Hawaii Ocean Science and Technology Park
Administered by the
NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY

Summer 2022
Volume 4, Issue 1

THE PIPELINE

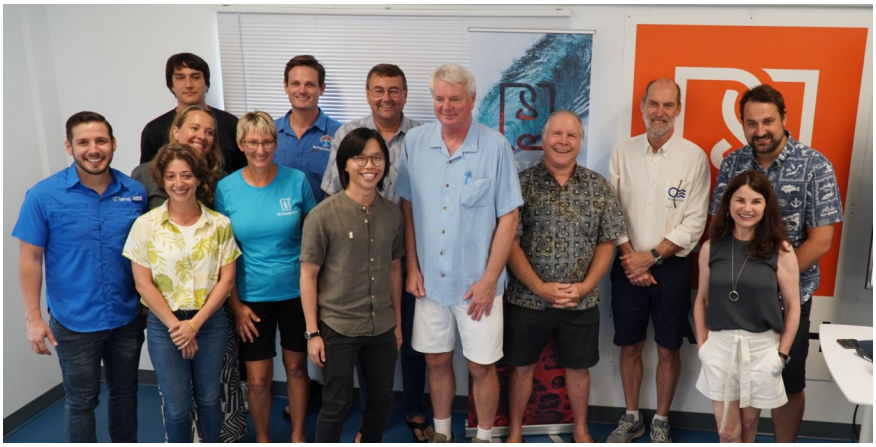
HATCH 2022 Hawaii HAWAI'I INNOVATION STUDIO

HATCH ran its second Hawai'i Innovation Studio from April 18 to May 13. Due to the pandemic, the program was hybrid with both remote and in person attendance. 11 early stage projects/ teams were selected to participate in four weeks of training, network access, mentoring, site visits culminating in a pitch event. Four of the teams were from Hawaii: Kauai Sea Farm, Kulahaven Farms, Marine AgriFuture and Minnowtech.

The Studio culminated in a pitch event for which 120 people registered followed by a networking Community Day event at the HATCH facility.

HATCH is moving its Global Program Headquarters to HOST Park

It is official! After a three year pilot program and a recent multi million US department of Commerce EDA award, HATCH is continuing and expanding the aquaculture accelerator program at HOST Park. As a result, HATCH is moving its global program activities to Kona in July 2022! Keep your eye out for news on Hatch's next steps, activities and plans to be released this fall.

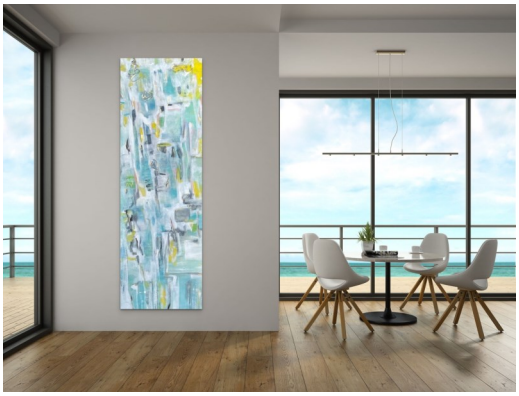


Above: A few of the onsite Innovation Studio participants including HATCH staff, mentors and cohort participants (May 2022). Recognize any prominent NELHA mentors?

INSIDE THIS ISSUE

CATHERINE DI NAPOLI'S OCEANA ART

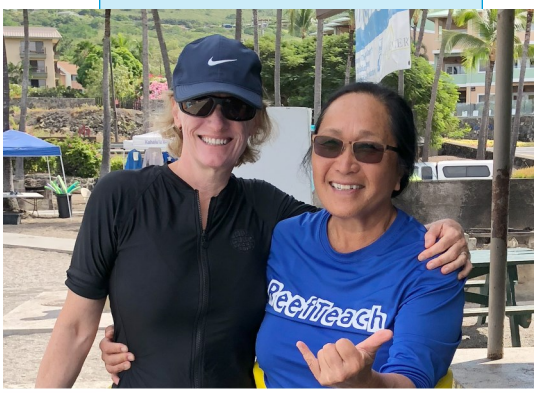
In Catherine di Napoli's own words: " *The ocean provides endless inspiration. Perhaps because I struggle to relate to linear structured thinking, the fluid, timeless ocean is more relatable to me than telluric studies. Her ebb and flow is closer to the truth. She holds the forces of the universe within her depths. Volcanoes, shipwrecks and creatures rule the salt waters. The Hawaiian skies are reflected in waves crashing to the shore... where the history and livelihood of the Hawaiian people thrive. My painting is inspired by the fluid abstraction...the currents, tides and turmoil of the sea.*" Catherine, drawn by the creative vibe and sense of community at HOST Park, as well as the beauty and proximity of the ocean is manifesting an outdoor studio to produce her large scale abstract works of art.



