whether deep-sea mining could take place.

LANDING THE NEXT CHAPTER WITH NEW TECHNOLOGY

In January 2025, working with Japan's Nippon Foundation, SAMS announced plans to further investigate the mystery of the production of oxygen in the absence of light that researchers had first discovered in 2021.

The international team, led by Prof. Sweetman from SAMS, have been building several 'Hadal-rated' seabed landers. These platforms, the only ones in the UK capable of exploring the very deepest parts of the ocean, will carry purpose-built sensors to probe the source of dark oxygen in upcoming expeditions. Oxygen optodes will monitor oxygen conditions in the chamber, while pH and hydrogen sensors will document whether water oxidation or seawater electrolysis is occurring.



REBUTTING THE CRITICISM OF DOP

Towards the end of 2025 authors mostly from the mining industry published a paper that expresses their doubts over the validity of the 2024 *Nature Geosciences* paper and the existence of dark oxygen production. The international consortium of authors of the original study have rebutted their points but are waiting on the peer-review process to share their perspective, that is unshaken that dark oxygen production occurs.

HOW MARINE LIFE MAY RECOVER AFTER MINING

In March 2025, researchers published results of a 2023 expedition to the mineral-rich Clarion Clipperton Zone by a team of scientists led by Britain's National Oceanography Centre. It found that the impacts of a 1979 test mining experiment were still being felt on the seafloor, a complex ecosystem hosting hundreds of species.

The collection of small polymetallic nodules from an eight-metre strip of the seabed caused long-term sediment changes and reduced the populations of many of the larger organisms living there, though some smaller, more mobile creatures have recovered, according to the study, published in the journal *Nature*.

Then in late 2025, the Natural History Museum, London published findings of an investigation into the biodiversity of a deep- sea mining exploration zone before and after trials, concluding that the number of animals within the mining tracks decreased by 37%.

The team, including **Prof Andrew Sweetman**, **Dr Andrew Dale** and **Dr Dmitry Aleynik** also found that the test caused a 32% reduction in species richness - the number of different species in a particular area.

POLITICAL REVERBERATIONS

At time of publishing this report, the UN International Seabed Authority had not adopted the Mining Code, which would set out the rules and regulations around deep-sea mining.

Meanwhile, Prof. Sweetman was invited to give a seminar on his discovery at the Scottish Parliament in April 2025.

DARK OXYGEN IN THE MEDIA

Prof. Sweetman was interviewed for press, radio and tv programmes throughout the year.

Following the announcement that The Nippon Foundation would be supporting his research of this phenomenon, the story was covered by the BBC, CNN, Newsweek and New Scientist, among others.

In March he was invited to contribute an article to The Conversation and his work appeared in the Science Journal for Kids that summer.

Further coverage by the BBC and Scientific American was followed by an ABC (Australia) Four Corners documentary on deep-sea mining, which included a segment on dark oxygen.

At time of publication, his original 2024 paper is now #752 of approx 30,000,000 ever tracked on Altmetric and has been downloaded almost 500,000 times.

May

Hunting for sea lice

Current sea lice management techniques cost the salmon farming sector hundreds of millions of pounds worldwide. Sustainable solutions are hampered by limited knowledge of the life cycle and distribution of sea lice larvae in the water column.

Drs **Helena Reinardy** and **Kim Last** made regular sampling trips to Loch Etive in 2025 on the hunt for *Lepeophtheirus salmonis*, aka the sea louse, and found them present at depths down to 30 m – much deeper than they had expected based on published studies.

Meanwhile, a sea lice hatchery in the SAMS aquarium produces hatched sea lice larvae, helping the team investigate larval behaviour, survival, and sensitivities.

Supporting solar-powered drone testing

The company behind a unique solar-powered drone, capable of flights of up to 12 hours, carried out testing in airspace with the help of SAMS scientists and engineers.

Limosaero developed the sub-18 kilogram aircraft to conduct surveys at low to medium altitudes – less than 10,000 feet – over a longer period of time than electric drones, but needed a site in which to test new capabilities.

The company sought the support of SAMS, given its proximity to Oban Airport, and the expertise within its **Scientific Robotics Academy**.

