Environmental Assessment

Issuance of a Permit to Authorize the Use of a Net Pen and Feed Barge Moored in Federal Waters West of the Island of Hawaii to Fish for a Coral Reef Ecosystem Management Unit Species, *Seriola rivoliana*

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Abstract:

The National Marine Fisheries Service (NMFS) proposes to issue a Special Coral Reef Ecosystem Fishing Permit (SCREFP) to Kampachi Farms, LLC, to allow fishing for Almaco jack (*Seriola rivoliana*), or kampachi, using a new gear type not currently authorized under NMFS' regulations (50 CFR Part 665). This new gear consists of a net pen system that would be tethered to an existing mooring located in Federal waters approximately 5.5 nm offshore west of Keauhou Bay on the Island of Hawaii. The permit would authorize the applicant to fish for (including the culture and harvest of) a maximum amount of 30,000 Kampachi or approximately 120,000 lb (54 mt) over two years. This environmental assessment analyzes the potential impacts of this proposed action on the human environment.

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List of Acronyms and Abbreviations

BMUS	Bottomfish Management Unit Species
BOM	Blue Ocean Mariculture
CREMUS	Coral Reef Ecosystem Management Unit Species
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ft, ft^2, ft^3	Feet, square feet, cubic feet
fm	Fathom(s)
FAD	Fish Aggregation Device
HAPC	Habitat Area of Particular Concern
Hawaii FEP	Fishery Ecosystem Plan for the Hawaiian Archipelago
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HDPE	High Density Polyethylene (pipe)
KF	Kampachi Farms
KBWF	Kona Blue Water Farms
kt	Knots (nautical miles per hour)
lb	Pound(s)
LLC	Limited Liability Company
m, m^2, m^3	meters, square meters, cubic meters
MMPA	Marine Mammal Protection Act
mt	Metric ton
MUS	Management Unit Species
NELHA	Natural Energy Laboratory of Hawaii Authority
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
nm	Nautical mile(s)
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OMZ	Oxygen Minimum Zone
PHCRT	Potentially Harvested Coral Reef Taxa
PIRO	Pacific Islands Regional Office
PMUS	Pelagic Management Unit Species
SCREFP	Special Coral Reef Ecosystem Fishing Permit
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WPFMC	Western Pacific Fishery Management Council (Council)

1.0 Introduction

1.1 Overview

The National Marine Fisheries Service (NMFS) proposes to issue a Special Coral Reef Ecosystem Fishing Permit (SCREFP) to the applicant, Kampachi Farms, LLC, to allow fishing for Almaco jack, (kampachi, *Seriola rivoliana*), using a gear type not currently authorized by NMFS' regulations (50 CFR Part 665). This new gear consistes of a submerged net pen system that would be located in Federal waters and used to culture and harvest kampachi. The applicant would tether the net pen to a feed barge that they would connect to an existing mooring. The mooring anchor rests in Federal waters in about 6,000 ft of water, approximately 5.5 nm offshore west of Keauhou Bay on the Island of Hawaii. The proposed permit would have a two-year duration allowing two harvest cycles. The estimated maximum production would be no more than 30,000 fish (two 15,000-fish cohorts), or approximately 120,000 lb.

The U.S. Army Corps of Engineers (USACE) is a cooperating agency for purposes of this EA, based on their expertise regarding the permitting of structures in navigable waters. The mooring for anchoring the Velella Delta Array requires a permit from the USACE. Issuing a permit for the mooring requires compliance with the National Environmental Policy Act (NEPA) and Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) based on similar analysis as required for the SCREFP. Therefore, NMFS and USACE are cooperating in the preparation of this EA to inform the decision-making by both agencies in the issuance of permits for the proposed action.

On January 25, 2016, NMFS published a notice of availability and provided the draft EA for public review and comments through February 16, 2016 (81 FR 4021). NMFS received comments from 13 sources including individuals, non-governmental organizations, and State agencies. NMFS considered all comments when finalizing the EA. A summary of comments and NMFS' responses are provided in Appendix H.

The comments represented both support for and opposition to the project. Overall, the comments did not result in substantial changes to the environmental effects conclusions or substantial revisions to the EA, although NMFS made minor revisions to the EA as a result of comments that required additional consideration of potential environmental effects (see, section 6.2, Summary of Public Review and Comments). NMFS received comments on the EA that were addressed sufficiently in the draft EA or suggestions that were not within the scope of the proposed action. Some comments provided input on the environmental effects described in the draft EA, but did not provide additional information that resulted in new or different analysis. In those cases, no changes were made in response to those comments. New information added to the EA in response to public comments is in Sections 1.4.6, 2.3, 4.1.1, 4.2.3, 4.2.5, 4.3.2, 4.6, 4.8, 5.7, Appendix B and Appendix I. A summary of public review and comments can be found in Section 6.2.

We also updated section 4.2.2 to incorporate information contained in Amendment 4 to the Fishery Ecosystem Plan for Fisheries of the Hawaiian Archipelago, which was approved on

April 21, 2016. Amendment 4 revised EFH and HAPC for 14 species of bottomfish and three species of seamount groundfish in the Hawaiian Archipelago.
This EA fulfills the requirements of NEPA, the Council on Environmental Quality regulations, and the National Oceanic and Atmospheric Administration's (NOAA) general guidance on NEPA found in NOAA Administrative Order 216-6A (NAO 216-6A). NAO 216-6, and a previous guidance, NAO 216-6, contain NOAA's procedures for implementing NEPA to assess potential environmental impacts from proposed Federal action.

This EA contains the elements required by NEPA to analyze potential effects of a proposed Federal action. The Purpose and Need for the proposed action and proposed action description are in Section 1.0. The proposed alternatives and alternatives rejected from detailed consideration are in Section 2.0. The affected environment is described in Section 3.0. An analysis of the potential impacts on the human environment is in Section 4.0. Compliance with other applicable laws and coordination with others is in Section 4.8. Section 6.0 lists the preparers, reviewers, and contributors and summarizes public review and comments. Literature cited is in Section 7.0. The appendices provide supporting information, including a summary of public comments and agency responses on the proposed action.

1.2 Purpose and Need

The purpose of this action is the issuance of a SCREFP pursuant to 50 CFR 665.224 to authorize fishing for a potentially harvested coral reef taxa (PHCRT) using gear that is not authorized under 50 CFR 665.227. The Fishery Ecosystem Plan for the Hawaii Archipelago (FEP) identifies kampachi as a PHCRT. The applicant proposes to test a prototype open ocean net pen system to fish, including the culture and harvest, for kampachi in Federal waters off the Island of Hawaii over a two-year period. A SCREFP is required to test this gear type because using a net pen system is not an approved gear for fishing for kampachi in Federal waters.

NMFS has to make a decision on whether to authorize the proposed SCREFP, and, if so, needs to determine whether and which terms and conditions should be included in the SCREFP.

1.3 Proposed Federal Action

The proposed Federal action is the issuance of a SCREFP to Kampachi Farms, LLC to fish, including the culture and harvest, for kampachi with the Velella Delta Array in Federal waters. The permit would include terms and conditions, and emergency, monitoring, and reporting plans and reporting forms to ensure compliance with the management objectives of the FEP. A SCREFP, if issued, would be for a two-year period. The applicant proposes to fish for kampachi and to test the culture and harvest of kampachi using the Velella Delta Array. The array design is in Section 1.4 and shown in Figure 4, Figure 5, and Figure 9. The proposed permit would authorize fishing for two cohorts of 15,000 fish each. The estimated production could be up to 30,000 fish (approximately 120,000 lb).

The mooring for the Velella Delta Array is currently anchored in deep water (~6,000 ft) approximately 5.5 nm offshore west of Keauhou Bay on the Island of Hawaii. The exact position of the array would depend on wind and currents, but roughly within a known 1.75 nm radius.

The entire array would never enter state waters, 0-3 nm from shore. The net pen and barge would each have a global positioning system (GPS) transponder to provide ongoing location information and to allow the applicant to retrieve the net pen in the case of separation from the mooring. More details on the array location are in Section 1.4.

The applicant would be required to comply with regulations for a SCREFP (50 CFR 665.224, Appendix A), with the terms and conditions of the SCREFP (Appendix B. Terms and Conditions), and with the emergency, monitoring, and reporting plans (Appendices D and E). The permit also would require the applicant to submit completed reporting forms (Appendix C). The permit further requires that the applicant operate the Velella Delta Array as described in sections 1.4.4 through 1.4.8 of this EA. Both the barge and float ring are required to have all required navigational safety lighting. More details about the proposed equipment and operations are presented in Section 1.4.

1.4 Project Description

1.4.1 Action Area

The action area is approximately 5.5 nm west of Keauhou, Hawaii (Figure 1). The existing mooring is located at 19° 33’ N, 156° 04’ W. in waters approximately 1,000 fm deep. The array would be prohibited by permit conditions from operating within any restricted fishing areas, the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) waters, or any marine protected zone. Figure 1 shows the location of the HIHWNMS (lighter outlined areas), which is outside the area of operation for the Velella Delta Array. The deployment and retrieval of the Velella Delta Array would cross a small portion of the HIHWNMS to access Kawaihae Harbor. Tender and support operations would involve transit through State waters.

Once moored, the specific location of the Velella Delta Array would depend on the oceanic conditions (currents and wind); however, the maximum distance from the mooring site is approximately 1.75 nm. The mooring line would prevent the Velella Delta Array from entering State waters. The array’s position would always be down current relative to the direction of prevailing currents. Currents in the proposed action area vary in direction and velocity; however, the array would always be located within the swing radius depicted in Fig. 2. Depending on the location of the array with respect to the mooring site, water depths beneath the array could range from around 4,800 ft at the array’s inshore extent to 7,800 ft deep.

The applicant selected the location because the area is subject to relatively strong and constant currents that would ensure constantly circulating water through the net pen. The constant and strong currents would provide clean oxygenated water and would quickly dissipate fish metabolites. The other advantage of the proposed location is its position in the lee of the Island of Hawaii, reducing wind effects (e.g., storm surf and wind chop) on the Velella Delta Array. Finally, the proposed site is relatively close to harbors, minimizing resupply, maintenance, and operation travel times. The close proximity to harbors would also ensure that staff could quickly address emergencies involving storms or disconnection from the mooring system. However, the proposed site is far enough from land that potential user conflicts would be limited.

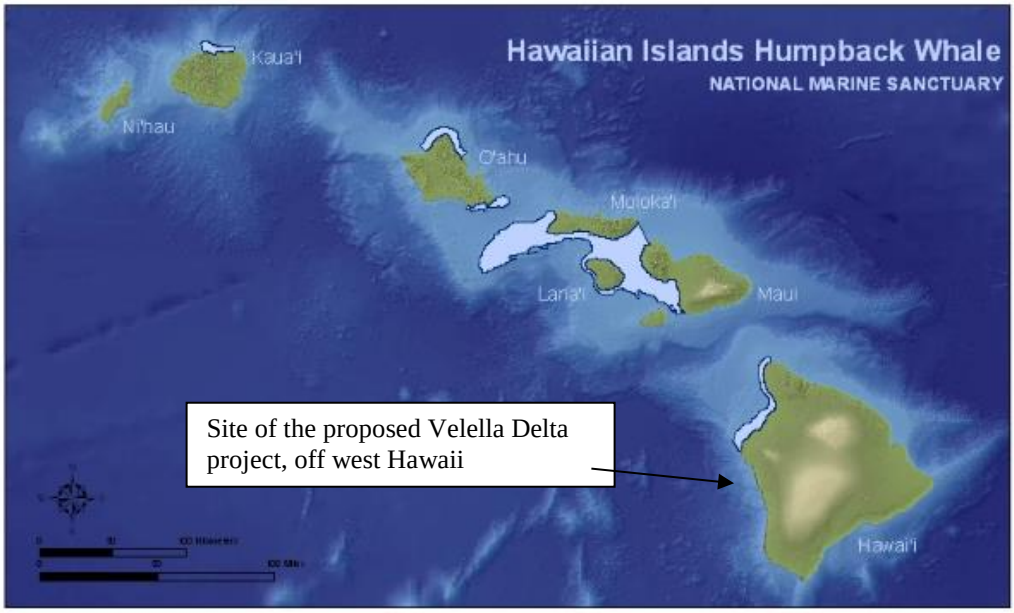

Figure 1. General location of the proposed Velella Delta project off the Island of Hawaii. (Map source: Hawaii Department of Land and Natural Resources (DLNR) website at http://dlnr.hawaii.gov/dar/marine-managed-areas/hawaiian-islands-humpback-whale-national-marine-sanctuary-hihwnms/).

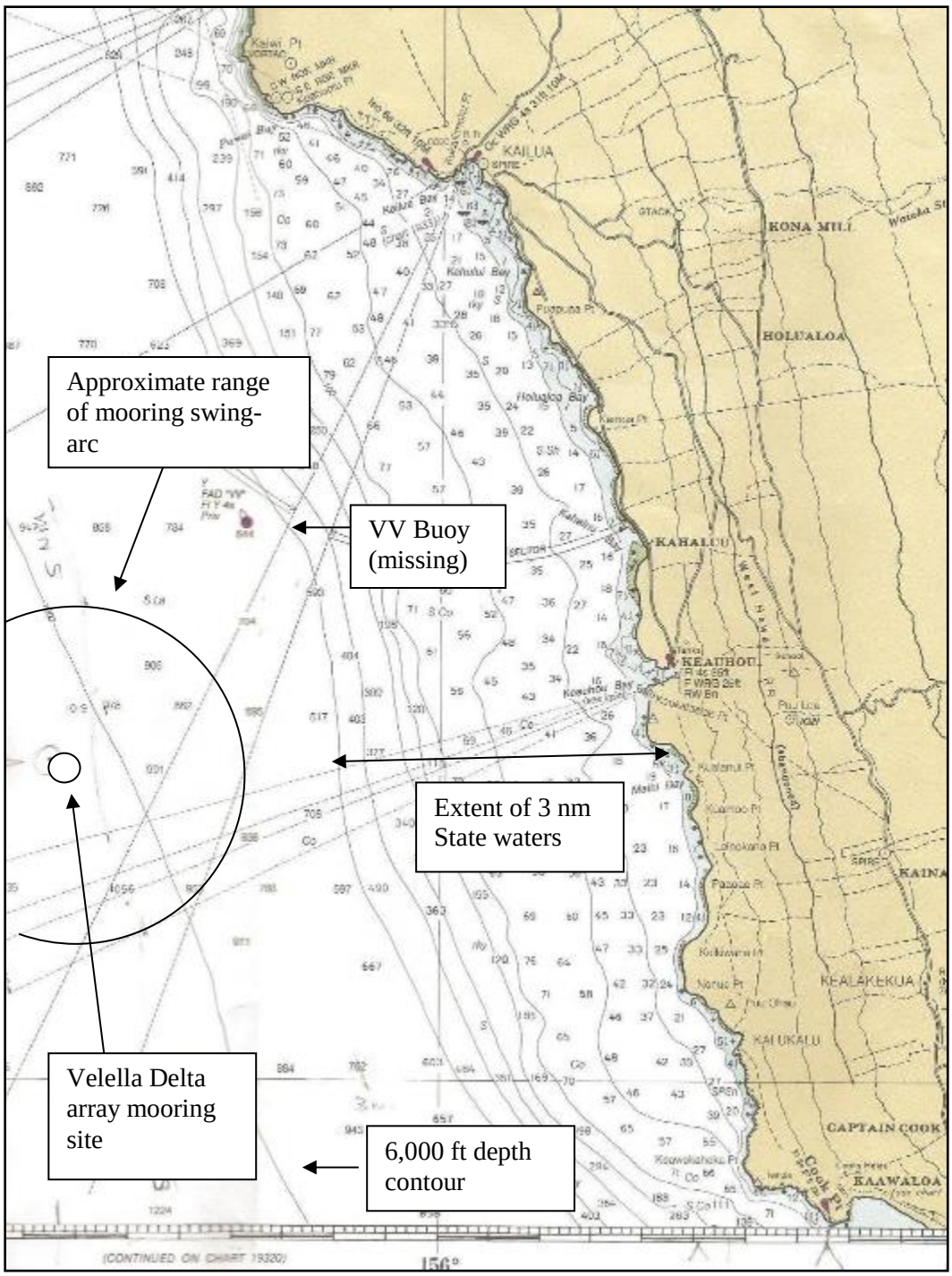

Figure 2. Approximate Location of the Proposed Mooring Site and Swing Arc of the Velella Delta Array. Base chart source: NOAA Chart 19327. The applicant would tether the proposed array to an existing mooring anchored approximately 5.5 nm from shore.

1.4.2 Coral Reef Fish Species to Be Cultured

The applicant proposes to grow and harvest kampachi (Figure 3). Kampachi is classified as a PHCRT. See 50 C.F.R. § 665.221 (identifying *Seriola rivoliana* by its family taxa "Carangidae"). The applicant would stock the net pen with 30,000 fingerlings (juvenile fish longer than 2 inches) obtained from hatchery facilities operated by Blue Ocean Mariculture (BOM) located at the Natural Energy Laboratory of Hawaii Authority (NELHA) facility in Kona, Hawaii. The applicant would grow and harvest the fish in two 15,000-fish cohorts raised sequentially in two years. All fingerlings would be first-generation offspring reared from wild-caught brood stock. BOM and its predecessor, Kona Blue Water Farms, has cultured this species since 2005, supplying fingerlings to aquaculture facilities operating in State waters (BOM 2014).

Kampachi is distributed circumglobally throughout the tropics. The species depth distribution ranges from 1-245 m; however 30-160 m on outer reef slopes is more typical in tropical regions (Honebrink 2000, Randall 2005). This species may be more pelagic than other *Seriola* spp. (Honebrink 2000). In Hawaii, fishermen typically catch this species as bycatch in association with bottomfishing (Pers. Comm. Kurt Kawamoto, NMFS, July 13, 2015.). There is no commercial fishery for this species in Hawaii due to the occasional occurrence of ciguatera toxin, and infestations of parasitic worms in the flesh of wild-caught animals. Because consumers consider the wild-caught kampachi unpalatable or inedible, the fish are unmarketable and discarded.

Figure 3. Kampachi in Net Pen (Source: Doug Perrine, SeaPics.com, Inc., 2009.)

Reliable population estimates of the species are not available. However, because kampachi is extremely fecund spawning multiple times per year, not targeted for food, and globally distributed (Meyers 1991; Blacio 2004), populations are likely healthy. A single gravid female can spawn once or twice a week for up to three months in captivity. According to Blacio (2004), a single female weighing 20 kg produces nearly 12 million eggs in a season. Kikkawa and Everson (1984) found that closely related *S. dumerili* females when gravid contained 1-4 million

eggs in their ovaries and could spawn 3 to 4 times per season. Cultured kampachi may be ready for harvest about eight months after fingerlings are placed in rearing pens.

Due to their similarity to other *Seriola* spp., fishermen in Hawaii have generally reported kampachi catches under the catchall term "kahala", which also includes at least one other common *Seriola* species (*S. dumerili*), undermining an accurate population assessment of the species in Hawaii. Unlike kampachi, *S. dumerili* is listed as a bottomfish MUS in the Hawaii FEP. Using the term, kahala, for both species makes it difficult to determine catch rate differences and relationships between various *Seriola* spp. populations found in the region (WPFMC 2001).

While similar in appearance, cultured kampachi tend to have a thicker and rounder body than their wild conspecifics. Consumers have readily accepted the cultured product in a variety of markets. Unlike wild *Seriola* spp., cultured kampachi do not carry high parasite loads or ciguatera toxin (KBWF 2009). Cultured kampachi have a higher fat content than wild fish due to high-lipid feeds and do not expend energy searching for food and evading predators. The high fat content and mild flavor makes kampachi a desirable food fish. Locally, kampachi may be found on restaurant menus and, occasionally, in supermarkets in Hawaii.

1.4.3 Gear: Velella Delta Array Components

The main components of the Velella Delta Array are: a) a moored feed barge (a 60 ft-long former military landing craft); b) umbilical line between the feed barge and double ring float; c) 98 ft diameter double-float ring; d) suspension lines; e) submerged net pen about 30 ft below the surface; and f) ballast tank and weight with bridle lines. The applicant would suspend the net pen from the double-float ring, which they would tether to a feed barge connected to the mooring. Figures 4, 5, and 9 show the array design.

The project would also involve constructing the float ring and net pen, transport of the float ring, net pen and feed barge to the mooring site, transporting fingerlings to the site, stocking the net pen, feeding the kampachi, harvesting grown fish, and transporting them to shore for processing and sale. The applicant would access the array with supply vessels, such as small to medium-sized fishing vessels or inflatable motorboats, as needed. Access would likely be daily initially, and weekly after the applicant establishes that the system is working properly.

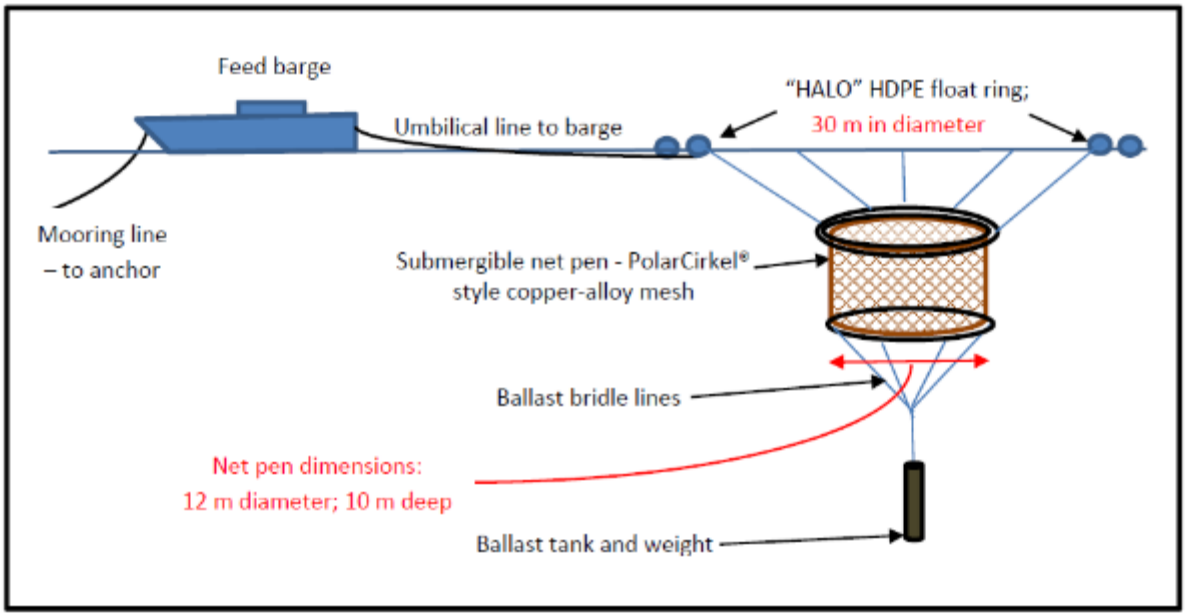

Figure 4. Schematic Diagram of the Proposed Velella Delta Array Configuration. "HDPE" means high-density polyethylene, a type of plastic. "HALO" means HDPE artificial lagoon, offshore.

The applicant would attach a floating net pen securely to a feed barge that staff would anchor to an existing single-point mooring system (Figure 5). This EA describes the barge, double float ring, and covered net pen as the Velella Delta Array. The new gear design would be a modification of cylindrical net pens in use elsewhere in the world. However, the new design would be more stable in the higher velocity currents that sometimes occur in offshore environments compared with the previous spherical net pen designs. As with standard industry practices, the applicant would construct the new net pen system from the high-density polyethylene (HDPE) pipe, KikkoNet (polyethylene terephthalate monofilament woven into a double twisted hexagonal) mesh) (top) and a stainless-steel and copper-alloy mesh on the sides and bottom.

The design would include new features. The first innovation would be suspending the cylindrical net pen beneath a large 98-foot dual float ring to a depth of 33 ft below the surface. This would reduce stresses from wind and waves, which are stronger at the ocean's surface. The second new feature would be the addition of a ballast tank to bottom of the net pen. The ballast tank would maintain tension on the net pen helping it keep its shape in high velocity current (up to 1 m/s). The constant tension from the ballast tank would keep all bridle lines tight reducing the likelihood of entangling wildlife.

We describe in detail below each component of the Velella Delta Array.

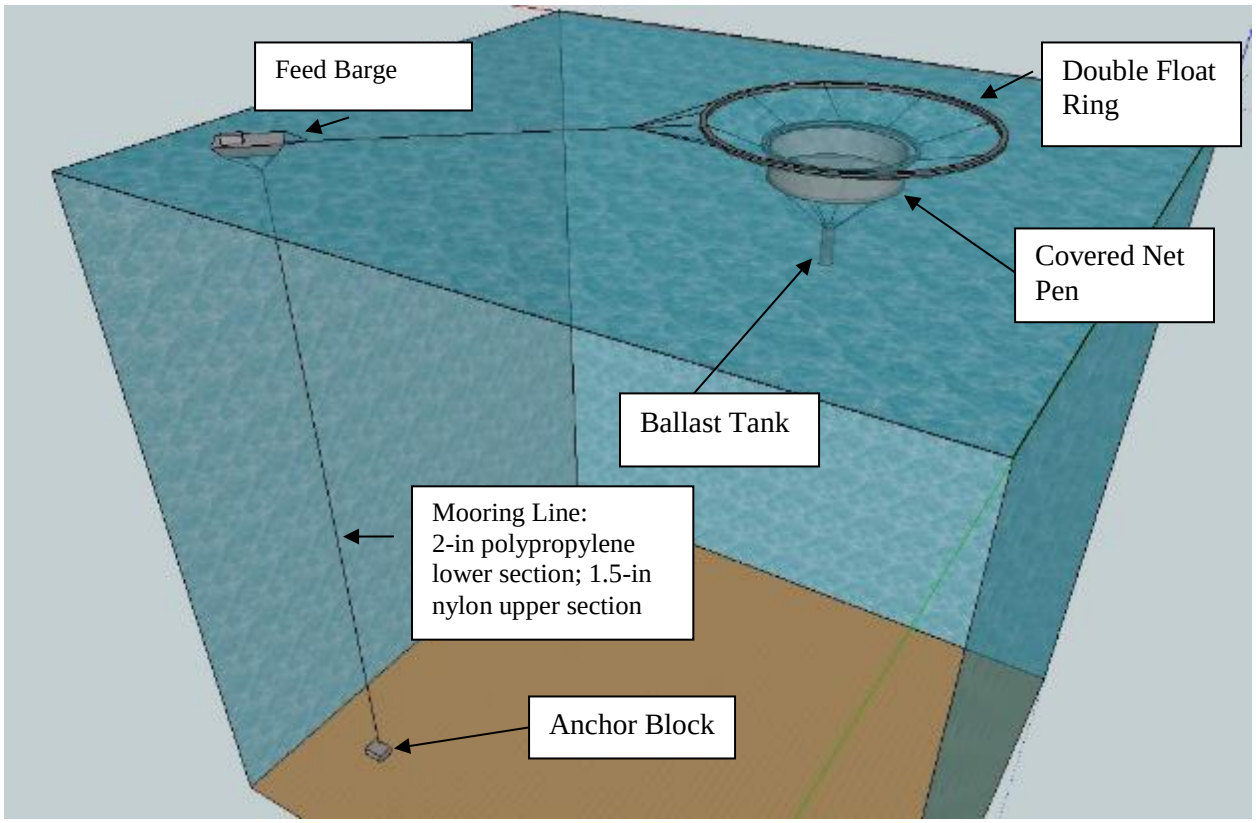

Figure 5. Generalized diagram of the Velella Delta Array showing the single-point mooring system and attachment points between the anchor and barge and between the net pen and barge. Note: The bottom square represents the seafloor. The gear, including anchor line and tether lines are not drawn to scale. (Source: Kampachi Farms, 2015).

Mooring System: The applicant would use an existing single-point mooring system to anchor the Velella Delta Array.

The mooring system currently consists of five components:

1) A 15,000 lb concrete and steel anchor;
2) 360 ft section of stud link chain;
3) 6,000 ft of 2-inch polypropylene line;
4) 6,000 ft of 1.5-inch nylon line; and
5) A mooring buoy (3,000 lb net displacement).

The mooring anchor consists of approximately 15,000 lb of steel-reinforced concrete and is set in approximately 6,000 ft of water. The applicant connected the approximately 360 ft of 2-inch stud-link chain directly to the anchor by a shackle. The heavy chain lies along the bottom to prevent the anchor from lifting free. They connected the other end of the chain to the mooring line.

The 12,000-foot long mooring line is comprised of two types of synthetic line spliced directly together and attached to a mooring buoy (3,000 lb (weight), 6,000 lb (displacement)). The lower

section of line, attached to the anchor chain, is made of 6,000 ft of positively buoyant 2-inch diameter polypropylene line. The buoyant polypropylene line floats above the bottom avoiding abrasion from the bottom. The buoyant properties of the nylon section also reduce the weight of the mooring line in the water reducing stresses on the mooring system that could lead to breakage. Two-inch polypropylene line has a breaking strength of 48,600 lb (Engineering ToolBox 2015).

The upper section of the mooring line is made of 6,000 ft of negatively buoyant 1½-inch diameter nylon rope. The negatively buoyant material ensures the line remains at depth rather than rising to the ocean's surface. One-and-half-inch nylon line is rated at 48,600 lb of breaking strength. Additionally, nylon line has elastic properties that absorbs shocks (Engineering ToolBox 2015). The synthetic mooring line sections have not been subjected to abrasion, rotational forces, or UV light that may weaken lines over the last two years (Sims 2014).

The applicant would attach the vessel to the mooring line at the bow of the vessel. They would attach the upper nylon portion of the mooring line to a chain near the surface. Staff would attach the chain to the feed barge by shackles inserted through both the chain and pad-eye welded to the feed barge.

