US Army Corps
of Engineers
Honolulu District

Public Notice of Application for Permit

Regulatory Branch (1145b)
Building 230
Fort Shafter, Hawaii 96858-5440

Public Notice Date: March 12th, 2013
Expiration Date: **April 12th, 2013**
Permit File Number: POH-2012-00016

Interested parties are hereby notified that an application has been received for a Department of the Army permit for certain work in waters of the United States as described below and shown on the attached drawings.

APPLICANT: Mr. Neil Anthony Sims, CEO, Kampachi Farms, LLC

LOCATION: The proposed mooring site is located approximately 6 nautical miles west of Keauhou Bay and 7 nautical miles south-southwest of Kailua Bay, off the Kona Coast of the Island of Hawaii, Hawaii.
Latitude: 19.55 N Longitude: -156.066667

WORK: The proposed project is the culture and harvest of a managed coral reef species of fish, kampachi (*Seriola rivolina*) using a fixed mooring and a single proprietary Aquapod net pen. To accomplish this, the proposed action will require the deployment of a single-point mooring array, consisting of a deadweight anchor (approximately 15,000 lbs), mooring line (12,000 ft of 1.5" Polypropylene and nylon caternary), surface buoy (4 ft diameter foam-filled steel sphere), surface vessel (modified 28-ft Sportfisher, plywood and fiberglass), and the submerged Aquapod net pen (22-ft. diameter plastic, lumber, and brass mesh) to conduct a single-cohort experimental grow-out of around 2,000 native, hatchery-reared kampachi in a reiteration of the Velella "drifter-cage" experiment.

PURPOSE: The proposed project's purpose is to determine if similar biological performance of the fish can be attained in very deep water on a single-point mooring rather than an unanchored "drifter" pen, as was done in the Velella "beta trial." In addition, approximately 8,000 lbs of fish are proposed to be cultured for commercial sale.

ADDITIONAL INFORMATION: Please see the attached documentation for additional information on the proposed project and its potential impacts.

MITIGATION: To avoid impacts to waters of the U.S., the proposed project has been designed in such a way that no discharge of dredged or fill material will occur for the installation of the structure. To further minimize impacts to waters, as well as prevent adverse effects to endangered species, Best Management Practices (BMPs) are proposed to prevent detrimental impacts to the aquatic resources

present in the open-ocean environment adjacent to the proposed project site. Please see the attached information for details of the proposed BMPs.

WATER QUALITY CERTIFICATION: The Corps may not issue a DA permit for any activity that may result in a discharge into waters of the United States until the applicant has obtained a certification or waiver of certification as required under Section 401 of the Clean Water Act, from the **State of Hawaii Department of Health – Clean Water Branch**.

COASTAL ZONE MANAGEMENT ACT CERTIFICATION: Section 307 of the Coastal Zone Management Act of 1972, as amended, requires the applicant to certify that the described activity affecting land or water uses in the Coastal Zone complies with the enforceable policies of the State/Territory's approved Coastal Zone Management Program and that the activity will be conducted in a manner consistent with the Program. A permit may not be issued until the **Office of State Planning, Department of Business, Economic Development, and Tourism** has concurred with the applicant's certification.

PUBLIC HEARING: Any person may request that a public hearing be held to consider this application. Requests for public hearings must be in writing, within the comment period specified in this notice, and state clearly and concisely, the reasons and rationale for holding a public hearing.

CULTURAL RESOURCES: The latest published version of the National and State Registers of Historic Places (NRHP and SRHP) has been consulted to assist in determining the presence or absence of historic properties, including those listed in or eligible for inclusion in the National Register of Historic Places. There are no listed or eligible properties in the vicinity of the worksite. Consultation of the NRHP and SRHP constitutes the extent of cultural resource investigations by the District Engineer at this time, and he is otherwise unaware of the presence of such resources. In addition, activities are limited to a land form or waterway (the Pacific Ocean approximately 6 nautical miles offshore) with low probability for intact cultural deposits. Therefore, the Corps has determined that the proposed work has **no potential to cause effect** to any historic property listed, or eligible for listing, in the NRHP. This application is being coordinated with the State Historic Preservation Division (SHPD). Any comments SHPD may have concerning presently unknown archeological or historic data that may be lost or destroyed by work under the requested permit will be considered in the final assessment of the proposed work.

ENDANGERED SPECIES: Section 7 of the Endangered Species Act (ESA) requires federal agencies to consult with the National Marine Fisheries Service (NMFS) and/or U.S. Fish and Wildlife Service (USFWS) to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of species listed as threatened or endangered under the ESA or result in the destruction or adverse modification of designated critical habitat. Concurrently with the issuance of this public notice, the USACE will evaluate the potential impacts to proposed and/or listed species and their designated critical habitat and provide separate consultation letters to the NMFS and/or USFWS, as required, with the USACE's effects determination for the proposed project.

ESSENTIAL FISH HABITAT: The proposed work is being evaluated for possible effects to Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC) pursuant to Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act of 1996 (MSFCMA) (16 U.S.C. 1855 (b)) and associated federal regulations found at 50 CFR Part 600 Subpart K. The Honolulu District area of responsibility includes EFH for species managed under Fishery Management Plans. Concurrently with the issuance of this public notice, the USACE will evaluate further the potential impacts to EFH and provide a separate consultation letter to the NMFS.

We have preliminarily determined that the described activity may adversely affect EFH, but that adverse effects will not be substantial. The proposed work may affect approximately 9 acres of EFH for **bottomfish and seamount groundfish, precious corals and coral reef ecosystems and crustaceans**. This Public Notice initiates consultation requirements with the NFMS under the MSFCMA. We have insufficient information at this time to assess the cumulative effects of the proposed work on EFH, but cumulative effects will be considered in our final assessment of the described work. Any conservation recommendations regarding EFH for federally managed fish will also be considered in our final assessment of the described work. This proposed project may also adversely affect associated species such as major prey or predator species which are not covered by Fishery Management Plans.

SPECIAL AREA DESIGNATION: **None**

AUTHORITY: This permit application will be reviewed under the following authorities:

(X) Perform work in or affecting navigable waters of the United States – Section 10 Rivers and Harbors Act 1899 (33 U.S.C. 403).

( ) Discharge dredged or fill material into waters of the United States – Section 404 Clean Water Act (33 U.S.C. 1344). The Corps' public interest review will consider the guidelines set forth under Section 404(b) of the Clean Water Act (40 CFR 230).

( ) Transport dredged material for the purpose of dumping it into ocean waters - Section 103 Marine Protection, Research, and Sanctuaries Act of 1972 (33 U.S.C. 1413). The Corps' public interest review will consider the criteria established under authority of Section 102(a) of the Marine Protection, Research and Sanctuaries Act of 1972, as amended (40 CFR Parts 220 to 229), as appropriate.

EVALUATION: The decision whether to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits, which reasonably may be expected to accrue from the proposal, must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered, including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people.

USACE is soliciting comments from the public; Federal, State, and local agencies and officials; and other interested parties in order to consider and evaluate the impacts of this activity. Any comments received will be considered by the USACE to determine whether to issue, modify, condition or deny a permit for the work. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the activity.

COMMENT AND REVIEW PERIOD: Conventional mail or e-mail comments on this public notice will be accepted and made part of the record and will be considered in determining whether it would be in the public interest to authorize this proposal. In order to be accepted, e-mail comments must originate from the author's e-mail account and must include on the subject line of the e-mail message

the permit applicant's name and reference number as shown below. All e-mail comments should be sent to **emilee.r.stevens2@usace.army.mil**. Conventional mail comments should be sent to U.S. Army Corps of Engineers, Honolulu District, Building 230 (Attn: CEPOH-EC-R), Ft. Shafter, HI 96858-5440. Both conventional mail and e-mail comments must include the permit applicant's name and reference number, as shown below, and the commentor's name, address, and phone number. All comments, whether conventional mail or e-mail, must reach this office no later than the expiration date of this public notice to ensure consideration. Please include the following name and reference number: **Velella Gamma Trial, POH-2012-00016.** Please contact **Emilee Stevens** at (808) 835-4310 if further information is desired concerning this notice.