Cautions against fish farming further offshore

Prof Paul Tett led a SAMS response to Scottish Government plans to allow fish farmers to apply for developments up to 12 miles offshore.

Appearing before the Scottish Parliament's Rural Affairs and Islands Committee, Prof Tett cautioned against the plans. The SAMS submission raised concerns over whether local authorities had sufficient resources to deal adequately with both operational and strategic planning in offshore waters.

£10k gift to inspire young minds

Outdoor education and ocean science outreach activities in Scotland have received a boost following a charitable donation worth £10,000 to SAMS.

The donation of £8,000, plus Gift Aid, from Oban resident Robert Kincaid has been used to buy outdoor science equipment that enables learners to explore their marine environment and get them to think like scientists.

Robert, a former sailing instructor, presented his donation to the **SAMS outreach team** to buy kit such as a remotely operated vehicle to see below the surface, microscopes and a planktoscope to explore the microcosm and a variety of sampling and analytical equipment.

Seaweed diet for salmon

Prof Adam Hughes and **Dr Gail Twigg** led a review of more than 300 studies on the use of seaweed in finfish diets.

Their paper, 'The use of macroalgae in feeds for finfish aquaculture', found that inclusion of seaweeds and seaweed products in feed can have beneficial effects in many species.

Specifically, dietary seaweed can support and/or improve growth, feed efficiency and biochemical composition, have favourable health impacts including immunostimulatory effects and resistance to pathogens, increased antioxidant status, and improved intestinal function.

While the idea of using seaweed and their derivatives in salmonid feeds is not new – studies date back to the late 1980s – there is an increased interest in seaweed culture in Scotland. This has reinvigorated the discussion around more circular feed ingredients and, inevitably, the use of seaweed as feed for salmon and trout.

June

The changing flow of the North Atlantic 2014–2022

Some of our physical oceanographers including **Dr Neil Fraser**, **Dr Kristin Burmeister** and **Prof Stuart Cunningham** contributed to the detailed study of how the North Atlantic Current has been changing in the Iceland Basin, a critical region for ocean circulation and climate, between 2014 and 2022.

The researchers found that the amount of water, heat, salt and freshwater in the current varies widely over time. There was a trend for the current to transport increasing amounts of heat and salt northward and to re-distribute energy in the climate system.

By revealing how and why the North Atlantic Current changes, the study provides essential evidence for improving climate models and anticipating future impacts on weather, ecosystems, and long-term climate variability across the North Atlantic region. (Dotto *et al*)

Speaking up for seaweed @ the UN Oceans Conference

At a side event in Nice **Prof Liz Cottier-Cook** called for a UN Task Force to address biodiversity loss of wild seaweeds.

She also attended an event on shaping a sustainable future for seaweed in a regenerative blue economy that had been organised by the Prince Albert of Monaco Foundation. The meeting at the Blue Economy Finance Forum in Monaco focused on the untapped potential of seaweed in achieving several Sustainable Development Goals.

A decade of aquaculture training

For ten years SAMS has been leading the Erasmus Mundus Joint Master Degree in Aquaculture, Environment and Society (ACES-Star) that UHI co-delivers with the Universities of Nantes, Heraklion and Radboud. The 2-year course is profoundly multinational: the 199 students of the first decade hail from 49 countries and have been creating powerful professional networks.

A celebration event, sponsored by Scottish Sea Farms, brought 84 alumni, 24 current students and 60+ organisations and industry supporters together in Oban for two days of talking, re-connecting, discussing, networking and joyfully celebrating an amazing programme.

The event was organised by **Marianne Fell**.

Community scoop for whale poop

Volunteers are scooping whale poop in The Minch to help unlock some of the secrets that baleen whales have been keeping.

SAMS Honorary Research Fellow **Dr Conor Ryan** has helped to lead citizen science efforts to collect whale faeces samples and conducting stable isotope analysis to work out what proportions of fish or zooplankton make up their diets.

This information helps conservationists: It can be used to genetically identify digested prey species and to establish the severity of plastic ingestion in these whales.

