# BLUE ECONOMY INCUBATOR HIGHLIGHTS

# THIRD EDITION





July, 2022

### San Diego Blue Economy



As a center for trade and innovation, situated along a vast natural and deep-water harbor, the Port of San Diego (Port) is home to a diverse and growing Blue Economy ecosystem. The Port's waterfront supports infrastructure and access for both traditional and emerging companies to participate in this dynamic and unique market which is further supported by the region's burgeoning scientific community, growing technology, economy, and a one-of-a-kind location. San Diego's Blue Economy and the Port are known around the world as being a unique hub for blue technology innovation and the growth of a blue technology cluster.

The Port plays a critical leadership role in advancing Blue Economy opportunities in the region through the many roles it serves including landlord, operator, regulator, and environmental steward. As the state-legislated trustee of tidelands and submerged waters in and around San Diego Bay, supporting sustainable aquaculture and Port-related blue technology and innovation, assists the Port in fulfilling its public trust responsibility to promote navigation, fisheries, commerce, and recreation, as well as aligning with its mission to enhance and protect the environment.



San Diego is recognized globally as a leading blue technology cluster. In May 2022, TMA BlueTech, a non-profit industry association, published their updated report "The San Diego Maritime, Water, and BlueTech Economy in 2020". The report identifies San Diego as home to 4,320 maritime, water and blue technology businesses which generate direct revenues of \$16.2 billion and provide more than 114,000 direct jobs - accounting for five percent of the business establishments in San Diego County and nine percent of its total employment.

### Port as Catalyst for Blue Innovation

In 2015, the Port established its Aquaculture & Blue Technology Program (AQ&BT), recognizing the growth opportunities of the Blue Economy sector and its strategic position within one of the world's leading blue technology clusters. The AQ&BT program has been conducting planning and pre-development work to support and inform aquaculture and blue technology opportunities in and around San Diego Bay.

In 2016, the Port created its Blue Economy Incubator (BEI) to assist in the creation, early development, and initial scaling of sustainable aquaculture and Port-related blue technology ventures. Through its BEI, the Port is seeking innovative aquaculture and blue technology proposals to address Port environmental challenges and inform future Blue Economy opportunities.

The BEI is building a Blue Economy Portfolio of new businesses and partnerships that deliver multiple social, environmental, and economic co-benefits to the Port and the region. Through pilot project facilitation, the BEI creates synergies with, and is informing, other environmental programs from sea-level rise adaptation to copper remediation, marine debris removal management, and evaluating shellfish and seaweed aquaculture as a tool for bioremediation and restoration. To date, the Port has committed \$1.6 million in funding, provided use of Port-owned property, assisted with obtaining all necessary regulatory and operational permits, coordinated the installation of the pilot projects, and helped with community and media relations.

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.



### **Value Proposition**

- Funding
- Port-based testbed and pilot sites
- Pilot project facilitation services
- Regulatory and permitting assistance
- Subject matter expertise
- Strategic stakeholder collaboration
- Marketing and outreach
- Support to leverage grant opportunities



### **Partnerships**

Through the BEI, the Port has created a new and unique pathway to harness and advance innovation which offers exciting collaborative and partnership opportunities. To date, the Port has established collaborative partnerships with numerous local, state, and federal governmental agencies, academia, non-government organizations, foundations, industry, and the local community to leverage and strengthen our collective impact on our region's Blue Economy and accelerate innovation.



The Port's BEI Program is recognized as a catalyst for the region's Blue Economy and is complementary to many other initiatives and programs. The Port maintains relationships with a variety of entities including: ports and harbors in California and along the West Coast; maritime businesses; local and regional governments; academic institutions; the U.S. Navy and U.S. Coast Guard; Blue Economy cluster and accelerator organizations; philanthropists and foundations; state and federal agencies; and entrepreneurs and start-ups. Here are a few partner spotlights from this year:



**Canada's Ocean Supercluster (OSC)** – This partnership seeks new opportunities which support mutual goals to advance sustainable ocean innovation projects. The groups met quarterly throughout the past year and the BEI received several inquiries from OSC members.



