

BLUE ECONOMY INCUBATOR HIGHLIGHTS REPORT



FIFTH EDITION | 2024





Port's Blue Economy Incubator

A core element of the Port's commitment to promote the development of a sustainable ocean economy is the creation of its **Blue Economy Incubator (BEI)**, which serves as a launch pad for Port-related sustainable aquaculture and blue technology ventures. Established in 2016, the BEI was designed to remove barriers to early-stage companies and provide pilot project facilitation services including funding, key assets and support services, and permitting 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.

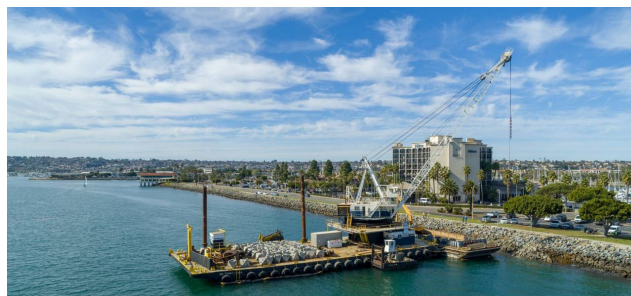
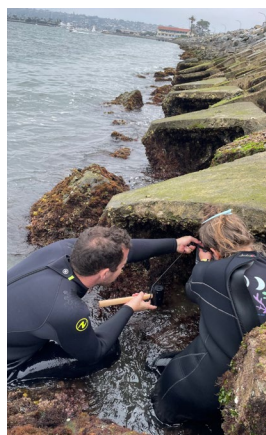
The Port serves a diverse role as landlord, operator, regulator, and environmental steward, plus it has extensive familiarity and expertise in the permitting and entitlements process for a variety of coastal and ocean uses. This uniquely position allows the Port to support innovative pilot project proposals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

Through pilot project facilitation, the BEI creates synergies with, and is informing, other Port environmental initiatives from coastal resilience and environmental protection to exploring and advancing opportunities for shellfish and seaweed aquaculture for food production and as a tool for bioremediation and restoration.

The success of individual BEI projects are measured based on Key Performance Indicators (KPIs) which are specific to each pilot projects' goals, while broader program results are tracked by "Our Impact in Numbers" on page 5. This report highlights the progress of companies within the BEI, recent achievements and opportunities for continued work to grow the BEI.



Port-wide Collaboration



San Diego's Blue Economy

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, non-governmental organizations (NGOs), 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.

The success of the BEI is based on the Port's value proposition along with the Port-wide collaboration process. From due diligence to installation, the successful launch of pilot projects involves various Port departments and subject matter experts. This is what truly makes the Port's BEI unique worldwide. The process to be considered for inclusion in the BEI is included at the end of this report.

BEI Value Proposition – Pilot Project Facilitation

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



H2O Conference and Greentech Conference in Halifax, Nova Scotia

Port representatives attended both the H2O Conference, and Green Marine GreenTech conference located in Halifax. Both conferences invited leading international delegates, researchers, startups, scientists, ports, and thought leaders in the BlueTech and sustainable Port and Maritime environments to promote sustainability in the Blue Economy.

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, coalitions, governments, ports, foundations, the US Navy, the US Coast Guard, as well as local communities. These relationships provide diverse pathways to harness and advance innovation which strengthens the region's collective impact on the Blue Economy. Here are a few partner spotlights from this year:



SPOTLIGHTS - Acceleration Partnerships



1,000 Ocean Startups

The 1000 Ocean Startups (1000OS) coalition unites the global ecosystem of incubators, accelerators, competitions, matching platforms and venture capital & corporate venture capital firms supporting startups for ocean impact. Since launching in 2021, 1000OS has grown to be the largest global ocean innovation network with the goal of scaling 1,000 startups by the end of the UN Ocean Decade of Science 2030. As a World Economic Forum initiative, 1000OS is comprised of 43 organizations, over 350 startups, and \$1.5 billion assets under management. They also commit to supporting and continuous improvement of the Ocean Impact Navigator, which is an open-source impact key performance indicator (KPI) framework, designed to simplify, harmonize and strengthen impact measurement and reporting for the ocean impact innovation ecosystem. The Port of San Diego is proud to be the first Port in the world to be a member of 1000OS.