Both sections of the synthetic mooring line consist of 8-strand plaited line to prevent loops from forming should any slack occur. However, wind and current forces acting on the feed barge and net pen would likely always maintain tension on the mooring line. While heavy ocean swells would create some movement in the feed barge, the predominant factor influencing force loading on the mooring would be pulling forces from currents acting on the Velella Delta Array. The applicant expects this force to be almost constant (Sims 2014).

The applicant designed the mooring system to be survivable under a range of weather and oceanic conditions that could occur at the proposed location. The applicant had Texas A&M University's Offshore Technology Research Center (OTRC) model the forces on the proposed mooring line, attachment points, and the dynamics of the Velella Delta Array using a proprietary computer-modeling program, "Orca-Flex." A summary of the modeling study is in Appendix G. Orca-Flex Modeling. The applicant evaluated the mooring and tether connection strengths for sea state conditions estimated to have occurred in the action area during Hurricane Iniki in 1992. The Orca-Flex simulation determined that the mooring components were strong enough to withstand Iniki-type forces (Sims 2014). The Orca-Flex simulation evaluated whether the mooring line and connections would be sufficient to hold the float ring and net pen in place during extreme conditions. In case of a hurricane, staff would tow the feed barge back to Honokohau Harbor and would leave in place the float ring and net pen attached directly to the mooring. Because weather forecasters can anticipate hurricane trajectories at least a week in advance, there would be adequate time to make these arrangements and carry out the vessel relocation operation.

The applicant would leave the mooring line in place at the end of the project, pending approval by the USACE to establish a permanent mooring. If the USACE approves leaving the mooring line in place, at the end of the project, the applicant would reattach the mooring line to the metal buoy currently in place. The applicant has received inquiries from local fishermen asking that the

applicant leave the buoy currently attached to the mooring line as a fish aggregating device (FAD) (Sims 2014). If the USACE disapproves the request to establish a permanent mooring, the mooring line would be detached from the riser chain by running a specially designed cutting blade down the nylon/polypropylene mooring line and cutting it where it attaches to the riser chain (Sims 2014).

Feed Barge: The project would use a steel 60 ft x 20 ft flat-topped unpowered barge as a combined dive-platform and feed barge. The applicant would connect the feed barge to the mooring system as described above. The barge would be equipped with mast, required safety lighting, a GPS unit, and wireless communications for the cameras and the feeding auger. At night, the applicant would mark the barge by navigational lighting according to U. S. Coast Guard (USCG) regulations (one all-around white lantern, 33 CFR part 84). There would be no staff living aboard the feed barge. The applicant would remotely monitor the feed barge from shore using security cameras. The applicant would use standard marine-grade security cameras (AXIS POE Network Camera, M3024-LVE) equipped with infrared LED's to provide limited night vision capabilities up to 50 ft. Infrared light is invisible to the naked eye and would be not expected to disturb wildlife.

The applicant would use a small 20-horsepower diesel generator to deliver feed through a hose to the HALO net pen. The generator would be in a protected space aboard the barge to avoid swamping by large waves and helping dampen its sound. Staff would tow the feed barge from and to Honokohau Harbor. Because the barge does not have any engines, no refueling or oiling of the barge or barge components would occur at sea. Refueling of the generator would occur at sea during weekly resupply visits by a tender vessel. The applicant would transfer hand-held fuel containers (gas cans) by hand from support vessels to the barge. Staff would fill the generator's fuel tank. Staff would transfer empty and partially full fuel containers to the support vessels and return to shore. No extra fuel or oil would be stored on the feed barge. The applicant would remove the feed barge at the end of the project. The applicant would clean the feed barge at sea before transporting it to shore reducing the likelihood of introducing potential invasive species to the near-shore environment.

For safety, the unmanned barge would be equipped with compartmentalized void spaces, and four automatic bilge pumps to ensure survivability. If a hurricane approaches the operating area during the course of the proposed action, the applicant would return the feed barge 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 (Sims 2014).

Umbilical Lines and Tether: Several umbilical lines would run from the feed barge to the net pen including a feed hose, armored air line for the ballast tank, camera cables, and a tether line. The applicant would attach the net pen to the feed barge using a tether made of 150 ft long three stranded 1½-inch nylon line. Nylon line is somewhat elastic and 1½-inch gauge line is rated at 48,600 lb breaking strength (Engineering ToolBox 2015). Staff would tie the umbilical lines directly to the float ring described below using clove hitches reinforced with half hitches. The applicant would tie the other lines along the tether line using zip ties. The feed hose would run from the food auger on the barge to the float ring into the net pen. The feed hose would be comprised of 2-inch diameter plastic TigerFlex® hose. The camera line would similarly run from

the video equipment aboard the feed barge into the net pen. The armored air hose would run from a compressor aboard the barge to the float ring and to the ballast tank below the net pen (Sims 2014).

Net Pen: The HELO net pen would be a variant of the Polarcirkel-type pens.The frame of the net pen would be made of HDPE plastic pipe. The applicant would use two types of mesh to construct the net pen: a rigid copper alloy linked mesh and a more pliable synthetic KikkoNet webbing.

The net pen would be cylindrically shaped, with a diameter of 39 ft and a depth of 33 ft, and a volume of 36,600 ft^3 (Figure 6). The frame of the net pen would be comprised of two 12-meter-diameter HDPE rings: a double upper ring and a bottom weight ring attached to a ballast tank.

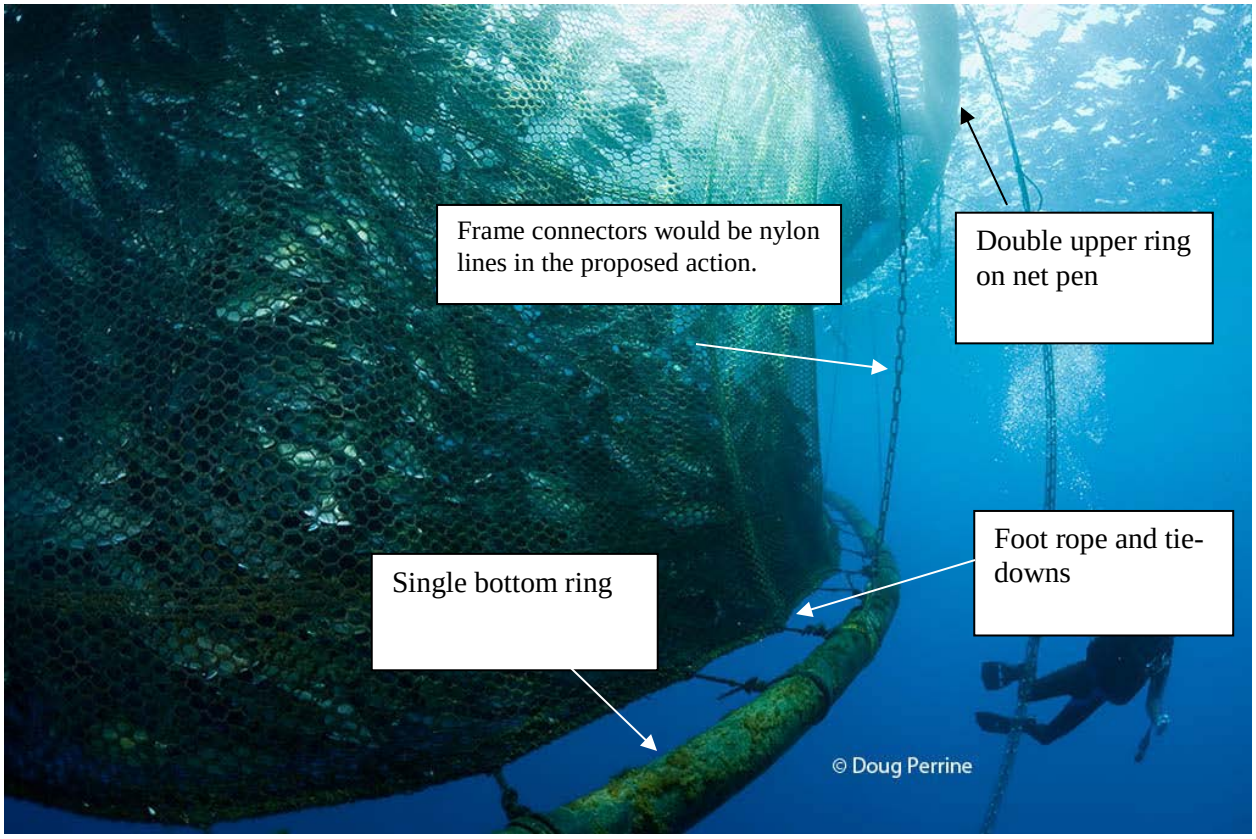

Figure 6. In-water view of a net pen similar to the one that would be used in the proposed Velella Delta project and showing attachment of the net pen to the bottom ring. The chains attaching the bottom and upper rings in the photo would be nylon lines and fabric slings to reduce friction. (Source: Doug Perrine, SeaPics.com, Inc., 2009.)

Staff would connect the upper rings to each other by HDPE brackets and be filled with closed-cell foam ensuring buoyancy even if the HDPE pipes were somehow breached. There would be a handrail about 3 ft high running around the inside upper ring. The outer ring would serve as a platform for walking on when the pen is at the surface. The bottom ring would be flooded and negatively buoyant. The applicant would connect the upper and bottom rings using synthetic

ropes that are approximately 30 ft in length and attached to synthetic slings about every 8.5 ft around the pen. The synthetic ropes would reduce chaffing on the net and the upper and lower HDPE rings.

The applicant would construct the sides and bottom of the pen from copper alloy mesh (Fig. 7). The top of the cage would be made of KikkoNet comprised of polyethylene terephthalate (PET) plastic. The metal chain link mesh would be comprised of 4-milimeter copper alloy wire. Copper is extremely resistant to biofouling and designers commonly use this material in net pen construction. The synthetic KikkoNet is also a standard material used in aquaculture. It is very strong and is resistant to UV radiation and biofouling. The KikkoNet webbing (42 mm mesh width) can withstand pressures of about 10,000 lb per m^2 making it predator-resistant[1]. The applicant would sew together the copper alloy panels making up the sides and bottom of the net pen using 4-milimeter copper metal alloy wire of the same composition as the metal mesh. The applicant would sew the KikkoNet top panels together using KikkoNet monofilament, as per manufacturer's recommendations.

Figure 7. Copperalloy mesh for the Sides and Bottom of the Velella Delta Array. (Source: Kampachi Farms, 2014)

The applicant would use double-braided 3.16" STA-set marine grade polyester line to attach the KikkoNet panels to a rope around the perimeter of the top edge of the pen. The applicant would then lash the top rope to the upper rings of the net pen using a series of clove-hitched tie-downs made of ½-inch nylon line. Similar to the top of the pen, there would be a footrope running the circuit of the bottom of the net pen. The applicant would attach the footrope to the weight ring using ½-inch nylon line tie-downs. Figure 8 shows a similar design to the proposed net pen.

[1] For KikkoNet product information go to: http://www.kikkonet.com/net_rolls.php.

Figure 8. Kona Blue Water Farms staff attaching KikkoNet webbing to the handrails on a net pen similar to the proposed Velella Delta Array net pen. A top panel of KikkoNet mesh would cover the top of the Velella Delta Array net pen. (Source: Doug Perrine, SeaPics.com, Inc., 2009.)

The applicant would submerge the net pen to a predetermined depth of 32 ft below the surface (measured from the top of the pen). The net pen would remain submerged during normal operations by means of at least six bridles running from the outside upper ring to a surface float ring described below.

Ballast tank: A steel pendulum ballast tank suspended from the weight ring beneath the net pen (Figure 9) together with the positively buoyant ring system would ensure the pen remains upright while deployed. Staff would raise and lower the net pen in the water column using compressed air to displace seawater in the ballast tank allowing the positively buoyant upper ring to pull the pen to the surface. Raising and lowering the net pen would occur during stocking, cleaning, and fish harvesting.

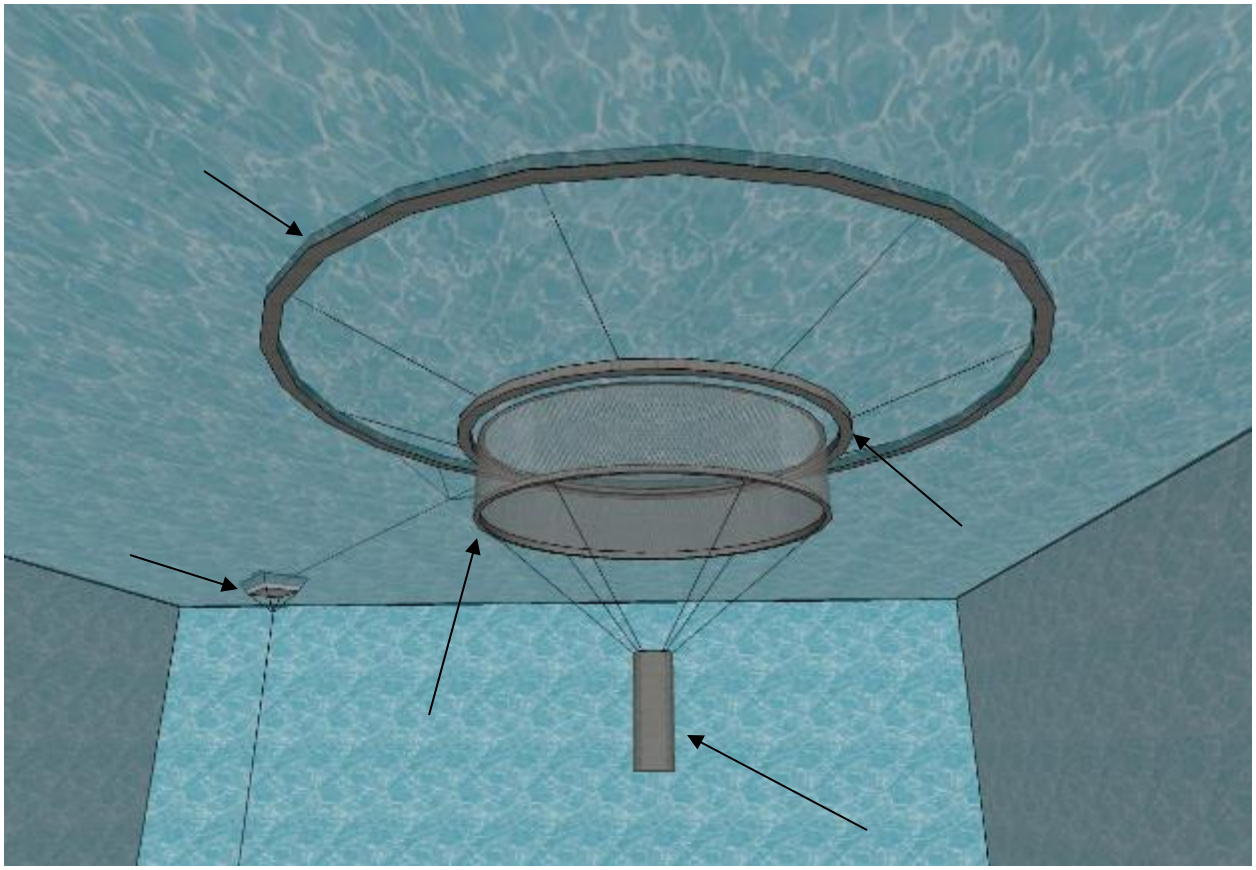

Figure 9. Generalized in-water view of Velella Delta Array looking up toward the surface of the ocean. The figure depicts a double float ring, net pen with upper net pen frame ring and lower net pen frame ring, ballast tank, and bridle lines. The applicant would tether the array to the anchored feed barge, which is in the left side of the view. (Source: Kampachi Farms, 2015)

Float Ring: The applicant would stabilize and maintain the net pen at depth by attaching the pen to a surface float ring by multiple bridles (see Figure 9 and Figure 10). The float ring would be a double-ring made of 40-centimeter-diameter HDPE pipe filled with a solid foam core about 30 m in diameter and encompassing an area of around 7,800 ft^2. Staff would connect the two float rings by HDPE brackets. The gap between the double rings would be approximately eight inches.

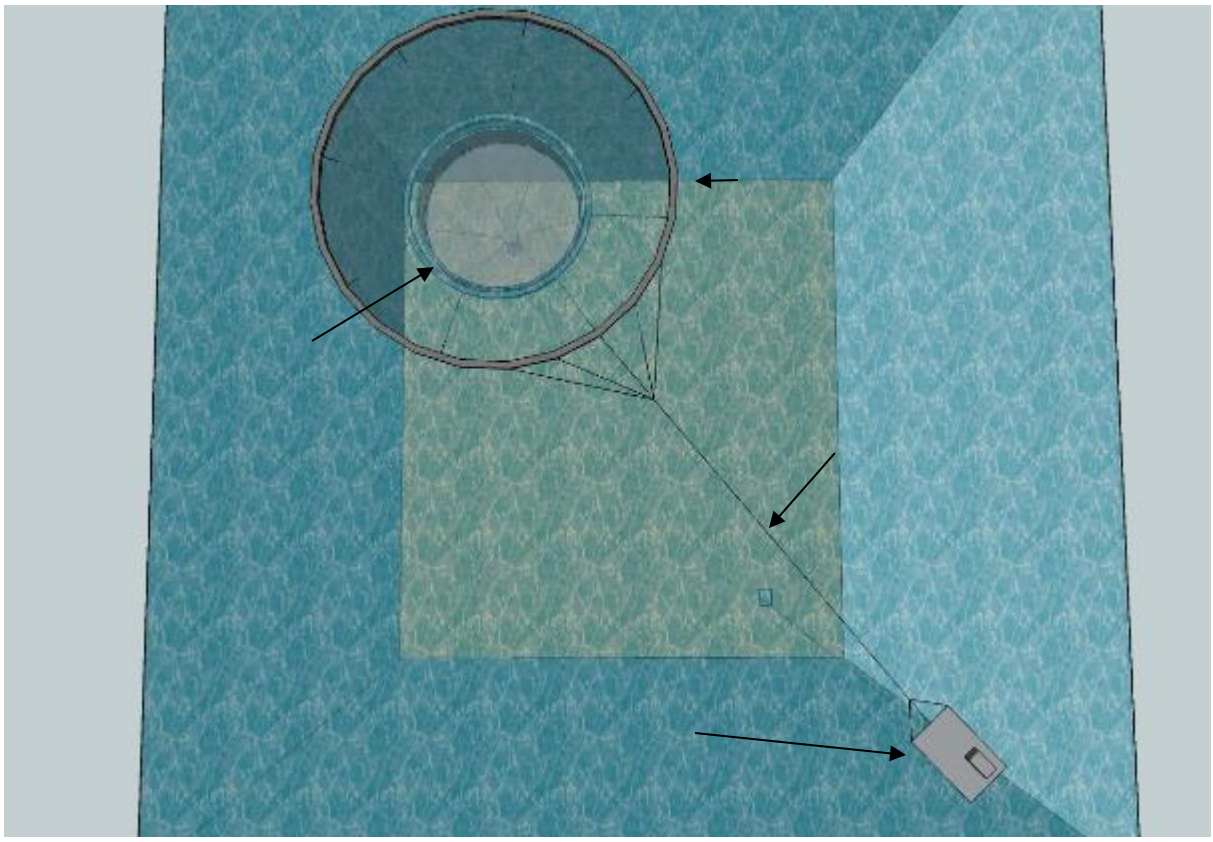

Figure 10. Overhead view of Velella Delta Array showing the double surface float ring and net pen suspended below. (Source: Kampachi Farms, 2014)

The inner ring of the surface float ring would have a 3-foot-high handrail or stanchions distributed around the circumference (Figure 11). The handrail would be above the surface when the net pen is at the surface. Staff would connect the float ring to the net pen by eight 1½-inch nylon bridle lines and tied to the upper ring of the net pen using clove hitches reinforced by half hitches. This type of knot is difficult to unravel if left in place under tension for any length of time and one usually needs to cut the line to remove it, i.e., it does not come undone. To suspend the pen at the proposed depth, the bridles would necessarily need to be approximately 13.5 m in length. As stated above, the bridle lines are rated at 48,600 lb breaking strength (Engineering ToolBox 2015). Additionally, the nylon lines are somewhat elastic and can absorb shocks, like waves, without breaking.

Lighting and Maritime Safety: The applicant would operate the array with safety lighting on board both the feed barge and float ring meeting the requirements of the Coast Guard regulations at 33 CFR part 84. The regulations require that the feed barge have one white flashing light and the float ring display one amber flashing light. The applicant would use SeaLite M650 buoy lanterns with a visibility of 3 nm, to mark the array's position at night in accordance with USCG regulations, as well as a radar reflector and a GPS transmitter. The SeaLite M650 runs on solar-powered internal batteries. Figure 11 shows similar navigational aids on a net pen.

Figure 11. Photo showing handrails, stanchions, double ring configuration and navigational safety aids mounted on a float ring similar to the proposed design. The figure does not show the KikkoNet top panel, which would be mounted to the top of net pen. (Source: Kampachi Farms, 2014)

1.4.4 Deployment and Retrieval of the Velella Delta Array

This section describes deployment and retrieval procedures for the proposed Velella Delta Array.

Feed Barge Deployment: The applicant would hire a contractor to tow the feed barge described above from Honokohau Harbor to the mooring site. The tow vessel would pull the feed barge to the mooring site at approximately 2 kt during this operation. The applicant would only tow the feed barge to the proposed site during favorable weather and sea traffic conditions.

Once at the mooring, the applicant would attach the feed barge to the mooring system currently at the site. Two lengths of chain would run from metal pad eyes at the corners of the feed barge's bow to a shackle attached to the mooring system at steel-thimble-reinforced eyelet in the mooring line.

Float Ring and Net Pen Deployment: The applicant would construct the float ring and net pen at Kawaihae Harbor. Once constructed, the float ring and net pen would be towed approximately 5.5 nm to the mooring site and attached to the feed barge as described above. The applicant would use float bags to ensure that all components, including the ballast weight and metal net pen, would avoid contact with the bottom and any nearby coral. This operation would briefly cross a small portion of the HIHWNMS. The applicant anticipates that the tow vessel would transport the float ring and net pen at approximately 2 kts during this operation. The permit's terms and conditions would require the applicant to install and remove the array and associated structures, including transport of these to and from shore, when there are no small craft advisories in effect. The permit would also require transport of the array during a Douglas sea scale of sea state of 3 (short and moderate waves) or less to avoid uncontrolled movement and loss of structures and materials.

End of Trial Retrieval of the Net Pen: At the of the Velella Delta trial, the applicant would tow the float ring and net pen back to Kawaihae Harbor after hand cleaning all surfaces at sea. The net pen retrieval operation would require a brief transit through a small portion of the HIHWNMS similar to deployment. The applicant would fit all components with float bags to avoid contact with the bottom and coral as they move the components to shore. The applicant would be required to follow the terms and conditions of the permit during these operations. The tow vessel would transport the float ring and net pen back to shore at about 2 kts during the operation.

End of Trial Retrieval of the Feed Barge: Once the applicant decouples the float ring and net pen from the feed barge and returns to shore, the applicant would tow the feed barge back to Honokohau Harbor. The applicant would be required to follow the terms and conditions of the permit.

1.4.5 Stocking Operations

The applicant proposes two stocking operations: one for each 15,000-fish cohort. Each stocking operation would involve transporting kampachi fingerlings from the hatchery at the NELHA in aerated containers, transferring the fingerling containers to transport vessels, and pumping the kampachi fingerlings into the net pen. We discuss these three steps in detail below.

Transport of Kampachi Fingerlings from the Hatchery to Transport Vessels: At the BOM hatchery located at NELHA, the applicant would transfer kampachi fingerlings from land-based rearing tanks into aerated holding containers. Using a crane, they would then place the holding containers onto flatbed trucks and secure them. The trucks would not differ in any way from other flatbed trucks used for transport in Hawaii. The trucks would follow the shortest distance from NELHA to Honokohau small boat harbor. At Honokohau small boat harbor, the holding tanks would be transferred using a small crane to the deck of a transshipment vessel. The applicant estimates that they would need three trips to stock the net pen for each grow out cycle (see below). This activity would not likely create any large delays to other harbor operations at Honokohau small boat harbor.

Transfer of the Fingerlings to the Net Pen: Once the crew secures the holding tank with the fingerlings to the transshipment vessel, the transshipment vessel would proceed to the Velella Delta Array. The transshipment vessel would not travel faster than 10 kts (11.5 mph) to the Velella Delta Array. Before transferring the fingerlings from the tanks on the transshipment vessel to the net pen, the applicant would raise the net pen to the surface by displacing water from the ballast tank. The net pen would then float to the surface. The applicant would open the access panel on the topside of the net pen. Then they would pump the fingerlings into the net pen using a specially designed fish pump. Small kampachi fry would travel from the holding tank down a hose and directly into the net pen. This would require the use of a small 20-horsepower diesel generator. The applicant would use scoop nets and hand nets to transfer any fry missed by the fish pump from the holding tanks to the net pen. It is unlikely any fry would escape during these operations, because the net pen would have a KikkoNet mesh skirt attached to the inside of the handrails (see Figure 12). The applicant would use dip nets to capture any fingerlings that end up on top of the net pen and put them inside.

Once stocked, the applicant would secure the access panel by sewing it shut to the net pen's top panel using 4-milimeter lashing twine. The applicant would then flood the ballast tank lowering the net pen to a depth of 33 ft below the surface. Wave surge and weather would minimally affect the net pen at this depth.

Number of Trips to Stock the Net Pen: The applicant anticipates they would need three trips from the hatchery to the net pen for each cohort, for six trips over the duration of the project. Once the applicant stocks the pen, daily fish rearing operations would commence.

1.4.6 Daily Operations

Feeding: The applicant would feed the kampachi in the net pen using remote command and control facilities aboard the feed barge. The communications system would use a semi-directional Wi-Fi antenna with a commercial wireless broadband (4G) backup system attached to the barge's mast. Once activated, a feed auger would pump feed slurry from the barge, through a hose, and into the net pen. The feed hose from the feed barge would run into the cage. The applicant would secure the open end of the feed hose to the net pen's frame. On shore, the applicant would monitor feeding by a remote video link. The applicant would use the same visual criteria as in the Velella Beta and Gamma trials. As the fish start to reach satiation, the aggregation of fish around the feed dispensing point would become less dense with fish moving towards the middle of the net pen away from the feed hose (Sims 2014).

Initially, staff would feed the fish five times a day and less often as they grow. The maximum amount of feed used per cohort would be around 40,000 kg (~88,000 lb). The daily rate increases over time but would max out at around 300 kg (660 lb) per day.

Feed: The feed pellets would include various agricultural products (e.g., soybean meal) formulated with approximately 30 percent fishmeal and 10 percent fish oil from sustainably managed sources, primarily Peruvian anchovies. The feed would not include prophylactic antibiotics or other medications (Sims 2014).

Monitoring the Velella Delta Array: The applicant would remotely observe the fish and activity around the Velella Delta Array using a closed-circuit television (CCTV) system. As described above, the applicant would outfit both the net pen and feed barge with infrared-capable cameras for night vision. Monitoring with cameras would also help aid the staff to identify any fish, sharks, turtles and marine mammals that may be present around the net pen for diver safety, wildlife protection and research purposes (Sims 2014).

Additionally, GPS transponders aboard the feed barge and the net pen would provide regular automated reporting of the array's position. This information would be available only to the applicant and not to other mariners. Video feeds from security and in-water cameras would be available for monitoring at the shore station 24 hours a day. Streaming video would also be available in the applicant's Chief Executive Officer's office and accessible through the internet. Project staff would access the online command and control system at least twice a day to conduct feeding operations and monitor the systems. If the applicant detects either the feed barge or net pen outside of the expected operating area, they would use GPS information to launch an

emergency response in a timely manner. The applicant estimates that it would take under an hour to retrieve any lost gear: 30 minutes to launch a vessel and an estimated 20 minutes to find the gear (Sims 2014).

Both the feed barge and net pen would be marked with signs indicating that no public access is allowed aboard the feed barge, float ring, or the net pen. In addition to the security provided by the on-board camera, GPS systems, and signage, the applicant would also visit the Velella Delta Array and inspect it for unauthorized access during maintenance visits (Sims 2014).

In-Person Maintenance Visits to the Velella Delta Array: The applicant would visit the array using small fishing vessels launched from Honokohau Harbor, at least weekly to clean the pen, feed barge, fill the feed hopper, fill the generator fuel tank, directly monitor the stock, remove mortalities, and check for wear and tear on the gear.

Feed Resupply

The applicant would fill the feed hopper by transferring feedbags by hand from maintenance vessels to the feed barge. Staff would then simply pour the feed from the bags into the feed hopper. The applicant would transfer all empty feedbags by hand to maintenance vessels for disposal in trashcans or dumpsters on shore.

Fueling

The applicant would buy fuel just prior to boarding maintenance vessels at a gas stations filling 10-gallon gas cans. The fuel cans' caps would be tightened to prevent leakage or accidental spillage. Staff would transfer the fuel cans to the maintenance vessels and feed barge by hand. Using the nozzle provided with the fuel can and a funnel, the applicant would fill the generator's fuel tank. Staff would secure the caps on empty and partially used fuel cans then transfer them to maintenance vessels and return them to shore for reuse. The applicant would only use gas cans meeting OSHA Standards at 29 CFR 1926.152(a) (1).

It would be unlikely that fuel cans would fall into the ocean, but if they did the spills from fuel cans would be small and would rapidly dissipate. The applicant would retrieve the fuel tanks either using long-handled items, like dip nets, or enter the water and hand them up to the maintenance vessel.

Cleaning

In contrast to previous Velella trials, the applicant does not anticipate that they would need to clean the net pen with a power washer during weekly visits. Experience has shown that the copper alloy mesh and KikkoNet mesh are resistant to fouling. Biofouling would likely occur on the copper alloy mesh. Staff would kill the little biofouling that may aggregate on the top KikkoNet panel by raising the net pen to the surface and air-drying it. This is a standard practice in aquaculture operations (Pers. Com., Neil Sims (Kampachi Farms), January 30, 2015). If the net pen frame and float ring need cleaning, the applicant's staff (divers) would simply manually scrub those surfaces with cleaning brushes. Staff would use no chemicals to clean the gear. They

would return to the sea only accumulated marine biological matter without alteration by any human or industrial processes. The copper-alloy mesh material and that of the HDPE of the float ring and net pen are non-ablative (i.e., do not flake off), so this mechanical cleaning would not result in contaminants entering the water.

