Draft
Environmental Assessment

Proposed Expansion of Hukilau Foods Offshore Fish Farm, Mamala Bay, Oahu, Hawaii

Prepared for: Office of Conservation and Coastal Lands
Department of Land and Natural Resources

Prepared by: Aquaculture Planning & Advocacy LLC
Honolulu, Hawaii

March 5, 2009

Project Summary

Project Name:	Proposed Expansion Hukilau Foods Offshore Fish Farm
Proposed Action:	Expand the current 28 acre State ocean lease to 61 acres and increase the size and number of submersible sea cages from four (4) 3000 m^3 to eight(8) 6000 m^3. A feed/security barge is to be permanently moored on site. Limited site use by the public is requested by restricting snorkeling or SCUBA diving or anchoring of any boat in the leased area.
Applicant:	Grove Farm Fish and Poi LLC dba Hukilau Foods LLC P. O. Box 335 Kailua, Hawaii 96734 Contact: Randy Cates Phone: 808-841-4956 Email: rcates@hukilaufoods.com
Approving Agency:	Department of Land and Natural Resources Office of Conservation and Coastal Lands Honolulu, Hawaii 96809
EA Preparer:	Aquaculture Planning & Advocacy LLC c/o Hukilau Foods P.O. Box 335 Kailua, Hawaii 96734 Contact: John Corbin Phone: 808-239-8316 Email: jscorbin@aol.com
Project Location:	Expansion seaward of existing offshore lease site approximately 2 miles offshore of Ewa Beach, Oahu, in water depths between 140ft and 250 ft
Tax Map Key:	Seaward of nearest TMK: (1) 9-1-27
State Land District:	Conservation District and Resource Subzone
Land Owner:	State of Hawaii
Permits Required:	CDUP, DLNR; Dept. of Army Section 10 Permit; NPDES/ZOM Permit
Anticipated Determination:	Finding of No Significant Impact (FONSI)

Table of Contents

	Page
Summary	3
Table of Contents	4
List of Figures	5
List of Tables	6
List of Appendices	6
Conversion Table	6
List of Acronyms and Abbreviations	7
Section 1.0 Introduction	8
1.1 Proposed Project In Brief	8
1.2 Potential Community Benefits	8
1.3 Permits and Approvals Required	9
1.3.1 Federal	9
1.3.2 State	9
Section 2.0 Company History	9
Section 3.0 Proposed Action	10
3.1 Technical and Operational Characteristics	10
3.1.1 Location and Technical Characteristics	10
3.1.2 Major Operational Characteristics	16
3.2 Economic Characteristics	22
3.3 Socio-cultural Characteristics	22
3.3.1 Multiple Use Issues	22
3.3.2 Cultural Resources	23
3.3.3 Other Characteristics	23
3.4 Environmental Characteristics	24
3.4.1 Operations	24
3.4.2 Increased Fish Production	24
3.4.3 Proximity to a Coral Reef	25
Section 4.0 Alternatives to the Proposed Action	25
4.1 Preferred Alternative	25
4.2 Other Alternatives	26
4.3 No Action Alternative	26
Section 5.0 Description of the Environment	27
5.1 Regional Setting	27
5.2 Climate	27
5.3 Ocean Setting	27

5.3.1. Waves and Currents 27
5.3.2 Water and Sea Floor Quality 28
5.4 Fauna and Flora 32
5.5 Rare, Threatened and Endangered Species 33
5.6 Ocean Activities 33
5.7 Scenic and Visual Issues 34
5.8 Historical and Cultural Resources 34

Section 6.0 Potential Impacts and Mitigation Measures 34

6.1 Short Term Impacts 34
6.2 Long-term Impacts 36
6.2.1 Water and Sea Floor Quality 36
6.2.2 Fauna and Flora 37
6.2.3 Rare, Threatened and Endangered Species 39
6.2.4 Ocean Activities 39
6.2.5 Noise and Air Quality 40
6.2.6 Aesthetics 40
6.2.7 Historical and Cultural Resources 40
6.2.8 Cumulative Impacts 41
6.2.9 Irreversible and Irretrievable Commitment of Resources 41

7.0 Relation to State Constitution, Plans and Policies 42

7.1 State Constitution 42
7.2 State Plan Law 42
7.3 State Environmental Policy 43
7.4 Coastal Zone Management 44
7.5 Ocean Leasing Law 44
7.6 Ocean Resources Management Plan 44
7.7 Hawaii 2050 Sustainability Plan 45

8.0 Agencies, Organizations and Individuals Consulted 45

8.1 Federal Agencies 45
8.2 State Agencies 45
8.3 County Agencies 46
8.4 Other Organizations and Individuals 46

9.0 Preliminary Determination and Significance Criteria 47

10.0 References 50

List of Figures

Figure 1. Regional Map of Oahu Showing Project Site
Figure 2. South Shore of Oahu with Location of the Project Site and Sites of Interest
Figure 3. Site Location in Vicinity of Ewa Beach, With Water Depths and Bottom Types
Figure 4. Individual SS 6000 Cage, a) Side View and b) Top View
Figure 5. a) Current Approved Cage Layout, b) Expanded Cage Layout
Figure 6. Prototype Feed and Security barge On the HF Site

Figure 7. Danforth Anchor System
Figure 8. Fresh Moi Being Prepared For Steaming
Figure 9. Stocking of Moi Fingerlings In a Submerged Cage
Figure 10. Moi Harvested From a Submerged Cage Using a Pump
Figure 11. Power Washer Used to Clean Submerged Cage Netting
Figure 12. Current Patterns In the Vicinity of the Hukilau Foods Site
Figure 13. Map of Current NPDES/ZOM Permit Sampling Sites
Figure 14 Photo of Ocean Bottom in the Expanded Site

List of Tables

Table 1. Specific Criteria for Open Coastal Waters, Chapter 54 HAR

Table 2. Summary of Seven Years of Water Quality Sampling at the Hukilau Site

List of Appendices

Appendix 1. Current Meter Test Data

Appendix 2. Pre-consultation Correspondence

Appendix 3. Cultural Resources Assessment

Appendix 4. Common Names of Resident and Transient Marine Species HOARP Site

Conversion Table

This DEA utilizes both English and Metric Units. Utilize the values below to convert English Units to Metric Units and Metric Units to English Units. N= value to be converted.

- feet to meters= N x .3048
- meters to feet= N x 3.281

- inches to centimeters = N x 2.54
- centimeters to inches = N x .3937

- miles to kilometers = N x 1.609
- kilometers to miles = N x .6214

- meters^3 to feet ^{3} = N x 35.312
- feet ^{3} to meters ^{3} = N x .0283

- acres to meters ^{2} = N x 4046.86
- meters ^{2} x acres = N x .000247

- pounds to kilograms = N x .4536
- kilograms to pounds = N x 2.205

- knots to feet/sec = N x 1.67
- knots to cm/sec = N x 50.9

List of Acronyms and Abbreviations

ACOE	Army Corps of Engineers
ADP	Aquaculture Development Program
BLNR	Board of Land and Natural Resources
CDUP	Conservation District Use Permit
CWB	Clean Water Branch
DA	Department of the Army
DAR	Division of Aquatic Resources
DBOR	Division of Boating and Ocean Recreation
DLNR	Department of Land and Natural Resources
DOA	State Department of Agriculture
DOH	State Department of Health
DEA	Draft Environmental Assessment
DOT	State Department of Transportation
EA	Environmental Assessment
FAD	Fish Aggregating Device
FCR	Feed Conversion Ratio
FONSI	Finding of No Significant Impact
HAR	Hawaii Administrative Rules
HF	Hukilau Foods
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HOARP	Hawaii Offshore Aquaculture Research Project
HRS	Hawaii Revised Statutes
KBWF	Kona Blue Water Farms LLC
LLC	Limited Liability Company
NASA	National Aeronautics and Space Administration
NPDES	National Pollution Discharge Elimination System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OCCL	Office of Conservation and Coastal Affairs
OHA	Office of Hawaiian Affairs
SS	Sea Station
SCUBA	Self Contained Underwater Breathing Apparatus
UH	University of Hawaii
UHSG	UH Sea Grant
ZOM	Zone of Mixing

1.0 INTRODUCTION

Hukilau Foods LLC (HF), formerly Cates International, Inc. (CII), is proposing to increase the size of its existing offshore lease approximately two miles off Ewa Beach, Oahu, for expanded aquaculture of the native species, moi (*Polydactylus sexfilis)*. The purpose of this Draft Environmental Assessment (DEA) is to update the previous environmental review, pursuant to Chapter 343, Hawaii Revised Statutes (HRS), as amended, and Title 11, Chapter 200, Hawaii Administrative Rules (HAR), as amended. The updated review will be used in the process to amend the existing permits and the lease or secure new permits, as required.

1.1 PROPOSED PROJECT IN BRIEF

HF has a long-term lease for 28.077 acres of State marine waters, authorized on January 21, 2001 by the Department of Land and Natural Resources (DLNR). The Company is approved to operate four anchored Sea Station (SS) 3000 sea cages, each with a volume of 3000 m^3, and with a total production capacity of around 1.2 million pounds a year, with multiple crops. The farm has successfully operated for seven years with minimal environmental impact, using cages that are operated submerged 30 ft. to 40 ft. below the surface, in an average water depth of 140 ft. Stocking, harvesting and daily feeding and maintenance occurs from surface work boats and barges, with SCUBA diver assistance.

HF proposes to amend its existing lease to expand to a total of 61.59 acres and accommodate four additional larger structures, SS 6000 series cages, each with a volume of 6000m^3. The Company also proposes to change out the existing four cages for SS 6000 cages and reposition the initial mooring grid to accommodate the new configuration. The proposed changes will provide the potential to produce up to 5 million pounds of fish a year, with multiple crops. In addition, HF is requesting that a feeding/security barge be permanently moored (24/7) at the site, with lighting approved by the Coast Guard. With the expanded site and in consideration of staff and public safety, expanded operations and insurance liability, the Company is requesting that no snorkeling or SCUBA diving or anchoring of any boat be allowed in the entire lease area. Boats may continue to freely transit the area.

1.2 POTENTIAL BENEFITS

On a broad national level, this project will continue to demonstrate that commercial open ocean fish farming can be carried out in an environmentally sound, economically viable manner. Hawaii currently leads the nation in the development of commercial open ocean aquaculture with two operating companies (HF and KBWF) - the Secretary of Commerce has declared the state the Silicon Valley of aquaculture (Stanton, 2006). Going forward, US interests are expected to foster continued expansion of this industry sector in coastal waters around the country to increase domestically produced seafood supplies from their current contribution of only 20% of total US consumption (Corbin, 2007; NOAA, 2008).

HF strongly desires to benefit the Hawaii economy and residents statewide by focusing on two long-term goals: 1) Sustainably producing quality seafood that significantly contributes to satisfying the local demand for moi, before considering exportation, and 2) Hiring qualified Hawaii residents for the expansion of its work force. Among the foreseeable community benefits of the proposed project are: 1) generation of high wage, skilled jobs; 2) local purchasing of equipment and supplies; 3) local purchasing of services for administration, environmental monitoring, and repair of facilities; 4) increasing the supply of high quality seafood to resident and tourist markets; and 5) payment of lease rents to the State.

1.3 PERMITS AND APPROVALS

There are three major permits that govern siting and operating an offshore fish farm in State marine waters: the Federal Army Corps of Engineers (ACOE), Department of the Army (DA), Section 10 permit; a State Department of Land and Natural Resources (DLNR), Conservation District Use Permit (CDUP); and the State Department of Health (DOH), National Pollution Discharge Elimination System (NPDES)/Zone of Mixing (ZOM) permit. In addition, an Aquaculture License from the Division of Aquatic Resources (DAR), DLNR is also needed.

1.3.1. Federal

An ACOE Section 10 permit is required for structures or work in US navigable waters. Structures or work includes deploying anchors, mooring systems, and sea cages. The permit is issued by the Regulatory Branch, Honolulu District, USCOE. The public interest review of the application requires consultations with appropriate local agencies for potential impacts on: historic resources, protected species and critical habitat, as well as, consistency with State Coastal Zone Management Program objectives and policies.

1.3.2 State

A CDUP for commercial use of State marine waters and submerged lands is required from the Office of Conservation and Coastal Lands (OCCL), DLNR. All State marine waters are in the Conservation District, Resource Subzone and aquaculture is a permitted use in the Resource Subzone. After public review, the CDUP application, which requires attachment of an EA, is approved at a regularly scheduled meeting of the Board of Land and Natural Resources (BLNR).

The NPDES/ZOM permit issued by the Clean Water Branch (CWB), DOH, regulates fixed point source discharges into surface waters, including coastal waters. Offshore cage complexes (one or more cages on a site) are considered a point source discharge and need a NPDES/ZOM permit to operate when production exceeds 100,000 lbs. annually. Production less than 100,000 lbs. can be exempted from the permit requirement.

An aquaculture farm growing a species regulated by State fisheries management laws requires an Aquaculture License. Licenses are issued by the DAR, with technical assistance by the Aquaculture Development Program (ADP), Department of Agriculture (DOA).

2.0 COMPANY HISTORY

Chapter 190 D, HRS, the ocean and submerged lands leasing law, was amended in July 1,1999 by the State Legislature to permit leasing of State marine waters for commercial aquaculture. CII was the first company to apply for an ocean lease under the amended law. Company planning benefited from participation in the federally funded, comprehensive multi-year cage culture research project, the Hawaii Offshore Aquaculture Research Project (HOARP), which began in April, 1999 and demonstrated sea cage culture at a site several miles off Ewa Beach, Oahu (Ostrowski, et al, 2001).Based on its firsthand experience as part of the HOARP team, CII sought a lease adjacent and seaward of the research project site.

CII received an approved CDUP and authorization for a lease from DLNR, January 26, 2001.

Subsequently, on August 23, 2002, a General Lease to CII was approved by BLNR, encumbering 28.077 acres for operation of four cages. The term was 20 years, with a reopening and redetermination of the rent on the 10 year anniversary of the approval. Two SS 3000 cages were operated until April 14, 2003, when administrative approval was gained to deploy the third and fourth cages. Fingerlings, the baby moi needed to stock the cages, were supplied during this time period, through an arrangement with the Oceanic Institute for hatchery services.

Successful operation of the total four cage system approximately two miles offshore for nearly six years, demonstrated the commercial potential of submerged cage technology and marketability of moi in Hawaii and on the mainland. The feasibility of the technology was further underscored by the startup of Kona Blue Water Farms (KBWF) in March 2004 off Kailua-Kona, Hawaii using the same off-the-shelf cage technology. In 2006, Grove Farm, a kama`aina, Kauai-based agribusiness firm, expressed interest in investing in CII to significantly expand production. As a result, Grove Farm formed the subsidiary Grove Farm Fish and Poi LLC, which acquired CII, and rebranded the operation as Hukilau Foods LLC. Ownership of CII was officially transferred to Grove Farm Fish and Poi LLC on April 1, 2006.

In looking towards the future, the new company has acquired a lease from the DOA for four acres in the Kalaeloa Agricultural Park, near Campbell Industrial Park. The site is being used to build a large-scale hatchery to secure a large and consistent supply of fingerlings to stock the offshore cages. With the facility under construction and staffed with experienced personnel, HF is now seeking to expand its existing lease and production to realize the economic benefits of an integrated hatchery/ cage grow out operation and the inherent economies of scale. HF will continue to operate other support facilities leased from the DBOR, DLNR at Keehi Lagoon. In addition to office space and general storage, these facilities provide feed storage, a maintenance shop and fish transfer and packing capabilities.

3.0 DESCRIPTION OF THE PROPOSED ACTION

3.1 TECHNICAL AND OPERATIONAL CHARACTERISTICS

3.1.1 Location and Technical Characteristics

HF is proposing to increase its existing open ocean State lease off Ewa Beach, Oahu for expanded sea cage culture of the native fish species, moi, *Polydactylus sexfilis* (Fig. 1 & 2). Current operations consist of four SS 3000 cages, each with a volume of 3000 m^3, and with a maximum total production capacity of 1.2 million lbs per year. The farm has successfully operated for seven years with minimal environmental impacts using a mooring system that anchors cages submerged 30 to 40 ft. below the surface, in an average water depth of 140 ft. (Fig. 3). Regular stocking and harvesting, daily feeding of stock, and system maintenance occurs in the submerged mode from specially designed surface boats and barges, with SCUBA diver assistance.

The Company desires to build on its three years of HOARP research experience and seven years of commercial experience and expand production capacity to up to five million lbs. a year. To accomplish the increase, it is proposed the existing site be expanded in the seaward direction to 61.59 acres. The expansion will accommodate four additional state-of-the-art SS 6000 series sea cages, each with a volume of 6000 m^3 and available commercially from Ocean Spar LLC, Bainbridge, Washington (Fig. 4 a & b). HF also desires to change out the four smaller cages obtained from the same company and replace them with SS 6000 cages to further

increase production and promote operational efficiency. The new cage layout will require realigning and adding to the current mooring grid to accommodate the additional cages (Fig 5 a & b). However, the total number of anchors to secure the grid will not increase and will remain at 16. The cage array will be oriented roughly perpendicular to the nearest land and to the prevailing currents to allow for maximum mixing.

Fig. 1 Regional map showing Hukilau Foods project site.

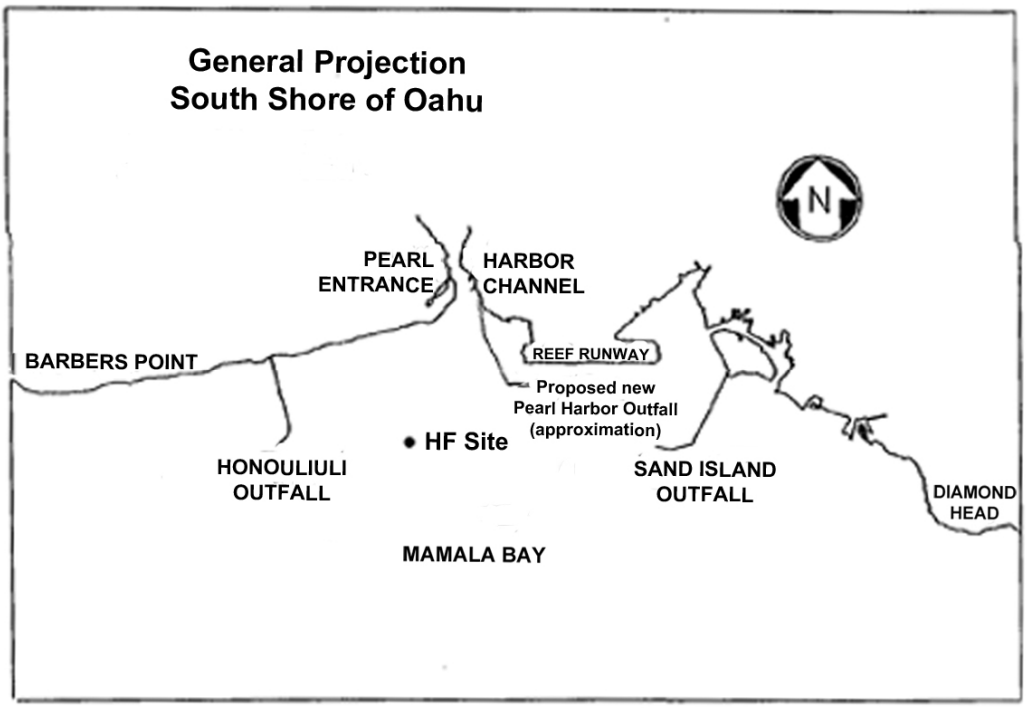


Fig. 2. South shore of Oahu with location of the project site and points of interest.

