

BLUE ECONOMY INCUBATOR HIGHLIGHTS

FOURTH EDITION



PORTof
SAN DIEGO

May 2023



Port's Blue Economy Incubator

A core element of the Port's commitment to promote the Blue Economy is the creation of its **Blue Economy Incubator (BEI)**, which serves as a launch pad for Port-related blue technology and sustainable aquaculture ventures. Established in 2016, the BEI removes barriers to entrepreneurs and provides pilot project facilitation services including funding, key assets, permitting and entitlement assistance. Through its BEI the Port is building a portfolio of new businesses and partnerships that deliver multiple social, environmental, and economic co-benefits to the Port and the region.

The Port serves a diverse role as landlord, operator, regulator, and environmental champion plus it has extensive familiarity and expertise in the permitting and entitlements process for a variety of coastal and ocean uses. This allows the Port to attract and support innovative pilot project proposals and assist in the creation, development, and scaling of new blue economy business ventures.

Through pilot project facilitation, the BEI creates synergies with, and is informing, other environmental programs from coastal resilience and environmental remediation to marine debris removal and stormwater monitoring. In addition, through its BEI the Port is exploring and advancing opportunities for shellfish and seaweed aquaculture for food production and as a tool for bioremediation and restoration.

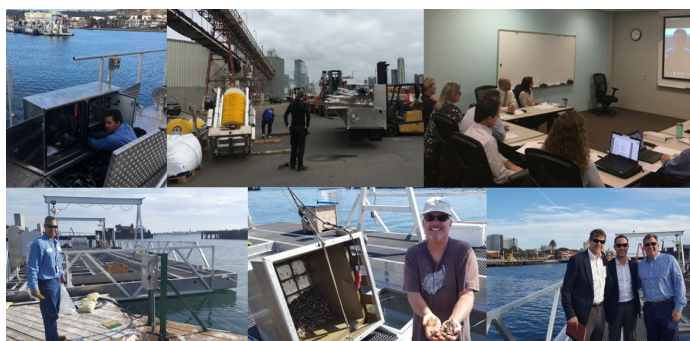
The success of BEI projects are measured based on Key Performance Indicators (KPIs) which are specific to each pilot projects' goals. Performance indicators may include a range from proof of concept, cost-effectiveness, customer acquisition and achieving scale. This report highlights the progress of companies within the incubator, recent achievements and opportunities for continued work to grow the BEI.



The Blue Economy and the Port's Role

According to the World Bank, the Blue Economy refers to the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems.

San Diego, with its vast natural and deep-water harbor, infrastructure supporting both traditional and emerging companies, burgeoning scientific and technology communities, and a one-of-a-kind location continues to build its reputation as **Blue Tech Bay**. At the center of this is the Port of San Diego which takes an active role in assembling partners from government, business, conservation, and academia to pursue innovative solutions to bridge the need for economic growth and environmental stewardship. As the state-legislated trustee of tidelands and submerged waters in and around San Diego Bay, the Port serves as a catalyst for building and supporting the region's Blue Economy by supporting entrepreneurship and partnering with other leaders in research and innovation.



Port-wide Support and Involvement

The Port's BEI is successful because of the people of the Port who support prospective and selected companies who want to launch a pilot project and demonstrate their technology within San Diego Bay. Staff involvement is at the core of the Value Proposition provided by the BEI. From due diligence to installation, Port staff contribute expertise in Port operations but also specific fields such as aquaculture, engineering, public safety, planning, environmental protection and conservation, real estate, finance, data management, stakeholder and public relations, and media support. The BEI's Port-wide collaboration process offers early-stage companies the benefit of the Port's knowledge, assets, and resources while they demonstrate their technologies in a real-world setting.



BEI Value Proposition – Pilot Project Facilitation

- Funding
- Port-based testbed and pilot sites
- Regulatory and permitting assistance
- Subject matter expertise
- Strategic stakeholder collaboration
- Public Relations services and media visibility
- Support to leverage grant opportunities

Partnerships and Outreach

The Port maintains a global network of partnerships within the Blue Economy ecosystem and maintains relationships with academic institutions, technology clusters, accelerators, governments, ports, foundations, the US Navy, the US Coast Guard, and local communities. These relationships provide a unique pathway to harness and advance innovation which strengthens the region's collective impact on the Blue Economy. The Port also participates in a variety of outreach opportunities - both to inform others about the BEI but also to strengthen relationships. In the past year, the BEI was represented at Ignite22 (Los Angeles), South By Southwest (Austin), Aquaculture America (New Orleans), World Ocean Summit (Portugal), National Working Waterfront Network (Boston), International Economics and Blue Growth Forum (Mexico), Urban Land Institute, TMA Blue Tech Week and Oceanology 2022 (San Diego).