Additional Project Information and Exhibits **(15 pages)** are attached to this Public Notice.

District Engineer
U.S. Army, Corps of Engineers

Attachments

Project Summary:

Culture and Harvest of a Managed Coral Reef Fish Species (*Seriola rivoliana*) Using a Fixed Mooring and Aquapod in Federal Waters West of the Island of Hawaii, State of Hawaii

Applicant: Kampachi Farms, LLC
P.O. Box 4239
Kailua-Kona, HI 96745-4239

The proposed project is needed to advance our knowledge and technical capacity to raise marine finfish in various ocean settings. In particular, the proposed activity will help to develop information about and capability for raising finfish in a moored deepwater culture system.

The issuance of a Federal permit would allow the applicant to evaluate the feasibility of conducting fish culture in cages in Federal waters around Hawaii and add to our knowledge about the resulting environmental conditions. The main objective of the proposed activity is to raise hatchery-produced marine finfish to harvest size inside a specially designed cage, tethered to feed barge, which is itself attached to a single-point mooring in the U.S. Exclusive Economic Zone (EEZ). The proposed activity is consistent with NOAA's aquaculture policy and priorities, which, among other priorities, support the development of innovative technologies and encourage the advancement of scientific knowledge about open ocean aquaculture in the U.S. in an environmentally sound manner.

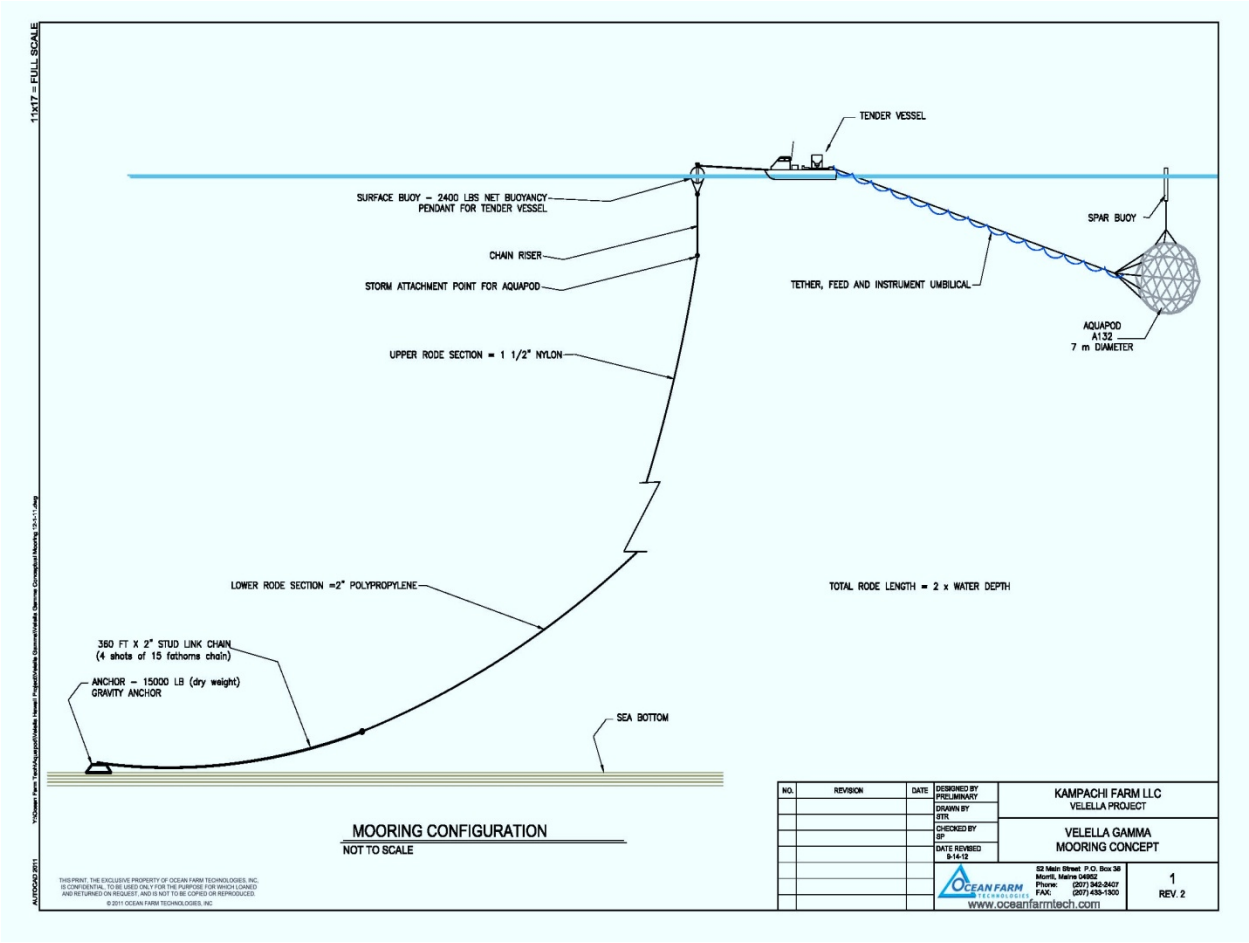
The permit would allow the permittee, Kampachi Farms, to demonstrate refinement of the *Velella Concept* (Fig. 1) in Federal waters. The *Velella Concept* is named after a genus of free floating hydrozoans that live on the surface of the open ocean, and would involve culturing 2,000 hatchery-sourced native fish in a submersible net pen (CuPod), tethered behind a vessel adapted to serve as a feed barge and communications station, which would in turn be affixed to a single-point mooring. The feed barge/vessel and net pen are collectively referred to as the "Velella array." The proposed feed barge/vessel will be a retrofitted 28' fishing boat modified to function as an unmanned, remotely-operated feed barge. The CuPod would be stocked with *Seriola rivoliana* (Almaco jack) from Blue Ocean Mariculture's land-based hatchery using a customized support vessel capable of transshipping the fish from the shore to the Velella array, which would be located in EEZ waters. Additional supply vessels, such as charter, fishing or small recreational craft would be used intermittently to transport divers and maintenance crew, and feed for the fish during the course of the demonstration project as needed. See "Overview of Proposed Operations" section for further details on array construction, maintenance, stocking, and harvesting.

The scope of the permit would be to authorize the use of the 132m^3 (4,662 ft^3) CuPod and 28' feed barge to culture fish, as well as authorize the harvest and transshipment of the fish to and from the CuPod using a U.S. Coast Guard registered support vessel. The use of land based activities (hatcheries, harbors) associated with licensed aquaculture businesses are not analyzed here, because these operations would not be changed by the issuance of the permit and are already occurring.

As the proposed activity constitutes a navigation hazard in navigable waters of the U.S, a letter of permission or a concurring Section 10 permit may also be required from the Army Corps of Engineers.

The project depends upon a deep water mooring structure, and but for the permit, this mooring would not likely be installed.

Fig. 1:



Most of the permitted activities (culture and harvest) would take place in Federal waters. Transport of fingerlings from the hatchery to the Velella array at sea and transport of harvested fish would involve a low level of use of state roads and waters, but these activities are not “at sea” or in Federal waters, and so are not germane to this permit request. Supply vessels including vessels transporting fingerlings and harvested fish would operate out of Honokohau Harbor and Keauhou Bay in west Hawaii (see maps, Appendix E and F). All vessel traffic related to the permitted activity would transit State waters to access the Velella array within Federal waters.