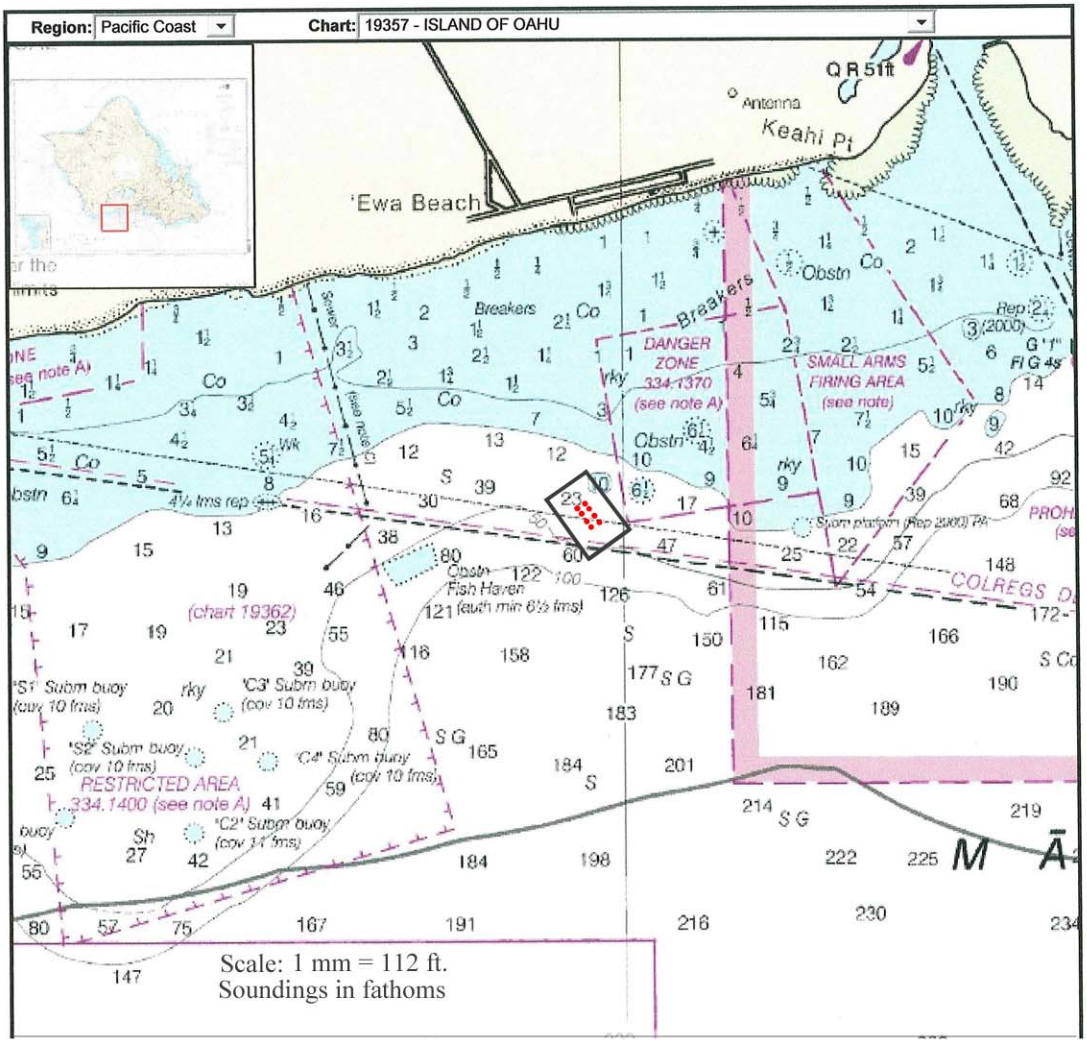


Fig. 3. Site location in the vicinity of Ewa Beach, with water depth and bottom type. Bottom types: Co (coral); rky (rocky); SG (sand and gravel); S (sand). Red circles are cages.

Specifically, HF proposes to widen the current North-South dimension of the current rectangular site layout from 782 ft. to 1451 ft. and the approximately East-West dimension from 1564 ft. to 1849 ft. (Fig. 5 a & b). This will result in extending the current Northeast boundary seaward 285 ft. and extending the Northwest boundary to the Southeast a total of 669 ft. In total, the site will be expanded 33.5 acres to accommodate the new mooring configuration with the same number of anchors and fewer mooring lines per cage.

Diver and visual surveys indicate the ocean terrain in the expanded area is the same as the current area that is moderately sloping, barren sandy bottom. Water depth under the farthest of the additional cages will be between 150 ft. and 170 ft. and the depth of the anchors at the far reaches of the grid will be around 250 ft. The waters along Oahu's South facing shore experience a predominant pattern of East to West current flow in the range of 0.5 to 2 knots.

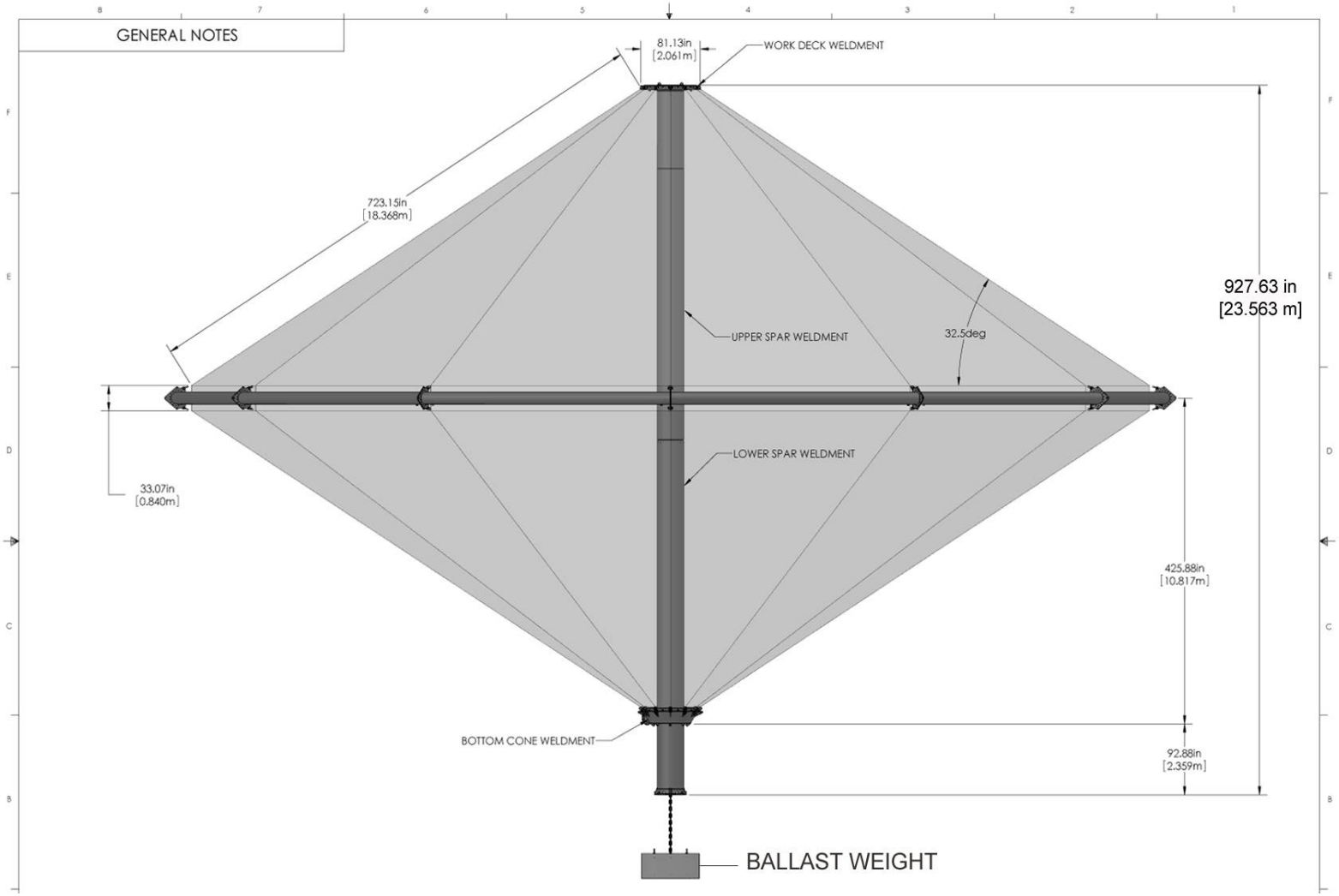


Fig. 4a. Individual Ocean Spar SS6000 cage, side view.

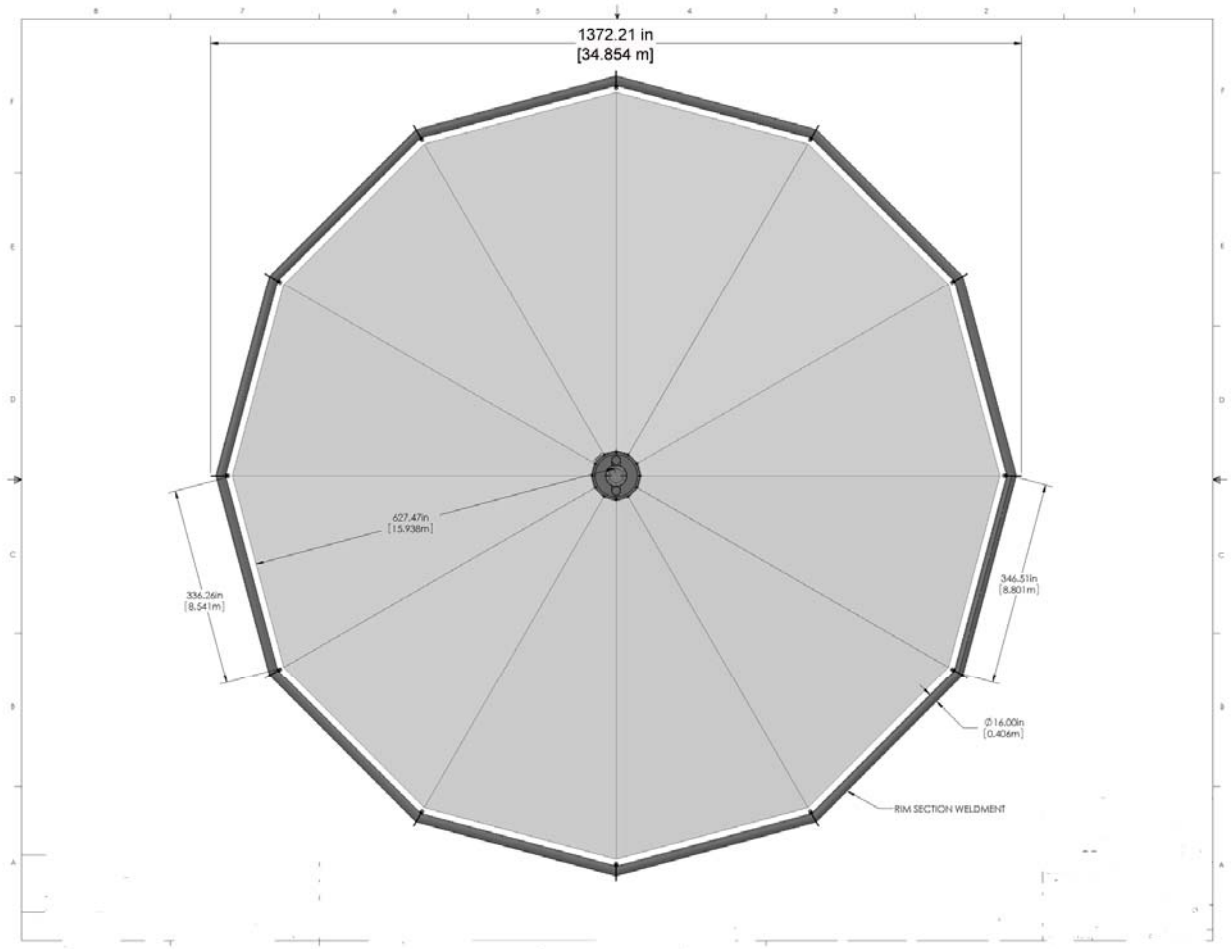


Fig. 4b. Individual Ocean Spar SS6000 cage, top view.

During the semi-diurnal tidal changes, twice per day, the velocity diminishes and in some areas may reverse or rotate in a circular pattern. The sea cage and its mooring system are designed to withstand sustained current in excess of 2.5 knots (L. Gace, pers. comm., 2008). In a 2002 test of currents adjacent to the cages, actual currents on the site rarely have exceeded one knot (Appendix 1).

The expanded area remains a rectangle with four corner points, described by the following latitude and longitude coordinates:

Northeast Corner: 21.2904 N Latitude; 158.0049 W Longitude.

Northwest Corner: 21.2899 N Latitude; 158.0093 W Longitude.

Southeast Corner: 21.2852 N Latitude; 158.0041 W Longitude.

Southwest Corner: 21.2846 N Latitude; 158.0085 W Longitude.

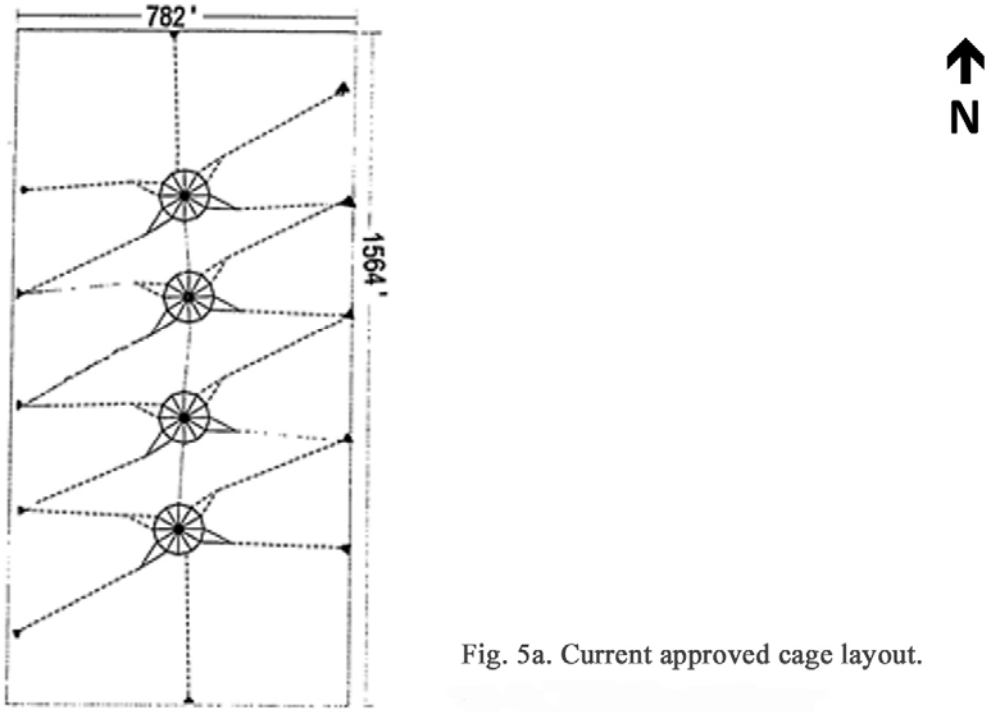


Fig. 5a. Current approved cage layout.

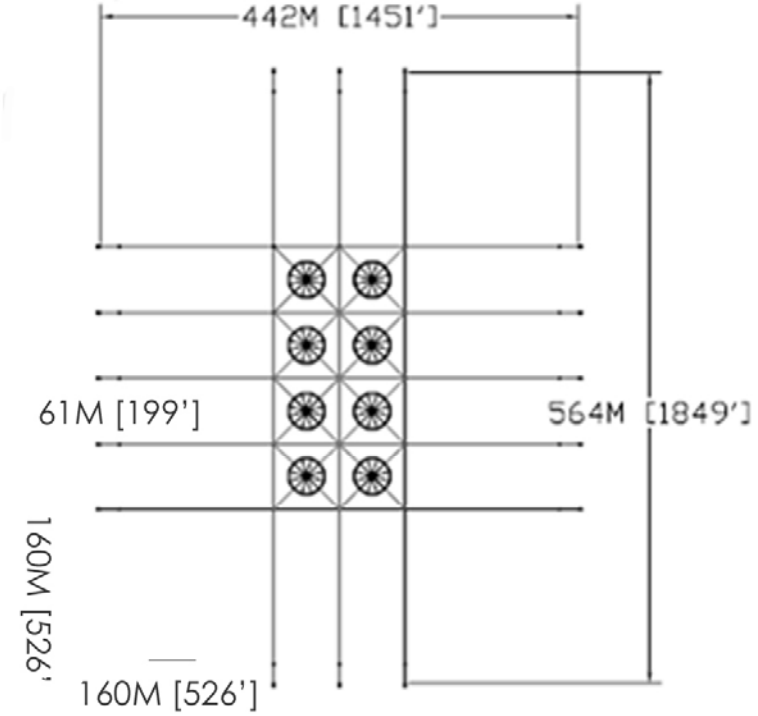


Fig. 5b. Proposed expanded cage layout.

It is requested that a feed/security barge be permanently attached to the mooring grid and be moored (24/7) at more or less the center of the expanded lease and attached to the mooring grid. The barge is will be 70 ft. long, 24 ft. wide, and approximately 6 ft. above the sea surface and will be similar to the smaller prototype currently in use (Fig. 6). The platform will support remotely controlled fish feeding, remote video monitoring of stock and cages, security telemetry, and raising and lowering of cages for maintenance. All telemetry equipment and frequencies will be approved technology. Coast Guard approved lighting and appropriate signage will be utilized.

