



Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

GROWING THE SCOTTISH SEAWEED SECTOR

SCOTLAND'S PRODUCERS AND PROCESSORS







INTRODUCTION

Scotland is a coastal nation placed in the temperate zone where seaweed populations naturally flourish. The clean, nutrient-rich and sheltered seas of sea lochs provide optimal conditions for wild harvesting seaweed from the shore or farming seaweed on rope structures.

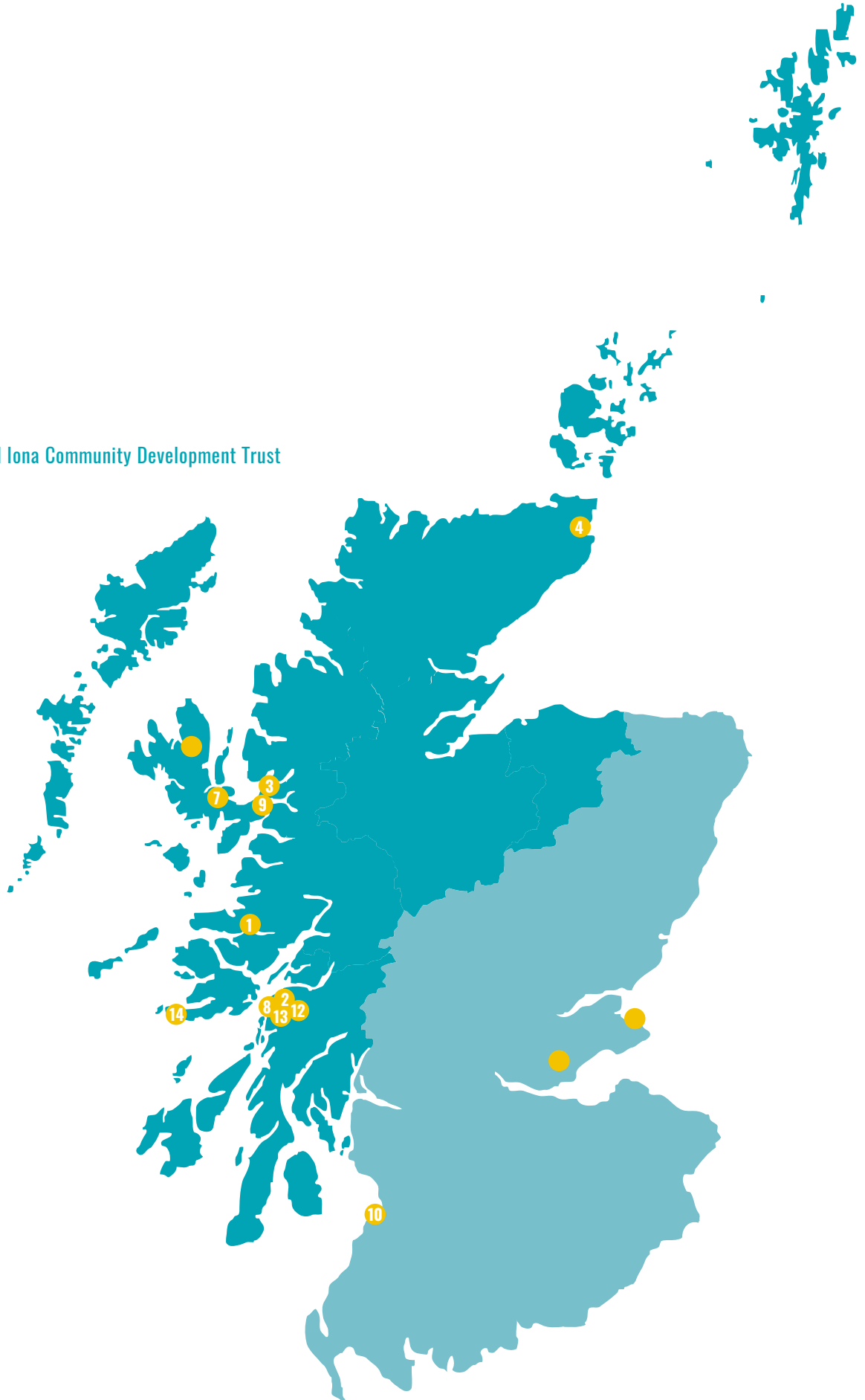
Historically, seaweed has been harvested in Scotland to supplement food, fertilise agricultural land and for industrial production including ash and alginates. In the past decades seaweed research expertise has developed an international reputation and supported the growth from pilot farms to commercial farms. Seaweed harvesting and farming are now both active industries in Scotland, each supplying a range of raw materials. The largest wild harvested crop is egg wrack alongside a range of red, green and brown seaweeds, seaweed farming on the other hand mainly grows kelp such as sugar kelp and dabberlocks. The taste, qualities and compounds vary between all species which means different species can have different applications.

Seaweed can be part of the solution against climate change through the provision of ecosystem services and as a low carbon raw material with a wide range of applications. Processors can create seaweed-based products that replace resource-intensive products such as plastic, fuel and fertiliser. Seaweed has traditionally been eaten in Asia but is increasingly eaten across the world and is seen as a sustainable blue food. In Scotland seaweed is a growing sector and forms part of Highlands and Islands Enterprise's Blue Economy Priorities and the Scottish Government's Blue Economy Vision.

In this booklet, we feature interviews from a number of producers and/or processors in Scotland along with several supporting organisations. Just as the sector is growing, so will this booklet. If you are interested in getting featured please get in touch (see page 34). The range of organisations featured in this booklet showcase the diversity and potential of the Scottish seaweed sector to continue to develop and grow.

Christine Rolin
Senior Project Manager (Blue Economy)
Highlands and Islands Enterprise

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ATLANTIC MARICULTURE

Interview with Amabel Hamilton (Founder)



How did you enter the world of seaweed?

In 2018, I was working for an environmental think tank and read about how feeding seaweed to cattle could be a pathway to reducing their methane emissions. After putting out feelers to agricultural industry, my husband Dougal and I founded the company (formerly GreenSea Solutions) in order to undertake research with Scotland's Rural College (SRUC) to test the methane-reduction capabilities of different varieties of Scottish kelp. It was important that we were using seaweed sourced in Scotland, as we didn't want to wild harvest at scale, which incentivised us to set up our own farm to produce kelp.

Could you describe the brief history of your company?

Douglas and I founded the business in 2018, and have been farming kelp at our 15-hectare seaweed farm in Loch Sunart since 2021. We also run a kelp processing facility at Ardtoe Marine Laboratory. In 2021 we started testing what species grew best on the farm and experimented with supplying to different markets, but have since settled on a combination of fresh food and biostimulant production. Our biostimulant processing is relatively simple; we let the seaweed ferment with fresh water in tanks, before passing the liquid through our

unique filtration system, all of which requires very low energy input. We were initially called GreenSea Solutions but changed our name to Atlantic Mariculture in 2022, primarily to reflect our evolution from R&D entity to a commercial farm and processing operation. We have also expanded our team by recruiting local people with experience in operations and aquaculture. In January 2023 we overhauled our farm structure, and expect to produce up to 40 tonnes this season, which we hope to continue scaling to 100 tonnes by 2025 – 2026.

What products or services does your organisation offer?

Most of our seaweed biomass is sold to the agriculture market as our liquid biostimulant, Liquid Kelp™, or our SeaBiome™ slow-release mulch pellets. We also sell small-scale fresh to the food market during the early harvest season; in the Spring, we delivery fresh seaweed twice-weekly to London restaurants through our wholesale partner Natoora. We also offer to buy bulk seaweed biomass from seaweed farmers to process into our plant and soil product ranges. Finally, we are launching consultancy services to help potential farmers get set up, from farm design through to licencing and processing.



What role does sustainability play in your business?

Our business revolves around sustainability. Farming kelp is hugely beneficial to the marine environment as it cleans the water, reduces ocean acidification and can act as a carbon sink, although only if done sustainably and correctly. We are slowly scaling up and collecting data as we go, so we can properly understand how bigger seaweed farms interact with the environment. Plant and soil health products made from kelp can also play a role in regenerative agriculture, and all of our products contain a range of nutrients and hormones that improve soil structure and support plant growth and resilience. We are working with farmers and industry members to understand how we can support the transition from traditional practices to more sustainable farming practices.