Above: Image of Makai 21 that illustrates the scale of di Napoli's work.

Left: More artwork from di Napili's Oceana series.

"It is better to know some of the questions than to know all of the answers." James Thurber.



Kahalu'u Hope Spot Team
Top: Dr. Christine Zalewski and Cindi Punihaole
Bottom: Sanjay Velappan (Dear Ocean) and Kathleen Clark (KBEC)

KAHALU'U BAY IS DESIGNATED A "HOPE SPOT"

Mission Blue, an international marine conservation group founded by Dr. Sylvia Earle, has designated Kahalu'u Bay on the Big Island of Hawai'i as a Hope Spot, a special place that has been scientifically identified as critical to the health of the ocean. Cindi Punihaole, Director of The Kohala Center's Kahalu'u Bay Education Center (KBEC) and Dr. Christine Zalewski, President of Dear Ocean and Manager of Silver Spiral Seas located at HOST Park, were named Hope Spot Champions.

The NELHA water quality lab provides monthly lab analyses to assist in monitoring Kahalu'u Bay through KBEC's ongoing water quality sampling, and Silver Spiral Seas is part of the Hawai'i Wai Ola team dedicated to measuring and sharing the status of Hawai'i Island's ocean water.

Kahalu'u, which means "diving place," has been subject to increasing challenges in recent years from coral trampling, sedimentation, sewage, sunscreen pollution, thermal stress related to climate change, and over 400,000 beachgoers annually. With the help of Mission Blue and the Hope Spot designation, Kahalu'u Bay will serve as a model for other small bays around the world to integrate modern technology, traditional knowledge, and community collaboration to care for and protect these special places.

NEW HOST PARK CLIENTS

2022 is starting strong for sustainability projects at HOST Park. Terraformation Inc., which helps scale forest restoration initiatives across 5 continents and is headquarted on the Island of Hawai'i was looking for a central location to coordinate their ridge to reef efforts including a desalination/reforestation demonstration site in Kohala, seed bank up mauka and reef rehabilitation project in partnership with Arizona State University led by Dr. Greg Asner. The project started occupying space at Gateway in January 2022. It includes the Gateway building and an acre of adjacent open space for reef work.

Other new climate focused projects at HOST Park include scientific observation and commercialization projects. The Royal Belgian Institute for Space Aeronomy (BIRA) has deployed innovative state of the art instrumentation to better understand the importance of iodine for stratospheric ozone loss. Iodine is 400 to 1000 times more effective than chlorine at destroying ozone and has been increasing by a factor of 3 since 1950.

Heimdal Inc is developing ocean-based direct-air-capture technology using brine waste water from desalination processes. Their technology mineralizes CO2 into carbonates to form sand while producing hydrogen. Heimdal performs lab work at HOST Park's research campus and also has a larger installation of a containerized system at a site further north on the Kohala coast.

Meanwhile, EcoHarvest LLC recently built a pilot facility at HOST Park's research campus to grow land based ornamental fish. They also obtained an approval in concept to expand to 6 acres at HOST Park.

To round things out, HOST Park has also welcomed a project by Pacific Filtration Systems to test a water membrane for seawater, wastewater and aquaculture effluent applications. Finally, we are providing a small ocean studio location to an artist who will be creating abstract expressionist art inspired by and incorporating the ocean (more about her art on page 2).

Above: Tree planting in Kohala curtesy of Terraformation Inc.