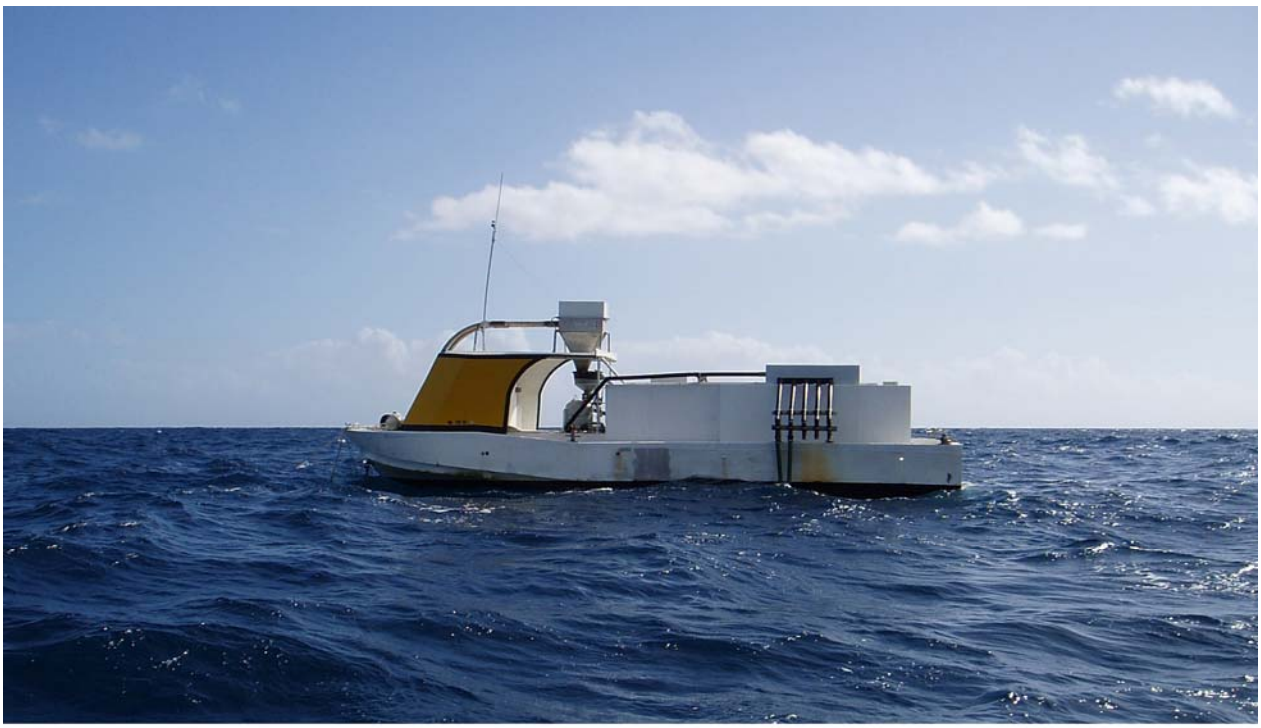


Fig. 6. Prototype feed and security barge on site.

3.1.2 Major Operational Characteristics

HF proposes to build on the experiences and innovations of a total of seven years of successful commercial operation to expand the fish farm. In general, operational procedures will be the same as those successfully developed and utilized to date without any significant incidents. Key aspects of operation are reviewed below.

<u>Culture System</u>

The expanded culture system will consist of eight SS 6000 series sea cages, with high strength netting and a mooring grid made up of high strength bridles, lines, chains and anchors. These cages were designed for offshore aquaculture by Ocean Spar LLC, who provides expert installation and follow up advice. A single cage is bi-conical in shape with a frame of steel tubing, similar to the smaller version. The size of an individual cage is approximately 104 ft. in diameter by approximately 77 ft. in length and an internal volume of 6000 m^3 (Fig. 4 a & b). A vertical buoyant cylinder that keeps the cage up right is in the center of the cage.

The cage frame is covered with a tight 35 mm (1.378 in.) mesh netting of a “Spectra” fiber- an extremely strong, UV resistant synthetic material developed by NASA. Divers enter through zippered openings in the mesh. Over the past seven years this type of cage has been successfully operated in diverse open ocean environments and weather conditions around the world, e.g., Cypress, the Philippines, Spain, Portugal, the Bahamas, Puerto Rico and New Hampshire.

The central spar controls the buoyancy of the cage, allowing it to be raised or lowered in the water column. The cage maintains its upright position by utilizing a 14,300 lb. cement ballast weight attached to the bottom of the spar and resting on the substrate. During normal operating conditions, the cages will be submerged 30 to 40 ft. below the ocean surface and the base of the cages will be 30 ft to 60 ft. above the ocean bottom. Sixteen “Danforth” style anchors, each weighing 6000 to 8000 lbs. will be used in the mooring grid system designed by Ocean Spar. The anchors are designed for securing large ships (200 to 300 feet in length) in sand and mud bottoms and have proven effective on the HF site (Fig. 7). A series of submerged buoys and weights will ensure that the anchor, chains and lines are perpetually taut.

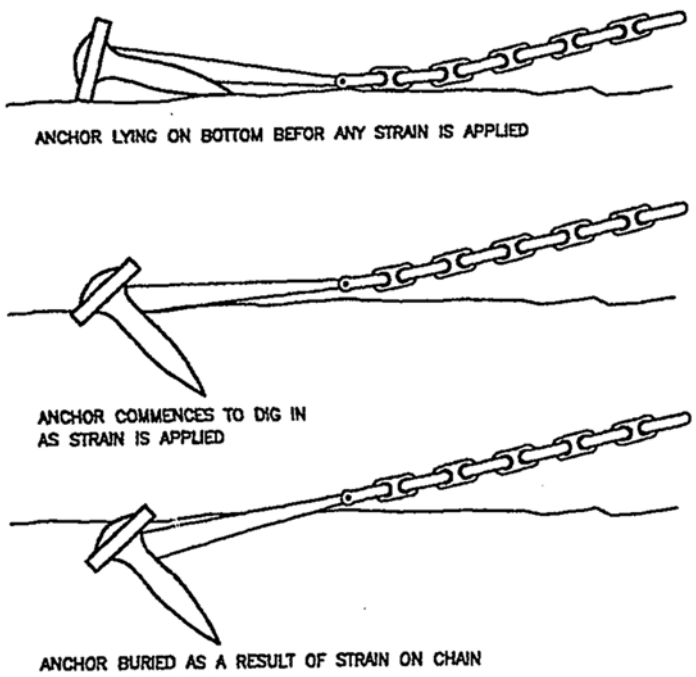


Fig. 7 Danforth anchor in operation.

Species Choice and Stocking

HF will continue to focus on the culture of the popular native species moi (Fig. 8). Moi, called locally the “fish of kings”, are under-supplied for local consumption to the local marketplace.

Reported yearly wild catch from 1997 to 2005 has averaged 690 lbs (DAR, 2008). The fish has a relatively long history of public and private sector aquaculture research and development; hence there is a solid information base for continued culture improvement. For example, genetic mapping of the species has indicated that fish from around the islands are one genetic stock, thus wild brood stock can be sourced from anywhere in local waters.

Fig. 8 Fresh Moi being prepared for steaming.

CII and its successor company HF have produced over one million lbs. of fish and received great positive feedback from local market sales and limited mainland test marketing. Many well known local distributors and chefs associated with the Hawaii Regional Cuisine movement, such as Roy's Restaurants and DK's Restaurants, seek out locally produced products like moi to include in their preparations (see Appendix 2).

Stocking material, fingerling moi, will be produced from captive broodstock in HF's new hatchery at Kaelaeloa. Initial broodstock will be sourced from wild populations and occasionally replenished making stocking material genetically the same as wild fish. Fingerlings approximately 2 to 3 inches in length (two to three months old) will be truck transported in tanks to either the Company's Keehi Lagoon shore-side facility or Kaelaeloa Harbor for loading onto a boat with specially constructed transport tanks. Upon arriving at the lease site, stock are gently distributed into the submerged cages, with diver assistance, using hoses that carry fish and seawater into the enclosure (Fig.9). Grow out to market-size, approximately one pound, takes about seven months.

Fig. 9 Stocking of Moi fingerlings in submerged cage.

Feeding

Feeding of the farm stock will occur daily from the electronically controlled, central feeding barge. The barge will store a supply of pelletized, sinking feed, a portion of which will be distributed to each cage daily through hoses that carry seawater and feed pellets into the cage. Feeding schedules and quantities will vary per cage depending on the biomass present. Feed pellets are spread widely in a cage to facilitate consumption by all stock and to minimize wastage. The feed distribution will be electronically controlled and monitored by video cameras and divers, so as not to over feed. The Company has a strong economic incentive to carefully manage feed consumption and minimize wastage because it is the highest contributing unit cost to each unit of fish production.

The feed used is a commercially available, specially formulated slow sinking marine fish diet shipped in bulk from the mainland. The pellets are a mixture of fish meal, agriculture grains and a vitamin/mineral mix, with a crude protein content of 43%. No additives, such as hormones or antibiotics, are used. Company policy is upon request by DLNR and /or DOH, feeds can be tested by a mutually agreeable, third party laboratory to affirm composition and results will be provided to the agencies. Feed Conversion Ratio (FCR), feed fed divided by the fish produced, has averaged 2:1; generally considered acceptable for culture of a new marine fish species. Reduction of FCR' s will be a priority target of national and local research efforts, with a goal of reaching FCR' s achieved in the global salmon industry after years of research, i.e., 1.1:1 (NOAA, 2008).

Harvesting

Harvesting of market sized fish of about 1 to 1 ¼ lbs. from a submerged sea cage is an intricate operation that utilizes a custom surface vessel and commercially available fish pump to move fish to the surface (Fig 10). Divers inside the cage “herd” marketable fish to a portion of the cage, where they are gently pumped to the deck of the support vessel. On the vessel, fish slide into one of two large ice-brine slurry baths to quickly disable them with minimum damage. Fish are then transported whole in the slurry to HF’s Keehi Lagoon facility for off loading into containers that are destined for a local wholesaler .No fish processing occurs at sea during harvests and solid waste disposal is the responsibility of the wholesaler and other buyers that process the fish.

Fig. 10 Moi being harvested from submerged cage using a pump.

Security and Maintenance Procedures

HF staff will be monitoring the lease site every day, seven days a week, while carrying out stocking, feeding, harvesting and maintenance. These activities and the staff presence will provide a high measure of security for the operation. Video surveillance cameras will be set up to have 24/7 observation of critical areas.

Cage maintenance is of three types: 1) Inspection of stock for mortalities and their removal 2) Repair of various cage components, including the spar, support cables, anchor system, and net enclosure, and 3) Cleaning of the cage netting and mooring lines. According to the manufacturer, the design life of steel components is 15-20 years. However, due to the possibility of mechanical wear and abrasion, lines are inspected on a biweekly to monthly interval, and thus far this schedule has worked very well to avoid breakage problems.

The Spectra netting is designed to have a service life of 10-12 years. Regardless, netting is inspected regularly. If major repairs are needed netting is replaced. Minor repairs can be accomplished by divers, while the cage remains submerged.

Cleaning of attached algae and other marine growth on the cages is carried out by divers using a commercially available Power Washer that utilizes a jet of water to dislodge material (Fig. 11). Regular cleaning is important because when this material heavily coats the cage, it interferes with the free flow of seawater through the netting. Experience shows that cleaning every cage, approximately every two months keeps attached marine growth to a minimum and maintains water circulation. No chemicals are used in the cleaning process. Pulverized material is readily dispersed by the currents and assimilated and recycled by the ocean environment

Fig. 11. Powerwasher used to clean cages.

3.2 ECONOMIC CHARACTERISTICS AND IMPACTS

The expansion of HF's site and production capacity will impact the Hawaii economy in a number of ways, including through increases in employment opportunities, product availability in the local marketplace, expenditures in local support industries, and increased opportunities for Federal research dollars. The Company has plans to invest up to $13 million dollars, from a combination of existing private funds and a Federal Fisheries Loan Program, which lends to marine aquaculture. The existing project has already obtained a loan from this Federal program.

Current company employment is 11 local people in its hatchery and offshore operation. With phased build out of the hatchery and approval of the new cages, HF anticipates increasing staffing to 10 in the hatchery and 15 in the administration and grow-out operation. Jobs will require a variety of skills from, for example experienced divers and hatchery technicians to accounting and marketing specialists. Company policy is to hire Hawaii residents, whenever possible, and it anticipates developing internship programs and other mutually beneficial relationships, with local high schools, colleges and universities, to help create the labor pool for industry expansion (see Appendix 2).

Plans are to phase up production to five million lbs. per year over a three year period. Maximum individual cage production is estimated at 625,000 lbs. per cage per year, with multiple crops. It is estimated Hawaii consumes over 50 million lbs. of seafood a year, with 80 % being imported mostly in a processed form (ADP, 2008). HF will focus initially on contributing to satisfying local demand for moi and import substitution before considering exporting. Public comments over the years to the project principal strongly indicate that participants in the local seafood industry and fish-loving residents welcome year-round, increased availability of fresh, high quality moi (see Appendix 2). Supply from the wild is limited in quantity and seasonal due to fishery regulations and moi populations are small and too dispersed to be regularly targeted by commercial fishers.

Estimated wholesale value of HF production at full scale is projected to be $ 20 million, with a projected wholesale market price of $4.00 per lb. The State budget will benefit from increased personal income tax and corporate taxes, as well as lease rents paid to DLNR, which increase with the amount of production. Significant economic impacts on support industries will be fostered through: sales to the wholesale and retail fish trade; processing and packing activities; use of transportation providers; and company purchase of services, equipment and supplies.

The Hawaii offshore aquaculture industry has benefited from close collaboration with the research capabilities within the UH System, as well as with the internationally known Oceanic Institute. A thriving commercial aquaculture sector will provide an added basis for these entities to write research proposals and compete for federal grants to improve industry technology and economics. Federal research dollars coming to Hawaii not only expand the knowledge base, but create jobs and bring valuable revenue into the state.

3.3 SOCIO-CULTURAL CHARACTERISTICS

3.3.1 Multiple Use Conflicts

The Company has been on the present site for ten years (including the research project) and has not experienced any user conflicts with the public, that is, not a single complaint. The approximately two mile distance from shore and water depth of 140 ft. or more in the vicinity, coupled with the sand bottom and lack of natural relief, does not make the area conducive for diving or fishing. With cages submerged 30 to 40 ft. below the surface, the limited boat traffic

has transited the site readily and has cooperated with the Company's farming activities. HF will continue to make a significant effort to inform and engage the interested public and as the operations expand to anticipate and resolve any issues. The ongoing approach to communication with the public has been "one on one" onsite discussions by staff with the interested boaters, and also the Company will continue being an active and involved member of the Oahu marine community.

HF is, however, requesting that access to the expanded site be more controlled in the amended lease than with the previous operations. The existing CDUP and lease have allowed the boating public to freely transit the site, but maintained exclusive use of the area encompassing the submerged cage systems, i.e., no access to the immediate cage area or its interior, as the caged fish are considered private property. The relatively rare incidence of recreational and commercial divers on site was discouraged. Sea cages over time become a Fish Aggregation Device (FAD) and at times concentrations of popular sport or food species can occur that can attract divers and fishers. At these times, HF has actively discouraged anchoring within the mooring grid due to serious concerns over public and staff safety and the potential for entanglement.

With the expanded site and in necessary consideration of: staff and public safety (i.e., the cages that are anchored in very deep water that greatly increases diving risks for recreational divers), the expanded and busier site and company insurance liability, HF is formally requesting that no snorkeling or SCUBA diving or anchoring of any boat be allowed in the lease area. Appropriate signage noting the restrictions will be posted on the feed/security barge. Boats may continue to transit the area, including the area directly over the submerged cages and continue to troll or drift fish at the site. HF currently maintains a close and mutually beneficial relationship with some local fishers that frequent the site and views this relationship as an important part of the Company's security effort (see Appendix 2).

3.3.2 Cultural Resources

Chapter 343, HRS, as amended, requires that any Environmental Assessment (EA) identify and assess any potential impacts of a proposed project on cultural practices and resources. As previously described, the open ocean site does not contain any known historic resources or traditional and culturally important sites and none have been pointed out in seven years of operation. This was confirmed by a recent interview with a knowledgeable Hawaiian fisher and several meetings with the EWA Beach Neighborhood Board (see Appendix 3). However, commercial fishers, both Hawaiian and non-Hawaiian, do come to the site to take advantage of the occasional aggregations of fish, such as opelu (see Appendix 2). Reportedly, occasional catches of opelu have increased at the site and with greater numbers of sea cages, this periodic positive impact should continue. HF will continue to cooperate with any visiting commercial fishers to the site, within its need for a greater degree of exclusivity, as described above.

3.3.3 Other Characteristics

Two nearby ocean activities are of note, one new and one ongoing. The DAR, DLNR is proposing a 108 acre artificial reef to the West about 1 mile off Kalaeloa in 60 to 120ft. of water-currently in the permit process (OEQC, 2007). This site is approximately three miles from the HF site and downstream of the prevailing current. Given the distance and the current pattern, no impacts are expected on HF's expanded activities or on users of the artificial reef.

The ongoing activity occurs in a large unmarked area to the Northeast of the HF site, roughly

opposite the entrance to Pearl Harbor. This area is occasionally used by the Navy for various training exercises. Over the years, the Company and the Navy have developed a high level of cooperation in the execution of these periodic exercises. This mutually beneficial cooperation will continue with the expanded activities at the site, which will be seaward and away from the Navy training area.

Importantly, increasing wild populations of moi have been a target of State stock enhancement efforts by the DLNR's Anuenue Fisheries Research Center, in cooperation with the Oceanic Institute. When the HF hatchery produces excess fingerlings for stocking its cages - commercial hatcheries routinely plan excess production to be certain to accommodate stocking needs - then the opportunity exists for HF, under the direction of DLNR, to provide fingerlings to the State to help with restocking efforts. Benefits to wild moi populations and fishers statewide would accrue from these cooperative efforts.

3.4 ENVIRONMENTAL CHARACTERISTICS

3.4.1 Operations

The basic environmental characteristics of the expanded project will be similar to those of the existing farm, though the production levels will increase and the number of personnel on site and level of daily activity will increase in proportion to the build out and stocking of the larger sea cages.

Boat traffic to and from the site will consist of one or two motorized vessels. Boats will be powered by standard diesel engines. Noise levels will be no more than boats of comparable size.

Cages will remain submerged at all times, except in the event of major net replacement. Raising and lowering of cages is done with compressed air and there are no engines or petroleum products involved. Cages will be cleaned regularly by divers with power washers deployed from a work boat (Fig.11). As previously described, currents readily disperse the particulate organic material removed from the cage to be assimilated and recycled by the ocean environment.

There will be a permanently moored, low profile feed/security barge at the site, similar to, only larger than, the prototype pictured in Fig. 6. Feeding will be observed by cameras and divers, so as not to overfeed. Experience shows that any feed not consumed and fish waste products (dissolved and feces) are readily dispersed by the currents or consumed by other organisms. Water quality monitoring has indicated waste products (nutrients) are rapidly dispersed and assimilated by the open ocean environment. The barge will have signage and lighting as required by the Coast Guard.

Routine stocking and harvesting will be supported by surface vessels with electric or gasoline powered pumps that move fish through large, flexible hoses to and from the cage (Figs. 9 and 10). These operations, which use the same basic technologies previously used by the Company to date with no operational problems, are also supervised by divers.

3.4.2 Increased Fish Production

The SS 6000 sea cages have about twice the volume of the existing SS 3000 cages, allowing stocking and grow-out of roughly twice the number of fish per cage. As such, there will be proportional increase in feed used per cage, but these inputs and outputs will be spread over

the larger cage volume and the larger lease area. Maximum fish densities (weight per unit volume of water, e.g., kg/m^3) will remain roughly the same as the current operation (approximately 30 kg/m^3), which represents good management practice. Similarly, densities of feed fed and fish waste products excreted should be similar to those observed with the existing farm. Therefore, impacts of the greater fish production per cage on the water column and substrate under each cage should remain insignificant, as demonstrated by experience to date. Moreover, with the strong currents, short residence time of water in the cage and high level of mixing at the open ocean location; coupled with a suitable ZOM, the site can be expected to meet State receiving water standards.