What are the next steps for your business and your hopes for the industry?

We want the seaweed industry to grow, and hope there will be space for a mix of small and large scale farmers to co-exist. Seaweed farming is a very exciting opportunity for coastal communities. The more kelp is grown, the more exciting sustainable products can be made using this incredible natural resource. As a business, we want to grow symbiotically with other seaweed farmers and agricultural farmers and hope to foster many new collaborations within this sphere in the years ahead.



CONTACT DETAILS

Email: amabel@atlanticmariculture.co.uk
Visit: www.atlanticmariculture.co.uk
Visit: www.tangledgreens.co.uk

EAT SEAWEED

Interview with Kyle McPherson (Founder)



How did you enter the world of seaweed?

Initially I was interested in seaweed farming, I wanted to help develop the farming because I thought I could help the new industry. Basically, I wanted to be a seaweed farmer and it seemed my background as a fisherman and diver was a good fit to enter the industry. Once I started, I went around the shore to understand the types of seaweed that grew in my local area. I became more and more fascinated with how it grew, the ecosystem and the potential applications especially in food. I then narrowed down to the most edible species such as dulse, pepper dulse, Irish moss, sea lettuce, sea spaghetti, nori and kelps.

Could you describe the brief history of your company?

I started out wild harvesting and later started farming kelps on part of the South West Mull and Iona Development Trust seaweed farm. When I started, I assumed there would be a large market for seaweed, but I quickly realised the market didn't exist yet. So I started in Oban making contacts with chefs and delivering fresh product to them. I later set up a small processing plant at Lochnell North of Oban to dry and

package whole leaf seaweed. Eat Seaweed was formally set up in 2021 to formalise and brand my seaweed products to sell to the British market. After setting up Eat Seaweed I discovered other key knowledge gaps for my business and the sector, which has led me to be involved in a variety of innovations that solve issues faced by seaweed farmers. which led me to set up other businesses to solve these challenges, such as Seaweed Services to help standardise production practices and The Oban Drying Company to create drying technology and services.

What products or services does your organisation offer?

We offer three products: dried dulse, Atlantic wakame and sugar kelp. We sell wholeleaf in packages to create the healthiest and best quality products, that allows chefs and consumers to decide how to use the seaweed in their food. We are currently developing new products that we hope to launch in the near future.



What role does sustainability play in your business?

As a small business we use artisanal processes which have a low environmental impact. The dulse is harvested by hand, on the harvest sites we harvest less than 20% of the dulse in an area and conduct surveys to protect the seaweed and biodiversity. I believe our dulse from the West Coast is the best quality you can find in the UK. Our kelp is grown on the ocean farm which requires no extra inputs to grow such as fertilisers. We have full traceability from seed location to our end products so consumers can be confident in the provenance of our seaweed. Overall, the seaweed products have few negative environmental impacts and are beneficial for human health.

What are the next steps for your business and your hopes for the industry?

We are looking to build relationships with farmers across the UK to buy farmed seaweed such as sugar kelp and Atlantic wakame to produce our growing range of products. We hope to be frontrunners in the industry to really showcase what is possible with seaweed. Working with chefs and other food producers has led to exciting collaborations and we hope to inspire people to use seaweed in their food. Our hope for the industry is to see entrepreneurs and farmers thrive and coastal communities benefit from this exciting opportunity.



CONTACT DETAILS

Email: info@eatseaweed.co.uk
Visit: www.eatseaweed.co.uk

ECO CASCADE

Interview with Alison Baker (Co-founder)



How did you enter the world of seaweed?

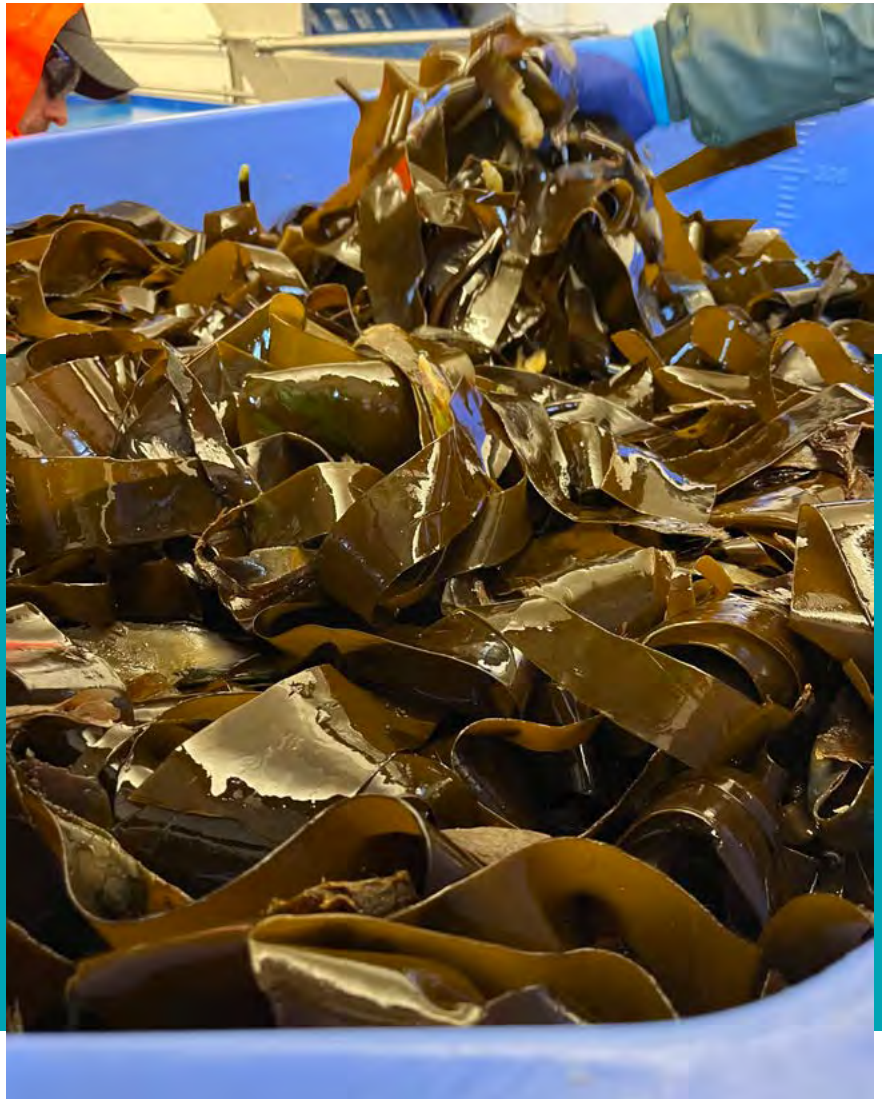
I entered the world of seaweed through a business network investing in UK companies developing solutions to tackle climate change. An inspiring talk by Paul Dobbins in 2021 about the environmental benefits and growth of the seaweed industry was my introduction had me captivated. I then joined an informal network of Scottish seaweed stakeholders - including Dr Cait Murray-Green - all passionate about a future in farmed seaweed and discussing how to advance the industry in Scotland. A common theme was the need for primary processing services for farmers at harvest time, to bridge the gap between cultivation and commercial buyers.

Could you describe the brief history of your company?

In Spring of 2022 Cait and I co-founded Eco Cascade as a Community Interest Company. We were helped along the way by HIE in initial start-up costs and a graduate placement scheme. At rapid speed we launched seaweed processing operations in Spring 2023 in Kyle of Lochalsh, made possible through an equipment grant from Scottish Government's Marine Fund, a Scottish Edge award, a Crowdfunder and support from Treebeard Trust. More recently, we have received generous support from the People's Postcode Lottery. Now in our second year, we are consortium partners in an Innovate UK research project lead by Notpla, in addition to serving a range of farmers' processing needs.