The feed barge / communication vessel would be launched from a trailer out of Honokohau Harbor or Keauhou Bay, towed to the site through State and Federal waters, and attached to the mooring line. The unstocked CuPod would be constructed and deployed from Kawaihae Harbor, and towed to the designated location, 5.5 nautical miles (nm) from shore in Federal waters. The single-point mooring is proposed to be deployed at a position of latitude 19^{o}33’North, longitude 156^{o}04’ West. A mooring scope ratio of 2:1 would be used (i.e. ratio of mooring line length to water depth), with a rope of length around 12,000 feet (2 nm). This means that the swing arc of the

array would not impinge on bottomfish restricted fishing areas, the Humpback Whale Sanctuary waters, State waters, or any other marine protected zone. The stocking, culture and harvest of the fish would all take place within a 10,400 ft (1.73 nm) radius of the deployment point (see Fig. 2). The precise location of the tethered CuPod would depend on the oceanic conditions (currents and wind) described below.

The array would be operated and lighted at the surface according to Coast Guard regulations so as to be visible to other mariners. The feed barge will technically be engaged in 'fishing' as described in the MSA, and so will be required to show only those lights mandated in USCG Rule 26 (as per paragraph (a)). When the CuPod is attached to the feed barge, the feed barge will be engaged in an activity that is most similar to 'trawling' (as described in USCG Rule 26 (b): "by which is meant the dragging through the water of a dredge net or other apparatus used as a fishing appliance"), and so will be obligated to display "two all-round lights in a vertical line, the upper being green and the lower white, or a shape consisting of two cones with their apexes together in a vertical line one above the other," (USCG Rule 26(b)(i)). The lights shall have a range of visibility of at least two miles (USCG Rule 22(c)(iv)), with a luminous intensity of 4.3 candelas (USCG Rules Annex I Paragraph 8(b)). The obligation to display a masthead light is only for vessels greater than 50 meters in length, and the feed barge will be no more than 10 m in length. The surface spar buoy attached to the CuPod will also be equipped with a flashing SeaLite M650 buoy lantern with a visibility of 3 miles, to mark the pen's position at night, as well as a radar reflector and a GPS transmitter.

The proposed location is readily accessible by recreational and commercial fishers working out of Honokohau Harbor and Keauhou Bay, who can take advantage of the Fish Aggregation Device (FAD) characteristics of the Velella. The Velella Beta trial proved to be a very effective FAD, and became popular among local fishermen, catching primarily small ahi (Yellowfin Tuna, *Thuunus albacares*), but also aku (Skipjack Tuna, *Katsuwonus pelamis*) and occasionally mahimahi (*Coryphaena hippurus*). The Velella Beta crew monitoried the number of fishing vessels around the array, and recorded as many as 17 small boats fishing in the vicinity of the Velella on one morning (Veterans' Day, 11/11/11).

In moving between Kawaihae Harbor and the desired location in federal waters, the vessels towing the CuPod to and from the mooring would briefly transit across the Hawaiian Islands Humpback Whale National Marine Sanctuary, but this should involve only two vessel trips, and the activity would not be notably different or more intense than the typical maritime traffic that is already occurring in and out of the harbor. The harbor, itself, is excluded from the sanctuary (Sanctuary boundaries are described at 15 CFR §922.181(b)).[1] The transshipment of fish from Honokohau Small Boat Harbor to the EEZ waters would be accomplished with a support vessel equipped with closed, oxygenated bait-tanks, similar to a fishing vessel, as is currently practiced for the commercial farm operation off Keahole Point, and as was undertaken in the Velella Beta project. As in the Velella Beta project, both Honokohau Small Boat Harbor, and Keauhou Bay boat launching facilities may be utilized by support and supply vessels. Uses of the harbors to support the demonstration project would be performed at a level that is consistent with normal everyday harbor activities. These activities would include moving supplies, equipping vessels, tending gear, and transferring fingerlings at stocking or whole fish at harvest.

The Kaloko-Honokohau National Historical Park, administered by the National Park Service (NPS) encompasses waters immediately outside of the Honokohau harbor and park lands surround the Honokohau Small boat harbor (see map, Appendix E). The proposed permit activity would not affect lands or cultural resources to either side of

[1] http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=9d6329b754a250b3fd6457fe9c28c61b&rgn=div6&view=text&node=15:3.1.2.2.11.17&idno=15

the harbor and vessels would transit park waters in the same manner as other vessels already using the harbor and adjacent waters.

The hatchery facility that would be the source of fingerlings is operated by Keahole Point Hatcheries, located within the Natural Energy Laboratory of Hawaii Authority (NELHA). Transport of fingerlings on roadways would be done using closed tanks placed on the back of trucks that are of a type and size that are ordinarily operated on roadways. These closed tanks would be loaded directly onto the supply vessels. Stocking and harvest transportation activities would not involve a large number of trucks or trips that could disrupt traffic either on roadways or at harbor facilities. These activities on land would not constitute part of the permitted activities under the SCREFP.

Currents in the area of the array generally flow parallel to the shoreline, either setting to the south (i.e. from north to south), or setting to the north (i.e. from south to north), at variable speeds up to a maximum of approximately two knots (2.3 mph) (Navy HYCOM and NLOM datasets are available online at http://www7320.nrlssc.navy.mil/). The speed and direction of the currents are governed by the location and intensity of offshore cyclonic or anticyclonic eddies. The potential for downstream footprint effects is considered below, in the Impacts section.

Note on Figures: scaling of site markers and text boxes are not fixed to image, and therefore approximate only.

Figure 2a. Proposed action area for the Velella Gamma Trial directly west of Keauhou Bay, Kona Hawaii