3.4.3 Proximity to a Coral Reef

Potential impacts on coral reefs are a concern for all ocean projects in Hawaii. The closest coral reef to the project is located in a shoreward direction to the North Northwest approximately 1800 ft. (Fig. 3). Coral heads sit on top of a ledge that rises sharply from a depth of 85 ft. to a depth of 50 ft. Coral covers about 8% to 12% of the total area at the top and coral cover increases going shoreward.

The expanded project should not affect the coral reef. The HF project included in its initial monitoring program a water quality station near the reef. Repeated sampling showed no effect from the fish farm. Prevailing currents carry water originating at the farm away from the reef. Moreover, expansion activities will be in the seaward direction away from the reef.

4.0 ALTERNATIVES TO THE PROPOSED ACTION

4.1 PREFERRED ALTERNATIVE

The initial CII site was selected because of its proximity to the HOARP site. HOARP successfully demonstrated open ocean cage culture with submerged cages was environmentally sound and potentially scalable to achieve economic viability. Briefly, important site determination factors that were considered at the time of HOARP site selection included: optimum current speeds (around 2 kts or less); water depth of around 150 ft.; adequate distance from shore for open ocean conditions (no land influences and adequate mixing); barren sand or mud bottom; protection from severe storms; absence of competing recreational and commercial uses; and reasonable proximity to available harbor support facilities.

These site selection factors were re-evaluated by HF to determine the technical and environmental feasibility of doubling the existing lease area by moving seaward and increasing production capacity by four fold. The evaluation revealed that expanding the site area and converting the sea cages to the larger volumes would not change the acceptability of this larger area for large-scale open ocean farming. Impacts of the existing project on water quality and substrate quality have not been significant at the current location due to the strong and consistent currents that facilitate mixing and the high assimilative (uptake) capacity of Hawaii's nutrient poor, subtropical ocean environment. Expansion of site area and production capacity together, should be able to be accommodated within required State receiving water standards and Zone of Mixing regulations. The Company's seven years of site experience and continuous data collection to monitor the existing project impacts at this location suggest that expanding the ocean area and the production can be managed using HF's well understood operational practices.

HF views the existing successful cage operation at the current site as a starting point that has demonstrated technical, environmental and economic feasibility. Development of the existing farm to an economically viable business is the long-term Company goal. In addition, HF has made major investment in accessible hatchery and support facilities in proximity to the operation to further support expansion at this site as the preferred alternative.

4.2 OTHER ALTERNATIVES EVALUATED

Several alternative approaches to expanding moi production were considered by HF. The Company could increase the stocking density in the existing sea cages beyond the industry standard of 30 kg/m^3. Consultation with experts in cage farming did not recommend this approach for moi, even with the strong and consistent current pattern at the site. Issues such as more stress on the stock and greater fish size differences within a crop,that can occur with greater fish densities, could reduce the value of fish in the marketplace.

Another option considered was to change the four SS 3000 cages to four SS 6000 series cages, without expanding the lease area, thus roughly doubling the production capacity of the existing site. Again, while the oceanography of the site would be able to accommodate the expanded production, the substantial investment in the new hatchery and other facilities and the goal of satisfying Hawaii's demand for moi, then moving to exporting, do not support this limited expansion alternative. In a related option, consideration was also given to increasing the number of sea cages on the existing site to eight of the larger type. Best practices for anchoring structures in the ocean, i.e., maintaining a ratio of anchor line to water depth of 7:1, precludes this alternative from further consideration, as the existing site is too small.

A final alternative considered was pursuing a suitably sized lease for a new site in the same general vicinity. A preliminary look along the Leeward Coast indicates there may be other suitable sites considering the uniformity of ocean topography and currents. However, recreational and commercial use in some candidate areas, location of domestic waste outfalls, and various restricted areas along this coast, will make identifying a suitable and available area a challenge. Moreover, operating two sites would greatly impact logistical efficiencies and operating costs, as well as, increase financial risk for the Company at this stage of development. Consolidation of facilities expansion at a known and contiguous location is the preferred alternative for growth.

4.3 NO ACTION ALTERNATIVE

The No Action Alternative would mean the fish farm would not expand and would remain at its current size. Moi production for the local market would remain limited and supply statewide would continue to be inadequate. Economic benefits of the proposed expansion would not be realized e.g., no increase in employment, no increase in direct and indirect expenditures, and opportunities to further refine sustainable open ocean aquaculture technologies for Hawaii and an emerging global industry sector would be lost. Hawaii could lose a new, environmentally sustainable supply of seafood and the Company would not be able to achieve its business goals and economies of scale. Thus the No Action Alternative is unacceptable.

5.0 DESCRIPTION OF THE ENVIRONMENT

5.1 REGIONAL SETTING

The farm site is located in oceanic conditions approximately two miles off Ewa Beach on the Leeward Coast of Oahu. Coastal features of note in the region are the entrance to Pearl Harbor, which is approximately two miles to the East and Barbers Point and Campbell Industrial Park about five or six miles to the West. In addition, there are two domestic waste outfalls in Mamala Bay, the Sand Island Outfall about four miles away to the East and the Honouliuli Outfall about one and a half miles away to the West (Fig. 2). Further West is the oil tanker unloading facility off Barbers Point.

5.2 CLIMATE

The prevailing weather pattern throughout the Hawaiian Island chain is Northeast trade winds, which blow around 80% of the time at an average of 8 to 12 kts. Kona winds, where the direction is from the Southeast or Southwest, occur about 20% of the time (Juvik, et al,1998). On Oahu, the Koolau and Waianae mountain ranges provide some shelter to reduce the intensity of wind, rain and seas generated by trade winds, making the near shore coastal waters of South facing shores of the Islands attractive for offshore sea cage culture.

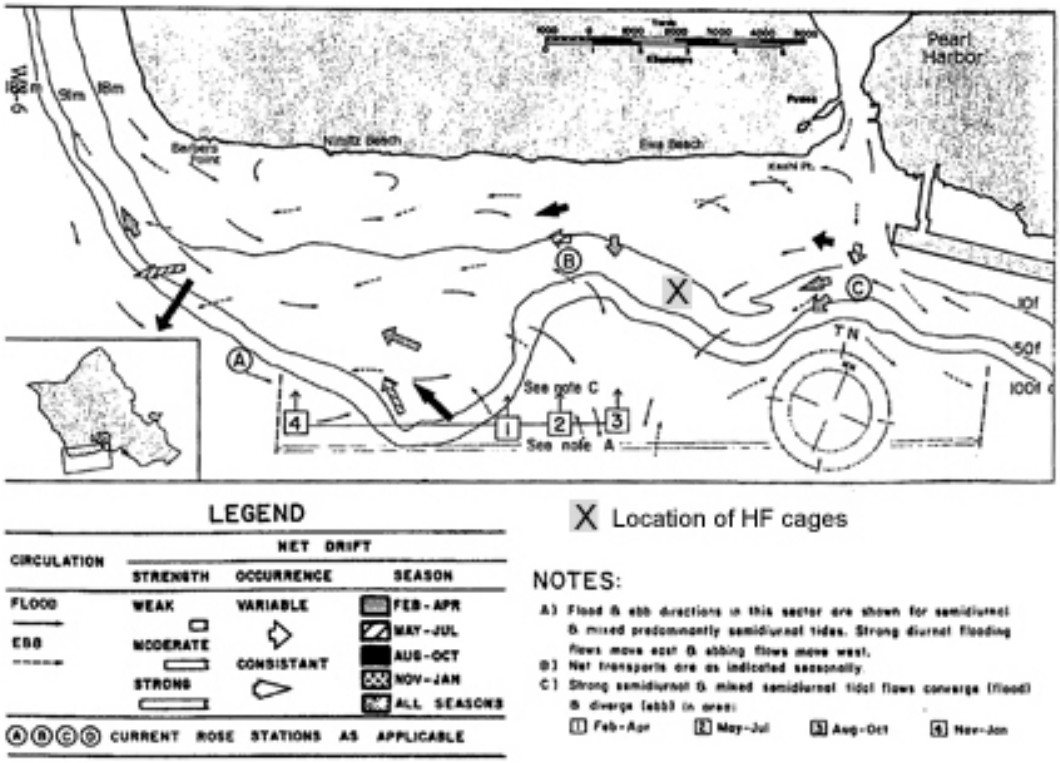
5.3 OCEAN SETTING

5.3.1 Waves and Currents

Wind generates two types of waves: 1) sea that is caused by prevalence and intensity of wind in specific areas; and 2) swell or the wave, whose origin may be distant storms, that continues to travel without relation to local winds. Swell will break to form surf that is in direct relation to the size of the wave and the depth of the rising bottom.

The prevailing surf break off Ewa Beach was observed to have no effect on the bottom two miles offshore at 150 ft. Moreover, prevailing wave patterns and seasonal swell in the area have not significantly interfered with daily farm operations to date.

The variable oceanic currents in the vicinity of the Hawaiian Islands are believed to depend mostly on the velocity and direction of the wind. Tidal currents are generally weak. The waters along Oahu's South facing shore experience a general pattern of East to West flow in the range of 0.5 to 2 kts. During the semi-diurnal tidal changes, twice per day, the velocity diminishes, and in some areas reverses in a circular motion (Fig.12). Measurements during the HOARP project and more recently in 2002 by Ocean Spar (Appendix 1), as well as numerous subjective observations made by project personnel over a seven year period, confirm the direction and shifts in current. Notably, these observations indicate speed rarely exceeds one knot.



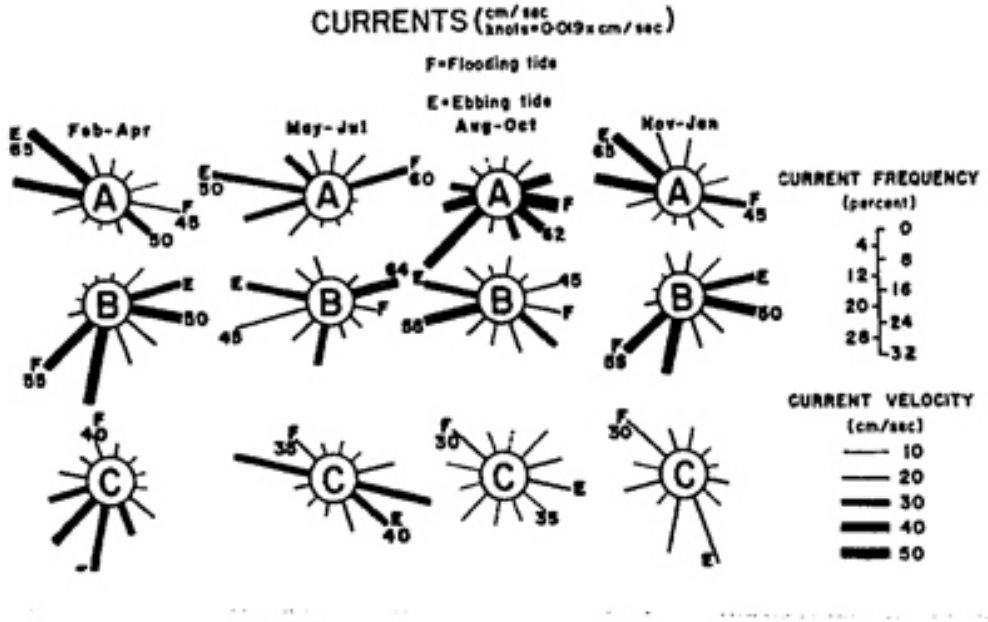


Fig. 12. Current patterns in the vicinity of the Hukilau Foods site. (Source: K. Bathen, 1978)

5.3.2 Water and Sea Floor Quality

Water Quality

The HF site is located in oceanic conditions and is classified by the CWB, DOH, for monitoring purposes as subject to wet criteria for open coastal waters. Specific regulatory criteria governing receiving water standards for discharges into these waters are found in Table 1.

Table 1. Specific criteria for open coastal waters based on Hawaii Administrative Rules, Title 11, Department of Health, Chapter 54, Water Quality Standards which apply to Receiving Water Limitations for a Wet Location.

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**
Total Nitrogen (µg N/L)	150.00*	250.00*	350.00*
Ammonia Nitrogen (µg NH_4-N/L)	3.50*	8.50*	15.00*
Nitrate + Nitrite (µg [NO_3+NO_2]-N/L)	5.00*	14.00*	25.00*
Total Phosphorus (µg P/L)	20.00*	40.00*	60.00*
Chlorophyll a (µg/L)	0.30*	0.90*	1.75*
Turbidity (NTU)	0.50*	1.25*	2.00*

pH units – shall not deviate more than 0.5 units from a value of 8.1.

Temperature – shall not vary more than 1 deg. C from "ambient conditions".

Salinity – shall not vary more that 10% from natural or seasonal changes considering input and oceanographic factors.

Dissolved oxygen – not less that 75% saturation.

* "wet" criteria apply when the open coastal waters receive more than three million gallons per day of fresh water discharge per shoreline mile.

HF has been required to monitor the existing site by CWB, DOH for important water quality parameters to fulfill the requirements of its NPDES/ZOM permit. A qualified consultant was hired for this purpose. Basically, the water quality monitoring program establishes sampling stations within (near the cages) and on the down current edges of the permitted ZOM (Fig. 13). Each station was sampled at three depths; surface, mid-depth and near the bottom. Stations are established on the Eastern and Western edges of elliptically shaped ZOM in areas of maximum water flow; Z 6-9 and Z 1-4 respectively. In addition, stations on the Eastern and Western sides of the cages, within the ZOM, were also monitored; E 1 and C 1-2. The summary values for sixteen monitoring surveys are presented in Table 2. It should be noted that since stations Z 1-4 were down current at times and Z 6-9 were down current at other times due to tidal action, for reporting purposes, the results of Z-1 and Z-9, Z-2 and Z-8, Z-3 and Z=7 and Z-4 and Z-6 were combined.

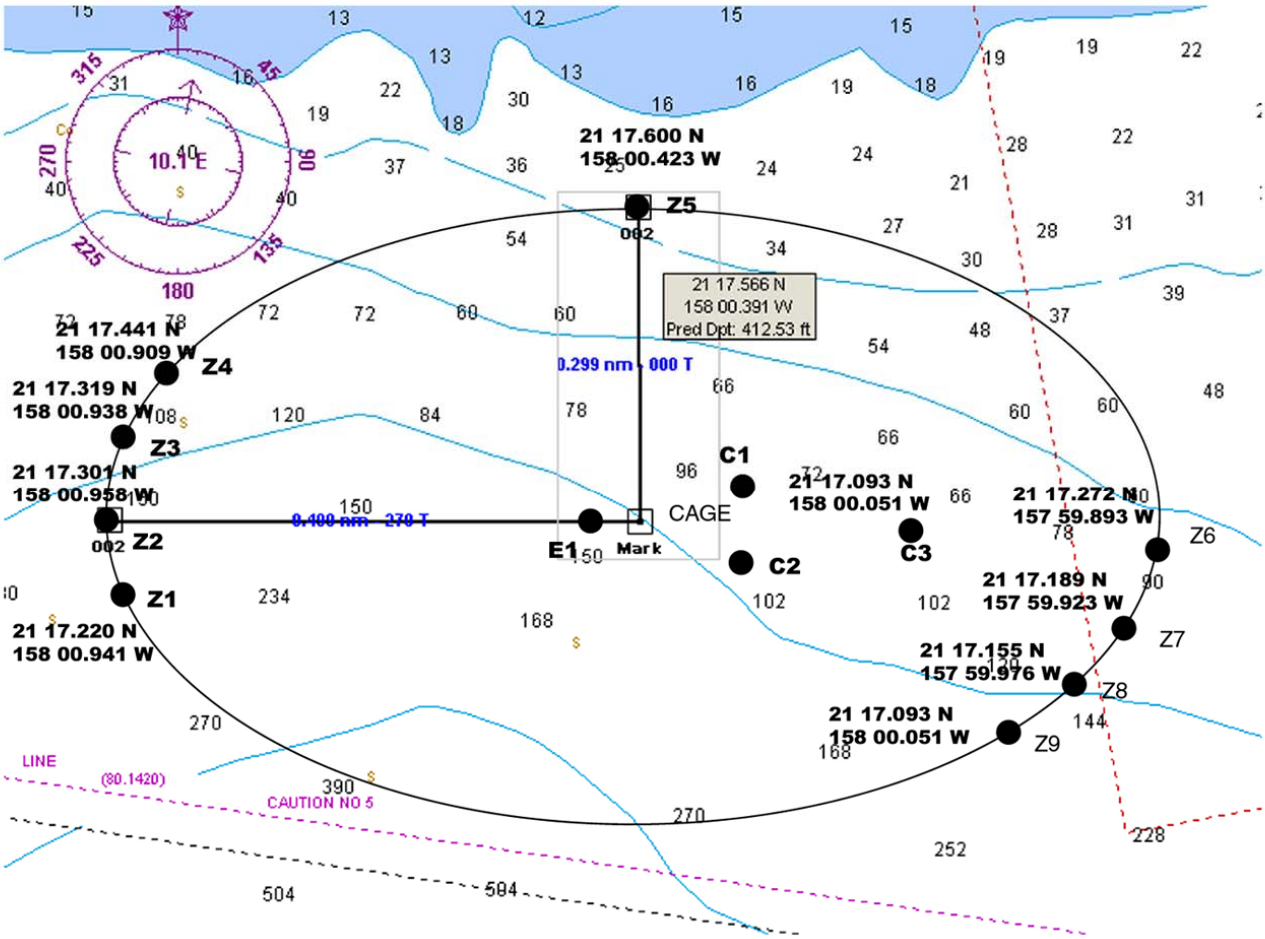


Fig. 13. Map of water quality sample station locations and Zone of Mixing. Depth in feet.

Results indicate that all the values from al the sampling depths are less than the wet criteria used by DOH to establish receiving water standards, that is, ambient oceanic water conditions are found at the edges of the ZOM as required (Table 2). Further, results indicate both the existing and proposed site are in open ocean conditions.

Sea Floor Quality

The sea floor at the Ewa Beach site can be described as a gently sloping sandy bottom at an approximate slope of 12:1, i.e., for every 12 ft. of distance seaward the depth drops 1 ft. During the initial CII project siting, a team of divers inspected a circular area emanating from the site center roughly 1800 to 2000 ft in all directions. The terrain was described as consisting of sand and virtually barren. No large concentrations of benthic animals and plants were observed at the time.

Table 2. Geometric means of water sampled during 16 monitoring surveys at Zone of Mixing stations in the vicinity of the Hukilau Foods Ocean Farm. Also shown are State of Hawaii Dept. of Health specific "not to exceed" geometric means criteria for open coastal waters under wet (DOHGM-W) conditions.
S = surface, M = mid-depth, B = bottom sampling.