Above: Optical head of the MAX-DOAS instrument curtesy of BIRA

Above: Screen capture of Heimdal installation in Kohala from Heimdal website

Above: Algae/Larval rearing area in Research Campus curtesy of EcoHarvest

Above: Catherine di Napoli. Artist.

What is that Building?

The last newsletter mentioned the blessing for the Mats 4 convenience store and refueling station project at the entrance of the park. The steel frame and roof for that project are up! You will soon be able to grab coffee and pick up lunch made from NELHA products as you enter HOST park! EV refueling will also be available.

Above: Mats4 building steel

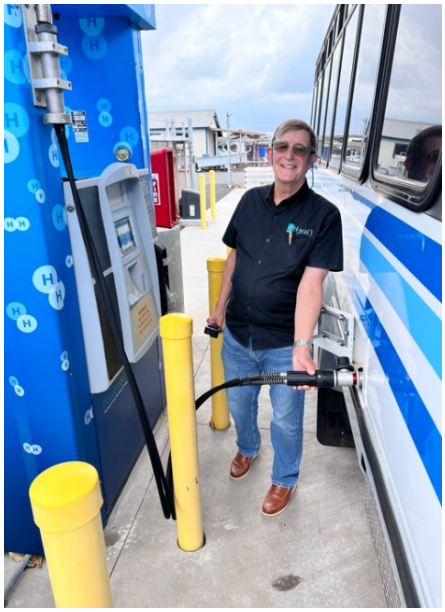
Tropical AgTech Conference

NELHA is proud to have supported the first Tropical AgTech Conference in Hilo June 22 and 23. The conference took place in Hilo and was organized by Jim Wyban, a HOST park old timer. The aim of the event was to help spur innovation and create solutions to urgent food system problems in the tropics. Our own Executive Director, Greg Barbour presented on similarities with the development of aquaculture sustainable tech. He also discovered his missed calling as stand up comedian!

HYDROGEN BUS ARRIVES

In an important milestone, UH Hawai'i Natural Energy Institute (HNEI) has received its first hydrogen fuel-cell powered bus. HNEI is donating this bus to the County transit system as an important first step to transition the Hele-On bus fleet to zero emissions by 2023 through the use of hydrogen and electric vehicles.

The bus is being prepared for service and will be fueled at HOST Park's HNEI 65 kg/day H2 station. The bus will be operated and maintained by Roberts Hawai'i until the new County of Hawaii base yard is completed in West Hawai'i in 2025. It is expected that the station will also provide hydrogen to two additional hydrogen fuel buses donated to the County by the Hawai'i Volcanoes National Park.

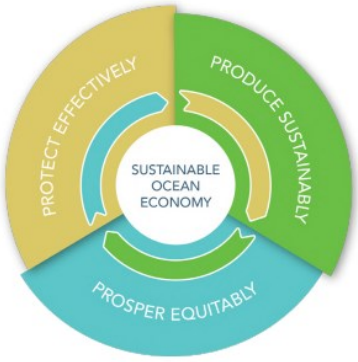


Left: Mitch Ewan, Hydrogen Project PI, fills the new H2 bus. Photo curtesy of HNEI.

RESTORATIVE AQUACULTURE OPPORTUNITIES

HATCH Innovation Services has produced a report for the Hawai'i Department of Agriculture which raises awareness of the environmental, social and economic benefits of a sustainable ocean economy and more specifically restorative aquaculture defined as seaweed and shellfish cultivation.

Hawai'i presents unique and competitive advantages for restorative ocean food production. This area provides opportunities for equitable prosperity to Hawai'i residents while assisting with ocean protection, climate mitigation and habitat restoration.



The full report is available online here.

Restorative aquaculture opportunity	ENVIRONMENTAL VALUE			SOCIAL VALUE			ECONOMICAL VALUE				Technological readiness (Existing scientific knowledge, proven cultivation and production systems)
	Water quality improvement	Climate change mitigation	Habitat provision / biodiversity	Cultural significance	Healthy food source	Alternative livelihood	Local market opportunities	Export opportunities	Green job opportunities	Indirect economic opportunities	
SEAWEED (LIMU)	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	MEDIUM	HIGH	LOW	LOW
BIVALVE SHELFISH	HIGH	MEDIUM	HIGH	HIGH	HIGH	HIGH	HIGH	LOW	MEDIUM	MEDIUM	MEDIUM

Graphics are from the above mentioned report , curtesy of HATCH Innovation Services

HAWAI'I AQUACULTURE COLLABORATIVE

The University of Hawai'i Sea Grant College Program and its Center for Sustainable Aquaculture and Coastal Resources have started facilitating a collaborative to engage the aquaculture industry with the aim to organize and leverage resources and strengthen aquaculture in Hawai'i. The activities have been possible in part through a NOAA grant. Progress and resources in the areas of increasing government support/ communication/marketing, workforce development, processing and feed, as well as technology and research can be found at the collaborative website.

Sea Grant is partnering with NELHA to facilitate Technology and Research brown bags on the 2nd Wednesday of each month at Noon staring July 13th, 2022. If you are not already receiving notices for the NELHA brown bag seminars, please reach out, and we will add you to the distribution list.

Finally, the collaborative is maintaining a list of aquaculture job opportunities. Over 20 job openings are currently listed here!

Blue Ocean Barns
Algae Quality Assurance Technician
Algae Processing Technician
Algae Technician – multiple positions!
Aquaculture Systems Technician
Sanitation Coordinator – FT
Sanitation Coordinator – PT
Senior Commercial Phycologist (Macroalgae)

Blue Ocean Mariculture
Accounts Receivable Specialist
Driver
Hatchery Technician
Offshore Production Diver – Farm Hand
Retail Sales Associate

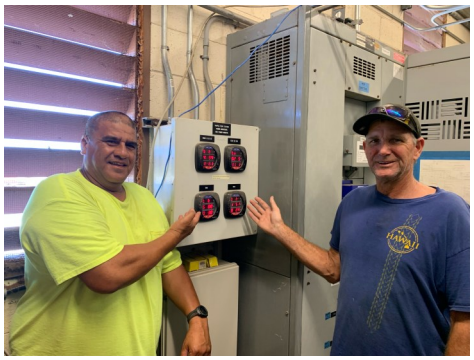
Cyanotech
Accounting Manager
Accounts Payable Specialist
Business Analyst and Project Manager
Customer Service Representative
Distribution Warehouse Specialist
Electrician/Maintenance Mechanic
Harvest Processor (day, swing, & grave shift)
In-house Construction Crew

A sampling of job postings on collaborative website as of 6/15/2022

"If your dreams do not scare you, they are not big enough." Ellen Johnson Sirleaf.

FROM THE DEEP - "WE GOT YOU NUMBERED"

Chad Debina, NELHA's General Laborer and Kevin Tapley, NELHA's Mechanic will be assigning every electrical, seawater and fresh water meter with a unique four-digit identifier that will incorporate the type of service, zone location, company identifier, and meter number for the 175 utility meters located at HOST Park. The project, which began in early July, has generated several lively discussions within the NELHA Ops. Dept. on best methods to tag the utility meters with a lasting identifier to various ways to divide HOST park into zones. Chad, who is the "we got you numbered" project lead, will also digitally document the utility meter locations with photos into a mapping program and NELHA meter reading instruction SOP. If you see a unique identifier on your utility meters in August, you'll now know why.



Above: Chad Debina (left) and Kevin Tapley (right) point at research campus electrical meters connected to the NELHA SCADA system.

IRONMAN 2022

After a three year hiatus due to the pandemic, the World IRONMAN Championship returns to Kona.

The race will take place on two separate dates this year, October 6th and 8th with over 5,000 athletes expected.

As in the past, racers must qualify to participate. And as in the past, the legendary course will include a portion of the marathon taking place at HOST Park.

Ironman officials are working with NELHA staff to minimize disturbances to park clients and operations. Stay tuned for a brown bag seminar event to bring race officials to the park to present plans and discuss concerns.

New Lunch Truck

Lunch time! Big Island Abalone now has a food truck on their property offering abalone tasting items which also make a great lunch right here in the park!

Above: Abalone Poke Bowl and Butter Garlic Abalone

Are you enjoying this newsletter?

Previous issues of The Pipeline are available on our website:

- Summer 2019
- Winter 2019/2020
- Summer 2020
- Winter 2020/2021
- Summer 2021
- Winter 2021/2022

AQUATIC PHOTOGRAPHY OFF KEAHOLE POINT

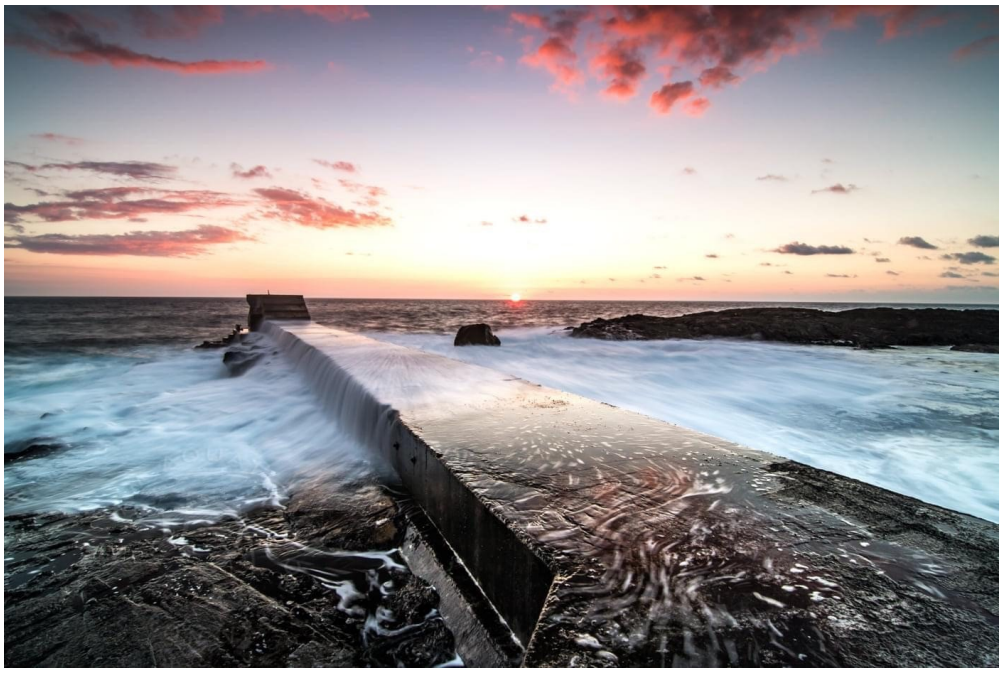
Did you know that great whites occasionally visit Keahole Point? Deron Verbeck ran into one recently and captured it on film (see photo on right).

Deron is an award winning photographer and record holding free diver based on the Island of Hawaii. He combines his two passions by specializing in underwater photography which he shoots on a single breath of air and only in ambient light.

His photos are unique and you can view some of them on his website iamaquatic.com.

Deron Verbeck has also captured some beautifully serene pictures of Keahole Point during large surf (see photo below).

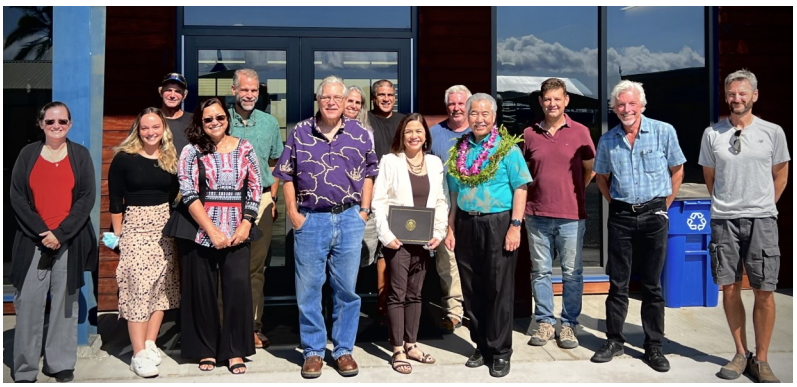
Above: Great White Shark—Deron Verbeck – Iamaquatic.com

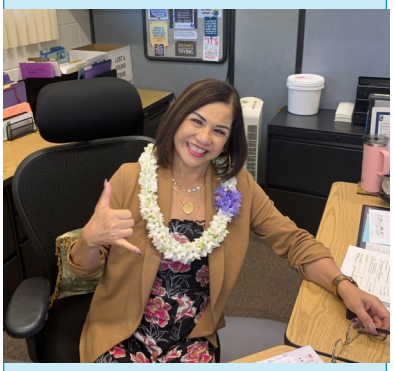


Above: Keahole Point Sunset—Deron Verbeck – Iamaquatic.com

GEORGIE RETIREMENT AND GOVERNOR VISIT

Until her recent retirement, Georgie Espinueva was often the first NELHA staff person many met upon arrival at our offices. Georgie retired on June 30 after 30.5 years of service. But until then, she kept everyone in line but did so with a warm smile! Governor Ige presented her with her award for 30 years of service and joined us in wishing her the best for the next chapter in her life.





Above: Georgie on her last day!

Left: Governor Ige with full NELHA staff during the June 24 visit

"Inspiration usually comes during work rather than before it." Madeleine L.Engle.

STAFF UPDATES—THE GREAT RESHUFFLE

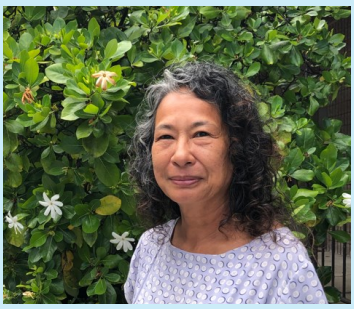
NELHA was not immune to the Great Resignation (also know as the Great Reshuffle) of 2022!

We have three new employees to present to you: Steve Midgley, Brian Berg and Faustine Edge.

Steve is an experienced electrician with extensive experience with the County Department of Water Supply. Brian also has an electrical background as well as electronics and SCADA system experience from the oil fields in northern Alaska. Both have joined the NELHA operations team and are quickly coming up to speed. We are thrilled to have them join us.

Speaking of the operations team, we have reorganized for more efficient workflow. The operations and laboratory activities have been combined and will be overseen by Keith Olson, Operations and Science Officer. Operations Supervisor, Dean Towle has taken on additional responsibilities to facilitate this reorganization and Pam Madden has been promoted to Laboratory Manager. We believe the transition which took place 3 months ago has been seamless thanks to these hard working folks. If anything, you should start noticing improvements with more to come.

Finally, Faustine Edge is joining us just this mid-month as senior administrative assistant. Please help us welcome the new members of the NELHA team!



Photos of new staff. From the top, Brian, Steve, and Faustine

UPDATE ON US DOE AMERICAN MADE CHALLENGE

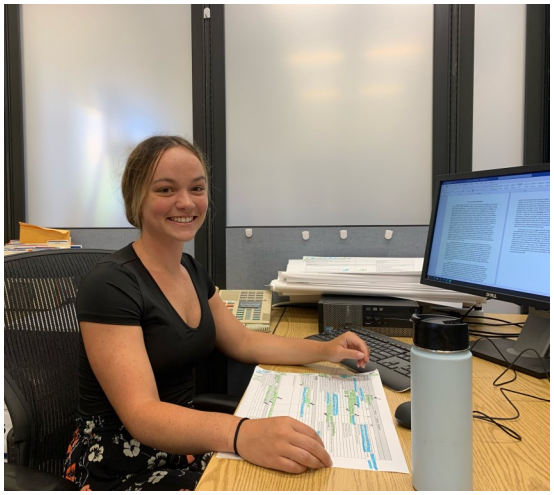
The AMC has issued Solar Prize Round 6, a $4.1 million prize competition designed to energize US solar innovation. $4.1 M is available for this prize which uses the same 3 stage format with increasing prizes. Submission deadline for the first stage is October 6, 2022.

If you have a great idea for a solar project, don't hesitate to reach out as we may be able to provide some guidance.

One of the companies supported by NELHA , RCAM Technologies has won 2 stages of the Round 5 Solar prize and is currently competing as a finalist for the last stage. RCAM is developing 3-D printed concrete anchors for floating solar panel installations which can also be used for offshore aquaculture system.

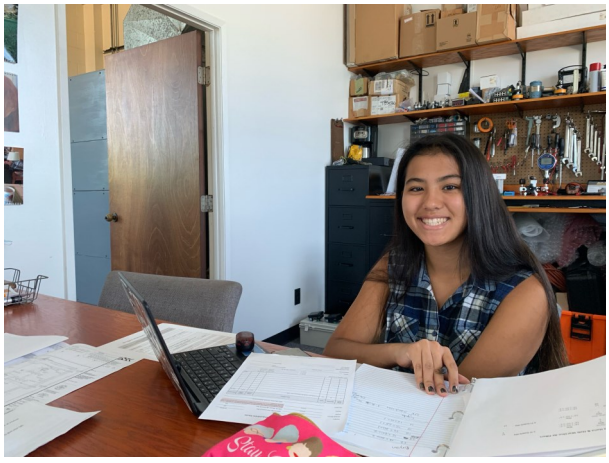
2022 SUMMER INTERNSHIPS AT NELHA

Infrastructure Risk Assessment Analysis for NELHA's Seawater Pumping System:



Jenna, A Chemical Engineering sophomore Student at Washington University in St. Louis is participating in the Akamai Workforce Initiative program and is interning at NELHA this summer for 7 weeks. The purpose of Jenna's project is to identify critical vulnerabilities within the NELHA pumping and distribution infrastructure. Through collaboration with the NELHA operations team a list of vulnerabilities was created pertaining to the pumping network. The identified vulnerabilities were then investigated further, and action items/workarounds were created that would help the pumping system be more prepared. The final products of this project will include a 4x4 risk matrix, a written report giving a suggested five-year plan for NELHA, and a table consisting of the vulnerabilities, the potential failures each vulnerability possesses, a frequency score, a severity score, potential solutions, and cost and time estimates for each solution.

Critical Maintenance Calendar:



Lilly, a WHEA high school student, is participating in a full year Hawaiian STEM Program called Project Hokulani. Part of the program is to gain STEM work experience in a professional environment during a two-week summer internship. Lilly is gathering maintenance frequency information for critical infrastructure, utilizing spreadsheets to document parts needed and programing NELHA's electronic calendar to notify Operations staff when to order parts and schedule the services.

BLUE OCEAN BARNS MAKES IMPRESSIVE PROGRESS

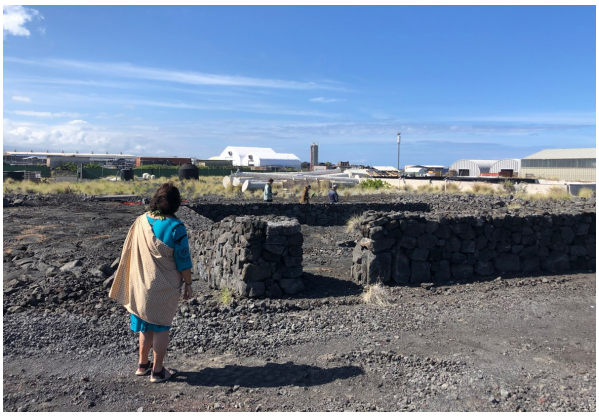
It has been an exciting year so far for Blue Ocean Barns, an Elemental Excelerator company, which joined the HOST Park ecosystem in 2020. Their amazing progress includes a California Department of Food and Agriculture authorization to use and sell their first product, Brominata, a cattle feed supplement that assists in drastically reducing cattle methane production from their digestive systems, after undergoing a comprehensive safety and efficacy review.

Above: Blue ocean Barns facilities at HOST Park. Curtesy of Blue ocean Barns.

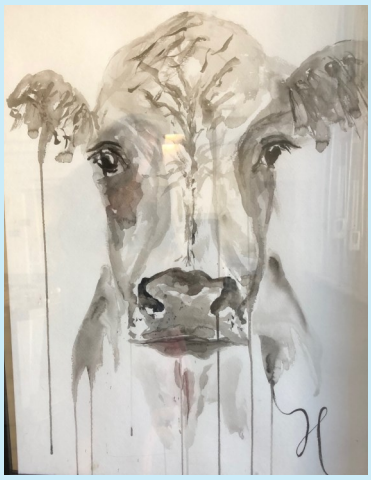
The regulatory approval has paved the way to partnering with several sustainability and climate minded dairy customers such as Ben & Jerry's, Straus Family Creamery, and Clover Sonoma. Blue Ocean Barns' trade-marked product, Brominata, is made from a local Hawaiian limu species, *Asparagopsis taxiformis* which is organically grown.

On May 16, the company closed a $20 Million Series A funding round which will allow them to rapidly expand their operations at HOST Park. In the summer of 2021, Blue Ocean Barns entered into a long term lease on 10 acres and increased that footprint to 14 acres this past June.

A blessing took place on July 19 at the new 4 acre space. This space will allow a rapid ramp up as it is graded and improved.



Above: Kahu Kahu Malani DeAguiar blesses Blue Ocean Barns 4 acre expansion including an on-site burial



Above: Young artist portrayal of a methane producing cow. Curtesy of Blue Ocean Barns.

OUR FAVORITE RECENT QUOTE FROM BLUE OCEAN BARNS

When discussing the origin story of Blue Ocean Barns, Joan Salwen, CEO, explains how the company was stared at Stanford University in California but when it was time to scale up, they "**started to look at Hawaii because California doesn't have anything like NELHA, a ready-made infrastructure that is perfectly tailored to people using ocean water for business, academic or research purposes**."

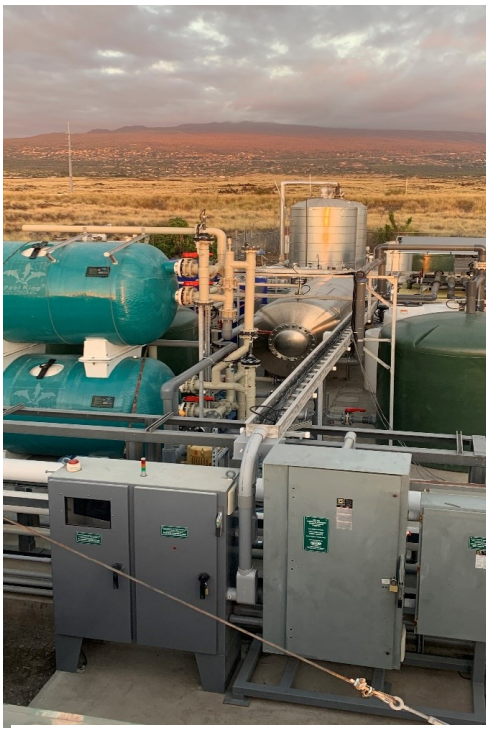
West Hawaii Today article July 15, 2022

ASME Energy Sustainability Outstanding Student Paper Award

Yogesh Manoharan, PhD student at the University of Tennessee at Memphis, won one of two outstanding student paper awards at the July 11-13, 2022 American Society of Mechanical Engineers Conference on Energy Sustainability. His paper was co-authored with his advisor Alex Headley and Keith Olson from NELHA and the work title was "Optimization of Energy Storage Systems and Demand Side Management to Maximize the Potential Savings at NELHA Hawaii".

PROGRESS MADE ON DOE DESAL PROJECT

Two important milestones have been reached by the Forward Osmosis project funded by the Department of Energy Solar Energies Technology Office. The 2MW solar thermal array is back online at the NELHA site and is producing heat for a Forward Osmosis system. Trevis Systems Inc. has installed the Forward Osmosis on the site and is in the process of commissioning it to start producing fresh water for a HOST park aquaculture client. More information on Trevi Forward Osmosis technology can be found here.



Above: Trevis Systems Forward Osmosis Installation

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NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY (NELHA)

NELHA administers the world's premier energy and ocean technology park. This unique master-permitted park is located on 870 acres of prime coastal property in Kailua-Kona Hawaii and offers R&D support facilities for the development of renewable energy and ocean technologies through demonstration projects that utilize the unique resources found at the park. NELHA continually brings ashore high quality, pristine supplies of both warm surface and cold deep seawater 24 hours a day which allows for various tests to take place with intent to reap economic potentials from the dual temperature seawater delivery system and high solar insolation. Tenants located in HOST Park work at the pre-commercial, commercial, research and educational levels. It is the largest diversified economic development project in the State and is solely focused on developing green economic projects.