Algal revolution @ Royal Society

Sharing their enthusiasm for all things algae were **Dr Francisca Vermeulen** and research students **Anita Flores Lenero** and **Artemis Eales**, joined by a number of living cultures of algae from CCAP. For six days, the SAMS contingent supported the British Phycological Society's stall 'The Algal Revolution' at the Royal Society's Summer Science Exhibition 2025. They had developed a new art activity using pigments extracted from algae, and engaged over 10,000 visitors.

July

The Ocean is celebrated by art science collaborations

SAMS welcomes artists-in-residence and many of our marine scientists find it enriching to collaborate with creatives who share their enthusiasm and curiosity about the marine environment.

Poet **Dr Suzannah V Evans** (right) collaborated with SAMS' Marine Mammals Research Team and crafted a 'concrete' poem intended to be seen rather than heard. *Sea Ear* captures the experience of listening to the sea with hydrophones and plays with ideas of seeing and hearing. Argyll sculptor **Melanie Chmielewska** was inspired by the poem and carved it into a stone slab that was exhibited at the Taynish Nature Reserve Art Trail as part of Artmap Argyll 2025.

Following the inaugural Wild SciArt event SAMS held in 2022 exploring algae in science, art and literature, **Dr Michael Ross** and two collaborators created a special issue for *Applied Phycology* called 'Algae at the Interface' that published 15 SciArt articles in 2025.

Articles included a reflection on poetry PhD student **Helena Hunter**'s 6-month internship in 2024; a description of the Microalgae Museum event trialled during **Eric Bear**'s stay in 2024; and one on the making the invisible visible project (below).

In the spring the Ocean Explorer Centre hosted **Rosie Newman**'s 'Making the invisible visible' exhibition inspired by **Dr Francisca Vermeulen**'s research on Antarctic algae.

SAMS hosted animator **Viola Madau** in the summer of 2025 to work on an animated documentary 'Dùthchas: Our Underwater Forests', collaborating with SAMS honorary research fellow, **Dr Mandy Haggith,** our writer in residence for 2026-7.

August

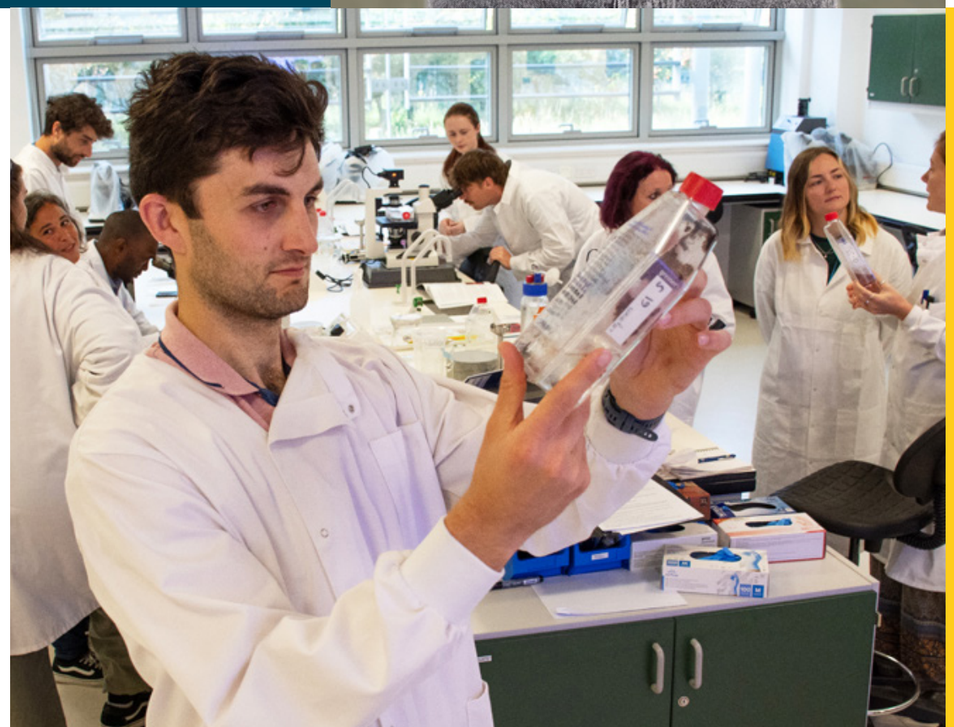
Safely clearing a forgotten danger

The world wars left many undetonated explosives on the bottom of the North Sea that now need to be cleared to build windfarms. Detonating them *in situ* comes with the risk of harming wildlife nearby.