What products or services does your organisation offer?

We are the first service dedicated to bulk primary processing for Scottish seaweed farmers. We offer washing, chopping, drying and packaging services of freshly harvested seaweed using our specialist equipment, including food-safe processing to HACCP guidelines. In 2024 we can take in more drying (after challenges in our first year). Each species has its quirks, and we are constantly refining our methods to get through more tonnes of seaweed in the narrow harvesting window.



What role does sustainability play in your business?

Eco Cascade was set up to assist an industry that can replace carbon intensive practices with a low impact alternative, be that food, agricultural products, or bioplastic applications. But we need to make primary processing as low impact as possible. Significant energy consumption is required in drying seaweed in a North Atlantic climate, therefore we are testing methods to stabilise seaweed in a wet state ready for direct use in end products, with a special interest in biostimulant production. If we can eliminate the need for drying, we strip out time and energy, and retain the nutrients of the biomass, giving Scottish cultivated seaweed an edge over cheaper dried alternatives.

What are the next steps for your business and your hopes for the industry?

Scaling our volumes of throughput is our ambition - we now have large capacity for this but scaling will be slow without consistent market pull to give farmers the confidence to grow more. In addition to our processing service for farmers, we want to in the future to become an integral part in the end-product manufacturing, and this is most likely to be in the agricultural or animal feed market.



CONTACT DETAILS

Eco Cascade, Fishery Pier, Kyle of Lochalsh

Email: kelp@eco-cascade.com

Visit: www.eco-cascade.com

HORIZON SEAWEED

Interview with Peter Elbourne (Managing Director Supply and Operations)



How did you enter the world of seaweed?

I am a marine biologist and started studying toothed wrack at Bangor University and later completed my PhD on barnacles and Newcastle University. I then moved to the Highlands where I worked on various sustainability projects and around 2012 started thinking about setting up a business to build a seaweed factory. Before building a factory, I needed to understand where to source the seaweed, how to process it and how to market it. This eventually led to the creation of New Wave Foods.

Could you describe the brief history of your company?

Our search for the best coastline to harvest seaweed led us to Caithness. We set up New Wave Foods in 2015 basing our factory in Wick so we could access seaweed harvesting across the Caithness coastline, production started in 2016. Since then we have grown our team and have people across Scotland from Wick, to Alness, Invergordon and Glasgow. We have received Organic Certification from the Soil Association for our products. We started seaweed farming trials in 2016 with the Scottish Association for Marine Science and were the first company in Scotland to setup a commercial seaweed farm in 2018.

What products or services does your organisation offer?

We wild harvest ten species, which are harvested during specific seasons, but across the species we harvest year-round. All seaweed is harvested by hand making sure to cut it to allow for regrowth, hand harvesting also acts as our first quality control step for our products. We batch process at low temperature and offer a range of particles sizes and packaging options to our customers. We target markets across food and drink, human health, animal nutrition, cosmetics and biocompounds/bioactives. We also supply seaweed to the SHORE brand, which was acquired from New Wave Foods by our lead shareholder Aquascot in summer 2023.



What role does sustainability play in your business?

Sustainability is central to our business. We initially founded the company with a focus on seaweed, as it is a renewable resource and as a raw material it is low carbon and can be used for a wide range of applications. Seaweed is a natural product that requires minimal freshwater and land use, and no chemical additives. As part of our harvesting good practice, we do environmental impact monitoring of each of our harvest sites to check our methods cause minimal impact and allow the seaweed to regrow.

What are the next steps for your business and your hopes for the industry?

We want to scale up wild harvesting and processing to offer a broader range of product formats to enable us to exploit new market opportunities. Our company now operates as Horizon Seaweed to reflect the extraordinary potential for using our sustainably-sourced seaweed in a range of interesting applications. It will be important for different stages of the seaweed value chain to collaborate and we look forward to working with others to scale the Scottish industry.



CONTACT DETAILS

New Wave Foods, Unit 16c, Airport Industrial Estate,
Wick KW1 4QS

Email: info@horizonseaweed.com

Visit: www.horizonseaweed.com

HOUSE OF SEAWEED

Interview with Clare Dean (Co-Founder + Brand and Marketing Director)



How did you enter the world of seaweed?

Our house is made up of people with varied backgrounds and careers, from industries as far reaching as food manufacturing, commercial sales & recruitment to fresh produce and snack manufacturing. We all bring new perspectives, skills and experiences to the seaweed industry that can help move it forward and mature. Our path to the seaweed industry was different for each of us, but what holds us together is a shared drive about the opportunities seaweed holds and the benefits it brings. We are all captivated by the challenge and excited about the environmental and societal impact we can make as a business together.

Could you describe the brief history of your company?

House of Seaweed was established in August 2023 and is based in Fife on the East coast of Scotland. We wild harvest seaweed along a 30km stretch of the East Neuk coastline and purchase seaweed from West Coast Farmers. We have Soil Association Organic Accreditation, SALSA accreditation and in 2024, registered House of Seaweed Incorporated as a business in the United States.

What products or services does your organisation offer?

We are a processing hub for the seaweed industry, in addition to our own harvesting and processing, we offer contract manufacturing services for farmers and wild harvesters, where we provide quality control, drying, milling, branding and packaging services. We produce powders, flakes, blends and value added products from a range of native seaweed in bulk and small format for a huge variety of buyers from nutraceuticals, food manufacturers, bioplastics, biostimulants and many more.



What role does sustainability play in your business?

House of Seaweed believes in the transformative power of seaweed to massively benefit our blue planet and the people who live on it. As a processing hub for the nascent Scottish seaweed sector, we hope to be part of unlocking large scale production, stabilising biomass to supply industries in bulk to create impact in many areas, whether that be lower carbon food, the removal of single use plastics or better nutrition. Our scale will support the UK and Europe continue its journey to stabilise its own supply of seaweed, reducing the vast and detrimental carbon costs of moving seaweed from the Far East and South America. Once we have finished our factory fit out, we will start measuring our carbon footprint to understand what carbon benefits we can pass on to our customers.

What are the next steps for your business and your hopes for the industry?

We are excited about the future for House of Seaweed as one of the newest brands and businesses in the industry. We are looking to continue building strong transparent relationships with the West Coast seaweed farming community and supporting employment on the East coast both directly and indirectly through our factory and supply chain. We will soon be launching a new food brand with some exciting new product development...watch this space.

HOUSE OF SEAWEED

CONTACT DETAILS

59 Nasmyth Road, Glenrothes, Fife, KY6 2SD

Email: info@houseofseaweed.com

Visit: www.houseofseaweed.com

Call: +44 (0)131 563 3636



How did you enter the world of seaweed?

It was a stroke of luck that I entered the world of seaweed. My co-founders Dan Hillman and Bruce Hare read the book “Eat Like a Fish” by Bren Smith and several other people were also talking about it, so I thought I should read it. After that the stars aligned.

Could you describe the brief history of your company?

Kaly is based on the Isle of Skye, we started working on the company in 2021 and incorporated in 2022. Before embarking on the direction the company should take we worked diligently through a lot of questions. We are now slowly building every piece of the supply chain for the business and for the industry with the aim to fulfil the seaweed industry’s full potential. We are a motley crew of different people, from impact finance in London to real estate development, creel fishers, retired land farmers and seaweed specialists. In 2024 we started our first farm trials on the Isle of Skye, and are using this to gather data on the seasonal changes in seaweed

What products or services does your organisation offer?

We are focused on enabling the value and supply chain necessary for the scale up of the industry. Specifically, we are creating a fully tenanted processing centre next to the quay side where our customers can create products out of seaweed to their specifications. We offer a guaranteed supply of high-quality biomass that we stabilise, customers then have access to co-location space where they can complete secondary processing to ensure the most efficient and cost-effective process.

What role does sustainability play in your business?

Sustainability is the main reason we started the business. We want to join the needs of the shareholders, environment, and the local communities, they are equally important to us. As far as sustainability is concerned, we are on a journey to make every step of the value chain as sustainable as possible, for instance, we are using second hand farming gear on our trial farm. We are looking at the whole life cycle of the value chain and think the co-location opportunities will help shorten the supply chain and reduce costs of production as well as the environmental impact of processing by removing the need for transporting long distances.