Station	TN (µg/L)	NH_4^+ (µg/L)	NO_3^- (µg/L)	TP (µg/L)	PO_4^{3-} (µg/L)	$Si(OH)_4$ (µg/L)	O_2 % sat	O_2 mg/L	Turbidity NTU	pH	Temp. deg. C	Salinity ppt
E 1 - S	126.41	0.53	1.21	10.92	1.72	63.91	102.32	7.02	0.11	8.160	25.90	34.90
E 1 - M	111.59	0.70	0.90	10.73	1.61	68.80	97.97	6.73	0.10	8.163	25.83	34.97
E 1 - B	117.87	0.82	0.89	10.26	0.90	49.43	97.59	6.71	0.10	8.159	25.65	34.97
C 1 - S	117.61	0.97	1.02	10.05	1.11	51.13	102.52	6.81	0.10	8.162	25.99	34.77
C 1 - M	115.15	0.93	0.82	10.57	1.28	46.67	96.88	6.47	0.10	8.164	25.90	35.00
C 1 - B	108.95	0.70	0.89	10.31	1.23	51.01	97.15	6.52	0.10	8.160	25.51	35.02
C 2 - S	112.81	1.16	1.08	10.39	0.95	59.20	102.37	6.80	0.11	8.163	26.03	34.92
C 2 - M	112.63	1.12	0.85	10.57	1.38	40.21	97.24	6.49	0.09	8.165	25.93	34.99
C 2 - B	106.59	0.95	0.67	10.45	1.64	45.71	97.31	6.53	0.10	8.163	25.54	35.02
Z 1 - S	104.52	1.13	0.89	10.50	1.41	58.87	104.14	6.91	0.11	8.155	26.04	34.95
Z 1 - M	121.87	1.22	0.80	10.41	1.56	62.24	97.28	6.46	0.10	8.162	25.93	35.00
Z 1 - B	115.61	1.13	0.74	10.85	1.62	47.58	97.46	6.50	0.09	8.160	25.73	35.01
Z 2 - S	118.02	1.94	0.77	10.25	1.55	52.23	102.85	6.82	0.11	8.160	26.05	34.97
Z 2 - M	109.80	1.57	0.70	10.11	1.96	45.08	97.35	6.47	0.09	8.164	25.91	35.00
Z 2 - B	99.99	1.50	0.88	9.91	1.29	40.04	97.51	6.50	0.10	8.164	25.72	35.01
Z 3 - S	112.51	1.57	1.17	9.91	1.40	53.45	102.36	6.79	0.12	8.156	26.05	64.97
Z 3 - M	104.80	1.33	1.12	9.99	1.59	47.53	97.27	6.47	0.10	8.163	25.92	35.00
Z 3 - B	97.94	1.25	0.96	10.00	1.69	39.95	97.39	6.50	0.10	8.163	25.71	35.01
Z 4 - S	103.64	1.37	1.17	10.54	1.43	48.67	102.40	6.79	0.13	8.156	26.04	34.97
Z 4 - M	104.83	2.50	1.00	10.90	1.63	39.95	97.54	6.48	0.10	8.163	25.91	35.00
Z 4 - B	112.11	1.52	0.97	9.96	1.47	50.01	97.86	6.53	0.10	8.164	25.70	35.02
DOHGM-W	150.00	3.50	5.00	20.00			*		0.50	**	***	****

* Dissolved oxygen shall not be less than 75% saturation.
** pH shall not deviate more than 0.5 units for a value of 8.1.
*** Temperature shall not vary more than one degree C from ambient conditions.
**** Salinity shall not vary more than 10% from natural or seasonal changes.

Regular benthic sampling is also required for the DOH NPDES/ZOM permit maintenance and ten reports have been submitted. Again, control sites were established for comparison to sites underneath and near the cages to monitor farming impacts on the ocean bottom. Control sites were established 1080 ft.(360 meters) up current(East) and 1170 ft.(390 meters) down current(West) from the center of the reference cage. Measurements made from replicate core samples included: species/community analysis, sand grain size and Total Organic Carbon (TOC).

Among invertebrates sampled (i.e., nematodes, crustacean, priapulids, supnculans), the numerically dominant polychaetes play a major role in sediment dwelling benthic communities and may be regarded as indicators of environmental quality (Baily-Brock, pers. comm.., 2008). The two species of polychaetes that dominate the control sites were *Synelmis acruminata* and *Euchone sp. B*. In addition, *Pionosyllis hertercirrata*, a consistently widespread species around Oahu was found in limited abundance. These species are typical of undisturbed oceanic sandy bottom conditions in Hawaii (Baily-Brock, pers. comm., 2008).

Water clarity at the site is such that the expansion area has been observed for seven years. No large, resident concentrations of fish, invertebrates and plants have been observed. A 2008

visual survey by a SCUBA diver of the proposed cage expansion area confirms this conclusion and indicates the ocean bottom composition is the same as was previously encountered at the existing HF site and its surrounding area; slightly sloping, barren sand bottom (Fig. 14). By extension, the expansion site is likely to have the same or very similar polychaete species, species diversity and community structure as the undisturbed control sites being utilized in the permit monitoring.

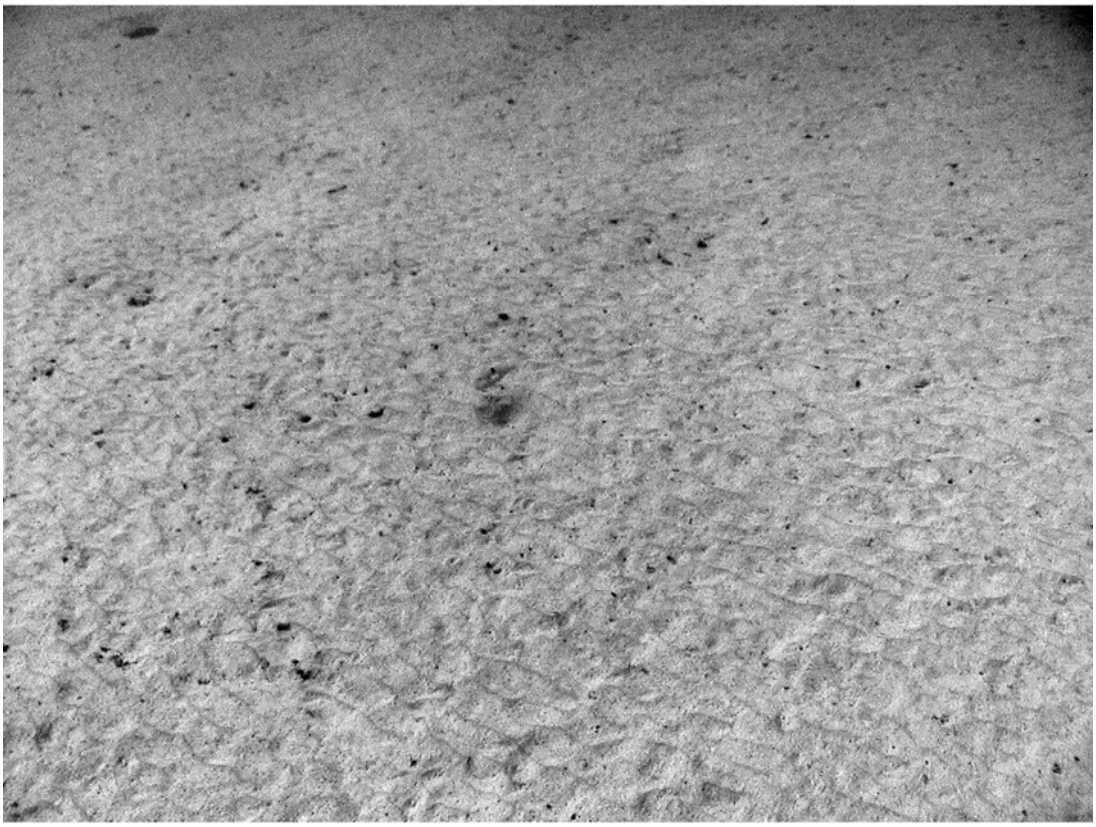


Fig. 14. Photo of barren, sandy ocean bottom in proposed HF expansion area.

5.4 FAUNA AND FLORA

The existing HF site over time has acquired an assemblage of fauna and flora that can be described as “resident” species that stay in the vicinity for days to weeks or longer and “transient” species that stay in the vicinity for minutes to hours to days. Generally, species appear and disappear periodically on a semi-regular and irregular basis. The cage system provides a substrate for plants (micro- and macro-algae) and benthic invertebrates to attach. The cage system as a whole acts as a Fish Aggregation Device (FAD) for some pelagic and benthic fish species. Reef and pelagic herbivorous(eats plant material) fish were observed to graze on the attached plants to the point at times keeping the cage clean, while carnivorous(eats animal material) and omnivorous(eats both plant and animal material) fishes catch smaller species and also consume any uneaten feed and feces that escapes the cage.

During the HOARP Phase II project, the fish and invertebrates that were attracted to the SS3000 cage were intensively studied for one month. The results, found in Appendix 4, are generally representative of the species and shifts in populations observed consistently by

Company personnel over the years. More specifically, the listing is representative of the current site situation. The HF site is located 650 ft. seaward of the HOARP site.

In general, the community of fish and invertebrate species around the cages was dynamic in nature, but in a broad sense the movements are largely consistent and somewhat predictable over the timeframe of a year. To illustrate the changes, during the first few years of operation the most abundant resident species was a broomtail file fish (*Aluterus scriptus*), yet in 2002 this species disappeared and now occasionally returns in numbers. Occasionally during the year, large schools of mackerel scad (*Decapterus macarellus*) will congregate in the vicinity of the cages and this in turn would attract pelagic predators, such as false albacore tuna (*Euthynnus alletterates*). Other pelagic predator species frequent the site on a more regular basis, e.g., the blue ulua, (*Caranx melampygus*) and amberjack, (*Seriola dumerilli*); probably attracted by the resident population of ornamental species that builds up, e.g., butterfly fish (*Chaetodon* sp.) and surgeon fish (*Acanthurus* sp.). Sandbar sharks (*Carcharhinus plumbeus*) are periodic members of the cage ecosystem, but have posed no threat to divers or the fish stock to date.

Expectations are that the expanded cage culture project will attract a similar assemblage of marine animals and plants. In time, the mini-ecosystem, as described above and in Appendix 4, will develop and broadly reach a dynamic balance around each new cage making up the farm.

5.5 RARE, THREATENED AND ENDANGERED SPECIES

The main rare, threatened and endangered species of concern to Federal and State authorities in Hawaii are: the hawksbill turtle (*Eretmochelys imbricata*), green sea turtle (*Chelonia mydas*), monk seal (*Monachus schauinslandi*), and the humpback whale (*Megaptera novaeangliae*). Federally protected bird species do not frequent the area or forage in the vicinity.

The hawksbill turtle is infrequently seen in the main Hawaiian Islands and has not been observed at the HF site. Green sea turtles frequent the main Hawaiian Islands, though their principle nesting sites are in the Northwest Hawaiian Islands. Green sea turtles have been observed on occasion (two or three times a year) at the HF site and near the sea cages. These animals are transient and remain in the cage area for a few minutes to a few hours and are not affected by the farm activities.

Monk seal sightings rarely occur in the main Hawaiian Islands, though statewide there are usually a few sightings every year. Monk seals have not been observed around the HF cages.

Humpback whales winter in the Hawaiian Islands from approximately December to April every year. They are the focus of a large Federal-State co-managed ocean sanctuary that is largely in State marine waters, the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS). The South shore of Oahu is not part of the sanctuary and whales have rarely been observed in the vicinity of the site and never at the site.

5.6 OCEAN ACTIVITIES

Combining the initial three years of the HOARP project and the seven years of Company operation, provides ten years (over 2000 days) of nearly continuous observations of public use for the HF site and the proposed expansion site. Ocean sports such as canoeing and kayaking, have rarely been observed in the vicinity of the sea cages and jet skiing has never been observed. Curious recreational snorkelers and SCUBA divers in boats have occasionally (a few times a year) approached the area when work boats were on site, but have not lingered when

personnel explained what was going on and the potential for entanglement in anchor lines. Distance from shore and water depth act as a deterrent to these uses.

Occasionally recreational fishermen have come by and transited the site or trolled or drift fished near the site without incident, while farm work is going on. Staff has on such occasions, when boats wanted to anchor in the mooring grid, explained the problems that can occur and boaters have been cooperative in avoiding the area. Commercial fishermen have occasionally approached the staff to fish for aggregations of opelu that sometimes occur on site. HF has cooperated with commercial fishers to ensure that opelu fishing can take place without affecting operations (see Appendix 2). Moreover, HF considers its relationship with commercial opelu fishers as mutually beneficial and part of its site security plan.

5.7 SCENIC AND VISUAL RESOURCES

The current site and its proposed expansion area are located two miles offshore from the nearest land, the community of Ewa Beach. Visually, the proposed project at full build out will have minimal impact on the scenic viewscape from shore. Sea cages at the existing site have been operated submerged with no markers at the surface and the expanded project will be operated in a similar manner. The expansion is requesting a 70 ft long, 24 ft. wide and 6 ft. high feed/security barge be anchored permanently at the site. This low profile structure and the work boats that are periodically on site should be barely visible from shore and will not appear any different from normal boat traffic.

5.8 HISTORICAL AND CULTURAL RESOURCES

HF has had no cultural resource issues arise during ten years of operation on the site. Recent interviews with knowledgeable native Hawaiian fishers and cultural practitioners familiar with the location confirm there are no traditional fishing grounds or resources at the project location (Appendix 3). Water depth and distance from shore prevent some culturally based recreational uses, such as outrigger canoeing. Both native Hawaiian and non-Hawaiian commercial and recreational fishers have occasionally taken advantage of the habitat enhancement and fish aggregation characteristics of the sea cages. HF will continue to work with those individuals that request occasional access to the site for this purpose.

6.0 POTENTIAL IMPACTS AND MITIGATION MEASURES

6.1 SHORT-TERM IMPACTS

Moving cage materials to the site from Keehi Lagoon and assembling the sea cages themselves on site should take approximately 26 days, depending on weather, and have no significant impacts. Ocean Spar representatives, who have installed cages all over the world, will be in Hawaii to advise on the installation.

There will be short-term impacts on the water clarity and bottom sediments with the realignment of the existing and new mooring grid and installation of the four new cages. Lifting the existing Danforth anchors and the single ballast weight suspended from the center of each cage will result in minimal and short-term re-suspension (a matter of minutes)of soft sediments and sand. Likewise, when new anchors and weights are positioned for the grid, sediments will be disturbed for a short period of time. Any marine life within the immediate footprint of the repositioned or new anchors, which will cover a total of .025 acres, will be disturbed for a short time.

Observations of the growth of attached marine life at the site indicate they will readily repopulate.

The general installation plan to upgrade and increase the number of sea cages is to realign and expand the mooring grid to accommodate eight SS 6000 series cages. The existing four SS 3000 cages will be removed and eventually changed to the larger SS 6000 cages, as harvesting of each crop is completed. At the same time, the farm grid will be made more perpendicular to the prevailing currents to further enhance turbulent mixing.

Installation will generally be carried out as follows:

Step 1: The existing four SS 3000 cages will be moved and secured within the existing site a few hundred yards to the West, in approximately the same depth of water. (Timeframe – About 3 days)

Step 2: Some of the existing anchors will be moved to attach new anchor lines, so that the grid is capable of securing eight cages. A total of 16 anchors were used in the previous four cage configuration – the project was approved for 18 anchors – and 16 anchors will be used in the new grid layout for eight cages. Once the 16 anchors are moved in the new position, they will be connected using a series of lines, bridles, floats, and weights; similar to the current system. (Timeframe – approximately 14 days)

Step 3: The newly deployed anchor grid will then undergo final adjustment of the tension in the system.(Timeframe – 2 days)

Step 4: The four existing SS 3000 cages will be moved and attached to the newly repositioned grid. (Timeframe – Approximately 7 days)

Step 5: Installation dates of the four new SS 6000 series cages will depend on the availability of stocking material from the hatchery (Timeframe – When undertaken a cage takes 2 days to set up and install, so a total of 8 days will be needed for all the cages)

Step 6: As crops are harvested from the four SS 3000 cages, they will be replaced by SS 6000 series cages, so installation dates will vary (Timeframe – When undertaken, setup and installation takes 2 days per cage or 8 total days)

In summary, the realignment of the existing grid and the addition to the existing grid to accommodate eight cages, as well as, the reattachment of the SS 3000 cages to the new configuration will take approximately 26 days. As it becomes possible to attach the new SS 6000 cages and replace SS 3000 cages with SS 6000 cages, HF will notify DLNR in advance of each deployment. The completed new configuration with eight SS 6000 cages should be in place within one year of the initial realignment of the mooring grid. Factors affecting these timetables include: weather, harvestable fish in the existing four cages, and availability of fingerlings from the Company hatchery to stock the new cages.

6.2 LONG-TERM IMPACTS

6.2.1 Water and Sea Floor Quality, Existing and Projected

Water Quality, Existing and Expanded Site

The HF commercial site has been operational since February, 2001. Since that time, the required NPDES/ZOM permit monitoring program, approved in August of 2001, has taken and analyzed 16 sets of samples from thirteen sampling stations around the sea cages (Fig.13). Each station was sampled at three depths and yearly sampling frequency was quarterly (see Section 5.3.2 for more details).

A summary of the water quality monitoring results can be found in Table 2. Over this period of operation, there have been no violations of the DOH NPDES permit wet criteria. Analysis of samples showed that it was very difficult to detect any increase over ambient values in the measured parameters due to the short residence time of water in the cage, large volumes of ocean water available for mixing and high assimilative capacity of the nutrient poor Hawaii ocean environment. It should be noted the amount of ocean water passing through a single cage in a day, with a minimum current of .1 knot, is 217 million gallons (Ostrowski ,2001). These large volumes will greatly assist dilution and assimilation of waste products.

Moreover, HF believes the expanded production capacity on the expanded site would realize similar water quality results with the biomass involved, the expanded area proposed, the proposed realigned cage layout, and the strong, consistent current patterns in the area. Maximum fish biomass (weight per unit volume of water, e.g. kg/ m^3) will remain roughly the same as the current operation, approximately 30 kg/m^3, which represents accepted industry management practice. Similarly, densities of feed fed and fish waste products excreted should be similar to those observed with the existing farm. Therefore, impacts should remain insignificant.

Per DOH CWB regulations, an appropriate ZOM for the expanded project will be requested and it is anticipated it will be similar in size, though different in shape(extending more seaward), than the existing ZOM. A comprehensive monitoring program by a qualified consultant will be put in place. Should concerns over elevated nutrients arise, a number of effective mitigation measures are available to HF to control amounts of dissolved and solid waste inputs into the environment. These measures include: 1) modifying feeding schedules, 2) adjusting cage biomass, 3) altering cage cleaning schedules, and 4) adjusting the size of the ZOM.

Substrate Quality, Existing and Expanded Site

The ongoing benthic monitoring program for the existing site conducted by the University of Hawaii scientists has submitted ten reports summarizing results from the four previously described sampling stations around the sea cages (2 near the cages and 2 controls outside of cage influence). Yearly sampling frequency of sampling was approximately quarterly.

The most noticeable result of the monitoring was the change in polychaete species composition and abundance under the sea cages compared to the control sites. The species that dominated samples under the cage was *Ophryotrocha adherens* and near the cage was *Capitella capitata.* These species were absent in the two distant control stations. It is known these particular polychaete species are opportunistic and their presence are indicators of organic enrichment of the sediments. Both species tend to occur in marine environments that contain elevated

nutrients (Lin and Baily-Brock, 2008).

It is clear that the sea cages can elevate nutrient levels in the sediments underneath, which in turn have changed the ambient (common) species composition and abundance of polychaete species. While these shifts in species composition and abundance in the limited area under the cage and nearby are measurable, they do not have great ecological significance. Such changes are known to occur in benthic environments when nutrient enrichment occurs from any source. Moreover, it has been observed that when cages have been harvested and are empty for up to six months, species composition and abundance tends to shift back to that of barren sand, indicating these changes are reversible (Lin and Baily-Brock, 2008).