- **TMA BlueTech** – By creating regional awareness, promoting opportunities, and attracting companies from around the world, this cluster plays a major role in advancing blue technology innovation in San Diego. The Port is an active participant in TMA BlueTech activities, provides sponsorship, and coordinates with cluster members.



 startBlue - This accelerator from Scripps Institution of Oceanography and Rady School of Management is soon to be supporting its second cohort of Blue Economy startups. BEI staff supports startBlue cohorts through mentorships, advising and networking.

The Port is actively responding to inquiries from national and international entities interested in collaborative partnership opportunities, from companies seeking to launch pilot projects to organizations exploring pathways to apply our BEI process as a model.

# Our impact in **Numbers**

# \$160,000

in royalty payments that can be re-invested in supporting new pilot projects through the Port's Blue Economy Incubator



metals being tested by FREDsense to develop 5-in-1 system for near real-time stormwater compliance monitoring, including aluminum, copper, lead, zinc, and nickel

MILLION

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



control cleaning events and concurrent water quality sampling events to evaluate in-situ release of copper from boat hulls using Rentunder Boatwash technology

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

MILLION

additional research and

development funds

Economy Incubator

leveraged by Blue

pilot projects

250+ **INQUIRIES** received from organizations seeking partnership and pilot project opportunities

### 110,000 POUNDS

of marine debris removed from San Diego Bay by Zephyr - 33,000 pounds during its first year of pilot operations, and an additional 77,000 pounds during a follow-on contract with the Port

innovative pilot projects launched through a port-wide collaboration process

DIFFERENT

including sessile species, mobile invertebrates, fish, and algae - found living on ECOncrete's bio-enhancing shoreline protection armor units (Coastalock) eight SPECIES months after deployment





different algae species tested at the seaweed aquaculture pilot farm established by Sunken Seaweed to launch various products and measure restoration benefits

SPEARS technology deployed into the sediment by ecoSPEARS to demonstrate their innovative approach to sediment and soil remediation in Port environments



### **Portfolio Map**



### **Portfolio Spotlight**

Now in its sixth year, the BEI program supports the demonstration of new technologies and businesses that promote sustainable aquaculture, environmental remediation, smart-port technologies and resilient coastal infrastructure. The BEI serves as a launch pad for early-stage entrepreneurs by providing funding, key assets, permitting and other key services focused on pilot project facilitation.

This report highlights our progress to date, achieving the vision and goals set forth with the establishment of our Port-based BEI. Detailed Scorecards highlight the path taken by our nine portfolio companies and the progress made from pilot projects to commercial success. These projects demonstrate the Port's commitment to foster innovation and partnerships that promote a sustainable ocean economy. The collective ingenuity and commitment of the portfolio companies to tackle Port environmental challenges and inform opportunities, bolsters sustainability and drives economic progress throughout the San Diego region.

Our portfolio companies are achieving pilot project success, including experiences in realworld conditions, opportunities to validate technologies, and support navigating permitting processes and requirements. In addition to the following Scorecards, here are a few key highlights from our portfolio:





- FREDsense The company successfully validated the chemistry tests for the analytes of interest to develop a five-in-one portable field-testing sensor device optimized for stormwater compliance monitoring. FREDsense is preparing to demonstrate the sensor device against laboratory tests. Results from the pilot will allow for case study development in preparation for full commercialization and regulatory approvals.
- ECOncrete Just over a year after deployment, over 50 different marine species were found living on the interlocking coastal armor units, showcasing development towards a richer and more diverse biological community, compared to adjacent control rocks. Results from the pilot biological and structural monitoring study will be used by ECOncrete to continue scaling its bio-enhancing technology throughout California and globally.



ecoSPEARS - After 12 months of deployment, 1/3 of the SPEARS were retrieved for preliminary data collection to measure the mass of contaminants removed from the marine sediment compared to baseline conditions. Similar tests will occur at the end of the year and the results will be used by ecoSPEARS to validate its remediation technology and to pursue scaling opportunities.

### FREDsense Technologies

FREDsense technologies is developing custom field-enabled technologies for rapid detection of chemical compounds in water.