What are the next steps for your business and your hopes for the industry?

We want to set up our first large scale farm, collect more data to improve our processes and develop stabilisation processes for a range of end products. We would like to see people with a broad range of skillsets required to solve the problems needed to grow the seaweed industry. At the end of the day, we want Kaly to be biomass producer that can compete on the global market.



CONTACT DETAILS

The Old Manse, Hallin, Isle of Skye, Scotland IV55 8GH

Email: hello@kaly.eco

Visit: www.kaly.eco

KELPCROFTERS

Interview with **Kyla Orr (Founder)**



How did you enter the world of seaweed?

Before founding Kelpcrofters with Martin Welch and Alex Glasgow, I worked in marine science, and researched the ecological impacts of seaweed harvesting and cultivation. I also worked as an independent fisheries consultant for 10 years and realised we could diversify how we use our seas. I became interested in seaweed due to its potential to enhance biodiversity and produce a renewable biomass.

Could you describe the brief history of your company?

Martin was developing his company KelpRing and he reached out to Alex and I for help to seed seaweed. We then developed a small seaweed hatchery, once this succeeded, we realised we could set up a seaweed farm. We set up Kelpcrofters in 2019 between Martin, Alex and I. When we started the idea in 2019, it was on the back of the ban of mechanical dredging of kelp in Scotland. The ban means the only way to obtain large volumes of kelp in Scotland is therefore to farm kelp which showed the need for farming kelp.

In 2021, we were granted a seaweed farm licence for a site just off Isle of Skye at Pabay. We started out focusing on R&D before scaling up, and before moving onto developing more efficient harvesting and farming methods. We are now in our third year of growing seaweed, and continue to improve our practices, the next step is to refine our processing methods to become more efficient.

What products or services does your organisation offer?

We supply high quality kelp as wholesale fresh, frozen or dried to businesses across the UK and dried seaweed for international markets. We are also developing a range of products including liquid extracts and kelp bio-ferments that have a range of uses from biostimulants to cosmetics and food additives. We do not harvest seaweed from the wild, but we source sustainably harvested seaweed such as egg wrack on request. The extracts are cold-processed to ensure active ingredients and nutrients are preserved.



What role does sustainability play in your business?

We are locally owned and operated, when we started Kelpcrofters one of our primary goals was to set up more sustainable aquaculture practices and ensure sustainable use of the sea. Sustainability also guided how we develop our products, instead of identifying products first we are identifying the most sustainable processing practices and then developing our products to match the process. This led us to using green chemistry and developing our range of liquid extracts, as well as drying methods that use less fossil fuels. Our liquid extracts further promote sustainability when used as biostimulants as they promote plant health and growth which can play a role in creating resilience against increasing environmental stresses caused by climate change. Within the next year we also hope to undertake a carbon audit, we hope the audit will show Kelpcrofters is either carbon neutral or carbon negative.

What are the next steps for your business and your hopes for the industry?

We want to grow the market for seaweed and are starting by selling our excellent quality Scottish seaweed and kelp extracts. The Scottish seaweed industry needs significant investment to promote Scottish seaweed products and showcase what is available, as well as develop the logistics of the supply chain from sea to table. We are working on developing the sales and marketing side of our business, and plan to attend trade shows and promote our B2B products such as whole chopped, liquid extract and dried seaweed.



CONTACT DETAILS

Email: info@kelpcrofting.com
Visit: www.kelpcrofters.com

KELPRING

Interview with **Martin Welch (Founder)**



How did you enter the world of seaweed?

I am a wrasse fishermen on the Isle of Skye and I was catching all these wrasse to be cleanerfish in salmon farms, but there was a high mortality rate many of them were dying in the salmon cages. So I thought, something isn't working here. Wrasse live in the kelp forests and I started adding kelp to the wrasse tanks on my boat to reduce their stress. The next natural step was to give them their habitat back in the salmon cages

Could you describe the brief history of your company?

After seeing the wrasse health improve on my fishing boat when I added kelp, I created KelpRing in 2018 to help wrasse live healthier and longer in salmon cages. By improving the health of wrasse we can improve their use as cleanerfish and reduce sea lice numbers on salmon more efficiently. KelpRing spun out as a business from my fishing boat and I developed the business idea after support from HIE's Pathfinder programme and several trials. I was looking for help to seed and produce the KelpRing which is when I met Alex Glasgow and Kyla Orr which later led us to founded another seaweed business, Kelpcrofters Ltd.

What products or services does your organisation offer?

The KelpRing is purely a habitat for cleanerfish, it is all natural. The basic frame is made from industry standard material and I'd like to make them from reused materials within the industry. The industry commonly uses plastic-based structures that mimic kelp habitats, but this can lead to plastic waste entering the environment and they require regular cleaning. The KelpRing is seeded using either naturally seeded kelp in the wild or lab-grown kelp from our hatchery, which means we can reduce the use of plastic in the industry and provide a better habitat for the wrasse. We have been improving our product and addressing concerns from fish farms such as the presence of hydroids on the kelp, but we have now developed a solution to remove hydroids from the kelp.



What role does sustainability play in your business?

Sustainability is a huge part of the business. I want to help make salmon farming sustainable. It is not sustainable to make kelp habitats out of plastic which then degrades into the water and they don't meet the needs of the wrasse. When placed next to each other 95% of the wrasse will choose natural kelp over plastic kelp. I want to help embed circular economy principles by using natural or reused materials where possible into my business and the industry. The KelpRing is sustainable by reusing materials and the kelp will add some environmental benefits by absorbing some excess nutrients from the salmon farm.

What are the next steps for your business and your hopes for the industry?

Streamlining and scaling the production of KelpRing and get it accepted by mainstream salmon producers and potentially other salmon producing countries. We recently completed a sea trial with University of Stirling and a salmon company in the North West of Scotland, who are interested in continuing using KelpRing in their salmon cages. I am also developing a trial with RSPCA Assured to investigate how salmon interact with the KelpRing and its potential use for environmental enrichment for salmon as well as cleanerfish.

CONTACT DETAILS

Email: info@kelpring.com
Visit: www.kelpring.com
Call: +44 (0)7818 453220

KILCHOAN ESTATE

Interview with Marnik van Cauter (Rewilding Officer)



How did you enter the world of seaweed?