Gear Maintenance

The applicant would check all lines, chains, shackles and load points on the feed barge and pen every week. Divers would inspect the net pen, bridles, lashings, and couplings for damage or wear. The applicant would make repairs as appropriate under safe conditions (Sims, 2014). The applicant would only allow divers into the ocean around the Velella Delta Array under safe conditions. Safe conditions include calm weather, low shark numbers, and the absence of marine mammals nearby. The underwater cameras would help the applicant determine whether large numbers of shark or any marine mammals are present. In past trials, divers encountered potentially dangerous sharks (e.g. oceanic whitetip (*Carcharhinus longimanus*), Galapagos (*C. galapagensis*). During the Velella Delta trial, divers would immediately exit the water if they notice aggressive behaviors while inspecting and repairing gear. The applicant would not employ lethal measures such as bangsticks against any sharks during the Velella Delta trial.

Mortality Removal

During maintenance visits, divers would inspect the stock for evidence of disease and remove dead fish from the net pen. Staff would use nets to remove mortalities, would carry dead fish to the surface, and would place these in plastic bags for transport and on-shore disposal. The applicant would inspect all mortalities for any signs of disease at an accredited laboratory. The laboratory would record the details of diseases such as parasite loads and bacterial and viral infections prior to disposing of dead fish in compliance with County of Hawaii rules (i.e., landfill). Documenting disease incidents would be an extremely important part of the project for the applicant and would be valuable for future project designs.

Water Quality Testing

The permit would require the applicant to sample and analyze water samples at four stations 50 ft from the float ring at a depth of 100 ft every month. The stations shall be directly north, east, south and west of the float ring. The permit holder would analyze the samples for dissolved oxygen content and turbidity. Dissolved oxygen and turbidity testing provide a simple and effective way of determining whether the proposed action is polluting the environment. In a process called eutrophication, nutrient inputs into marine waters may cause algal blooms, which deplete oxygen levels, and can change species diversity at a microscopic level. This usually occurs at aquaculture facilities located at shallow, poorly flushed sites (Price and Morris 2013). The applicant would provide NMFS with annual reports of water quality testing results.

Marine Mammal/Protected Species Monitoring

The applicant would implement a Marine Protected Species Monitoring and Reporting Plan. Marine protected species are marine mammals, sea turtles, and Endangered Species Act (ESA)-listed seabirds. The Velella project staff would monitor marine mammals and other protected species whenever staff are at the proposed action site. A designated representative of the permit holder shall report immediately to NMFS 1) Any observed or reported direct physical contact by any marine mammal, sea turtle, or ESA-listed seabird with any part of the float ring, net pen, feed barge, tether, or mooring lines; or 2) Any observed or reported injured or entangled marine mammal, sea turtle, or ESA-listed seabird within 100 m of any part of float ring, net pen, feed barge, tether, or mooring lines. The permit holder shall cease all surface activities, including stocking, harvesting operations, and routine maintenance operations when an ESA-listed seabird comes within 100 ft of the activity until the bird leaves the area. The applicant may conduct marine mammal surveys in coordination with other entities at the Velella Delta Array. More details on the reporting requirements are in Appendix E.

1.4.7 Harvest and Marketing

Harvest: The applicant anticipates that fish would reach marketable size in about eight months. For each cohort, the applicant would harvest kampachi twice per week after the fish reached marketable size until they have harvested all of the fish. This would allow the fish remaining in the pen more room for growth allowing more efficient feeding and reducing disease transmission risks. This approach would also lessen the risk of potential shocks to fresh fish markets that often occur when harvesters introduce large amounts of fish during a short period.

Harvesting operations would require a fishing vessel equipped with a seine net. First, the applicant would bring the net pen to the surface allowing staff to peel back the KikkoNet top panel. Fisheries escapes during harvest operations would be unlikely due to the mesh on the inside of the net pen handrails above the surface. Staff would drop the seine net into the net pen. Divers would then herd the fish into a tight ball. Once enough fish are over the seine net, staff would raise the seine net, trapping a portion of the stock in the seine. Personnel would then transfer fish to the support vessel using dip nets into a seawater-ice slurry in the fishing vessel's hold (Sims, 2014). The support vessel would then transport the chilled kampachi to shore for processing. A similar operation is in Figure 12.

The applicant would sew the top panel back onto the top of the cage once harvesting is complete. The ballast tank would then be flooded lowering the net pen back to about 30 ft below the surface.

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Figure 12. Harvesting fish from a net pen using a vacuum pump. Fish would be concentrated using a seine net and harvested. In the proposed action, staff would harvest fish using dip nets and transfer the fish to a support vessel for transported to shore and processing. (Source: Doug Perrine, SeaPics.com, Inc., 2009.)

The applicant anticipates harvesting approximately 6,700 lb (~3,000 kg) of fish each week after the fish reach maturity. The applicant would market the fish through existing channels and other markets as they arise. NMFS does not expect that this amount of fish added to current markets would soften local or national fish prices.

The applicant would be required to report fish harvests and sales on the appropriate Federal and State catch, transshipment, and dealer forms.

1.4.8 Emergency Response Operations:

Severe Storms: If severe weather, such as a hurricane, approaches the action area, the feed barge would be detached from the float ring and net pen and towed to Honokohau Harbor, leaving the float ring and net pen attached to the mooring system during the storm. The applicant would attach a mooring buoy to the mooring line after removing the feed barge. The net pen would remain submerged 33 ft beneath the 98 ft float ring. The applicant would tether the float ring directly to a steel ring in a riser chain connecting the mooring buoy to the mooring line using 1½-inch nylon line with steel thimble-reinforced eyelets and a shackle. The ballast tank would

remain fully flooded to provide downward tension on the float ring and net pen, helping to stabilize them during storms.

Possible Gear Failure or Accidents

The applicant would be required to adhere to the Emergency Reporting Plan described in the SCREFP (Appendix D. Emergency Reporting Plan)

Although the applicant designed the project to withstand harsh marine conditions, there remains the potential for gear failure. Below are several scenarios for potential gear failure and proposed prevention and response measures.

Scenario 1: The entire Velella Delta Array detach from the mooring line.
Scenario 2: The float ring and net pen detach from the feed barge.
Scenario 3: The net pen partially detaches from the float ring.
Scenario 4: The net pen fully detaches from the float ring.
Scenario 5: The ballast tank separates from the net pen.
Scenario 6: A tank full of fry or harvested adult fish falls off a transport vessel.
Scenario 7: A breach of the net pen and all fish escape.

Scenario 1. The entire Velella Delta Array detaches from the mooring line: Uncoupling or breakage of the mooring line is not expected because the mooring line selected for the project was recommended by engineers to exceed anticipated force loading on the gear by sea states. However, if the mooring line were to separate below the feed barge, the entire array (feed barge, float ring, and net pen) plus an undetermined length of mooring line would remain afloat and drift with prevailing currents.

The Applicant's Response: If the GPS transponder shows the Velella Delta Array outside of the proposed action area, the applicant would consult with a local salvage specialist and deploy an appropriate vessel to retrieve the array. The average momentary surface current velocity is roughly 0.67 kts and generally runs north to south along the coastline of the Island of Hawaii, but current speed and direction are variable due to eddies on the west coast of the Island of Hawaii. Even if the current was running west to east towards the Island of Hawaii, based on the average momentary current velocity, it would take approximately 8 hours for the array to reach the nearest land. This would be more than enough time to secure the array and tow it further out to sea. The array would easily be detectable through GPS systems, navigational lighting, and radar reflectors on the feed barge and float ring. The applicant would notify NOAA and the USCG of the situation as soon as possible.

Once the applicant secures and safely tows the array away from land, they would consult with NMFS and the USCG regarding appropriate additional action. The applicant would investigate the extent of the malfunction and its potential causes and consult with NMFS as to whether the project can still proceed. A break in the mooring line itself would be very serious and reattachment of the Velella Delta Array to the mooring line may not be possible, or deemed prudent depending on the cause of the break. If the project cannot proceed, the applicant would

return the feed barge, float ring, and net pen to shore with the assistance of qualified salvage experts.

Scenario 2. The float ring and net pen detach from the feed barge: This scenario would involve a break in the nylon tether and possible serious damage to the camera lines, air hose, and feeding system. The float ring and net pen would have enough residual buoyancy to remain afloat indefinitely even if for some reason the HDPE casing on the float ring was cracked or breached because the rings contain positively buoyant closed-cell plastic foam.

The Applicant's Response: The float ring and net would drift with prevailing currents. As with the previous scenario, it would take about 8 hours at the soonest for the lost gear to make landfall. The float ring's GPS transmitter signal originating from outside the operation area would alert the applicant. Once the applicant is aware of the situation, they would notify NMFS and the USCG of the situation.

The applicant would then deploy a salvage vessel, either theirs or one from a qualified salvage expert, to retrieve the lost gear. Once the applicant secures the float ring and net pen, it would provide NMFS and the USCG a situational update. The applicant would then determine the most likely reason for the malfunction and consult with NMFS on the feasibility of continuing the project and modifications needed. Under this scenario, it is likely there would be significant damage to the umbilical lines. If NMFS and the USCG deem that the project could continue, the applicant would need to make alternate plans for feeding the stock in the pen (i.e., hand feeding with buckets and scoops) until the feeding system could be repaired. In addition, it would be necessary for the applicant to monitor the site until necessary repairs; and staff make modifications.

If NMFS and the USCG decide the project cannot continue, then the applicant would raise the net pen by displacing the water in the ballast tank with a compressor and air hose from a support vessel. The staff would harvest the fish in the net pen as described above and would transport the fish to the shore. Staff would tow the feed barge and net pen to shore as described above in Section 1.4.3.

Scenario 3. The net pen partially detaches from the float ring: It is unlikely, but possible, that one or more of the float ring bridles could part or be cut. In this scenario, the mooring, feed barge and float ring connections would remain intact, but the net pen would be hanging from the float ring from the remaining bridle lines. One of the 1½-inch nylon bridles would likely be enough to keep the net pen attached to the float ring (48,600 lb breaking strength), until the applicant could arrive on site. It is likely that under this scenario, the weight of the net pen would no longer be distributed evenly around the float ring. This could cause the float ring to tip on one side, lifting a side of the float ring out of the water. The array would stay afloat because, even on its side, the float ring would have enough buoyancy to keep the net pen from sinking. The net pen detachment is not likely to affect the feed barge and mooring system.

The Applicant's Response: The applicant would quickly become aware of the situation from the camera feed; either the view would be different, or there would be no image. In either case, the applicant would investigate the situation and notify NMFS of a possible problem. Once on-site,

the applicant would replace the broken or cut bridle lines, if they determine it is safe to do so. After the applicant makes repairs, the applicant would consult with NMFS, USCG, and USACE about why the incident occurred and what actions the applicant needs to take to prevent future similar incidents.

If they cannot safely repair the severed bridle lines, the applicant would consult with NMFS. The most likely outcome would be that the net pen would sink. To sink the pen, the staff would detach the umbilical lines from the net pen and would cut the remaining bridle lines. The net pen would then sink to the bottom (~6,000 ft) with any remaining fish inside. The applicant does not anticipate that any remaining fish in the pen would survive in this scenario. The applicant would not likely be able to retrieve the net pen from this depth.

Scenario 4. The net pen fully detaches from the float ring: In this worst-case scenario, the net pen fully separates from the float ring, but the float ring remains attached to the feed barge, which itself is still attach to the mooring system. In this scenario, the bridle lines and umbilical connections to the net pen would be completely severed. This is unlikely because there are multiple bridles, and a single bridle would support the net pen, at least temporarily.

The Applicant's Response: The applicant would become aware of the situation because the camera view would indicate a malfunction. The applicant would investigate the situation as soon as possible after becoming aware. If the net pen fully separated from the float ring, the net pen would sink to the bottom (~6,000 ft) taking any fish inside with it. The net pen would be irretrievable and remain on the bottom.

Scenario 5. The Ballast Tank Separates from the Net Pen: In this scenario, the ballast tank either partially separates from the bottom of the net pen or fully separates from the net pen. This is unlikely because the applicant would attach the ballast tank to the bottom of the pen by multiple bridles (resulting in a redundant connection) and a strong shackle.

If the ballast tank were to partially separate from the net pen, any single remaining bridle line would keep it from sinking. However, the weight of the fully flooded ballast tank would not be evenly distributed around the bottom ring of the net pen, possibly distorting the shape of the net pen. Under this scenario, the applicant does not expect the copper alloy mesh comprising the sides and bottom of the net pen to tear. The seams connecting mesh panels would not likely separate under this scenario. The top panel's KikkoNet mesh would not tear due to it being flexible and strong. In addition, the applicant does not expect the lashings and upper and lower nylon lines of the net pen to tear or separate. The net pen would remain submerged under this scenario.

If the ballast tank fully separated from the bottom of the net pen, all bridle lines and the air hose would be severed. If this occurs, the ballast tank would sink to the bottom, and the net pen and fish would rise to the surface inside the float ring.

The Applicant's Response: If the ballast tank partially or totally separates from the net pen, the applicant would become aware of the situation from the camera feed. In the case of a partial separation of the ballast tank, the applicant would deploy as quickly to the array as possible to

assess the situation. The applicant would notify NMFS of the problem as soon as possible. In all likelihood, staff would secure a partially separated ballast tank by replacing severed bridle lines to redistribute the weight evenly around the bottom ring of the net pen. The net pen would then return to its cylindrical shape. The applicant would inspect the net pen and consult with NMFS about the net pen's integrity and the likely reasons for the gear failure.

If the ballast tank fully separates from the net pen, it would sink to the bottom. This situation would mean that the bridle lines and air hose have been intentionally severed (vandalism or sabotage) or something catastrophic occurred, possibly compromising the integrity of the net pen. However, the net pen, because of its positively buoyant upper rings, would float to the surface without the weight of the ballast tank. In this situation, the applicant would inform and consult with NMFS.

Scenario 6: Loss of a Tank of Fingerlings during Transport to the Velella Delta Array: This scenario would only be possible during stocking operations and is highly unlikely. Stocking operations would only occur during calm weather, and the applicant is qualified and experienced at this type of operation. If for some reason an aerated tank did become loose and fall into the ocean during transport to the Velella Delta Array, it would be neutrally or slightly positively buoyant, due to containing seawater and air. The tank would float at or near the surface, and recovering the lost tanks would be an easy operation.

The Applicant's Response: In the unlikely event that a tank containing fingerlings came loose and fell into the ocean, the applicant would simply attach lines to the tank and with the assistance of float bags tow it back to port. If the integrity of the tank has not been comprised and the fingerlings are unharmed, it could be reloaded onto a vessel for transport to the Velella Delta Array. If the tank breaches and fingerlings escaped, their probability of survival would decrease with distance from shore due to predation.

Scenario 7: A Breach of the Net Pen and all Fish Escape: A breach of the net pen causing all fish to escape is a highly unlikely event.

The Applicant's Response: In the unlikely event that a breach of the net pen occurs and all fish escape the applicant would attempt to fix the net pen and recover the fish. If the cultured kampachi were to escape, they would likely remain around the Velella Delta array and be recaptured. The fish would likely be caught by the applicant and by recreational fishermen. In the unlikely event that the escaped fish survive and reproduce, no genetic adverse impacts to the native fish population is expected (see Section 4.2.3).

1.5 Prior Permitted Culture-Harvest Projects in the Action Area

NMFS granted two previous one-year permits to the applicant to conduct experimental aquaculture activities off the west coast of the Island of Hawaii. These were called the Velella Beta (2011-2012) and Gamma (2013-2014) trials. Although the applicant used many of the same materials in the Velella Beta and Velella Gamma trials, the Velella Delta trial net pen would differ in many ways from the spherical cages previously deployed. Both trials used a spherical net pen system called a CuPod. The CuPods were constructed with copper alloy mesh lashed to a

high-density polyethylene pipe frame. The CuPod net pens had smaller volumes (4,662 ft^3) than the proposed Velella Delta Array net pen. The applicant initially stocked each CuPod with 2,000 kampachi fingerlings. Both CuPods were suspended about 30 ft below the surface attached to a surface buoy. Maintenance divers entered the CuPods through surface entry hatches after emptied ballast tanks lifted the net pends to the surface (NMFS 2011, NMFS 2013). However, the two trials differed significantly.

The applicant employed a "controlled drift" strategy for the Velella Beta trial. This involved attaching the submerged CuPod to a powered feed vessel. The applicant intended the Velella Beta Array to drift with local currents 5-150 nm off the west coast of the Island of Hawaii. The trial tested whether a "controlled drift" would adequately flush the CuPod (NMFS 2011). The applicant monitored the Velella Beta Array for protected species interactions and demonstrated that the experiment did not affect marine mammal behavior or distributions. The Velella Beta trial concluded in February 2012.

In 2013, NMFS and USACE granted permits to the applicant to conduct the Velella Gamma trial. The applicant wished to test the feasibility of using a moored net pen in an open-ocean environment. In this trial, local currents flushed fresh water through a relatively stationary net pen, similar to nearshore aquaculture operations. After receiving a permit from the USACE, the applicant placed a single-point mooring system in about 6,000 ft of water 5.5 nm west of Keauhou Bay on the Island of Hawaii (NMFS 2013). This mooring system is still in place and would be used for the Velella Delta trial. See Section 1.4.3 for a description of the mooring system. The applicant then attached a 28-foot feed vessel and a CuPod to the mooring system. Unlike the Velella Beta trial, the applicant did not keep staff on-site for the Velella Gamma trial, so there is little information on protected species interactions, however protected species interactions were not observed remotely though cameras or during visits by staff (Sims 2014). The Velella Gamma trial had one large escape event caused by currents breaking the lashings on the net pen's entry hatch. Most escaped fish were captured by the applicant staff and fishermen near the array (Sims 2014). The Velella Gamma trial concluded in June 2014. For more information about previous trials, please refer to reports provided to NMFS (Sims and Key 2012, and Sims 2014). The environmental assessments (EAs) for permitting those projects also provide details about the array gear, configuration, and operations (NMFS 2011; and NMFS 2013).

2.0 Alternatives

2.1 Development of the Alternatives

On October 19, 2014, NMFS received an application from the applicant requesting a SCREFP authorizing fishing for kampachi using gear that is not specifically authorized under 50 CFR 665.227. If approved, the SCREFP would allow the applicant to fish for kampachi using a net pen and feed barge array, which is not authorized gear for fishing for kampachi. NMFS has not received any other applications for a SCREFP at this time.

The applicant seeks to test new gear to fish for kampachi for 2 years. The new gear would consist of a cylindrical net pen anchored offshore attached to the mooring and feeding system used in the previous Velella Gamma trial. This mooring system is still in place and serviceable,

precluding the need to install a new anchorage. The ability to fish for kampachi using the Velella Delta Array would allow the applicant to obtain more information on the performance of the fish in the new gear array.

The SCREFP would be effective for two years to allow the applicant to fish for at least two cohorts of kampachi, providing sufficient information to understand the feasibility of the gear type for fishing for this species.

Although the applicant would sell the fish, these sales would not cover the costs of the proposed trial. The applicant intends to rely on funding from other sources to meet the costs of this pilot project.

2.2 Alternatives Considered in Detail

Alternative 1: No Action. Do not issue a SCREFP to the applicant

Under the No-action Alternative, NMFS would not issue a SCREFP to authorize fishing for kampachi using the Velella Delta Array. The effects of the no action alternative would be as described in Chapter 3, Affected Environment in which a mooring exists, but there is currently no existing net pen in use for fishing for kampachi.

Alternative 2: Issue a SCREFP to the applicant to authorize the use of the Velella Delta Array to fish for kampachi for 2 years (Proposed Action)

Under Alternative 2, NMFS would issue a SCREFP to the applicant authorizing the use of the Velella Delta Array to fish for kampachi for a two-year period. The permit would contain the terms and conditions that are necessary to ensure compliance with the purposes of the permit, consistent with the objectives of the FEP. The applicant would test the use of a cylindrical net pen tethered to a feed barge moored in Federal waters approximately 6,000 ft deep. The SCREFP would be effective for a 2-year period. The applicant would be required to demobilize all gear at the end of the authorized period of operation. Details of the gear and operations are in Section 1.4, above. Proposed permit terms and conditions, included in the proposed action, are in Appendix B. Terms and Conditions.

The SCREFP would allow the applicant to conduct research on the use of this type of gear to fish for kampachi. The information from the project would provide the applicant with increased knowledge about the commercial feasibility of using this type of gear to fish for this species.

2.3 Alternatives Initially Considered but Rejected from Detailed Consideration

2.3.1 Proposed permit condition to mark fish

NMFS initially considered an alternative in which the permitte would be required to mark fish in the Velella Delta trial to distinguish them from wild stock should the fish escape from the net pen. NMFS, however, did not further consider such an alternative for a number of reasons. First, marking fish using dyes or fin-clips, or inserting tags, would be invasive and would have the

potential to stress the fish, thereby increasing the possibility of disease, serious injury, or mortality. Such a process, moreover, would not directly serve the purpose and need because the process would affect the test results for raising and harvesting kampachi in this new gear. Second, even if fish were to be marked, and if some or all fish escaped, the species is not targeted by fishermen, so it is unlikely that NMFS would be able to gather much information if fish were tagged due to an expected low recovery rate.

Third, fish stocked in the net pen would be first generation offspring of wild-caught native fish and, therefore, would be genetically similar to wild kampachi. The number of fish in the proposed Velella Delta project (30,000 fish) would be a small fraction of the estimated kampachi biomass in the wild, so escaped fish would not likely cause genetic introgression or magnify deleterious traits in wild stock (see Section 4.2.3).

In addition, NMFS evaluated whether fish marking would help to prevent, reduce the likelihood, or mitigate potential adverse impacts to other species in the wild in the event of an escape event. NMFS evaluated the potential for escaped fish to affect wild fish stocks and essential fish habitat (see EA, section 4.2.3 for details). The agency believes that escaped fish from the offshore Velella Delta Array are unlikely to reach essential fish habitat for bottomfish management unit species and significantly affect bottomfish stocks through predation. During the large escape event in the Velella Gamma trial, 340 of the estimated 1,000 fish that escaped were not recovered by the applicant or local fishermen. The applicant reported that most of the escaped fish remained in close proximity to the Velella Gamma Array. The applicant recaptured about 500 escaped fish, while fishermen caught an additional 160 fish. The remaining escapees being unaccustomed to life in the wild and natural predators likely had a low survival probability.

NMFS has also evaluated the proposed net pen and considers the new design to have some improvements over two net pens previously tested. For example, the net pen would only be opened when the net is at the surface and a protective net barrier established to prevent fish from escaping. The applicant would be required to inspect the gear including lashings during every visit and replace worn components as necessary.

For these reasons, NMFS does not believe that tagging of captive stock would meet the purpose and need for the action, and thus NMFS did not further consider an alternative in which the applicant would be required to mark the fish.

2.3.2 Proposed permit condition to Prohibit genetic modification of fish

NMFS initially considered including a term and condition in which the permittee would not be allowed to genetically modify the fish. NMFS rejected this from detailed consideration because the applicant is not proposing to use genetically modified fish or to genetically modify fish either directly or indirectly. The fish that would be cultured and harvested are native species and are not genetically modified. The applicant would stock the pen with first generation offspring of wild-caught fish. Culturing and harvesting genetically modified fish would require a separate application supported by a new environmental analysis.

2.3.3 Proposed permit condition to require a damage bond.

NMFS considered requiring a bond to cover costs for damage to the environment that may occur. Damages are not likely based on previous operations under the SCREFP not resulting in damage and the applicant's operations and emergency planning required by the proposed SCREFP. Therefore, a bond is not necessary.

2.3.4 Proposed permit condition to require oil pollution response equipment and supplies be carried aboard the array

NMFS considered requiring oil absorbing pads and a floating oil containment boom to be stored and available aboard the feed barge, and require use if there is an oil or fuel spill. NMFS rejected this from detailed consideration because the applicant must comply with all applicable laws and regulations regarding the safe handling of fuel and oil products and the prevention and clean-up of hazardous materials spills (e.g., fuel or oil spills). Additionally, the applicant would not store fuel or oil on board the feed barge except small amounts within the 20-horsepower engine' fuel tank and crank case. The applicant would be required to comply with all applicable pollution laws when carrying out the activity.

2.3.5 Proposed permit condition to require protocols to ensure worker safety

Based on comments on a previous project, NMFS considered including in the SCREFP a requirement for the applicant to have clear standard operating protocols to ensure worker safety. NMFS rejected this from detailed consideration because employers in the State of Hawaii are required to comply with a variety of Federal and State occupational safety and health laws and such a requirement would be redundant to existing requirements. The permit holder would be responsible for complying with existing laws pertaining to workplace safety. NMFS does not regulate worker safety and therefore there are no employment related conditions in the permit.

2.3.6 Proposed permit condition to require applicant to remove the anchor and line after the project concludes

NMFS considered requiring the applicant to remove the anchor and anchor line after the end of the 2-year permit. The retrieval of the anchor and chain from this depth would be difficult and potentially hazardous to staff. The applicant foresees that the mooring would serve as an asset in future experiments. The applicant after conferring with USACE would leave the mooring in place. At the end of the Velella Delta trial the applicant would remove the feed barge and net pen and reattach the buoy currently connected to the mooring.

2.3.7 Proposed permit condition to require the applicant to culture fewer number of fish

Requiring the applicant to stock the new gear type with a lower number of fish would not meet the purpose and need for the action. As described in the EA, section 1.3 (Proposed action), the applicant proposes to test a new gear type to cultivate and harvest *Seriola rivoliana*. The applicant proposed 15,000 individual fish per trial for the new gear-type to be consistent with the

stocking density of the past gear type tested. The modified gear type proposed in this action is larger, with a stocking density of 0.29 kg per m^3. The stocking density of the previous Velella Gamma trial was 0.30 kg per m^3. Consistent stocking densities between trials would allow appropriate comparisons of fish growth and health to meet the purpose and need of the proposed project.

3.0 Affected Environment

3.1 Physical Setting

3.1.1 General setting

The project would take place in Federal waters of the U.S. EEZ on the leeward side of the Island of Hawaii. The Velella Delta Array would move around a fixed mooring that is located approximately 5.5 nm west of shore and in waters 1,000 fm deep. Given this configuration, the array could be located anywhere within a circle that covers 12.6 square nm (Figure 2). The exact location of the Velella Delta Array would depend on currents and wind at any given time. The mooring line would be such that the array could be located as close as 3.75 nm from shore and would be as far as 7.5 nm from shore. When deployed, the array would not enter state waters.

The array would cover a relatively small portion of surface water: the outer float rings would be approximately 98 ft in diameter, and the net pen below it would be approximately 39 ft in diameter. The feed barge would be 60 ft long and 20 ft wide.

3.1.2 General Weather Patterns

Across Hawaii, the trade winds averaging 8-12 kts blow from the northeast about 80% of the time. Kona wind conditions, in which the wind blows from the southeast or southwest, occur about 20% of the time (Juvik and Juvik 1998). In the project area, the Island of Hawaii's land mass would help shelter the Velella Delta Array from the trade winds and heavy seas associated with storms coming from the east and northeast.

3.1.3 Benthic Topography and Composition

Water depths drop off quickly west of the Island of Hawaii, with the coral reef habitat extending approximately 0.54 nm from shore at its widest point (Coyne et al. 2003). At the extremes of distance from shore, water depths under the Velella Delta Array would range from about 4,500 ft to 7,800 ft, depending on where the array is located at any given time (Figure 13).

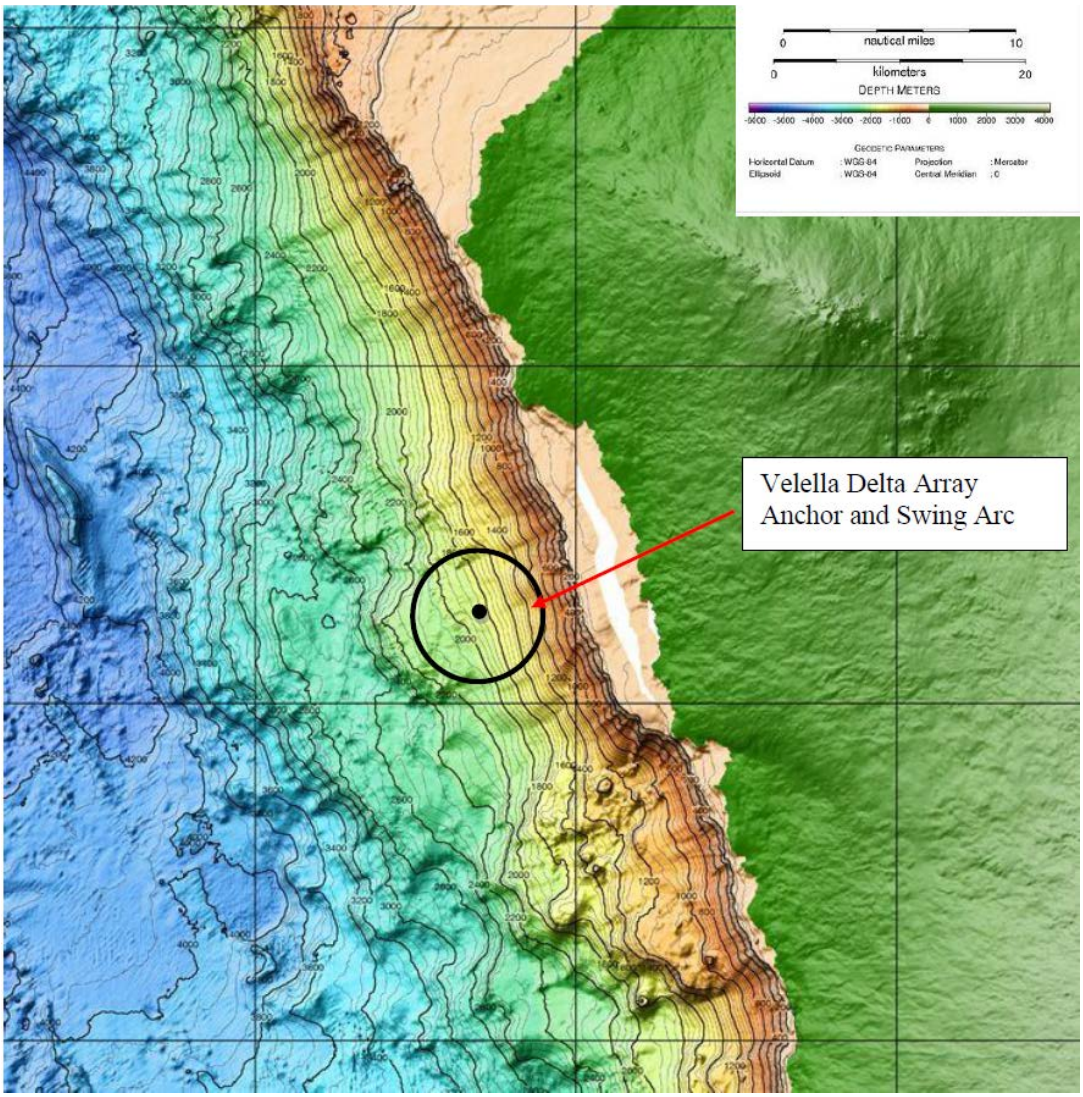

Figure 13. Plot of multi-beam underwater survey data, west Hawaii.
Note: This chart plots depth in meters. Scale and location are approximate. Source: School of Ocean and Earth Science and Technology, University of Hawaii; HMRG, and PIBHMC with approximate location of array and umbra. (Scale is approximate). Retrieved from: http://www.soest.hawaii.edu/HMRG/multibeam/products/mbs_charts-200-005.bty.b0.low.jpg, June 15, 2015.