To better understand the ecological risk and to facilitate mitigation, a team led by **Dr Nienke van Geel** studied how harbour porpoises respond to controlled detonations. Analysing data from acoustic detectors on the seabed, porpoises were found to vacate the area around a detonation site up to a distance of 15-20 km. These measurements helped the UK Government better tune national guidelines for porpoise impact assessment during activities such as constructing offshore windfarms.

Floating offshore platforms affect plankton

A research expedition aboard *RRS Discovery* found that a prototype floating offshore wind farm in the North Sea increases water column mixing. This reshapes nutrient behaviour and may fuel phytoplankton productivity at the base of the marine food web. The expedition was part of the eSWEETS project that involves **Drs Robyn Tuerena, Andy Dale, Rob Hall, Richard Abell** and **Lisa Friberg**. The cruise featured on Countryfile on BBC1 on 12 October with research intern **Louise Gao** discussing the response of zooplankton.



New course supports seaweed farming in Europe

In response to the growing interest in seaweed farming, SAMS' **Seaweed Academy** delivered a training course on the early stages of seaweed cultivation that attracted delegates from as far away as Portugal.

The course, the first of its kind in the UK, took participants through the practical skills required and introduced them to such important aspects as building a nursery, ensuring biosecurity and undertaking selective breeding.

Restoring coastal habitats

People want our seas and Ocean to be healthy, diverse and resilient. Restoration aims to actively re-establish thriving coastal habitats by reintroducing key species – in temperate waters mostly seagrass, kelp and oysters. But to achieve this worthy goal, we need new knowledge, skills and technology. SAMS has set up a restoration working group to maximise the effectiveness of our work and support restoration in a fair and just way.

MARINE ROBOTS FOR RESTORATION

The Kilchoan Estate is rewilding both terrestrial and marine habitats on the Degnish peninsula in Argyll. They need a survey of Melford Loch and a habitat suitability model to decide where to reintroduce European flat oysters, once abundant in the area, and where flapper skate lay their eggs so the area can be protected.

A team from **SAMS Enterprise's** Scientific Robotics Academy, Unique Group and the University of Glasgow successful trialled various autonomous surface vehicles and sensors in the summer and is planning the full survey for 2026.

According to **Dr Phil Anderson**, who heads up the Scientific Robotics Academy, robotic systems will transform how we conduct and monitor restoration projects because, once set up, they provide more, better and cheaper information faster than people ever could.

PLOTTING THE PATH TO MARINE RESTORATION

We published two reports that outline the status of Scotland's threatened seagrass meadows and native oyster reefs, including an overview of the current restoration efforts, techniques and research gaps.

The reports were commissioned by SSEN Transmission, who are engaging proactively in restoration to regenerate marine habitats in recognition that building infrastructure for renewable energy projects impacts the marine environment.

Listen to our podcast episode: Marine restoration - Why it's everyone's business

SEAGRASS NURSERY FOR SEDIMENT STUDIES

Dr Alasdair O'Dell has been exploring the suitability of different sediments for successful seagrass restoration, combining field, laboratory and historical remote sensing approaches.

In 2025 he set up a **nursery**, planting 1,500 seeds from Loch Craignish, a restoration site cared for by the community-based charity *Seawilding*. There he is now testing the effect of different substrates, freshwater treatments and anoxic regimes on seagrass growth.

OYSTER RESTORATION

Oysters are ecosystem engineers that filter and thus clear water, create complex reefs that provide habitat for many other species, and offer coastal protection. Native oysters suffered a 95% reduction in the last 100 years due to overfishing, pollution, habitat destruction, disease and invasive non-native species.

At SAMS **Dr Mairi Cowan** has been focussing on strengthening the restocking and reef enhancement supply chains by studying endocrine control of oyster reproduction and early development in *Ostrea edulis*.