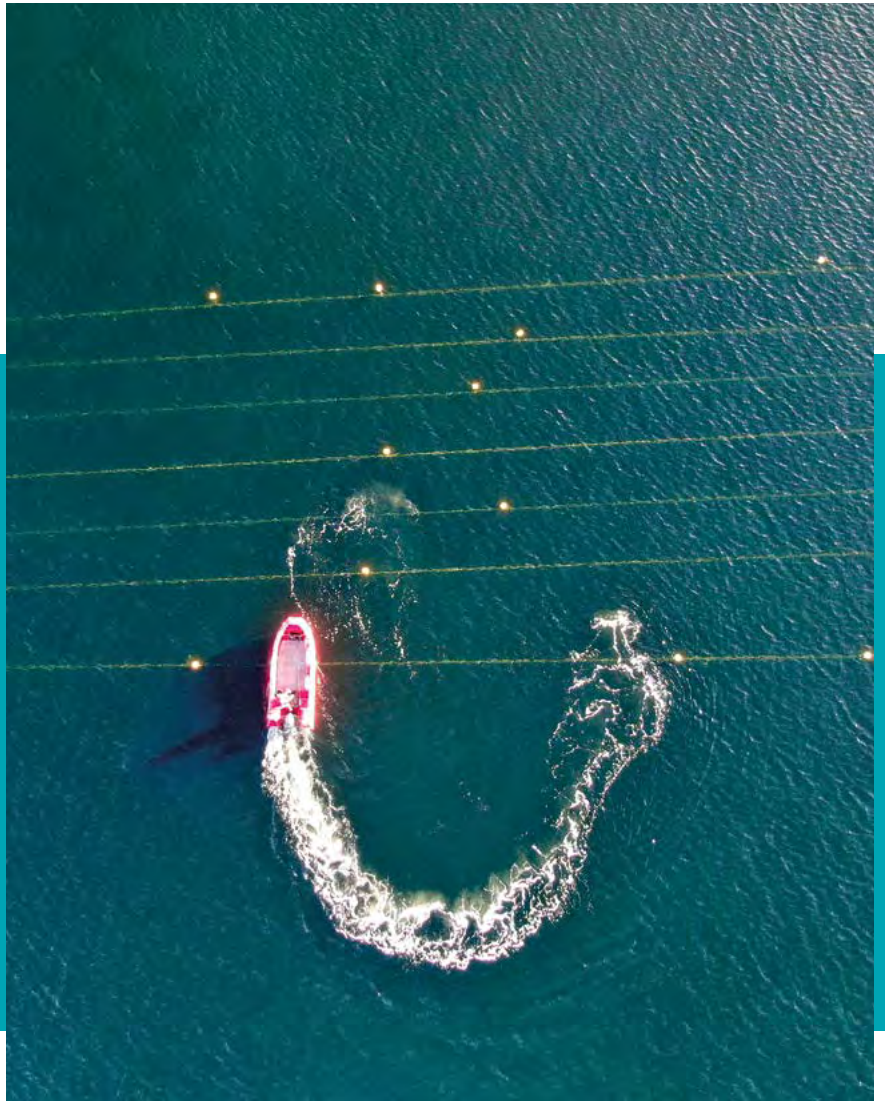
I was working for Kilchoan Estate as the Rewilding Officer and being close to Oban learnt about work from organisations such as Kelp crofting and the Scottish Association for Marine Science (SAMS). Someone said suggested to build a seaweed farm and it seemed like a good challenge. It has been really great but also hard work as it is not a straightforward business to set up.

Could you describe the brief history of your company?

Kilchoan Estate is a privately owned estate with a focus on rewilding, conservation sustainability and education. We are located 20 km South of Oban on the Northern shore of Loch Melfort. As an estate we already have completed extensive woodland creation and a variety of other conservation projects and this was an opportunity for a sustainable marine activity that aligned with our mission. Alongside our seaweed farm we are also growing Native oysters for rewilding purposes.

What products or services does your organisation offer?

As a small scale farm we offer premium quality food grade fresh seaweed, our farm is located just outside our office so once harvested the seaweed is transported onwards. We previously sold seaweed to Mara Seaweed who recently went into administration, we are now exploring other options available. We are also looking into producing biostimulant from our seaweed. Biostimulant is a soil enhancer that is good for soil fertility, We would love to use biostimulant produced from our seaweed on our estate land to create a fully sustainable and cost-saving solution.



What role does sustainability play in your business?

Sustainability is the biggest goal of our kelp farming endeavour. We expect our small scall seaweed farm to at least be carbon neutral with limited impacts on the marine environment. I think Kilchoan Estate is quite unique as it offers opportunities for innovation with as core mission to find the most sustainable ways to utilise the land and sea. We are also fortunate to benefit from world leading expertise in seaweed at SAMS on our doorstep in Oban. As we grow and learn from our farm operations, we plan to share our knowledge and be open about if it works or if doesn't work.

What are the next steps for your business and your hopes for the industry?

Cultivating seaweed is the easy part, but finding end markets for our seaweed is more difficult. There is a need to develop better options for processing and market access. We are focused on innovation and only growing the farm within our currently licenced area. We have put in an application to set up a I Integrated Multi-trophic Aquaculture farm to grow oysters alongside our seaweed farm, that would be a massive milestone. If we can grow 2 tonnes of kelp and 30,000 oysters this year with low mortalities that would be a great accomplishment and then next year we can focus on trying to grow these numbers.



THE KILCHOAN ESTATE

CONTACT DETAILS

Email: factor@kilchoanestate.co.uk

Visit: www.kilchoanestate.co.uk

MARINE BIOPOLYMERS

Interview with **David Mackie (Director and Founder)**



How did you enter the world of seaweed?

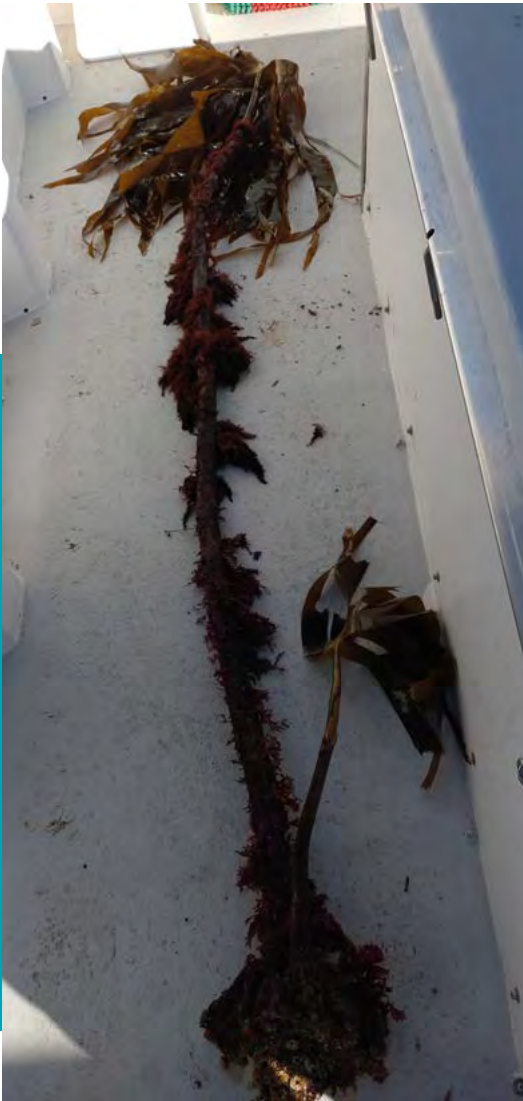
Almost by accident. I founded Marine Biopolymers with Douglas Macinnes when there was an alginate plant in Girvan planning to close. Our initial aim was to create an efficient alginate process. Initially, we looked at *Ascophyllum nodosum* but then realised demand was high for a high gelling agent found in *Laminaria hyperborea* and we developed our process to meet that market demand.

Could you describe the brief history of your company?

We went from germ of idea to setting up the company fairly quickly. We graduated through feasibility and pilot grants to build process for alginate extraction. We were already based around Ayr so made our base there. Our long-term plan was to build a plant to process wild Scottish seaweed, and after looking at several locations we settled on the idea to build a full scale biorefinery in Mallaig. Our licence application for harvest kelp was met with public opposition and the Scottish Government ended up denying our application. We then looked at other sourcing options and ended up finding a partner in North Iceland to supply our kelp.

What products or services does your organisation offer?

We have the leading technology for processing *Laminaria hyperborea*, particularly the stem. We extract six compounds from the stem and three from the frond. We can process it commercially to achieve a balance of biorefining compounds and we have ongoing developments on fucoidans and high potassium salts. In Iceland, we benefit from cheap energy supply for our processing facility.



What role does sustainability play in your business?

Sustainability is completely central in our business. We look to use wild seaweed due to their properties and availability. We only want to take what is required to ensure the long-term sustainability of the seaweed standing stock. A common rule of thumb is up to 10% of *Laminaria hyperborea* is naturally removed by storms which then allows regeneration.

What are the next steps for your business and your hopes for the industry?

We want to fully commercialise our biorefinery. We hope the seaweed industry is developed across its full scope for both wild and harvested seaweed.



CONTACT DETAILS

David Mackie, MBL

Email: david@marinebiopolymers.com

Call: +44 (0)1292 262680 / (0)7595 024967

MARIVATE

Interview with Haris Zaimovic (Co-founder)



How did you enter the world of seaweed?