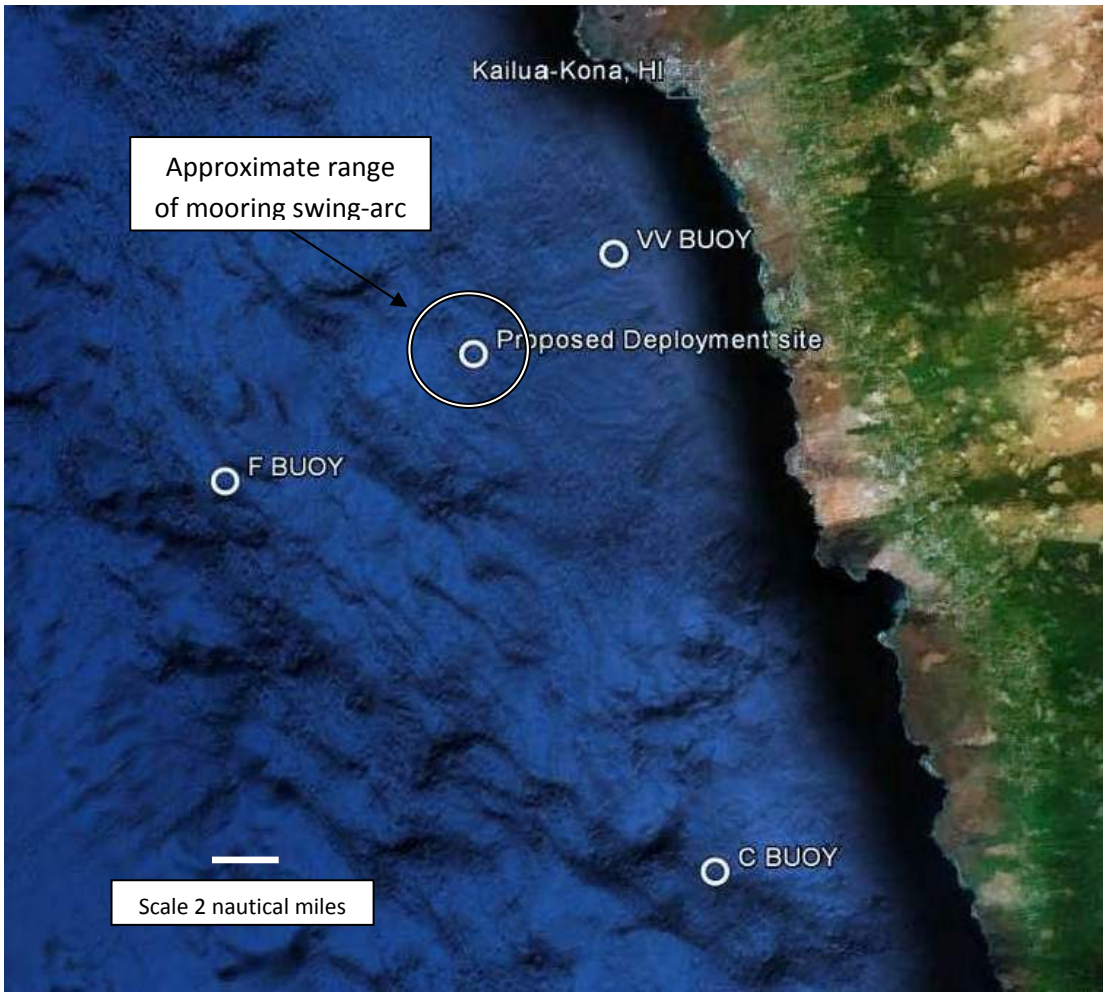


Figure 2b. Proposed action area for the Velella Gamma Trial directly west of Keauhou Bay, Kona Hawaii, in waters over 1,000 fathoms deep, and beyond the 3 nautical mile boundary of State waters.

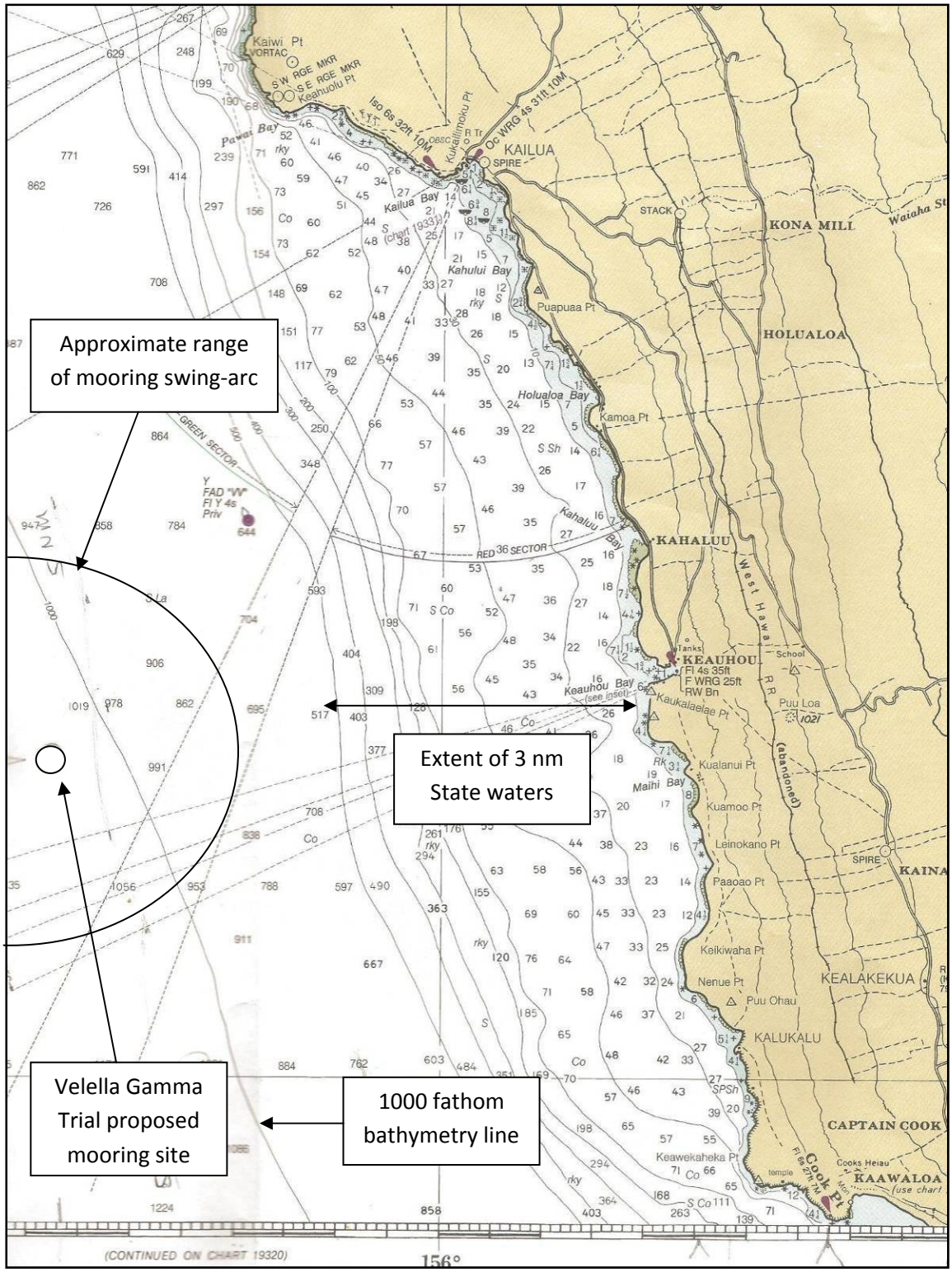


Figure 3. Proposed action area for the Velella Gamma Trial relative to Hawaii Islands Humpback Whale National Marine Sanctuary. (Source: DLNR 2012)

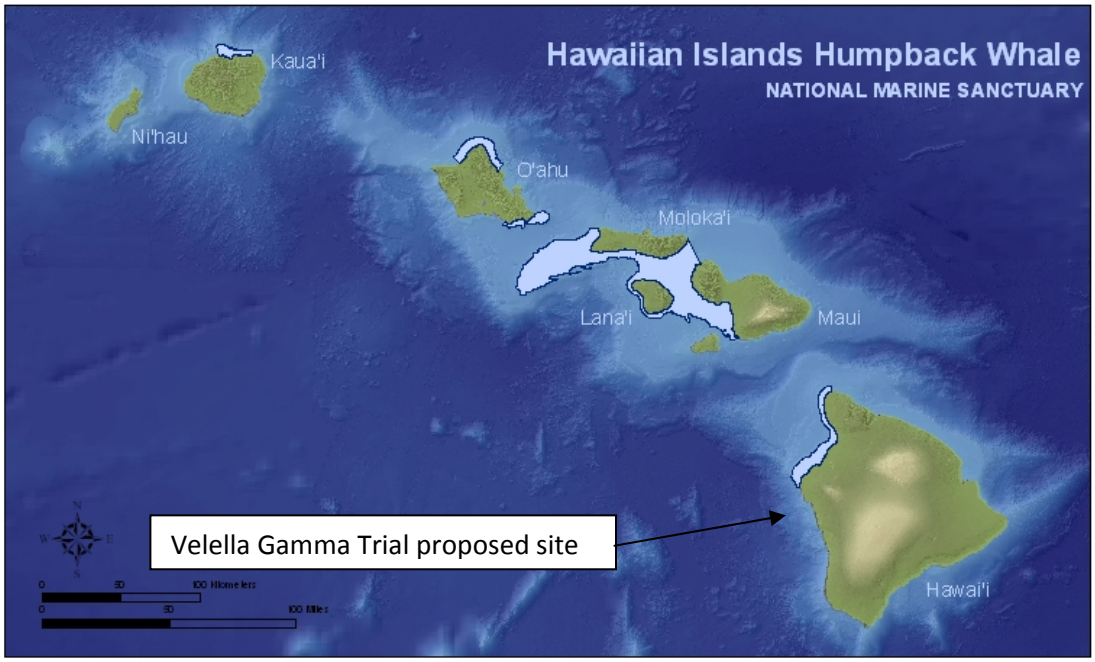
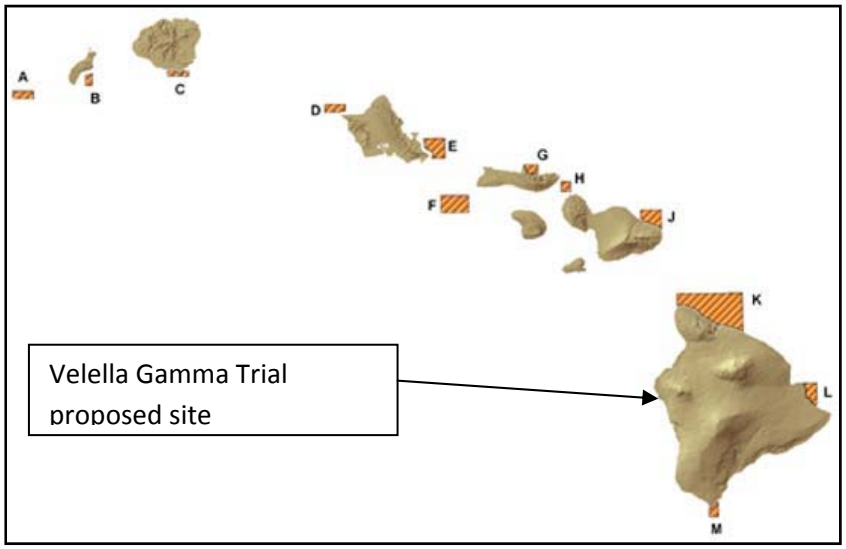