SUPPORTING RESTORATION ON THE SOLWAY COAST

SAMS welcomes the Dumfries & Galloway Council led project 'Solway Coast and Marine Project – Landscape Connections' (SCAMP) that uses community-driven initiatives to enhance and restore biodiversity in one of the largest estuaries in Europe. After two earlier visits to SCAMP and two from SCAMP to SAMS, we coordinated a two-day visit from 19 stakeholders to SAMS in December to grow a wide network with opportunities across all SAMS activities.

Work-ready graduates

September saw the launch of a five-year undergraduate master degree programme that provides students with work experience in the blue economy as part of their studies.

The new **MSci Applied Marine Science** programme allows students to bridge the gap between academic learning and hands-on work-based experience by spending most of their final year in a workplace of their choice. The new UHI degree is the brain child of **Dr Arlene Ditchfield**, who is also the programme leader.

SAMS @ Holyrood

We spent three days at The Scottish Parliament talking with MSPs about the importance of marine science to Scotland and the plight of cetaceans faced with floating and anchored ropes, nets and waste.

We were heartened to notice that MSPs in inner city areas and inland have as much concern about the future of the Ocean as those representing or living in coastal communities – the Ocean gets to us all. We will be back to talk some more...

Supporting Malaysian seaweed farmers

Seaweed supports more than six million farmers in 56 countries worldwide. The industry is, however, facing increasing pressure from climate change.

SAMS researchers travelled to Sabah in Malaysia for a workshop with officials from the Department of Fisheries, other seaweed researchers, and 50 stakeholders to co-develop a progressive management pathway for improving biosecurity in the seaweed industry.

The workshop focused on the main commercially grown seaweed species in Malaysia, the key pest and disease challenges faced by the industry, and the practical solutions that may allow the industry to develop its full potential.

September

Robotics for nature management

A new CPD-recognised course provided professionals working in fish farming, wind energy, polar science and environmental mapping with knowledge and skills to use robotic platforms and sensors for monitoring changing environments.

Delegates travelled from Canada, Croatia and across Scotland to participate in the 3-day debut course in 'Environmental Monitoring using Multi-Platform Technology' delivered by scientists from the **Scientific Robotics Academy**. Topics included mission planning, legislation and risks, sensor integration, and data processing.

Top student

Popular SAMS final year PhD student **Tim Awbery** has won numerous accolades during his doctoral studies, including Student of the Year 2025 for both SAMS and the entire University of the Highlands and Islands. The prize was awarded during the 2025 SAMS UHI Graduation in Oban's Corran Halls, when 22 students graduated.

Tim studies the distribution of minke whales in Scottish waters and the potential impacts of human activities such as fishing and marine traffic. His computer modelling work has provided important information to the Scottish Entanglement Alliance which works with creel fishermen to reduce entanglements of whales and other marine animals in Scotland.

Protecting Arctic from invasives

Shipping traffic has been dramatically increasing in Arctic Canada and offers less mobile invasive species the opportunity to 'hitch a ride'.

A team including SAMS geospatial analyst **Dr Alison Cook** established that a new eDNA method can detect non-indigenous species.They reported the first recording of the bay barnacle *Amphibalanus improvisus* as a prolific invading species in Arctic Canada.

The method is considered suitable for citizen science investigations and could underpin a monitoring scheme for marine invasives in this rapidly changing area. (Boyse et *al*)

Neurodiversity helps marine science flourish

A SAMS marine scientist used his inaugural lecture as a UHI Professor to reflect on the challenges faced by neurodivergent students and researchers and the contributions they can make.

Adam Hughes, newly appointed Professor of Innovation in the Blue Economy, spoke passionately about his pioneering science and added a powerful personal message: that resilience, determination, and diversity of thought are essential for the future of our Oceans, and for academia itself.

New Nova Scotia partnership

Building on well-established cultural relationships with the Gaelic diaspora in Nova Scotia, SAMS has been developing new academic, educational and commercial links.

We launched an undergraduate student exchange programme with Dalhousie University and twinned our Ocean Explorer Centre with Àros na Mara Centre of Learning and Discovery on Cape Breton Island.

Prof Nick Owens and trustee **Prof Doug Wallace** have been exploring funding opportunities for research links with universities in Atlantic Canada.

What can the sounds of nature tell us about the health of our ecosystems?