Blue Action

The Port's partnership with Blue Action provides an opportunity to advance sustainable ocean innovation by cooperatively exploring opportunities for program alignment and investment to support the development and scaling of innovative solutions that promote the blue economy at ports. Blue Action is a Bahamian organization that is driving solutions for coastal resilience, accelerating innovation in ocean and climate technology, and growing a network of strategic government, industry, academic, and ecosystem partnerships to address the challenges entrepreneurs face in scaling their ocean and climate technology solutions.



NOAA's Ocean-based Climate Resilience Accelerators Program and StartBlue

The Department of Commerce and NOAA announced \$3.9 million in awards (Phase I) to help small businesses improve climate resilience in communities across the nation. This investment, funded by the Inflation Reduction Act, supports 16 awardees in 11 states and is structured in two phases, with Phase I focused on design and development of regional accelerators.



StartBlue Climate Ocean Resilience Accelerator Launchpad (CORAL) was one of the 16 awarded \$250,000 in development funding. The Port, and many other regional partners will be supporting and participating in this program. StartBlue is an accelerator from Scripps Institution of Oceanography & Rady School of Management that supports the formation of advanced science and engineering startups tackling ocean-focused challenges and solutions integrated into science, industry, investment, and government networks. The Port has been supporting startBlue cohorts through mentorship, advising, networking, and pilot project opportunities.



photo credit: Melissa Jacobs

Blue Economy Incubator in the Media

Our BEI has generated 24 national media exposure pieces and international coverage that has reached millions of viewers in the past year. Some key media pieces that have helped the BEI reach wider audiences include:

- **American Society of Civil Engineers -**
[Nature-inclusive shoreline protection installed in San Diego](#)
- **The Cool Down article**
[Ocean development rich in opportunities](#)
- **Ocean Optimism Podcast**
[The Port of San Diego's Innovative Blue Economy Incubator](#)
- **TedTalk San Diego**
[Ports can be catalysts for blue economy innovation](#)
- **American City and County**
[Innovation Trends: Local government teams are embracing change by introducing new and innovative projects](#)

Our impact in Numbers

\$1.95 MILLION in funding to support the launch of sustainable aquaculture and blue tech pilot projects

Over 30 PARTNERSHIPS created as part of the BEI growth strategy

330+ INQUIRIES received from organizations seeking partnership and pilot project opportunities

500+ pounds of edible seaweed produced weekly by Sunken Seaweed's Humboldt shoreside tumble culture farm

\$5.4 MILLION investment leveraged by Blue Economy Incubator Companies

\$2.5 MILLION research and development funds leveraged by Blue Economy Incubator companies

44+ MILLION Impressions from local, national and global media coverage around BEI innovation and investment

5 Smart Buoy technology to be deployed across San Diego Bay, demonstrating real-time ocean monitoring platform developed by HyperKelp