Figure 4. Proposed action area for the Velella Gamma Trial relative to Bottomfish Restricted Fishing Areas. (Source: DLNR 2012)



(latitude 19°33'North, longitude 156°04' West), in relation to existing FADS in the Kona area.
C Buoy (19-23.1' N, 155-59.2'W) is about 12.9 miles further South-East from the proposed site;
F Buoy (19-30.4' N, 156-09.4' W) is about 6.5 miles to the South-West; and
VV Buoy (19-35.1' N, 156-01.9' W) is about 3.8 miles to the NorthEast.

Technical and Operational Characteristics of the Velella Gamma Array

The CuPod that would be used for the project would be the same net pen that was used for the Velella Beta trial. This pen has a volume of 132 m^3 (4,662 ft^3), a diameter of 6.4 m (21 ft) and is intended to be submerged to a predetermined depth during normal operations by means of a float line and ballast tanks (see Figs. 1, 5 and 6). The CuPod can be raised and lowered in the water column for stocking and cleaning (i.e., manual scrubbing and/or pressure washing) purposes using compressed air to displace sea water in ballast tanks attached to the pen. The spherical, geodesic CuPod consists of structural-plastic framing with rigid, brass chain-link enclosure panels that are engineered to minimize biofouling, tearing, entanglements and the ability for fish to escape (Fig. 5).

Access to the inside of the CuPod is through a swing-door hatch built into the topside and the bottomside panels of the cage. The bottomside hatch is fitted with an internal panel of mesh with a zipper, to allow divers to reach inside the pen when submerged, without fish escaping (for removal of fish carcasses). While a small number of individual fish did "leak" through this hatch while divers were obtaining live fish samples, the applicant has adjusted its diver protocols to prevent this in the future. Divers will now be required to insert any tools (nets, grabbers, etc) through a small opening in the mesh, and reach into the pen only up to their shoulder, while maintaining the zipper in the closed position. The top portion of the CuPod can be raised above the surface of the water to allow divers to fully enter and exit the pen without fish escaping.

The first major operation of the proposed activity will be to construct and deploy a deepwater single point mooring (SPM) system (Fig 1). This will consist of a single large anchor, with 360 feet of ground chain, 6,000 feet of floating 2" polypropylene rope, 6,000 feet of sinking nylon rope (providing a mooring scope of 2:1), a chain riser to reduce the risk of near-surface severing, and a 2400lb mooring buoy. Under most conditions, tension would be maintained on the mooring line by wind and currents. In completely slack water combined with still airs (a rare occurrence), the differential in buoyancy between the floating and sinking sections of the anchor rode will help to prevent looping and entanglement. In terms of scale, construction, and potential environmental impact, the mooring system itself is similar to any of the 55 currently operating Hawaii State FAD buoy installations.

The deadweight anchor would consist of a single steel-reinforced concrete block, with a weight of around 15,000 lbs. This would be deployed from two vessels: one to stretch the nylon and polypropylene line across the water surface prior to deployment, and the second to drop the anchor and chain. The first vessel would hold fast to the bitter end of the mooring to provide tension, and ensure that the chain does not hit the bottom prior to the anchor.

Once deployed, the Velella Array would be attached to the mooring. The array itself would consist of a converted 28' Californian Sportfisher vessel, which has been retrofitted as an automated, remotely-operable feed barge; connected to the mooring buoy and to a 132 cubic meter Aquapod® fish pen by heavy nylon tethers. This material has a high breaking strength and adequate working stretch to absorb the shock loads induced by heavy surface waves. The barge will also be connected to the Aquapod by several umbilical lines: a feed hose, compressed air hoses to supply the ballast tanks, and camera cables to allow remote in-pen monitoring.

After the Velella array is moored according to plan, tested, and allowed to undergo sea trials to ensure reliable operations, the Aquapod would be stocked. Fingerling/juvenile fish would be obtained from the Blue Ocean Mariculture hatchery facility at NELHA, and transported by truck in closed, oxygenated tanks to Honokohau Harbor. Fish would be transferred to the transshipment vessel by craning the fish tanks from the truck onto the deck of the transshipment vessel, in a manner similar to that used to transfer fish to the Velella Beta trial, and to the commercial net pens located in State waters.

(See video of fish stocking of the Velella Beta trial at http://www.youtube.com/watch?v=OPs-0LfCEq0)

The transshipment vessel would then motor directly to the Velella array. Once outside of Honokohau Harbor, seawater will be pumped through the fish tanks, and oxygen will be added. None of the stocking operations are expected to cause traffic congestion on the roadways or at the harbors due to the relatively small number of fish that would be stocked (compared to the numbers usually stocked for the commercial aquaculture operation in State waters), and the single transshipment trips required to carry out the proposed demonstration project.

Fish would be transferred into the CuPod through the access hatch using scoop or surround nets, and specially designed fish pumps, travelling down a hose directly from the transfer vessel to the CuPod. Once stocked, the hatches would be secured and the CuPod would be submerged so that the top of the cage would be approximately 7.6 m (25 ft) below the surface of the sea to limit effects from surface waves, currents and/or weather anomalies on the CuPod. Actual depths could vary slightly.

Tension would be maintained on the mooring, tether lines and surface floats by the force of wind and currents. The CuPod would be equipped with a surface buoy float-line attached at the top to keep the submerged CuPod at the specified depth (Fig. 1). A GPS transmitter and radar reflector would also be attached to the CuPod floats prior to stocking so in the event of detachment from the tender vessel and the mooring line, the CuPod could readily be relocated. The array would be operated, marked and lighted according to Coast Guard regulations. (see above, Section 1.3.1). Underwater CCTV cameras and SCUBA divers would be used to monitor the CuPod while submerged.