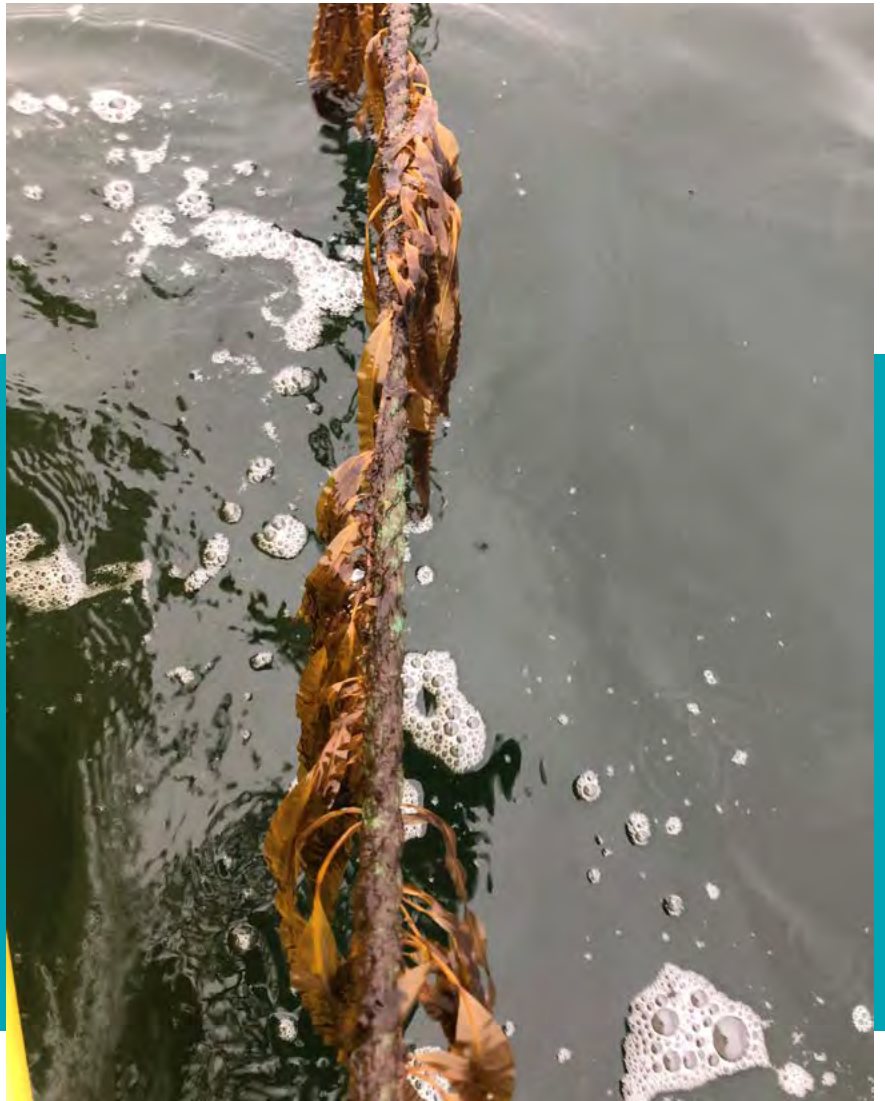
A few years ago, my business partner John and I were interested in the many uses of seaweed to promote a sustainable future. Once we started looking into it, we realised sourcing Scottish seaweed at scale was difficult and expensive. We started thinking about how we could become part of the industry and ended up building a seaweed hatchery with the aim to supply UK seaweed farmers with cost-effective seed.

Could you describe the brief history of your company?

Marivate officially started in 2022 as a dedicated seaweed hatchery in St Andrews, Fife. Operations are run in a biosecure facility leased from the university. In the 2022/2023 season, we focused on R&D in our hatchery facilities, and in November 2023 our first trials using *Alaria esculenta* seeded twine were deployed on a seaweed farm on the West Coast of Scotland. We are happy with the results of the trials and have already improved our processes for the next season.

What products or services does your organisation offer?

We offer seeded twine for *Saccharina latissima*, *Alaria esculenta* and *Laminaria digitata*. We are also trialling *Palmaria palmata* (Dulse) and *Ulva*, and hope to make these commercially available in the near future. Additionally, we ship our spools in a cooled box directly from the lab to the farm dock location within 24 – 48 hours, depending on farm location. We also offer gametophyte holding services for farmers, where we can hold gametophytes in stasis to better align with farmers deploying calendars. Alongside this, we can also induce fertility in kelp blades within 6 weeks to help farmers widen the window of time they can collect and send samples to us. Furthermore, we provide a harvesting manual along with our cooled shipped box that explains exactly what we are looking for in a sample. We are committed to helping farmers access cost-effective twine and offer financing plans that spread out the cost, which we hope will provide greater flexibility for farmers.



What role does sustainability play in your business?

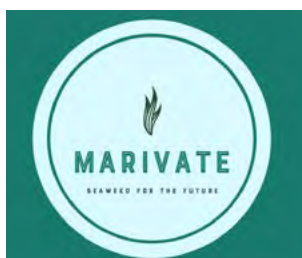
Sustainability is important to us, and we have designed ways to ensure our business has a low impact. We have designed our spools to allow them to be reused after deployment - this both reduces the environmental impact and reduces the cost for the farmer. Our hatchery processes do not require large amounts of seaweed to set up seedstock for a farmer, and our harvesting manual includes instructions to ensure that any seaweed harvested can regenerate.

What are the next steps for your business and your hopes for the industry?

Marivate is focused on several aspects of the industry - our current goals are to 1) improve our internal processes for growing Dulse and 2) driving the price of seeded twine for

farmers. Our red seaweed research is supported and funded by the Scottish Government (SMART:SCOT) and we aim to start commercially offering Dulse seeded twine in the near future. Furthermore, our current price for our Brown Seaweed twine is £2 per metre for smaller orders, and this figure decreases down to £1.5 per metre for every metre purchased over 4km. Shipping is free for orders over 1.6km. We are happy to share our pricing chart upon request.

We are working hard to be able to reduce these figures in the future through process optimisation and scaling. We are also actively researching and testing direct seeding methods, which we hope can reduce the cost per metre drastically, however, until direct seeding methods provide reliable results consistently, we will keep experimenting non-commercially. Looking ahead, we hope to scale the seaweed industry through continued collaboration, meeting new partners, and adding new species as they are demanded.



CONTACT DETAILS

Address: Scottish Oceans Institute, St Andrews, Fife, KY16 8LB

Email: inquiry@marivate-seaweed.com
hzaimovic@marivate-seaweed.com

Visit: marivate-seaweed.com

Call: 07464076973

OCEANIUM

Interview with Jessica Thorne (Director of Corporate Affairs)



Could you describe the brief history of your company?

Karen Scofield Seal and Dr Charlie Bavington set up OCEANIUM in 2018 because of a shared vision to scale and enable the seaweed industry for environmental, social and economic benefit. The company applies green chemistry and biorefinery technology to maximise the use of seaweed to create a range of products. Since 2018, the company has undertaken significant R&D to develop innovative and high quality products, as well as perfect the unique biorefinery process. The company is now in commercialisation while operating three lab facilities in the European Marine Science Park in Oban, Scotland, which is a real hub of world-leading marine science and seaweed expertise.

What products or services does your organisation offer?

OCEANIUM develops and makes innovative ingredients for food, health and materials from sustainably sourced seaweed. The products include fibre for food, high quality bioactives for health, skin care and cosmetic use, and a range of seaweed-based materials for multiple applications across textiles and packaging to replace resource intensive products. OCEANIUM sells B2B to enable companies of all sizes to incorporate high-quality, high-purity ingredients/components into their products in high-demand, growing markets.



What role does sustainability play in your business?

OCEANIUM is an impact business. Our model enables the market for farmed seaweed as a future buyer at scale. We help farmers to get infrastructure in the water, thereby preparing seaweed as a scalable crop for food security, as land-based feedstocks become more susceptible to climate change threats including soil erosion and drought conditions.

OCEANIUM is working towards zero waste and full utilisation of the seaweed biomass. We also have plans to recycle water through our biorefinery process, use green energy and ultimately become carbon neutral by 2030. OCEANIUM targets sectors such as food, cosmetics, packaging and textiles with the aim to replace more resource intensive products with seaweed-based alternatives.