In 2020, FREDsense partnered with the Port of San Diego to develop a portable five-in-one field-testing sensor device to provide real-time metals analysis for stormwater monitoring. FREDsense is an early-stage company comprised of a multidisciplinary team of water scientists, biologists, and engineers specializing in custom development of unique water quality solutions.

During the two-year pilot project, FREDsense is proposing to develop, optimize and commercialize a real-time five-in-one automated sensor device for metals in water samples. The proposed metals include aluminum, copper, lead. zinc and nickel, all of which are monitored in the Port's stormwater programs. The project's approach will help stormwater programs by providing real-time data in the field, enabling adjustments to Best Management Practices (BMPs) guicker than with laboratory data that can take several weeks for results.

#### **CURRENT STATUS**

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#### HIGHLIGHTS



FREDsense has validated its core technology through pilot projects for various applications within the mining, remediation and water industries. FREDsense is currently focused on expanding the sensor suite with exciting projects underway for the detection of SARS-CoV-2, nutrients and marine toxins.

In support of the pilot, the Port is providing funding, and expert consultation with Port staff regarding use cases and other information based on Port stormwater experience. FREDsense has successfully validated the chemistry tests for the analytes of interest and has begun work on initial testing units for eventual field testing. Results from the pilot will allow for case study development in preparation for full commercialization and regulatory approvals.



### Scorecard: FREDsense / FY21-22

PILOT TIMELINE: Board Approval: 12/08/2020 Start Date: 01/01/2021 End Date:01/01/2023

### PILOT OVERVIEW

Tracking progress from pilot project to commercial success



### **KEY PERFORMANCE INDICATORS (KPI) & HIGHLIGHTS**

OVERALL KPI	Demonstration of	Proof of Concept / Case Study	Customer
	Hardware System	Development	Acquisition
FY 21-22 Highlights	FREDsense will utilize t compare and validate a successful customizatio develop a case study th application to stormwa to regulatory agencies methodology for regula	he Port's current stormwater sampling p against known laboratory samples. Upon on of the five-in-one sensor device, FRED nat demonstrates its effectiveness and p ter monitoring. The case study will be pr to achieve certification of their rapid tes atory and permit compliance monitoring	rogram to Sense will octential esented ting



Since the start of their pilot project, FREDsense demonstrated chemistry data for the detection of all five analytes of interest. In collaboration with the Port Environmental Protection team, FREDsense gathered requirements on use case and began first hardware prototype for testing.





### ECOncrete

ECOncrete is developing bioenhancing concrete technology to enable both development and sustainability in coastal and marine construction.



HYUNDA

#### PILOT PROJECT

In 2019, ECOncrete partnered with the Port of San Diego to demonstrate a new design of its tide pool coastal armor unit product. ECOncrete is an early-stage company comprised of a multidisciplinary team of renowned marine ecologists, biologists, concrete experts, engineers, and designers.

During the three-year pilot project, ECOncrete will demonstrate their new and innovative tide pool design, the COASTALOCK interlocking tide pool. The COASTALOCK is designed as a singlelayer interlocking armor unit, with the ability to create and mimic different natural habitats, often missing from artificial structures. When rotated, the units can create unique habitats such as water retaining tidepools, caves, and overhangs, providing niches critical to diverse marine species. During the pilot project, ECOncrete will install 74 Coastal Star tide pools across two sites along the San Diego Bay shoreline. ECOncrete will conduct ecological and structural monitoring every six months for two years.

#### HIGHLIGHTS



The project was the recipient of the 2022 'Outstanding Airports and Ports Project' awarded by the San Diego Section of the American Society of Civil Engineers (ASCE) to projects that demonstrate the greatest engineering skills and represents the greatest contribution to civil engineering progress and to society.

#### CURRENT STATUS

In support of the pilot, the Port is providing funding, permitting, and environmental review as well as access to Port-controlled land in San Diego Bay to test the ECOncrete technology. The casting of the tide pool units and installation was completed in partnership with a local contractor. In 2021, 74 interlocking COASTALOCK armor units were installed across two sites along the San Diego Bay shoreline and the first two monitoring events (November 2021 and May 2022) were conducted by ECOncrete.