In the event that the CuPod should become detached from the float line, and if the ballast tanks were deflated at the same time, the CuPod would sink to the maximum depth of the tether or umbilical line. In the single instance when this occurred for the Velella Beta Trial, the CuPod sank to a depth of 300 feet and was hauled up to a depth of around 30 feet by the tether line, and the ballast tanks were then re-inflated to bring the pen to the surface. The fish inside the CuPod appeared to be unaffected by the incident. If the float line and the umbilical were to both part from the array, the CuPod would then most likely sink to the bottom; the fish inside the cage would remain inside and the stock would not be expected to survive or escape into the wild. At the expected depth of 6,000 feet, the CuPod and the fish inside would most likely be unrecoverable from the ocean bottom. If the CuPod were to become detached from the tender vessel but remain afloat, or should the barge itself become disconnected from the mooring, KF would contact the U.S. Coast Guard and a responsible NOAA official to report the accident and any navigational hazard therein, while acting to recover the cage with a secondary tow vessel.

Raising and maintaining the stock within the CuPod would be carried out by project staff using the remote command-and-control facilities of the feed barge, enabled by a semi-directional Wi-Fi antenna with a commercial wireless broadband (4G) backup system. Feeding the stock would be accomplished through a hose that would extend from the feed barge to the CuPod, as in the Velella Beta trial. The feed pump and auger would be controlled remotely, and feeding would be monitored by remote-link video, using the same visual criteria that divers used to regulate feeding during the Velella Beta trial. As the fish start to reach satiation, the feed ball (the dense aggregation of fish around the feed pipe dispensing point) becomes less dense, and begins to move down through the water column towards the middle of the net pen. Initially, the fish would be fed five times a day (less often as the fish grow) to near satiation through the feed hose into which a feed/sea water slurry would be pumped into the submerged CuPod (see Fig. 1). No prophylactic antibiotics or other medications would be used in the feed. The feed pellets would include various agricultural products (e.g., soybean meal) formulated with approximately 30% fish meal and 10% fish oil from sustainably-managed sources (primarily Peruvian anchovies). Kampachi Farms researchers will remotely observe the fish and the activity around the CuPod on a regular

schedule using the CCTV system; additionally, there is anticipated to be a weekly visit to the array, to resupply the feed hopper, clean the pen, and directly monitor the stock. Monitoring with cameras would also help aid the staff to identify any fish, sharks, turtles and marine mammals that may be present around the CuPod for diver safety, wildlife protection and research purposes.

Even under the best-case scenarios, some of the fish that are stocked would not survive. Survival rates for the Velella Beta Trial were unusually high (over 98%), but a survival rate of around 80% is generally expected. Therefore, from an initial 2,000 fish stocked, the final harvest is expected to be approximately 1,600 fish, with around 400 mortalities over the course of the grow-out. Any fish carcasses would be removed from the CuPod by divers as soon as is practical (generally during the weekly maintenance trip, but more frequently if required), and disposed of in the County land-fill disposal system. No fish, either dead or alive, would be intentionally put into the ocean.

Information collected from larger commercial aquaculture net pen operations in State waters indicate that concentrations of waste products around fish cages in the open ocean would, in the case of the CuPod, likely be unmeasurable due to the small amount of stock biomass, the carefully applied amounts of food, the nutrient-poor nature of the surface waters around Hawaii (WPRFMC, 2012), and the constant movement of water through the CuPod resulting in large volumes of water passing through the pen to dilute fish metabolites (Hukilau Foods 2009, KBWF 2009). The amount of fish proposed to be cultured under the proposed activity (approximately 8,000 lb), is significantly below the 100,000 pound limit that requires a National Pollutant Discharge Elimination System (NPDES) permit (40 CFR 122.24c), and is equal to less than 1% of the total annual production of *Seriola rivoliana* that was previously raised at Kona Blue's offshore aquaculture facilities permitted in State waters. There was no measurable impact on water quality at the Kona Blue farm site over the years from 2005 – 2009, when up to 1 million pounds per year were raised at the site. There is therefore no reasonable likelihood of any detectable impact on water quality over the course of the Velella Gamma trial.

As this Velella Gamma trial would use a single-point mooring, the changes in current direction would result in the movement of the array over a wide area. The 'umbra' of the array (the area covered by the motion of the tethered pen) would cover an arc of radius 10,400 ft (1.73 nm), with a total area of 7,804 acres (9.2 square nm). For the majority of the time at sea, the currents would keep the array in a downstream orientation. If currents change or slacken, then the windage on the feed barge, or the weight in the nylon line and the buoyancy in the polypropylene line would maintain the tension between the pod and the anchor to minimize the risk of chafing of the line or entangling with marine mammals or other fauna.

The mooring system has been designed to be survivable in all conceivable weather conditions for the proposed location. The 2:1 scope, half of which is provided by nylon line, provides adequate working stretch to absorb all expected shock loads with a 5x safety factor. The weakest segment of the mooring system is the floating 2" polypropylene line, which is chafe-resistant and has a minimum breaking strength of 46,800lbs. The unmanned barge would have a foam-filled hull and four automatic bilge pumps to ensure survivability; however, in advance of extreme weather events, the mooring design makes provision for the removal of the vessel and the direct attachment of the pod to the mooring line (below the chain riser) via an extended tether. If a hurricane approaches the operating area during the course of the proposed activity, the barge would return to port at Honokohau harbor, and the pen would remain at sea to ride out the storm below the surface, attached directly to the mooring.

At the end of the trial, the feed barge and net pen would be disconnected from the mooring line, and towed/motored back to their respective harbors for haul-out (feed barge to Honokohau Harbor; Cupod net pen to Kawaiahae Harbor), and the mooring line, chain riser, and buoy would be retrieved.

Due to the inherent danger and expense of removing a 15,000lb mooring block from 1000-fathom depths, the inert properties of concrete, and the inability to sever chain remotely without the use of sophisticated ROV's or shaped explosive charges, the mooring block and ground-chain will be abandoned to become permanent, stationary features of the seafloor. The mooring line will be retrieved through the use of a bladed messenger device provided by Sea Engineering of Honolulu, HI. The line will be hauled tight using a large drum winch, and the messenger unit will be deployed to follow the line as it sinks down toward a stopper plate above the ground chain. When the messenger hits the stopper plate, the bladed mechanism will sever the mooring line at its base, allowing the vast majority of the mooring system (12,000 feet of soft line, chain riser, 2400lb buoy) to be retrieved.

The test of the Velella Gamma concept would utilize hatchery-produced Almaco jack, *Seriola rivoliana* - the same indigenous species that is grown at Blue Ocean Mariculture's State ocean lease site off Kailua-Kona, Hawaii. All cultured kampachi are first-generation offspring of wild-caught broodstock. Kona Blue – the pioneering company that preceded Kampachi Farms - had grown and marketed up to one million pounds a year of this fish from 2005 – 2009, with no major environmental impacts, as documented though extensive monitoring of the existing net pen systems (KBWF 2009). Kona Kampachi® was sold in Hawaii, other U.S. states and countries (e.g., Japan) and is regarded as a premium quality, cultured product. Stocking procedures are described in detail above.

Impacts to Physical Qualities of the Environment

Water Quality

The impacts on water quality from the Velella Gamma trial would be immeasurably small. This trial only consists of 2,000 fish, with a maximum biomass of around 8,000 lbs. The Velella Beta trial yielded a Feed Conversion Ratio of around 1.6 : 1, implying a total feed level for the year of 12,800 lbs. By comparison, the moored net pen array off Keahole Point in 2008 produced a total of around 1 million pounds of fish, at a Feed Conversion Ratio of around 1.8 : 1, with *no measureable impact on the water quality*. This implies a total feed level of around 1,800,000 lbs over the course of that year, at a farm site that is in waters around 200 feet deep, a half mile from the shoreline. The Velella Gamma project therefore would entail 0.7% of the feed level, yet would be located in waters that were 30 times as deep, and 12 times as far from shore.