The benthic substrate in the action area is listed on navigation charts as lava and sand (C. Kelley, HURL, pers. comm. to NMFS 2013). It is likely devoid of habitat structuring benthos such as corals, sponges and macroalgae (C. Kelley, HURL, pers. comm. to NMFS 2013). NMFS has identified this area as a location with low rugosity, which indicates the absence of relief that would indicate habitat for deep corals (C. Kelley, HURL, pers. comm. to NMFS 2013). Researchers have not found stony (Scleractinian) corals in the project area. They also have not found precious corals at the depths within the project area. Given the depths of the location, and marine survey information from the general vicinity, the seabed is largely devoid of special structures or dense aggregations of marine fauna.

3.1.4 Ocean Currents

Large-scale ocean currents generally run east to west near the Hawaiian Archipelago given its position toward southern edge of the north Pacific Sub-tropical gyre (WPFMC 2009a). On a large-scale, both winds and ocean currents run from east to west. However, the Hawaiian Islands act as barriers disrupting prevailing currents and winds. These disruptions create chaotic mesoscale oceanic and atmospheric eddies with relatively high velocities in the lee of the islands such as in the action area to the west of the Island of Hawaii (WPFMC 2009a, Jia et al. 2011, and Woodworth et al. 2011).

The area in the lee of the Island of Hawaii is marked by an abundance of mesoscale eddies, both cyclonic (counterclockwise rotating) and anticyclonic (clockwise-rotating) (Jia et al. 2011). These eddies are generated mainly in two ways. First, ocean currents moving around a solid barrier, like the Island of Hawaii, create an effect similar to areas of turbulence seen behind large rocks in streams. Second, winds forced around the Island of Hawaii create wind shear inducing vertical movement in the water column helping to create mixing (WPFMC 2009a, Jia et al. 2011). Jia et al. (2011) found that there was a strong correspondence between eddy formation in the lee of the Island of Hawaii and the prevalence of the trade winds indicating that wind shear may be the more significant factor in eddy creation in the lee of the Island of Hawaii. However, mesoscale eddy strength and distribution in the area is complex and seems to be influenced by how small-scale and mesoscale eddies unpredictably interact with each other (Jia et al. 2011). In sum, the interaction of currents, winds, and the islands themselves create chaotic water movement in the lee of the Island of Hawaii. This produces current velocities near the action area that generally exceed current velocities found in other parts of the State (Flament et al. 1998, Jia et al. 2011). Jia et al. (2011) found that while surface current direction in the action area is variable, surface current velocities average about 0.2 – 0.3 m per second. Flament et al. (1998) had similar results (Figure 14). Note the area of high velocity currents west of the Island of Hawaii.

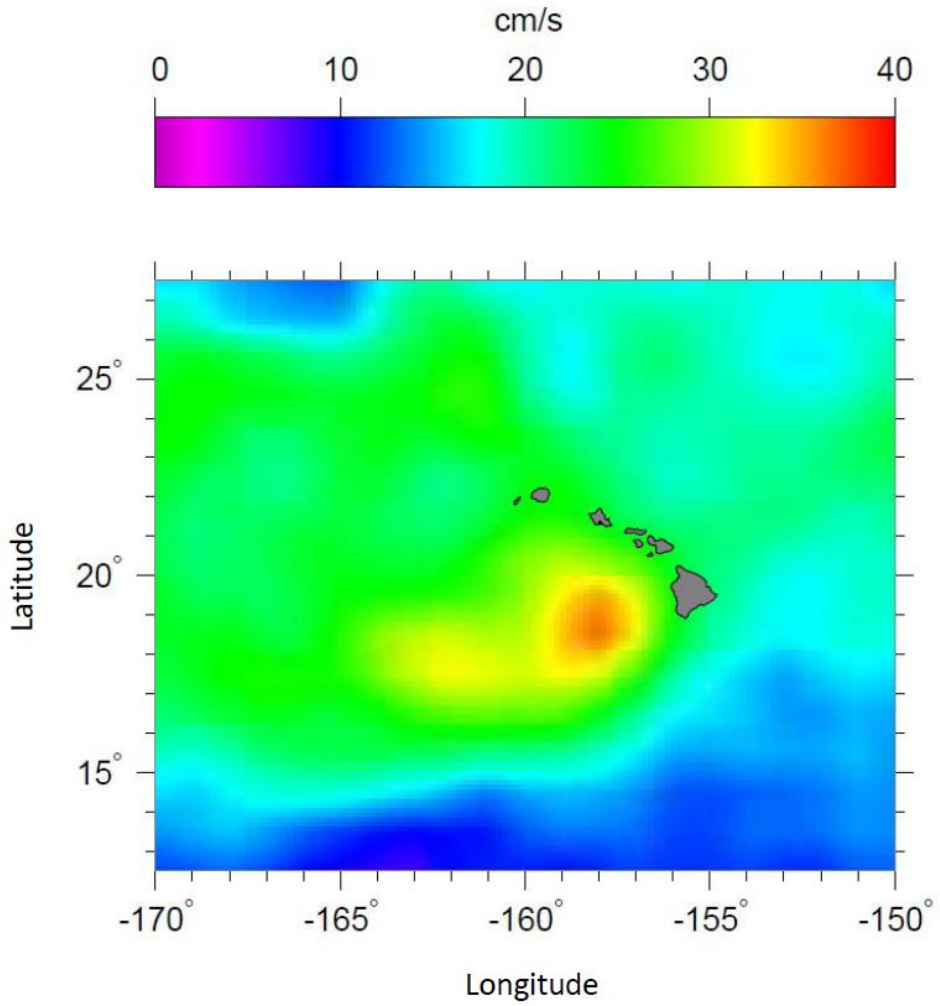

Figure 14. Variations in current velocities near Hawaii due to eddies and swirls (geometric-root mean square). (Source: Flament et al. 1998), http://oos.soest.hawaii.edu/pacioos/outreach/oceanatlas/currents.php, June 15, 2015)

Because eddies vertically displace underlying nutrient rich waters, they cause mixing with nutrient poor waters creating localized favorable biological conditions, especially in areas of eddy convergence. Increased nutrients in the surface waters allow phytoplankton to occur in high concentrations. Once established, these areas of higher productivity allow zooplankton to flourish, which in turn attract mid-trophic level species (fish and shrimp), which become prey for top-level predators such as sharks, billfish, and marine mammals (Seki et al. 2002, Woodworth et al. 2011). These biologically rich hot spots are "patchy," and the conditions creating them do not lead to increased primary production over wide geographic areas.

3.1.5 Water Column Structure

The proposed site is located offshore in waters about 6000 ft deep. The Velella Delta Array and its mooring system would run from the surface through the mesopelagic and bathypelagic zones to its mooring on the bottom. For the purposes of this document, the epipelagic zone is the area

where light readily penetrates the water (0-650 ft). The mesopelagic zone, or twilight zone, is the area immediately below the epipelagic zone where only minor amounts of light may penetrate (650-3,300 ft). The final vertical zone the project would overlap with is the bathypelagic zone where no sunlight reaches (3,300-13,100 ft). The anchor and chain would rest on the bottom, often referred to as the benthic zone. In addition to these general vertical zones based on depth and light penetration, the water column has physical and chemical characteristics that give it a density-based structure, called a pycnocline, which varies geographically and temporally.

Pycnocline

The pycnocline is an area in the water column where the density of the water changes rapidly with depth (a cline) due to differences in temperature and chemical composition. In the open ocean, the pycnocline acts to separate the top mixing zone from the relatively stable layers below it. Rapid temperature change (thermocline) is the most important factor in forming the pycnocline. Additionally, chemical composition gradients, such as salinity (halocline), also help form density clines in the water column. Temperature and chemical clines roughly correspond to each other with depth in the oceans. However, the depth at which the pycnocline occurs and its seasonal persistence varies with latitude. In tropical regions, the pycnocline tends to be deeper and more stable than at higher latitudes. Figure 15 shows vertical profiles for temperature, salinity, and nitrogen compounds near Hawaii.

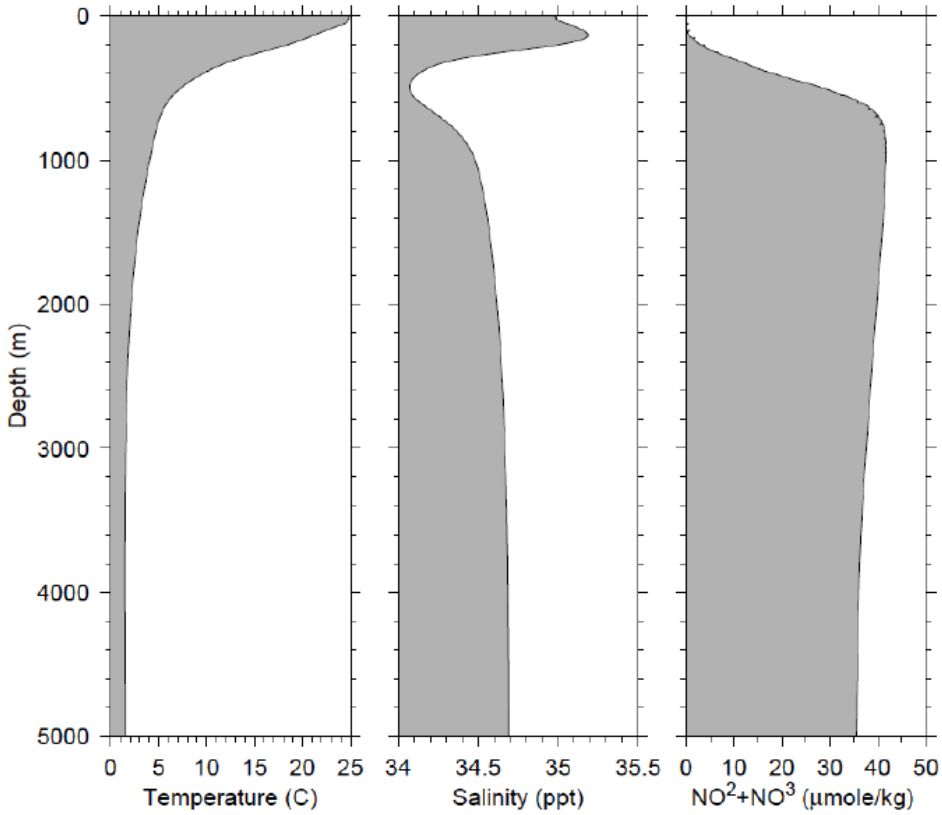

Figure 15. Average vertical distribution of temperature, salinity, and nutrients (nitrate and nitrite) at Ocean Station Aloha. Period: 1988 to 1995. (Source: Flament et al. 1998, http://oos.soest.hawaii.edu/pacioos/outreach/oceanatlas/verstructure.php, June 15, 2015)

As Figure 15 demonstrates, rapid changes in both temperature and chemical composition occur at roughly the same depths. While salinity and temperature are high at the surface, nitrogen compounds are almost non-existent but increase with depth. Since temperature is the most important factor in determining the vertical structure of the water column, the location of the thermocline is a simple way to determine the boundary between the upper mixed layer and the relatively static deep waters below. Figure 16 shows the mean depths of the 10° C isotherm (about the middle of the thermocline) around Hawaii.

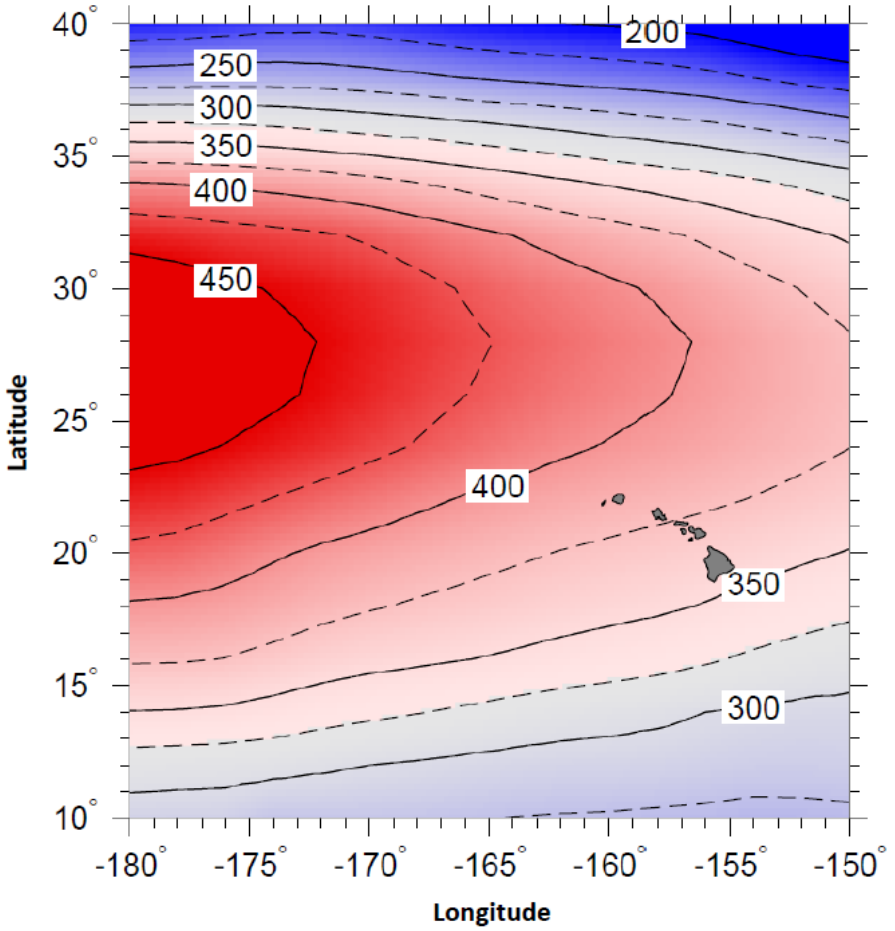

Figure 16. Average depth in meters of the 10 C isotherm around Hawaii. (Source: Flament et al. 1998, http://oos.soest.hawaii.edu/pacioos/outreach/oceanatlas/currents.php, June 15, 2015)

Flament et al. (1998) in Figure 16 shows that the average depth of the middle of the thermocline near the action area would be somewhere between 1,150 ft and 1,230 ft. However, the above mentioned island effects on ocean currents and winds mean that the actual depth of the thermocline and the mixing layer above it are likely variable in depth in the action area.

Sea surface temperatures in the action area throughout the year are stable, ranging from around 25°-27° C (NOAA 2015).

Oxygen Minimum Zone

Another chemical characteristic of the water column in deep waters is the presence of an oxygen minimum zone (OMZ) below the thermocline. The OMZ is the region of the water column where, due to the actions of aerobic microbes, oxygen levels are too low to sustain aerobic metabolism. Because this area is below the thermocline, surface eddies and currents do not replenish oxygen used by aerobic organisms. Around Hawaii, greatly reduced dissolved oxygen levels occur from about 2,133-3,280 ft (De Leo et al. 2012) with the lowest oxygen levels at about 2,625 ft (Bingham and Lukas 1996). While seemingly a hostile environment for

organisms, the oxygen minimum layer is not devoid of life (De Leo et al. 2012, Ulloa et al. 2012).

In this region, anaerobic organisms thrive and their metabolisms contribute to chemical processes involved in natural nitrogen, sulfur, and carbon cycles (Ulloa et al. 2012). Figure 16 shows nitrogen compounds are abundant below the thermocline. This region is both a link and a sink for fixed nitrogen in the world's oceans. Villareal et al. (1996) demonstrated that some plankton (diatom mats) descend to the OMZ and transport fixed nitrogen upward to the epipelagic zone. However, under extreme anoxic conditions, Ulloa et al. (2012) believe that aerobes in this zone may contribute to the release of fixed nitrogen in the form of N_2 and NO_2, which may have larger implications for the Earth's climate. Larger animals around Hawaii also descend to the OMZ to rest during daylight hours, including bluntnosed sixgill sharks (*Hexanchus griseus*) (Comfort and Weng 2014).

3.1.6 Water Quality

The array would be located in oceanic waters largely free of pollution. The project's path would not enter into State waters, which are designated as Class AA marine waters[2], the highest quality of marine waters. Surface waters in the area are well mixed; the project would be located in an area that is subject to gyres that periodically form offshore from west Hawaii and move closer to shore from time to time.

As Figure 15 shows, the surface waters in the proposed action area have very low concentrations of nitrogen compounds. Managers often cite these compounds as pollutants associated with aquaculture that create anoxic conditions (Price and Morris 2013). Bacteria and phytoplankton rapidly acquire and use nitrogen and phosphorus introduced into surface waters. This accounts for the extremely low nutrient levels found in epipelagic tropical waters. Below the pycnocline, nutrient concentrations are much greater. This region of the ocean acts as a nutrient sink. Nutrient compounds descending below the pycnocline are essentially trapped, although some upward transport of nutrients does occur via diatom mats and anaerobic metabolism (Villareal et al. 1996, Duce et al. 2008, Ulloa et al. 2012).

Both natural and anthropogenic nutrient sources may affect water quality. Some natural inputs include excretion of animal metabolites (Smith and Johnson 1995, Price and Morris 2013). Duce et al. (2008) demonstrated that total annual atmospheric nitrogen inputs into the ocean from man-made sources have greatly increased since 1860 and are expected to continue to increase. While there are some natural nutrient inputs from runoff into the ocean, most increases in nutrient inputs from land-based sources are due to the use of agricultural fertilizers (Duce et al. 2008).

3.1.7 Air Quality

There are no large sources of anthropogenic emissions into the atmosphere in the project area. Motorized fishing vessels are a small source of emissions in offshore waters, but trade wind conditions around Hawaii are likely to disperse quickly these emissions. Fine particulate matter associated with the eruption of Kilauea Volcano, on the eastern flank of the Island of Hawaii, can

[2] Hawaii Water Quality Standards Map at: https://health.hawaii.gov/cwb/files/2013/05/IslandHawaii.pdf

degrade air quality in the proposed action area depending on weather, wind direction and the amount of volcanic activity. [3,4] According to the State of Hawaii Clean Air Branch, the volcano is responsible for large inputs of sulfur dioxide into the local environment causing a form of air pollution called "vog."

3.1.8 Noise

The project would be located in an area with ambient noise from wind and waves as well as periodic noise from outboard motors on fishing and other boats.

3.1.9 Views

The applicant would anchor the array at a distance of approximately 5.5 nm from shore. The mooring line scope would allow the Velella Delta Array to range 3.75-7.5 nm from shore. At night, the flashing light currently attached to the mooring buoy has a viewing range of two miles. There are no other structures in the project area, but fishing and other vessels are common in offshore waters day and at night.

3.2 Biological Setting

3.2.1 Marine Habitats in the Project Area and Adjacent Areas

Most of the project would take place on or near the surface of the ocean at varying locations between approximately 3.5 and 7.5 nm from shore. As described above, the area is sheltered from east-originating winds and waves, but is exposed to waves and winds from the west and southwest. Strong currents of varying directions affect the project area. Periods of low current flow may occur occasionally.

The proposed Velella Delta project area is located in deep ocean waters. The epipelagic portion of the deep ocean ecosystem 0-656 ft is home to a variety of primary and secondary producers (bacteria, phytoplankton, and zooplankton), forage species, and pelagic fishes (WPFMC 2009a).

The Kona Coast is an important sport fishing area for pelagic species. The centers and edges of eddies can be highly productive areas and may concentrate plankton and mid-trophic level prey for larger fish, birds, and cetaceans. Recreational, charter, and commercial fishermen target bigeye and yellowfin tuna (*Thunnus obesus* and *T. albacares*), swordfish (*Xiphias gladius*), blue marlin (*Makaira nigricans*), striped marlin (*Tetrapturus audax*), mahimahi (*Coryphaena* spp.), and wahoo (*Acanthocybium solandri*) in the area (WPFMC 2009c). All of these species are highly migratory and likely present in various life stages in the proposed action area. Blue marlins migrate into waters off west Hawaii and tend to remain on peripheries of eddies (Seki et al., 2002).

[3] http://hvo.wr.usgs.gov/kilauea/

[4] http://health.hawaii.gov/cab/kilauea-volcano-air-pollutants

Bottomfish fishing, another important commercial and recreational fishery, primarily occurs in shallower State waters in this region. Because the bottom topography drops steeply off the west coast of the Island of Hawaii, bottomfish habitat does not exist within the project area.

There are nine species of pelagic sharks commonly found in the open ocean environment around Hawaii (WPFMC 2009b). Sharks may occur in coastal waters and in waters around the project location. Many pelagic shark species are in decline. In response, NMFS has implemented shark conservation measures including listing some species under the ESA (none in Hawaii) and identifying the bigeye thresher shark and smooth hammerhead shark as candidates for listing (80 FR 48061 and 80 FR 48053, August 11, 2015).

Based on the previous two Velella projects, the applicant may encounter sharks at the array. Over the course of an earlier trial (Velella Beta Trial), divers encountered a number of sharks - oceanic white-tip sharks (*Charcharinus longimanus*), Galapagos sharks *(C. galapagensis*), silky sharks (*C. falciformis*) and, on several occasions, whale sharks (*Rhincodon typus*). The applicant has dive safety protocols for different levels of response to shark sightings and aggression.

The applicant's staff have occasionally observed a few sharks during the Velella Gamma (moored) trial. On a single notable occasion, spearfishermen hunting around the array reported a Galapagos shark attacking the copper-alloy mesh on the pen in an attempt to get at some pelagic fish. The shark created a small tear in the metal mesh structure where staff had lashed the chain-link mesh to the plastic frame.

The Velella Delta Array would aggregate pelagic fish as some fish are naturally attracted to objects floating at the surface. The 2011-2012 towed Velella Beta array attracted small plankton-eating fish (manta rays and whale sharks) and larger fish including tuna, mahi-mahi and sharks (Sims and Key 2012). Rainbow runners (*Elegatis bipinnulata*), in the same family as *Seriola*, were commonly seen around the moving pen as it was towed. Also during the 2011-2012 towed Velella Beta and 2013-2014 anchored Velella Gamma projects, recreational, commercial and charter fishermen frequented both the towed Velella Beta Trial cage, when it was within 12 nm of shore, and the relatively fixed Velella Gamma Trial cage, which was located within 3.5 to 7 nm of shore (Sims 2014).

Marlin, an important commercial recreational species, regularly occurs along the deep waters of the 1,000 fathom line, and this area is important for a commercial charter catch and release fishery. The proposed mooring is within this activity area. The applicant understands that other fishermen would access the same waters in the action area and would work to minimize and/or help to mediate user conflicts if they were to arise.

NMFS has not conducted deep-water surveys in the location of the proposed array, and we have limited information with which to characterize the composition of the deep-water fauna likely to occur at the depths beneath the proposed Velella Delta project. Vetter et al. (2010), De Leo et al. (2012), and De Leo et al. (2013) report on species composition and density in waters 314-1500 m (1,030-4,900 ft) deep in around Hawaiian Islands. The authors documented relatively high abundances of macro-invertebrates including worms, tiny crustaceans, isopods and mollusks (clams and snail-like creatures) on the seafloor near submarine canyons. A wide range of fish

species including grenadiers, conger eels, and sharks were also documented (Vetter et al. 2010, De Leo et al. 2012, and De Leo 2013). The authors indicate that species diversity and abundance are higher in submarine canyons than on bathypelagic slopes (Vetter et al. 2010, De Leo et al. 2012, De Leo 2013). At intermediate depths, De Leo et al. (2012) found that concentrations of benthic fish species decreased in the OMZ (about 2,600 ft).

At 6,000 ft where the anchor is located, the sea bottom is likely devoid of habitat-structuring benthic organisms such as deep-water corals, sponges and macroalgae (pers. com., W. Wiltse, U.S. EPA, to NMFS April 22, 2013). There is no habitat for commercially important bottomfish in the seafloor beneath the project area. Multi-beam data provided by C. Kelley, Hawaii Undersea Research Laboratory (HURL), show that the anchor has been established in an area of low topographic rugosity and at a depth that has a low likelihood of supporting precious corals (Appendix F. Maps). Researchers have not detected precious corals in the project location. Grigg (2002) places the nearest precious coral beds 40 nm north of the proposed action site.

Coral reef resources do not occur in the immediate vicinity of the grow out operation; however, there are high quality coral reef resources in coastal areas that have the potential to be affected during towing and other boating operations.

3.2.2 Protected Species

Protected species may occur in the project area year round, or seasonally. These include sea turtles, seabirds, marine mammals, and corals. The Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), the Migratory Bird Treaty Act, and the Magnuson-Stevens Act protect many of these species. The following provides baseline information on these species that may occur in the action area.

3.2.2.1 Sea turtles

Several species of sea turtles occur in Hawaiian waters and may be present in the action area. ESA-listed threatened green turtles (*Chelonia mydas*) and endangered hawksbill turtles (*Eretmochelys imbricata*) occur in nearshore waters throughout the archipelago. NMFS and the U.S. Fish and Wildlife Service (USFWS) are proposing to reclassify green sea turtles into 11 DPSs under the ESA (80 FR 15271). The proposed Hawaiian DPS would remain listed as threatened. Commercial fishing vessels operating beyond 50 nm from Hawaii have caught other sea turtle species including the endangered leatherback turtle (*Dermochelys coriacea*) and threatened olive ridley turtle (*Lepidochelys olivacea*) (Gilman et al., 2006; WCPFMC 2009). In 2011, NMFS designated the North Pacific population of loggerhead turtles (*Caretta caretta*) as a distinct population segment (DPS). NMFS designated this DPS as endangered under the ESA (76 FR 58868, September 22, 2011). Loggerheads occur near the action area.

A thorough review of the life history, status and trends, threats, and conservation efforts for sea turtles is available in section 5 of the September 19, 2014 Biological Opinion on the Hawaii-based shallow-set longline fishery (NMFS 2014d). Information about Pacific sea turtles' range, abundance, status, and threats is in the recovery plans for each species, available from the NMFS website:

- Olive ridley: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_oliveridley.pdf
- Leatherback: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_leatherback_pacific.pdf
- Loggerhead: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_loggerhead_pacific.pdf
- Hawksbill: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_hawksbill_pacific.pdf
- Green turtle: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_green_pacific.pdf
- East Pacific green turtle: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_green_eastpacific.pdf

3.2.2.2 Seabirds

Seabirds may occur in the proposed action area, including these ESA-listed:

Hawaiian petrel (*Pterodroma sanwichensis*)
Newell's shearwater (*Puffinus newelli*)
Short-tailed albatross (*Phoebastria albatrus*)

The Hawaiian petrel and Newell's shearwater have breeding colonies in the MHI Islands (USFWS 1983). The ESA-listed short-tailed albatross does not appear to frequent the vicinity of the proposed action site. A few short-tailed albatrosses visit Midway Atoll every year in the Northwestern Hawaiian Islands (USFWS 2008).

The applicant did not observe any ESA-listed seabirds during the previous two Velella projects. During the 2011-2012 towed Velella Beta project, staff often observed unidentified seabirds in the project area. Some seabirds landed on the CuPod and tender vessel, but staff did not observe seabirds diving on the CuPod, and did not observe adverse impacts on seabirds from the operation of the CuPod. Several Brown boobies (*Sula leucogaster*) were frequently observed resting on the feed barge in the 2013-2014 Velella Gamma trial (October 2013 to June 2014), but these birds were not in any way harmed. The boobies departed the site once staff removed the feed barge.

The Migratory Bird Treaty Act makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit. The list of migratory bird species protected by the Act is in 50 CFR 10.13 and includes most seabirds. Other migratory seabirds occurring in the project area include black-footed and Laysan albatrosses (*Phoebastria nigripes* and *P. immutabilis*); Christmas, flesh-footed, wedge-tailed, and sooty shearwaters (*Puffinus nativitatis*, *P. carneipes*, *P. pacificus, and P. griseus*); and masked, brown, and red-footed boobies (*Sula dactylatra, S. leucogaster, S. sula*).