10 innovative pilot projects supported through a port-wide collaboration process

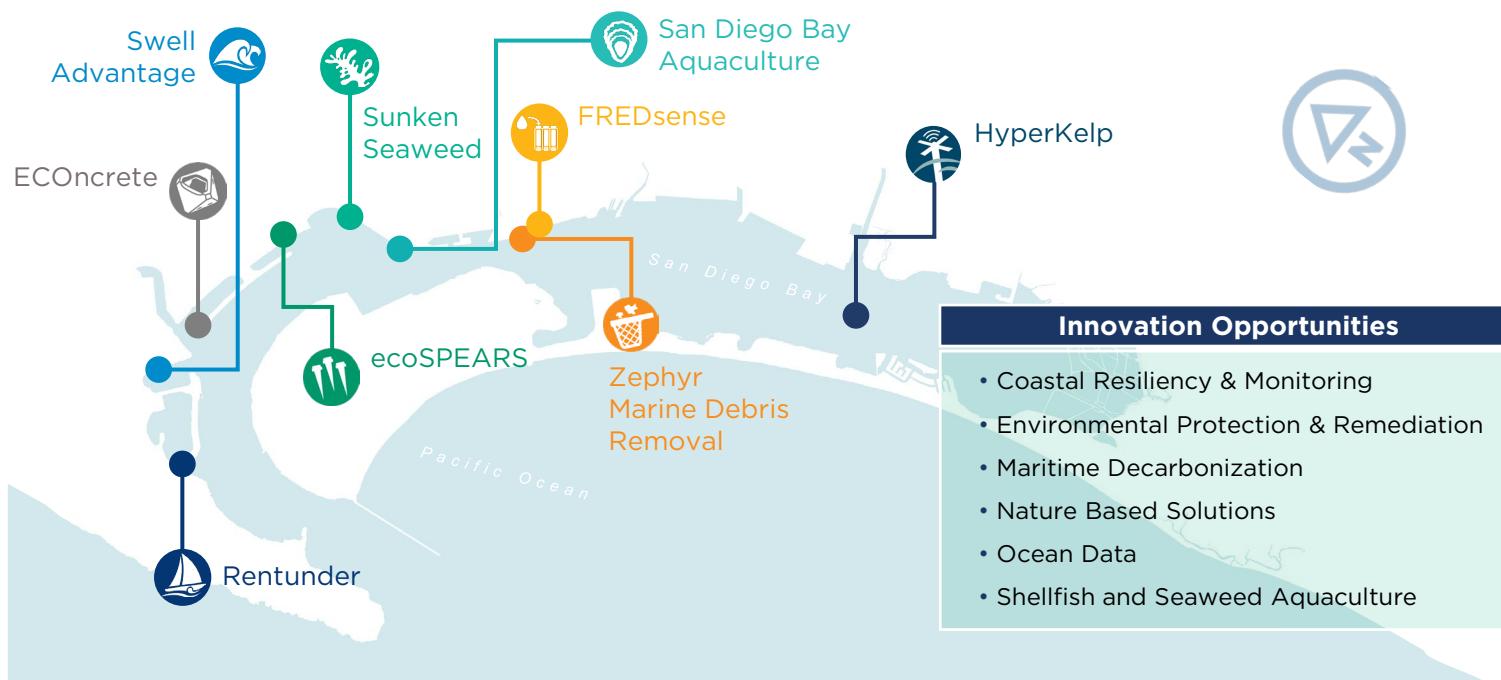
20 MILLION juvenile-stage oysters expected to be produced annually when San Diego Bay Aquaculture's FLUPSY is fully permitted and operating at full capacity

\$172,000 in royalty payments that can be re-invested in supporting new pilot projects

50+ DIFFERENT SPECIES including sessile species, mobile invertebrates, fish, and algae - found living on EConcrete's bio-enhancing shoreline protection armor units

Company Updates

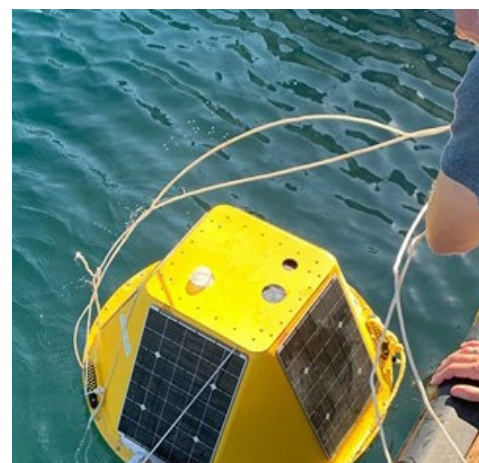
To date, the Port Blue Economy Portfolio includes ten pilot projects including resilient shoreline infrastructure, shellfish and seaweed aquaculture, smart buoy technology and water and sediment remediation technologies. Through its BEI, the Port is seeking innovation opportunities that align with the Port Blue Economy priorities from coastal resiliency and environmental protection to decarbonization and nature-based solutions.