Similarly, at a feeding level of around 1% biomass, the maximum daily feed rate would be around 80 lbs per day. This is perhaps equivalent to the amount of *palu* (chopped fish) used by a single palu ahi fisherman in the course of one night.

The potential for impact on the substrate would be even less, because extreme depth of the action area, and the wider swing range of the SPM Velella Gamma array than for a traditionally-moored farm site.

Air Quality

The feed barge will have a single generator to operate the feeder system and the other maintenance and communications equipment. This generator will operate for no more than one hour per day, during feeding. The diesel exhaust output from this single motor would be about the equivalent of a small fishing boat with a single

diesel engine, for one hour per day. Trickle-charging to supply the onboard navigation lights, communications and camera equipment would be supplied by a yacht-type wind generator and/or small photovoltaic panel.

As the Velella Gamma array should reach no closer than around 3.5 miles offshore, this will result in an imperceptible impact on air quality.

Noise

Similarly, the daily noise generator by the feed barge over the course of a day will be approximately equivalent to that of a single fishing boat for about one hour. As the Velella Gamma array should reach no closer than around 3.5 miles offshore, this will result in an imperceptible impact on noise.

Viewplane/Lights

The lighting and above-water presence of the Velella Gamma array is similarly equivalent to that of a single fishing boat. The Velella Gamma therefore should have no perceptible impact on the view-plane or seascape. Any night work lighting will be downshielded and is not expected to result in light pollution on land.

Impacts to bottom topography

The impacts to bottom topography will be approximately equivalent to a single FAD buoy but would be limited to one year, after which the mooring would be removed. The deployment of a single 15,000lb concrete anchor is not expected to significantly change the bottom topography in this area, which is described as a flat silted basalt plain (Chart No. 19327; NOAA, 1997)

1.1 Impacts to Biological Environment.

3.2.1 Impacts on associated pelagic and bottom-dwelling species

The most likely impact to other species is from cultured fish escaping from the pod. There is a concern that this could result in genetic inbreeding and introduction of diseases. The likelihood of escapes is considered low, and the operation has been designed to prevent and minimize adverse impacts. The CuPod cage is designed to reduce the chances of any of the cultured fish escaping. The brass mesh remained intact throughout the Velella Beta Trial, and the only escapes were the infrequent 'leakage' events through the hatch and zipper when divers are accessing the pen (for collecting fish samples or removing dead fish, for example). Diver protocols have been amended to prevent further 'leakage' escapes. These few escapees during the Velella Beta Trial remained very close to the pen for periods of up to several weeks (if allowed to persist), but were readily captured by divers with three-prong pole spears.

Even if some breach were to occur during the Velella Gamma trials (e.g. through failure of the Dacron stitching of the brass mesh to the frame), it is highly unlikely that the fish would leave the general area of the CuPod. The small number of fish being cultured would not be expected to adversely impact wild populations of this or other species. The hatchery uses native fish, reared from wild caught broodstock, in an effort to help minimize potential impacts of escapees. The fish are never genetically altered or exposed to any prophylactic drugs.

The fish would be maintained at generally low densities. Concerns about biomagnification of diseases in the CuPod were not observed during the Velella Beta test with the towed pod and are not expected to be a problem in the

proposed trial. The rigorous cleaning schedule and constant apparent motion of the pen through the water disrupt the life cycle of known parasites and provide a clean and healthful environment for the stock.

The installation of an anchor and chain on the seafloor is not expected to have a large impact on bottom-dwelling species or their habitats. There is likely to be a limited amount of disturbance of the seafloor as a result of the chain dragging around the anchor as the current changes direction, but the low-relief basalt and sand substrate at this depth does not represent a particularly valuable or vulnerable habitat. The waters at this depth are cold, dark, and subject to great pressure. Precious corals around Hawaii are generally found at shallower depths, as is bottomfishing activity. The total area subjected to potential chain impact would be approximately 9 acres. After the mooring line is retrieved, the mooring chain will remain on the bottom and begin to corrode. This is not expected to have a large adverse impact on the surrounding environment, as rusting steel releases minute quantities of metal ions over a long period of time.

Impacts on wild con-specific stocks

Two main concerns of open ocean aquaculture involving the impact of escaped cultured fish into the wild are disease introduction and spread, and the reduction of genetic diversity from escapes interbreeding with wild fish. The use of the brass mesh cage and operational aspects of the project are designed to minimize fish escapes. As was seen from the Velella Beta Trial, the pen frame structure and brass wire cage material are robust and would be submerged away from surface wave action for the majority of the time. Moreover, the use of the CuPod would allow access through a hatch in the top of the cage that would be above water while the CuPod is raised to the surface, in an effort to improve upon conventional designs and to reduce accidental escapes of cultured stock into the wild. The bottom access includes a zippered compartment that prevents escapes. Fewer than ten fish 'leaked' through the bottom hatch during the Velella Beta trial, and these all remained with the CuPod for up to several weeks, before being recaptured by spearing.

Should fish accidentally escape during the Velella Gamma trial, genetic impacts to wild stocks are not anticipated for several reasons. First, the number of fish that would be cultured (2000) is small in relation to the wild population. Second, the risk of significant numbers of the cultured fish escaping is expected to be minimal and the survival of escapees is not expected to be high due to natural predation. Third, any fish that may escape would probably remain in close proximity to the CuPod pen, where they could readily be speared by divers, as noted during the Velella Beta Trial. Finally, the fish that would be used in this trial are the first generation offspring of local wild fish, and are genetically indistinguishable from wild stocks.

Potential for Fish Diseases and Parasite Proliferation

Fish health will be closely monitored by researchers and staff. The risk of disease introduction and transmission is expected to be low for several reasons. The fish used to stock the CuPod would be inspected for disease or parasites prior to stocking by trained fish health management personnel. Any disease or parasite that affects the cultured fish would almost certainly, therefore, have originated from the wild fish that are attracted to the array, and so would already be present in the wild population. There is expected to be a low likelihood of proliferation of diseases or parasites due to the low biofouling rate of the brass mesh, regular cleaning of the pen, and the unidirectional movement of water through the net pen on the SPM. With the Velella Beta Trial, skin fluke ectoparasite (*Neobenedenia* sp) infestation levels remained low throughout the grow-out cycle, usually below 5 flukes per fish, which is imperceptible to the human eye and hence the marketability of the product, and is an inconsequential loading on the health of the animal. By the conclusion of the Beta trial, the fluke loading was lower

than 1 fluke per fish, which is the baseline level for wild kahala. No other fish diseases were seen through the Velella Beta trial, and fish survival was higher than expected, at 98%.

Impacts of Drugs and Chemicals

No therapeutants were used during the Velella Beta project. The proposed permit for the Velella Gamma project would not authorize the use of any antibiotic, medication, or chemical, unless otherwise authorized by a competent federal or state agency. If treatment is recommended and practical, authorized therapeutants would be administered only under standard treatment protocols and with relevant oversight under an approved INAD (Investigational New Animal Drug) permit from the Food and Drug Administration (KBWF, 2009) and/or under the guidance of the U.S. Fish and Wildlife Service's Aquatic Animal Health Program. [2,34,5]

Potential Impacts on Essential Fish Habitat, Habitat Areas of Particular Concern and Biodiversity

The MSA identifies EFH as those waters and substrates necessary to fish spawning, breeding, feeding and growth to maturity. HAPC is defined as areas where ecological function of the habitat is sensitive to anthropogenic degradation, development activities are, or would stress the habitat, or the habitat type is rare. Marine organisms managed in accordance with the MSA in approved fisheries management plans and that occur in the water column include highly migratory and pelagic fish species. Marine organisms managed in accordance with the MSA that reside on the ocean bottom include bottomfish and seamount groundfish, precious corals and coral reef ecosystems and crustaceans.