The expanded project will make several changes that will reduce the impact of the sea cages:

1) The cages will be realigned to the prevailing current pattern so that turbulent flow will increase, thus increasing dilution of waste products.
2) The new cages will be anchored in deeper water thus increasing the space between the bottom of the cage and substrate; allowing for greater mixing and assimilation of any particulate and dissolved waste products.

In addition, the benthic impacts will continue to be regularly monitored and mitigation measures to manage farm waste products are available if needed, including: modifying feeding schedules, adjusting cage biomass, and altering cage cleaning schedules.

6.2.2 Fauna and Flora

General Discussion

The existing and expanded sea cage farm will continue to attract marine life and essentially create a mini- ecosystem in what was a relatively barren part of the ocean. The sea cages and mooring system provide a substrate for attachment of animals and algae. The structures will attract a host of benthic invertebrates and algae, as well as, benthic, reef and pelagic species of fish (similar to State managed FAD system), that periodically take up residence for significant periods of time or are transient (Appendix 4).

The nutrient sources that help maintain the ecosystem include: uneaten feed, fish waste products and pulverized material cleaned from the cages. Ultimately, HF experience indicates this ecosystem is a dynamic mix of species that comes into a dynamic balance with the ocean environment around the cages. The impact of this cage ecosystem on near and distant organisms and habitat (e.g., recruitment of the larvae and juveniles of various popular species) is not considered significant given the relative size of the farm habitat and the large expanse of available natural habitat for reproduction and recruitment on the South shore of Oahu.

Disease Issues

There is a public concern about disease transfer from cultured stock to wild stock and a farmer concern of transfer of disease from wild species to the farmed species. HF is striving to be a leader in marine finfish biosecurity in Hawaii. The Company is diligent in applying best management practices to its operations, including inspection of fingerlings for disease prior to stocking, maintaining controlled feeding rates, utilizing acceptable stocking densities, and regular removal of fish mortalities and cage cleaning.

Stringent biosecurity procedures, adapted from large-scale marine hatcheries in Europe, will be adopted at the HF hatchery, including highly controlled access to the facility by visitors and managed movement of staff within the facility Plans for the expanded farm include instituting disease testing at three stages of the grow-out process: stock going into the cage, at 4 months into the grow-out and just before fish are harvested. Should a disease event occur in the stock, State authorities (DLNR, DOA and DOH) will be notified and approved treatment and stock disposal procedures for aquatic species will be followed.

Escape of Stock

Escape of the cultured stock from the cage environment has been an issue raised in the consideration of Hawaii offshore aquaculture projects due to concerns over potential for transfer of disease to wild stocks from cultured stocks and genetic impacts of cultured fish on genetics of wild fish. To date, there has been no known escape of fish from HF cages over the seven years of commercial operation.

In regard to the genetics issue, several points can be made. Broodstock for the hatchery are replenished generally once a year by capturing up to 100 juvenile and adult fish. This amount of fish is needed because moi are protandric hermaphrodites, that is, they start off life as a male and at a certain size become a female capable of egg production. Thus, in order to have a sufficient ratio of males to females for reproduction, up to 100 fish are required to be kept in the hatchery.

Broodstock moi to produce fingerlings for stocking are sourced by HF from various locations around the main Hawaiian Islands. It is known that moi around the Islands are genetically the same and represent one population. Therefore, fingerlings produced from these fish would be genetically the same as wild fish. Any escape would function as a stock enhancement event similar to that regularly carried out by DLNR.

Invasive and Protected Species Attachment

The State and the public are very concerned about aquatic invasive species (animals and plants) becoming established in Hawaii and displacing native species. Regarding the HF sea cage farm, the concern has been expressed that the cages and the mooring system provide a potential substrate (albeit, a comparatively small area in comparison to the coastal ecosystem and all its uses) for attachment of invasive algae. The two mile distance from shore and water depth of 140 ft. will act as major deterrents to attached invasive species becoming significant. Moreover, the regular cleaning of cages will strongly reduce the likelihood of invasive species establishing a population at the farm.

There is a positive side to the sea cages providing a substrate for attachment of marine life and that is there have been instances of attachment of regulated and protected species, i.e., the native pearl oyster (*Pinctada margeritifera*) and various coral species. In these few instances, HF has cooperated with DAR, DLNR in discussions to utilize the species for enhancement of wild locations. These cooperative efforts in ocean resource stewardship will continue with the expanded farm.

Sharks

There is a public concern that open ocean aquaculture farms will attract increased numbers of sharks to public recreation areas and in particular increase populations of pelagic sharks, e.g.,

the Tiger Shark (*Galeocerd cuvier*). The HF experience indicates certain species of shark, e.g., Sand Bar Sharks (*Carcharhinus plumberus*), do commonly become part of the cage ecosystem. Experience also shows that the numbers of sharks vary greatly over the year, with no particular pattern of attraction or avoidance. These observations are supported by scientific studies of shark movements conducted in several locations around the islands, including the HF site (K. Holland, pers. comm., 2008).

Sand bar sharks are the most prevalent species observed at the farm by far. The animals are usually seen alone or in groups of up to five, below the cages. Rarely do they come up to the level of the cage and there have been no aggressive incidents with Company divers. Tiger sharks have been observed near the site once over the years, though it is known they occur regularly in the vicinity of the farm with no pattern of attraction or avoidance (K Holland, pers. comm., 2008). HF observations support the conclusion that given the distance from shore and water depth, farming activities have not significantly affected shark behavior or movements in the general vicinity of the farm. Regardless, HF is aware of the issue and mitigates the potential for problems by regularly removing any dead fish from the cages.

6.2.3 Rare, Threatened, and Endangered Species

Public and agency concerns over open ocean aquaculture's potential impacts on rare, threatened and endangered species focus on altering the animals' behavior and habitat, as well as, the potential for harm by entanglement in netting and mooring lines. As previously described, hawksbill turtles and monk seals have not been observed at the site. Spinner dolphins and humpback whales have been rarely seen in the vicinity and their activities are not affected by cage operations. Green sea turtles are likewise rarely observed at the farm site. Farm activities do not significantly affect their movement and feeding and resting activities.

Humpback whales are of particular interest in Hawaii because they are the focus of a joint State/Federally managed national marine sanctuary. The HF site is not in the sanctuary and whales have not been observed at the site. Moreover, a review of the potential for entanglement of whales in the Gulf of Maine and Newfoundland has indicated the greatest threat is from fishing gear. The same author concluded that the chance of entanglement with Sea Station cage is unlikely to very unlikely due its construction(Celikkol, 1999).Ocean Spar also confirms that there have been no marine mammal entanglement issues with any of its 50 sea cages deployed around the world (L. Gace, pers. comm., 2008). Likewise, experience to date with KBWF, whose lease is in the whale sanctuary, indicate whales can pass around and through the submerged sea cages without incident (N. Sims, pers. comm., 2008).

Regardless, HF will adhere to the recommended standard procedures for avoiding marine mammal entanglement by maintaining taut cage mooring lines and netting at all times. Regular inspection by HF divers of netting and lines will make sure the cage system is taut. Further, should any protected species be encountered at the farm, the appropriate Federal and State authorities will be contacted.

6.2.4 Ocean Activities

The State has ongoing concerns for maintaining access to ocean resources by the public, as well as managing commercial interests. Chapter 190 D HRS passed by the Legislature and signed into law in 1999, provides a process for the long-term leasing and exclusive use of State marine waters for commercial aquaculture. Thus far, commercial offshore farming projects have requested partial exclusivity from DLNR to operate and have readily accommodated certain

uses compatible with operations and the public has cooperated with the request. To illustrate, both HF and Kona Blue currently operate submerged cages and boats transit the lease site either moving to another location or trolling in the area. However, anchoring of boats in the lease site has been discouraged by the lessee's due to the potential for entanglement with the mooring system and disruption of farm operations, as well as safety concerns for staff, divers and fishers.

In proposing to expand its commercial aquaculture activities and lease, HF is requesting several changes in the permit and lease language that affect the degree of public access. The Company is requesting to permanently anchor a feed/security barge more or less in the center of the expanded site (Fig. 6). In addition, HF is requesting that the 61 acre lease area be formally declared a "no anchor" and "no snorkel or SCUBA diving" area.

Allowing this increased control of public access to the leased area will not significantly affect the boating public from moving over the site, as cage operations will continue to be submerged 30 to 40 ft. below the surface. Fishing and diving in the vicinity of the farm have been minor activities and will not be greatly affected by the request for no anchoring and diving in the lease area. Troll and drift fishing in the lease area will continue. Requesting these limited restrictions on this relatively small amount of ocean is essential to: maintaining a safe work environment and keeping the boating public safe, allowing efficient farming operations and managing the substantial insurance liability associated with the project. Appropriate Coast Guard approved lighting and DLNR approved signage will be utilized to alert the public of these limitations.

6.2.5 Noise and Air Quality

Noise and air quality are insignificant issues with respect to the HF farm expansion. Fish farming activities (e.g., work boat engines and air compressors) will not significantly add to the ambient noise levels two miles offshore of a major international airport. Air emissions from the boats and fed/security barge will be insignificant in comparison to that emitted by coastal developments.

6.2.6 Aesthetics

Viewscape, particularly when it involves an ocean view, is very important to coastal property owners, as well as all manner of ocean users. The visual profile of the HF project will change in that a larger permanent feed/security barge (70 ft long, 24 ft. wide and 6 ft. above the ocean surface) will be moored in the center of the site. Otherwise, farm activities will appear as they have for the past seven years without complaint, that is, cages will be operated at depth and rarely be at the surface for maintenance. Further, one or two work boats will be on site daily and will be indistinguishable at a distance from normal boat traffic. These activities will be barely visible, if at all, from the Ewa Beach shore and should have no significant impacts on ocean aesthetics or viewscape.

6.2.7 Historical and Cultural Resources

Potential degradation of historical and cultural resources by development is a concern of the State and the public. HF is not aware of any historical or cultural resources at the existing or expanded site and there have been no such comments or complaints to date. Regardless, interviews were conducted with a knowledgeable cultural practitioner familiar with the location. The Company has also appeared before the EWA Neighborhood Board on three occasions to brief them on the project and received no negative comments. These actions and Company

experience to date supports the conclusion that there are no known traditional fishing grounds or resources at the project site (Appendix 3).

However, both native Hawaiian and non- Hawaiian commercial and recreational fishers have on occasion taken advantage of the fish aggregating characteristics of the cage system and occasionally harvested important species, such as opelu. HF has cooperated with commercial fishers in these instances and in return fishers have avoided farm operations. In terms of the proposed limitations on access, HF anticipates a continuation of the mutual respect and cooperation with commercial fishers.

6.2.8 Cumulative Impacts

The proposed HF action will not obligate DLNR to consider any additional expansion at the existing site or additional leases at other sites. Requests for additional lease acreage anywhere in the state must be justified and approved according to the permitting and lease process specified by Federal and State law.

Expectations are that the expanded lease acreage will accommodate the expanded production capacity given the physical nature of the site, i.e., the relatively strong and consistent currents, the barren sandy substrate suitable for anchoring and the lack of significant marine life in the area. Moreover, the Company's sustainable management of the farm expansion, including stocking, feeding and harvesting, will be supported by ten years of operating experience and application of the latest technology available. Further, a comprehensive environmental monitoring program will provide the feedback needed to determine any unacceptable changes in water or substrate quality and proactively manage them.

In summary, cumulative impacts on the lease site and on the ocean environment around the lease are expected to be manageable and insignificant.

6.2.9 Irreversible and Irretrievable Commitment of Resources

The proposed action does not involve an irreversible and irretrievable commitment of marine resources or State finances. A long-term lease on 61 acres of State marine waters is being requested. The lease term of 20 years, while necessarily long for investment recovery, is finite and revocable for cause. Moreover, the lease requires the lessee to post a bond so that in the event of HF bankruptcy, funds will be available for the State to remove structures and return the environment to its former condition. Further, there are no State funds involved in the financing of this expansion.

The open ocean environment off Ewa Beach and around the main Hawaiian Islands has demonstrated an enormous capacity to rapidly assimilate and recycle excess nutrients from fish farming. Consistent, strong currents mix and disperse fish waste products into an ambient, low nutrient ocean environment. Marine organisms attached to the cages, in the water column and in the substrate readily consume particulate wastes. Should the source of these nutrient inputs stop, such as with removal of the fish farm, it has been demonstrated the oceanic conditions in the substrate prior to the project placement will likely return (Lin and Baily-Brock, 2008).

7.0 RELATION TO THE STATE CONSTITUTION AND STATE LAWS, PLANS AND POLICIES

The proposed action to expand commercial open ocean aquaculture in State marine waters is consistent with the State Constitution and State laws, plans and policies related to: economic development and diversification, marine resource conservation and use, sustainable food production, and food security and self sufficiency. Below are excerpts from various documents that support this conclusion.

7.1 STATE CONSTITUTION

Article XI Conservation, Control and Development of Resources

"Section 1. For the benefit of present and future generations, the State and its political subdivisions shall conserve and protect Hawaii's natural beauty and all natural resources, including land water, air, minerals, and energy sources, and shall promote the development and utilization of these resources in a manner consistent with their conservation and in furtherance of the self-sufficiency of the State …

Section 6. The State shall have the power to manage and control the marine, seabed, and other resources located within the boundaries of the State, including the archipelagic waters of the State, and reserves to itself all such rights outside state boundaries not specifically limited by federal or international law.

All fisheries in the sea waters of the State not included in any fishpond, artificial enclosure or state- licensed mariculture operation shall be free to the public, subject to vested rights and the right of the State to regulate the same; provided that mariculture operations shall be established under guidelines enacted by the legislature, which shall protect the public's use and enjoyment of the reefs."

7.2 STATE PLAN LAW, CHAPTER 226, HRS

" Section 226-4 State Goals. In order to guarantee, for present and future generations, those elements of choice…
it shall be the goal of the State to achieve:

(1) A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaii's present and future generations…

Section 226-7 Objectives and policies for the economy—agriculture.

(a) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:

(2) Growth and development of diversified agriculture throughout the State.

(3) An agriculture industry that continues to constitute a dynamic and essential component of Hawaii's strategic, economic and social well-being…

(9) Enhance agricultural growth by providing public incentives and encouraging private initiatives…

(12) Expand Hawaii's agricultural base by promoting growth and development of flowers, tropical fruits…food crops, aquaculture, and other potential enterprises.

(13) Promote economically competitive activities that increase Hawaii's agricultural self-

sufficiency.

Section 226-103 Economic priority guidelines. (a) Priority guidelines to stimulate economic growth and encourage business expansion and development to provide needed jobs for Hawaii's people and achieve a stable and diversified economy:

(1) Seek a variety of means to increase the availability of investment capital for new and expanding enterprises.

(A) Encourage investments which:

(i) Reflect long term commitments to the State;

(ii) Rely on economic linkages within the local economy;

(iii) Diversify the economy;

(iv) Reinvest in the local economy;

(v) Are sensitive to community needs and priorities;

(vi) Demonstrate a commitment to provide management opportunities to Hawaii residents.

(2) Encourage the expansion of technological research to assist industry development and support the development and commercialization of technological advancements…

(8) Provide public incentives and encourage private initiative to develop and attract industries which promise long-term growth potentials and which have the following characteristics:

(A) An industry that can take advantage of Hawaii's unique location an available physical and human resources.

(B) A clean industry that would have minimal adverse effects on Hawaii's environment.

(C) An industry that is willing to hire and train Hawaii's people to meet the industry's labor needs at all levels of employment…

(d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:

(1) Identify, conserve and protect agricultural and aquacultural lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural and aquacultural uses of such lands…

(7) Encourage the development and expansion of agricultural and aquacultural activities which offer long-term economic growth potential and employment opportunities."

7.3 STATE ENVIRONMENTAL POLICY, CHAPTER 344, HRS.

Section 344-3 Environmental policy. It shall be the policy of the State, through its program, authorities, and resources to:

(1) Conserve the natural resources, so that land, water, mineral, visual, air, and other natural resources are protected by controlling pollution, by preserving or augmenting natural resources, and by safeguarding 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…

(5) Economic development

(A) Encourage industries in Hawaii which would be in harmony with our environment;

(B) Promote and foster the agricultural industry of the State; and preserve and

conserve productive agricultural lands;…

(D) Encourage all industries including the fishing, aquaculture, oceanography, recreation, and forest products industries to protect the environment;…

(F) Promote and foster the aquaculture industry of the State; and preserve and conserve aquacultural lands."

7.4 COASTAL ZONE MANAGEMENT, CHAPTER 205 A, HRS…

"Section 205 A-2 Coastal zone management program; objectives and policies.
(a) The objectives and policies in this section shall apply to all parts of this chapter…
(b) Objectives…
(5) Economic uses;

(A) Provide public or private facilities and improvements important to the State's economy in suitable locations…

(10) Marine Resources;

(A) Promote the protection, use and development of marine and coastal resources to assure their sustainability…

(c) Policies…
(5) Economic uses;

(C) 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, and permit coastal dependent development outside of presently designated areas when:

(1) Use of presently designated locations is not feasible;…

(ii) Adverse environmental effects are minimized; and

(iii) The development is important to the State's economy…

(10) Marine resources;

(A) Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;…

(E) Encourage research and development of new , innovative technologies for exploring , using or protecting marine and coastal resources."

7.5 OCEAN AND SUBMERGED LANDS LEASING LAW, CHAPTER 190 D, HRS.

Section 190 D-2 Findings and purpose.

Article XI of the Constitution of the State of Hawaii relating to…

The legislature finds that the State's marine waters offer the people of Hawaii sources of energy, minerals, food, and useable space. The legislature further finds that the proper management and development of these ocean resources require defined rights of usage and tenure."

7.6 HAWAII OCEAN RESOURCES MANAGEMENT PLAN, DECEMBER, 2006.

"Table 2: Perspective 2: Preserving Our Ocean Heritage: A vibrant and healthy ocean environment is the foundation for the quality of life in Hawaii and the well being of its people, now and for generations to come…

Management Goal and Strategic Actions

Encourage cutting edge and appropriate ocean science and technology with safeguards

for ocean resource protection…

Plan and develop sustainable commercial aquaculture in coastal areas and ocean waters to diversify and expand Hawaii's economy and provide locally produced sources of seafood."

7.7 HAWAII 2050 SUSTAINABILITY PLAN.

" The Five Goals For Hawaii 2050

The Hawaii 2050 goals are integrated philosophies that express the suitable future of Hawaii. They reflect a deeply held sense of where Hawaii should be headed…

Our diversified and globally competitive economy enables us to meaningfully live, work and play in Hawaii.

Our natural resources are responsibly and respectfully used, replenished and preserved for future generations."

8.0 AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONSULTED

Agencies, organizations, and individuals consulted during the preparation of this DEA are listed below. Correspondence received is included in Appendix 2.

8.1 Federal Agencies

US Army Corps of Engineers
- Regulatory Branch

Western Pacific Regional Management Council

US Department of Commerce, National Oceanic and Atmospheric Administration (Washington DC)
- NOAA- Fisheries
- NOAA- Aquaculture Program
- NOAA- Marine Fisheries Advisory Committee

US Department of Commerce, NOAA (Pacific Region)
- NOAA- Fisheries

US Coast Guard

8.2 State Agencies

Department of Agriculture
- Chairperson
- Aquaculture Development Program
- Agricultural Resource Management Division

Department of Business, Economic Development and Tourism
- Coastal Zone Management Program

Department of Land and Natural Resources
- Chairperson
- Office of Conservation and Coastal Lands
- Land Division
- Division of Aquatic Resources
- Division of Boating and Ocean Recreation

University of Hawaii
- Sea Grant College Program
- Hawaii Institute of Marine Biology

Department of Transportation
- Harbors Division

Department of Health
- Office of Environmental Quality Control
- Clean Water Branch

8.3 County Agencies

City and County of Honolulu
- Department of Planning and Permitting

8.4 Other Organizations and Individuals

Office of Hawaiian Affairs

Ewa Neighborhood Board

Waianae High School
- Marine Science Learning Center

The Oceanic Institute

United Fishing Agency

Pacific Ocean Producers

Roy's Restaurants

D.K.'s Restaurants

Tropic Fish Hawaii LLC

Ocean Spar LLC

Mike Buck, Radio Personality

William Aila, Harbor Master, Waianae Boat Harbor, DBOR

Kona Blue Water Farms LLC

Maui Fresh Fish LLC

Hawaii Oceanic Technology, Inc.

Kona Fish Company Inc.

Hilo Fish Company Inc.

Hawaii Farm Bureau Federation

Marine Mammal Center

Hiroshi Restaurant

9.0 PRELIMINARY DETERMINATION AND SIGNIFICANCE CRITERIA

The Significance Criteria listed in Chapter 200, HAR, were reviewed in consideration of the proposed action to expand the HF lease area and production capacity at its site approximately two miles off Ewa Beach, Oahu. A finding of no significant impact (FONSI) is anticipated based on the information presented in this DEA.

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

   There will not be an irrevocable commitment to loss or destruction of any natural or cultural resource by this action. Both the existing and expansion site have a barren sand bottom with no natural relief or significant fisheries or other marine resources. Currents in the area mix dissolved and particulate waste products and aid in their rapid assimilation and recycling by the highly dynamic, nutrient poor ocean environment. Any species population changes in the substrate infauna below the cages are not ecologically significant and it has been demonstrated the substrate community will change back to previous ocean conditions when the source of excess nutrients or the project is removed. Further, there are no known cultural resources in the area.

   In addition, the long term lease is for a finite period of time. The lease specifies that all improvements must be removed by the lessee upon termination of the lease and a bond is posted to assure compliance with this condition.

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

   Ten years of nearly daily observations of the public's use of the general area where the farm is located indicates very limited public activity and the proposed action will not curtail the range of beneficial uses of the environment. There is little regular recreational or commercial use of the lease area, except for occasional transiting of boats in the vicinity and the occasional opelu fisher. The proposed action is requesting the lease formerly establish a greater limitation in public access, that is, a no anchor and no diving zone for the lease area. The request is prompted by increased concerns over staff and public safety and potential for disruption of expanded farm activities, as well as, company insurance liability. This requested limitation is consistent with the current HF management approaches and the permitted lessee management of State land leases. The restriction will not interfere with boats freely passing through and around the submerged farm and troll and drift fishing at the

site.

3. Conflicts with the State's long-term environmental policies or goals or guidelines as expressed in Chapter 344, HRS.

   The proposed action, which sustainably expands commercial aquaculture in State marine waters and increases supplies of high quality seafood for tourists and residents in an environmentally responsible manner, is consistent with State environmental goals, policies, and guidelines as stated in Chapter 344, HRS. To illustrate, Section 344-3 discusses managing the State's unique natural environment for the benefit of residents;" 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."

   Further, Section 344-4 states aquaculture should be promoted by the State; "(F) Promote and foster the aquaculture industry of the State; and preserve and conserve productive aquacultural lands."

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

   The proposed action will positively affect the economic or social welfare of the community or state and no negative effects are anticipated. Expanded environmentally sustainable fish farming activities will increase employment opportunities for residents, provide greater amounts of moi for the local market, and stimulate the economy by the Company's expenditures to support industries. The State will benefit from payment of lease rents to DLNR for use of the ocean resources, as well as the increased personal and corporate taxes paid to the State. The proposed action will be financed by a combination of federal loan funds and private investment and not require State funds.

5. Substantially affects public health.

   The proposed action will increase the availability of high quality, healthy seafood (moi) for residents and tourists, statewide. The project will be managed to be environmentally sustainable and not have any significant impacts on the quality of state marine waters, as regulated by the DOH.

6. Involves substantial secondary impacts, such as population changes or effects on public utilities.

   No significant secondary impacts, such as shifts in population or impacts on public utilities, will be involved in the proposed action. The Company's support facilities at Keehi Lagoon and Kalaeloa are compatible and consistent with current land uses in the area.

7. Involves substantial degradation of water quality.

   The proposed action will not involve any substantial degradation of water quality. Regular testing for seven years at the existing commercial project site has shown that ocean currents readily disperse dissolved and particulate waste products and facilitate assimilation and recycling by the ocean environment. The expanded production will be carried out in an expanded lease area and subjected to the same consistent current patterns and ocean mixing of the existing project. Moreover, the project will be subjected to a rigorous water

quality monitoring program to assure State receiving water standards are met.

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

   The project is relatively small in comparison to the large and busy open ocean area along the South shore of Oahu. Data from the existing farm suggests that there is no measureable impact on water quality, and no significant impact on the substrate beyond the minor impacts in the immediate cage area. Thus no cumulative impacts on the water column are anticipated with the expanded farm and any unacceptable impacts on the substrate beneath the cages can be managed by HF. Implementation of the proposed action does not involve any commitment to a larger action at the site.

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

   There are no substantial effects anticipated on any rare, threatened or endangered species by the expanded project. Most species of concern, except for green sea turtles, have not been seen at the site. Observations indicate that green sea turtles and their habitat are unaffected by the farming activities. Moreover, the sea cages will maintain taut netting and mooring lines at all times to deter any potential issues with protected aquatic species.

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

    The project has no significant air borne emissions beyond those of standard boat engines that service the farm. Any noise generated by farm operations will come from logistics and support vessels and will be insignificant compared with noise generated by airplanes in the adjacent approach zone to Honolulu International Airport. As discussed above there will be no detrimental effects on water quality by the proposed action due to the environmental setting and current farm management practices.

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

    The project's ocean location is not an environmentally sensitive area and is reflective of open-ocean and sand bottom communities around the state. The nearest coral reef is shoreward to the North Northwest approximately 1800 ft, away. As indicated, the proposed expansion is seaward of this location. Moreover, water quality studies of the impacts of the existing HF project on this habitat have shown no impact and none are anticipated with the expansion.

12. Substantially affects scenic view planes or vistas.

    The HF site is a significant distance from shore (nearly two miles) off Ewa Beach, Oahu. Moreover, the sea cages will be operated submerged with only occasional appearances at the surface for maintenance. A permanently moored feed/security barge is being requested for the site. The low profile barge, as well as the work boats will appear as normal vessel traffic from the ocean and should be barely visible if at all, from shore.

13. Requires substantial energy consumption.

    There will be an insignificant increase in energy required by vessels providing logistics and maintenance support to the expanded site.

10.0 REFERENCES

Aquaculture Development Program, 2008. Aquaculture in Hawaii. DOA. [http://www.hawaiiaquaculture.org]

Baily-Brock, J., University of Hawaii, Department of Zoology, pers. comm., 2008.

Bathen, K. 1978, Circulation Atlas for Oahu, Hawaii. UHIHI-SEAGRANT-MR-78-05, 94 p.

Corbin, J. 2007. "Marine Aquaculture: Today's Necessity for Tomorrow's Seafood". Marine Technology Society Journal. Vol. 41, No. 3, pp. 16-23.

Celikkol, B., 1999. Biological Assessment of the University of New Hampshire Open Ocean Aquaculture Demonstration Project Finfish Component. US Army Corps of Engineers, New England Division, Concord, MA. 60 p.

Division of Aquatic Resources, 2008. Fisheries Statistics. DLNR. [http://hawaii.gov/dlnr/dar/].

Gace, L., Ocean Spar LLC, pers. comm., 2008.

Holland, K., Hawaii Institute of Marine Biology, University of Hawaii, pers. comm., 2008

Juvik, S. P. and J. O. Juvik, editors, 1998. Atlas of Hawaii, Third Edition. University of Hawaii Press, Honolulu, Hawaii, 333 p.

Lin, D. and J. Baily-Brock, 2008. "Partial recovery of infaunal communities during a fallow period at an open ocean aquaculture farm." Mar. Eco. Prog. Ser., Vol. 371: 65-72.

NOAA, 2008. Offshore Aquaculture in the United States: Economic Considerations, Implications & Opportunities. US Dept. of Commerce, NOAA Aquaculture Program. July, 2008, 274p.

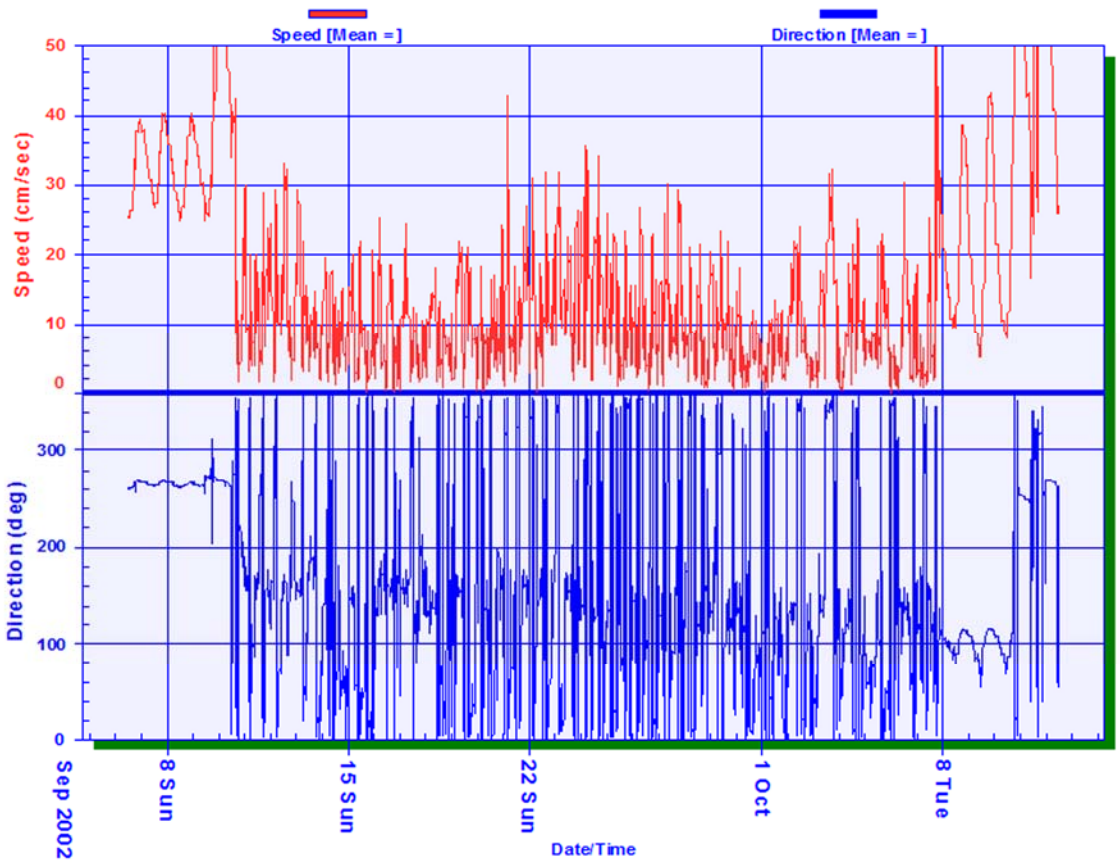
OEQC, 2007. "(8) Kalaeloa Artificial Reef". The Environmental Notice. November 23, 2007.

Ostrowski, A., J. Baily-Brock, and P.S. Leung, 2001. Hawaii Offshore Aquaculture Research Project (HOARP) - Phase II. Final Report to University of Hawaii Sea Grant College Program. 79 p.

Sims, N., Kona Blue Water Farms LLC, pers. comm., 2008.

Stanton, K., 2006. "It's the Silicon Valley of Aquaculture, a top Federal official praises the progress of fish farming in Hawaii". Honolulu Star Bulletin, Vol. 11, Issue 346. December 12, 2006.

APPENDIX I: CURRENT DATA



Appendix 1. Current meter test data for HF site, September 8, 2002 to October 8, 2002.

APPENDIX 2: COMMENT LETTERS

- Leslie Canisbog
- Jay Gyotoku
- Waianae High School
- Marine Mammal Center
- Roy's Restaurant
- Hiroshi Restaurant
- United Fishing Agency
- Tropic Fish Hawaii LLC
- Kona Fish Company Inc.
- Hilo Fish Company Inc.
- Oceanic Institute
- Hawaii Farm Bureau
- Pacific Ocean Producers

Leslie Cansibog
87149 Milikami St.
Waianae, HI 96792

July 28, 2008

Randy Cates
Hukilau Foods
P.O. Box 335
Kailua, HI 96734

Dear Randy,

Thank you for asking me to review your expansion plans for your fish farm. I have read through your proposal and have no concerns to the ocean environment or our fishery, in fact, it will once again enhance it. As you know I am a Commercial fisherman who over the past few years has taken advantage of the Opelu fishery that your site has enhanced, I have received a great benefit due to the site and location.

I find it interesting how both You and I have evolved from our earlier days of commercial fishing, we both have had to make changes in the way we catch and produce our product, You went into Aquaculture, and I changed my type of fishing from primarily trolling to now Opelu fishing. The ever changing fishery and economics of commercial fishing have forced this change in many ways, fuel is now the biggest driver of this change. Though there were many skeptics regarding your fish cage operation initially, we have all seen the benefits and your operations have only benefited many commercial fishermen.

Your crew and I over the years have enjoyed a great mutual respect and working partnership, I am thankful to be an additional eyes and ears for you when your crew is not present at the site, in return I have a good resource to fish for and near to shore.

I fully support your expansion and look forward to any other sites if you choose to do so, we will need this type of operation in the future as long as they are able to work with the existing fisherman as you have done so. Hopefully others will take note and learn how to be respectful to other fisherman and the Community.

Sincerely,

Leslie M. Cansibog

Leslie Cansibog
Captain

Jay Gyotoku
1620 Wailele St.
Honolulu, HI 96819

July 28, 2008

Randy Cates
Hukilau Foods
P.O. Box 335
Kailua, HI 96734

Dear Randy,

Thank you for having me review your expansion plans, as you know, over the years I have benefited from your operation with regards to my opelu fishery, with the expansion proposal, I see only an increased benefit. The mutual respect and working relationship that I have with your company and crew is a win, win situation, over the years I have seen no negative impact, only positive impact with regards to both the fishery and other ocean users. I have been a commercial fisherman for most of my life, and your operation has only benefited me personally.

As times have dramatically changed with my fishery, it has been a great benefit to have an opportunity to fish around your site, with rising fuel costs, it is important to have the ability to stay closer to our shoreline and maintain my lively hood.

I wish you all of the success, and look forward to maintaining our working relationship in the future.

Sincerely, Jay Gyotoku

Jay Gyotoku

MARINE SCIENCE LEARNING CENTER

Wai`anae High School 85-251 Farrington Hwy Wai`anae 96792
Phone: 696-7017 Fax: 697-7018

June 11, 2008

To Whom It May Concern:

My name is Dana Hoppe and I am the coordinator of the Marine Science Learning Center at Waianae High School. I teach a four course sequence to juniors and seniors that constitutes the marine science major within the Natural Resources Academy at Wai`anae High School. I have been a teacher at Wai`anae High School for the past 20 years and coordinator of the Learning Center for the past 8 years.

Wai`anae High School's marine science major is designed to expand and enrich learning experiences of students in the field of marine science and aquaculture science through a variety of "hands-on" activities. The program provides students with knowledge and skills about aquaculture; and, a restructuring of their attitudes about the use, protection and appreciation of the ocean environment and its resources. The Marine Science Learning Center has a functioning saltwater aquaculture facility where students learn to raise a variety of marine species. A primary focus of our program is saltwater aquaculture and its role in the sustainability of our marine resources.

Randy Cates of Hukilau Foods (HF) has made important contributions to the success of the Marine Science Learning at Wai`anae High School. This school year he provided 1000 *moi* fingerlings to the Learning Center and has offered more fingerlings to the program for the coming school year. He has provided technical support and advice that has improved the function of Wai`anae High School's facility. He has also offered to open HF's hatchery facilities, when they have been completed, for student field trips. It is our hope that with the skills learned in the Learning Center program our students will be able to participate in internships and provide the future workforce for HR's hatchery and cage culture facilities.

We strongly support Hukilau Foods's proposed expansion of their existing offshore cage culture. It is critical with the diminishing fisheries in the World's Oceans that we explore all possible options that will reduce the demands upon wild ocean resources. I believe that offshore cage culture will play an important role in helping us meet the demands for seafood. I strongly support HF's programs and activities.

Yours Sincerely,

Dana H. Hoppe

Dana H. Hoppe, Coordinator
Marine Science Learning Center
Wai`anae High School

June 11, 2008

To Whom It May Concern;

I fully support the mission of Hukilau Foods to bring more sustainable fish and seafood to the tables of Hawaii and eventually to the rest of the world. The success that Randy Cates has had with farming Moi offshore, and developing an industry in Hawaii that both employs Hawaii residents and showcases Hawaii to Chefs and consumers nationally, is remarkable. Responsible farming of fish not only brings more product to the market, it takes the pressure off of the fragile ecosystem of the ocean that surrounds us. By farming larger quantities through aquaculture it allows the wild fish populations to regroup, and strengthen in number because of the lessened demand for wild caught fish. It is truly a win-win situation.

The opportunity to be on the cutting edge of something so important to the people of Hawaii for not only this generation, but for generations to come presents itself in Hukilau Foods proposal. I urge you to strongly support their proposal.

Yours truly,

Roy Yamaguchi
Chef/Founder
Roy's Restaurants

Roy's Restaurant

6600 Kalanianaole Hwy.
Honolulu, Hawaii 96825

Tel: (808) 396-ROYS (7697)
FAX: (808) 396-8706

hiroshi

June 11, 2008

Re: Expansion of offshore Moi farm, Ewa Beach, Oahu

Dear Randy,

I am very glad to hear of your plans to seek an expansion of your lease area and increase production with your moi farm. Your product has been very important to our business; many of our customers often request moi in our restaurant. As you know, we have utilized your product from the very first harvest, and we fully support your business success.

Many people do not realize how important it is to have fresh products produced from Hawaii. Our customer base is a mix of both local residents and tourists. It is vital that we have products from Hawaii available to our customers. Over the years I have seen the demand for your product increase, and with the recent closure of the bottom fish fishery, many of us in the restaurant trade rely on your product to help fill the missing gap in fish supply, especially a fish that can be served whole.

I am very thankful to you and your crew for taking me and my staff out on several visits to see first hand how you produce your fish. It was amazing to see how small of a footprint the area is once you are out in the open ocean; it truly put everything into perspective. This experience truly educated my staff as to what the possibilities are in being able to have sustainable fish from Hawaii.