In addition, the BEI provides a unique opportunity for incubator companies to develop partnerships and collaborate with one another to support their respective pilot and commercialization goals. Joint research, shared resources, and growing of networks is all based on mutual interests and inclusion in the BEI. This type of cross pollination brings about more creativity and innovation, which demonstrates how the BEI is compounding the Port's impact on the blue economy ecosystem.



HIGHLIGHTS

NavalX SoCal Tech Bridge

In 2018, the Port's BEI and the Naval Undersea Warfare Center (NUWC), Division Keyport partnered to promote cooperative activities with small business firms and educational institutions to help drive blue economy innovation in the San Diego region.



In 2023, this partnership has been expanded to support the NavalX Southern California Tech Bridge, which was established to engage and leverage the region's collective programs, partners, capabilities, and funding streams that bring the most value to Naval and other partner community missions.

Expanding on this partnership is offering a unique opportunity to enable further collaboration, accelerate the pace of discovery, learning and experimentation; and foster regional workforce capacity for innovation and agility. Through this partnership, both the Port and the Navy will benefit from pipeline sharing and support their respective innovation goals.

Collaboration within the US Blue Economy Ecosystem

The Port is part of a newly formed, and growing, west coast blue economy coordination group seeking to build capacity and support collaboration among maritime and ocean innovation stakeholders in the region. The group currently consists of representatives from Alaska Ocean Cluster, Port of Seattle, Washington Maritime Blue, Alta Sea, Scripps Institute of Oceanography, TMA Blue Tech, and the NavalX Southern California Tech Bridge and together they are considering the critical elements to a sustainable ocean economy – such as research, workforce development, and support for the global blue economy ecosystem.



Blue Economy Incubator in the Media

As environmental champions of San Diego Bay, our BEI is just one of the ways we are leveraging technology to help preserve and protect our planet's resources while serving the needs of today's world. We recently had the opportunity to educate NBC TODAY Show, "Climate Today" audiences, with national host and NOAA emissary Al Roker on the many benefits of aquaculture and blue technology by showcasing our BEI companies, Sunken Seaweed and San Diego Bay Aquaculture.

[Link to NBC Today Show Episode](#)



Blue Economy Incubator Portfolio

The Port's current portfolio includes ongoing pilot projects relating to resilient shoreline infrastructure, shellfish and seaweed aquaculture, and water/sediment remediation technologies. A pilot use-case can come from any sector of the Port and may include technologies and business models that:

- enhance tidelands and marine ecosystems.
- ensure sustainable and resilient waterfront operations.
- support public safety and homeland security.
- achieve cost-effective, reliable, and responsive support services through sustainable maintenance of Port assets.

Information about applying to the Port BEI and the process for consideration are provided at the end of this document and at: [Business Proposal Application Process](#).

ONGOING PROJECTS

The Port's current portfolio includes five pilot projects including resilient shoreline infrastructure, shellfish and seaweed aquaculture, and water and sediment remediation technologies.