The Velella Gamma Test would be operated in waters that have been defined as Essential Fish Habitat (EFH) and Habitats of Particular concern (HAPC) for pelagic management unit species (PMUS). The Council's recently authorized Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region specifies 1,000 m (3,280 ft) as the lower boundary of EFH for PMUS and 1,000 m in waters that lie above seamounts and banks within the EEZ shallower than 2,000 m (6,560 ft) as HAPC. These broad designations are due to the recognized gaps in scientific information about the life histories and habitat utilization patterns of many PMUS (WPFMC 2009d).

EFH and HAPC boundaries, as designated by the Council, for all life stages of bottom fish, seamount groundfish, and coral reef ecosystem MUS are also varied and extensive, extending in most cases from the shoreline to 200 nm and depths from the surface to as deep as 400 m (1,312 ft). These broad designations are also due to the gaps in scientific information about the life histories and habitat utilization patterns in those important fish species (WPFMC 2009c).

At a depth of 6000 ft, the project could affect HAPC and EFH for pelagic, bottomfish and groundfish and coral reef ecosystem MUS, so the project is evaluated for impacts to EFH.

Concerns regarding potential project impacts to EFH include the possible reduction of water quality or impact to benthic communities within the project footprint from fish waste or food accumulation, ecosystem related impacts due to fish escapes or disease transmission, disruption or displacement of habitat or migratory patterns from cage

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[2] http://www.fda.gov\AV\GuidanceComplianceEnforcement\GuidanceforIndustry\ucm123818.htm
[3] http://www.fws.gov/aah/
[4] http://www.fda.gov\AV\GuidanceComplianceEnforcement\GuidanceforIndustry\ucm123818.htm
[5] http://www.fws.gov/aah/

configuration, impacts from the installation of the mooring, and the potential impacts to EFH from the occasional scraping of the mooring chain on the seafloor.

The relatively small amounts of uneaten feed, other particulates, and the dissolved waste products of fish metabolism from the project are not expected to accumulate in or near the array because the CuPod would be subject to a constant flow of water and located in the deep open ocean. The Velella Gamma Trial would therefore facilitate rapid nutrient dilution and assimilation in the deep ocean environment, similar to that which is observed at the Keahole Point farm site (KBWF 2009). The Velella Gamma Trial is located around 14 miles from the Keahole Point farm site, and will only involve around 2,000 fish, so there is no potential for cumulative impacts. The chances for habitat disruption or displacement, or impacts on migratory patterns for any species of concern from the operation are minimal due to the transient nature and short duration of this test, small size of the pod, and the location of the activity outside of 3nm and away from seamounts.

The navigational chart for the area (Figure 2b) indicates that the substrate at the location of the mooring is sand and rubble or lava rock (basalt). The deadweight anchor and chain are not expected to result in any major changes to the benthic habitat beyond the immediate anchor area. The anchor will be inert concrete, and will not interact with the seawater or marine biota. Steel hardware and fittings will necessarily corrode over time and release minute amounts of metal ions which are not expected to cause any perceptible impact to water quality or benthic habitat.

The chain is designed to lie along the bottom, to prevent the anchor from being lifted free. The chain therefore has the potential to scrape along the bottom as the current changes direction. This would impact a circular area with a radius of up to 360 feet, totaling approximately 9 acres.

The polypropylene line on the lower half of the mooring line is buoyant, and is designed to float clear of the bottom, even when the current slackens. The nylon line on the upper half of the mooring line is negatively buoyant, and is designed to sink below the surface, to prevent any potential for entanglement with other vessels or marine mammals. Even at slack water, the buoyancy of the polypropylene and the weight of the nylon will combine to provide some tension on the mooring line.

At the end of the trial, the line, chain riser, and buoy will be retrieved

Although the proposed action would occur within these general EFH and HAPC boundaries, it is of such limited scope and duration that the proposed action is not expected to cause any negative impacts to designated EFHs and HAPCs of any managed finfish species. Likewise, due to these same factors, it is anticipated that any impacts on the biodiversity of the Hawaii Archipelagic ecosystem would be negligible.

Effects on Target Species

The sustainability of the target species, *Seriola rivoliana,* is not expected to be affected by the proposed action. The culture, harvesting, and transport of the fish would be done in a manner that would minimize the risk of accidental release of the target species. If accidental escapes were to occur, it is believed that predation on the escaped fish from wild species (e.g., sharks, billfish, tunas) would be high, and those that survive for any period of time would not leave the area of the array and would be captured. While *Seriola rivoliana* is a species native to Hawaii, the location of the project would be well removed from reef and deep bottom habitat of this species

(around the 400 ft depth profile; 60 – 70 fathoms), and post-escape settlement to these areas is considered highly unlikely. Additionally, the CuPod and operating protocols are designed to prevent accidental escapes.

If any of the cultured fish escape and survive, the impacts on wild stocks are expected to be negligible because of the small number of fish being cultured (2,000 fingerlings) in relation to the wild population; a reduced likelihood of survival after escape; a low risk of being a disease carrier due to careful disease management and low stocking density; and a low potential for reduction of genetic diversity in wild stocks that could occur if wild fish were to breed with escaped fish (because all cultured kampachi are F1 offspring of wild fish).

Effects on Non-target Species

No large adverse effects are expected to occur to non-target species stocks or stock complexes. Other non-target species may be attracted to the net pen which is expected to act as a floating fish aggregation device or FAD. The effects of the pen as a fish aggregating devices are not expected to result in large or adverse impacts on the migratory habits of pelagic fishes because the pen is relatively small (compared to commercial-scale aquaculture cages), and the project would only be of limited duration.

The installation of the mooring block is not expected to have any major effects to fish, molluscs, crustaceans, corals, or other marine life because it is a single anchor and chain, and the impacts are confined to the radius of the chain (360 ft). Potential impacts within this area would be limited to any marine life crushed underneath the mooring block upon deployment, and the disturbance of epifauna due to scraping within the mooring chain radius.

Impacts of Feeds and Feeding on Wild Fish Stocks

As discussed above, the fish food that would be used in the Velella Gamma project would consist of a commercial diet, in pellet form, which would be fed to fish until near satiation. The applicant's experience indicates optimum consumption and minimal wastage occurs with this strategy. Given the level of the proposed activity, the calculated application of feed and the size of the CuPod (with a limited number of fish,) there should be little uneaten feed released to the environment.

KF's fish feed is especially formulated using low levels of fish meal (30%) and fish oil (10%). In this trial and at the KF research facility at NELHA, in Kona, fish meal and oil have been reduced and replaced by agricultural meals and oils, reducing dependence on industrial fisheries. Furthermore, establishing partnerships with established U.S. domestic agriculture entities (e.g., Illinois Soybean Association)[6] is considered to be a benefit to the U.S. agriculture industry, and encourages the use of more sustainable alternatives in aquaculture production in general.

Effects on Fisheries

State and Federal waters around the main Hawaiian Islands are the location of several of Hawaii's pelagic fisheries, including longline, troll and handline, offshore handline, and aku boat (pole and line) fisheries, which are the largest and most valuable in the state. The most important species in terms of value and volume in the Hawaiian pelagic fisheries are: bigeye and yellowfin tuna (*Thunnus obesus* and *T. albacares*), swordfish (*Xiphias gladius*), blue marlin (*Makaira mazara*), striped marlin (*Tetrapturus audax*), mahi mahi (*Coryphaena* spp.), wahoo (*Acanthocybium solandri*), and moonfish (*Lampris* spp.) (WPFMC 2009b). All of these species are highly migratory and probably all are present in various life stages in the upper portion of the water column of the test area.

[6] http://www.ilsoy.org/index.cfm?pageID=36&criteria=aquaculture