Additional information on seabird populations, distribution, life history, and status is available from the USFWS at http://www.fws.gov/birds/index.php and at http://ecos.fws.gov/tess_public/pub/SpeciesReport.do?groups=B&listingType=L&mapstatus=1.

3.2.2.3 Marine Mammals

Many species of marine mammals may occur in the proposed action area. These include pinnipeds (seals) and cetaceans (whales and dolphins). The following describes the occurrence and status of marine mammals that may occur in the action area.

Hawaiian Monk Seal

The Hawaiian monk seal (*Neomonachus schauinslandi*) is the only pinniped indigenous to Hawaii. This seal is listed as Endangered under the ESA. Monk seals occur throughout the Northwestern Hawaiian Islands (NWHI), with subpopulations at French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Necker Island, and Nihoa Island. They also occur throughout the main Hawaiian Islands (MHI) (NMFS 2014a). According to NMFS (2007), monk seals have declined in the NWHI since monitoring began in 1995. Since 1981, the number of monk seals in the MHI has increased. The minimum population estimate for Hawaiian monk seals is 1,182 individuals with 909 in the NWHI, 41 at Necker Island, 86 at Nihoa Island, and 146 in the MHI (NMFS 2014a). The population in the NWHI has been declining annually due to low juvenile survival (NMFS 2014a). Monk seal numbers in other parts of their range appear to be increasing, but population growth rate estimates are uncertain at this time (NMFS 2014a). The species is depleted and well below its optimum sustainable population and is a strategic stock under the MMPA (NMFS 2014a). Around the MHI, threats include disturbance, fishery interactions (hooking and entanglement in fishing gear or marine debris); human interactions (including feeding and other harassment); diseases (leptospirosis and toxoplasmosis), and intentional killing.

According to NMFS (2010), 5-10 monk seals visit the Island of Hawaii every year. Monk seals may use areas within the critical habitat depth contour (200 m) for foraging, as well as certain coastal areas for pupping, nursing, and hauling out (NMFS 2007). The proposed action area lies outside the 200 m depth contour and outside areas important to seals for pupping. During the Velella Beta and Gamma trials, the applicant did not observe any Hawaiian monk seals near either array (Sims 2014).

On August 21, 2015, NMFS published a final rule for monk seal critical habitat (80 FR 50925). A portion of this critical habitat occurs in the nearshore waters where the applicant would transit for deploying, retrieving, operating, and maintaining the Velella Delta Array (Figure 17). The Kawaihae Harbor, where the applicant would transit, is located near site HA-42 on Figure 17. The critical habitat at the Island of Hawaii extends from the shore to the 200 m depth contour. The essential features of this area of critical habitat are adequate prey quality and quantity for juvenile and adult monk seal foraging.

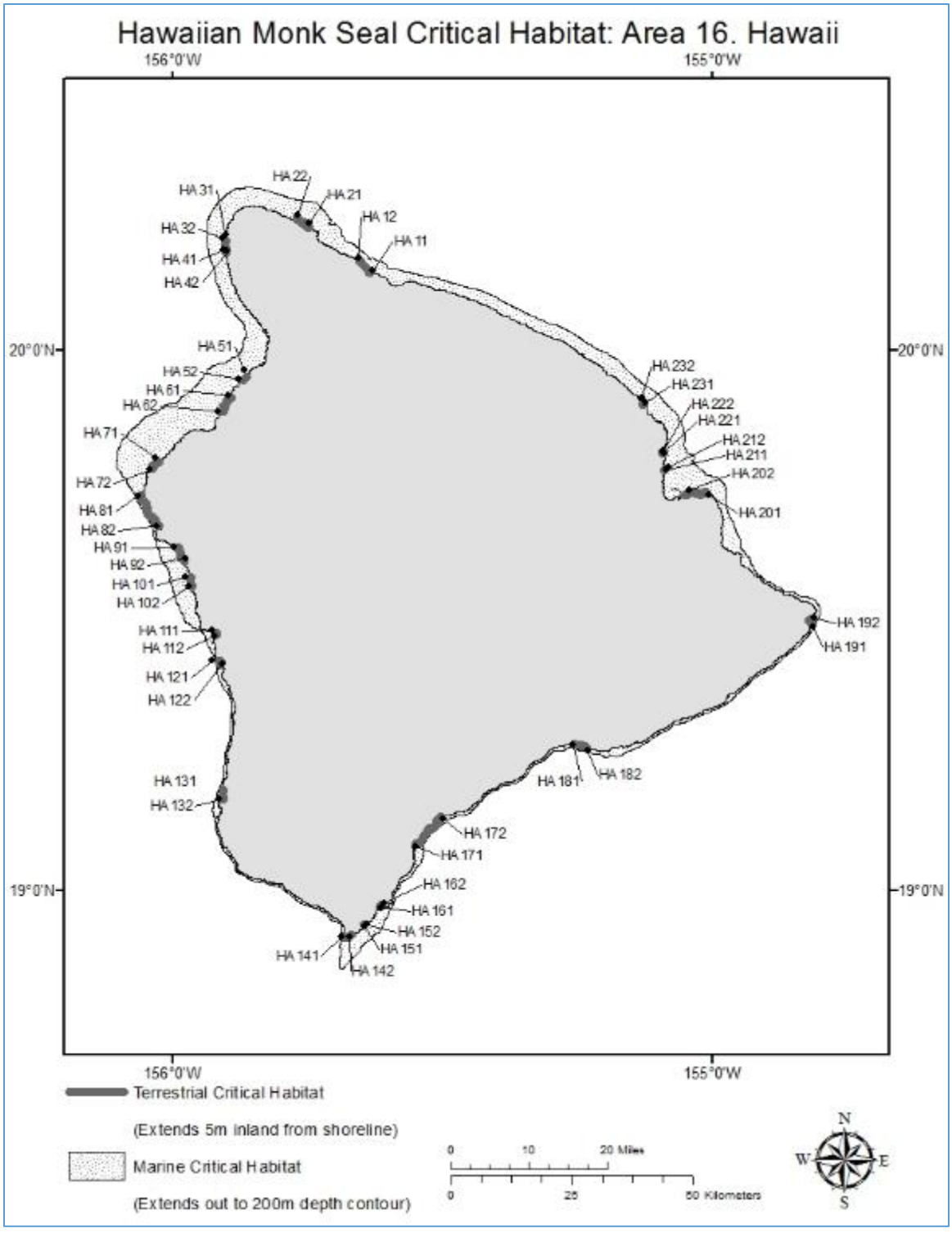

Figure 17 Monk Seal Critical Habitat on the Island of Hawaii (80 FR 50925, August. 21, 2015)

For more information on monk seal life history, population size, and threats, please see: http://www.fpir.noaa.gov/PRD/prd_hms_population_threats.html.

MHI Insular False Killer Whale

The Main Hawaiian Islands (MHI) insular false killer whale distinct population segment (DPS) is listed as an endangered species under the ESA (77 FR 70915, Nov. 28, 2012). The MHI insular false killer whale DPS occurs in the proposed action area. Because NMFS listed the MHI insular FKW DPS as endangered under the ESA, it is also a depleted stock under the MMPA. According to the latest MHI insular FKW stock assessment report, the minimum population estimate is 129 animals, and the population appears to be declining (NMFS 2014b).

Additional information on MHI insular FKW stock, including stock assessments, population trends, and current management issues is available from http://www.fpir.noaa.gov/PRD/prd_false_killer_whale.html.

Humpback Whale

NMFS has listed humpback whales as endangered under the ESA and depleted under the MMPA. Both mating and calving humpback whales may be present in or around the action area from November through March during the calving and breeding season. Humpback whales wintering in Hawaii belong to the Central North Pacific (CNP) stock. The minimum population estimate for the CNP humpback whale stock is 5,833 animals and is growing seven percent annually (NMFS 2014c). NMFS received a petition to list the CNP DPS under the ESA and to delist this DPS. NMFS made a positive finding on the petition and has started a status review to determine if NMFS should delist this DPS (79 FR 36281, June 26, 2015). If this DPS is delisted, the protections of the MMPA and the Hawaiian Islands Humpback Whale National Marine Sanctuary would continue to apply (Figure 1). Federal regulations prohibit persons on or in the water from approaching the whales within 100 yards (90 m) within the sanctuary and throughout waters of the Hawaiian Islands.

Baird et al. (2015) found that the most biologically important areas for humpback whales around the Island of Hawaii are outside of the proposed action area.

Additional information on humpback whales including stock assessments, population, and current management issues is available from http://www.fpir.noaa.gov/PRD/prd_humpback.html.

Other Marine Mammals in the Proposed Action Area

Listed below are marine mammals that are not ESA-listed and that may occur in the action area. We compiled this list based on distribution information and previous sightings during Velella Beta trial.

- Blainville's beaked whale *(Mesoplodon densirostris*)
- Bottlenose dolphin or common bottlenose dolphin (*Tursiops truncatus)*
- Bryde's whale (*Balaenoptera edeni*)
- Common dolphin (*Delphinus delphis*)
- Cuvier's beaked whale (*Ziphius cavirostris*)
- Dwarf sperm whale (*Kogia sima*)

- False killer whale (*Pseudorca crassidens*) Hawaii pelagic population
- Fraser's dolphin (*Lagenodelphis hosei*)
- Killer whale (*Orcinus orca*)
- Longman's beaked whale (*Indopacetus pacificus*)
- Melon-headed whale (*Peponocephala electra*)
- Minke whale (*Balaenoptera acutorostrata)*
- Northern elephant seal (*Mirounga angustirostris*)
- Pantropical spotted dolphin (*Stenella attenuata*)
- Pygmy killer whale (*Feresa attenuata*)
- Pygmy sperm whale (*Kogia breviceps*)
- Risso's dolphin *(Grampus griseus*)
- Rough-toothed dolphin or Steno's dolphin (*Steno bredanensis*)
- Short-finned pilot whale (*Globicephala macrorhynchus*)
- Spinner dolphin (*Stenella longirostris*)
- Spotted dolphin (*S. attenuata*)
- Striped dolphin (*S. coeruleoalba*)
- Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)

While northern elephant seals (*Mirounga angustirostris*) occasionally are sighted in Hawaii, these are very rare occurrences. Due to very rare occurrences in Hawaii, the applicant is not likely to observer this species at the Velella Delta Array.

During the Velella Beta trial, a graduate student, Kelsey Kozbi, from the University of Hawaii at Hilo monitored the free-floating array to test whether marine mammal abundance was higher near the array than that encountered during line transect surveys away from the array. She found no significant difference in marine mammal abundance between the control area (away from the array) and the experimental area observations (near the cage). During this study, she sighted bottlenose dolphins, rough-toothed dolphins, spinner dolphins, and spotted dolphins near the array (Kozbi unpub). In addition, the applicant's staff sighted rough-toothed dolphins at the Velella Gamma array on eight occasions (Sims 2014). However, staff obtained these observations opportunistically; and we can make no real conclusions concerning the effect of the moored array on cetacean behavior. The applicant did not detect interactions between cetaceans and the gear during the Velella Gamma trial (Sims 2014).

Detailed information on these species' geographic ranges, abundance, bycatch estimates, and status is in the most recent marine mammal stock assessment reports (SARs), which are available online at: http://www.nmfs.noaa.gov/pr/sars/.

3.2.2.4 Corals

On September 10, 2014, NMFS listed 15 coral species as threatened or endangered under the ESA. None of the ESA-listed coral species occur in the proposed action area, as no coral found in the Hawaiian Archipelago was included in the ESA listing action (79 FR 53851, September 10, 2014).

3.3 Social Setting

3.3.1 Affected Communities

The array would be moored in deep waters approximately 5.5 nm offshore of Keauhou south of Kailua Kona (Figure 2). The Western Pacific Fishery Management Council (Council) identifies the Island of Hawaii as a fishing community. Residents of the Island of Hawaii are considered part of a "community which is substantially dependent or engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes vessel owners, operators, and crew and United States fish processors that are located in such a community" (16 U.S.C. §1802).

It is likely that local fishermen will fish around the Velella Delta Array. Currently, no one has deployed a FAD near the proposed action area except for the applicant's mooring buoy currently at the site. By functioning as a FAD, the Velella Delta Array would provide the Island of Hawaii's residents fishing opportunities that they otherwise would not have in the proposed action area.

3.3.2 Activities by Others in the Action Area

The proposed action area lies within a well-known recreational and commercial fishing area, and fishermen fishing off the west coast of the Island of Hawaii are likely to purposefully fish off the Velella Delta Array. The most common types of fishing in the project area are recreational and charter fishing for tuna and billfishes, pelagic troll, palu-ahi fishing, and night jigging for aku (ika-shibi fishing) fishing. Fishermen fishing well offshore (from between 3.5 and 7.5 nm) could encounter the Velella Delta Array. During the Velella Gamma trial in 2013, fishermen often purposefully fished around the gear as described below. While recreational fishermen frequent the area around the proposed site, the applicant and community members reported no adverse interactions between the Velella Gamma project and other fishermen. The recreational and charter fishermen that may fish around the proposed array may or may not be Island of Hawaii residents.

3.3.2.1 *Pelagic troll fishing*

As summarized by NMFS (2008), trolling is a popular pelagic fishing method in and around the project area by both small commercial and recreational fishermen. Trolling uses towed lures or baited hooks from a moving vessel using rods and reels or hydraulic haulers, outriggers and other gear. Fishermen may troll up to six lines rigged with artificial lures concurrently. Trollers typically fish at speeds between 8 and 10 knots. Generally, trolling takes place between 5 and 8 miles from shore; however, trips further out are common.

In 2012, there were 1,221 licensed commercial troll fishermen in Hawaii. They caught an estimated 1,926,000 lb of tuna (1,304,000 lb yellowfin, 341,000 lb bigeye) and about 346,000 lb of billfish statewide (WPFMC 2014).

3.3.2.2 Ika-shibi and palu-ahi fishing

The *ika-shibi*, or night jigging ("squid-yellowfin tuna") fishery evolved from a nighttime squid fishery first developed by Okinawan immigrants using baited handlines to target large yellowfin tuna (Yuen 1979). This fishery also catches albacore tuna (*Thunnus alalunga*), bigeye tuna (*T. obesus)*, and shortbill spearfish (*Tetrapturus angustirostris*). A survey by Hamilton and Huffman (1997) found that *ika-shibi* fishery participants generally engage in single-night trips and fish between five and 6.5 miles from shore. The 1,000-fathom (1,830-meter) isobath off the west coast of the Island of Hawaii is a key area for the fishery (NMFS 2013). *Ika-shibi* fishermen use three to four weighted handlines attached to nylon mainline with circle hooks baited with squid or opelu (mackerel scad). Fishermen use a low wattage light source above or in the water to attract squid, baitfish, and tuna. They chum the surface with chopped squid or whole baitfish (e.g. anchovies). The fishery is seasonal and runs from May to October (or later) with fishing effort peaking in mid-summer (Glazier 2005).

Palu-ahi fishing is the modern adaptation of Polynesian "drop stone" fishing where a baited handline is dropped to greater depths during the daytime to target yellowfin, bigeye, and albacore tuna (Boggs and Ito 1993). *Palu-ahi* fishing occurs around State-operated fish aggregating FADs. In 2012, 241 fishermen using handlines in the main Hawaiian Islands reported landing an estimated 1,129,000 lb of tunas and about 17,000 lb of billfish (WPFMC 2014).

3.3.2.3 Other Commercial and Recreational Fishing

Big game fishing off the west coast of the Island of Hawaii is an important commercial and recreational social activity. Off Kona, deep waters are relatively close to shore and in the lee of the island. This prevents choppy surface conditions due to wind making for consistently pleasant conditions for passengers aboard small sport vessels. The mountains blocking winds also lead to dynamic current conditions and increased localized primary productivity (Section 3.1.4). Additionally, the area contains spawning grounds for pelagic fishes. All these factors combined result in world-class sport fishing conditions off the west coast of the Island of Hawaii.

Charter operators conduct the majority of charter fishing around the Island of Hawaii from Honokohau small boat harbor in Kona. In 2012, 4,013 charter-fishing trips originated from the Island of Hawaii. Blue Marlin was the primary target species (WPFMC 2014).

In 2012, recreational fishermen targeting pelagic species across the Hawaiian Islands made an estimated 324,593 fishing trips and caught an estimated 44,436,638 lb of fish (WPFMC 2014). Major target species included yellowfin tuna, mahi-mahi, and blue marlin (WPFMC 2014). In 2012, charter (paid trips) fishing operators caught an estimated additional 661,477 lb of Pelagic Management Unit Species principally, the same species as were caught by recreational fishermen (WPFMC 2014).

An existing longline exclusion zone prohibits commercial longline fishing year-round around the MHI (50 CFR 665.806(c)). NMFS implemented the exclusion zone in 1992 to reduce conflicts between longline fisheries and pelagic troll/handline fisheries (57 FR 7661, March 2, 1992). NMFS modified this exclusion zone in 2012 by FKW Take Reduction Plan regulations (77 FR

71260, November 29, 2012). The MHI Longline Fishing Prohibited Area encompasses the action area; therefore, regulations prohibit all longline fishing within the action area.

There is no commercial or recreational bottomfish fishery within the action area.

4.0 Potential Impacts of the Alternatives

4.1 Potential Effects on Physical Features

The physical features in the proposed action area include water quality, air quality, noise, and view plane. The impacts of Alternative 1 (no action) on the physical features of the proposed action area would be the same as the baseline conditions described in Section 3.1. These conditions or their trends are not expected to change if NMFS does not issue the SCREFP. The following analyzes the potential impacts of Alternative 2 on physical features in the action area.

4.1.1 Potential Impacts to Water Quality

The Velella Delta Array would produce potential water pollutants from two main sources: fish metabolites and uneaten food. The weight (60,000 lb or 27 mt) of fish the applicant would culture annually would not exceed the 100,000-pound annual threshold, set by the U. S. Environmental Protection Agency (EPA), that requires a National Pollutant Discharge Elimination System (NPDES) permit for aquaculture operations (40 CFR 451.20).

The following section summarizes results from modeling the potential impacts of the Velella Delta and information from much larger theoretical offshore and near-shore operations.

V*elella Delta Trial AquaModel*

At the request of NMFS and in partnership with System Science Applications, NOAA's National Centers for Coastal Ocean Science (NOS/NCCOS) Coastal Aquaculture Planning and Environmental Sustainability Program (CAPES) constructed an AquaModel simulation for the Velella Delta project to assess potential environmental effects on water column and benthic communities. For more information about the NCCOS, see http://coastalscience.noaa.gov/research/scem/marine_aquaculture. AquaModel was parameterized with data from the applicant and a modeling routine was constructed for a fixed moorage in 6,000 ft. of water. At capacity, CAPES scientists concluded there would be no risks to water quality from the operation of the Velella Delta project with Kampachi, and only insignificant effects would occur in the water column down to 100 ft. Because of the great depth, strong currents (>20 cm/sec), and physical oceanographic nature of the site, dissolved wastes would be widely dispersed and assimilated by the planktonic community. Further, the results of the model showed that benthic impacts and accumulation of particulate wastes would not be detectable through measurement of organic carbon or infaunal community biodiversity (pers. com., J. Rensel (System Systems Applications) August 10, 2015). CAPES scientists concluded that there are minimal risks to water column or benthic ecology functions in the subject area from the operation of the fish cage as described in the applicant's proposal.

AquaModel Predictions for Larger Aquaculture Operations

The AquaModel was first used in Hawaii to predict impacts to water quality from multiple large (six aquaculture facilities with 267 mt (590,000 lb) of annual production) aquaculture farms operating simultaneously in State waters (O'Brien et al. 2011). The model anticipated that the mariculture sites would be located less than a mile from shore (within 1.6 km). Under these conditions, the model predicted that near the large fish farms, total dissolved nitrogen levels would be about 0.7 micromoles (µm), and the dissolved oxygen in the net pens would be slightly lower inside the cages but indistinguishable from ambient levels away from the cages.

Blue Ocean Mariculture (BOM) has used the AquaModel to predict water quality impacts from a proposal to double production at a BOM facility to 1,100 mt of kampachi per year. The BOM aquaculture facility is in State waters near the Kona airport, 1,970 ft from shore. The site is located in about 200 ft of water with steady currents (BOM 2014). Currently, the BOM facility produces about 500 mt (1.1 million lb) of kampachi annually. At any one time, the BOM facility has about 300,000 kampachi in various growth stages on site (pers. comm. J. Lowell (BOM), to NMFS, January 22, 2015).

BOM has monitored water quality at this site since 1993. At current production levels, BOM has never approached water quality limits set by the State of Hawaii under its NPDES permit for any water quality variables. This includes nitrogen compounds, dissolved phosphorus, turbidity, dissolved oxygen, and pH. BOM's water quality reports show that most indicators of effluent impacts such as phosphorus concentrations, pH, dissolved O_2, salinity, and turbidity were similar to expected ambient levels. In fact, BOM did not detect phosphorus in 2013.[5]

Using the AquaModel, Grubman (2014), citing BOM's 2014 State EIS, states that the BOM facility was estimated to discharge 134 mt (295,000 lb) of nitrogen (nitrite+nitrate and ammonia) into the water column per year. This is against a background level of 38,032 mt at the site. BOM's 134 mt (295,000 lb) of nitrogen inputs represent about 0.35 percent of the nitrogen compounds naturally occurring at the site. BOM estimates that one mt (2,200 lb) of kampachi produces 51.456 kg (113 lb) of nitrogen compounds per year. BOM has predicted that increasing its annual production from 500 mt to 1,100 mt (1.1 million lb to 2.4 million lb) will not greatly affect water quality near the site. The AquaModel predicts that even with production doubled, total nitrogen concentrations in the waters surrounding the facility would be 100.78 µg/l of seawater, well below the permitted level (Grubman 2014). The current and proposed production levels should not exceed the limits of BOM's NPDES permit (BOM 2014).

Water Quality Impacts of Feed and Fish Metabolites

The applicant would apply feed at levels below satiation, minimizing the amount of uneaten feed entering the water column. The applicant anticipates that about three percent of the feed would remain uneaten and enter the water column (Sims 2014). The nearly constant flushing of the pen by currents would quickly dilute these small amounts of feed and fish metabolites entering the water column. The applicant, based on previous experience with larger nearshore aquaculture operations and the proposed action site conditions, anticipates that Velella Delta project would

[5] http://www.bofish.com/responsibility/water-quality/

not elevate nutrient concentrations around the array to detectable levels (pers. comm. Neil Sims, Kampachi Farms, July 23, 2015). The results of modeling effects from the BOM project described in the previous paragraph provides some insight into how the proposed action would affect water quality. In contrast to BOM's relatively large operation that began in 2005, which is close to shore in 200 ft of water, the proposed action would raise 15,000 kampachi per year at a site moored in 6,000 ft of water. The proposed action would have less than 60,000 lb of kampachi in the net pen at any one time. BOM's projected annual production would be about 80 times the volume of the Velella Delta trial. Using the maximum of 15,000 kampachi per year, the proposed action would introduce about 1.3 mt of fish metabolites and uneaten feed into the surrounding waters per year. Given the average flow rate of the surface waters near the proposed site is 29 cm/second (Jia et al. 2011), it is unlikely that changes in nitrogen levels due to the Velella Delta Array would be detectable. Pelagic fishes around the array would consume most of the uneaten feed before it could migrate through the water column (pers. comm. Jack Rensel, System Science Applications, Inc., May 8, 2015). Epipelagic and mesopelagic organisms would continue to consume uneaten feed as it descends through the water column (pers. comm. Jack Rensel, System Science Applications, Inc., May 8, 2015; and Randall and Keifer unpub.). Due to consumption by organisms in the water column, the amount of uneaten feed reaching benthic habitats would be a very small amount of uneaten feed drifting through any net pen (Rensel et al. 2015). Based on the fish feeding practices the applicants would use to minimize uneaten feed and the consumption and dispersal of uneaten feed and fish metabolites that do pass through the net pen, it is not likely that uneaten feed or fish metabolites passing through the net pen would have a substantial impact on water quality.

Potential for phytoplankton blooms

The Velella Delta trial would not likely cause plankton blooms due to inputs of dissolved nutrients such as nitrogen, phosphorus, and dissolved organic compounds. At aquaculture sites near the proposed Velella Delta Array, studies have predicted no phytoplankton plumes to enter nearshore waters (O'Brien et al. 2011). Price and Morris (2013) found that in well-flushed open ocean tropical environments there was little risk of causing algal blooms through dissolved nutrient inputs. Ambient currents would flush the proposed site almost constantly (Jai et al. 2011). The BOM facilities off Unualoha Point on the Island of Hawaii have a much larger production capacity than the proposed Velella Delta Array, and their historic data indicate that the facility has not produced algal blooms (BOM 2014). Price and Morris (2013) do caution that aquaculture facilities may exceed the ability of local environments to absorb dissolved nutrient inputs, especially in areas where water circulation is poor. However, given BOM's historic data and the similarity between the BOM site and the proposed site in terms of current velocities, nutrient inputs from the Velella Delta Array should not exceed the local environment's capacity to absorb the nutrients. Therefore, the proposed action is not likely to result in phytoplankton blooms that would affect water quality in the action area. No phytoplankton bloom was observed by the applicant or reported to NMFS during the Velella Gamma project.

Effect of net pen materials on water quality

NMFS does not expect the Velella Delta Array's metal mesh to adversely affect water quality. The metal mesh is made of UR 30^{TM}, a proprietary material produced by Mitsubishi-Shindoh

Company (Powell and Stillman 2009). According to the company's technical website (http://www.mitsubishi-shindoh.com/en/ur30/ur30st.htm), the metal mesh is made of a 66% copper and 32.8% zinc brass alloy with 0.6% tin, 0.6% aluminum, and effective microelements. The alloy has a low general corrosion rate of less than 0.02mm/yr. According to company specifications and based on the applicant's experience with the product in the past, the product is strong and resistant to bio fouling.

According to the manufacturer (http://www.kikkonet.com/net_pens.php), the KikkoNet webbing, composed of polyethylene terephthalate, resists decomposition from UV radiation and would mostly be submerged to a depth of about 30 ft and shielded from UV radiation. The KikkoNet webbing is non corrosive (Marine Research Specialists 2014) and would not likely leach detectable amounts of organic compounds into the water. Therefore it is not likely that the proposed action would have any substantial impact on water quality due to net pen materials.

Some commenters asserted that the draft EA did not fully consider the copper alloy's potential adverse effects on marine life and provided references regarding potential effects of leaching copper into the environment. In response, NMFS evaluated additional information.

Most marine organisms require small amounts of copper for metabolic use (Dwyer and Stillman 2009, Jordi et al. 2012). However, some studies show that relatively high copper levels in marine environment cause harmful effects to organisms, from phytoplankton to juvenile salmon (Hecht et al., 2007, Rodgers et al., 2009, Jordi et al., 2012). These studies referred to high levels of copper inputs from anti-fouling paints, mining operations, industrial processes, wastewater discharges from cities, pesticides, road runoff, and atmospheric aerosols. Some effects included photosynthesis inhibition, loss of smell (salmon), and adverse behavioral changes (e.g., slower flight responses to predators). Although the studies indicate hazards to marine organisms from copper toxicity, the high concentration of copper in these studies is not comparable to the proposed use of the copper-alloy mesh as part of the net pen. As described above, the copper metal mesh alloy has a very low rate of corrosion. Therefore, copper toxicity to the seafood is not expected to occur in the current proposed project.

Several studies do exist detailing effects of copper-alloy mesh pens on the marine environment (Dwyer and Stillman 2009, Grey et al. 2013). Results from Dwyer and Stillman (2009) and Grey et al. (2013) show that copper inputs from copper alloy net pens do not leach dangerous amounts of copper into marine environments. Testing [fish/water] Grey et al. (2013) found no detectable increases in dissolved copper around net pens in British Columbia above normal levels. Dwyer and Stillman (2009) cited a study that concluded that salmon raised in copper alloy mesh pens did not bio-accumulate copper in edible fish tissues during growth. The authors concluded that the net pens did not release significant amounts of copper and, if any amount were released, most would be in forms not usable by marine organisms. According to Dwyer and Stillman (2009), copper alloys quickly form an oxidized barrier to seawater when submerged, and only organisms directly contacting copper alloy meshes (e.g. biofouling organisms, parasite eggs) receive toxic amounts of copper. Additionally, Lowell (2012) demonstrated this antifouling property greatly reduces the risks of parasite infestations in kampachi pens in Hawaii. After considering the information available, NMFS concludes that the copper alloy meshes proposed for use by

Kampachi Farms, LLC, would not adversely affect water quality, benthic habitats, or marine ecosystems, nor esult in adverse effects to the fish reared in the net pens.

Effect of routine maintenance on water quality

The applicant would use a limited amount of petroleum products to support the Velella Delta Array's operations. Staff would fuel support vessels either onshore or in Honokohau Harbor. Insignificant amounts of fuels and oils would be stored aboard in the generator's fuel tank and crankcase. Staff would transport these products, and would refuel the generator using small hand-held fuel tanks. No petroleum or chemicals would be stored aboard the feed barge.

The applicant does not propose using any chemicals during the project including cleaners, feed additives, paints, solvents, or medications including antibiotics. Permit terms and conditions prohibit use of chemicals. If necessary, the applicant would manually scrub the net pen and the vessel. Finally, the feed would contain no chemical additives, hormones, or antibiotics.

It is not likely that any substantial amount of fuel or chemicals would enter the water from the maintenance activities under the proposed action; and therefore, no substantial effect on water quality from these maintenance activities is likely to occur.

Effect of use of in-water treatments of fish

Based on two previous studies during which fish were stocked at similar densities, the Applicant expects fish health to remain high and application of chemical treatments is not proposed. This permit would not authorize the use of any antibiotic, medication or chemical as listed in the permit terms and conditions (Appendix B). If an outbreak of skin flukes were to occur the applicant would notify NMFS and the fish would be removed from the net pen concluding that portion of the trial.

Water Quality Effects Summary

In summary, under Alternative 2, NMFS does not expect substantial adverse impacts to water quality from the proposed action. The AquaModel results for the BOM project showed minimal impacts to water quality. The BOM project has higher production than the proposed action and is located where less dispersion of effluents is likely compared to the Velella Delta project. The proposed action's operations, smaller production, and higher effluent dispersion potential would result in less potential water quality impacts than the BOM project. Because the BOM project does not have substantial impacts on water quality, as shown by the AquaModel and BOM's history of compliance with NPDES permit, it is not likely that the proposed action would result in substantial adverse impacts to water quality in the action area. In addition, the applicant's fish feeding plan, which includes dispensing fish feed at levels below satiation, use of net pen materials that are not likely to leach chemicals at toxic levels, and other measures that would be taken to protect water quality are expected to protect water quality around the project.

4.1.2 Potential Impacts to Air Quality

Under Alternative 2, any impact on air quality should be minimal. The feed barge would have a single generator to operate the feeder system and the other maintenance and communications equipment. This generator is a 20-horsepower diesel engine that would 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. A yacht-type wind generator and/or small photovoltaic array would supply trickle-charging for the onboard navigation lights, communications, and camera equipment. The Support vessels would also result in minimal emissions, and these emissions would not exceed the general level of vessel air emissions that occur in the area on a regular basis and would not individually or cumulatively result in a degradation to air quality. Winds at sea are expected to disperse the small amount of emissions quickly.

Fishing vessels drawn to the action area would possibly elevate engine exhaust around the Velella Delta array on a very short-term basis. The array would possibly serve as a focal point for fishing activities like a FAD. However, the Velella Delta array would not increase fishing activities overall since fishing currently occurs at a mooring buoy at the proposed site and fishing charters and recreational fishing vessels regularly use the waters offshore from Keauhou. Due to fact that the limited use of generator and support vessels and fishing vessel activity near the mooring would result in air emissions that are similar to Alternative 1, Alternative 2 is not likely to have substantial adverse impacts on air quality.

4.1.3 Potential Impacts from Noise

If NMFS issues the SCREFP, a small 20-horsepower diesel generator would run for less than an hour a day to feed periodically the fish. Staff would not feed the fish at night. Wind and waves would likely dampen the limited amount of noise from the generator, and the generator sound would not likely reach the shore. The noise generated by the feed barge on a daily basis would approximate a single fishing boat running for about one hour. Fishing boat frequently use the area, and it is unlikely that running the small generator for one hour per day would add substantially to ambient noise levels.

The noise from the small generator would not be at levels likely to adversely affect the health or well-being of wildlife in the vicinity. Noise from the generator, would possibly startle seabirds causing them to leave the immediate area around the array, but this would not likely result in any physical harm. Short-term behavioral impacts (e.g., birds fly a short distance away) would likely occur. The density of the seawater would dampen the generator's sound intensity as it transfers to the water from the air (Wartzok and Ketten 1999) likely preventing harmful physical impacts to marine life below the surface. Based on the limited operation of the generator, distance from shore, and production of sound similar to ambient levels, Alternative 2 is not likely to impact substantially noise in the proposed action area.

4.1.4 Potential Impacts to the View-plane

Potential impacts to the view-plane from the project include changes to what one can see from land, what one may see from vessels at sea, and any emissions that one may see. One may see the lights, buoy, feed barge, and net pen of the Velella Delta Array. Currently, a variety of vessels is visible in the proposed action area both at day and at night. A mooring buoy is currently located on site and has a light beacon that flashes at about 60 flashes per minute at 26 candela. The buoy and light have been on station since 2013. Under the proposed action, the applicant would light three components of the array in accordance with required navigational lighting. These components include the feed barge, the mooring buoy, and the net pen floating rings.

The Velella Delta Array would be lit in compliance with applicable USCG lighting requirements for Anchored Vessels and Vessels Run Aground (33 CFR part 84). These regulations require that the feed barge would display one flashing white light (approximately 60 flashes per minute). The float ring would need one flashing amber light. The applicant would use marker lights similar to the one currently on-site.

During the day, the net pen would remain submerged for most of the trial and generally not visible from shore. Considering the size of the feed barge and float ring and the distance from shore, the feed barge and float ring would be relatively small and would not alter daytime views from shore. The feed barge and float ring would be visible to other fishing vessels when they approach the array at sea both by day and by night. This view to fishing vessels would be similar to encountering other fishing vessels.

The navigational lights from the array would not be brighter than other fishing vessels in the project area. The applicant proposes using for obstruction lights the SeaLite M650, which has a visible range of up to 3 nm. Because the array would not be closer than 3.75 nm from shore, NMFS would not expect that the lights on the array would significantly change nighttime views from shore. Any night-work lighting would be down-shielded and one should not see from land and from long distances on the water.

Under the proposed action, the applicant would remove the Velella Delta Array at the end of 2 years, so lighting impacts to the view-plane would be temporary. If the applicant left the mooring in place, USCG regulations (33 CFR Part 67) would only require a single flashing light to mark the mooring buoy. This would not significantly add to nighttime lighting on the Kona Coast where the State has placed FADs. Fishermen and other vessels also frequent the area at night.

Based on the location and size of the feed barge and float ring, on current fishing vessel activity, and on the lighting used, Alternative 2 should not substantially impact the view-plane.

4.2 Potential Direct and Indirect Impacts to Biological Resources

Section 3.2 describes the biological resources if NMFS implements Alternative 1 (no action). These baseline conditions and trends for the biological resources are likely to remain the same if

NMFS does not issue the SCREFP. The following sections describe the potential impacts of Alternative 2 on biological resources.

4.2.1 Potential Impacts on Pelagic and Benthic Habitats

The Velella Delta Array may impact habitats within the water column including epipelagic, mesopelagic, and deep-water benthic habitats. The following analyzes the potential impact to these zones of the water column in the proposed action area.

Analysis of impacts to epipelagic and mesopelagic habitats

The Velella Delta array would have minor impacts to epipelagic and mesopelagic environments mostly through solid nutrient inputs (i.e., excess feed and fish wastes) descending through the water column. Fish congregating below the cage would likely immediately eat excess feed passing through the cage. Other organisms would continue to consume the excess feed as it descends through the water column as described above in Section 4.1.1. Organisms within the water column would also likely consume solid fish wastes from the Velella Delta Array (pers. comm. Jack Rensel, System Science Applications, Inc., May 8, 2015). Due to nutrient inputs, the proposed action would likely cause small, local increases to biological productivity in epipelagic and mesopelagic habitats. These impacts would likely be imperceptible as the amount of nutrient inputs, discussed previously, was not likely to have a substantial impact on water quality (Section 4.1.1).

Analysis of impacts to deep-water benthic habitats

A small amount of excess feed and fish waste could reach deep-water benthic habitats. Currents in the area would disburse the small amounts of excess feed and fish wastes that make it through the water column over a large area on the bottom (Rensel et al. 2015). The small amounts of solid nutrient inputs reaching the bottom would not likely cause eutrophication due to the relatively high dissolved oxygen content of the water near the bottom. The small amount of nutrients reaching the bottom, these inputs could cause imperceptible increases in productivity to deep-water benthic ecosystems in the proposed action area.

The Velella Delta Array would cause a small area of disturbance to the seafloor resulting from the anchor chain dragging on the bottom as winds and currents act on the array and mooring line. Over the course of the project, as is the case now, the 360 ft-long chain would move and disturb the bottom over an area up to 9 acres. The potential impacts from the chain dragging across the bottom include the injury or mortality of benthic organisms and physical scraping and disturbance of bottom sediments. However, the mooring has been in place since 2013. The initial impact from previous projects from the anchor chain on benthic organisms was likely worse than subsequent impacts from the repeated sweeping of the chain over the same area. Any sessile organisms in the proposed action area have likely already been crushed or otherwise affected. Because the anchor chain has already been sweeping the area for the past two years, the proposed action would not likely substantially add to impacts to the benthic organisms and their habitats in the action area. The presence of the chain could introduce small amounts of dissolved

iron into the environment. Metals such as copper, selenium, iron and zinc are essential nutrients for fish and shellfish. The impact of this additional iron is expected to be negligible.

Based on the limited amount of feed and fish waste entering the water column and the dispersion of this nutrient input, Alternative 2 in not likely to substantially impact the epipelagic, mesopelagic, or benthic habitats. In addition, Alternative 2 is not likely to impact substantially benthic organisms or their habitat from the anchor chain contact due to the anchor chain being present for the past two years, when the greatest amount of potential impact has already occurred.

4.2.2 Potential Impacts to Essential Fish Habitat

The Magnuson-Stevens Act defines essential fish habitat (EFH) as "those waters and substrates necessary for fish spawning, breeding, feeding and growth to maturity." Additionally, the Magnuson-Stevens Act defines Habitat Areas of Particular Concern (HAPC) as "areas within EFH that are ecologically important, sensitive to disturbance, or rare." Thus, HAPCs often require more protection from activities that may adversely affect EFH. In general, marine organisms, managed in accordance with the Magnuson-Stevens Act, that occur in the water column include highly migratory species (HMS) and other pelagic fish species and eggs and larvae of a range of species. Species associated with benthic habitats include bottomfish, seamount groundfish, precious corals and coral reef ecosystem management unit species, and crustaceans and eggs and larvae. Table 1 provides a synopsis of EFH for each MUS group in Hawaii.

Table 1. Essential Fish Habitat and Habitat Areas of Particular Concern for Management Unit Species Occurring in Hawaii.

MUS Group	EFH for Eggs and Larvae	EFH for Juveniles and Adults
Bottomfish	Water column down to 400 m depth out to the 200-mile U.S. Exclusive Economic Zone (EEZ) boundary	Water column and all bottom from the shoreline down to 400 m depth
Seamount Groundfish	Water column down to 200 m depth of all EEZ waters bounded by 29°-35° N and 171° E-179° W	Water column and bottom from 200-600 m depth bounded by 29°-35° N and 171° E-178° W
Pelagics	Water column down to 200 m depth from the shoreline out to the EEZ boundary	Water column down to 1000 m depth from the shoreline out to the EEZ boundary (also HAPC)
Precious Corals	Known precious coral beds in the Hawaiian Islands including: off Keahole Point, between Milolii and South Point, The Auau Channel, Makapuu, Kaena Point, the southern border of Kauai, Wespac Bed, Brooks Bank, and 180 Fathom Bank	
Coral Reef Ecosystem	Water column down to 100 m depth from the shoreline out to the EEZ boundary	
Crustaceans	Lobsters and Crabs: down to 150 m depth from the shoreline out the EEZ boundary	Lobsters and Crabs: Bottom from the shoreline down to 100 m depth
	Deepwater Shrimp: The outer reef slopes between 500-700 m depth	Deepwater Shrimp: Outer reef slopes between 300-700 m depth

Amendment 4 to the Fishery Ecosystem Plan for Fisheries of the Hawaiian Archipelago was approved on April 21, 2016. Amendment 4 revised EFH and HAPC for 14 species of bottomfish and three species of seamount groundfish in the Hawaiian Archipelago. The revised EFH and HAPC is listed in Table 1b.

Table 1b. Revised EFH and HAPC for Main Hawaiian Islands Bottomfish.

Species assemblage	EFH (eggs)	EFH (post-hatch pelagic)	EFH (post-settlement)	EFH (sub-adult/adult)	HAPC (all life stages)
Bottomfish Shallow ..... Complex.	Water column from 0–240 m depth extending from the shoreline to the outer boundary of the EEZ.		Water column from 0–240 m depth extending from the shoreline to the outer boundary of the EEZ.		Kaena Point, Oahu Kaneohe Bay, Oahu Makapuu, Oahu Penguin Bank, Oahu Pailolo Channel, Maui North Kahoolawe, Kahoolawe Hilo, Hawaii (see Amendment text and Appendices 4 and 5 for specific site locations).
Bottomfish Intermediate Complex.	Water column from 0–320 m depth extending from the shoreline to the outer boundary of the EEZ.		Water column from 40–320 m depth from the shoreline to the outer boundary of the EEZ.		
Bottomfish Deep Complex.	Water column from 0–400 m depth extending from the shoreline to the outer boundary of the EEZ.		Water column from 80–400 m depth from the shoreline to the outer boundary of the EEZ.		
Seamount Groundfish	Pelagic waters 0–600 m depth within the EEZ north of 29° N., and west of 179° W.		Benthic or benthopelagic waters from 120–600 m depth within the EEZ north of 29° N., and west of 179° W.	Benthopelagic waters from 120–600 m depth within the EEZ north of 29° N. and west of 179° W.	All waters from 0–600 m depth within the EEZ north of 29° N., and west of 179° W.

Source: Proposed rule for RIN 0648-XD907, available at: https://www.federalregister.gov/articles/2016/02/12/2016-02843/pacific-island-fisheries-hawaii-bottomfish-and-seamount-groundfish-revised-essential-fish-habitat#h-9

Changes:

The revision refines EFH to update and clarify which life stages and species assemblages are associated with a particular depth range and were based on updated life history and depth range information for bottomfish MUS. Bottomfish MUS are now classified into three bottomfish species complexes (shallow, intermediate and deep). Life stage terms are now "post-hatch pelagic," "post-settlement," and "sub-adult/adult."

HAPC for Hawaiian Islands bottomfish MUS was refined under Amendment 4. No HAPC for MHI bottomfish was established in the project area.

HAPC for seamount groundfish was designated in all areas that comprise EFH for seamount groundfish. No EFH or HAPC for seamount groundfish occurs in the main Hawaiian Islands.

The overall EFH designations for Hawaii bottomfish around Hawaii Island remained the same and did not result in a change to the affected environment or the effects of the proposed action on EFH and HAPC. This change updates information in the EA but did not change the analysis.

Potential Impacts to EFH at the Proposed Action Site

While deployed, the Vella Delta Array's potential area of effect would overlap the following EFH: EFH for bottomfish, pelagic, coral reef ecosystem species and crustactean eggs and larvae from the surface down to 100 m in the immediate vicinity of the array.

The project would not have substantial effects on water quality (see Section 4.1.1). Attaching the Velella Delta Array to the existing mooring would not increase impacts to EFH, as no benthic EFH exists in the proposed action area. The proposed action area depth exceeds the deepest EFH depths occurring in Hawaii waters (Section 1.4.1 and Table 1). Therefore, NMFS does not expect the proposed action to affect substantially any EFH or HAPC on site.

Potential Impacts to Benthic EFH from Vessel Transit

Benthic EFH for bottomfish management unit species (BMUS), coral reef ecosystem management species (CREMUS), and crustacean management unit species exists shoreward of the proposed action site. The Velella Delta Array would not likely have any impacts on these areas. Deployment and retrieval of the Velella Delta Array would require transiting through areas with benthic EFH. Additionally, stocking, harvest, and maintenance operations would require support vessels to transit through areas with benthic EFH.

During deployment and retrieval operations, the applicant would transit through areas with designated BMUS, CREMUS, and crustacean management unit species benthic EFH. These operations would cross through areas with benthic EFH for only a few hours at a time and vessels would use existing channels to enter and exit harbors. The applicant executed similar operations during the Velella Beta and Gamma trials. If mishaps occurred in which support vessels sank or the applicant lost control of Velella Delta Array components, the proposed action would potentially affect benthic EFH. However, the array is composed largely of inert materials that, in the unlikely event of a catastrophic loss, would not threaten the benthic environment. In addition, the applicant would carry small quantities of fuel and lubricants, which if spilled would likely dissipate or evaporate, and produce no lasting impacts.

If any component (e.g. feed barge or net pen) became detached from the mooring, the proposed action would potentially affect benthic EFH. This would only occur if a detached component reached land scraping coral reefs or sank in areas containing benthic EFH. GPS units on both the feed barge and the net pen's float ring would send a signal to the applicant if either unit were to drift outside the operating area. Given prevailing current speeds, staff would likely retrieve any detached array component before it made landfall, were it to travel shoreward. Compartments on the feed barge would reduce the likelihood that it would quickly sink if the hull were breached. Staff would likely have the opportunity to attach float bags to the barge before it would sink. The actions that would be taken by the applicant in the event of any component of the array becoming detached from the mooring minimizes the potential for any impacts on EFH benthic habitat. Therefore, Alternative 2 is not likely to result in substantial adverse impacts to benthic EFH shoreward of the proposed action site.

Potential Impacts to Precious Corals EFH

The proposed action would not likely damage precious coral EFH. The nearest precious coral beds are located off Keahole Point located about 40 nm north of the proposed site (Grigg 2002). The Keahole Point coral bed supports gold coral from 1,148-1,693 ft and pink coral from 1,076-1,883 ft (Grigg 2002). There is no precious coral known from or likely to be occurring in the immediate project area. The applicant's vessels would not transit over areas designated as precious corals EFH or HAPC during any project activity. It would be highly unlikely for any Velella Delta Array component to become detached from the mooring and drift 40 nm to the north before retrieval by the applicant.

Impacts to Seamount Groundfish EFH

NMFS has not designated any seamount groundfish EFH in waters surrounding the MHI; therefore, no impacts to seamount groundfish EFH would occur from the proposed action.

Summary of EFH Impacts

No benthic EFH occurs where in the Velella Delta Array project area. Because the Velella Delta Array effluent is not likely to substantially change water quality, the effluent is not likely to adversely affect EFH located in the water column in the proposed action area. Neither the applicant's use of support vessels por potential array component detachment are likely to result in adverse effects on water column or benthic EFH or HAPC outside of the proposed action area. Transiting vessels would avoid contact with benthic habitat and response plans are in place for retrieving detached array components before they may encounter benthic habitat. For these reasons, Alternative 2 is not likely to have any substantial adverse impacts on EFH within the action area or in areas transited by support vessels. Please see section 5.9 for further EFH compliance coordination.

4.2.3 Potential Impacts to Target Species

The proposed action may impact wild stocks of the target species, kampachi. Potential impacts include:

1) Harvesting wild stocks for captive breeding operations;
2) Potential for increased demand for wild kampachi;
3) Cultured kampachi escaping into the environment;
4) Genetic impacts to wild populations from escaped kampachi; and
5) Disease and parasite transmission to wild kampachi populations.

Effects of Harvesting Wild Stocks for Breeding Operations

The proposed action would not affect the sustainability of the target species, kampachi, through harvesting of wild stocks for captive breeding operations. The applicant would obtain fingerlings from Blue Water Mariculture (BOM), an established fish hatchery. The sale of the cultured fingerlings to the applicant would not increase fishing pressure on wild kampachi fish stocks for two reasons. Currently, BOM harvests only 10 fish from the wild each year to maintain 60 adult fish as brood stock for kampachi culture activities in Hawaii (Grubman 2014). BOM would not

need to increase wild kampachi harvests to supply the applicant with 15,000 kampachi fingerlings per stocking event (Pers. comm. J. Lowell, BOM, January 22, 2015).

Potential for Increased Demand for Wild Kampachi

The popularity of the cultured fish would not likely lead to an increase in fishing pressure on wild stocks by commercial or recreational fishermen due to the wild conspecific's potential to contain ciguatera toxin that can, in turn, lead to ciguatera poisoning in humans. High parasite loads in wild fish would also contribute to a continued lack of interest in targeting wild kampachi. For these reasons, Alternative 2 is not likely to result in a substantial increased harvest of wild kampachi stock.

Risk of Escapes into the Environment

A potential exists for cultured fish to escape from the net pen into the environment. Such an event would have the potential to affect wild kampachi populations through competition for resources, genetic effects, and disease and parasite transmission. Escape events occurred during both the Velella Beta trial (13 fish) and the Velella Gamma trial (about 1,000 fish; with all but 340 fish being retrieved).

Escapes during Velella Beta trial were limited and occurred when divers entered and exited the CuPod net pen. Escaped fish remained near the net pen and divers speared all escaped fish.

The Velella Gamma pen suffered a structural failure when strong currents broke the lashings on the entry hatch. As a result, an estimated 1,000 fish escaped. The majority of escapees remained near the net pen, and the applicant recaptured about 500 fish using spears and dip nets. Fishermen near the Velella Gamma array caught about another 150 fish. The applicant believes approximately 340 cultured kampachi escaped into the wild. Because the fish were raised in captivity their entire lives, they were likely very susceptible to predation (Waples et al. 2012, Grubman 2014, Sims 2014). The number of escaped fish that reached nearshore habitats would likely have been far fewer than 340 fish (Sims 2014).

Both the Velella Beta trial and the Velella Gamma trial used a spherical net pen design. The Velella Delta trial would employ a different net pen design that would prevent any accidental escapes during pen entries such as occurred during the Velella Beta and Gamma trials. A topside entry hatch, would only be accessed after surfacing the pen and securing the netting around the inside of the net pen's handrail. This would prevent fish from escaping into the ocean. If fish did escape the pen, the applicant would be able to recapture them on top of the net pen. The netting on the inside of the handrail would block any fish that happened to reach the edge of the net pen from entering the ocean.

The applicant proposes to use a net pen built with materials commonly used in aquaculture operations throughout the world. The pen design is a variation of the Polarcirkel net pen.[6] The applicant selected this gear and net pen design because it is believed to have improved ability to

[6] For more information on this type of net pen, go to: http://www.akvagroup.com/products/cage-farming-aquaculture/plastic-cages.

withstand weather and predators and because the design is expected to allow fish to move within the pen more easily. The netting material would consist of copper-alloy-coated, marine-grade stainless-steel mesh (bottom and sides) and KikkoNet mesh (top). The strength of the materials would minimize the risks of accidental tearing by predators that could result in fish escapes. Access to the inside of the net pen would be through a swing-door hatch built into the topside panel of the cage. Staff would reinforce the entry hatch with 4-milimeter nylon lashing cords to prevent opening under heavy current loads, as happened during the Velella Gamma trial. Staff also would open the entry hatch only after raising the pen to the surface. Fish escaping when divers enter or exit the pen would be improbable. This is part of the perceived advantage of the Velella Delta net pen design. During normal operations, kampachi would not likely escape into the environment due to the net pen design, construction materials, and the permit's terms and conditions.

Kampachi could possibly escape during net pen stocking and harvest activities; however, the applicant would use methods designed to prevent accidental escapes including using closed containers to transport fingerlings to the Velella Delta array. If one or more of these containers were to fall into the ocean, kampachi fingerlings would not likely escape into the wild. The applicant would use specially designed fish pumps to transfer fingerlings from the transport containers directly into the pen. This would involve placing the open end of tubing directly into the net pen. Staff would capture fingerlings in the transportation containers missed by the pump with dip nets and manually place them into the net pen. Because stocking would be done using pumps while the net pen is at the surface and the surround net is deployed, few fingerlings if any would likely escape during stocking operations. Should any fingerlings escape, NMFS expects that they would remain around the array (which would, even in this case, act as a fish aggregating device) rather than swimming off into pelagic waters. Large fish that are expected to have become attracted to the empty array such as tunas, billfish, and – possibly sharks -- would likely consume any escaped fingerlings that are not retrieved. Considering the equipment and operations in place to reduce the risk of escape, and the likelihood that escaped fish could more than likely be retrieved, the potential for escapes during stocking and harvesting is thought to be minimal.

Potential Genetic Impacts from Escaped Kampachi from Proposed Velella Delta Project

Although the applicant will have measures in place to prevent escapes and to retrieve fish that happen to escape, there is the possibility for some or all fish from the project to escape. This section analyzes potential impacts to wild kampachi genetics in the event that cultured fish should escape into the environment.

The concern about an escape is what would happen to genetic diversity and wild stock natural genetic diversity should large numbers of hatchery-bred fish escape and survive to reproduce with wild kampachi. For other projects, the concern is related to the selection by breeders of specific traits that make a fish commercially valuable, but which could reduce the species' fitness in the wild. In such cases, there is a concern that introducing artificially selected genes into wild populations can reduce the fitness and resilience of wild populations (Waples et al. 2012).

NMFS expects escape events to rarely occur because the array would be operated in the marine environment for a limited time and the gear and operational procedures are designed to reduce the potential for escapes to occur. However, gear failures could occur, so this section describes NMFS' review of the potential genetic effects of the accidental release of all captive fish from the Velella Delta array.

The fish that would be stocked and maintained in the net pen would be genetically indistinguishable from the local wild population because they are first-generation offspring from wild-caught fish and are the result of mixed broodstock parental crosses.

NMFS evaluated the potential risk to genetic variation further. In April 2015, researchers at the NMFS Northwest Fisheries Science Center (NWFSC) modeled the potential impact to wild populations from a catastrophic failure and release of all captive fish. Specifically, NWFSC analyzed potential genetic impacts from cultured fish escaping into the wild from the Velella Delta Array. To assess genetic impacts to wild kampachi populations, the NWFSC researchers ran a computer simulation to test the potential impacts to wild kampachi if all 30,000 fish escaped from the Velella Delta Array. The results indicated that the proportion of the wild population comprised of escapees' descendants would peak (e.g., have a maximum composition of the population) at less than 1% over the 100-year timespan of the simulation. The results also show no significant fitness effects (less than 0.02% decrease in fitness over 100 years) if all 30,000 fish escaped into the wild and survived. The researchers described their findings as "negligible." Factors contributing to the predicted negligible impacts included, but were not limited to, the number of stocked fish in the proposed Velella Delta Array relative to wild biomass, short duration of the project, and use of wild-caught native fish for brood stock (pers. comm. Kristen Gruenthal, NMFS NWFSC, April 25, 2015).

NMFS concludes that, based on NWFSC's modeling results, that an unforeseen but catastrophic release of all 30,000 fish into the wild would not substantially impact the genetic structure of wild fish stocks through genetic introgression and would not reduce the health or fitness of the wild stock.

Potential Impacts from Disease or Parasite Transmission

NMFS considered the potential for bio-magnification of diseases and parasites within the net pen and subsequent transmission to wild kampachi populations. The applicant would employ several operational procedures that would help to reduce the risk of disease or parasitic infection.

First. Fingerlings would be from a certified disease-free hatchery facility. Before stocking the pens, the applicant would examine the fish. The pens would not be stocked with fish showing signs of disease or parasites.

Second, the applicant would routinely monitor the health of the fish in the net pen. Dead, sick or infested individual fish would be removed. Should a disease outbreak occur or heavy parasite loading be detected then all fish would be removed from the net pen and that portion of the trial concluded (pers. com., Neils Sims, Kampachi Farms, May 2016).

Third, the fish are proposed to be stocked at levels that are not expected to result in stress from over crowding, which has the potential to result in a greater likelihood for diseases. The dynamics of infectious diseases and parasite abundance are related to the density of host populations where high densities of host populations can lead to increased contact rates among individuals or between hosts and a pathogen or parasite resulting in increased transmission (Krosek 2010).

The applicant would harvest kampachi cohorts in six batches in each year. Initially, fish are expected to be about 0.7 kg per fish (1.5 lb) at the first harvest, with harvest size increasing as the remaining fish are then able to grow up to about 2 kg (4.4 lb) – the company's preferred harvest stize. The batch harvests would help to maintain stock densities at levels that, according to the applicant and based on his experience and expertise, are expected to limit the potential for disease and parasite bio magnification.

Grubman (2014) reports the much larger BOM facility (300,000 fish) does not have high rates of diseases or parasites among its stock. The Grubman report indicates that once kampachi fingerlings reach 10-20 g in size (0.7 oz), BOM stocks them in net pens. BOM places cohorts of around 120,000 fish in 7,000 m^3 net pens for growouts (BOM 2014). Using the upper limit in Grubman (2014), the intial stocking density is 0.34 kg per m^3. The applicant indicates that they also would stock their pens with 20 g fry (pers. com., Neils Sims, Kampachi Farms, August 21, 2015). Stocking a 1,018 m^3 net pen with 15,000 fry, each about 20 g, results in a estimated stocking density of 0.29 kg per m^3, lower than BOM's initial stocking density. Additionally, the initial stocking density of the Velella Gamma trail was 0.30 kg per m^3, about the same as the proposed action. Parasite and disease transmission did not occur during the Velella Gamma trial (Sims 2014). Due to the wild brood stock and feeding controls, the proposed action's fish growth rates are not expected to differ significantly from those at BOM and during the Velella Gamma trail. Harvesting each cohort in six batches would approximate harvesting operations at BOM (BOM 2014) and in the Velella Gamma trial (Sims 2014) and would maintain similar stocking densities to BOM operations and the Velella Gamma trial over the course of the growout. Additionally, the Velella Delta project would be unlikely to have a disease outbreak because the project site is not located close to other net pens or wild kampachi populations. Because the proposed action's stocking density levels over the course of a growout would be similar to BOM's operations and the previous Velella Gamma trail, the Velella Delta project would likely also have minimal potential for disease and parasite transmission to cultured and wild stocks. The proposed action's isolation from other net pen operations and wild stocks would also lessen the likelihood for disease and parasite outbreaks.

Fourth, when mortalities do occur during the proposed action, the applicant would remove the dead fish during weekly maintenance operations. The Beta trial had a mortality rate of less than 2%. The mortality rate for the Velella Gamma trial is likely similar to the Velella Beta trial, but the number of total mortalities cannot be quantified due to a large escape event of about 340 fish. Predators ate or recreational fishermen caught many of the escaped fish (Sims 2014). In light of previous experience, the applicant expects that about 97.5% of fish would survive during the Velella Delta trial. At this rate, the applicant anticipates about 375 mortalities per cohort or 750 mortalities over two years. The applicant would send samples (whole fish) to a laboratory for pathogenic analyses to determine the cause of death. As a condition of the permit, the applicant

would not dispose of any mortalities in the ocean. The applicant would dispose of all mortalities on shore (Sims 2014).

The levels of the main parasite, a skin fluke (*Neobenedenia* spp.) associated with kampachi culture were low in the Velella Beta and Gamma trials. In the previous Velella trials, infection rates were generally below five flukes per fish. By the conclusion of both the Beta and Gamma trials, the fluke loading was lower than one fluke per fish, which is the baseline level for wild *Seriola* spp.

The applicant saw no other fish diseases during the two preceding Velella trials, and fish survival was exceptionally high. The applicant did not report the presence of worms found in the flesh of wild *Seriola* spp. in either of the previous trials (Sims 2014). The presence of skin flukes and round worms in kampachi flesh does not present a known health risk to humans (Kaneko et al. 2005), but does affect the product's consumer appeal.

In the case of sea lice, evidence is accumulating in salmon aquaculture that disease reservoirs in fish farms create a significantly higher likelihood of exposure of wild fish to infectious agents (Gardner and Peterson 2003). However, these studies focused on salmon aquaculture facilities and has little relevance to this proposed kampachi net pen trial. As indicated in the Gardner and Peterson (2003) study, the chance of effective contact with pathogens is increased by the siting of salmon farms on the migration routes of wild salmon. This is different than the proposed kampachi trial as the location of the net pen is in deep ocean water, well removed from the reef and deep bottom habitat of wild kampachi.

Given the results of the past two trials with no significant disease occurrence, similar stocking densities in the Delta trail, the insignificance of disease and parasite at the BOM facility, and the permit requirements for disposing of mortalities on shore, Alternative 2 is not likely to substantially increase infection risk to wild fish stocks through the transmission of diseases or parasites.

Summary of Impact on Target Species

The only target species likely to be impacted under the proposed action is kampachi. The fish proposed for use in this trial would be first generation offspring of local wild fish. Alternative 2 would not result in the harvest of wild kampachi. Modeling indicates that escapes of cultured kampachi during operations would not substantially impact the genetic diversity of wild stocks due to the cultured kampachi being from wild stocks and the very small number of fish that would enter the environment in relation to the existing wild biomass. Disease and parasite transmission from the Velella Delta Array is unlikely to have a substantial impact on wild stocks based on previous experiences with the Velella trials, disease occurrence in larger BOM kampachi operations, and the permit terms and conditions for dealing with mortalities. For these reasons, Alternative 2 is not likely to result in substantial impacts on target species.

4.2.4 Potential Impacts to Other Fish Stocks

The proposed action could potentially affect fish stocks other than kampachi. Our analysis of potential impacts focused on commercially important bottomfish, and pelagic species most likely to be found around the array (e.g., sharks and tunas).

Potential Impacts of the Velella Delta Array on Bottomfish Stocks

Some fishermen have voiced concerns that escaped kampachi would adversely impact commercially valuable bottomfish stocks through predation on juvenile bottomfish.

Effects to marine fish assemblages resulting from aquaculture development have been suggested but not confirmed by scientific studies. Conversely, a long-term study (1984 – 2001) comparing ichthyofauna of the sandy shore of the Northern Red Sea assessing fish assemblages before the commencement of marine aquaculture, during the buildup phase (<100 tonnes per annum), during the full production (2000 tonnes per annum) found no significant change in number of individuals, number of species, biomass per sample, or cumulative number of species (Golani and Lerner 2007).

While NMFS expects escape events to rarely occur, gear failures and/or operator error are a possibility, so this section describes NMFS' review of the potential effects of the accidental release of all captive fish from the Velella Delta array. NMFS considered whether escaped kampachi would be likely to result in substantial effects on bottomfish from direct predation or competition for food.

As previously discussed above, NWFSC Researchers modeled the potential impact to wild populations from a catastrophic failure and release of all captive fish. Specifically, NWFSC analyzed potential impacts from cultured fish escaping into the wild from the Velella Delta Array. Researchers ran a computer simulation to test the potential impacts to wild kampachi if all 30,000 fish escaped from the Velella Delta Array. The results indicated that the proportion of the wild population comprised of escapees' descendants would peak (e.g., have a maximum composition of the population) at less than 1% over the 100-year timespan of the simulation. The results also show no significant fitness effects (less than 0.02% decrease in fitness over 100 years) if all 30,000 fish escaped into the wild and survived. The researchers described their findings as "negligible." Factors contributing to the predicted negligible impacts included, but were not limited to, the number of stocked fish in the proposed Velella Delta Array relative to wild biomass, short duration of the project, and use of wild-caught native fish for brood stock (pers. comm. Kristen Gruenthal, NMFS NWFSC, April 25, 2015).

While there is limited information available on the diet of wild kampachi in Hawaii, there is information on the related *Seriola dumerili* (kahala). Humphreys (1980) showed dietary differences among sizes of kahala. Comparisons of weight versus diet show cephalopods as the primary dietary constituent of kahala less than 5.4 kg (12 lbs). There isn't a changeover in diet to fish (Scombridae and Carangidae) until they become much larger. Kampachi proposed for this trial will be harvested around 2 kg (4 lb).

For the above reasons, which include the number of fish proposed for stocking relative to the total wild biomass, as well as the preferred diet of juvenile kahala, NMFS does not expect the Velella Delta project to effect the sustainability of bottomfish stocks through direct predation or competition for forage.

Potential Impacts of the Velella Delta Array on Sharks

The Velella Delta Array would likely attract sharks. Sharks often investigate floating objects in their environment, and fish congregating around the array would present a potential food source. On several occasions during previous trials, divers exited the water because of aggressive behavior by oceanic white-tip and Galapagos sharks. Sharks tended to travel on and did not stay with the towed array.

The proposed action could potentially affect sharks in the following ways:

1. Congregating sharks and making them susceptible to increased fishing mortality;
2. Presenting an entanglement risk; and
3. Disrupting shark movement patterns.

Under natural conditions, sharks recruit to floating objects, and the applicant observed several species of sharks near the previous 2011-2012 towed Velella Beta project, as described in section 3.2.1. The applicant noted unidentified sharks a few times around the Velella Gamma array. In one instance, a spear fisherman reported that a Galapagos shark pursuing prey had damaged the net pen (Sims 2014). Because sharks may aggregate near the array, a slight increase in fishermen-shark interactions could occur. This effect would likely be similar to any other FAD in Hawaii. There would be a possibility that a spear fisherman fishing near the Velella Delta array would use lethal force (e.g. a bang stick) on a shark, but this scenario would likely infrequently occur as this method of fishing is not as likely as other methods near FADs. The applicant has indicated that they would not employ lethal measures to cull aggressive sharks during the Velella Delta project (Sims 2014). To reduce the attractiveness of the Velella Delta array to sharks, the applicant would remove dead kampachi from the net pen during weekly maintenance operations. NMFS does not anticipate that Alternative 2 would substantially impact shark populations through increased fishing-related shark mortality.

Based on experience from the previous trail and the small mesh sizes used to build the Velella Delta array, the array would not present an entanglement risk to sharks. Tension on the array's lines (e.g. mooring, umbilicus, and tie-downs) would also preclude sharks from entangling themselves.

Because floating objects attract many pelagic fish species including sharks, the Velella Delta Array would potentially disrupt normal movement patterns by habituating sharks to a small area. This would potentially interfere with breeding behaviors. Papastamatiou et al. (2010) found that sandbar sharks (*Charcharinus plumbeus*) did show some site fidelity to underwater fish cages in nearshore waters south of Oahu; however, tiger sharks (*Galeocerdo cuvier*) did not show any site fidelity to these underwater fish cages. Therefore, habituation to underwater net pens appear to be species-specific. No evidence exists suggesting that FADs or aquaculture operations cause changes to pelagic shark movement patterns in the open ocean. Sims (2014) observed that, while

the Velella Beta and Velella Gamma arrays attracted pelagic sharks, individual sharks did not seem to continually associate with those projects. The Velella Delta Array would present feeding opportunities if prey species congregated around the array, but would probably affect sharks similarly to any other FAD. Sharks would not likely become habituated to the Velella Delta Array itself, because the array would not directly serve as a food source. The applicant would not dispose of mortalities in the sea, and sharks would not be able to enter the net pen. For these reasons, NMFS does not anticipate that the Velella Delta array would modify shark movement patterns either through aggregating effects or food habituation.

In summary, Alternative 2 would not likely substantially affect sharks by increasing fishing mortality, entangling sharks, or modifying movement patterns.

Potential Impacts to Other Pelagic Management Unit Species (PMUS)

The Velella Delta Array, like any other floating object, would attract bony pelagic management unit species. According to DNLR (2012), the most common teleost fishes present around FADs in Hawaii are:

- Bigeye tuna
- Skipjack tuna
- Yellowfin tuna
- Billfish (primarily marlins)
- Mahimahi
- Wahoo
- Rainbow runner

These species are important to both commercial and recreational fishermen. NMFS managed Bigeye tuna harvest with an annual catch limit (ACL) with fishery closures occurring when catch reaches the catch limit. NMFS has not specified ACLs for most pelagic species because they are subject to international fishing agreements or have life cycles of less than a year. The Velella Delta Array could potentially affect these species through increased fishing mortality and disruption of migratory patterns, as discussed more below.

The Velella Delta Array would likely aggregate PMUS like any other floating object. Sims (2014) reported that both commercial and recreational vessels fished near the Velella Beta and Velella Gamma arrays, and continue to do so near the mooring buoy. As discussed in Section 3.3.2, recreational and commercial fishermen in Hawaii catch large volumes of these species annually. Any commercial harvest of pelagic species that may occur near the Velella Delta would be subject to federal reporting and catch limits for that species. Because fishing already occurs at the proposed action site around the mooring buoy, attaching the Velella Delta Array to the mooring would not significantly increase PMUS fishing mortality at the site or in Hawaii. Due to fishing already occurring and catch limits, it is not likely that Alternative 2 would substantially affect the sustainability of pelagic fish populations through changes in fishing mortality.

Some researchers have expressed concerns that FADs disrupt normal PMUS migration patterns. PMUS do associate with floating objects, but these effects do not appear to be long-term. Dagorn et al. (2007) found that while some individual yellowfin tuna and bigeye tuna did spend extended time around FADs, the majority of fish tagged in the study visited FADs for short time periods and then left. The researchers concluded that local geographic features had greater influence over yellowfin tuna migration patterns than FADs. Given available information, Alternative 2 would not cause adverse effects to PMUS by disrupting migration patterns.

4.2.5 Potential Impacts to Protected Species

The following describes the potential effects that Alternative 2 may have on seabirds, turtles, and marine mammals.

Potential Impacts to Seabirds

Alternative 2 would potentially affect seabirds in the area. Potential impacts to seabirds from the proposed action include:

- Entanglement in mesh used to construct the net pen;
- Collisions with the feed barge or float ring; and
- Increased mortality from incidental fishery interactions.

When fishing gear entangles animals, the animals may be injured or die (e.g. drown). The heavy lines the applicant proposes using to attach the Velella Delta Array to the mooring, construct the umbilicus, and tie the net pen to its frame would pose no entanglement risk to small animals like seabirds. In contrast, the mesh used to build the net pen would present a potential entanglement risk to seabirds, especially diving species, such as shearwaters. During the majority of the project, the net pen would remain submerged to a depth of 30 ft beyond the reach of most seabirds. When the net pen would be at the surface during stocking, harvest, and maintenance activities, the presence of humans would likely discourage most seabird species from approaching the Velella Delta Array. The Velella Delta Array does not have hooked or barbed protrusions that could potentially ensnare a diving seabird. The black plastic and brass meshes of the net pen would provide a visual barrier between fish and the surface that would likely reduce the attractiveness of the net pen to seabirds.

The Velella Delta Array would not likely affect ESA-listed seabirds in any way. Staff saw no ESA-listed seabirds during operations for the previous trials (Sims 2014). As a term of the permit, the applicant would halt all activities in the presence of ESA-listed seabird species. The short-tailed albatross occasionally visits the MHI. This species cannot dive more than a few meters below the surface (USFWS 2008), and would not become entangled in the net pen. While the ESA-listed Newell's shearwater (threatened) and the Hawaiian petrel (endangered) do occur in the proposed action area, the presence of the Velella Delta Array would not present a significant entanglement risk to either of these species. The Newell's shearwater does have the ability to dive down to the Velella Delta Array's net pen. It can dive to at least 100 ft (pers. comm. Nick Holmes, University of Hawaii at Manoa, May 15, 2009). However, NMFS seabird surveys did not find Newell's shearwaters near the proposed action area (pers. comm. Lisa T. Ballance NMFS, April 11, 2009). Because Newell's shearwater does not appear to frequent

waters off the Kona Coast, NMFS does not anticipate that the Velella Delta Array would harm this species through entanglements. Hawaiian petrels forage by seizing prey near the surface and do not have great diving capabilities (Simons 1983). The species also does not appear to be attracted to ships (Harrison 1987). This would suggest that the Velella Delta Array would not likely attract Hawaiian petrels precluding any potential impacts to this species. On December 4, 2015, NMFS determined that the proposed action is not likely to adversely affect ESA-listed seabird. On January 12, 2016, the U.S. Fish and Wildlife Service concurred with NMFS' determination.

The applicant reported the presence of brown boobies (*Sula leucogaster*) visiting the Velella Beta and Velella Gamma arrays (Sims 2014). Boobies commonly land on vessels and buoys. The applicant reported no injuries or mortalities to boobies during the previous Velella trials due to gear entanglements. Boobies are plunge divers that capture prey on the wing or by plunge diving a few meters below the surface (Shealer 2002). They would not likely reach the net pen during these dives, and NMFS does not anticipate, given past information of seabird encounters with the CuPods, that boobies would entangle themselves in the Velella Delta Array's gear.

If seabirds were to collide with the Velella Delta Array, they would likely suffer injuries or mortality. All seabird species would be highly unlikely to collide with the Velella Delta Array during the day. Researchers have documented nighttime collisions with land-based structures for Newell's shearwaters when bright lights disorient the birds, like at stadia (Podolsky et al. 1998). TenBruggencate (2006) reported that seabirds of various species do collide with brightly lit cruise ships at sea near Hawaii.

NMFS also considered additional information provided by commenters who reviewed the Draft EA. One commenter stated that the Velella Delta Array's lighting could entrap seabirds explaining that light-entrapped seabirds often do not forage, exhaust themselves, and sometimes die. To support their assertion, the commenter cited various sources documenting light-induced interactions with seabirds including Weise et al. (2001), Black (2005), Le Corre et al. (2002), and Montevecchi (2005). NMFS reviewed these sources. The sources confirmed the information provided in the Draft EA showing that *bright* lights often confuse seabirds causing them to collide with structures or vessels. While Montevecchi (2005) does mention that fledgling Newell's shearwaters and Hawaiian petrels suffer high mortality due to coastal lights, this source does not provide any information that would lead NMFS to conclude that the navigational lighting aboard the Velella Delta Array would adversely affect seabirds. Montevecchi (2005) refers to bright city and stadia lighting, not the less intense navigational lighting proposed by the applicant. NMFS does not anticipate these navigational lights would disorient seabirds and cause collisions with the Velella Delta Array. NMFS knows of no information indicating that navigational lights similar to those required by the USCG would disorient seabirds. Additionally, the applicant would only use down-shielded lights for any necessary nighttime work at the array. Because NMFS determined seabirds would be unlikely to collide with the Velella Delta Array during the day and the array's lighting would not likely adversely affect seabirds at night, NMFS does not anticipate that Alternative 2 would likely harm seabirds through collisions or disorientation or light entrapment.

Fishermen attracted to the Velella Delta Array could potentially harm seabirds through gear interactions (e.g. hooking, entanglement). Fishermen currently troll and handline for pelagic species at the proposed action site (Sims 2014). As addressed previously, the presence of the Velella Delta Array would not likely substantially increase fishing activity at the proposed action site. There were no reports or observations of fishing activities during the previous Velella trials hooking or entangling seabirds. Interaction rates are probably very low. Because, the project would not likely increase fishing activity in the area, NMFS does not expect that interactions between seabirds and fishing vessels would substantially increase due to the presence of the Velella Delta Array.

During stocking and maintenance activities, the applicant would monitor the site for protected seabird species. Should the applicant observe any protected seabird species entangled in the gear, the permit would require staff to contact immediately NMFS for further instruction on how to respond.

In conclusion, based on previous Velella trial observations, seabird behavior, type of gear, and activities at the proposed site, Alternative 2 would not likely harm seabirds through entanglements, collisions, or increased fishing vessel interactions.

Potential impacts to sea turtles and marine mammals

The applicant monitored marine mammal occurrence during the Velella Beta trial. They found no substantial difference between marine mammal densities near the array and those found during control surveys (Sims 2014). During the Velella Gamma trial, the applicant sighted marine mammals only eight times, all rough-toothed dolphins. Staff saw no monk seals or sea turtles during the previous trials (Sims 2014).

There are several types of potential impacts to sea turtles, monk seals, and other marine mammals from the proposed action's gear and operations. These include:

- entanglement in gear including mooring lines, bridles, and netting;
- collisions with vessels including propellers;
- impacts of noise and disturbance;
- impacts of wastes or spills;
- impacts of fishing by others around the array;
- impacts to critical habitat; and
- impacts to behaviors, including habituation.

On December 2, 2015, NMFS completed an ESA Section 7 consultation on the potential effects of the proposed action on ESA-listed turtles and marine mammals. The analysis for the consultation showed that any project-related effects to listed sea turtles or marine mammals resulting from entanglement, collision with vessels, debris consumption, and impacts from fishing would be discountable. The analysis also showed that in-water disturbance, degradation of water quality, and effects to critical habitat would be insignificant to listed sea turtles or marine mammals. NMFS determined that the proposed action is not likely to adversely affect these ESA listed sea turtles or marine mammals or their designated critical habitat.

Entanglement

Several parts of the Velella Delta Array may pose an entanglement risk to marine mammals and sea turtles. These parts are the net pen, mooring line, and bridles. The risk of entanglement depends on the material used for the array gear and the behavior of the animals.

Net Pen

The metal and KikkoNet meshes of the net pen would be rigid and small (1-inch width). The small size and tension on the mesh would preclude entangling any large protected species. Healthy monk seals are nimble swimmers and seem to possess excellent underwater vision under a wide range of light conditions often foraging at depths of 1,600 ft (Parrish et al 2002). The monk seals are likely to see the net pen either at the surface or when submerged and are likely able to avoid entanglement in the pen.

Cetacean entanglement in passive fishing gear is a well-documented problem (Reeves et al. 2013). However, there is evidence that noise and lighting help reduce the likelihood of entanglements (Carretta et al. 2008, Carretta and Barlow 2011). Cetaceans tend to actively echolocate in the presence of floating and submerged objects, avoiding direct contact with them. With lighting and some low-level sound coming from the Velella Delta Array, it is likely that cetaceans, especially odontocetes, would be aware of the presence of the array and avoid becoming entangled.

During the previous Velella trials, the applicant did not report seeing any sea turtles. Sea turtles are deliberate swimmers, and the small mesh on the net pen would not likely present an entanglement risk for sea turtles.

Mooring Line and Tether

NMFS does not expect the single-point mooring line and tether to entangle cetaceans, monk seals, or sea turtles because lines would be under constant tension and free of loops. Currents would entrain; and at the same time, the mooring would restrain the net pen and feed barge. The mooring line and tether would be under tension most of the time and is designed to minimize slack and prevent loops from forming that could entangle baleen or flukes. When the currents change, the lines would likely remain taut even as the currents shift because of the negative buoyancy of the upper 12,000 ft of rope.

The mooring system at the proposed action site is similar to that used for FADs deployed by the State of Hawaii. Over 25 years, the State has reported no entanglements with protected species with state FADs. Additionally, NMFS PIRO issued an ESA Section 7 opinion stating that similar State mooring systems would not likely adversely affect ESA-listed species (DLNR 2012). Finally, ocean aquaculture facilities located in State waters and moored offshore of the Island of Hawaii, have not reported any incidents of protected species entanglements in a combined 15 years of operation (HF, 2009; KBWF, 2009).

Bridles

The use of multiple bridle lines to attach the net pen to the float ring and ballast tank probably would not pose a substantial threat to protected species through entanglements. The applicant would maintain large gaps between the bridles and tension on all bridles for the ballast tank while the applicant deploys the array.

During stocking and maintenance activities, the applicant would monitor the site for protected species. Should the applicant observe any marine mammal or sea turtle entangled in the rope or other gear, or interacting with any portion of the gear, they would be required to contact NMFS for further instruction on how to respond.

In conclusion, marine mammals and sea turtles are likely to detect the presence of the array and would be able to avoid the gear. The applicant has demonstrated that previous Velella trials did not attract marine mammals or sea turtles. The applicant would use for the net pen small mesh under tension that would preclude protected species entanglements. The lines on the Velella Delta Array would be under constant tension and free of loops, also precluding entanglements. Finally, no aquaculture operations or FAD in Hawaii has reported a protected species entanglement. Therefore, Alternative 2 is not likely to pose a substantial entanglement risk to cetaceans, monk seals, and sea turtles.

NMFS received public comments stating that the Draft EA did not adequately assess the proposed action's risk of entangling protected species by the array gear. Due to general concerns about the potential for ocean net pen aquaculture projects' effects on protected species, David Schofield (NMFS PIRO Protected Resources Division) has monitored aquaculture facilities in State waters off the Island of Hawaii from 2006 to 2016. Over that period, Mr. Schofield has received no reports of offshore aquaculture facilities causing protected species entanglements or modifying behaviors in ways that would increase entanglement risks. Mr. Schofield reported a single marine mammal interaction with aquaculture gear occurring in 2015: a monk seal biting a cage. Mr. Schofield considers this an isolated incident. The monk seal did not repeat the behavior. (pers. comm. David Schofield, NMFS, February 17, 2016). The monk seal did not become entangled in the net pen gear, nor was the monk seal reported as becoming habituated to the net pens.

Collisions with the Array

The Velella Delta Array would be located at the surface, within 1.75 nm of the mooring. The relatively small size of the array coupled with its visibility and relatively slow movement in currents (e.g., usually less than 1.2 kt or nearly stationary at the surface) makes it unlikely that marine mammals or sea turtles would collide with the moored gear. Sea turtles swim relatively slowly and would not likely collide with the Velella Delta Array. There was no evidence of marine mammals or sea turtles colliding with the Velella Beta or Gamma arrays.

It would be highly unlikely that marine animals would contact the mooring line. Even at depth and at night, the taut mooring line would not likely seriously harm marine mammals or sea turtle incidentally contacting the line.

Interactions with whales and dolphins would likely be low because individuals and pods are expected to pass by the array. If pelagic fish schooling under the feed barge and net pen attracted whales or dolphins, NMFS does not expect the cetaceans would collide with the Velella Delta Array while chasing prey. When there is activity at the array, such as when staff wash the net pen, marine mammals would likely avoid the array because of the presence of humans.

Because of the visibility of the gear and behavior of marine mammals and sea turtles, NMFS does not anticipate that the Velella Delta array would present a substantial collision hazard to marine mammals or sea turtles.

Collisions with Support Vessels or fishing vessels including propellers

Although more commonly observed in large whales, ship strikes also have potential to kill or injure smaller cetaceans including false killer whales. False killer whales in waters surrounding Hawaii ride the bow or stern wake of vessels and may come into proximity of propellers (Oleson et al. 2010). A propeller strike from a small support vessel or by motors on the feed barge may cause disfigurement of the dorsal fin or other parts of the body without killing the whale (Wells et al. 2008); however, a strike could also seriously injure or kill smaller protected species (e.g. dolphins, monk seals, sea turtles). No documented ship-strike related injuries or deaths of false killer whales or humpback whales exist for Hawaiian waters. However, Baird (2009) reported a fresh head wound on one MHI insular DPS false killer whale photographed off Oahu in September 2009 that a propeller strike may have caused. Observations of monk seals with propeller wounds exist, and there have been reports of sea turtles killed or injured by propellers in waters around the State.

NMFS estimates all marine vessels statewide take an average of 577, 872 annual trips. This includes fishing and non-fishing vessels (NMFS 2008). Collisions between cetaceans and vessels are relatively rare events based on data from Marine Mammal Stock Assessments for the Pacific (available from http://www.nmfs.noaa.gov/pr/sars/pdf/pacific_sars_2014_final_noaa_swfsc_tm_549.pdf). The majority of vessel operators usually sight protected species and avoid them. Detection of sea turtles by vessel operators may be more difficult, but NMFS in past biological opinions has determined that the rate of vessels collisions between sea turtles and vessels was negligible (NMFS 2008), and NMFS does not expect turtle vessel strikes to occur.

Vessels towing the Velella Delta Array net pen to and from the mooring between Kawaihae Harbor and the proposed action site would briefly transit through the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS). This activity would involve only two trips, and would not be notably different or more intense than typical maritime traffic already occurring in the area (Sims 2014). The harbor itself is outside the sanctuary boundaries (15 CFR §922.181(b)). Vessel strikes on marine mammals are not likely to occur, due to the slow speeds involved when towing the array to and from the mooring site. The maximum speed of the Velella Delta Array under tow would be about 2 kt. NOAA's general guidance for vessels transiting areas where there are known populations of whales indicates that collisions between marine mammals and vessels are minimized when vessel's travel at less than 10 kts (HIHWNMS, 2011).

During weekly maintenance, the applicant's staff piloting support vessels to the Velella Delta Array would remain vigilant during transits to avoid collisions with marine mammals and other protected species. Support vessels, either inflatable or small recreational craft, would have a maximum operating speed of 24 kts; however, in the open ocean conditions around the array, the support vessels for the project are likely to be operated at speeds of less than 15 kts (Sims 2013b), reducing the risk of collisions with marine wildlife. The support craft operator and other staff would watch for sea turtles and marine mammals reducing the risk of collisions. If a collision between a support vessel and a protected species occurred, the vessel operator would file a report with NMFS. There were no support vessel related interactions with protected species during the Velella Beta and Velella Gamma trials (Sims 2014). A permit condition states that support vessels must not exceed ten knots except in cases of emergency to make it easier for operators to spot protected species and to avoid potential collisions.

The proposed action would not substantially increase vessel traffic near the proposed action site and therefore not increase the risk of vessel collision with marine mammals and sea turtles. The applicant would operate all vessels at safe speeds and watch for marine mammals and sea turtles during transit, mitigating the likelihood of a collision with protected species. For the above reasons, Alternative 2 is not likely to increase substantially the risk of collisions between vessels and marine mammals and sea turtles.

Noise

Noise from the Velella Delta array has the potential to disturb marine animals; however, the noise, would be brief and similar to noise from vessels that currently fish and transit through the proposed action area. NMFS does not expect noise from the permit activities to harm any marine animals or sea turtles. Therefore, Alternative 2 would not affect any marine mammals or sea turtles by increasing ambient noise levels.

Wastes

NMFS does not anticipate that the Velella Delta array would substantially impact water quality due to the location of the array, the amount and types of waste generated and the dispersion of these wastes (Section 4.1.1). Federal and State regulations prohibit the applicant from discharging wastes and oil into the marine environment, and the terms and conditions of the permit would require the applicant to follow operational procedures that minimize the risk of wastes and discharges that may affect protected species. Therefore, Alternative 2 is not likely to impact any marine mammals or sea turtles from wastes entering the environment.

Fishing Near the Array

Because the Velella Beta and Gamma arrays behaved like FADs, fishermen were attracted to the immediate vicinity of both projects (Sims 2014). NMFS anticipates that fishermen would also frequent the Velella Delta Array for the same reason. Fishing activities could result in gear interactions and reduce fish populations protected species depend on for food. Fishermen currently fish around the mooring buoy at the proposed action site (Sims 2014) and in the general area, but there is no evidence that this activity results in interactions with marine mammals or

turtles or reduced prey resources. Alternative 2 is not likely to increase fishing activity or catch volumes at the proposed action site. Therefore, Alternative 2 is not likely to harm marine mammals or sea turtles by increasing fishing gear interaction rates or by reducing available prey.

Monk Seal Critical Habitat

The proposed site of the Velella Delta Array would not be located in designated or proposed critical habitat for any ESA-listed species. On August 21, 2015, NMFS published a final rule for monk seal critical habitat (80 FR 50925). A portion of this critical habitat occurs in the nearshore waters where the applicant would transit for deploying, retrieving, operating, and maintaining the Velella Delta Array (Figure 17). The Kawaihae Harbor, where the applicant would transit, is located near site HA-42 on Figure 17.

The essential features of this area of critical habitat is adequate prey quality and quantity for juvenile and adult monk seal foraging. The Velella Delta Array would operate well outside of this nearshore zone. Support vessels for the project would pass through designated monk seal critical habitat, but would not likely affect prey quality or quantity for juvenile and adult monk seals as a transiting vessel would not remove prey and would only temporarily change schooling behavior of fish prey. A support vessel grounding or oil spill is unlikely. Due to the size of the support vessels and the operations at the array, if a spill occurred, it would likely be small and would rapidly dissipate, and effects on monk seal critical habitat would likely be insignificant. On December 2, 2015, NMFS completed an ESA Section 7 consultation on the potential effects of the proposed action on Hawaiian monk seals and their critical habitat. NMFS concluded that the proposed action was not likely to adversely affect monk seal designated critical habitat. Therefore, Alternative 2 is not likely to substantially affect monk seal critical habitat.

Changes in Behavior

Anthropogenic activities can habituate animals if the animals associate those activities with feeding opportunities. Habituated animals often have negative interactions with humans. The applicant would dispose of mortalities on shore, and the fish inside the cage would not be accessible to any protected species. In the absence of an abundant, direct food source, Alternative 2 is not likely to harm marine mammals or sea turtle through habituation.

4.2.6 Introduction of Invasive Species

The proposed action would not likely introduce new invasive species from outside the State. The Velella Delta Array would not leave the vicinity of the action area and would not likely introduce new species to Hawaiian waters. The applicant would return the feed barge and net pens to their respective ports of origin after the project ends and the staff clean the gear. If invasive species occur in only one of the harbors used for operations, there is a minor possibility that the applicant could transfer non-indigenous species between Kawaihae Harbor and Honokohau via the feed barge to the net pen, or vice versa. That possibility would be reduced due to the applicant using only new materials, and the thorough cleaning of materials for the Velella Delta Array and associated components to ensure that invasive species are not transported to or from the offshore project site. At the end of the project, staff would thoroughly clean the in-

water components before transporting back to shore. Alternative 2 would not likely affect the environment by introducing new or spreading existing invasive species.