What are the next steps for your business and your hopes for the industry?

To continue scaling up our production. We are excited to see progress across seaweed production and research and hope to see an industry that supports economic diversification in coastal communities. We would like to see even more science-led initiatives, Scotland is at the forefront of biotechnology research and hope to see even more applied to the seaweed industry.

CONTACT DETAILS

Oceanium, European Marine Science Park Malin House
- Suite 10, Dunbeg, Oban PA37 1SZ

Email: info@oceanium.co.uk

Visit: www.oceanium.world

OCEANIUM®

SAMS ENTERPRISE



How did you enter the world of seaweed?

The Scottish Association of Marine Science (SAMS) has been involved in seaweed research for over a century and through the trading subsidiary, SAMS Enterprise, provides a mechanism for researchers at SAMS to pass their world-leading research and expertise on to industry. SAMS Enterprise is at the cutting-edge of understanding and delivering seaweed seeding, cultivation and disease management, strengthened by research and experience gained from operating a seaweed nursery and seaweed farms. The Seaweed Academy was established to enable the transfer of this knowledge and best practice methods to the UK and international seaweed industry.

Could you describe the brief history of your company?

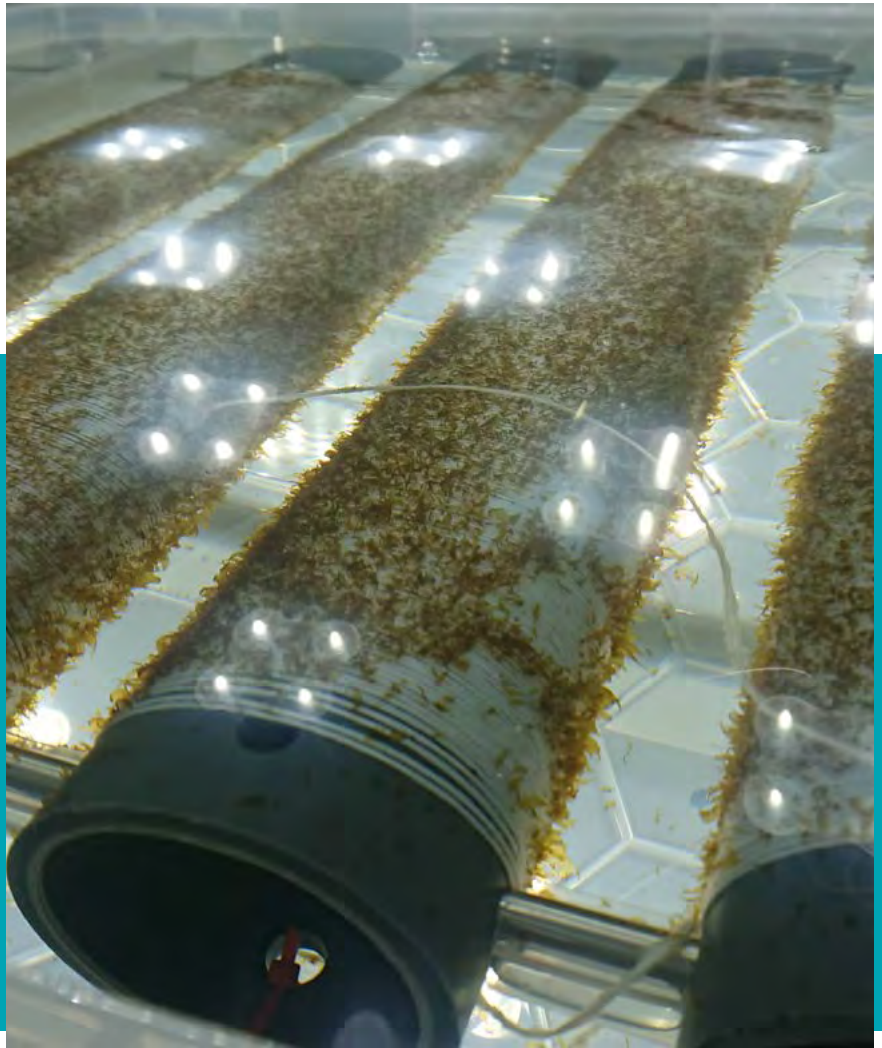
SAMS and SAMS Enterprise are based within the European Marine Science Park near Oban, Argyll. SAMS has been at the forefront of global algae research and development for over 100 years, leading and contributing to numerous international, collaborative, and multidisciplinary research projects. This expertise is translated into practical applications via SAMS' seaweed farms, the Culture Collection of Algae and Protozoa (CCAP), and through the specialist marine consultancy and commercial services of SAMS Enterprise, including the UK's first commercial Seaweed Nursery and the UK's only dedicated industry education facility, The Seaweed Academy.

What products or services does your organisation offer?

SAMS Enterprise offers seaweed consultancy services based on our research and cultivation experience spanning from site and species selection to environmental monitoring and conservation.

Our Seaweed Nursery provides high-quality seeded twine and seaweed cultures for research, restoration, and commercial purposes, culture bulking services, and biobanking services for the long-term storage of seeding material and protection of seaweed strains.

The Seaweed Academy supports the expansion and skills development for the seaweed aquaculture industry by providing a solid foundation for the fledgling industry in UK and Europe. Its courses cover topics including industry overviews, detailed cultivation training, and coastal conservation and restoration.



What role does sustainability play in your business?

The seaweed industry offers a broad range of environmental benefits including crop provision without the use of fresh water or fertiliser inputs, whilst also benefiting local biodiversity and providing nutrient sequestration. Enabling the growth of this sector therefore contributes significantly towards UK requirements under the Climate Change Act. By providing nursery facilities and Seaweed Academy training, SAMS Enterprise is significantly contributing to the UK Clean Growth Strategy and net zero aspirations by enabling sustainable growth of the seaweed industry, while safeguarding the future of the marine environment.

What are the next steps for your business and your hopes for the industry?

SAMS Enterprise wishes to continue to support the growing industry through knowledge transfer from research, and cultivation and industry experience. For the Seaweed Academy, we will continue to develop our courses to deliver the most industry relevant information. Research and development are ongoing in our Seaweed Nursery to ensure that we meet the needs of seaweed farms by providing consistent high-quality and reliable products. Our hopes for the seaweed industry are the continued sustainable expansion and development throughout Europe.



CONTACT DETAILS

SAMS Enterprise, SAMS, Dunbeg, Oban, PA37 1QA

Email: info@sams-enterprise.com

Visit: www.sams-enterprise.com

Call: +44 (0)1631 559470

SOUTH WEST MULL AND IONA COMMUNITY DEVELOPMENT TRUST

Interview with **Celia Compton** (General Manager)



How did you enter the world of seaweed?

The seaweed industry has generated a lot of interest over the last few years. We (SWMID) were looking for an income generation opportunity for the community, our aim was to create a model where the community has control over the aquaculture process and the profit 100% benefits the community. We also wanted to create employment, diversify income for the local fishing industry, and improve biodiversity and climate mitigation. The seaweed farm fitted well with our broader vision for sustainability on our islands.

Could you describe the brief history of your company?

SWMID is a place-based, non-profit community development organisation. We are based in South West Mull and Iona. Our mission is to support economic, social and environmental re-generation and resilience in our community. We have a seaweed farm at Aird Fada and a shore-side site at Bendoran. On behalf of the community, we also own a 789 hectare forest, a community garden, let out spaces for local organisations at a centre in Fionnphort, and are developing two housing projects. Our activities are led by the community's needs and aspirations.

What products or services does your organisation offer?

We grow seaweed and sell it to other businesses, we are also developing our own products from seaweed to be sold locally. What's really different is our story. We are a community development trust and our activities are led by the community's needs and wishes, gathered through consultation. We have 100% social licence for our seaweed farm. We employ local people who operate the farm and make all operational decisions. Any income we generate will go back into community projects.



What role does sustainability play in your business?