OVERALL	Biodiversity	Species	Species	Community	Percent Live	Biogenic Build-Up
KPI		Abundance	Richness	Structure	Cover	(calcium carbonate)
FY21-22 Highlights	In Novemb monitoring units, inclu addition, c species, co the algal c Structural Coastaloci condition establishe Investigati	per 2021, eight-m g event showed a uding many sessil on the Coastalock omposed of gree community comp criteria will be ev k at the conclusio (cracking, chippi d by the America ions".	onths post-de a diverse comm le species, mol c units a divers n, red, brown, rised nine spec valuated accord on of the 3-yea ng, etc.), as we an Society of C	ployment, the re nunity that has c bile invertebrates e algal communi and coralline alg cies and was dor ding to the Leve ar pilot project fo ell as structural s ivil Engineers "A	sults from the fir developed on the s, and different fi ity was noticed i hae while on the o minated by an inv 11 & 2 visual insp or determining th stability - per the SCE Manual 101,	st biological Coastalock sh species. In ncluding 13 control rocks vasive red alga. ection of the e overall standards Underwater



The Coastalock creates unique habitats providing niches critical to a diversity of marine species promoting local biodiversity and ecosystems.



Control Rock



Coastalock Armor Unit

### ecoSPEARS

ecoSPEARS is developing costeffective cleanup solutions to extract and destroy toxic contaminants from impacted sediment, soil and groundwater.



#### PILOT PROJECT

In 2019, ecoSPEARS partnered with the Port of San Diego to demonstrate its innovative in-situ technology to extract contaminants from impacted marine sediment. ecoSPEARS is a startup company comprised of a fast-growing team of innovators, engineers, and scientists developing cleanup solutions for contaminated sediment.

SPEARS stands for Sorbent Polymer Extraction and Remediation System. Shaped like spikes, SPEARS filled with a proprietary solution are deployed into contaminated sediment or around challenging facilities like wharves/piers or sensitive wetland areas where dredging may not be feasible. Once settled into the sediment, the SPEARS act like sponges, passively absorbing chlorinated toxic contaminants such as polychlorinated biphenyls (PCBs) and dioxins. Once the remedial site goals are met, the SPEARS are safely removed and retrieved, and then the SPEARS enter a green chemical process to destroy the PCB's absorbed.

#### HIGHLIGHTS



In January of 2022, ecoSPEARS conducted a 12-month retrieval event where 1/3 of the deployed SPEARS were retrieved to collect data. Studies are currently being conducted by both ecoSPEARS and third-party laboratories to measure the mass of PCBs in the SPEARS that were retrieved.

#### **CURRENT STATUS**

In support of the pilot, the Port is providing funding, permitting, and environmental review as well as access to Port-controlled land in San Diego Bay to test the SPEARS technology. The permits for the pilot were obtained, two baseline sampling events were conducted, and the SPEARS deployment took place on December 14, 2020. The results from the pilot will serve to demonstrate and scale this innovative approach to sediment and soil remediation in Port environments.



### Scorecard: ecoSPEARS / FY21-22

PILOT TIMELINE: Board Approval: 6/8/2019 Start Date: 10/15/2019 End Date: 12/31/2022

### PILOT OVERVIEW

Tracking progress from pilot project to commercial success



### **KEY PERFORMANCE INDICATORS & HIGHLIGHTS**

OVERALL KPI	Effectiveness in reducing PCB concentrations in sediments	No solvent/water exchange across spike	Destruction of extracted PCBs	Assess effectiveness in treating PCB-impacted sediment using solvent-rinse extraction process	
FY21-22 Highlights	SPEARS technology performance will be evaluated after 12, 18, and 24 months of deployment at two locations in San Diego Bay. A SPEARS retrieval event took place 12 months after deployment, in January 2022, for comprehensive data collection and to visually inspect the remaining ecoSPEARS mats.				
FY20-21 Highlights	ecoSPEARS deployed SPEARS technology at two locations in San Diego Bay. The primary goal will be to determine how much PCB mass the SPEARS technology will remove over a 24-month period compared to baseline concentrations.				