SAMS' mammal ecologist **Dr Denise Risch** talked on the BBC World Service's The Conversation with journalist Datshiane Navanayagam and Australian environmental scientist Dr Elizabeth Znidersic. Use the QR code to listen.

SAMS tech improves safety in cold places

Technology capable of monitoring snow and ice conditions in some of the most extreme and challenging environments on Earth is improving safety and infrastructure management in a changing climate.

SIMBA (Snow Ice Mass Balance Apparatus) is a powerful autonomous device. Originally designed as a scientific tool for polar research, the latest commercial version of SIMBA can help forecast avalanche risk, assess the safety of ice roads, monitor flood risk and protect energy infrastructure.

SIMBA units are stationed throughout the Arctic and Antarctica. Two SIMBA units are stationed on Dempster highway, Canada's only all-season public road crossing the Arctic Circle, where they monitor river ice at temperatures as low as -42.5°C. In Scotland, SIMBAs are deployed in the Cairngorm mountain plateau, where wind speeds can reach up to 173 mph.

Phillip Thompson and **Craig Livingstone** at SAMS Enterprise built and delivered 40 new units in 2025, bringing the total units built since 2012 to 437.

October

November

Taking stock of COP progress

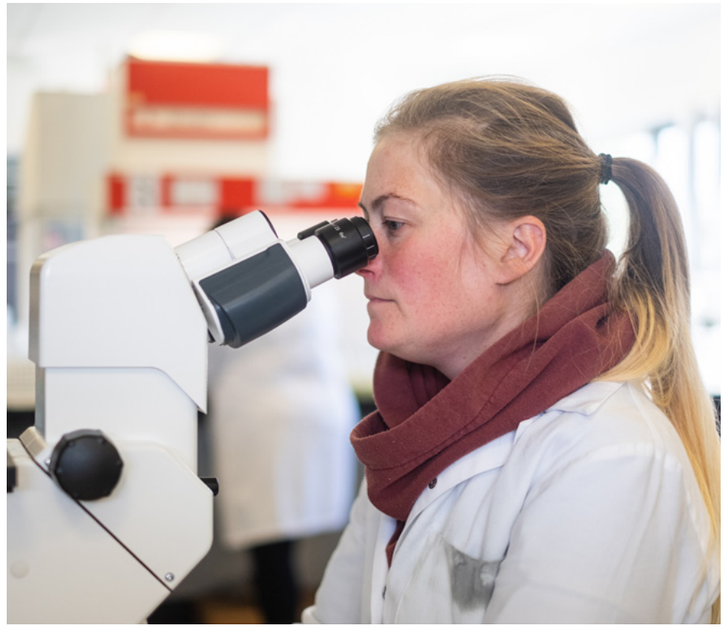
SAMS' social scientist **Dr Bernadette Snow** contributed to the 'Roadmap to Oceans and Climate Action Initiative' report that takes comprehensive stock of progress in implementing the Ocean and climate agenda at the COP, across other global policy platforms and processes, and through regional and national initiatives.

The report serves as a resource for negotiators and identifies gaps in information and policy that require attention and provides recommendations for future action.

Short training for professionals

The **Culture Collection of Algae and Protozoa** delivered two courses on algaculture for biotechnology and one on algal cryopreservation training a total of 50 people from all over the world.

Drs **Matthew Davey** and **Francisca Vermeulen** organised three courses in algal biotechnology and one in restorative aquaculture and entrepreneurship for EIT Food in collaboration with colleagues in Germany, Iceland and Poland. They trained c 100 participants from 24 countries.



Squid hiding in plain sight

When she studied ROV footage from 4,000 m in the Clarion-Clipperton Zone in the central-eastern Pacific, SAMS UHI PhD student **Alejandra Mejía-Saenz** and colleagues from NOC spotted something never seen before: what they first thought were stalks of deep-sea sponges turned out to be the tentacles of a 'muddy squid' that had buried its head in the sediment, apparently mimicking sponges. It's the first time any cephalopod has been recorded in a rigid upside-down position and no other squid species is known to show similar burying behaviour.