We chose to set up a seaweed farm due to the positive environmental benefits of seaweed farms from climate mitigation to biodiversity gains. We are working with researchers to understand how the seaweed farm improves biodiversity and our initial results are positive. By farming seaweed we also reduce pressure on wild seaweed populations. As an organisation we embed circular principles into our processes where we can, for example, our seaweed drying kiln is fuelled using timber from our forest on Mull.

What are the next steps for your business and your hopes for the industry?

We are now in our second year of operating our seaweed farm and are continuing to work with others in the industry to share knowledge and experiences. We will continue marketing our seaweed, but we are also feeling the pressure from competition with overseas markets and wild harvested seaweed. Our hope for Scottish seaweed is to that it is recognised as a distinct high quality product due to the clean seas and social licence. We hope to set a good example for good practice in establishing meaningful social licence and benefits for the community.



CONTACT DETAILS

Email: admin@swmid.co.uk
Call: +44 (0)1681 700021
Visit: www.swmid.co.uk

If you are a business actively producing or processing seaweed in Scotland and want to be featured

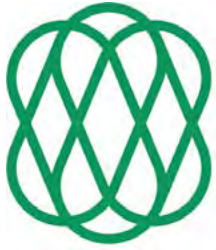
GET IN TOUCH ON
enquiries@hient.co.uk

and ask for the blue economy team.

Organisations supporting the seaweed sector

- Page 36** Crown Estate Scotland
- Page 37** Highlands and Islands Enterprise
- Page 38** Industrial Biotechnology Innovation Centre
- Page 39** Scottish Seaweed Industry Association
- Page 40** Sustainable Aquaculture Innovation Centre

ABOUT CROWN ESTATE SCOTLAND



**Crown Estate
Scotland**
Oighreachd a' Chrùin Alba

Crown Estate Scotland is a public corporation, which invests in property, natural resources, and people to create lasting value for Scotland.

Our team manages seabed, coastline, rural estates and more, helping ensure families, businesses and communities can live, work, and thrive on the assets which make up the Scottish Crown Estate.

The assets which make up the Scottish Crown Estate include:

- Virtually all seabed out to 12 nautical miles
- Just under half the foreshore
- Four rural estates comprising 37,000 hectares of rural land
- Rights to fish wild salmon and sea trout in river and coastal areas
- Rights to naturally occurring gold and silver across most of Scotland
- A commercial retail and office property in central Edinburgh
- The Zero-Four innovation park near Montrose

Technically these assets are owned by the Monarch 'in right of the Crown' but our revenue profit goes to the Scottish Consolidated Fund and then to Scottish Government.

Support opportunities

We:

- Support the development of young people eg. holding outdoor learning sessions at our rural estates and funding projects such as Clyde in the Classroom.
- Offer grant funding through our Sustainable Communities fund.
- Fund enabling projects or initiatives that help enhance value from our assets in line with our statutory obligations.
- Utilise our knowledge of the uses and users of Scotland's territorial sea to offer advice on interests and issues to be considered by prospective developers in preparing proposals for statutory consents.

CONTACT DETAILS

Crown Estate Scotland, Quatermile Two, 2nd Floor, 2 Lister Square, Edinburgh, EH3 9GL

Email: enquiries@crownestatescotland.com

Call: +44 (0)131 260 6070

Visit: www.crownestatescotland.com

ABOUT HIGHLANDS AND ISLANDS ENTERPRISE



Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

Highlands and Islands Enterprise (HIE) is the economic and community development agency for a diverse region that extends from Shetland to Argyll and from the Outer Hebrides to Moray, covering over half of Scotland's land mass.

HIE's vision is for the Highlands and Islands to be a prosperous, inclusive and sustainable region, attracting more people to, live, work, study, invest and visit. HIE supports hundreds of client businesses and social enterprises; works with communities, particularly in fragile areas, on locally led development; and invests in infrastructure and regional opportunities to create a more competitive and low carbon region.

Support opportunities:

- Advice and networking
- Access to grant funding
- Business parks and co-working spaces
- Funding for work placements
- Accelerator programmes for entrepreneurship and innovation

HIE works in partnership with Scotland's two other economic development agencies and businesses based in those regions should get in touch directly with:

Scottish Enterprise

Call: +44 (0)300 013 3385
Visit: www.scottish-enterprise.com

South of Scotland Enterprise

Call: +44 (0)300 304 8888
Visit: www.southofscotlandenterprise.com

CONTACT DETAILS

An Lòchran , 10 Inverness Campus, Inverness, IV2 5NA

Email: enquiries@hient.co.uk
Call: +44 (0)1463 245 245
Visit: www.hie.co.uk

ABOUT INDUSTRIAL BIOTECHNOLOGY INNOVATION CENTRE



Since it was established in 2014, the Industrial Biotechnology Innovation Centre (IBioIC) has excelled at providing technical expertise and advice to companies, opportunities for networking, funding for collaboration, and exceptional training and development programmes delivered in conjunction with its academic partners.

Having exceeded the target trajectory of Scotland's original National Plan for Industrial Biotechnology, IBioIC will help to deliver new stretch targets of 220 active industrial biotechnology companies, £1.2bn in associated turnover and over 4,000 direct employees by 2025. IBioIC connects industry with academic expertise and government to accelerate and de-risk commercialisation to bring new biotechnology processes and products to the global market. IBioIC is hosted by the University of Strathclyde in Glasgow's Innovation District.

Support opportunities

- Access to seaweed fermenter and other bioprocess scale up capabilities
- Collaborative R&D funding
- Access to IBioIC's extensive industry networks and talent
- Skills and training opportunities

CONTACT DETAILS

Inovo Building, 121 George Street, Glasgow G1 1RD

Email: info@ibioic.com

Call: +44 (0)141 548 5830

Visit: www.ibioic.com

ABOUT SCOTTISH SEAWEED INDUSTRY ASSOCIATION



Scottish Seaweed Industry Association

The Scottish Seaweed Industry Association (SSIA) is an organization dedicated to the growth and innovation of the seaweed industry.

We are committed to the sustainability of the industry by promoting research, educational programs, and advocacy. Our members come from all sectors of the industry, ranging from seaweed harvesters to processors and distributors.

We strive to bring together the industry's best and brightest to foster innovation and growth. SSIA is the go-to source for all things related to seaweed and the industry in Scotland.

Support opportunities:

- Promote Scottish seaweed
- Exchange knowledge
- Grow the sector
- Inform regulatory guidance
- Develop the sub-sector
- Explore and Identify funding options
- Organise events to give exposure to the sector

CONTACT DETAILS

Albany Chambers, Albany Street, Oban PA34 4AL

Email: info@ssia.scot

Call: +44 (0)7565911506

Visit: www.ssia.scot

ABOUT SUSTAINABLE AQUACULTURE INNOVATION CENTRE



Sustainable Aquaculture Innovation Centre

Launched in 2014, SAIC (the Sustainable Aquaculture Innovation Centre) is part of the Innovation Centres programme, which aims to drive innovation in key economic sectors.

SAIC's mission is to transform aquaculture by unlocking sustainable growth through innovation excellence. This means we work to reduce the environmental footprint and increase the economic impact of aquaculture.

Connecting businesses and academics, we fund and support commercially relevant, collaborative research that aims to deliver solutions to key sector challenges. We safeguard jobs and revenue through projects that result in spin-out businesses, new markets, and increased productivity.

We also attract, educate and upskill the aquaculture workforce through funded university places and tailored training programmes. We provide an independent voice, offering science-based insight and knowledge exchange. Throughout our work, we strive for a spirit of support, agility, integrity and collaboration.

Support opportunities

- Collaborative R&D funding
- Skills and training programmes
- Events, knowledge exchange and networking opportunities

CONTACT DETAILS

Sustainable Aquaculture Innovation Centre, Unit 19, Scion House, Stirling University Innovation Park, Stirling FK9 4NF

Email: info@sustainableaquaculture.com

Call: +44 (0)1786 278318

Visit: www.sustainableaquaculture.com



For more information visit
www.hie.co.uk/biotech



Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean