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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Office of Conservation and Coastal Lands
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:MC

CDUA: HA-3720

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JUL 08 2014

JUN 25 2014

MEMORANDUM

To: Jessica Wooley, Director
Office of Environmental Quality Control

From: Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

Subject: Draft Environmental Assessment (DEA) for Conservation District Use Application (CDUA) HA-3720 for the expansion of the existing Blue Ocean mariculture facility offshore of Unualoha Point, Kalaoa, North Kona, Hawai`i, TMK (3) 7-4-043:000

The Department of Land and Natural Resources has reviewed the draft EA for the subject project. Please publish notice of availability for this project in the July 8, 2014 issue of the *Environmental Notice*. We have enclosed one hard copy of the draft EA document, as well as a disc with the Conservation District Use Application, draft EA, OEQC Bulletin Publication Form and Executive Summary. We will follow this with an electronic copy of the applicant's project summary and the OEQC Bulletin Publication Form.

Please contact Michael Cain of our Office of Conservation and Coastal Lands staff at 587-0048 should you have any questions.

Attachments: *Draft EA, OEQC Pub Form, 1 disc*

RECEIVED
'14 JUN 25 P4:19
OFC. OF ENVIRONMENTAL QUALITY CONTROL

APPLICANT ACTIONS
SECTION 343-5(C), HRS
PUBLICATION FORM (JANUARY 2013 REVISION)

Project Name: Capacity increase at Blue Ocean mariculture facility
Island: Hawaii
District: North Kona
TMK: makai of (3) 7-4-043:000 (submerged lands)
Permits: DLNR Conservation District Use Permit; Army Corps of Engineers Section 10 Permit

Approving Agency:
Office of Conservation and Coastal Lands
Hawaii State DLNR
PO Box 621
Honolulu, HI 96809
Michael Cain: 808-587-0048

Applicant:
Blue Ocean Mariculture LLC
74-429 Kealakehe Parkway
Kailua-Kona, HI 96740
Jennica Lowell, Research Manager; 808-557-2233; jennica.lowell@bofish.com

Consultant:
same as applicant

Status (check one only):

_X_DEA-AFNSI — Submit the approving agency notice of determination/transmittal on agency letterhead, a hard copy of DEA, a completed OEQC publication form, along with an electronic word processing summary and a PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov; a 30-day comment period ensues upon publication in the periodic bulletin.

__FEA-FONSI — Submit the approving agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and a PDF copy (send both summary and PDF to oeqchawaii@doh.hawaii.gov; no comment period ensues upon publication in the periodic bulletin.

__FEA-EISPN — Submit the approving agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov; a 30-day consultation period ensues upon publication in the periodic bulletin.

__Act 172-12 EISPN — Submit the approving agency notice of determination on agency letterhead, an OEQC publication form, and an electronic word processing summary (you may send the summary to oeqchawaii@doh.hawaii.gov. NO environmental assessment is required and a 30-day consultation period upon publication in the periodic bulletin.

__DEIS — The applicant simultaneously transmits to both the OEQC and the approving agency, a hard copy of the DEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the DEIS (you may send both the summary and PDF to oeqc@doh.hawaii.gov); a 45-day comment period ensues upon publication in the periodic bulletin.

__FEIS — The applicant simultaneously transmits to both the OEQC and the approving agency, a hard copy of the FEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the FEIS (you may send both the summary and PDF to oeqc@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.

__ Section 11-200-23 Determination — The approving agency simultaneous transmits its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS to both OEQC and the applicant. No comment period ensues upon publication in the periodic bulletin.

__Statutory hammer Acceptance — The approving agency simultaneously transmits its notice to both the applicant and the OEQC that it failed to timely make a determination on the acceptance or nonacceptance of the applicant's FEIS under Section 343-5(c), HRS, and that the applicant's FEIS is deemed accepted as a matter of law.

__Section 11-200-27 Determination — The approving agency simultaneously transmits its notice to both the applicant and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is not required. No EA is required and no comment period ensues upon publication in the periodic bulletin.

__Withdrawal (explain)

Summary:

Blue Ocean proposes to expand the production capacity of their existing mariculture facility by increasing the maximum growing volume from 24,000 m3 to 64,000 m3, increasing the number of allowable pens from five to eight, and increasing the maximum size of individual pens from 7000 m3 to 8000 m3. The proposal will require a small modification to the existing mooring grid.

The existing permit allows for the cultivation of kāhala (almaco jack, *Seriola rivoliana* and amberjack, *S. dumerili*), moi (Pacific threadfin, *Polydactylus sexifilis*), mahi mahi (*Coryphaena hippurus*) and ulua (giant trevally, *Caranx ignobilis*). The only species Kona Blue currently cultures in the ocean pens is *S. rivoliana*.

No expansion of the lease area is being proposed, and no change in the types of net pens is being proposed.

The applicant states that the extensive monitoring they have conducted over the past eight years of water quality and benthic parameters has indicated that the facility has had no significant environmental impact. Per the tests that the applicant has conducted on water quality parameters and benthic parameters, the proposed action is well within the nutrient assimilation capacities of the local water column and benthos.

Draft Environmental Assessment

for a

Production Capacity Increase at the Existing Open Ocean Mariculture Site off Unualoha Point, Hawaii

PREPARED FOR:

Department of Land & Natural Resources
Office of Conservation and Coastal Lands

U.S. Army Corps of Engineers

PREPARED BY:

Blue Ocean Mariculture LLC
74-429 Kealakehe Parkway
Kailua-Kona, HI 96740
(808) 331 8222

June 5, 2014

PROJECT SUMMARY

Project Name:	Production Capacity Increase at the Existing Open Ocean Mariculture Site off Unualoha Point, Hawaii
Proposed Action:	Increase the production capacity of the existing open ocean mariculture site operated by Blue Ocean Mariculture LLC through the following modifications to CDUP HA-3497: • Increase the net pen volume limit from 7,000 m^3 to 8,000 m^3 • Increase the maximum number of allowed net pens from 5 to 8 • Increase the total site volume limit from 24,000 m^3 to 64,000 m^3 No other changes to CDUP HA-3497 are proposed, and no modifications to other farm site permits are proposed.
Applicant:	Blue Ocean Mariculture LLC 74-429 Kealakehe Parkway Kailua-Kona, HI 96740
Applicant Contact:	Jennica Lowell, Research Manager (808) 557 2233 jennica.lowell@bofish.com
Approving Agencies:	Department of Land and Natural Resources (DLNR) U.S. Army Corps of Engineers (USACE)
Project Location:	Offshore the West coast of the Island of Hawaii, approximately 1 km north of Keahole Point and 600 m west of Unualoha Point
Ahapua'a:	Kalaoa 1st – 4th
Tax Map Key:	7-3-43 Seaward
State Land District:	North Kona, County of Hawaii
Land Owner:	State of Hawaii
Permits Required:	Conservation District Use Permit (CDUP) Section 10 Permit (USACE)
Expected Determination:	Finding of No Significant Impact (FONSI)

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List of Acronyms and Abbreviations

AADAP	Aquatic Animal Drug Approval Program
ADP	Aquaculture Development Program, a division of DOA
BMP	Benthic Monitoring Program
CDUP	Conservation District Use Permit
CWB	Clean Water Branch, a division of the State Department of Health
DAR	Division of Aquatic Resources, a division of DLNR
DEA	Draft Environmental Assessment
DLNR	Department of Land and Natural Resources
DOA	Department of Agriculture
DOBOR	Division of Boating and Ocean Recreation, a division of DLNR
DOH	Department of Health
EPA	Environmental Protection Agency
FCR	Feed Conversion Ratio
FEA	Final Environmental Assessment
FDA	Federal Drug Administration
FONSI	Finding of No Significant Impact
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HRS	Hawaii Revised Statutes
INAD	Investigational New Animal Drug
KBWF	Kona Blue Water Farms
KOA	Kona International Airport
MAB	Maximum Allowed Biomass
NELHA	Natural Energy Laboratory of Hawaii Authority
NMFS	National Marine Fisheries Service, a division of NOAA
NOAA	National Oceanographic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OCCL	Office of Conservation and Coastal Lands
UH	University of Hawaii
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish & Wildlife Service
WET	Whole Effluent Toxicity
WHAP	West Hawaii Aquarium Project
WQMP	Water Quality Management Program
ZOM	Zone of Mixing

1 INTRODUCTION

Blue Ocean Mariculture LLC (Blue Ocean) proposes to increase the production capacity of its existing open ocean mariculture site off Unualoha Point, Hawaii (the Farm Site). The purpose of this Draft Environmental Assessment (DEA) is to provide information to the approving agencies (DLNR, USACE) in support of their assessment of the proposed action. This DEA was prepared pursuant to the Hawaii Environmental Policy Act (HEPA), including HRS Chapter 343 and HAR 11-200.

1.1 Background

The Farm Site has been in continuous operation for eight years at its existing location, just offshore of the Kona International Airport (KOA). It was one of the first farms developed in support of Hawaii's goals to establish an environmentally sustainable open ocean aquaculture industry. Relative to more established mariculture businesses around the world, the Farm Site was initially designed to operate at a small, prototype level of production as a first step for Hawaii's mariculture industry. Much has been accomplished and proven in recent years:

- Development of hatchery protocols for repeatable, scale production of local species such as Kahala (*Seriola rivoliana*) and Moi (*Polydactylus sexfilis*).
- Development of technologies and techniques for safe, efficient offshore farm operations in the strong ocean current conditions found off Keahole Point.
- Use of a comprehensive water quality and benthic monitoring program to confirm no significant environmental impacts from the Farm Site.
- Strong regulatory oversight by DLNR (OCCL) through detailed Management and Reporting Plans and a transparent working relationship with Blue Ocean.

Since its inception in 2005, the Farm Site has produced over 2,500 metric tons of harvested fish. Farm Site operators have successfully sold this fish as a premium, Hawaii-branded product to markets around Hawaii, throughout the continental U.S., Australia and Europe. In 2013, the Farm Site operated at its maximum permitted capacity of 24,000 m^3 growing volume, producing approximately 450 metric tons of Hawaiian Kampachi™ (*Seriola rivoliana*). Regular water quality testing, benthic monitoring and marine mammal monitoring conducted under the farm's CDUP and NPDES permits have identified no significant impacts to the environment. A key next step towards a viable mariculture industry in Hawaii is to expand the production capacity of the Farm Site.

The Proposed Action in this DEA is to increase the allowed growout capacity of the Farm Site, which will enable an increase in whole fish production from 450 T to approximately 1,100 T per year by 2017. No other changes are proposed, including no changes to the Farm Site's mariculture lease location or dimensions, no changes to permitted fish species, and no changes to the environmental monitoring program, which

is already designed for the new level of production. The Proposed Action has several economic and social benefits to the State of Hawaii, all of which can be achieved while continuing to protect the State's natural and cultural resources. The Proposed Action will:

- Support employment growth and economic development in West Hawaii.
- Demonstrate Hawaii's ability to increase utilization of its marine resources in an environmentally safe way.
- Increase State of Hawaii revenue by growing lease, permit and consumption fees, and income taxes.
- Advance Hawaii towards its stated food security goals by increasing the amount of dependably grown seafood in State waters.
- Advance Hawaii towards its economic diversity goals by increasing exports of locally produced seafood.
- Keep Hawaii at the forefront of open ocean mariculture skills and technology in the U.S. and around the world.

Close monitoring of potential environmental impacts has been a mandatory requirement since the Farm Site's inception in 2005. Blue Ocean, along with multiple State and Federal agencies, has collected a significant amount of data on the Farm Site's potential impacts to local water quality, the benthos, and marine mammals. All of the information collected to-date indicates that farm activities have not resulted in a detrimental impact on the environment. This comprehensive environmental monitoring program will continue under the Proposed Action.

A Finding of No Significant Impact (FONSI) is anticipated based on the information in this DEA. In short, the production capacity of the Farm Site will remain among the smallest in the industry, and the Farm Site hydrology and bottom composition enable the local marine environment to safely carry more production than proposed.

1.2 Regulatory Oversight

Blue Ocean's mariculture business utilizes State of Hawaii infrastructure and natural resources, and is therefore subject to significant regulatory oversight. A strong public-private partnership is required for the company's success, and the success of the Hawaii mariculture industry generally. The Blue Ocean team works closely with DLNR, NOAA and other regulatory groups to maintain transparency on farm operations and support government research into open ocean mariculture. Major interactions include:

- DLNR, Office of Conservation and Coastal Lands (OCCL). OCCL is Blue Ocean's primary point of contact with the State. OCCL sets and enforces key Farm Site operating guidelines and limits regarding species, production and

wildlife interactions under a Conservation District Use Permit (CDUP). Blue Ocean meets regularly with OCCL to review company status and plans.

- U.S. Army Corps of Engineers (UASCE). USACE authorizes and monitors the deployment of Farm Site infrastructure in the navigable waters of the U.S. under a Section 10 Permit.
- Hawaii DOH, Clean Water Branch (CWB). CWB sets water quality and benthic monitoring protocols for the Farm Site under a National Pollution Discharge Elimination System (NPDES) permit, and reviews test results for adverse impacts on the environment.
- U.S. Fish & Wildlife Service (USFWS), Aquatic Animal Drug Approval Partnership Program (AADAP). USFWS monitors and helps set Blue Ocean's use of FDA-approved topical and in-feed treatments for fish such as hydrogen peroxide and antibiotics. All treatments are managed and reported under USFWS's Investigative New Animal Drug (INAD) program.
- Hawaii DOA, Aquaculture Development Program (ADP). ADP is a primary point of industry contact with the State of Hawaii and works to develop the offshore aquaculture industry in the State.
- DLNR, Division of Aquatic Resources (DAR). DAR is a key point of contact for Blue Ocean regarding wildlife and benthic interactions. DAR receives and monitors CDUP and environmental reports related to the Farm Site.
- DLNR (Land Board). The Land Board is responsible for the State of Hawaii submerged lands lease on which the Farm Site is located.
- U.S. Coast Guard (USCG). Blue Ocean interacts with USCG on issues related to vessel navigation in and around the Farm Site.
- NOAA (Protected Resources). NOAA's Protected Resources office receives and monitors Farm Site reporting on marine mammal interactions.
- NOAA (Aquaculture Office). Blue Ocean communicates with NOAA's Aquaculture Office on issues related to national aquaculture policy.
- DLNR (DOBOR). Blue Ocean is closely tied to DOBOR through harbor leases for vessel and onshore workspace.
- NELHA. Blue Ocean's onshore hatchery facility is located in the NELHA aquaculture park near the Kona International Airport (KOA).

1.3 Consistency with State Laws

The Proposed Action is consistent with State of Hawaii laws, policies and plans related to marine resource conservation and use, economic development and diversification, and sustainable food production and self-sufficiency.

- State Constitution, Article XI, Section 6 (Marine Resources). On the State's power to manage and control the marine, seabed and other resources located within the boundaries of the State, including archipelagic waters of the State.
- State Plan Law, HRS 226, Section (7) (b) (12). On State policy to "expand Hawaii's agricultural base by promoting growth and development of flowers, …, food crops, aquaculture, and other potential enterprises."
- State Plan Law, HRS 226, Section (7) (b) (13). On State policy to "promote economically competitive activities that increase Hawaii's agricultural self-sufficiency."
- State Plan Law, HRS 226, Section (103) (a) (8). On a State priority guideline to develop and attract industries which promise long-term growth, take advantage of Hawaii's unique location and resources, will have minimal adverse effects on Hawaii's environment, will hire and train Hawaii's people, and will provide reasonable income and steady employment.
- State Environmental Policy, HRS 344, Section (3) (1). On the State's policy to "… safeguard the State's unique natural environmental characteristics in a manner which will foster and promote the general welfare, create and maintain conditions under which humanity and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of the people of Hawaii."
- State Environmental Policy, HRS 344, Section (4) (5) (F). On guidance to "promote and foster the aquaculture industry of the State; and preserve and conserve aquacultural lands."
- Coastal Zone Management, HRS 205A, Section (2) (c) (5) (C). On State policy to "Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas…"
- Coastal Zone Management, HRS 205A, Section (2) (c) (10) (C, E). On State policy to "Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial; and encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources."
- Hawaii Ocean Resources Management Plan, July 2013. Management Priority 6 Ocean Economy, Goal A: "Develop aquaculture standards, based on current scientific data, to support culturally, environmentally, and economically sustainable operations which increase production for local consumption."
- Hawaii 2050 Sustainability Plan, January 2008. Priority Action 7 Intermediate steps for the year 2020: "Increase production and consumption of local foods and products, particularly agriculture."

2 PROPOSED ACTION

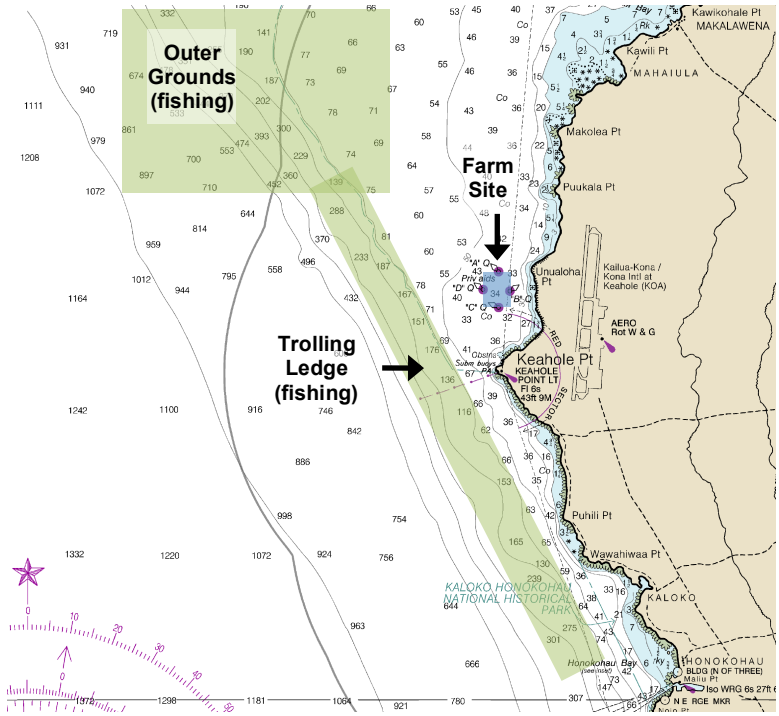
Blue Ocean proposes to expand the growing volume capacity of its existing mariculture operation from the current CDUP limit of 24,000 m^3 to a new CDUP limit of 64,000 m^3. In addition to the increase in overall capacity, a corresponding change in the maximum number of allowed net pens from 5 to 8, and in the maximum size of individual net pens from 7,000 m^3 to 8,000 m^3 is proposed. A small modification (extension) of the existing mooring grid system is required to implement the capacity changes. With these changes, the farm will have the capacity to produce approximately 1,100 MT of harvested whole fish per year by 2017.

No other changes to the regulatory structure of the Farm Site are proposed, including no changes to the current mariculture lease area location or size (90 acres), and no changes to existing NPDES (EPA, CWB) permit limits on water quality.

2.1 Technical Characteristics

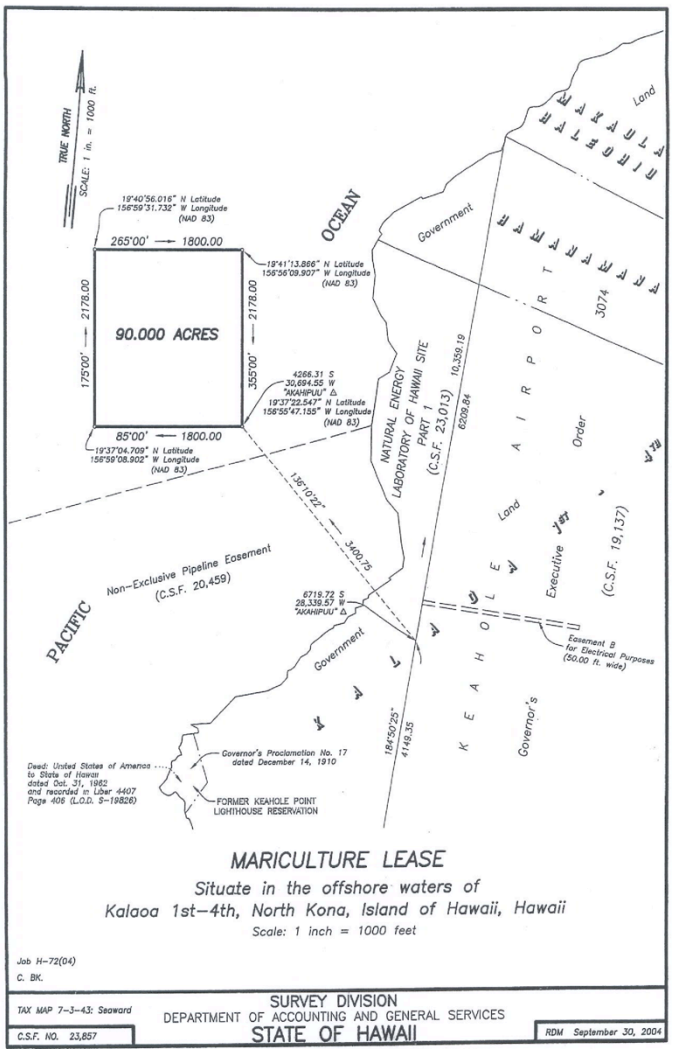
The existing Farm Site is located approximately 1 km North of Keahole Point and 600 meters off Unualoha Point (Figure 1). The Farm Site is situated in the offshore waters of Kalaoa 1st – 4th, West of KOA. No changes are proposed to the location of the Farm Site.

Figure 1: Farm Site Location



The Farm Site operates on a 90 acre submerged lands mariculture lease with the State of Hawaii (Figure 2). No changes are proposed to the dimensions of the Mariculture Lease or its terms.

Figure 2: Mariculture Lease



Species & Stocking

Blue Ocean is currently permitted to grow several species of marine finfish at the Farm Site (Table 1). Kahala (*Seriola rivoliana*) is the primary species for the business, and Blue Ocean is currently producing small amounts of Moi (*Polydactylus sexfilis*) at the Farm Site. No changes in permitted species are proposed.

Juvenile fish (fingerlings) are produced in Blue Ocean's onshore hatchery facility located in the NELHA aquaculture park. Fingerlings are transported live to the Farm Site on Blue Ocean vessels and released into the net pens for growout. Approximately 60,000 to 120,000 fingerlings are stocked with each new group of fish (a Cohort) depending on

the size of net pen used. The transfer takes place over a 1-2 week period. Blue Ocean is developing new techniques to improve the speed and efficiency of stocking fish offshore, including the use of larger transportation tanks onshore and onboard its vessels. Under the Proposed Action, the size of each Cohort would remain at about 120,000 fish, and the number of Cohorts stocked each year would increase from approximately three to six.

Table 1: Permitted Species

Species	Common, Trade Names	Status
Seriola rivoliana	Kahala, Hawaiian Kampachi™	In Production
Polydactylus sexfilis	Moi, Hawaiian Threadfin™	In Production
Seriola dumerili	Kahala, Amberjack	No Plans for Production
Coryphaena hippurus	Mahi Mahi	No Plans for Production
Caranx ignobilis	Ulua, Giant Trevally	No Plans for Production

Net Pens & Moorings

The Farm Site is currently permitted to operate three net pen designs: the SeaStation™ 3100 FLIP, the SeaStation™ 7000 DR and a standard HDPE surface pen. Blue Ocean has successfully produced fish in all three net pen types.

The submersible SeaStation™ 3100 FLIP encloses 3,100 m^3 of growing volume using Dyneema™ netting connected to a central spar and single, mid-spar rim (Figure 3). The net pen is moored inside a mooring array grid cell and is capable of inverting by filling a sequence of air chambers in the spar. This inversion maneuver (flipping) allows either end of the net pen to be surfaced and the fouling on the net to be desiccated in sunlight for ease of cleaning.

The SeaStation™ 7000 DR encloses 7,000 m^3 around a central spar using an upper and lower rim (Figure 4). This net pen does not invert, but uses a polyester monofilament netting material that reduces fouling buildup, making it easier to clean and helping to reduce predation. Although 100% of the netting is typically submerged, the SeaStation™ 7000 DR has a permanent surface buoy that allows easy access to the net pen and serves as a platform for electronic communications (e.g., live video of fish behavior transmitted to vessels or shore facilities).

Figure 3: SeaStation™ 3100 FLIP

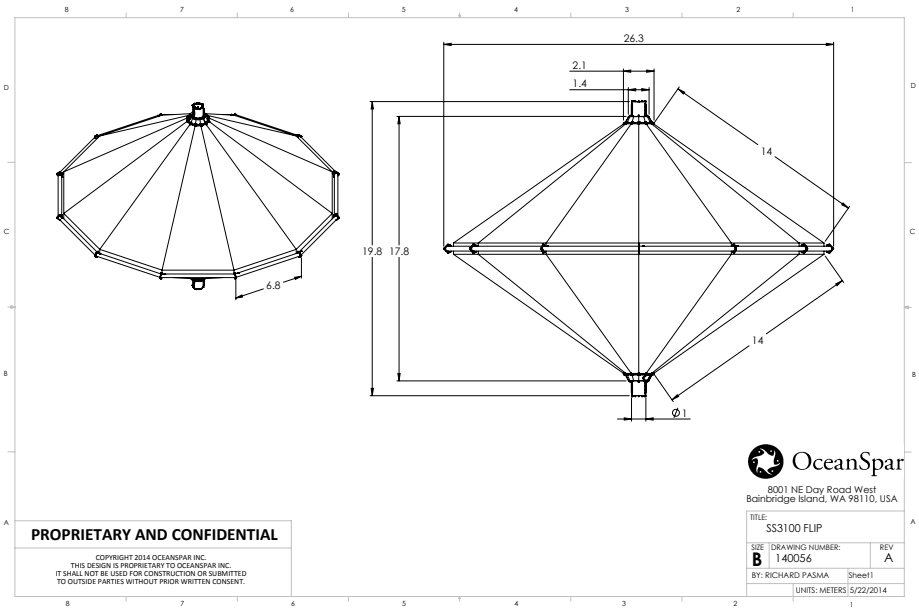
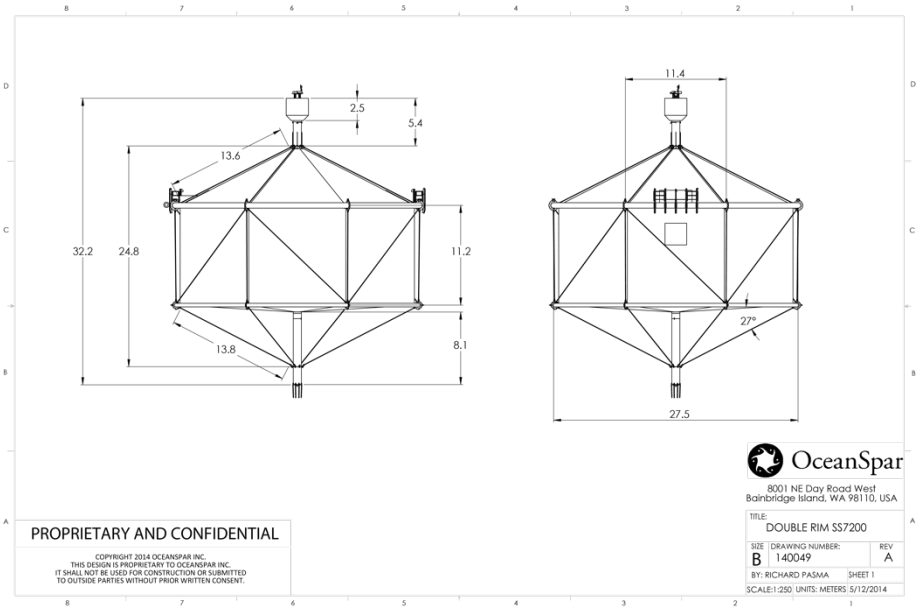


Figure 4: SeaStation™ 7000 DR (Double Rim)



In addition to the submersible SeaStation™ net pens, the Farm Site has successfully operated HDPE surface net pens, including a 7,000 m^3 surface pen in 2009-2010 (Figure 5). HDPE surface pens consist of 2-3 concentric HDPE "rings" at the surface from which the netting is hung. Netting material is the same polyester monofilament used on the SeaStation™ 7000 DR, which helps reduce biofouling and predation. Moorings for the HDPE surface pens are similar to those of the SeaStations, with surface rings bridled to the corners of cells in the mooring grid array.

Figure 5: HDPE Surface Net Pen

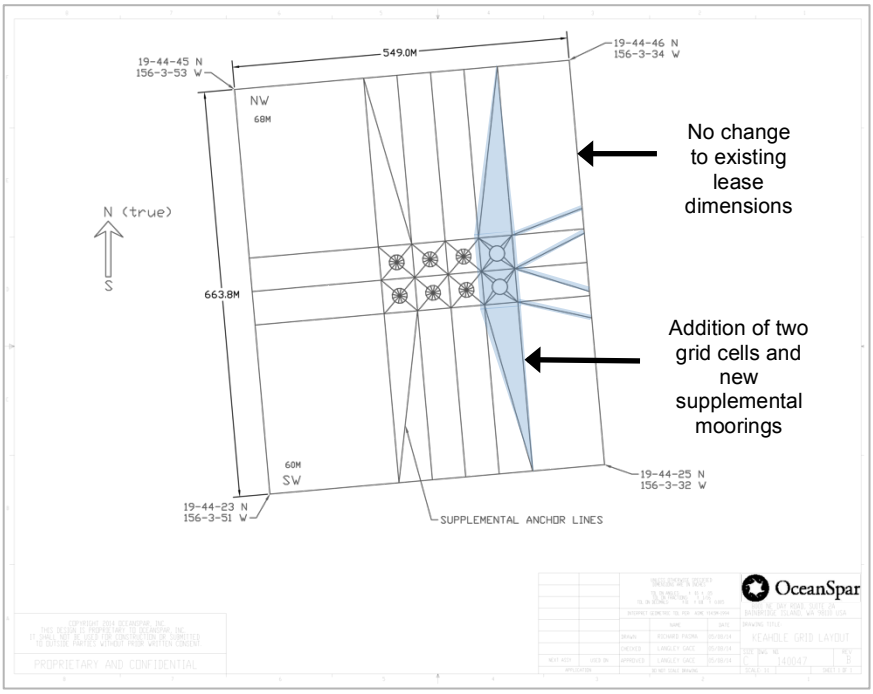
No changes are proposed to the types of net pens permitted at the Farm Site, but the Proposed Action calls for an increase in the maximum net pen volume from 7,000 m^3 to 8,000 m^3. This proposed change in maximum net pen size is consistent with the grid cell size and holding power of the existing mooring array, and better utilizes the existing mooring infrastructure.

The proposed increase in the maximum number of net pens from 5 to 8 (when combined with the increase in maximum net pen size) will provide much needed flexibility to meet customer demands and manage costs. Cohorts are not comingled inside a net pen, so a small number of large net pens (3-4 in the current deployment) forces an extended harvest period to maintain continuous annual production. This situation makes it difficult for the Company to respond to customer preferences for multiple species and consistent fish harvest sizes, and it greatly reduces utilization of the net pens and hatchery facility. On the other hand, a large number of small net pens increase the cost of operations such as delivering feed and managing ectoparasites. Many of the fixed costs of conducting these operations are tied to the number of net pens. Also, a major revision and expansion of existing mooring system would be required to accommodate more than eight net pens. Overall, the flexibility to deploy net pens of various sizes (up to 8,000 m^3) in greater numbers (up to 8) will enhance Blue Ocean's ability to meet customer demands and allow it to reduce operating costs per T of biomass.

The Proposed Action calls for minor modifications to the existing mooring infrastructure to accommodate the maximum 8 net pens. Two new cells will be added to the East end of the existing 6-cell array, for a total of 8 cells (Figure 6). The extension and all associated anchors will remain inside the existing 90-acre mariculture lease footprint. The Farm Site previously held 8 net pen mooring cells (2008-2010), with two cells moored independently of the main grid. Under the Proposed Action, the Farm Site

will again consist of 8 net pen cells, but with fewer anchor lines and better integration with the existing mooring solution.

Figure 6: Modified Mooring Array (8 Cells)



No changes to the mooring system materials are proposed. New anchor legs will consist of 54 mm, 12 plait nylon line and 41 mm Dilok chain connected to 2.5 T drag embedment anchors, similar to existing anchor legs. The mooring system currently contains 18 anchor legs. Under the Proposed Action, two anchor legs will be moved approximately 50 meters and six new anchor legs will be deployed, for a new total of 24 anchor legs in the system. All new grid lines and hardware will be similar to materials in the existing grid system, as specified in the 2006 finite element analysis report for the mooring system (OceanSpar 2006). The currently permitted feed vessel will continue to be moored at the net pen array.

The overall increase in growing volume to 64,000 m^3 is consistent with full utilization of the modified mooring system. The increased production enabled by the capacity expansion will improve the efficiency and utilization of major infrastructure items such as the hatchery, the mariculture lease area, the workboat fleet, and Blue Ocean's Hawaii-based brand development. In summary, Blue Ocean proposes the following changes to the current CDUP capacity and net pen restrictions:

- New maximum net pen size: Not to exceed 8,000 m^3
- New maximum number of net pens: Not to exceed 8
- New maximum site capacity: Not to exceed 64,000 m^3

It will take approximately 18 months to fully implement the modifications under the Proposed Action. The Farm Site currently consists of two SeaStation 7000 DRs and three SeaStation 3100 FLIPs. The exact sequence of net pen replacement and addition is yet to be determined. However, given the flexibility of net pen types under the current CDUP and the time required to upgrade the Farm Site, Blue Ocean proposes to provide OCCL and USACE with quarterly updates of the "as built" Farm Site infrastructure through 2016. This will help keep DLNR and USACE appraised of the exact configuration at the Farm Site as it evolves to its finished state.

Feeding

Blue Ocean uses high quality dry pellet feed, specifically formulated for warm water marine finfish. Feed composition is approximately 45% protein (primarily high quality fish meal), 25% lipids (e.g., fish oil), and 30% ash and carbohydrates (e.g., wheat, corn gluten meal). Vitamins and minerals are supplemented for optimal fish health. No hormones are added. Feed production is quality controlled for PCBs, mercury, melamine and other adulterants. Blue Ocean's feed supplier is certified under the Global Aquaculture Alliance BAP (Best Aquaculture Practices) and Global GAP (Good Agriculture Practice) programs.

Under the Proposed Action, the amount of feed delivered to the Farm Site will increase proportionally with the expected increase in production. The Feed Conversion Ratio (FCR) measures the amount of feed required per unit production during the offshore growout period. Over the past four years, the average FCR for production of *Seriola rivoliana* at the Farm Site was 2.3. Using this average and an expected increase in production to 1,100 T by 2018, Blue Ocean expects to deliver approximately 2,530 T to the Farm Site annually under the Proposed Action.

No changes to feed composition or basic feed delivery methods are anticipated under the Proposed Action, although Blue Ocean continues to invest in equipment and techniques to increase the efficiency of feed delivery and improve performance on its FCR measure. Some of these projects include the use of video cameras to monitor feed behavior and reduce feed loss, development of greater precision in feed delivery equipment, and ongoing research in feed composition to improve digestibility.

Animal Health

No changes to basic animal health practices are expected under the Proposed Action, although the frequency and magnitude of some practices may increase. Blue Ocean focuses on good animal health and disease prevention by:

- Maintaining healthy stocking densities for fish (kg / m^3).
- Using only high quality, tested feeds.
- Conducting health checks and using vaccines prior to stocking offshore.
- Attending net pens daily and removing mortalities.

- Periodically cleaning net pens to remove biofouling buildup.
- Periodically delivering hydrogen peroxide baths to treat parasite infections.

Regular cleaning of the net pens to remove biofouling buildup is an important animal husbandry practice. Removal of biofouling improves water flow through the net pen, reduces anchor loads and reduces available habitat for ectoparasites. Farm Site experience indicates that biofouling builds up on net pens at the rate of 25-75 grams (dry weight) per m^2 of netting per quarter, depending on the types of biofouling and time of year. Based on the estimated netting surface area under the Proposed Action, the entire Farm Site is expected to generate approximately 500 to 1,500 kg (dry weight) of biofouling per year, mostly macroalgae. Mechanical cleaners with high pressure water are used to remove biofouling buildup on the net pens. Under the Proposed Action, Blue Ocean expects to increase employment for net pen cleaning proportional to the increase in the number of net pens deployed under the Proposed Action.

Even with good animal husbandry practices, cultured fish are susceptible to ectoparasites. Blue Ocean uses hydrogen peroxide baths to treat fish for ectoparasite infections. All of the fish inside a net pen are treated for ectoparasites as a group. Fish are crowded inside the net pen and enclosed with low-permeability tarps. Hydrogen peroxide is delivered into the enclosed volume and baths last about 45 minutes, at which point the tarps are removed and the fish are released from crowding. The basic treatment method will not change under the Proposed Action. However, the number of treatments delivered will increase proportionally with the increase in production expected under the Proposed Action. The amount of hydrogen peroxide delivered per unit of biomass is expected to decrease as more efficient crowding methods are developed. Please see Section 5.2 for a discussion of the potential environment impacts of hydrogen peroxide use.

The Farm Site is permitted to deliver certain FDA-approved and USFWS-monitored antibiotics to fish to treat confirmed bacterial infections. Prophylactic antibiotic treatments are not permitted. The Farm Site has not experienced a bacterial infection offshore or delivered an antibiotic treatment offshore since February 2011 and does not expect an increase in antibiotic treatment frequency under the Proposed Action.

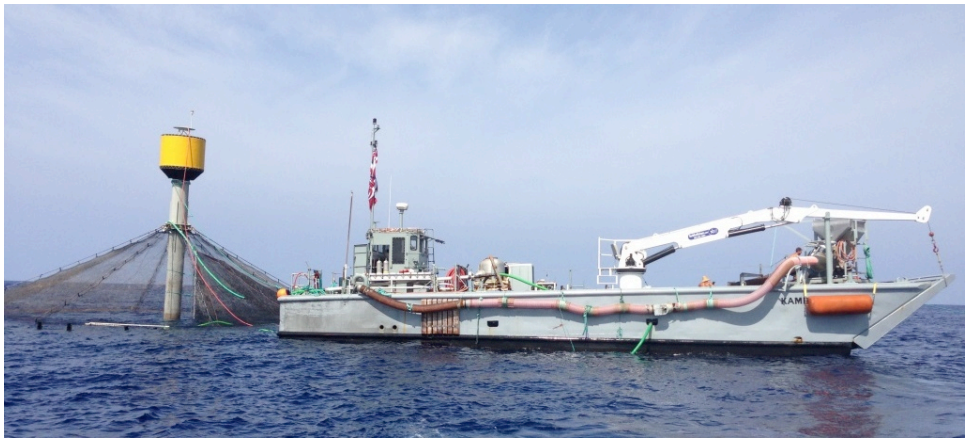
Harvesting

Under the Proposed Action the amount of harvested fish will increase with the expected increase in offshore growing capacity. The Farm Site produced approximately 450 T of harvested fish in 2013 and is expected to produce approximately 1,100 T by 2017 under the Proposed Action. Currently, the Farm Site harvests fish 1-2 times per week. Under the proposed action, the harvest frequency may increase to 3 times per week, requiring an increase in employment and enabling better workboat utilization. No changes to the Farm Site's basic methods for harvesting fish are expected under the Proposed Action, although Blue Ocean continues to invest in equipment and techniques to improve the efficiency of harvesting, including the use of new fish crowding methods and onboard harvest fish storage.

Fleet & Facilities

Blue Ocean currently maintains four workboats of various sizes for Farm Site, the largest being the Kampachi 3, a 74' LCM (Figure 7). The company also maintains a 20,000 sf base yard near Honokohau Harbor for shore-based activities. The fleet and shore facilities are under-utilized at current Farm Site production levels. The increase in workboat and shore-based activities under the Proposed Action will allow greater utilization of this equipment and facilities, and will not require an increase in Blue Ocean's fleet capacity or shore-based footprint.

Figure 7: Kampachi 3 Workboat



2.2 Economic Characteristics

The Proposed Action will generate several incremental economic benefits for Hawaii, including:

- New skilled employment opportunities in West Hawaii.
- Increased expenditures on local services in West Hawaii.
- Increased lease, license and permit fees to various State of Hawaii agencies.
- Increased support of the State's economic diversification and food security goals.

Blue Ocean is a significant private employer in West Hawaii. In 2013, the Company employed 21 full-time people in West Hawaii, with total payroll over $1.2 million. Under the Proposed Action, Blue Ocean employment in West Hawaii is expected to increase to 30 people with a total local payroll of about $1.7 million per year. Nearly all of the employment at Blue Ocean is considered skilled or professional, including the expert diving skills required for offshore work and the marine biology education required for most hatchery positions. The increased employment under the Proposed Action will be consistent with existing skill levels and required education.

Blue Ocean is well-integrated into the West Hawaii business community, spending over $2 million on local services each year. Locally purchased services cover a wide range of activities, including transportation services, equipment rental and repair, temporary labor and professional services such as legal and accounting. Under the Proposed Action, Blue Ocean's local services expenditures are expected to increase approximately 50%. In 2013, Blue Ocean paid over 2.5% of its gross revenue to the State of Hawaii in lease, license, permit or consumption fees (not including state income taxes). These fees are tied directly to the size of the company, regardless of Blue Ocean's profitability. The value of these fees will rise proportionally with the production increases under the Proposed Action.

Blue Ocean's primary market for harvested fish is Hawaii, which accounted for approximately 40% of production in 2013. The company offers its products to local distributors in Hawaii at a steep discount to mainland markets to ensure local access to its products. Blue Ocean exported 60% of its products outside the State of Hawaii in 2013, supporting the State's economic diversification goals. The seafood produced by Blue Ocean also contributes directly to the State's food security goals (Hawaii 2050 Sustainability Plan, January 2008). The Company's contribution to these State goals will increase under the Proposed Action.

2.3 Social Characteristics

Social characteristics of the Proposed Action include increased opportunities for skilled and non-skilled employment in the West Hawaii area, and Company contributions to the local community (e.g., harbor cleanup days, school tours). Blue Ocean has relationships with the University of Hawaii and Konawaena High School to give local students early exposure to commercial employment opportunities in marine biology and skilled trade jobs (e.g., mechanics). The Company provides internship opportunities to motivated and qualified students with interests in these areas. The internship program would expand under the Proposed Action. The expected increase in operating scale under the Proposed Action will also allow Blue Ocean to expand its research relationship with the University of Hawaii to pursue larger projects such as feed trials.

2.4 Environmental Characteristics

Currently operating at its production limit, the Farm Site discharges nutrients (mostly Nitrogen, Phosphorus, and Carbon) at levels that have not resulted in a significant impact on the environment (see Sections 5.2 and 5.3). The environmental characteristics of the Proposed Action are primarily driven by the expected increase in the amounts of these nutrients. Sections 5.2 and 5.3 of this DEA discuss the potential impacts of these increases on the environment. There is no proposed change in the Farm Site's proximity to the coral reefs along Unualoha Point and Makako Bay, or in the permitted fish species.

3 ALTERNATIVES TO PROPOSED ACTION

Blue Ocean considered several alternatives to the Proposed Action for expanding marine finfish production at the existing Farm Site, including increasing fish stocking densities, adding a second farm site location, and no action.

3.1 Alternative 1: Increase Fish Stocking Densities

Blue Ocean considered the alternative of increasing its biomass stocking densities and harvesting smaller fish to increase the number of fish produced within the existing Farm Site limitations. This alternative is not recommended, as higher stocking densities would increase the risk of animal health issues such as ectoparasites and bacterial infections. In addition , the growth curve for marine species is relatively linear and fixed, so harvesting more fish at a smaller size would not increase the overall production tonnage. Bringing smaller fish to market would also decrease the fish price per lb sold, thereby reducing overall revenue to the business.

3.2 Alternative 2: Add Second Farm Location

Blue Ocean considered proposing a second location to meet its expansion objectives. This alternative is not recommended because the existing Farm Site is currently under-utilized and a new farm location would represent a significant investment in development time and expense. The existing Farm Site is situated on a 90 acre lease area, in 60 meters depth, with strong mixing currents generating a very high seawater replenishment rate. Background nutrient loads are significantly higher than the added nutrient loads expected under the Proposed Action. The Proposed Action requires no expansion of the existing lease area and only minor modifications to the existing mooring infrastructure. Increasing the utilization of the existing Farm Site location will be less costly and carry less risk than development of a new location. In addition, the 2007 DEA for the Farm Site (by KBWF) assessed and rejected several alternative sites because of existing or future public use concerns. These sites included the area just north of Kawaihae Harbor, the area offshore Kaloko-Honokohau National Historic Park, the deep-water area south of Kailua Bay, and offshore areas north of Makolea Point.

3.3 Alternative 3: No Action

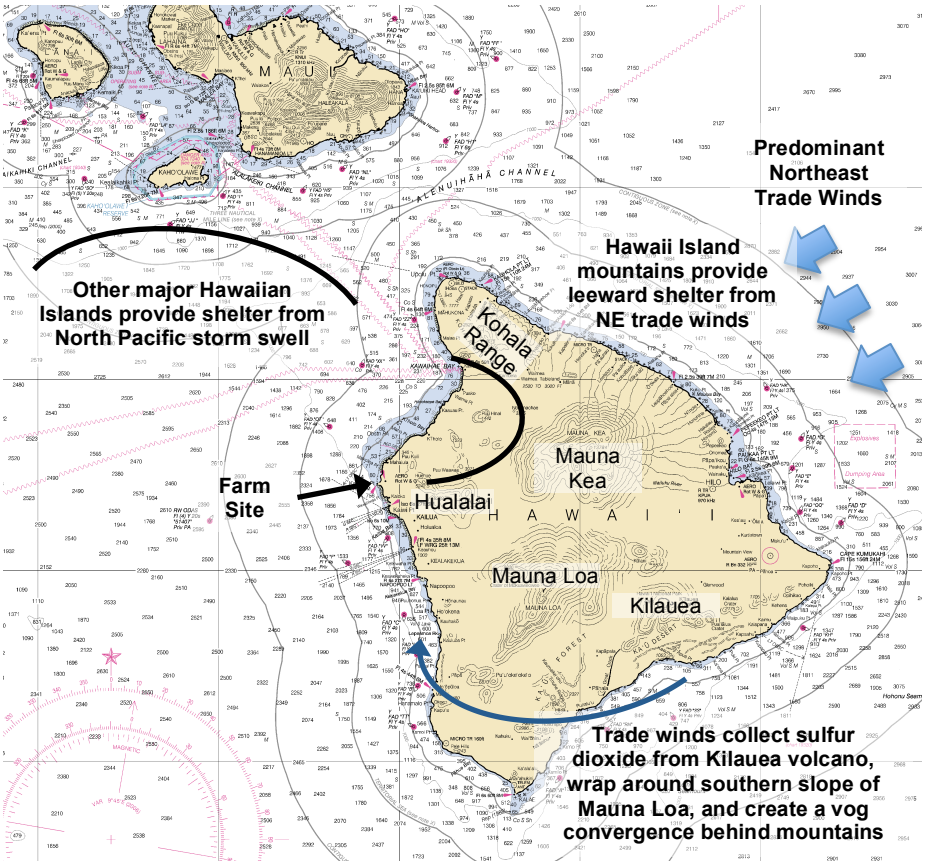
The No Action alternative is not recommended as it would result in the loss of the economic and social benefits expected under the Proposed Action, including the loss of expected increases in employment and fee revenue, and continuing progress towards the State's economic diversity and food security goals. The No Action alternative would also significantly discourage further private investment in offshore aquaculture in Hawaii, and likely halt further aquaculture research and development efforts based in Hawaii.

4 DESCRIPTION OF THE ENVIRONMENT

The Kona coast area around the Farm Site has a tropical, semi-arid climate with stable, warm temperatures year-round. The average annual temperature is 24°C with an average daily high of 28°C and an average daily low of 19°C. Relative humidity is generally stable throughout the year, with the daily average ranging from 60-75%. The area is generally dry, with average annual precipitation of 13 cm (NELHA 1992).

The Farm Site is generally sheltered from the predominant Northeast trade winds by several large mountains including the Kohala Range, Mauna Kea and Hualalai (Figure 8). Heating of the protected lee slope of Hualalai drives a 3-15 knots upslope onshore wind (the "Kona Sea Breeze") in the afternoon. After sunset the land cools and a downslope breeze drains offshore (NELHA 1992).

Figure 8: Factors Determining General Climate Conditions



Air quality is good, but can degrade with the amount of vog created by the Kilauea volcano (air pollution created when sulfur dioxide and other gases emitted by the volcano react with sunlight, oxygen and moisture). During the summer, weaker trade winds allow a vog-laden convergence to push northward from the southern slopes of Mauna Loa. Stronger trade winds in the winter generally keep the vog to the South.

Seawater near the Farm Site is generally characterized by tropical oceanic conditions with low levels of nutrients (Garrison 2007), stable salinity and very good visibility. Readings from the Farm Site from 2005-2013 indicate relatively little change in seawater temperatures through the year (Table 2).

Table 2: Seawater Characteristics at Farm Site

Parameter	Mean	Range	Unit
Dissolved Oxygen	6.79	6.01 – 8.26	mg/l
Salinity	34.8	32.8 – 37.0	ppt
Temperature	25.8	23.6 – 27.4	°C

4.1 Water Quality

Seawater quality, as it relates to aquaculture, is primarily assessed through measures of Nitrogen, Phosphorus, Turbidity and pH. Th (American Public Health Association 2014)e long-running water quality monitoring program at NELHA (the NELHA WQMP) (NELHA 2013) has closely monitored offshore water quality in the Keahole Point area since 1993 (Table 3).

Table 3: Baseline Water Quality (NELHA WQMP[1])

Parameter	Period	Transect 1 – Station 5		Transect 2 – Station 5		Unit
		Mean	Range	Mean	Range	
Total Nitrogen	2007-2013	75	51 – 90	72	43 – 120	µg/l
Ammonia Nitrogen	1993-2013	2.3	0.9 – 5.0	2.1	0.1 – 8.5	µg/l
Nitrate+Nitrite Nitrogen	1993-2013	3.9	0.3 – 13.6	1.6	0.1 – 13.6	µg/l
Total Phosphorus	2007-2013	11.5	9.1 – 13.3	12.2	7.2 – 17.4	µg/l
Turbidity	1993-2013	0.09	0.04 – 0.30	0.09	0.02 – 0.71	N.T.U.

[1] Annual Report, Comprehensive Environmental Monitoring Program, July 1, 2012 through June 30, 2013, NELHA

The NELHA WQMP periodically measures water quality along six transect lines that run perpendicular to the shoreline around Keahole Point. Each transect starts at the shore and extends 500 meters seaward. There are five sampling locations along each transect line (Station 1 is inshore, Station 5 is 500 m offshore). The 500 meter sampling points on the two northern-most transects are each within 1,000 meters of the Farm Site (Transect 1 – Station 5 and Transect 2 – Station 5).

In addition to data from the NELHA WQMP, Blue Ocean operates a Water Quality Monitoring Program (the Blue Ocean WQMP) per the requirements of its DOH (CWB) NPDES permit. The Blue Ocean WQMP has collected water quality data since 2005, including Control Site readings up current of discharge. The geometric mean for these Control Sites during the period Q3 2005 to Q4 2013 provides a second valuable baseline for Nitrogen, Phosphorus, Turbidity and pH levels at the Farm Site (Table 4).

Table 4: Baseline Water Quality (Blue Ocean WQMP)

Parameter	Geometric Mean	Unit	Type of Sample
Total Nitrogen	100.42	µg/l	Grab
Ammonia Nitrogen	1.47	µg/l	Grab
Nitrate+Nitrite Nitrogen	4.07	µg/l	Grab
Total Phosphorus	12.29	µg/l	Grab
Turbidity	0.18	N.T.U.	Grab
pH	8.2	Std.	Grab

Results from the NELHA WQMP and the Blue Ocean WQMP report consistent baseline levels for water quality around the Farm Site. The NELHA WQMP and the independent laboratories contracted for the Blue Ocean WQMP use standard methods of analysis for marine and brackish waters designated by the U.S. EPA (American Public Health Association 2014). The analysis methods and required sensitivity levels (parts per billion) account for the majority of variability in measurement results (NELHA 2013).

4.2 Sea State

Minor swell, occasional wind-driven waves, and strong, turbulent currents characterize the sea state around the Farm Site. The typical wave climate in the area includes 0.5 to 1.5 meter waves with periods of 9-15 seconds (NELHA 1992). The wind

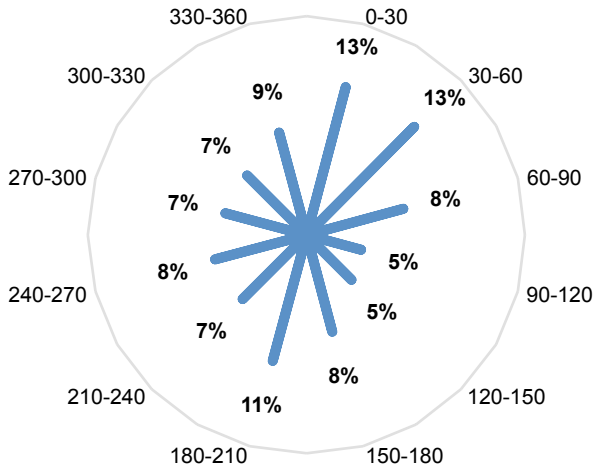
line from the Northeast trades will occasionally drop southward into the Farm Site area and short-period, wind-driven chop will build-up for 1-2 days.

The Farm Site is generally sheltered from North Pacific Ocean storm swell by the other major Hawaiian Islands (Figure 8). South Pacific storms during the summer months occasionally deliver a low, long-period swell 1-2 meters high with a 14-22 second period. On rare occasions, the formation of a low pressure system northwest of the islands will generate a "Kona Storm" with 3-5 meter waves at an 8-10 second period (Bretschneider 1978). Hurricane events in the area are exceedingly rare with most making landfall on the islands at the western end of the chain. Tsunami events are also rare and do not impact the deep water anchorage of the net pens.

The behavior of local ocean currents is the dominating feature of the sea state around the Farm Site. Native Hawaiian kupuna have long noted "the 'supernatural' currents and strong nature of the sea" in the Kalaoa and Keahole areas (KBWF 2003). The strong, mixing ocean currents quickly assimilate nutrients generated by the Farm Site biomass and replenish consumed oxygen.

The ocean currents in the immediate area are mixed in both direction and speed. The predominant current direction at 6 meters depth is either from the North (330° to 60°) or from the South (150° to 240°), but currents can cross the Farm Site from any direction (Figure 9).

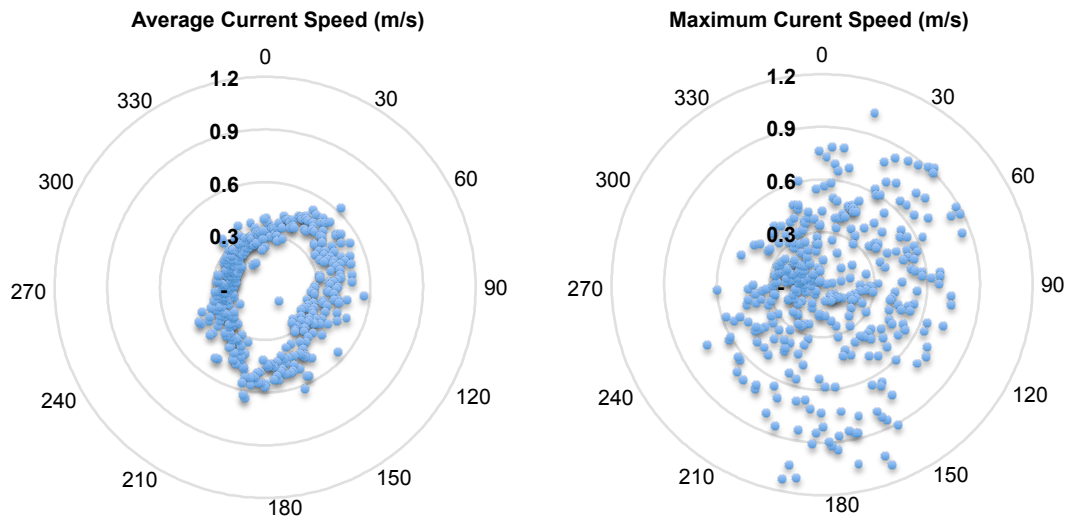
Figure 9: Frequency of Current Source Direction



Current direction often changes multiple times during the day, sometimes taking as little as two hours to completely reverse direction. The rapid direction changes also create a "shearing effect" through the water column with current direction varying 30-60 degrees through the water column at any given moment.

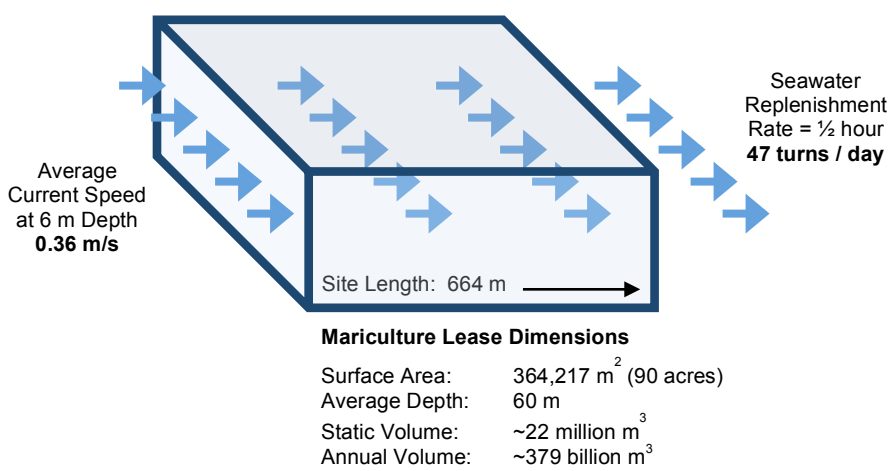
Current speeds also vary through the water column, with the strongest currents at 0-12 m depth (the working depth of the Farm Site). The average current speed (measured at 6 m depth) is approximately 0.4 m/s in the North-South direction, and 0.3 m/s in the East-West direction. Maximum current speeds are approximately 1.1 m/s North-South and 0.9 m/s East-West (Figure 10). Current speed typically changes multiple times throughout the day, but occasional periods of high current speed can last multiple days.

Figure 10: Farm Site Current Speed



The strong ocean currents and average depth of the Farm Site (60 m) combine to create a high seawater replenishment rate (Figure 11). The mariculture lease contains about 22 million m^3 of seawater volume (static condition). The average overall current speed is estimated at 0.36 m/s based on a 61% N-S frequency and a 39% E-W frequency. Applying these factors to a simplified box model of Farm Site volume gives a seawater replenishment rate of about 30 minutes, or roughly 47 daily turnovers (Figure 11).

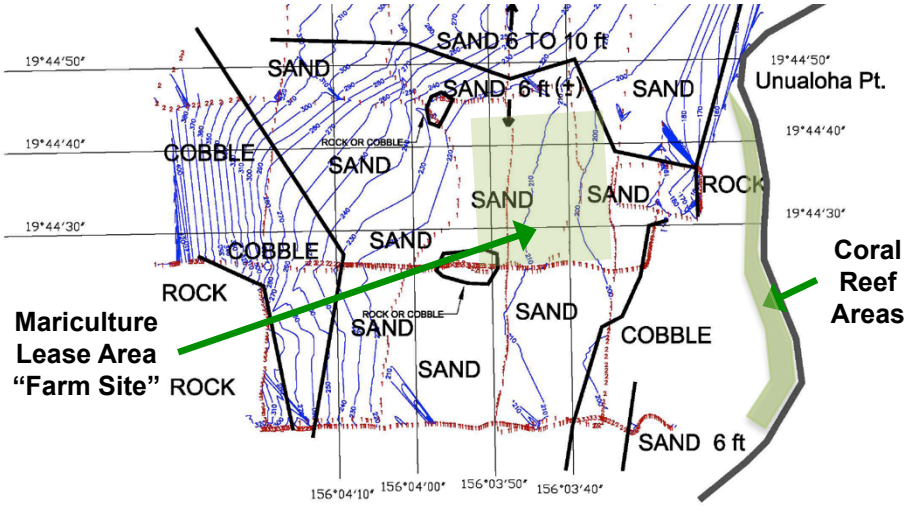
Figure 11: Seawater Replenishment Rate



4.3 Benthic Environment

The benthos under the Farm Site is a product of the 1801 Hualalai lava flow. Depths range from 55-66 m with an average of 60 m. The bottom is flat with no natural structures and a gentle downward slope seaward. A benthic study conducted by Sea Engineering, Inc. for the 2003 DEA noted that the sea floor under the mariculture lease area is composed of coarse sand 1-6 feet deep atop a solid basalt substrate (Figure 12).

Figure 12: Bottom Composition



While there are no major coral communities in the immediate area of the Farm Site, coral communities exist East of the Farm Site, along the shoreline of Ho'ona Bay and Makako Bay to Unualoha Point (Figure 12). DLNR's Division of Aquatic Resources (DAR) periodically surveys the coral reef at Unualoha Point, approximately 600 to 1,200 meters inshore of the Farm Site depending on the base of the reef (Walsh 2013). The most recent survey reported the following benthic cover categories and coral cover species at Unualoha Point (Table 5).

Table 5: Unualoha Point Reef Survey

Broad Benthic Cover Categories	%
Turf-Bare	59.4
Coral	36.5
Sessile Invertebrates	10.0
Other	7.2

Coral Cover Species	%
Porites lobata	28.5
Porites compressa	3.4
Pocillopora meandrina	2.9
Other	1.7

Blue Ocean operates a Benthic Monitoring Program (the Blue Ocean BMP) per the requirements of its NPDES permit. The program captures video and samples from the benthos under the net pens and at four control stations approximately 250 meters from the center of the Farm Site (Figure 13). The Control Site readings from the BMP provide a baseline description of the benthic environment under the Farm Site (Table 6).

Figure 13: Monitoring Stations

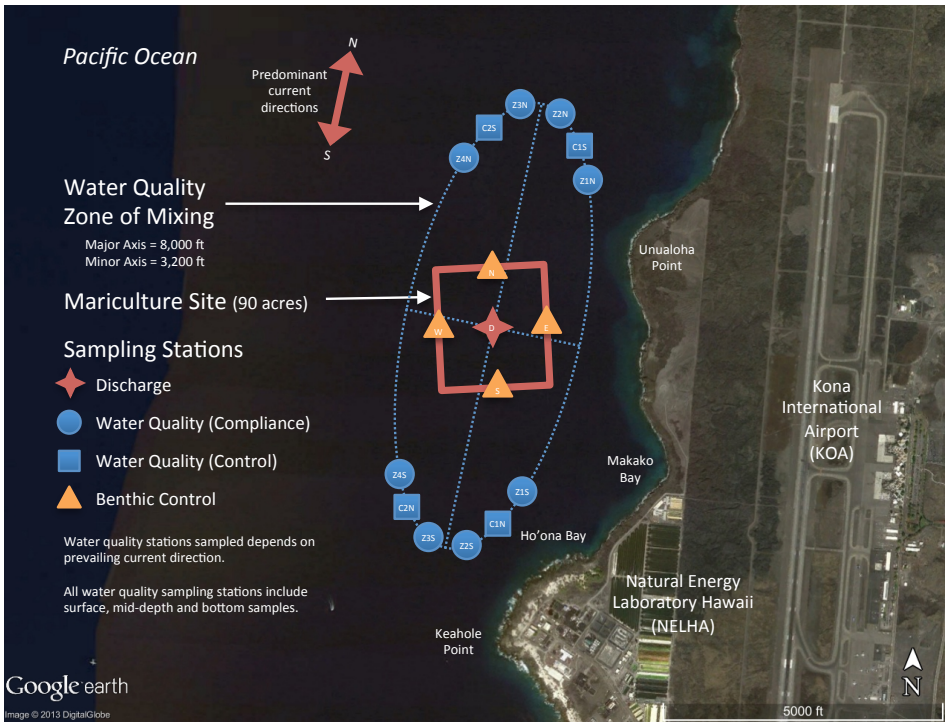


Table 6: Baseline Benthic Parameters (Blue Ocean BMP)

Control Site	Mean TOC (%)	Mean ORP (mV)	Occurrence of Macrofauna[1]	Occurrence of Macroalgae[2]	Coarse Sand Rate[3]
North	0.14%	163	0%	9%	56%
South	0.17%	159	9%	27%	73%
East	0.17%	151	0%	9%	48%
West	0.12%	185	18%	9%	90%

[1] Number of samples containing macrofauna. Organisms include shrimp and amphipods (West), and Ptychtoderid worms (South).

[2] Number of samples containing macroalgae. *Cladophora sp.* seen at all sites except West, *Halimeda sp.* found only at South and West sites.

[3] Coarse sand defined as particles greater than 0.5 mm diameter (Wentworth 1922).

The benthic profile under the Farm Site is consistent with a disruptive hydrological environment caused by strong ocean currents over coarse sand and lava. This type of benthos discourages long-term buildup of detritus and nutrients and is well-suited to nutrient dispersion and assimilation. The Blue Ocean BMP also collects data on the micromollusc environment in the benthos under the Farm Site (analyzed by the University of Hawaii, Hilo). The 2013 BMP characterized the micromollusc environment as, "…a divers and abundant molluscan fauna, with predominantly epifaunal gastropods displaying a variety of trophic levels. Microherbivores and detritivores were most abundant, with an array of carnivores and symbionts, indicating a diverse ecosystem with no apparent ill effect from the offshore aquaculture systems."

4.4 Wildlife

Fish Populations

The most common predator fish seen in the area of the Farm Site is Ulua (*Caranx ignobilus*). Bait fish commonly seen in the area include 'Opelu (*Decapterus macarellus*) and Akule (*Selar crumenophthalmus*). These fish take shelter under the net pens and in the water current shadow created by the net pens. Video surveillance conducted as part of Blue Ocean's BMP identified Unicorn Tangs (*Naso unicornis*) and Moorish Idols (*Zanclus conutus*) near the benthos.

Dolphins

As part of its existing CDUP, Blue Ocean reports all marine mammal activity observed at the Farm Site to NOAA Fisheries (CDUP HA-3497). Bottle Nose Dolphins (*Tursiops truncates*) are frequently observed around the Farm Site, with sightings recorded about one of every four days over the past three years. Dolphins are not a predation problem or a safety issue for the crew.

Spinner Dolphins (*Stenella longisrostris*) are rarely observed around the Farm Site (only 3 sightings in the past two years), but can be found along the shoreline of Makako Bay, south of Unualoha Point. The Spinner Dolphins' normal diurnal movements carry them from their nocturnal feeding grounds in deep waters offshore into a shallow rest area around the middle of the day, and then back towards the feeding grounds around the mid-afternoon (Norris 1994). It is likely that Spinner Dolphins transit the Farm Site on the way to and from their feeding grounds further offshore. The study also indicates that spinner dolphin rest areas are generally in water depths of 50 m or less.

Sharks

A variety of shark species are occasionally observed near the Farm Site, including Black Tip (*Carcharhinus limbatus*), Tiger (*Galeocerdo cuvier*), Sandbar (*Carcharhinus plumbeus*), and Galapagos (*Carcharhinus galapagensis*). Shark encounters at the Farm Site are usually short, with individuals or small groups seen periodically over the course

of a few minutes to a few hours. Blue Ocean began recording shark observations in 2011 under its Shark Management Plan (CDUP HA-3497). Sharks were observed at the Farm Site on 33 days in 2012 and on 26 days in 2013. The most frequently observed species was Black Tip (*Carcharhinus limbatus*) both years (Table 7).

Table 7: Shark Observations at Farm Site

Name	2012	2013
Black Tip	23	12
Sandbar	5	0
Galapagos	1	0
Silky	1	0
Manta Ray	0	1
Unknown	8	13
Total	**38**	**26**

Seabirds

Seabirds such as Shearwaters (*Puffinus sp.*), Frigate Birds (*Fregata sp.*), and Boobies (*Sula sp.*) are rarely seen in the area of the Farm Site. Seabird activity occurs primarily West of Keahole Point over the traditional fishing grounds.

4.5 Rare, Threatened & Endangered Species

Four species of marine mammals whose potential habitat includes the Farm Site have been declared threatened or endangered and are under Federal jurisdiction.

- Green Sea Turtle (*Chelonia mydas*), NOAA NMFS (Threatened). Commonly seen in near-shore waters, and the Hawaiian population is currently under review for delisting (NOAA website, www.nmfs.noaa.gov/pr/species/esa/turtles). Green Sea Turtles have not been observed near the Farm Site.

- Hawksbill Turtle (*Eretmochelys imbricata*), NOAA NMFS (Endangered). Known to nest on the Hawaii Island at several locations with documented sightings at Kaloko-Honokohau National Historical Park (correspondence with NOAA Protected Resources 2008). Hawksbill Turtles have not been observed near the Farm Site.

- Hawaiian Monk Seal (*Monachus schauinslandi*), NOAA NMFS (Endangered). Occasionally seen in the Mahai'ula – Makalwena area of Kekaha Kai State Park. Monk seals were observed near the Farm Site on two occasions in 2005. On both occasions, the monk seal remained in the area for one day and departed.

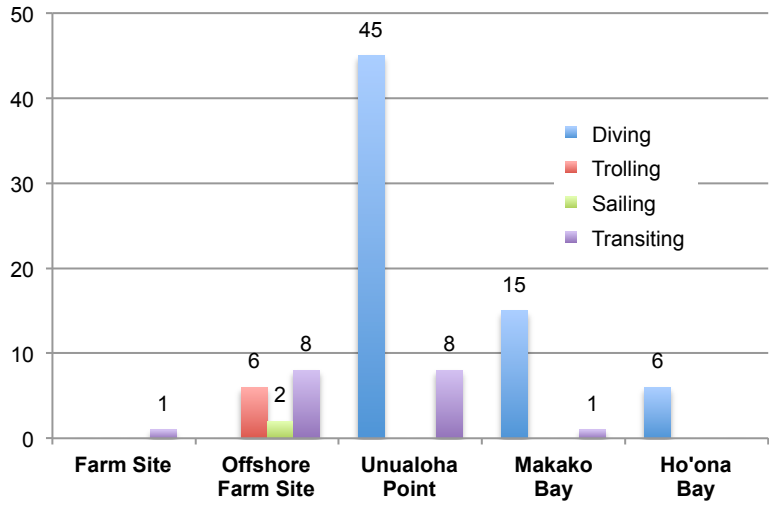
- Humpback Whale (*Megaptera novaeangliae*), NOAA NMFS (Endangered). Frequently observed around the main Hawaiian Islands December to April, and currently under review for delisting. The Farm Site lies just within the Southern boundary of the Hawaiian Islands Humpback Whale National Marine Sanctuary. Humpback whales were observed transiting the Farm Site on seven days during the period March 2010 through December 2013 (CDUP HA-3947, Marine Mammal Reports). On each occasion, the whales passed through the entire mariculture lease area within a few minutes.

4.6 Scenic & Recreational Resources

The Farm Site is located directly offshore of the NELHA and KOA facilities, with no shore-based recreation along the Unualoha Point or Makako Bay shorelines. The nearest public shore recreation areas are Kekaha Kai State Park (Mahai'ula) three miles North and Wawaloli Park two miles South. The Farm Site is not visible from either of these areas. Shoreline fishing is occasionally conducted at Keahole Point, approximately 1 km South of the Farm Site. The Site is visible from the shoreline on the north side of Keahole Point, but not from the shoreline south of the point. The Site is visible from the residential areas upslope from KOA during daylight hours.

A boat-based Recreational Use Survey of the area was conducted in 2001 as part of the 2003 DEA for the Farm Site (KBWF 2003). The survey recorded 92 boat observations in the general area during the survey period (Figure 14).

Figure 14: Recreational Use Survey



The survey was taken during the high recreational use months of August and September. Observations of boat activity were recorded three times each day during the 61-day survey period. Observations were classified by location (Farm Site, offshore of Farm Site, Unualoha Shore, Makako Bay, and Ho'ona Bay) and activity (Diving, Trolling, Sailing, Transiting). The most common recreational boat use was diving along the Unualoha shoreline (49%). Other common uses included diving along the Makako Bay or Ho'ona Bay shoreline (23%) and transiting offshore or inshore of the Farm Site (18%). Only 1 boat was observed in the Farm Site mariculture lease area.

Daily observations by Blue Ocean crew over the past few years are generally consistent with the 2002 Recreational Use Survey. The primary boat-based recreational use of the waters around the Farm Site is for tourist dive trips along the Unualoha shoreline, approximately 1 km from farm activities. Tourist dive operators also transit the shoreline area for trips North at Mahai'ula or Makalawena. The Blue Ocean crew regularly observes trolling activity 1-5 km offshore of the Farm Site in the traditional fishing grounds, and fishing vessels occasionally transit the Farm Site. The only major change in recreational boat use during the past few years is the increased frequency of "Manta Ray Night Dives" that take place in Makako Bay. Up to a dozen charter boats launch divers and snorkelers each night. These boats routinely transit the waters inshore of the Farm Site.

4.7 Historical & Cultural Resources

The Farm Site is located offshore of the Kalaoa ahupua'a in the Kekaha region of North Kona. A cultural resource assessment was conducted for the Farm Site during the original environmental assessment and permitting process (CDUP HA-3118). No active loko i'a (Hawaiian fish ponds) were identified in the area and the only historical and cultural resource relating to the Farm Site identified was the potential presence of an 'opelu ko'a. Meetings with kupuna and cultural historians during the cultural assessment determined there was not a functioning ko'a near the Farm Site (KBWF 2003).

5 POTENTIAL IMPACTS AND MITIGATION

5.1 Potential Short-Term Impacts

Implementation of the Proposed Action will take place over approximately 18 months as higher capacity net pens are installed and stocked. Installation takes 2-4 days per net pen and no environmental impacts are expected. There are no discharges associated with net pen installation and the net pens do not contact the seabed at any time. Modifications to the mooring system are minor and would take place approximately one year after approval. Repositioning of existing anchors or deployment of new anchors will result in minor and temporary re-suspension of soft sediments, which will not have a significant impact on the benthos. There are no significant short-term environmental impacts associated with the increase in biomass as the nutrients discharged under the Proposed Action will increase over several years, proportionally with increased utilization of the Farm Site.

5.2 Water Quality

The effluent (uneaten feed, ammonia excretions, fish feces) from increased biomass related to the Proposed Action has the potential to impact water quality. Specifically, the increased amount of organic material has the potential to alter nitrogen (N) composition, turbidity, and/or phosphorus (P) levels in the surrounding waters. The concentration of N (compounds such as total nitrogen, ammonia, nitrate, nitrite) and P (as total phosphorus or orthophosphate) are indicators of nutrient enrichment and are commonly used to assess the impact of aquaculture, or any other anthropogenic activity, on water quality. High N and P inputs may serve to fertilize marine food webs, boosting overall productivity with increases in phytoplankton and macroalgal production (Cloern 2001).

The Proposed Action is not expected to generate a significant increase in primary productivity due to the farm's relatively small amount of biomass and the dynamic hydrology at the Farm Site. To avoid the potential negative impacts of increased N and P, it is important that farm production levels remain within the nutrient assimilation capacity of the surrounding environment (Price 2013). The NOAA National Ocean Service reviewed global siting data to identify farm site characteristics best suited to water quality protection, concluding that, "Protection of water quality will be best achieved by siting farms in well-flushed waters." (Price 2013). The Farm Site has many of the attributes cited in this study, including strong, mixing ocean currents, deep waters and a coarse sand bottom type. To help assess the potential impact of the Proposed Action on water quality, this DEA includes an analysis of historical water quality data at the Farm Site, a nutrient (N and P) loading projection, and a benchmark comparison to other farm operations.

Potential Water Quality Impacts (Review of Historical Data)

The Farm Site has an eight-year history of detailed monitoring and reporting on water quality under the Blue Ocean WQMP. The results from all water quality testing are provided to regulatory agencies including DLNR, DOH and EPA. The Blue Ocean WQMP monitors the level of several compounds associated with the breakdown of fish feed and fish metabolism (feces and ammonia excretions). It also monitors the acute toxicity of any discharge associated with the use of therapeutants or antibiotics.

To identify water quality impacts from the farm, the Blue Ocean WQMP defines a Zone of Mixing (ZOM) around the Farm Site (Figure 13) and requires measurement of several water quality parameters at the ZOM border to confirm that seawater leaving the Farm Site is similar in composition and quality to the surrounding waters. The water quality limitations for the Farm Site's NPDES permit are based on the State of Hawaii definition of Class AA Marine Waters, HAR 11-54-06 (Table 8). The Proposed Action does not request a modification to the NPDES permit limitations.

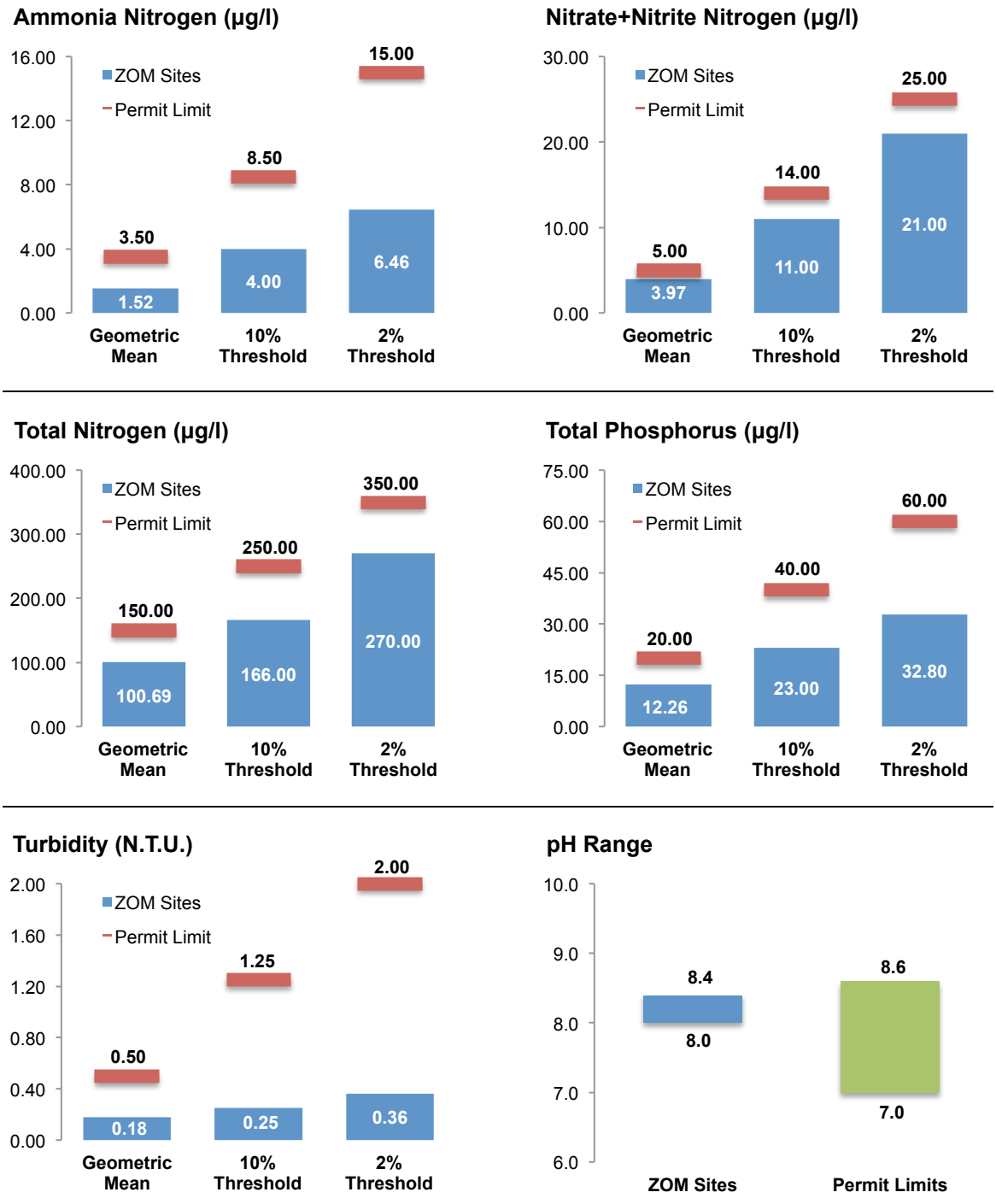
Table 8: NPDES Permit ZOM Limitations

Parameter	Geometric Mean Not to Exceed the Given Value	Not to Exceed the Given Value More than 10% of the Time	Not to Exceed the Given Value More than 2% of the Time	Unit	Type of Sample
Total Nitrogen	150.00	250.00	350.00	µg/l	Grab
Ammonia Nitrogen	3.50	8.50	15.00	µg/l	Grab
Nitrate+Nitrite Nitrogen	5.00	14.00	25.00	µg/l	Grab
Total Phosphorus	20.00	40.00	60.00	µg/l	Grab
Turbidity	0.50	1.25	2.00	N.T.U.	Grab
pH Range	7.0 – 8.6			Std.	Grab[1]

[1] pH shall be tested within 15 minutes from the time the sample was collected.

Under the Blue Ocean WQMP, water samples are collected and analyzed by independent laboratories. Since the farm's inception, the levels of these compounds in the ZOM readings have been well below the specified permit limits (Figure 15). These results from ZOM testing under the Blue Ocean WQMP confirm there has been no significant impact from mariculture operations at the Farm Site on any of the six primary water quality parameters.

Figure 15: Blue Ocean WQMP Results



There are inherent difficulties testing marine waters for these compounds at the low sensitivity levels required under the NPDES permit. In 2010 the laboratory contracted by Blue Ocean reported invalid results for Total Nitrogen (TN), where TN was reported to be less than the sum of Ammonia and Nitrite + Nitrate. These results are not included in Figure 15.

In addition to a comparison against Permit Limits, ZOM readings are also compared to their corresponding Control Site readings to identify any differences between water quality in the ZOM and water quality at the Control Sites. The Control Site readings are taken up current of the discharge location, at the opposite end of the Zone of Mixing (Figure 13). Comparison of the geometric mean of ZOM and Control Site readings for the period Q3 2005 to Q4 2013 indicates no statistically significant difference between readings downstream of the discharge location and upstream of the discharge location (Table 9).

Table 9: Water Quality (ZOM v. Control)

Parameter	ZOM Readings	Control Site Readings
Total Nitrogen	100.69	100.42
Ammonia Nitrogen	1.52	1.47
Nitrate+Nitrite Nitrogen	3.97	4.07
Total Phosphorus	12.26	12.29
Turbidity	0.18	0.18
pH	8.2	8.2

A second source of historical data on primary productivity in the Farm Site area is the NELHA WQMP. Its history of chlorophyll-a readings at stations near the Farm Site show average levels of 0.10 – 0.15 µg/l, almost three times lower than the DOH standard of 0.3 ug/l (NELHA 2013). This result indicates that the level of nutrient enrichment and microalgae production in the area near the Farm Site is not elevated.

In addition to the water quality parameters, the Blue Ocean WQMP also monitors the acute toxicity of discharges of FDA-approved therapeutants (hydrogen peroxide) and in-feed antibiotics. These discharge events are defined and managed under the USFWS INAD program (INAD 11-669, INAD 9332). The Blue Ocean WQMP requires Whole Effluent Toxicity (WET) testing for each discharge event involving antibiotics and one discharge event per quarter for hydrogen peroxide (in the past, WET tests were conducted for all hydrogen peroxide events). For each WET test, a water sample is taken just outside the net pen immediately after release of the tarps (for hydrogen peroxide events) and during feeding (for antibiotic events). Samples are sent to a third-party laboratory for acute toxicity testing in accordance with Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms (EPA-821-R-02-012, Fifth Edition, October 2002). The test provides in a Pass/Fail score for each discharge event (Table 10).

Table 10: WET Test Results (2009-2013)

Chemical Discharge	Passed Tests (Rate)	Failed Tests	Total Tests[2]
Antibiotic	8 (100%)	0	8
Hydrogen Peroxide	54 (96%)	2[1]	56

[1] Two failed tests due to sample collection errors.

[2] Includes all antibiotic treatments and quarterly tests for hydrogen peroxide treatments.

The high Pass rates of historical WET tests indicate no significant impact from whole effluent discharge events. The Proposed Action does not call for any changes in the amount of therapeutants or antibiotics used per discharge event, or any changes in the protocol for such events. Since the WET test procedure is related to each independent discharge event, the historical WET test results are demonstrative of the expected WET test results and water quality under the Proposed Action.

Potential Water Quality Impacts (Mitigating the Impacts of Hydrogen Peroxide)

Concentrated hydrogen peroxide is used extensively at the Farm Site to treat fish for the removal of ectoparasites. Its use in aquaculture is approved by the FDA and is managed by U.S. Fish & Wildlife Service under the INAD program. Hydrogen peroxide is an oxidizing disinfectant that breaks down into water and oxygen when added to seawater. The formation of these by-products is one of the reasons it is considered to be relatively safe for the environment (Yanong 2008). Hydrogen peroxide degrades more rapidly in the presence of organic material, aeration and sunlight. As discussed in Section 2.1, Blue Ocean uses hydrogen peroxide to bathe fish crowded within a volume enclosed by non-permeable tarps for 30 minutes, based on a protocol set by USFWS. To mitigate the risks of environmental impact, Blue Ocean continues the tarping treatment for an extra 15 minutes to reduce the amount of unreacted hydrogen peroxide released into the environment when the tarps are removed. Treatments are typically conducted mid to late morning to maximize the breakdown of hydrogen peroxide in the hours of strongest sunlight. Increased amounts of organic material in the net pen, including fish and biofouling also help accelerate reaction. Finally, once the tarps are removed the prevailing ocean currents quickly dilute any remaining unreacted peroxide. The WET testing conducted for hydrogen peroxide at the edge of net pens indicates that little, if any, unreacted hydrogen peroxide is released into the environment.

Potential Water Quality Impacts (Nutrient Loading Model)

A Nutrient Loading Model (NLM), based on work by Fernandes and Tanner (2008) and Islam (2005), was created to estimate the amount of nutrients (N and P) added

to the surrounding waters under the Proposed Action. The incremental nutrient load is then compared to background nutrient levels to assess potential impacts on water quality.

The end point of the NLM's mass balance equation is the net amount of N and P added to the environment over the course of a production cycle. The input amount of N and P is based on the Farm Site's economic FCR and the amount of N and P contained in the feed (manufactured by EWOS, British Columbia). The amount of N and P retained by the harvested biomass is then subtracted from the input. The amounts of N and P retained in harvest fish are 3.2% and 0.6% respectively, based on whole body analysis of *Seriola quinqueradiata* (Satoh 2004). These factors are then combined to create a Farm Load Factor for N and P per metric ton of harvest production (Table 11).

Table 11: Nitrogen and Phosphorus Load Factors

Measure	Nitrogen (N)	Phosphorus (P)
Farm FCR[1]	2.3	2.3
% in Feed Input[2]	6.9%	1.2%
% Retained in Harvest[3]	3.2%	0.6%
Farm Load Factor[4] (% Production)	**12.7%**	**2.2%**

[1] Historical FCR on Farm Site.

[2] Actual levels in Blue Ocean feed supplied by EWOS.

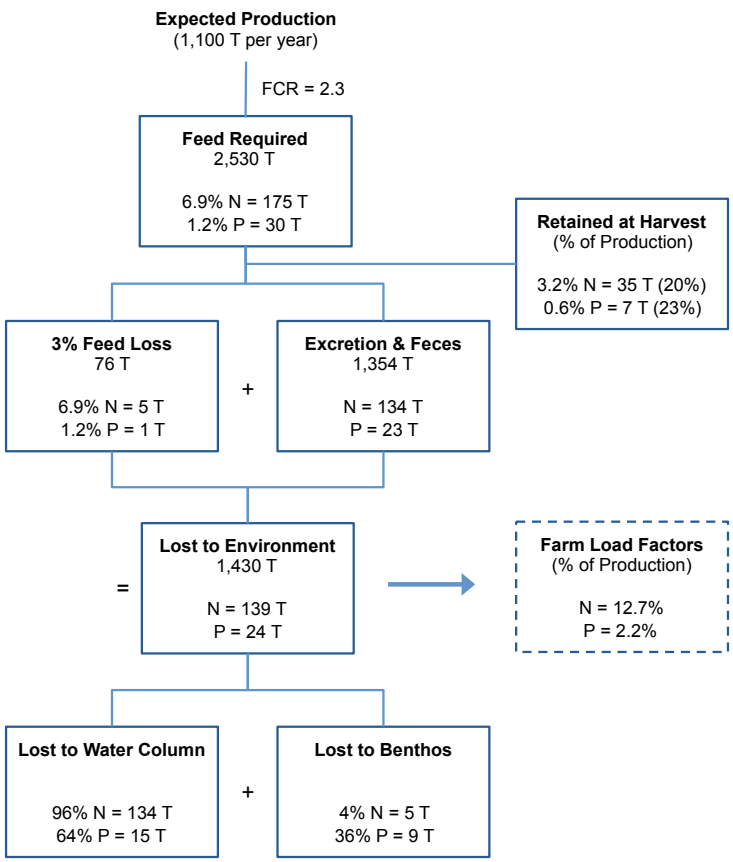
[3] Satoh 2004, Fernandes & Tanner 2008, FAO 2003.

[4] = (% in Feed * Farm FCR) - % in Harvest

The Farm Load Factors for N and P represent the amount of N and P added to the environment per unit of harvest fish production. For instance, 1 metric ton of harvest fish production is projected to add 139 kg of N and 24 kg of P to the environment over the course of the production cycle. The Farm Load Factors for the Blue Ocean Farm Site are consistent with research conducted by Islam (2005) (Farm Load Factor for Nitrogen = 13.3%), and the survey conducted by Price (2013) (Farm Load Factor for Nitrogen rage = 2% to 46%).

Ninety-six percent of the N and 64% of the P added to the environment are in the form of metabolic waste that dissolves or is suspended in the water column (Fernandes 2008) (Islam 2005). Based on estimated production of 1,100 T, the NLM estimates that approximately 134 T N and 15 T P will be added to the water column per year under the Proposed Action (Figure 16).

Figure 16: NLM for Proposed Action



The next step is to determine if this impact is significant by comparing the increased levels of N and P to background levels and NPDES permit limits for these nutrients. Using the baseline nutrient levels defined in Table 4 and the seawater replenishment rate defined in Figure 11, the background amounts of N and P through the Farm Site each year from normal ocean processes are over 38,000 T and 4,600 T, respectively (Table 12).

Table 12: Background Nutrient Load (Water Column)

Measure	Unit	Nitrogen (N)	Phosphorus (P)
Dynamic Seawater Volume[1]	T / yr	379 billion	379 billion
Baseline Nutrient Levels in the Water Column[2]	µg/l	100.42	12.29
Background Nutrient Load in the Water Column	T / yr	38,032	4,655

[1] See Section 4.2.

[2] See Section 4.1.

A comparison of the nutrient levels under the Proposed Action to background levels indicates that the impact of the Proposed Action is not significant. The projected increase in the level of N in the water column is 0.35% per year and the projected increase in P is 0.33%. In addition, these estimates show the projected levels of N and P in the surrounding waters will remain well below the N and P limits specified in the Farm Site's NPDES permit (Table 13).

Table 13: Impact of Farm Nutrient Levels (Water Column)

Measure	Unit	Nitrogen (N)	Phosphorus (P)
Farm Load (Impact)	T / yr	134	15
Background Nutrient Load in the Water Column	T / yr	38,032	4,655
Farm Load as % of Background Load	µg/l	0.35%	0.33%
Projected New Readings at Discharge Stations[1]	µg/l	100.78	12.33
NPDES Permit Limits	µg/l	150.00	20.00

[1] Baseline nutrient levels + new Farm Load.

The NLM provides a robust estimate of the incremental nutrient (N and P) loads expected under the Proposed Action. The deep waters and strong ocean currents replenish the Farm Site deliver with large amounts of nutrients under normal ocean processes. These same dynamic hydrological factors will reduce residence time and accumulation of the incremental nutrients added by the farm. These factors and associated analysis suggest no significant impact on water quality under the Proposed Action.

Potential Water Quality Impacts (Benchmark Comparisons)

Most developed aquaculture industries manage environmental impacts by limiting producers to a Maximum Allowed Biomass (MAB) per farm site, which represents the total biomass (T) in the water at any given time. Under the Proposed Action, the production level of the Farm Site is expected to increase from 450 T whole fish in 2013 to approximately 1,100 T whole fish by 2017. This level of production represents a maximum standing biomass of no more than 600 T. This Farm Site MAB is significantly below the MAB limits set by countries with developed aquaculture industries (Table 14). The results do not account for variations in site hydrology, water depths or bottom composition, but they indicate that the Farm Site will remain well below the size and subsequent impacts of most commercial aquaculture operations.

Table 14: Benchmark Comparison (Farm Size)

Location	Individual Farm Site Limit (Standing Biomass)	Species
Norway[1]	3,120 T	Atlantic Salmon (*Salmo salar*)
Canada[1]	4,500 T	Atlantic Salmon (*Salmo salar*)
Scotland[1]	2,500 T	Atlantic Salmon (*Salmo salar*)
United States[2]	3,000 T	Atlantic Salmon (*Salmo salar*)
Australia[3]	1,600 T	Yellowtail (*Seriola lalandi*)
Tasmania[4]	3,240 T	Atlantic Salmon (*Salmo salar*)
Blue Ocean	**600 T**	**Yellowtail (*Seriola rivoliana*)**

[1] Marine Harvest, Salmon Farming Industry Handbook 2013
[2] American Gold, Puget Sound, Washington State
[3] Clean Seas, Port Lincoln, South Australia
[4] Tassal Group, Macquarie Harbour, Tasmania

Water Quality Impact Mitigation

Blue Ocean works to mitigate Farm Site impacts on water quality in several ways. The Company participates in ongoing research with its feed supplier to improve the digestibility of its aqua feeds. Higher digestibility helps reduce the amount of metabolic waste (reduced amounts of feces) and leads to a lower FCR (reduced overall amounts of feed input). The move to larger net pens and increased use of HDPE surface pens will help improve the effectiveness of fish crowding, which will help reduce the amount of therapeutants (particularly hydrogen peroxide) required per T of biomass. Blue Ocean will continue to employ best animal husbandry practices to avoid use of antibiotics.

5.3 Benthic Environment

Farm Site effluent (particulate organic matter) in the form of feed loss and fish feces has the potential to impact the benthic environment. Particulate organic matter is the basis for the benthic food chain, which begins with bacteria, followed by colonization of ciliates and flagellates, followed by larger detritovores (Bybee 2003). The level of organic carbon (C) in the sediment is a direct indicator of the amount of particulate organic matter on the seafloor (e.g., uneaten feed, macroalgae or bacteria). High levels of

C in the seabed can lead to new algal and bacteria growth, which in turn can impact existing benthic species diversity (Cromey 2002). In cases of extreme accumulation of organic matter, bacteria may overgrow, and microbial breakdown of organic matter will consume more oxygen than is available in the substrate or nearby water, creating anoxic conditions in the benthos (Hargrave 2008). However, the amount of C added to the benthos under the Proposed Action is not expected to create significant benthic impacts for several reasons:

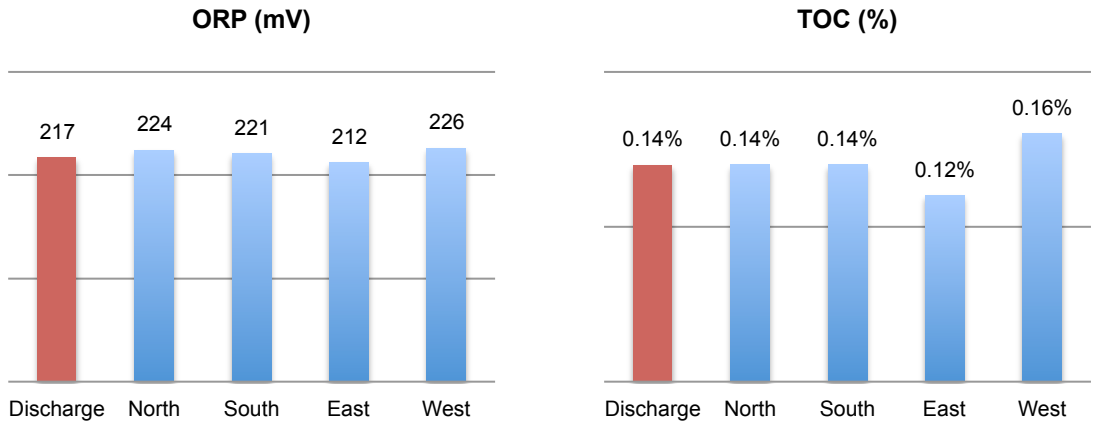
- Blue Ocean's feed management strategies effectively minimize the amount of feed loss, the major driver of C accumulation in the sediment.
- The small dispersion area for lost feed tends to limit effects to the immediate area under the net pens, typically within 30 meters (Nash 2005) (Rensel 2013).
- The coarse sand bottom and strong currents at the Farm Site allow greater oxygen mixing and carbon assimilation than other sediment types (Price 2013).
- The predominant long shore (N-S) current direction tends to keep nutrient loads away from coral reef areas.
- The proposed production level remains small relative to the water depth and replenishment rate at the Farm Site.
- Regular net pen cleaning will reduce long-term buildup of biofouling and inhibit the establishment of aquatic invasive species.

As part of this DEA, an analysis of historical benthic monitoring data at the Farm Site was conducted and a model of sediment carbon loading was created to evaluate the potential impacts on the benthos from the Proposed Action.

Potential Benthic Impacts (Review of Historical Data)

The Blue Ocean BMP provides information indicating that, to-date, the Farm Site has not had a significant impact on the benthic environment. ORP and TOC analysis at the discharge and control sites over the past three years shows that for both measures, the discharge site readings are consistent with control site baseline readings, indicating no significant impact (Table 15). In addition, the ORP levels at the discharge site are well above hypoxic (0 mV) and anoxic (-100 mV) risk levels (Wildish 2005) (Hargrave 2008). TOC levels are consistently low (< 0.16%) within and around the Farm Site indicating little organic enrichment. This level is markedly lower than many other aquaculture sites around the world, which range from 0.2% to 26.1% (Price 2013), and they are within the range of values (0.17% to 0.33%) seen in non-impacted sites around other Hawaiian Islands (Russo 2011).

Table 15: Blue Ocean BMP Results



In addition to TOC and ORP analysis, the Blue Ocean BMP calls for a periodic assessment of the micromollusc environment in the benthos under the Farm Site. A review of these assessments dating back to 2005 indicates a consistently low incidence of macrofauna (consistent with the local hydrological environment and coarse sand) and a consistent set of observed macroalgae species and locations. In addition, a review of the micromollusc environment descriptions shows a strong consistency in the characteristics of the micromollusc environment, indicating only minor changes in species diversity over time. Historical reports are consistent with an analysis from the Farm Site's 2013 micromollusc survey conducted by the University of Hawaii at Hilo, which concluded, "Overall, the data indicate a diverse and abundant molluscan fauna, with predominantly epifaunal gastropods displaying a variety of trophic levels. Microherbivores and detritivores were most abundant, with an array of carnivores and symbionts, indicating a diverse ecosystem with no apparent ill effect from the offshore aquaculture systems." (Blue Ocean BMP).

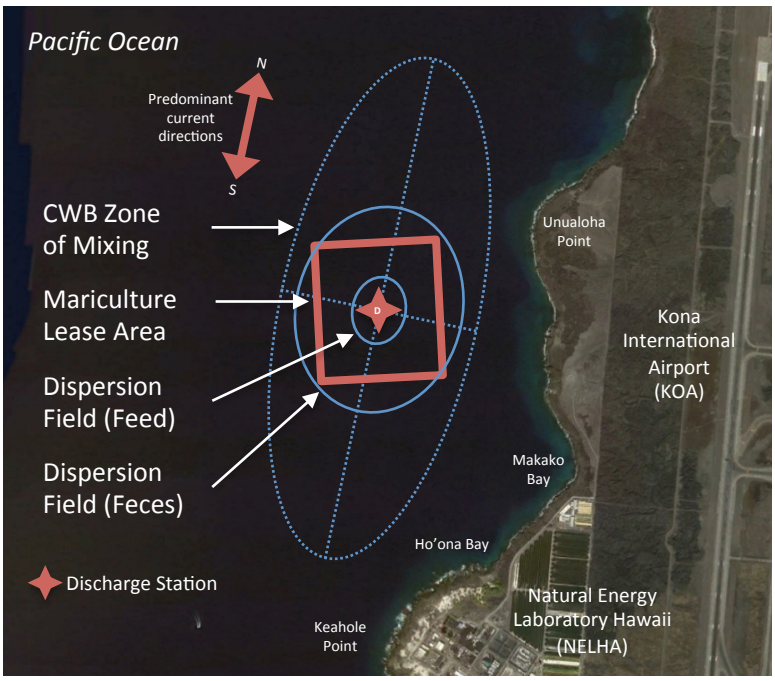
Potential Benthic Impacts (Sediment Carbon Loading Model)

Changes in organic carbon levels in the benthos can be correlated with nutrient loading from fish farms (Giles 2008) (Hargrave 2008) (Hall 1990). However, estimating the benthic impacts of C loading is complex and models are sensitive to site-specific parameters, particularly local hydrology (Chamberlain 2007). Organic carbon accumulation in the sediment (measured as grams of C per square meter per day) is one of the end points of analysis and several estimation models such as DEPOMOD have been developed (Cromey 2002). Research continues in this area to refine the models based on site-specific parameters.

A simplified Sediment Carbon Loading Model (SCLM) was created for this DEA to estimate the amount and dispersion of C sediment accumulation based on expected production under the Proposed Action. The two primary vectors for C accumulation are uneaten feed (feed loss) and biomass effluent (feces) settling to the bottom. A third

vector, periodic removal of biofouling from the net pens, is discussed separately. Impacts from feed loss and feces are modeled independently to account for the large difference in dispersion areas due to different settling velocities. Settling rates for feed loss and feces are estimated at 0.088 m/s (Vassallo 2006) and 0.025 m/s (Cromey 2002) (Rensel 2013), respectively. Ocean current speeds and direction frequency are used to define elliptical dispersion areas for C accumulation (Figure 17). The dispersion fields for feed and feces are both well within the ZOM defined by the NPDES permit.

Figure 17: Estimated Carbon Dispersion Fields



The SCLM model calculates the estimated C accumulation rates for feed loss and feces (g C m^2 day) by estimating the base C sedimentation rates, subtracting the amount of C resuspended into the water column (benthic flux) and dispersing the remaining amount of C across the respective dispersion fields for feed loss and feces (Table 16). The total amount of C input to the system is estimated as 50% of the total amount of feed input (EWOS personal communication). The amount of feed loss is 3% based on Farm Site experience. The amount of C reaching the seabed through feed loss is estimated at 95% as only minor changes to the feed take place during the drop (Hall 1990). Estimates for the amount of C reaching the seabed through feces discharge range from 8.8 (Nash, 2001) to 23% (Wu 1995). The high flushing rate and coarse sand bottom put the Farm Site at the low end of this range and a value of 9% is used. The estimate for benthic flux, primarily resuspension of particles off the bottom, is 20% (Hall 1990). The SCLM estimates that approximately 29 T C and 86 T C accumulate in the sediment per year from feed loss and feces, respectively. These amounts are dispersed across their respective dispersion areas for estimated C accumulation rates of 1.7 g C m^2 day for feed loss and 0.4 g C m^2 day for feces.

Table 16: Sediment Carbon Loading Model (SCLM)

Estimated Carbon Input
based on 1,100 T Production at 2.3 FCR
= 2,530 T Feed at 50% C
= 1,265 T C in Feed Input

Factor	Feed Loss	Feces
Feed Loss	3% = 38 T	N/A
Sedimentation Rate	95% = 36 T	9% = 108 T
Benthic Flux	20% = 7 T	20% = 22 T
Sediment Accumulation	29 T C yr	86 T C yr
Dispersion Field	45,274 m^2	560,962 m^2
Sediment Accumulation Rate	**1.7 g C m^2 day**	**0.4 g C m^2 day**

Impacts from sediment accumulation vary widely depending on the nature of the background environment and local hydrology (Price 2013). However, broad surveys of aquaculture sites indicate that moderate oxygen stress does not begin to develop until sediment accumulation rates are 2.0 to 5.0 g C m^2 day, and anoxic conditions typically require more than 10.0 g C m^2 day (Hargrave 2008) (Chamberlain 2007). The sediment accumulation values under the Proposed action are associated with normal, oxic conditions in which the benthos has an ongoing capacity to assimilate additional nutrients.

Although not included in the SCLM, the removal of net pen biofouling also contributes to the sediment carbon load, but in smaller amounts than contributed by feed loss and feces. As discussed in Section 2.1, the amount of biofouling produced annually under the Proposed Action is approximately 500 to 1,500 kg (dry weight). Blue Ocean typically removes fouling buildup about once per quarter. Assuming the biofouling contains 50% C, an additional 250 to 750 kg C will be added to the sediment load per year, or about 0.4% of the C load added by feed input under the SCLM (0.5 T C from biofouling ÷ 115 T C from feed input). The dispersion area for this sediment load is likely similar to the dispersion area for feces given the high water content of biofouling (although coralline-type fouling will fall more quickly and stay closer to the net pens).

The results of the SCLM and biofouling estimates, along with the consistency of discharge and control site readings for ORP and TOC, indicate that the increased benthic

nutrients expected under the Proposed Action will not have a significant impact on the environment. The relatively small size of the Farm Site and its discharge, combined with strong ocean currents and a coarse sand benthos, indicate minimal impact. In addition, the impact area appears to be limited to the benthos immediately under the net pens, well within the Farm Site lease area and NPDES permit Zone of Mixing boundaries.

Benthic Impact Mitigation

Blue Ocean continues to work on benthic impact mitigation strategies, including development of new technologies to reduce feed loss (e.g., video monitoring of feed events, greater precision in feed delivery equipment), improvements in feed digestibility to reduce the amount of nutrients lost to the environment (Rust 2011).

5.4 Wildlife

Fish Populations

Concerns about the environmental impacts of the Proposed Action on local fish populations are primarily focused on the potential for:

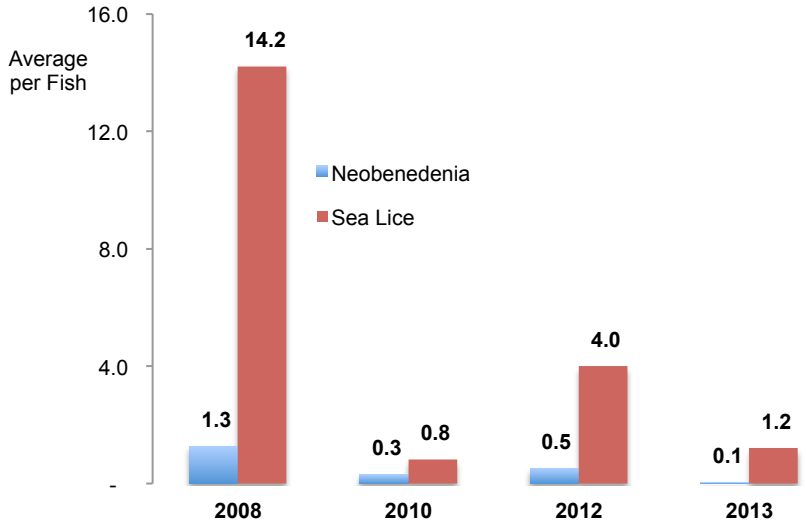
- Transmission of disease from farmed fish to wild fish.
- Transmission of ectoparasites (*Neobenedenia*) from farmed fish to wild Kahala.
- Escaped fish to reduce the genetic fitness of wild populations or become invasive.

Disease Transmission. Intensive culture (large numbers of animals in an enclosed containment system) creates the potential for disease development in any farming system. Containment allows the reinfection cycle to iterate through the enclosed population and a subsequent buildup of disease intensity can follow. However, this reinfection cycle is typically broken in wild populations where fish are able to swim away at various points in the cycle, or the population is not of sufficient density to allow the disease to reach critical mass (Nash 2005). In addition, studies have shown that, within a few meters of net pens experiencing an outbreak of disease, the level of pathogens is insufficient to cause disease in nearby healthy wild or farmed fish (Nash 2005).

Disease outbreaks at the Farm Site are extremely rare. The only disease incident over the past five years was a series of bacterial infections in 2010, from strains of *Vibriosis sp*., which are commonly found in marine environments. The infections were the direct result of a specific nutritional deficiency in the feed. Once the deficiency was identified, Blue Ocean switched to a new feed supplier and the health of the farm population recovered immediately. No evidence of disease transmission to wild populations was observed. To mitigate this risk in the future, Blue Ocean delivers basic vaccinations prior to stocking fish offshore, maintains low stocking densities in farm populations, and closely monitors the nutritional composition of its feed supply.

Ectoparasite Transmission. Ectoparasites of pelagic fish occur naturally in all marine environments, with particular species of fish being susceptible to particular species of ectoparasites. The primary ectoparasite for *Seriola sp*. is *Neobenedenia sp*., a monogenean (Dr. Teresa Lewis, Hawaii Institute of Marine Biology, 2007 personal communications). *Neobenedenia* is common to wild *Seriola sp*. throughout the world and can build-up in intensity on cultured fish at the Farm Site. Blue Ocean monitors the potential for *Neobenedenia* transmission from Farm Site fish to local wild Kahala by sampling the ectoparasite levels on wild Kahala along the Kona Coast (CDUP HA-3497, Ectoparasite Monitoring Plan). Results from the Ectoparasite Monitoring Plan indicate no buildup of *Neobenedenia* on wild fish (Figure 18). *Neobenedenia* levels are consistently low on wild Kahala and the predominant ectoparasite observed is Sea Lice (Family Caligidae), a copepod. Sea Lice have never been observed on Farm Site fish.

Figure 18: Ectoparasite Prevalence on Wild Kahala



Blue Ocean mitigates the buildup of *Neobenedenia* on its farmed fish through reduced stocking densities and the use of hydrogen peroxide baths, which remove ectoparasites without harming the fish. The ectoparasite monitoring analysis and mitigation strategies indicate that the Proposed Action is unlikely to result in transmission of ectoparasites from farmed fish to wild fish populations.

Impact of Escapes. In the past, concerns have been raised that escaped farmed fish may reduce the genetic fitness of wild populations or become invasive (e.g., out-compete wild populations for food). Specifically, if a large number of cultured fish with traits developed under a selective breeding program escape and breed with wild conspecific fish, the characteristics may be passed down to offspring, making the wild fish less fit or less competitive.

The potential environmental impact from escaped fish is not significant. Blue Ocean does not conduct selective breeding, which is prohibited under its operating

permits. All brood fish are wild caught in the Kona Coast area as adults and thus come from the ecosystem along the Kona coast. They spawn naturally (without hormones), usually in groups, in brood tanks at the hatchery.

In addition, fish cultured at the Farm Site are harvested before they become sexually mature, and are unlikely to survive to become sexually mature in the wild. Observations of escaped fish at the Farm Site indicate that most remain in the general area of the farm and quickly become prey for predators. Farmed fish are adapted to eating delivered dry pellets and do not adapt to hunting or even accepting wild feed sources (Brown 2001). Trials conducted by KBWF in 2006 showed that farmed fish weaned on dry pellet feed would not accept offered squid or sardines. Similarly, the wild caught Kahala in Blue Ocean's brood program cannot be converted to dry pellet feed.

Dolphins

The Proposed Action is not expected to have a significant impact on the local dolphin population. Human-dolphin interactions are not permitted at the Farm Site and all Blue Ocean employees are required to acknowledge this policy in writing. Blue Ocean will continue to monitor and report dolphin activity around the Farm Site per the Marine Mammal Monitoring Plan.

Sharks

The Proposed Action is not expected to have a significant impact on the local shark population. Staffing levels will increase to ensure continuation of good animal husbandry practices such as daily mortality removal to eliminate new forage opportunities for sharks. Blue Ocean will continue to monitor and report shark activity around the Farm Site per its Shark Management Plan.

In October 2008, seven Tiger sharks were tagged along the Kona Coast and their movements were tracked in an attempt to quantify their fidelity to the Farm Site and to identify other areas visited by the sharks (Papastamatiou 2010). The sharks spent only a short period of time associated with the net pens at the Farm Site although several returned sporadically to the net pens over a 236 day period. These findings are consistent with the transient nature of Tiger sharks generally, and with Farm Site crew observations of Tiger shark behavior over the past seven years.

Seabirds

The Proposed Action is not expected to have a significant impact on seabirds. Seabirds are very rarely seen around the Farm Site and no new attractants are proposed. Blue Ocean will continue to monitor and report seabird activity around the Farm Site per its Seabird Monitoring Plan.

Aquatic Invasive Species

The Proposed Action is not expected to significantly increase the risk of Aquatic Invasive Species (AIS) being introduced to Hawaii through the Farm Site. The Proposed Action does not create a new vector for AIS introduction to local waters beyond the existing vector of workboat activity at Honokohau Harbor. Regular net pen cleaning removes a long-term habitat development opportunity for potentially invasive algae and coral species. It is also unlikely that invasive species would be able to displace more abundant native species of algae and coral during the short periods between cleanings.

5.5 Rare, Threatened and Endangered Species

Four species of threatened or endangered species were identified in Section 4.5. The potential risk to these species under the Proposed Action is not significant. The potential risk usually noted for these species is risk of entanglement with anchor lines, net pens or other mooring equipment. There have been no incidents of entanglement with threatened or endangered species in the history of the Farm Site. Blue Ocean mitigates the risk entanglement by keeping all anchor lines and mooring system lines are taut, with no opportunity for wrapping or entanglement, and by keeping all netting taut or rigid, eliminating animal entanglement issues with loose netting. The Farm Site will continue to record and report all marine mammal observations under its Dolphin Management Plan and Marine Mammal Observation Plan.

5.6 Scenic & Recreational Resources

The Proposed Action is not expected to have a significant impact on scenic and recreational resources. The scenic impact of the increase in the number of net pens from 5 to 8 is very low, particularly for submersible net pens. All mooring system changes will occur below the ocean's surface and in the same location as the existing Farm Site. No changes are proposed to recreational access to the Farm Site for tour or charter boats.

5.7 Historical & Cultural Resources

The Proposed Action is not expected to have a significant impact on historical and cultural resources. No changes in the Farm Site location or mariculture lease area are proposed. As discussed in Section 4.7, no historical or cultural resources have been identified at the existing Farm Site location. Blue Ocean will continue to monitor the Farm Site location for historical resources according to its Historic Resources Management Plan (CDUP HA-3497).

6 PRELIMINARY DETERMINATION

Based on analysis of the 13 significance criteria listed below (HAR 11-200), the Proposed Action is not expected to result in significant environmental impacts when conducted within the constraints of the required permits. Pending comments received from agencies and the public, a Finding of No Significant Impact (FONSI) is anticipated.

1. **Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.**

   The DEA indicates that the increased nutrient loads under the Proposed Action will not create a significant loss or destruction of any natural resource, including the local water column or benthos. No cultural resources have been identified at the Farm Site and no changes are proposed to the Farm Site location.

2. **Curtails the range of beneficial uses of the environment.**

   No changes to the existing beneficial uses of the environment are proposed.

3. **Conflicts with the State's long-term environmental policies or goals and guidelines.**

   The DEA indicates that the increased nutrient loading and potential water quality and benthic impacts under the Proposed Action are consistent with the environmental policies established under HRS Chapter 344 and water quality standards set under HAR 11-54-06.

4. **Substantially affects the economic or social welfare of the community or state.**

   The Proposed Action will provide direct economic and social benefits to the local community and State in the form of skilled employment, increased expenditure on local services and revenue. Private investment will be used to finance the project.

5. **Substantially affects public health.**

   The Proposed Action does not impact public health.

6. **Involves substantial secondary impacts such as population changes or effects on public facilities.**

   The Proposed Action will not have a substantial secondary impact. No new onshore infrastructure is required, hence no new effect on public facilities.

7. **Involves a substantial degradation of environmental quality.**

The DEA indicates that the increased nutrient loads and potential impacts on water quality and the benthos under the Proposed Action are not substantial. The incremental nitrogen and phosphorus loads under the Proposed Action are approximately 0.35% and 0.33% of background levels, respectively. At these levels, the Farm Site is projected to remain well within the permitted nutrient load limits set forth under the NPDES permit. Also, the sediment carbon load projected under the Proposed Action is well within normal, oxic conditions in which the benthos has an ongoing capacity to assimilate additional nutrients.

8. **Cumulatively has a considerable effect on the environment or involves a commitment for larger actions.**

   The primary area of environmental concern is the potential impact of additional nutrients on the local water column and benthos. Experience with mariculture sites around the world indicates that such impacts are reversed within a few months to a year after removal of the mariculture operation (reference). The Proposed Action does not require a commitment to larger actions.

9. **Substantially affects a rare, threatened or endangered species or its habitat.**

   The incremental anchor legs under the Proposed Action do not create a substantial new risk for rare, threatened or endangered species. The amount of anchor line and mooring rigging under the Proposed Action will be less than has been approved at the Farm Site in the past, with no negative impact.

10. **Detrimentally affects air or water quality or ambient noise levels.**

    The DEA indicates that the increased nutrient loading and potential water quality impacts under the Proposed Action are not significant. The Proposed Action will not impact air quality or ambient noise levels.

11. **Affects or is likely to suffer damage by being located in an environmentally sensitive area.**

    The Farm Site will not be affected by being in an environmentally sensitive area.

12. **Substantially affects scenic view planes or vistas.**

    The Proposed Action involves modifications to an existing mariculture project, with no change in location. The proposed infrastructure changes are minor and will not significantly alter existing scenic view planes or vistas.

13. **Requires substantial energy consumption.**

    The offshore Farm Site does not consume energy. Increased fuel consumption for vessels and shore-based facilities will be minor.

7 CONSULTATIONS

The following agencies and groups were consulted in the preparation of this Draft Environmental Assessment.

- State of Hawaii DLNR (Office of Conservation and Coastal Lands)
- State of Hawaii DLNR (Division of Aquatic Resources)
- State of Hawaii DLNR (Chair)
- State of Hawaii DLNR (Deputy Director for Water Resource Management)
- State of Hawaii DOH (Clean Water Branch)
- State of Hawaii DOA (Aquaculture Development Program)
- State of Hawaii DOA (Animal Industry Division, Disease Control)
- State of Hawaii DOA (Deputy to Chairperson)
- National Energy Laboratory of Hawaii Authority
- University of Hawaii (College of Tropical Agriculture and Human Resources)
- U.S. Army Corps of Engineers, Regulatory Branch
- NOAA (Aquaculture Program)
- NOAA (Hawaiian Islands Humpback Whale National Marine Sanctuary)
- NOAA (Protected Resources)
- NOAA (Essential Fish Habitat)

Blue Ocean received initial letters of support for the Proposed Action from the following groups and people (Appendix A-1).

- Kona Cold Lobster
- Pineapple Custom
- Cyanotech
- Maria Haws
- International Marine Products, San Francisco
- International Marine Products, Los Angeles
- Seattle Fish
- Uoriki Fresh
- Samuels & Son
- Commodity Forwarder's Inc.
- OceanSpar, Inc.

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APPENDIX A-1 (PRE-CONSULTATION CORRESPONDENCE)

KONA COLD LOBSTERS LTD.
73-4460 QUEEN KAAHUMANU HWY. #103
KAILUA-KONA, HI 96740
TEL 808 329-4332 FAX 808 326-2882
www.konacoldlobsters.com

April 8, 2014

To: Mr. Samuel Lemmo, Administrator
Department of Land and Natural Resources
Kalanimoku Building, Room 131
115 Punchbowl St.
Honolulu, HI 96809
Re: Support Letter for Blue Ocean Mariculture Expansion

Kona Cold Lobsters Ltd. (KCL) is a tenant at the Natural Energy Laboratory of Hawaii Authority (NELHA) since 1987. Originally KCL researched and completed the life cycle of the Maine lobster in captivity using the NELHA deep cold seawater resources. KCL has been holding and shipping live seafood throughout Hawaii since 1993. KCL uses it certified processing facilities to pack all of Blue Ocean Mariculture (BO) and its predecessor companies kampachi harvests since 1998. KCL proudly purchases and distributes Hawaiian grown kampachi througthout the state of Hawaii.

Kampachi have been raised in open ocean cages off Keahole Point continuously since 2001. There has been ample opportunity to asssess the envirnomental compatibility of aquaculture operations with West Hawaii's Class AA waters standards. The habitat and water quality have been virtually unaffected by kampachi growing operations.

KCL believes BO's willingness to expand its operation is an opportunity for DLNR to help insure the economic sustainability of a successful fish aquaculture venture. Current production levels at 1 million pounds per year generate enough revenue to maintain viability. However the harsh seawater environment dictates significant maintenance requirements that can only be achieved with increased marginal revenues and economies of scale.

The ability of the natural seawater resource to support an exportable product grown in Hawaii while demonstrating compability with strict environmental standards sets an example for other worldwide aquaculture operations. This is an opportunity for state government to step up and perform its role in support of successful public/private partnership that uniquely benefits all the citizens of the state of Hawaii.

Philip L. Wilson III
Vice President Kona Cold Lobsters Ltd.

Pineapple Custom
Tate Marks
73-1247 Old Home Stead Rd
Kailua-Kona, HI 96740

May 30, 2014

Department of Land and Natural Resources
Office of Conservation and Coastal Land
Kalanimoku Building
1151 Punchbowl St, Room 131
Honolulu, HI 96813

To Whom It May Concern:

I am writing to express my support for Blue Ocean Marculture's Offshore Farm Site Expansion.

My name is Tate Marks, a local business owner here at the Honokohau Small Boat Harbor and Marina in Kailua-Kona, HI. I have conducted business with Blue Ocean Mariculture for several years. In the past, they have presented as a respectful business in the area.

I look forward to a long future here in Kailua-Kona, HI alongside Blue Ocean Mariculture and expect to hear great things from their farm expansion.

Thank you for your consideration.

Aloha,

Tate Marks
Pineapple Custom

Cyanotech

www.cyanotech.com

Mr. Sam Lemmo
Administrator
Hawaii Department of Land and Natural Resources
Kalanimoku Building, Room 131
1511 Punchbowl
Honolulu, HI 96809

June 3, 2014

Re: Blue Ocean Mariculture

Dear Mr. Lemmo,

I would like to express my support, for Blue Ocean Mariculture's plan to expand production capacity at their offshore farm site. The State of Hawaii has the potential to be a leader in domestic, marine aquaculture production, if businesses such as Blue Ocean are allowed to grow. As Executive Vice President and Chief Science Officer of Cyanotech Corporation, I am very familiar with the aquaculture industry around the State. Cyanotech came to NELHA in 1984 and we are now NELHA's largest tenant occupying 90 acres and are the largest exporter of aquaculture products in the State of Hawaii. Cyanotech's facilities are just onshore of the Blue Ocean farm site, and less than a half mile away from their hatchery facility. We have a friendly, professional relationship with their onshore staff and are deeply invested in how they manage their environment offshore.

The farm has been in operation since 2005, and the Company has demonstrated the ability to raise a great fish while maintaining the pristine environment. Based on Blue Ocean's assessment of their projected production and the environment surrounding their farm site, it seems that the quality of the waters off of Kona will be maintained, even after increasing their production.

Hawaii must continue to support diversification of its agriculture industry, in order to increase our food security and bolster our economy. Blue Ocean's production keeps food in the local market, and sends exports nationwide, helping to solidify Hawaii's reputation as a producer of high quality, high value products. Aquaculture also provides employment for a wide range of skill sets, from general labor to highly skilled professional, and these employees proudly act as stewards to the surrounding environment. The attributes of the industry and the company specifically allow me to support Blue Ocean's request for expansion.

Thank you for your consideration,

Sincerely,

Gerald R. Cysewski

Gerald R. Cysewski, Ph.D.
Chief Science Officer

73-4460 Queen Kaahumanu Highway, #102 • Kailua-Kona, Hawaii 96740
Phone: 808.326.1353 • Fax: 808.329-3597 • e-mail:info@cyanotech.com

Form #QS-08 Rev#3 12/28/2010

June 3, 2014

Mr. Sam Lemmo
Administrator
Hawai`i Department of Land and Natural Resources
Kalanimoku Building, Room 131
1511 Punchbowl
Honolulu, HI 96809

Re: Blue Ocean Mariculture

Dear Mr. Lemmo:

I would like to express my support for Blue Ocean Mariculture's plan to expand production capacity at their offshore farm site. First, I would like to clarify that although I am a State of Hawai`i Employee (Director, Pacific Aquaculture and Coastal Resources Center, University of Hawai`i Hilo), I am writing this letter as a private citizen and in my capacity as an aquaculture expert. My expertise in this area has been obtained through work in research and extension in Hawai`i over the last fifteen years, as well as over twenty-five years of experience with aquaculture development around the world. Part of my professional experience includes a focus on the environmental aspects of mariculture and development of Good Management Practices for aquaculture. Consequently, I have had the opportunity to follow the progression of the Kona farm since its inception.

After eight years of operations, it is clear that a high quality product can be grown in an environmentally responsible manner. Based on Blue Ocean's assessment of their projected production and the environment surrounding their farm site, it seems that water quality on the Kona coast will be maintained, even after increasing their production.

Hawai`i imports over 50% of its seafood and the U. S. imports over 80%. We cannot be certain that our imported seafood is produced sustainably and hence we as residents of Hawaii must take the responsibility to produce our own seafood using the best possible practices as determined by aquaculture and environmental science. By allowing small businesses like Blue Ocean to grow, we begin to ensure food security for our state and nation, provide employment opportunities for people of many different skill sets and increase the diversity of Hawaii's agriculture industry. With this expansion new jobs will be created and more revenue will be infused into the local economy. I hope the State of Hawai`i will make evidence-based decisions so that we can make sustainable use of our marine resources.

Best regards,

Maria Haws, Ph.D.

INTERNATIONAL MARINE PRODUCTS, INC.

Mr. Samuel Lemmo, Administrator
Department of Land and Natural Resources
Kalanimoku Building, Room 131
1151 Punchbowl
Honolulu, HI 96809

Dear Mr. Lemmo,

I am Glenn Sakata from International Marine Products, Inc in San Francisco. We are a seafood wholesaler/distributor with branches located along the west coast in Los Angeles, San Francisco, Las Vegas, Phoenix, Salt Lake City and plans for future branch openings. Established in Los Angeles in the early 1970's, we are one of the original companies to specialize in sushi grade seafood and have a fine reputation within the sushi and high end white table cloth chef community.

Hawaii Kampachi is one of our most important products that we sell at International Marine Products. It is a product that many of our chefs have committed to and are dependent on to promote their business. We find that the Hawaii Kampachi is an exceptional fish that is versatile enough to be used in many culinary applications including the sushi cuisine which we are known for. We have worked closely with Blue Ocean Mariculture to carefully promote the Hawaii Kampachi and to assure that the fish is well represented in terms of their eco friendly methods, quality of program and the area in which it is farmed. The Hawaii Kampachi definitely adds to the reputation of fine food products coming from Island of Hawaii along with coffee, pineapple, macadamia nuts and others.

We would like to give our support to Blue Ocean Mariculture for their expansion plans to increase sales and add to the local economy. We believe the expansion plan will help us be more competitive by stabilizing future supply as well as assure the availability of the right market size throughout the year. Our plan is to increase more sales in collaboration with Blue Ocean Mariculture production schedule.

Sincerely,

Glenn Sakata
Branch Manager
International Marine Products Inc, San Francisco Branch

330 Shaw Road, Unit E California 94080 Phone: (650)871-6816 Fax: (650)871-6787

INTERNATIONAL MARINE PRODUCTS, INC.

April 24, 2014

Samuel Lemmo
Administrator
Department of Land and Natural Resources
Kalanimoku Building, Room 131
1151 Punchbowl
Honolulu, HI 96809

RE: Blue Ocean Mariculture

Dear Mr. Lemmo:

We are sending you this letter to show our support for Blue Ocean Mariculture ("Blue Ocean") and its future business expansion plan.

Since our establishment in 1968, International Marine Products has been one of the most reputable and high-quality seafood distributors in the West Coast. We always seek for partners that not only can produce seafood products with the highest possible quality, but also that can be environmentally responsible.

From our own experience, Blue Ocean has been a leader in promoting an environmentally responsible fishery while not sacrificing quality in its products. It is at the forefront of marine finfish mariculture, and is dedicated to the development and use of sustainable mariculture practices. Blue Ocean's products, particularly "Hawaiian Kampachi", are highly respected and desired by our customers.

Needless to say, Blue Ocean's request to your office is an important necessity in our opinion, and we are proudly endorsing its request.

Sincerely yours,

Thomas Chen
Chief Financial Officer
International Marine Products, Inc.

500 East 7th Street, Los Angeles, CA 90014 | tel: (213) 893-6123 fax: (213) 680-0199 | info@intmarine.com www.intmarine.com

SEATTLE FISH Co

If it swims we have it.

Mr. Samuel Lemmo, Administrator
Department of Land and Natural Resources
Kalanimoku Building, Room 131
Honolulu, HI 96809

Dear Mr. Lemmo:

Seattle Fish Company has been a customer of Blue Ocean Mariculture since inception, October, 2011. Hawaiian Kampachi is an integral part of our premium product mix for our white table cloth restaurants and high end Whole Foods retail stores. Year round stock is extremely important and critical to keep a continuous supply. Blue Ocean Mariculture is an excellent business partner with superior service and delivery, providing a sustainable, fresh product. Demand for Hawaiian Kampachi is growing in our region and are encouraged Blue Ocean Mariculture is dedicated to expanding to meet those needs.

Sincerely,

James Iacino
President
Seattle Fish Company

6211 East 42nd Avenue | Denver, CO 80216 | 303.329.9595 | SeattleFish.com

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Mr. Samuel Lemmo, Administrator
Department of Land and Natural Resources
Kalanimoku Building, Room 131
1151 Punchbowl
Honolulu, HI 96809

April 24, 2014

Dear Mr. Lemmo,

Uoriki Fresh Inc is a US company (C corp), a subsidiary of Uoriki Co Ltd of Tokyo, Japan. We employ 20 people (all US residents – no transferees).

We are a leading distributor of all-natural, sustainable, and clean sushi ingredients in North America.

Our company is focused on not only supplying the sushi market, but also changing it to use the best ingredients – grown or harvested in the USA, where possible.

We have a program called American Sashimi® which proudly presents local products. I have attached some information on that program for your review.

The star of this program is Hawaiian Kampachi.

From a standing start 14 months ago, we currently move 7,000 lbs per month of finished Hawaiian Kampachi product into the sushi trade in the US and Caribbean region. This is approximately 16,000+lbs round fish.

Our customers consider this the best tasting fish in sushi and it has replaced imports.

There currently exists the opportunity for substantial expansion were we able to secure more fish. Conservatively 4 times more in the short term and as much as 15 to 20 times that in the longer term.

Blue Ocean Mariculture is an example of aquaculture at its very, very best. One need only look at the customer list to know this. Whole Foods is a nationally recognized retailer of natural and high quality products - and they have approved this fish.

Given America's rising demand for seafood and its current import of more than 80% of that need, I wholeheartedly encourage supporting the companies who have invested to do fish farming properly and promote them as an example in the industry. Let's bring more jobs home, and produce more great products at home just like this one.

I am happy to discuss this with you at any time.

Sincerely yours,

Michael McNicholas
VP Operations

SAMUELS & SON SEAFOOD

Mr. Samuel Lemmo
Department of Land and Natural Resources
Kalanimoku Building, Room 131
1151 Punchbowl St.
Honolulu, HI 96809

Dear Mr Lemmo,

I am writing this letter in regards to Samuels and Son Seafood support of Blue Ocean Mariculture and their consideration of future expansion.
Since our inception in 1989, we have been one of the most reputable and environmentally responsible distributors of fresh and frozen high-quality seafood on the East Coast. Samuels Seafood along with our customer base, pride ourselves in seeking partners that produce seafood of the highest possible quality, but who are also are environmentally responsible. Blue Ocean meets that criteria and has been an important business partner, because they share this philosophy and simply provide us with a wonderful product.
The Blue Ocean Hawaiian Kampachi has been a successful part of our premium, sustainable product line offering to high-end white tablecloth restaurants, sushi bars and retailers alike. There are many unique features of the Kampachi product which make this fish very attractive to our customer base;

- Year-round availability
- Important and Continuous supply
- Sustainability
- 'Grown in the USA'
- Promotion of the Clean and Exotic Waters of Hawaii

Many customers have replaced other less sustainable seafood and have chosen Hawaiian Kampachi because they feel it is fresher, better tasting and a more responsible choice. We therefore would be able to increase sale volumes of this high-quality product if production was there to support it.
I know personally of the fine stewards at Blue Ocean, their conservative use of both the water and land resources in which they operate and highly recommend this expansion. From my experience Blue Ocean has been a leader in promoting an environmentally responsible fishery, while not sacrificing the fish's quality.
Blue Ocean's request is important for the future of aquaculture and I highly endorse their request for expansion.

Yours truly,

Joseph J. Lasprogata
Vice President, New Product Development

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www.SamuelsandSonSeafood.com

COMMODITY FORWARDERS INC.
Transporting Perishable Products Worldwide
11101 S.La Cienega Blvd, Los Angeles, CA, 90045, tel: (310) 348-8855, fax: (310) 348-8979

April 28, 2014

Mr. Samuel Lemmo, Administrator
Department of Land and Natural Reswources
Kalanimoku Building, Room 131
1151 Punchbowl
Honolulu, Hi 96809

Dear Mr. Lemmo:

This letter is written in support of the offshore expansion plans of BLUE OCEAN MARICULTURE of Kona, Hawaii.

The named company is a loyal customer of my firm and has supported us in our transportation needs from and to the Island.
They are providing employment for our people in Kona and their support has been outstanding.

We have done business with Blue Ocean Mariculture for the last 5 years and can assure you that they are of the finest quality in the conduct of business.

I know personally that they are fine stewards of the water and land resources in which they operate and highly recommend that their application is given a favorable response.

This company if good for the Big Island and good for all of Hawaii.

Respectfully yours,

COMMODITY FORWARDERS, INC.

Alfred P. Kuehlewind
Founder and CEO

OceanSpar

Mr. Sam Lemmo
Administrator
Hawaii Department of Land and Natural Resources
Kalanimoku Building, Room 131
1511 Punchbowl
Honolulu, HI 96809

3 June 2014

Re: Blue Ocean Mariculture

Dear Mr. Lemmo,

I would like to express my support, for Blue Ocean Mariculture's plan to expand production capacity at their offshore farm site. OceanSpar, Inc. has been deeply involved with the farm since its inception, having installed, engineered and collaborated on technical aspects of almost all of the pens that have been used on that farm over the past 8 years.

As the President of OceanSpar I have had the opportunity to work with aquaculture farms around the world. Having seen may other operations and having worked extensively in Kona, it is clear that a high quality product can be grown in an environmentally responsible manner, at the Kona farm site. Based on Blue Ocean's assessment of their projected production and the environment surrounding their farm site, it seems that the quality of the waters off of Kona will be maintained, even after increasing their production.

The United States imports over 80% of our seafood, over half of which is farmed in other countries. By allowing small businesses like Blue Ocean to grow, we begin to ensure food security for our nation, provide employment opportunities for people of many different skill sets and increase the diversity of our agriculture industry. With this expansion over ten new jobs will be created and more money will be infused into the local economy. These positive attributes are, again, why I am expressing my support.

Thank you for your consideration,

Langley Gace
President

OceanSpar, Inc. • 8001 NE Day Road West • Bainbridge Island, WA 98110 • +1 (206) 947-1483