AI, our winning marine growth formula

Research that combines expertise in artificial intelligence and marine biology to assess marine growth on offshore structures won the Judges Award at The Scottish Green Energy Awards in Edinburgh. The award was presented to SAMS Enterprise's business development manager **Daniel Carcajona**, recognising the work of **Drs John Halpin, Joseph Marlow** and **Tom Wilding.**

Using ROV inspection footage, advanced 3D photogrammetry and machine learning, the SAMS research group generates precise 3D maps of marine growth, automatically identifies organisms, and accurately estimates biomass. The method provides a more informed assessment tool for offshore renewables companies than the current use of single point burbnssurveys.

Learning by playing Drones & Droids

Created by robot engineer **Dr Phil Peterson** and tested by marine scientists, Drones & Droids began as a spark of an idea: a thrilling, collaborative strategy card game where players tackle environmental challenges using flying, roving, and diving scientific robots – learning about ocean science and innovation as they play.

To bring the game to life, we asked supporters to back SAMS' first-ever crowdfunder. The response was extraordinary. From Scotland to across the globe, backers rallied behind the project. With great rewards, match funding from Creative Scotland's Crowdmatch programme, and a stream of videos from our robotics lab, the campaign didn't just meet its target - it smashed it.

Thanks to that collective effort, Drones & Droids entered production in early 2026. Every penny of profit from the game will be reinvested into real marine science, helping researchers push the boundaries of ocean discovery.

Fisheries management in Namibia

SAMS social scientist **Dr Bernadette Snow** contributed to a study aiming to improve shore-based fishery resource use and management by listening to the voices of 234 recreational anglers in Namibia.

More traditional ways of top down management had achieved limited success, opening the door for trialling more collaborative methods to manage wild fish stocks.

SAMS' hydrodynamic model helps MPA design

A team of marine conservation experts collaborated with SAMS physical oceanographer and modeller **Dr Dmitry Aleynik** to use the flow regime derived from his hydrodynamic WESTCOMS model to trial the use of particle algorithms for modelling the movements of flapper skate in the Firth of Lorn marine protected area (MPA).

The researchers found that integrating a modelling framework with animal tracking data delivered a significant improvement in space-use maps and residency estimates and so has the potential to improve the conservation of this critically endangered species. (Lavender et al)

December

Supplying the world

Our **Culture Collection of Algae and Protozoa** is a national facility that supports academic and commercial users in the UK and beyond with living cultures of **3,199** strains and associated knowledge.

For the reporting year:

- New taxonomic group added: **6** accessions of Choanoflagellates
- CCAP cultures featured in **551** new publication and **17** patents
- Average customer satisfaction rating: **4.9 / 5**

Fundraising @ SAMS

What began in 2022 as SAMS' call for our first philanthropic partners, has been steadily growing into a powerful movement - one driven by people who believe our Ocean deserves bold science, fearless innovation, and unwavering stewardship.

Your generosity, your curiosity, and your determination to uncover the mysteries beneath the waves has been inspirational, and we love being on this journey with you.

In just a few short years, your support has helped us continue to push the boundaries of marine research, nurture the next generation of ocean scientists, and strengthen our ability to respond to the urgent challenges facing our planet. Every conversation, every donation, every shared belief in the value of ocean knowledge has contributed to a momentum that is reshaping the future of SAMS and amplifying our global impact.

Now, as we stride into 2026, we are shaping the next chapter of this journey - one defined by deeper partnerships, wider scientific reach, and a renewed collective resolve to protect the seas that sustain us all. This is a moment of possibility, ambition, and purpose. And it's made possible because of you.

To everyone who has joined us - and to all those who will - thank you for standing with SAMS at this pivotal moment in our story.

Together, we are safeguarding the ocean for generations to come.

THE IMPACT YOU MAKE POSSIBLE

Powering possibility: a growing partnership with Nadara

In 2025, our relationship with renewable-energy pioneers Nadara continued to flourish. Supported by the company's Broadshore and Bellrock offshore wind farm projects, Nadara is helping SAMS to inspire the next generation of marine scientists, who will shape the future of Ocean research and renewable technology.

Nadara's funding enabled the creation of a new STEM Officer role - an investment that is bringing high-quality, hands-on science to rural schools across Scotland. More than 3,200 engagements have already taken place, with 2410 young people enjoying exciting learning opportunities they might not otherwise have access to. This impact extends to students and early-career researchers as well. Nadara's support has created 32 opportunities through bursaries, scholarships and internships, and enabled 15 subsidised places on the SAMS Scientific Robotics Academy.

Growing Futures through the Summer Internship Programme

Launched in 2021, the SAMS Summer Internship Programme was created to open new doors for students and early-career scientists, giving them a rare chance to take part in real, hands-on research at a pivotal stage in their career development. The programme was born from a five-year commitment by the Ettrick Charitable Trust, whose support ensured young people could gain meaningful experience in the lab.

In 2025, the trustees deepened their commitment; increasing their annual gift, thus providing the stability needed to expand the programme's ambition and reach. This enhanced support now enables us to offer five internships every year through to 2029, giving dozens more emerging scientists the opportunity to build skills, confidence and a sense of belonging in research.

Our fundraising priorities for 2026 & beyond

The following are our priority fundraising areas, which will allow us to respond to the most pressing environmental challenges we face today, and tomorrow:

THE DISCOVERY FUND

Curiosity, a thirst for knowledge and a desire for answers continues to be part of our DNA today. The Discovery Fund will ensure a vibrant future of exploration, and scientific breakthrough; being able to pursue the science that matters; without barriers, and without bias. Philanthropy will enable the most meaningful and impactful ocean science, deepening our fundamental knowledge about the planet.

TECHNICAL EXCELLENCE FUND

SAMS technical team are the lifeblood of our research - you may not always see them, but they are always there. Our skilled technicians create and maintain the environments needed to facilitate effective and successful science. Whether it's ensuring our labs are properly equipped, our vessels are sea-worthy, or our robotics are operational, we want to support and celebrate the crucial role technicians play in science.

RESTORATION RESILIENCE FUND

Advancing the underpinning knowledge needed for effective marine and coastal restoration, this fund enables crucial science to support rewilding efforts and ensure effective and long-term success. Focussing on fragile habitats including salt marshes, seagrass meadows, and oyster reefs – we deploy cutting-edge research to develop marine net gain metrics, and empower communities to care for their environments, together promoting healthier, more resilient ecosystems.

STUDENT SUPPORT FUND

SAMS trains the powerful young trailblazers who will inform and influence solutions for our most pressing environmental issues through their future research and careers. Donations will nurture promising young students, irrespective of financial, cultural or socio-economic circumstances, by providing immediate impact through bursaries, scholarships, and paid internships.

We'd like to thank all the philanthropic funders, donors and supporters who stood by our side in 2025, as together we strive for a healthy ocean for thriving people.

Thank you!

Blue Robotics
Cobb Charitable Trust
Coop Foundation
Creative Scotland
Crown Estate Scotland
Ettrick Charitable Trust
Kaiser Trust
Kinlochaline Trust
Limosaero Limited
Mission Performance
Nadara
The Nippon Foundation
Ocean Energy Systems (OES Environmental)
The Peterson Family
RBR Global
Robert Kincaid & Family
Scottish Marine Environmental Enhancement Fund (SMEEF)
Scottish Sea Farms
Sea-Changers

All those who wish to remain anonymous and not forgetting all those who have donated online, backed our Drones and Droids Crowdfunder, donated in the Ocean Explorer Centre or who have fundraised in aid of SAMS. You are all change-makers.

OUR APPROACH TO FUNDRAISING

SAMS' approach to fundraising is rooted in meaningful, trust-based relationships and a collective passion for protecting the ocean as an essential global resource. Our aim is for donors to feel part of our work, to know the individuals behind it, and to appreciate the positive impact their contributions achieve.

We ensure our fundraising methods are respectful and never persistent or pressurising. We adhere to the Fundraising Regulator's Code of Fundraising Practice and Fundraising Promise, and we hold the Fundraising Guarantee administered by the Scottish Fundraising Adjudication Panel.

We have not received any complaints in regard to our fundraising activities this year. We have worked with commercial participators this year and have welcomed the More Partnership to support our activities as professional fundraisers.

Peer-reviewed journal articles & reviews

Publications

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