As part of the pilot project, ecoSPEARS has launched an in-house surrogate study to replicate field conditions within San Diego Bay sediments. Sediment from the deployment sites was placed inside of a glass reaction chamber to monitor and estimate the quantity of PCB mass removed.

### San Diego Bay Aquaculture

San Diego Bay Aquaculture is specializing in growing marine shellfish to support sustainable aquaculture businesses in San Diego Bay.



#### **PILOT PROJECT**

In 2017, San Diego Bay Aquaculture (SDBA) partnered with the Port of San Diego to demonstrate an accelerated, year-round shellfish aquaculture nursery operation in San Diego Bay, using the Floating Upweller System (FLUPSY) technology. SDBA's principals have over a dozen years of experience in shellfish and seaweed farming, FLUPSY operations and aquafarm ownership.

A FLUPSY is a floating barge that serves as a shellfish nursery, growing oysters from seed (size of red pepper flakes) to juvenile stage (size of quarters). During the five-year pilot project SDBA will be importing and growing oysters and other shellfish to the juvenile stage, establishing health and growth baselines, and measuring the associated environmental benefits. The juvenile shellfish will be exported to grow-out locations outside of San Diego Bay. The goal of the pilot is to demonstrate that shellfish nursery operations in San Diego Bay are feasible.

#### HIGHLIGHTS



- First commercial shellfish aquaculture operation in San Diego Bay.
- Upon securing all approvals and permits, scaled operations of the FLUPSY's annual capacity is expected to be up to 20 million oyster seed per year.
- Port supporting long-term planning effort to establish health baseline and measuring the associated environmental benefits.

#### **CURRENT STATUS**

In support of the pilot, the Port provided funding, permitting, and environmental review as well as access to Port-controlled land in San Diego Bay to establish the FLUPSY. SDBA is rearing experimental batches of shellfish to verify growth performance, explore market diversification and further establish the health baseline record with a goal to obtain necessary export permits and regulatory approvals.



### Scorecard: SDBA / FY21-22

PILOT TIMELINE: Board Approval: 6/20/2017 Start Date: 9/10/2018 End Date: 9/10/2023

### PILOT OVERVIEW

Tracking progress from pilot project to commercial success



#### **KEY PERFORMANCE INDICATORS & HIGHLIGHTS**

OVERALL KPI	Shellfish growth rate ( shell length/day/individual)			Rate of customer	FLUPSY energy	Effectiveness of
	Diploid Pacific Oyster	Manila Clam	Triploid Pacific Oyster	acquisition	efficiency	operations
FY 21-22 Highlights	Pilot continues to track growth performance of experimental batches of shellfish to further develop the health baseline required to secure export markets through FY 2023. Market diversification opportunities are underway that include abalone grow out, research on barnacles for culinary uses, as well as shellfish production for restoration projects.					
FY20-21 Highlights	0.64 mm/day 4 weeks to juvenile (20mm)0.13 mm/day 4 weeks to juvenile (20mm)0.3 mm/day 4-6 weeks to juvenile (20mm)Growth faste anticipa to juvenile (20mm)0.3 mm/day 4-6 weeks to juvenile (20mm)M/AGrowth faste anticipa seed to (1.5 to					Growth rate 3X faster than anticipated from seed to juvenile (1.5 to 20mm)



San Diego Bay Aquaculture continues experimental testing of different species to develop health baseline and explore new market opportunities.

### Rentunder

Rentunder invented the Drive-in Boatwash technology to offer a quicker and environmentally friendly alternative to in-water hull cleaning.



#### **PILOT PROJECT**

In 2017, Rentunder partnered with the Port of San Diego to demonstrate whether the Boatwash technology is a feasible alternative to current in-water hull cleaning practices in San Diego Bay. Rentunder is the manufacturer, seller and distributor of the Drive-in Boatwash technology. Rentunder is led by a team of hydraulic experts and engineers from Sweden.