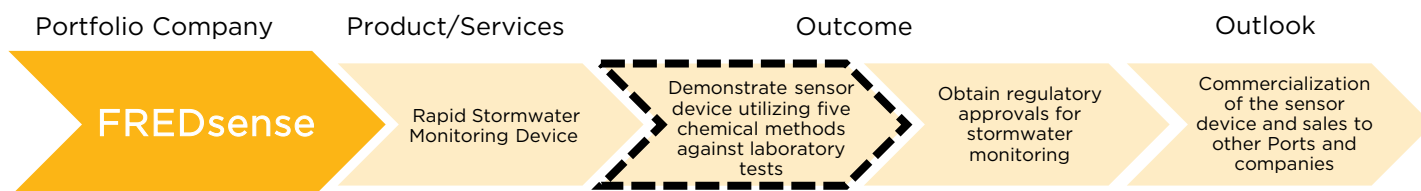
Pilot Project Updates



FREDsense

In 2021, the Port approved FREDsense Technologies for a pilot project to develop a portable five-in-one field-testing sensor device to provide near real-time metals analysis for stormwater monitoring. Under the pilot, FREDsense is developing a prototype to demonstrate the feasibility of automatically testing levels of aluminum, copper, lead, zinc, and nickel – all of which are of importance for stormwater compliance monitoring. The monitoring system is being designed to provide real-time data in the field, which is significantly faster than the several weeks necessary to receive traditional laboratory results, allowing for quicker adjustments to stormwater Best Management Practices and monitoring. Current work is directed at validating the prototype using water quality samples collected during the 2023 Port standard monitoring protocol.

Tracking progress from pilot project to commercial success



 Testing Ongoing

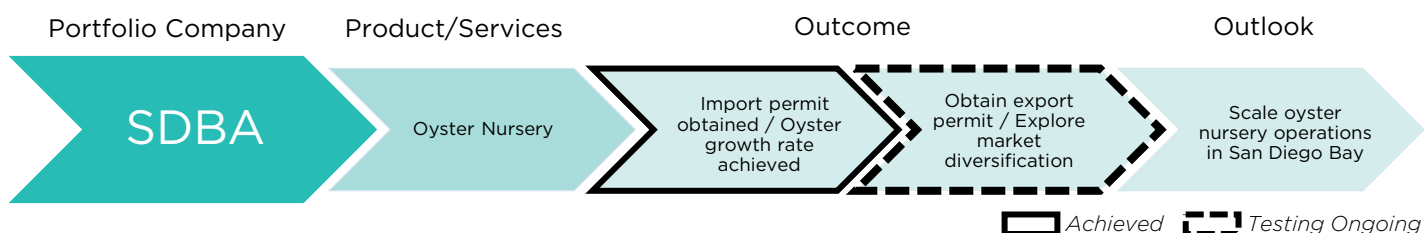
Pilot Project Updates *cont'd*

San Diego Bay Aquaculture

Since 2017, San Diego Bay Aquaculture is testing if a shellfish nursery, called a FLUPSY (Floating Upweller System), can be effective in helping address a coast-wide shellfish seed shortage. The FLUPSY is a floating barge that circulates water through compartments or bins holding shellfish, in this case oysters, as they grow from about the size of a red pepper flake to about the size of a quarter when they are ready to go to the farm. The operation of the FLUPSY, combined with the region's mild weather and nutrient-rich water, offers a competitive advantage over northern shellfish nursery sites because seed to harvest time is reduced up to one year compared to northern locations. After being in the FLUPSY, shellfish are transported to a farm where they will grow to market size. Approvals to conduct this pilot have been slow to obtain, but San Diego Bay Aquaculture is using the FLUPSY to conduct required baseline research for oysters, abalone, and seaweeds, and production is expected to begin this year (2023).



Tracking progress from pilot project to commercial success



Sunken Seaweed

Sunken Seaweed, an aquaculture start-up company led by two marine ecologists joined the Port's BEI to demonstrate the feasibility of seaweed aquaculture in San Diego Bay. Sunken Seaweed established a seaweed hatchery at San Diego State University's Coastal and Marine Institute Laboratory and installed their submerged seaweed pilot farm using assets, such as docks and piers, managed by the Port. Since 2018, the company has been successfully cultivating, outplanting, growing, monitoring, and harvesting several species of seaweed native to Southern California. Beyond commercialization, results from the pilot project are helping assess and quantify seaweed aquaculture's multiple co-benefits, from carbon sequestration and bioremediation to improving water quality and ecosystem productivity. In 2022, the Port reinvested in an expansion of Sunken Seaweed's pilot which enables the company to build and continue its research in San Diego Bay, while expanding operations to Humboldt Bay where they will benefit from shoreside facilities to help them reach market scale.