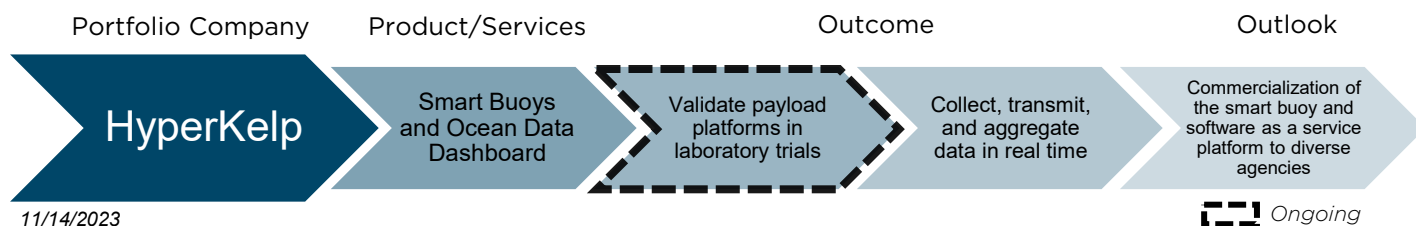
Pilot Project Updates

Sensor Agnostic Smart Buoys- HyperKelp

In 2023 The Port partnered with HyperKelp Inc. to demonstrate a sensor agnostic “smart” buoy platform designed to allow real time transmission of ocean data to an online dashboard for near real time monitoring and decision making. As part of the pilot project, HyperKelp will develop, test, and validate a smart buoy hardware platform tailored for various Port monitoring activities. The goal of the pilot is to enable real time monitoring for a variety of target parameters important for Port monitoring activities, including but not limited to: underwater noise levels, atmospheric carbon dioxide concentrations, and water quality parameters (e.g., dissolved oxygen, Chlorophyll A, Turbidity, pH, water temperature and salinity). The smart buoy platform will be field validated at 5 deployment sites located through the District’s tidelands to support various Port environmental initiatives.



Tracking impact from pilot project to commercial success



Pilot Project Updates *cont'd*



Sunken Seaweed



In 2018, 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. Since 2018, the company has been successfully cultivating, outplanting, growing, monitoring, and harvesting several species of seaweed native to Southern California. In 2022, the Port reinvested in an expansion of Sunken Seaweed's pilot which enabled the company to expand their operations to Humboldt Bay to develop shoreside facilities to help them reach market scale. Since their expansion to ten tumble culture tanks, seaweed production has doubled every 2-3 weeks, yielding 500-700 pounds of product on hand at any given time. As a result of their expansion, Sunken Seaweed has brought their fresh and dried seaweed products to market, maintaining accounts with numerous restaurants, grocery stores, and farmers markets across California and Southern Oregon. In addition to producing cultured seaweed for consumption, Sunken Seaweed is also assessing the ecosystem services of seaweed production like carbon sequestration, bioremediation and improving water quality. Results of their bioremediation, and Integrated Multitrophic Aquaculture (IMTA) studies have recently been published in two peer-reviewed journal articles. Sunken Seaweed's goals moving forward are to continue scaling their business and building an e-commerce platform.

Tracking progress from pilot project to commercial success



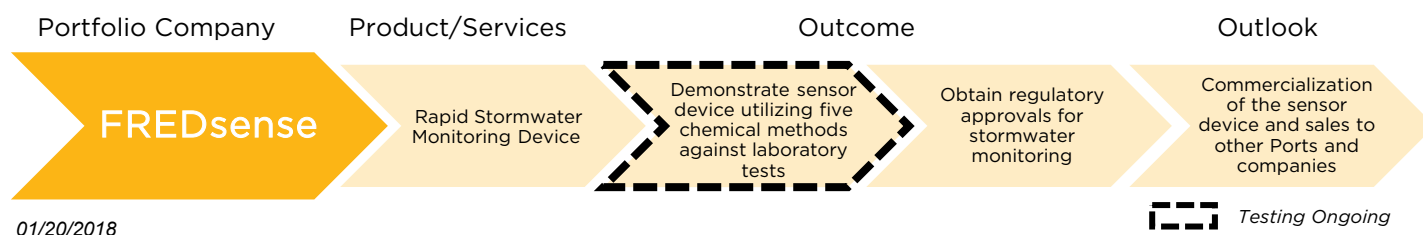
Stormwater Monitoring Device



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.

During 2023, the team worked heavily on phase II of the project, where they demonstrated the full functioning of the test for copper detection in water. This involved finalizing hardware and software systems as well as creating a method for producing dried tablets of the required chemical reagents to allow for long shelf life of the testing components. The next phase of the project moving in to 2024 will focus on determining a feasible pathway forward for total analysis of all five metals, as well as working towards getting the unit in the field for a pilot deployment.

Tracking progress from pilot project to commercial success



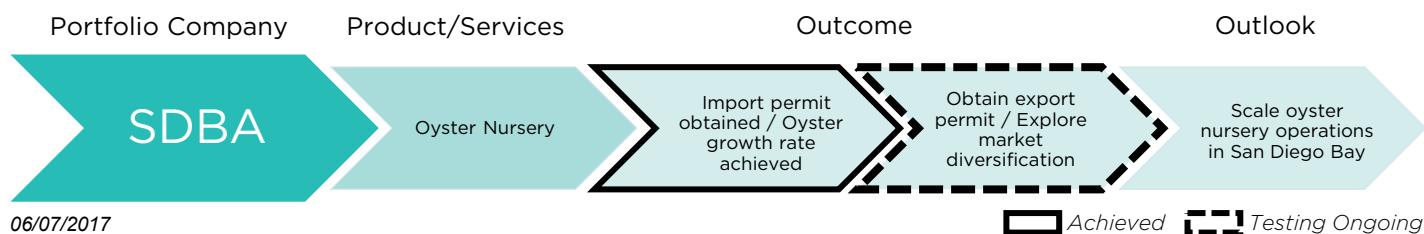
Pilot Project Updates *cont'd*



Shellfish Nursery

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 the team completed their first commercial production export in 2023 and is expected to expand capacity in 2024. Additionally, the FLUPSY is being used to conduct required baseline research for oysters, abalone, and seaweeds. Current research projects include an on-going collaboration between the United States Department of Agriculture and Oregon State University to study oyster genetics, San Diego State University's collaboration with Southwest Wetlands Interpretive Association to develop oyster monitoring microtechnology for oyster health monitoring to assist in real-time water quality assessment of the Tijuana River Estuary, and Scripps Institute of Oceanography to demonstrate fresh seaweed packaging technology and novel seaweed and shellfish co-culture methods.

Tracking progress from pilot project to commercial success



Recently Completed Project Updates



Sediment Remediation in Marine Environments

In 2020, the Port approved a pilot project with ecoSPEARS to demonstrate the company's innovative in-situ soil remediation technology. ecoSPEARS is the exclusive licensee of the 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 487 ecoSPEARS units in two different locations within 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. Based on third-party laboratory analysis, the installed SPEARS removed greater than 1,284 ug of PCBs after 2 years of deployment. The pilot project enabled ecoSPEARS to achieve several validation and commercialization milestones.



Award: ecoSPEARS is the 2023 Bronze Edison Award winner for the category of Sustainability- Green Remediation. ecoSPEARS was listed in the top 250 green tech companies by Time Magazine based on their positive environmental impact, financial strength, and innovation.

Recently Completed Project Updates *cont'd*



Bio-enhancing Shoreline Armoring



In 2020, EConcrete joined the Port's BEI to showcase its innovative tidepool shoreline armoring technology, called the 'Coastalock'. This technology, serving as a substitute for conventional riprap, not only provides ecological armoring and stabilizes shorelines but also fosters well-defined local ecosystems resembling natural tide pools. Over the 26-month period following installation, data revealed significant findings: a) a notable increase in the ratio of native to non-native species biodiversity, b) a doubling of species richness and abundance on the Coastalock units, and c) a two-fold increase in biomass compared to traditional riprap. This pilot project showcases the potential to incorporate Nature Inclusive Design (NID) into coastal protection infrastructures, addressing challenges posed by shifting coastal climates and bolstering climate resilience. During the pilot phase, Coastalock units garnered technological validation and received prestigious awards through the Port's initiative from preliminary to final results. The success has attracted attention globally, which EConcrete is leveraging as part of its commercialization and scale-up efforts.



Awards: 2024 Climate Leadership Awards (CLA) from the Climate Registry for the Innovative Partnership Category, IAPH Sustainability Award, Atlantic Project award (by the European Commission's Atlantic Strategy Plan), 2022 National Energy Globe Award, 2022 Design Educates Award, and the 2022 San Diego American Society of Civil Engineers (ASCE) Award for Outstanding Airports and Ports Project.

Completed Pilot Projects



Marine Debris Removal

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.



Smart Marina Technology

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.



Drive-in Boatwash Technology

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.



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 and Blue Technology.

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



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