The Drive-in Boatwash consists of driving a boat (sailboat or motor-boat up to 53 feet) into an enclosed basin, then mechanically brushing the boat hull. The entire cleaning process is conducted within the enclosed basin of the Boatwash, which is designed to retain residual debris and particulate matter to assist in reducing copper released into bays and harbors. During the two-year pilot project, a water quality study was developed to assess water quality during cleaning events and to determine potential operation adjustments.

#### HIGHLIGHTS



This pilot project represented the first installation of the drive-in Boatwash technology along the US West coast. The pilot allowed for testing of the Boatwash effectiveness to reduce copper inputs into the Bay from hull cleaning operations.

#### CURRENT STATUS

In support of the pilot, the Port provided funding, permitting, and environmental review as well as access to Port-controlled land in San Diego Bay to establish the Boatwash. To date, the pilot included the installation of the Boatwash, the establishment of a water quality monitoring study in collaboration with key stakeholders, and the coordination of four controlled cleaning events.



### Scorecard: Rentunder / FY21-22

PILOT TIMELINE: Board Approval: 06/20/2017 Start Date: 07/17/2018 End Date: TBD

### PILOT OVERVIEW

Tracking progress from pilot project to commercial success



### **KEY PERFORMANCE INDICATORS & HIGHLIGHTS**

OVERALL KPI	Rate of customer acquisition & total #	# boaters that stop painting their boats using copper	# of boats washed monthly	Amount of dissolved copper collected from basin	Water quality in and around basin	Effectiveness of cleaning operations
FY21-22 Highlights	<ul> <li>PHASE 2 / Results from Phase 1 were used to prepare recommendations for Phase 2 - to continue evaluating the use of the Boatwash as a potential alternative to in-water hull cleaning practices. There are five main recommendations for Boatwash operations during Phase 2 which include 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. Start of Phase 2 operations is anticipated for Spring 2023 at a new location.</li> </ul>					
FY20-21 Highlights	<b>PHASE 1 Completed and Report Finalized</b> / During Phase 1, Rentunder installed the Boatwash (May 2018), coordinated three controlled cleaning events and concurrent water quality sampling (July 2018 – March 2019), as well as a 'Dome Study' to evaluate in-situ release of copper from boat hulls under different cleaning scenarios (Dec 2018-Jan 2019). The Boatwash was not open to the public during this initial phase of testing.					



For comparison purposes, during the second cleaning event, boats were cleaned inside the Boatwash basin by a diver using standard in-water hull cleaning best management practices (BMPs). ACMUN.

### Utilities

Facility

Dashboard Waitlist

Fradelist

Leave Notices

Reservations

Plans



### Swell Advantage

Swell Advantage is offering a cloud-based, mobile-enabled enterprise management software for marinas, waterfronts, and yacht clubs.



Waitlist: 149 boats / 8154 feet

Active Vacancies: 24



#### PILOT PROJECT

In 2017, Swell Advantage partnered with the Port of San Diego to advance the development of its smart marina application. Swell Advantage is a technology start-up, developing operation support tools to assist professionals to automate marina and optimize their operations and enhance customer experiences.

Swell's smart marina application provides decision making support to assist marina managers in slip allocation resulting in increased revenue. The application also manages boater communication with the goal of building stronger and safer marina communities. The application assists managers to understand how individual boaters use their facility, how efficiently operations are running, and if the marina is maximizing slip revenues. The one-year pilot project was completed in collaboration with a local marina in San Diego Bay.

#### HIGHLIGHTS





In 2019, Swell Advantage teamed up with payments and Point of Sale (POS) Company Square to better service marinas and waterfronts across the US and Canada and meet boaters' customer service expectations in a digital world.

#### **CURRENT STATUS**

Since the completion of the pilot project, Swell Advantage has finalized the development of their smart marina app in partnership with a local marina in San Diego Bay, generated sales across North America, and established strategic technology partnerships.



### Scorecard: Swell Advantage / FY21-22

PILOT TIMELINE: Board Approval: 06/20/2017 Start Date: 07/1/2017 End Date: 09/1/2018

### PILOT OVERVIEW

Tracking progress from pilot project to commercial success



On November 10, 2020, the Port received a buy-out payment of \$150,000, concluding the pilot.

### **Red Lion**

Red Lion is developing environmental solutions to alleviate the impacts of oil spills, flooding or water contaminated by chemical pollutants.



#### PILOT PROJECT

In 2017, Red Lion Chem Tech (Red Lion) partnered with the Port of San Diego to demonstrate their adsorbent media filtration technology designed to remove dissolved copper in seawater. Red Lion is а remediation company specializing in developing environmental solutions to alleviate the impacts of oil spills, flooding or water contaminated by chemical pollutants. The company principals have over 30 years of experience assisting in the development and growth of technology start-ups.

The goal of the one-year pilot project is to demonstrate the efficiency of the media filtration technology under both a passive (Ballast Flow Through) and active (Pump and Treat Flow Through) filtration systems. The pilot project is expected to determine the cost-effectiveness and potential Baywide scalability of the technology in harbor environments.



HIGHLIGHTS

uon Chem

EPA Approved Technology Inside

Red Lion conducted laboratory demonstrations of their technology using San Diego Bay water with test results showing up to 85% efficiency in removing copper.

#### CURRENT STATUS

In support of the pilot, the Port provided funding, and permitting, and environmental review as well as access to Port-controlled land in San Diego Bay to test Red Lion's technology. The pilot is scheduled to take place during Phase 2 of the Boatwash pilot project.



### Scorecard: Red Lion / FY21-22

PILOT TIMELINE: Board Approval: 06/20/2017 Start Date: TBD End Date: TBD

### PILOT OVERVIEW

Tracking progress from pilot project to commercial success



#### **KEY PERFORMANCE INDICATORS & HIGHLIGHTS**

OVERALL KPI	Amount of total and dissolved copper removed	Effect on bay water quality and load removal	Amount of resin used, and cost associated with production and analysis
TBD	This pilot project is scheduled project, where advanced filtr technologies will be tested for during hull cleaning. Red Lion filtering water in an active Pu Passive Flow-Through (PASS) s	to take place during Ph ation systems and em their potential to collec copper remediation te Imp and Treat Flow-Th ystem.	ase 2 of the Boatwash pilot erging copper remediation t dissolved copper released chnology will be tested by rough (P&T) system and a



Active filtration device system to be tested in the field using Red Lion patented copper remediation resin technology.

### Zephyr Debris Removal

Zephyr is offering an innovative vessel design and service model for marine debris removal in bay and harbor environments to reduce marine debris pollution.





#### PILOT PROJECT

In 2018, Zephyr partnered with the Port of San Diego to demonstrate an innovative new design for a marine debris skimming vessel, and for the development of a database of key variables influencing marine debris accumulation in San Diego Bay. Zephyr is a start-up company whose founder has over 20 years of experience in the maritime industry as a small business owner and commercial fishing captain.

During the one-year pilot, over 33,000 pounds of trash were collected from San Diego Bay, as well as data on location, volume and content of debris. The data collected is assisting and informing management decisions to address marine debris sources and hotspots around San Diego Bay. Moving forward, Zephyr is actively working on a new innovative approach to prevent and reduce debris accumulation in Bay environments to improve and expand marine debris removal services.

#### HIGHLIGHTS



Category: Mitigation Marine Debris Removal Project

In 2018, the Port won an award from the American Association of Port Authorities (AAPA) for its support of Zephyr's innovative debris removal system through pilot project facilitation.

#### **CURRENT STATUS**

In March 2020, Zephyr completed a one-year contract with the Port's General Services Department to provide marine debris removal services. Within that year, an additional 77,000 pounds of debris were collected, bringing the total debris removed by Zephyr to 110,000 pounds. As the vessel continues to demonstrate its efficient skimming operation and technology, the goal is to commercialize the solution across California and beyond to help remove debris from other Ports and Harbors.