Tracking progress from pilot project to commercial success



Pilot Project Updates *cont'd*

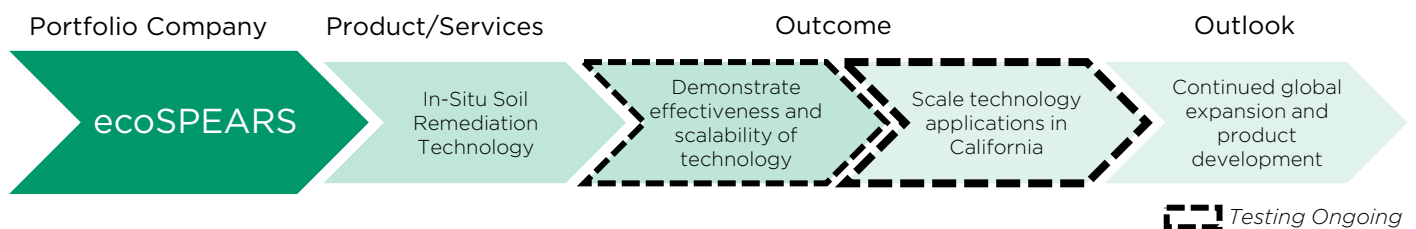
ecoSPEARS



In 2020, the Port approved ecoSPEARS for a pilot project to demonstrate the company's innovative in-situ soil remediation technology. ecoSPEARS is the exclusive licensee of the National Aeronautics and Space Administration (NASA)-patented SPEARS technology, which was invented by a team of NASA environmental scientists as a green remediation solution to extract contaminants from impacted marine sediment. The pilot focused on the deployment of over 450 ecoSPEARS units in three different locations around the bay where the technology passively absorbed contaminants. In December of 2022, ecoSPEARS conducted a 24-month retrieval event where the deployed SPEARS were retrieved. Final studies are currently being conducted by both ecoSPEARS and third-party laboratories to measure the mass of PCBs, or polychlorinated biphenyls, in the SPEARS that were retrieved. The pilot project has helped ecoSPEARS achieve several milestones. Data from the pilot is expected to be published soon and ecoSPEARS is now engaging other markets in the Pacific Islands, leading to multiple scaled-up deployments. ecoSPEARS is the 2023 Bronze Edison Award winner for the category of Sustainability- Green Remediation.



Tracking progress from pilot project to commercial success

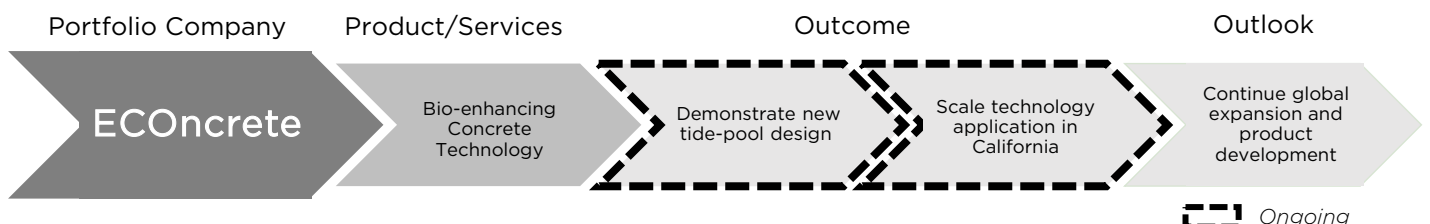


ECONcrete



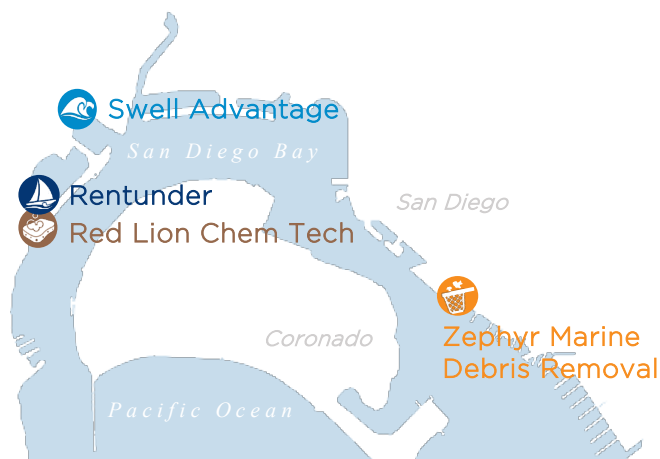
In 2020, ECONcrete joined the Port's BEI to demonstrate a new design of its tidepool shoreline armoring technology called the 'Coastalock'. This technology serves as a replacement for traditional riprap and provides ecological armoring and shoreline stabilization, while also creating well-defined local ecosystems that mimic natural tide pools. The pilot project has been monitored since installation and data demonstrates an increase in the ratio of native to non-native species, biodiversity, species richness, and abundance on the Coastalock units, approximately double compared to the traditional riprap. The project is nearing the end of the pilot term and a final report will provide detailed results which will help support ECONcrete scaling efforts locally and globally. Through the Port's pilot, Coastalock units have achieved technological validation and received the 2022 Design Educates Award and the 2022 San Diego American Society of Civil Engineers (ASCE) Award for Outstanding Airports and Ports Project. The project has sparked much interest and based on preliminary results, units have since been deployed around the world.