Often we are asked to support many charitable events in Honolulu, and Moi is often one of the products that we all rely on. Your donations of product goes a long way for our community.

I look forward to supporting you in anyway possible,

Sincerely,

Hiroshi Fukui

UNITED FISHING AGENCY, LTD.
1131 N. Nimitz Highway
Honolulu, HI 96817
TEL: (808) 536-2148 • FAX: (808) 526-0137

August 2, 2008

John R. Cates
Cates International, Inc.
P. O. Box 335
Kailua, HI 96734

Dear Randy,

We support your intent to expand your aquaculture operations and production, especially considering the plight of our nearshore/reef ecosystems and the significance of your moi to our Hawaii Regional Cuisine chefs and restaurants.

The quality, consistency, and availability of your finfish product means a lot to our seafood programs and the growing image of Hawaii and its ocean products.

Congratulations and best wishes for your continued success.

Sincerely,

Brooks H. Takenaka
Assistant General Manager

TROPIC FISH
HAWAII LLC

1020 Auahi St. Honolulu, HI 96814 Fax (808) 591-2934 Phone (808) 591-2936

July 28, 2008

Tropic Fish Hawaii, LLC. Fully endorses and supports Hukilau Foods in their expansion plans. The local seafood markets and our visitor industry sorely need more local marine fish that are grown in an environmentally sustainable manner. There is a growing shortage of seafood from the wild and aquaculture has become a major source of supply for our company.

Currently we sell moi, ogo, salmon, oysters, clams, kampachi, hamachi, abalone, basa, tilapia, and shrimp that are grown on aquaculture farms. Hukilau's proactive vision to expand their operations is very welcome news to the Hawaiian consumers who can not find local reef fish any more. Our restaurants and hotels will also benefit by having a reliable supply of the freshest home grown Hawaiian fish available year round. As an island state in the Pacific Ocean we are obligated to be able to provide fresh island seafood to our visitors and locals alike. And with the state of the art hatchery that Hukilau is building, we are very excited about the different varieties of Hawaiian fish that will be available in the very near future.

Sincerely,

Glenn Tanoue

Glenn Tanoue
Marketing Director
808-478-3205

KONA FISH COMPANY INC.
HAWAII

73-4776 Kanalani Street ~ Kailua-Kona, Hawaii 96740
Phone (808) 326-7708 ~ Fax (808) 329-3669

June 30, 2008

Aquaculture offers sustainability for our food supply and a means to avert depletion of our ocean resources. In the last half decade, those in the seafood business realize that the ocean is not limitless in its sea life and that there are bounds to how much can be fished before supply is depleted and the ocean ecosystem collapses. Protecting the long-term health and supply of Hawaii's fishery is for that, imperative to us. It is our livelihood that is on the line.

Hukilau Foods LLC., formally Cates International Inc., leads as the first successful business to ocean farm in the entire United States. Two miles off the Leeward coast of Oahu, the company commercially farms the Hawaiian moi ('Polydactylus sexfilis') in modern open ocean cages. The ocean cages that moi are raised in approximates the conditions that the ancient Hawaiians created with fishponds in years long-ago along the Hawaiian Islands coastline. Currently, Hukilau Foods has four cages immersed in 150 feet of water and lie about 40 feet under the ocean surface to produce 900,000 pounds of moi a year. This nears maximum capacity of 1.2 million pounds annually for its exiting facility; of which, Hukialu Foods is capable of selling beyond if it were granted permission to expand operations.

Hukilau Foods is requesting from the state Department of Land and Natural Resources (DLNR) to lease an additional 33 ocean acres for the accommodation of four additional cages in its continued production of moi. The company anticipates that the added cages will provide the potential to produce 5 million pounds of fish a year, enough supply to make moi available to everyone in Hawaii and markets beyond Hawaii. Furthermore, the demand fulfillment that could be achieved in the marketplace by a production rise will assist to alleviate market demand for over fished Hawaiian fish species in being an affordable eco-friendly alternative, and thereby enable depleted fish stocks a chance to recover.

Kona Fish Company, Inc. endorses and supports Hukilau Foods, Inc., in their expansion efforts. The technology that Hukilau Foods has pioneered to farm moi is one that is adaptable to other ocean species as well. Off the shores of Kailua-Kona, for instance, Kampachi is being successfully raised in similar systems derived from the farming of moi. With further development and expansion of fish farming in Hawaii, the technology will yield sustainability to Hawaii's food supply. This is the future. And, it is one that Hawaii can play a vital role in the way seafood is harvested and ocean resources conserved.

Sincerely,

Kerry A. Umamoto

Kerry Umamoto
President of Kona Fish Company, Inc.

HILO FISH COMPANY INC.
HAWAII

55 Holomua Street ~ Hilo Hawaii 96720
Phone (808) 961-0877 ~ Fax (808) 934-8783 / (808) 935-1603

June 30, 2008

Aquaculture offers sustainability for our food supply and a means to avert depletion of our ocean resources. In the last half decade, those in the seafood business realize that the ocean is not limitless in its sea life and that there are bounds to how much can be fished before supply is depleted and the ocean ecosystem collapses. Protecting the long-term health and supply of Hawaii's fishery is for that, imperative to us. It is our livelihood that is on the line.

Hukilau Foods LLC., formally Cates International Inc., leads as the first successful business to ocean farm in the entire United States. Two miles off the Leeward coast of Oahu, the company commercially farms the Hawaiian moi ('Polydactylus sexfilis') in modern open ocean cages. The ocean cages that moi are raised in approximates the conditions that the ancient Hawaiians created with fishponds in years long-ago along the Hawaiian Islands coastline. Currently, Hukilau Foods has four cages immersed in 150 feet of water and lie about 40 feet under the ocean surface to produce 900,000 pounds of moi a year. This nears maximum capacity of 1.2 million pounds annually for its exiting facility; of which, Hukialu Foods is capable of selling beyond if it were granted permission to expand operations.

Hukilau Foods is requesting from the state Department of Land and Natural Resources (DLNR) to lease an additional 33 ocean acres for the accommodation of four additional cages in its continued production of moi. The company anticipates that the added cages will provide the potential to produce 5 million pounds of fish a year, enough supply to make moi available to everyone in Hawaii and markets beyond Hawaii. Furthermore, the demand fulfillment that could be achieved in the marketplace by a production rise will assist to alleviate market demand for over fished Hawaiian fish species in being an affordable eco-friendly alternative, and thereby enable depleted fish stocks a chance to recover.

Hilo Fish Company, Inc. endorses and supports Hukilau Foods, Inc., in their expansion efforts. The technology that Hukilau Foods has pioneered to farm moi is one that is adaptable to other ocean species as well. Off the shores of Kailua-Kona, for instance, Kampachi is being successfully raised in similar systems derived from the farming of moi. With further development and expansion of fish farming in Hawaii, the technology will yield sustainability to Hawaii's food supply. This is the future. And, it is one that Hawaii can play a vital role in the way seafood is harvested and ocean resources conserved.

Sincerely,

Charles M. Umamoto
President of Hilo Fish Company, Inc.

Oceanic Institute
An Affiliate of Hawai'i Pacific University

June 20, 2008

John R. Cates
CEO
Hukilau Foods
P.O. Box 335
Kailua, Hawaii 96734

Dear Mr. Cates:

Subject: Environmental Assessment

The Oceanic Institute (OI), an affiliate of Hawaii Pacific University, has enjoyed working closely with you (dba Hukilau Foods) for many years. We appreciate your efforts and success in commercializing technologies for off-shore aquaculture that were developed collaboratively by you, Oceanic Institute, and the University of Hawaii. Hukilau Foods now operates what was the first commercial offshore aquaculture facility in the nation. Today, Hawaii is seen as a model for offshore aquaculture development. This is in no small part because of your success. Without your dedication and commitment to developing your facility in a sustainable manner while addressing public concerns, this would not have been possible.

One major contributing factor to your success has been your willingness and commitment to fully engage affected communities. The extensive public meetings you had with residents along the Leeward Coast of Oahu and your openness to hearing their concerns and addressing them was, in my opinion, critical to the success of your project. I know you have also reached out to the commercial fishing sector, WESTPAC, seafood distributors, restaurants, Waianae High School, McKinley High School, Heeia Fishpond and many other stakeholders to be sure that your business does not have any negative impact on them or the community at large. In fact, your practice of preferentially hiring people from the Leeward Oahu has had a positive impact on that community. This trust is reflected in the EA that you are submitting.

Technically, you have done things right, too. The development of sustainable hatchery and offshore cage culture technologies are critical to the successful, long-term operation of any facility. In addition, extensive monitoring conducted around your site has demonstrated that activities associated with offshore cage culture (e.g., feeding, etc.) do not cause significant adverse environmental impacts. Wild, native fish have been used as broodstock. Thus, if fish somehow escape from the cage, the only consequence is positive. This was demonstrated through research on stock enhancement we did at OI for over a decade. Uncertainties have been resolved in favor of assuring that your cages and other offshore facilities do not have adverse environmental impacts or compromise public use of the areas you are leasing.

41-202 Kalaniana'ole Highway, Waimānalo, Hawai'i 96795 Phone: +1 808 259 7951 Fax: +1 808 259 5971 Web: www.oceanicinstitute.org

Finally, I want to take this opportunity to commend you for your leadership in promoting sustainable aquaculture nationwide and recognizing the importance of the fishing industry and the aquaculture industry working together to meet the growing demand for seafood throughout the world in a sustainable manner. Your commitment to this is, perhaps, best recognized through your membership in MAFAC, which manages our Nation's fisheries. As a member of the Hawaii Aquaculture Association, I know you have stood up numerous times in defense of wild fisheries when it is evident that best management practices have been used.

I also want to acknowledge your willingness to support Hawaiian fishpond restoration and enhancement activities. To date, you have given away over 130,000 fingerlings to restock Hawaiian fishponds with moi, a fish that has traditionally been grown in fishponds but is so rare now that natural recruitment is practically impossible. This has been done with the knowledge that some of these fish will end up on the market competing with fish you are raising in offshore cages. This, too, is appreciated by the Hawaiian community and others interested in fishpond restoration.

In short, I am proud that Oceanic Institute is a partner in your efforts to develop offshore aquaculture in a sustainable manner. We look forward to working with you in the future.

Sincerely,

Bruce S. Anderson, Ph.D.
President

41-202 Kalaniana'ole Highway, Waimānalo, Hawai'i 96795 Phone: +1 808 259 7951 Fax: +1 808 259 5971 Web: www.oceanicinstitute.org

Hawaii Farm Bureau
FEDERATION
2343 Rose Street, Honolulu, HI 96819
PH: (808)848-2074; Fax: (808) 848-1921

Randy Cates
Hukilau Foods
P.O. Box 335
Kailua, Hawaii 9634

Dear Mr. Cates:

My name is Dean Okimoto, President of the Hawaii Farm Bureau Federation, which is the largest non-profit general agriculture organization representing approximately 1,600 farm and ranch family members statewide.

The Hawaii Farm Bureau Federation (HFBF) is writing in support Hukilau Foods' proposed expansion of their existing offshore lease for cage culture of moi. Hukilau Foods current operation plays a critical role in Hawaii's aquaculture industry. Aquaculture is a growing sector of Hawaii's agricultural industry that is important not only for the viability of the State's agricultural industry, but for the viability of the State's overall economy.

HFBF feels that Hukilau Foods' expansion project holds great potential and offers opportunities for Hawaii's thriving aquaculture industry. Their expansion and increased production would contribute to Hawaii's efforts towards sustainability.

HFBF strongly supports Hukilau Foods' expansion and their application for the required permits and Environmental Assessment.

Sincerely

Dean Okimoto
President
Hawaii Farm Bureau Federation

June 16, 2008

Randy Cates
Hukilau Foods, LLC
P.O. Box 662069
3-1850 Kaumualii Hwy
Lihue, HI 96766

Aloha Randy:

Thank you for inviting comment on Hukilau's proposed expansion. I am impressed, looking back over 25 years building POP from nothing to what it is today. I have a deep appreciation for what you have done and your future plans.

All of us in today's seafood environment face interesting challenges, and I very much believe as you do our industries should be working together. Our interest is best served by focusing on quality expansion that gives Hawaii solid environmental proposals and focuses on local product produced by local people.
So from my perspective, Hukilau is on point. This is a quality project that comes with a giant advantage to our state in that your proposal is well tested and your stewardship is fact.

I did note your request that access be somewhat restricted over the previous lease. In the scope of things this is a very small property and you are not limiting transit. I do believe the public will understand regarding their snorkeling and diving restrictions as they are in the interest of public safety.

The demand for seafood continues to increase on a global scale and I am aware of the marketing opportunities out of state. Your commitment to the local market is very important. I think keeping island tradition alive is what makes Hawaii special and in the long run will pay off.

Best of luck to you and always know that we are available to work with you in any way possible

Aloha,

Jim Cook
Pacific Ocean Producers

APPENDIX 3: CULTURAL RESOURCE ASSESSMENT

Introduction

A Cultural Resources Assessment is required in conjunction with any Environmental Assessment and Impact Statement (Chapter 343, HRS, as amended). The assessment should indentify and assess any potential impacts of a proposed project on the use of cultural and natural resources at the proposed site and its vicinity by native Hawaiians, including impacts on traditional and customary practices.

HF is proposing a seaward expansion of its existing 28 acre State lease for sea cage aquaculture of Moi by an additional 33 acres; for a new total lease site of 61 acres. The project, which is located in the open ocean about 2 miles off Ewa Beach, would expand the number of cages from four to eight. HF would change out for existing smaller SS 3000 cages (3000 m^3 in volume) to four SS 6000 series cages (6000 m^3 in volume) and add four additional SS 6000 cages. Cages would continue to be operated submerged, with the support of a permanently moored feed/ security barge on site. HF is requesting the entire lease site be designated a no snorkeling or SCUBA diving area and no anchoring of any boat be allowed. Transit of boats and troll and drift fishing at the site would continue to be permitted.

Methods

HF and its predecessor company Cates International Inc., have been operating in the area for ten years, seven years as a commercial farm. Personnel reviewed Company experiences and records to determine if there were any complaints or issues with regard cultural resources and traditional practices. William Aila, the long time Harbor Master at Waianae Small Boat Harbor, recreational fisher and someone very active in the Oahu Hawaiian community, was interviewed regarding any concerns the Hawaiian community may have with the project. In addition, the Ewa Beach Neighborhood Board, was briefed on three occasions on the project and asked for comment.

Results

The project is 2 miles East of the Honouliuli ahupua'a, which is the largest and western most ahupua'a in the highly urbanized Ewa District. Water depths average 140 ft. and the bottom is barren sand. The initial site was in large part chosen because of the open ocean conditions, sand bottom for anchoring cages, strong and consistent currents, and lack of recreational and commercial use, e.g., fishing. The proposed expansion site has similar physical and use characteristics.

Company experience to date is there have been no complaints regarding any impacts on cultural resources or traditional practices. HF is aware that nearshore fisheries and coastal marine resources are traditionally very important to native Hawaiians for subsistence gathering and recreation. However, the proposed expanded lease site is far from the Ewa shore where traditional and customary gathering occurs (e.g., limu) and does not have any significant fishery resources. Mr. Aila confirms that to his knowledge the HF area is of no particular significance to native Hawaiian fishers, though he noted the presence of sea cage aquaculture has improved fishing for certain species in the area, particularly opelu. He and others in the leeward fishing community attribute this improvement to the positive fish aggregation characteristics of the sea cage farm. Further, no cultural concerns were raised by the Ewa Beach Neighborhood Board.

Conclusion

Ten years of experience at the existing site and input from knowledgeable individuals and the Ewa Beach Neighborhood Board indicate the project expansion will have no significant impact on any cultural resources or traditional and customary native Hawaiian practices. Boats will continue to freely transit the site and drift and troll fishing by the public can continue as before.

APPENDIX 4: COMMON NAMES OF RESIDENT AND TRANSIENT SPECIES

Appendix 4. Common names of resident and transient (*) species identified around HOARP Phase II Project. Species are representative of species observed around the HF commercial cages.

ORNAMENTALS	INVERTEBRATES	REEF HERBIVORES	PELAGIC HERBIVORES	REEF CARNIVORES
Butterflyfish	**Mollusks**	**Filefish**	**Filefish**	**Barracudas**
Milletseed *Chaetodon miliaris*	Oyster *Margariaifera spp.*	Shy *Cantherhines verecundus*	Scribbled/broomtail *Aluterus scriptus*	Great barracuda *Sphyraena barracuda**
Bluestripe *C. fremblii*	Mussels (unknown)	**Pufferfish**		**Jacks**
Blacklip *C. kleinii*	Barnacle *Lepas anserifera*	Porcupinefish *Diodon hystrix*		Bluefin *Caranx melampygus**
Multiband *C. multicinctus*	**Crustaceans**	Stripebelly *Arothron hispidus*		Island *Carangoides orthogrammus**
Anthias	Coral banded shrimp *Stenopus hispidus*	Spotted *A. meleagris*		Leatherback *Scomberoides lysan**
Bicolor *Pseudanthias bicolor*	Blue crab *Callinectes sapidus**			Amberjack *Seriola dumerilli*
Surgeonfish	Collector crab *Simocarcinus simplex*			Ono/wahoo *Acanthocybium solandri**
Yellowfin *Acanthurus xanthopterus*	**Echinoderms**			
Blue spine unicornfish *Naso unicornis*	Cushion star *Culcita novaeguineae**			
Longfish	Blue spotted urchin *Astropyga radiata**			
Trumpetfish *Aulostomus chinensis*	Banded urchin *Echinothrix calamaris**			
Cornetfish *Fistularis commersonii*	**Nudibranchs**			
Hawkfish	Seahare *Stylocheilus longicauda*			
Longnose *Oxycirrhites typus*				
Squirrelfish				
Bigscale soldierfish *Myripristis berndti**				
Wrasses				
Hawaiian hogfish *Bodianus bilunulatus*				
Saddleback *Thallasoma duperrey*				
Blackside razorfish *Xyrichtys umbrilatus*				
Frogfish				
Commerson's frogfish *Antennarius commersonii*				
Damselfish				
Hawaiian dascyllus *Dascyllus albisella*				

BOTTOM FISH	PELAGIC CARNIVORES	MAMMALS	ELASMOBRANCHS
Bonefishes	**Mackerels**	**Dolphins**	**Rays**
Bonefishes *Albula sp.**	Scad *Decapterus macarellus*	Spinner *Stenella longirostris**	Eagle *Aetobatis narinari**
Squirrel fish *Priacanthus meeki*			
Snappers	**Needlefishes**		**Sharks**
Gray *Aprion virescens**	Crocodile *Tylosurus crocodiles**		Sandbar *Carcharhinus plumbeus*
Bluestripe *Lutjanus kasmira**			
Eels	**Tunas**		
Garden *Gorgasia hawaiiensis**	False albacore *Euthynnus alletteratus**		
Conger *Conger cinereus**	Yellowfin *Thunnus albacores**		

Note: Resident species were classified for this study as observed on a daily basis. Transient species were observed periodically. Species and common names based on the HOARP Final Report (2001) and The Hawaii Fish Species Reference (www.reef.org/data/haw/fishsp.htm).