### Scorecard: Zephyr

PILOT TIMELINE: Board Approval: 1/9/2018 Start Date: 2/5/2018 End Date: 2/5/2019

### PILOT OVERVIEW

Tracking progress from pilot project to commercial success



#### **KEY PERFORMANCE INDICATORS & HIGHLIGHTS**

OVERALL KPI	Track amount of debris collected	Track effectiveness of skimming operations
Q1 FY19	4,809 LBS	Seasonality pattern developed
Q2 FY19	15,872 LBS	Designed Technology improvements
Q1 FY19	4,216 LBS	Hot spot, trash accumulation locations identified
Q4 FY18	5,065 LBS	Pattern and predictability developed based on variables and data collected
Q3 FY18	3,172 LBS	Baseline variables established and recorded

2018 Total Trash (lbs/month)





Zephyr built a database of key variables influencing marine debris accumulation in San Diego Bay such as seasons, weather events and tidal swings.

### Sunken Seaweed

Sunken Seaweed is farming multiple seaweed species and developing a diversity of products from culinary seaweed to fertilizer.





#### **PILOT PROJECT**

In 2018, Sunken Seaweed partnered with the Port of San Diego to demonstrate the feasibility of seaweed aquaculture in San Diego Bay. Sunken Seaweed is an aquaculture startup company led by two marine ecologists committed to pioneering sustainable seaweed aquaculture in and around San Diego Bay.

Sunken Seaweed established their seaweed hatchery at San Diego State University Marine Lab and installed their submerged pilot farm using assets managed by the Port in San Diego Bay. Since the start of the one-year pilot project, the company has been cultivating, outplanting, growing, monitoring, and harvesting several species of seaweed native to Southern California. Beyond commercialization, results from the pilot project are helping assess seaweed aquaculture's multiple co-benefits, from carbon sequestration and bioremediation to improving water quality and ecosystem productivity.

#### HIGHLIGHTS



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In 2020, Sunken Seaweed obtained grant funding from the US. Department of Energy ARPA-e program and Pacific States Marine Fisheries Commission to measure the ecosystem benefits and services provided by seaweed aquaculture and continue their pilot farm operation.

#### **CURRENT STATUS**

In support of the pilot, the Port provided funding, permitting, and environmental review as well as access to Port-controlled land in San Diego Bay to establish the pilot farm. Sunken Seaweed has leveraged the assets and results from the pilot to obtain additional grant funding and permits to continue operations and measuring the ecosystem benefits and services that both seaweed and shellfish provide.



### Scorecard: Sunken Seaweed / FY21-22

PILOT TIMELINE: Board Approval: 07/17/2018 Start Date: 11/1/2018 End Date:11/1/2023

### PILOTS OVERVIEW

Tracking progress from pilot project to commercial success



#### **KEY PERFORMANCE INDICATORS & HIGHLIGHTS**

OVERALL KPI	Macroalgae growth rates	Innovation and Proof of Concept	Customer acquisition
FY 21-22 Highlights	Ulva: 50 lbs/week (land-based) Gracilaria (Ogo): no production due to Covid-19	Initiated a process with Humboldt Bay Harbor District to develop a land-based commercial farm in Humboldt County, CA Exploring using seaweed as a tool for bioremediation in urban waterways through Arpa-E Grant and San Diego State University	No new customers
FY 20-21 Highlights	<b>Gracilaria (Ogo):</b> 100 lbs/week (land-based)	Built a macroalgae tumble culture facility at Hubbs SeaWorld Research Institute through a Pacific States Marine Fisheries Commission Grant Acquired permits to add shellfish to pilot farm at Grape Street pier to test 3D Ocean Farming model	ANIMAE, Wrench & Rodent, The Plot, and The Berry Good Food Foundation, Monterey Bay Seaweed, Superior Seafoods, Catalina Offshore Products



Beyond commercialization, results from the pilot will help assess seaweed aquaculture's multiple co-benefits and uses such as carbon sequestration, restoration, and ecosystem productivity.



In order to be considered as a partner in The Port's Blue Economy Incubator, we 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 <u>incubator@portofsandiego.org</u>. 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 on the following page or at <u>www.portofsandiego.org/blueeconomy</u>.
- 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 employees

#### **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 five 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, 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.





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