Tracking progress from pilot project to commercial success



COMPLETED PROJECTS

The Port's current portfolio includes four completed projects including debris removal, drive-in hull cleaning practices, and smart marina technologies.



Completed Project Updates

Zephyr

In 2018, Zephyr Debris Removal joined the BEI aiming to demonstrate the effectiveness and scalability of its custom-made, debris-removing vessel in San Diego Bay. The vessel uses skimming technology and is designed to remove marine debris, such as plastic bottles and other trash, and solve a variety of logistical hurdles including efficient removal of small debris and access to shallow and/or rough water. During the pilot project, Zephyr collected 33,000 pounds of debris and developed a database for key variables influencing marine debris accumulation in San Diego Bay – such as seasons, weather events and tidal swings. In 2019, Zephyr went on to collect an additional 77,000 pounds of debris during a follow-on one-year contract with the Port. In total, Zephyr removed 110,000 pounds of debris. Zephyr is leveraging these results to support its goal is to commercialize the solution across California and beyond to help remove debris from ports and harbors



94%
398 / 422
Slips Filled

67%
10722 / 15902
Feet Used



Swell Advantage

In 2017, Swell Advantage joined the BEI as a technology startup developing software solutions to assist marina professionals in automating and optimizing their operations and enhancing customer experiences. The one-year pilot project was completed in collaboration with a local marina in San Diego Bay to finalized the development of a smart marina app. Since completion of the pilot the company generated sales across North America and established strategic technology and scale-up partnerships to better service marinas and waterfronts across the U.S. and Canada and meet boaters' customer service expectations in a digital world. In 2021, the Port approved a buy-out of the agreement with Swell Advantage to enable the company acquisition by Maryland-based Oasis Marina. The buy-out of the agreement with Swell Advantage led to a payment of \$150,000 to the Port. This provides a good example of the role the BEI play in enabling and accelerating innovation, in this case accelerating technology that benefits the marina industry and has potential for the Port marina tenants to increase their revenues and improve customer experience

Red Lion

In 2017, the Port approved a pilot project with Red Lion Chem Tech to demonstrate a technology to remove dissolved copper from seawater using absorbent media filtration material. Red Lion conducted laboratory demonstrations of their resin technology using San Diego Bay water with test results showing up to 85% efficiency in removing copper. The company is seeking applications of its patented copper remediation technology designed to provide advanced filtration systems for Ports and Harbors (passive and active).

Completed Projects *cont'd*

Rentunder



For this pilot, the Port collaborated with Swedish Company Rentunder to demonstrate their Boatwash technology as a potential alternative to current in-water hull cleaning practices in San Diego Bay. Rentunder's entire cleaning process is conducted within an enclosed basin which can accommodate both sailboats and motorboats up to 53-feet in length. The unit is designed to retain residual debris and particulate matter and reduce copper released into bays and harbors.



During the pilot project, Rentunder installed the Boatwash and coordinated three controlled cleaning events and concurrent water quality sampling. A report, including detailed recommendations for continued operations in San Diego Bay, was completed which includes using only non-copper antifouling paints (NC-AFP) as allowable paint types considered for vessels to be cleaned by mechanical brushes inside the Boatwash basin. Potential future installation of the Boatwash will include the latest technology, which includes new brushes, improved alignment, a more advanced gate, and an improved filtration unit to collect particulate.



For more information on the
Aquaculture & Blue Technology Program go to:
portofsandiego.org/waterfront-development/blue-economy

Or contact our Blue Economy Incubator program staff at:
incubator@portofsandiego.org

Blue Economy Incubator

Business Proposal Application Process

In order to be considered as a partner in The Port's Blue Economy Incubator, we have established the following application process and business plan submission requirements. We encourage any new or early-stage venture that aligns with our objective to submit an application to our incubator.

APPLICATION PROCESS

Aquaculture and Blue Technology entrepreneurs interested in working within the Port of San Diego are invited to connect with Blue Economy Incubator program staff at incubator@portofsandiego.org. This contact may spark a live or virtual meeting to briefly introduce the pilot project proposal, assess alignment of the project intent with Port goals, explain the processes to submit an application and approval, and answer general questions. If the project proponent decides to apply to the Port's Blue Economy Incubator, they should complete the following stages:

Four stages to potential approval

1. Receipt and Initial Screening

- Applicant submits a "Pitch Deck", requirements of which can be found below or at WWW.portofsandiego.org/waterfront-development/blue-economy.
- During this phase, incubator staff will work with the applicant to ensure the application is complete and begin assessing if the project intent fits within the incubator core objectives. A Non-Disclosure Agreement (NDA) will be initiated during this stage, if deemed appropriate. At the end of this phase, the applicant will receive either an invitation to proceed to stage two or a notification that the Port is not interested in pursuing the proposal further.

2. Deep Dive Review

- The applicant will be invited to participate in a meeting (in person or virtually) with the Incubator Committee (consisting of Port leadership and Subject Area Experts) who will carefully analyze the financials, business plan, and logistical elements of the proposal (i.e., possible location, asset needs, potential interactions with other Port activities and programs, etc.) and additional considerations.
- This phase will allow for mutual information gathering and project refinement in preparation for the next step in the process.

3. Executive Review

- Proposals which have been approved by the Incubator Committee will be presented to the Port's CEO. Applicants will not be required to participate in this meeting.
- The CEO will offer a corporate perspective review, considering the value of partnership, resources needed from the Port, and how the proposal integrates with current port businesses.
- If the CEO deems the proposal to be qualified to proceed, staff will initiate step four.

4. Board Review and Consideration of Approval

- The Port's Board of Commissioners will receive the proposal for final review and consideration of approval and funding.
 - The proposal will be presented with a staff recommendation.
 - Port Staff, in conjunction with the applicant, will present the proposal to the Board at a regularly scheduled monthly Board meeting.
- If the Board approves the action, there will likely be a few more logistical requirements prior to receiving funding and other incubator services.

Incubator companies that want to renew partnership with the Port will follow the same process as above.

Proposal, or “Pitch Deck”, requirements

An initial proposal “Pitch Deck” will be presented in PowerPoint format and will be no more than 20 slides in length. Additional, relevant details may be included in an appendix, with no more than 20 additional slides. Key content must include:

Company Info

- Company name & address
- Entrepreneur name
- Email address, phone number
- Company website
- Industry/sector (defined area of Aquaculture or Blue Technology)
- How did you hear about Port Aquaculture & Blue Technology
- Date company founded

Employees

- Number of employees
- Names/title/Linked IN profile
- Resumes of owners
- % ownership by employee

Business Plan Presentation

- Executive summary
- Market sizing & source of business
 - Competitive landscape
- Product/strategy
 - Customer description (how many/who/stage of development)
 - Product description
 - Value proposition
 - Intellectual property opportunities and/or barriers to entry
 - Go to market strategy
 - Permits required/obtained
 - Length to obtain
 - Key hurdles to obtain permits
- 5-year financial forecast
 - Previous year and next 5 years
 - P&L
 - Cash flow forecast
- Cash
 - Monthly burn
 - Current balances
- Funding
 - Previous funding amounts
 - Cash invested by owners
 - Partnership proposal: funding request & term sheet
- Exit strategy

Blue Economy Incubator Objective

Inherent to the Port of San Diego's mission is to utilize its various assets in leading and accelerating the Blue Economy in our region. Water dependent businesses, fisheries and other technologies are a long and proud tradition at the Port and their sustainable future is critical to our region's long-term success. To this end, and consistent with our mission to build and promote a culture of diversity, equity, and inclusion throughout all levels of the organization and throughout the Blue Economy, the Port is accepting proposals for new business plans from potential partners whose core purpose shares in this mission. Specifically, the Port has established a business incubator and investment program to assist in the creation, early development, and initial scaling of new business ventures targeted at a specific segment of the Blue Economy: Aquaculture & Blue Technology.