4.3 Potential Direct and Indirect Social and Economic Impacts

NMFS does not anticipate the proposed project would have substantial negative impacts to the local fishing community and ocean users. The Velella Delta Array would likely act as a FAD, attracting baitfish and PMUS like any other floating object in the open ocean. During the 2011-2012 Velella Beta trial, yellowfin tuna, mahimahi, and sharks aggregated under the cage. The towed array became popular with local fishermen. Sims and Key (2012) reported more than six recreational vessels around the towed array on Veterans' Day 2011. Recreational fishermen caught tuna and other pelagic species when fishing near the array. The applicant reported up to 30 vessels fishing near the Velella Gamma Array (Sims 2014) at a single time.

Based on previous experience, NMFS and the applicant both expect that community fishermen (both recreational and commercial charter vessels) will fish around the Velella Gamma project. As in the previous two trials, vessels are expected to remain a safe operating distance from the gear.

The Velella Delta Array would not interfere with existing FADs. While F buoy is still reported as missing, VV Buoy has been replaced as of May 10, 2016. There are no other FADs within a 30-mile range of Honokohau Harbor (the main fishing port on the Kona Coast). Permitting the proposed action would not grant the applicant special rights, exclusive use of any part of the ocean, or special rights to any fish attracted to the array. With the exception of access to the feed barge and float ring, the entire action area would remain open to all ocean activities. The proposed action would not affect commercial fishing communities described in Section 3.3.

The location of the proposed array along the 1,000-fathom depth contour would not likely affect recreational fishing activities or reduce catches. Recreational fishermen currently use the mooring buoy at the proposed site as a FAD (Sims 2014).

There were no instances of conflicts with local fishermen during the operation of the Velella Beta or Gamma trials. Local fishermen were supportive of the presence of the Velella Beta and Gamma arrays. Fishermen generally remained a safe distance from the Velella Beta and Gamma arrays as trolling too close to the arrays could have resulted in the loss of expensive fishing lures and other gear.

With respect to safety and boat operations, the risk of gear entanglements or collisions with the feed barge, submerged pod, mooring line, or tethers are not expected based on the fact that there were no such entanglements in the gear in the past, and the fact that fishing vessels do not normally become entangled or collide when fishing around other FADs. The USCG would note the array's position, as appropriate, through a USCG Notice to Mariners and the gear would be lit at night to prevent collisions at sea.

For the above reasons, NMFS would not anticipate that Alternative 2 would substantially affect fishermen and other ocean users.

4.3.1 Impacts to Cultural Marine Resources

The activities under Alternative 2 are not likely to impact cultural or other uses of materials from the sea (such as seaweed, sponges, or other marine species). These resources are primarily in the nearshore environment. None of these resources are removed from the environment by the proposed action. Any accidental spills or discharges and impacts to water quality from fish metabolites and feed that may affect cultural resources (such as seaweed, sponges, or other marine species) are expected to be minimal and occur so far at sea that they would not affect the nearshore environment. Therefore, Alternative 2 is not likely to substantially affect cultural resources.

4.3.2 Potential Impacts to Human Safety

The USCG would issue a Notice to Mariners to promote safety at sea by reducing the potential for a collision with the array or the mooring line. The array would include the required navigational lighting to reduce the potential for collision with components of the array at night. In the past, the public has voiced concerns about the applicant's fish culture pens attracting sharks and affecting public safety by increasing the potential for shark attacks on humans (Sims 2014).

Over the course of the Velella Beta Trial, divers encountered a number of pelagic sharks including oceanic white-tip sharks (*C. longimanus*), Galapagos sharks (*C. galapagensis*), Silky sharks (*C. falciformis*), and whale sharks (*Rhincodon typus*). Kampachi Farms established dive safety protocols for different levels of response to shark sightings and aggression. On several occasions, divers exited the water because of aggressive behavior by Oceanic white-tip and Galapagos sharks. Sharks tended to travel on and did not stay with the array. Interactions with sharks were less common when the Velella Beta array was closer to shore (approximately within10 nm of the coastline) (Sims 2014). There has been one incident, reported by Kona Blue Water Farms (KBWF), where a tiger shark directly threatened a diver working around nearshore pens. KBWF eventually euthanized the shark due to diver safety concerns (KBWF 2009). Kampachi Farm's current protocols call for divers to exit the waters when they encounter aggressive sharks, and the permit conditions prohibit the applicant from employing lethal methods to remove aggressive sharks.

While it would be possible that sharks could follow the net pen and feed barge back to shore, it would not be likely. The applicant would not have any fish in the net pen when retrieving it at the end of the project. Additionally, the shark species known to associate with the net pen in previous trials are oceanic sharks and do not normally frequent nearshore waters. NMFS does not anticipate that oceanic sharks would follow the net pen back to shore and increase shark attack risks to swimmers or other ocean users. Therefore, Alternative 2 is not likely to increase risk to human safety.

NMFS considered whether fish from the Velella Delta Array could cause ciguatera poisoning in humans if eaten. Ciguatera is a marine biotoxin that can poison people when they eat fish that have accumulated ciguatoxins in their flesh (Kaneko et al., 2005). Ciguatera poisoning symptoms include diarrhea, chills, stomach cramping, fatigue, nerve damage leading to tingling

or numbness in the body, muscle cramping, and slowed heart rate (Copeland et al. 2014). Microscopic algae known as dinoflagellates (*Gambierdiscus* spp.) produce ciguatoxins. Typically, *Gambierdiscus* spp. inhabit poorly flushed nearshore benthic habitats and are associate with macroalgae and sediments such as mangroves and the leeward sides of islands (Dickey and Plakas 2009). Large fish, such as *Seriola* spp., build up ciguatoxins in their flesh after consuming smaller nearshore plant-eating fish. Fish susceptible to developing dangerous ciguatoxin levels, tend to become more toxic as they age (Dickey and Plakas 2009).

NMFS does not anticipate that kampachi raised during the project would develop dangerous ciguatoxin concentrations. First, the Velella Delta Array is located in deep offshore waters subject to near-constant water movement. The project site would not overlap with habitats typically associated with *Gambierdiscus* spp., which is associated with ciguatoxin, preventing fish in the net pen from eating tainted natural prey. Second, the applicant would only use U.S. Department of Agriculture-approved feeds made from anchovies and soybean meal as described in Section1.4.6. Anchovies inhabit offshore environments where Gambierdiscus spp. are not likely to occur, and are plankton feeders that are not likely to bioaccumulate ciguatoxin. Soybean meal would not contain ciguatoxins as soybeans are not produced in a marine environment with *Gambierdiscus spp*. Therefore, kampachi raised and harvested during the Velella Delta trial would not ingest ciguatoxins from natural or synthetic sources. Additionally, Grubman (2014), cited by one commenter, indicates that raising kampachi in an aquaculture setting eliminates ciguatera risks. Kampachi grown during the project would not concentrate ciguatoxins in their tissues from the time they hatch to the time the applicant harvests them. Kampachi harvested during the project pose no foreseeable threat to human safety from ciguatoxin.

NMFS received comments concerning the potential that the Velella Delta Array could increase safety risks to air travelers by attracting seabirds and resulting in bird-aircraft strikes. Federal Aviation Administration (FAA) Advisory Circular No. 15/52000-33B recommends a 5 mile buffer between open aquaculture if a proposed activity is a hazardous wildlife attractant that could cause hazardous wildlife movement into or across the approach or departure airspace. Due to the comments, NMFS considered whether the proposed action would create a hazardous wildlife attractant.

Although the anchor point of the Velella Delta Array is located more than 5 miles from shore, the Kona International Airport (KIA) is located within 5 miles of the closest approach of the array to the shore. KIA has had the fewest bird strikes of any mid-sized airport in Hawaii. From 2003 to 2015, nine bird strikes occurred at KIA compared with 460 at Lihue, 257 at Hilo, and 349 at Kahului airports. Additionally, the State has permitted large aquaculture operations at the National Energy Laboratory of Hawaii Authority (NELHA) since 1984 (Karr and Buttner 2010). NELHA immediately abuts the southern end of Kona International Airport. In 2016, at least 17 companies conduct aquaculture operations at NEHLA (Source: http://nelha.hawaii.gov/our-clients/, accessed March 4, 2016). Additionally, offshore aquaculture raising Kampachi has existed off the Kona coast since 2004 (Karr and Buttner 2010).

NMFS evaluated which species collided with aircraft at the KIA between 2003 and 2015. Data from http://wildlife.faa.gov/database.aspx, accessed March 4, 2016, include one Short-eared Owl, two Pacific Golden Plovers, three unknown medium-sized birds, one small Chestnut

Munia, and one unknown small bird. From this data, it appears that none of the bird strike incidents at the KIA likely involved seabirds, and seabirds were certainly not commonly involved. Seabirds are the only species of bird likely to be flying offshore near the proposed Velella Delta array. Given how rarely bird strikes occur at the KIA with aquaculture operations nearby, the types of birds involved in strikes, and the fact that the submerged cage is not expected to result in the array becing a hazardous seabird attractant (based on the fact that existing net pens and 2 previous trial projects did not attract seabirds), NMFS does not expect that the proposed project would endanger human safety by increasing bird-aircraft strike hazards.

4.3.3 Potential impacts to community growth

The duration of Alternative 2 would be limited to two years, and economic impacts of the project would likely be small. The applicant would lease space at Kawaihae Harbor as needed and utilize existing facilities at Honokohau Harbor to support the project. The applicant anticipates the proposed action would create few new jobs, if any (Sims 2014). The applicant would potentially employ University of Hawaii graduate students to conduct wildlife monitoring and oceanographic research during the project. Alternative 2 is not likely to provide the economic support for community growth.

4.3.4 Potential impacts to the local economy and other fish culture operations

The applicant would harvest approximately 120,000 lb of fish in two 60,000-pound cohorts by the end of the proposed action. They would harvest the fish in about six batches per cohort. This would help mitigate impacts to fish prices. The applicant would sell the harvested fish as Hawaiian Kampachi through the company's existing marketing and distribution channels. NMFS expects the applicant to sell most of the fish locally, similar to the Velella Beta and Gamma trials fish sales. The applicant could potentially sell some portion of the harvest to markets on the U.S. mainland or abroad (Japan). The small size of the estimated production (15,000 fish annually) would not result in industry consolidation or overproduction and would be a very small portion of the commercial landings in the State. Therefore, Alternative 2 is not likely to have a substantial impact on the local economy or other fish culture operations.

4.4 Environmental Justice Impacts

On February 11, 1994, President William Clinton issued Executive Order 12898 (E.O. 12898), "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." E.O. 12898 provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." E.O. 12898 also provides for agencies to collect, maintain, and analyze information on patterns of subsistence consumption of fish, vegetation, or wildlife.

Where an agency action may affect fish, vegetation, or wildlife, the agency should consider the potential adverse effects on subsistence patterns of consumption and indicate the potential for

disproportionately high and adverse human health or environmental effects on low-income populations, and minority populations.

The proposed action footprint would be relatively small and located well out to sea. There are no minorities or low-income populations near the proposed action, but such populations may exist in west Hawaii communities living onshore. Some persons may gather seaweeds and fish in coastal areas for subsistence consumption. The proposed action is not likely to affect these cultural resources (Section 4.3.1).

The proposed action would not cause changes to the physical or natural environment that would affect coastal communities. The proposed action would not inhibit persons from any nearby communities from fishing near the action area.

For these reasons, Alternative 2 is not likely to impact adversely fish or other wildlife, habitats, or marine plants that are subsistence resources.

Finally, the proposed action is not expected to have high and adverse environmental or human health effects that would require further consideration under this Executive Order.

4.5 Potential Impacts to Historical, Archaeological or Cultural Resources

The proposed action would occur in Federal waters between 3.5 and 7.5 nm off the leeward coast of the Island of Hawaii in waters 3,000-7,500 ft deep. On July 31, 2013, the State of Hawaii Historic Preservation Division, Kona, informed NMFS that no written reports or studies exist that indicate the presence of native Hawaiian traditional fishing grounds, or "koa", in the project area, nor are there any features that could create koa in the project area. The proposed Velella Delta Array site does not affect significant cultural resources, historic properties, or archaeological resources, as none exist at the proposed action site. Therefore, the Velella Delta Array location would have no potential to affect directly historical, archaeological, or cultural resources.

Staging activities for the project would take place near historic sites located near harbors. The applicant would launch and retrieve gear and support vessels at public harbors in west Hawaii. These are well-developed, well-used State harbors at Kawaihae and Honokohau, and Keauhou Bay, on the Island of Hawaii (Appendix F. Maps).

Kaloko-Honokohau National Historical Park (see Appendix F. Maps) is adjacent to the Honokohau Harbor entrance and contains several sites of cultural significance, including native fishponds (e.g., Kaloko Fishpond)[7], kahua (house site platforms), ki'i pohaku (petroglyphs), holua (stone slide), and heiau (religious site).[8] Pu'ukohola Heiau National Historic Site, just south of Kawaihae Harbor, also includes important cultural resources of Hawaii, including submerged ruins of an ancient temple.[9]

[7] http://www.nps.gov/kaho/index.htm
[8] http://nationalparks.org/discover-parks/index.cfm?fa=viewPark&pid=KAHO
[9] http://www.nps.gov/puhe/index.htm

The applicant's activities would not differ from other activities routinely conducted at Honokohau Harbor and Kawaihae Harbor and would minimally increase ongoing activity levels. This increase in activity is not likely to impact substantially the historical and cultural nearshore sites near these harbors. Therefore, Alternative 2 is not likely to impact substantially historic, archaeological, or cultural sites where the applicant would conduct harbor activities.

4.6 Cumulative Impacts

Cumulative effects result from the incremental impacts of the proposed action in addition to past, present, and reasonably foreseeable future actions. The proposed action is a small-scale gear test project that would have minimal impacts to air or water quality, noise, marine species, the ecosystem, or other uses in the area.

No other culture and harvest projects currently operate in Federal waters around Hawaii near the action area. NMFS has not received any other applications for similar projects at this time. One aquaculture farm operates in State waters, but is located at least 6 nm from the proposed action site. The two prior culture and harvest projects permitted by NMFS, Velella Beta and Velella Gamma, are complete and do not set a precedent for the proposed action. The previous Velella Gamma project potential effects that may also occur under the proposed action include impacts to genetic fitness from escaped fish, mooring FAD effects, and chain impacts on the ocean bottom. As discussed in section 4.2.3 the amount of fish escaping in the past and potentially with this project is not likely to have a measurable effect on genetic fitness. The FAD effect of the mooring is a past, present and future effect, regardless of the proposed project. Effects from the presence of the chain riser have likely already occurred, and no substantial additional effects would be likely. The past effect from the mooring chain would be the greatest to the bottom habitat when it was first installed. The continued future effect of the mooring is likely limited to preventing recovery where sessile organisms may have been disturbed.

The Velella Delta Array is not likely to change past and current fishing activities at the array site. The MHI Longline Fishing Prohibited Area excludes the Hawaii longline fisheries from the proposed action area. Current fisheries in the proposed action area include pelagic troll, palu-ahi, and ika-shibi. Fish and fishermen already use the mooring buoy at the proposed action site as a FAD. Attaching the Velella Delta Array to the mooring would not noticeably change the function of the mooring as a FAD. It is unlikely that changes in fishing effort at this location would occur that would result in increased fishing mortality or affect fish landings in Hawaii. The State currently has no FADs near the project area, therefore fishermen would not shift fishing effort from other FADs to the Velella Delta Array mooring. Because it is unlikely that fishing activity at the Velella Delta Array would increase, the current rates of protected species interactions with existing fisheries would not change.

Issuance of the SCREFP would not result in the irretrievable or irreversible loss of resources. As described above, the potential environmental effects of the SCREFP activities would have limited and temporary effects because of gear and program designs, and mitigation measures designed into the project. Even a worst-case analysis did not provide evidence of irretrievable or irreversible loss of any resource.

A decision to issue this permit would not automatically result in the approval of future projects. Future permit applications, if any, would be subject to independent environmental evaluation, coordination with others, and compliance with all applicable laws including NEPA.

The proposed action would take place in an open ocean environment that is dynamic and subject to the long-term impacts of global climate change. Marine resources managers expect substantial changes to the marine environment from climate change, regardless of whether Alternative 2 is implemented or not. Fishery managers and scientists do not fully understand all of the climate change impacts that are occurring but. The global mean temperature has increased by 0.76°C over the last 150 years, and the linear temperature trend over the last 50 years is nearly twice that for the last 100 years (IPCC 2007a). Ample evidence now exists supporting the wide-ranging ecological impacts of global climate change (Walther et al. 2002). Observed changes in marine systems are associated with rising water temperatures, changes in ice cover, salinity, oxygen levels, circulation, and ocean acidity. Changes to marine systems include shifts in ranges; changes in algal, plankton, and fish abundance (IPCC 2007b); damage to coral reefs (Scavia et al., 2002); and other impacts. A more complete summary of climate change and climate change impacts is online at http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#1.

Within the limited duration of the project (2 years), specific climate change impacts are not expected to affect the feasibility of the project to meet the applicant's goals and objectives, or to have effects that would interact with the project to result in substantial cumulative effects. Sea level rise would not affect a floating net pen. Measurable changes in ocean temperature or ocean acidity and changes in ocean circulation are not expected to occur within the limited duration of the project.

The project would not likely result in substantial changes to greenhouse gas emissions. The use of motorized vessels would be well within background levels in the area that would occur even without the proposed SCREFP.

NMFS received comments that indicate NMFS should evaluate the potential greenhouse gas emissions related to the use of fish feed for the project. The applicant would use about 40 mt of fish feed annually. The applicant estimates that feed would be comprised of about 40 percent fishmeal and oil, and about 60 percent soybean meal (i.e. 16 mt of fish products and 24 mt of soybean meal). The World Bank (2013) estimates that world aquaculture operations use about 45,000 mt of fishmeal annually. Annually, the proposed action would use about 0.0004 percent of world fishmeal production dedicated to aquaculture feeds. The U.S. Department of Agriculture estimates annual world soybean meal production at approximately 200 million mt annually (USDA 2016). NMFS estimates that the project would use about 0.000001 percent of world's annual soybean meal production. Additionally, the project would not establish a permanent demand for these products, given its two-year duration. The proposed action would not significantly add to the short-term (or long-term) demand for fishmeal or soybean meal, and NMFS would not anticipate increased greenhouse gas emissions to supply the project with feed. Therefore, supplying the project with feed would not result in substantial cumulative environmental effects from greenhouse gas emissions.

Based on comments received, NMFS considered the cumulative effects from onshore hatchery operations that produce kampachi fingerlings at NEHLA. All companies culturing saltwater species at NEHLA must dispose of waste seawater using State of Hawaii-permitted underground injection wells. The State of Hawaii has monitored groundwater and the nearby ocean for pollution since 1989. To date, the State has not found any adverse environmental effects from NEHLA's saltwater disposal systems (Oleson 2015). The project would not increase onshore hatchery production. Therefore, the project would not affect how companies dispose of waste saltwater at NEHLA or add to the amount of wastewater produced at the site. The project would not likely cause cumulative environmental effects through onshore fingerling production.

Changes in oceanographic conditions may alter rates of direct and incidental harvests or interactions with marine resources in commercial fisheries. Ocean climate fluctuations that change the habitat quality or the prey availability of ocean resources have the potential to affect a species short- or long-term distribution and abundance. The magnitude of potential effects is uncertain, but these impacts would show as variability in stock size, recruitment, growth rates, or other factors for marine species in stock assessment reviews. Climate change is likely affecting sea turtles found in the action area through the impacts of rising sea temperatures and sea level, and chemistry. Current analyses of the impacts of climate change on sea turtle populations are in NMFS 2012 Biological Opinion for the continued operation of the Hawaii-based Shallow-set Longline Swordfish Fishery (NMFS 2012). There may be some impact from climate change on marine mammals in the action area, but the impact is unknown and expected to be minimal over the course of the project.

In 2008, the Council has recommended establishing aquaculture requirements in the five FEPs used to manage fisheries in federal waters. The amendments would establish a federal management program for aquaculture fisheries in the EEZ of the Pacific Islands Region (Hawaii, American Samoa, Guam, the Pacific Remote Islands, and the Northern Mariana Islands). The management program would provide long-term sustainable aquaculture management in federal waters of the Pacific Islands Region (PIR). NMFS and the Council are working together to develop this management program. The aquaculture management program would define areas suitable for aquaculture development, suitable management unit species for aquaculture in the PIR, reasonably foreseeable types of offshore aquaculture operations, gear requirements, and permitting and reporting requirements for persons conducting aquaculture activities in federal waters of the PIR. To inform the development of an aquaculture management program and pursuant to 40 CFR 1506.5(c), NMFS is preparing a programmatic environmental impact statement (PEIS) to analyze the social, economic and environmental impacts to the human environment of alternatives for managing aquaculture fisheries in the PIR. The development and content of the PEIS must be consistent with the regulations at 40 CFR 1500-1508 and NAO 216-6). It is too early in the development process of this program to identify potential future effects as the details of the alternatives have not been identified. Therefore, it is not possible at this time to determine any cumulative effects from this potential future action.

In summary, the proposed SCREFP is not expected to result in large adverse effects on marine resources individually or in combination with other actions that are ongoing or reasonably forseeable.

4.7 Effects on Administration and Enforcement

The SCREFP's terms and reporting requirements would be enforceable in accordance with the provisions of the MSA and applicable regulations. Failure to comply with requirements for reporting interactions with protected species including marine mammal injuries under the MMPA and ESA would be grounds for permit revocation. Failure of the permit holder to comply with requirements of the permit and logbook requirements could result in sanctions and possible revocation of the permit.

There would be a nominal administrative burden to NMFS to collect and process the information provided on catch logs, because the applicant is likely to harvest the fish and report the harvest information on approximately 12 separate days. NMFS does not anticipate the need to process marine mammal or other protected species injury reports, but would do so, if emergency interactions occur. Processing the application and developing this analysis to support the decision-making does not represent a substantial burden to NMFS. Issuing the permit is not likely to be a large administrative burden based on experience with previous SCREFPs and the proposed permit being a short document requiring little time to develop and issue.

The project would be of a small size and limited duration and would be located in an area that is approximately 5.5-7.5 nm from shore. Due to the specific and limited nature of the project, NMFS would not need substantial law enforcement resources for this proposed action.

Table 2. Summary of Potential Impacts of the Alternatives.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
Physical environment:		
Water quality:	Water quality is high in the project area. The applicant would not raise fish in the offshore area under a SCREFP.	Negligible impact. The low stocking density, monitored application of feed, and near constant water movement through the Velella Delta net pen would be likely to minimize adverse impacts to water quality by diluting any metabolites quickly. Cleaning of the net pen and feed barge would be through manual scrubbing. The antifouling properties of the mesh material would be likely to minimize the buildup of fouling organisms. Staff would use no chemicals to clean the vessel or array gear. A modeling program applied to a much larger operation under similar conditions found no risk to water column or benthic ecology functions. The composition of the synthetic and copper alloy cage materials are resistant to biofouling and leaching.
Air quality:	The area is a popular sport fishing area, so there are some emissions from outboard motors. Air quality would remain high.	Negligible impact. The limited use of a small generator several times a day to feed the fish would not substantially add to emissions.
Noise:	Current sources of noise from this area are fishing and other maritime vessels. Noise would remain at the low levels associated with vessel motors.	Negligible impact. A small generator would run for less than an hour a day to feed the fish periodically. One would not likely hear the noise on shore and water and wind effect would dampen sounds near the Velella Delta Array. Support vessel noise would be short term and similar to ambient noise from other vessels in the area.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
View plane:	Ships and fishing vessels are visible in the project area both by day and at night. Ships and fishing vessels would continue to be visible under this alternative. The mooring buoy currently at the site has a single navigational light visible up to 3 nm.	Negligible impact. To ensure safety of life at sea and prevent the risk of collision, the Velella Delta Array would operate with required navigational lights visible at up to 3 nm. The applicant would add an additional light to the Velella Delta array. The Velella Delta Array would not likely be visible from shore especially at a distance of 7 nm. At its closest approach to shore, 3.5 nm, lighting intensity from the array would be greatly attenuated and probably not visible. Both the feed barge and the net pen are relatively small and would not be highly visible from shore during daylight hours. They would be visible by both sight and radar when approached by fishing vessels at sea.
Bottom features:	Deep-water benthic habitat at the mooring site is in the bathypelagic zone where no light penetrates. At the depth of the anchor (6,000 ft), the sea bottom is likely devoid of habitat structuring benthos such as corals, sponges and macroalgae. The area is likely to consist of basalt and sediments. Under the no-action alternative only previously, assessed impacts to the bottom would be likely from the extant mooring system.	Negligible impact. The proposed action would use the existing mooring infrastructure. Implementation of the proposed action would have no additional impacts. During the two-year trial, the 360-foot-long chain riser would disturb up to 9 acres of bottom habitat as the chain drags on the bottom. Effects from the presence of the chain riser have likely already occurred, and no substantial additional effects would be likely (NMFS 2005). NMFS has not designated EFH for benthic habitats in the project area.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
Biological environment:		
Target species:	Kampachi is a native finfish found in waters of Hawaii and throughout the tropics. Fishermen do not generally retain this species because it is unpalatable, and often contains ciguatera toxin, so there is no market for the wild caught fish. Kampachi would continue to be cultured in pens in State waters.	Negligible impact. The proposed action would not have an adverse effect on native kampachi. First, the Velella Delta Array and mooring system would be able to withstand severe weather and water conditions and would be located in deep (6000 ft) waters a considerable distance from habitat supporting wild kampachi stock. Any escapes would be unlikely to occur based on the permit's terms and conditions, which minimize the risk of escapes and address recapture of escaped fish as soon as possible. All fingerlings would be F_1 generation fish from wild native stocks with minimal harvest of wild stock needed for the brood stock. If the cultured kampachi were to escape, they likely would remain around the Velella Delta Array and be recaptured. In the event escaped fish survive and reproduce, modeling results indicate that there would be no adverse impacts to the health or fitness of the native fish population and genetic introgression is not expected to occur because they are F_1 fish and genetically indistinguishable from wild stocks. The low stocking density of fish and required weekly maintenance would reduce the likelihood of disease magnification and transmission to wild stocks. During the 2011-2014 Velella Beta and Gamma trials, the level of naturally occurring parasites (flukes) on the kampachi in the net pens was lower than levels found naturally occurring in wild fish. Therefore, given Velella Delta Array's proposed site away from kampachi natural habitats and the cultured fishes' lower parasite loads, it would be unlikely that skin flukes would transmit to native fish.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
Non-target species:	A variety of pelagic fishes occurs in the project area. Some individuals are attracted to floating objects including privately owned and State FADs. The Council and NMFS sustainably manages fisheries targeting these species around FADs in accordance with national and international management. Pelagic fish stocks would continue to be harvested sustainably by fishermen in Hawaii.	Negligible impact. The proposed action would not adversely affect pelagic fish species. The array likely attracts some individual fish, including tunas, sharks and other species because it is natural for fish to recruit to floating objects. All nearby FADs have been lost and not replaced. Therefore, the Velella Delta Array would not affect fish recruitment to nearby FADs. Fisheries management of non-target species would continue to apply to harvests of these species near the array.
Coral reefs and seaweed	There are no coral reefs in the project area. There are areas with coral and seaweed in the coastal environment of west Hawaii. The proposed array or the Velella Delta support vessels transiting nearshore water would not affect Coral reefs and seaweeds.	No impact. The proposed action would not affect corals, seaweed or other nearshore marine organisms. The array would remain at least 3.75 nm from shore in very deep waters. The mooring itself was designed to prevent the mooring line from breaking; however, if the net pen or the feed barge were to become detached, GPS systems on both components are expected to allow detection of a decoupling and facilitate recovery before the feed barge or net pen could be grounded. If the net pen became detached or sank, it would likely sink to the bathypelagic depths far from coral reef areas. No effects on water quality are likely that could adversely affect coral reefs or seaweeds.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
Deep-water benthic organisms	Deep-water benthic organisms are likely to include sessile invertebrates as well as motile fishes. Currently, the mooring system is suspended in the water column by a surface buoy. The riser chain and anchor would continue to affect the deep-water benthic organisms. Impacts would be similar to the action alternative.	Negligible impact. The types of organisms that are likely impacted would not be in dense aggregations in this deep habitat. The organisms that may be directly affected occur in similar deep ocean habitat, which is broadly distributed in offshore areas of similar depths around the Hawaiian Islands. Most motile fish would be able to escape crushing by the anchor by detecting the pressure wave as the anchor nears the seabed. The 360-foot chain may contact the bottom. The impact area could be up to 9 acres. The impact of this contact is not likely to be large because the mooring has been in place since 2013. Since the riser chain is currently connected to a surface buoy, additional effects to the bathypelagic benthic environment are likely to be negligible.
Invasive Species	Fishing activities may introduce invasive species. This may occur when the activity carries non-native species from one area to another where the introduced species is not endemic. Introduction may occur from release of ballast water or attachment of invasive species to hauls or gear in one location that later release in another location that is not endemic to the species.	Negligible Impacts. The proposed action would not change fishing activities that would result in introduction of invasive species. Support vessels may move between two harbors on the west side of the Island of Hawaii, but spreading of invasive species between these harbors is not likely to occur due to their close proximity. The applicant would construct the array with new gear and would thoroughly clean the gear before movement to reduce the risk of spreading any species that may attach to the gear.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
Protected species: monk seal:	Monk seals numbers are increasing in the main Hawaiian Islands. Some monk seals frequent the waters and beaches around the Island of Hawaii. No SCREFP would allow activities that may affect Monk seals.	Negligible impact. Monk seals are generally not likely to occur in the proposed action area due to the distance from shore (greater than 3.75 nm). If a monk seals were to visit the array, it would be unable to obtain fish from the cage. The proposed gear is not likely to entangle monk seals because tension would be maintained on the net, lines and bridles. The ESA and MMPA prohibit feeding monk seals. Dead fish would be disposed of on land. The proposed action is not likely to have any impacts on prey quantity or quality by transiting Velella vessels inside critical habitat. Monk seal critical habitat is not likely to be adversely affected. If an interaction were to occur, the applicant would be required to report the event. In the case of an injury or entanglement, the applicant would be required to contact NMFS immediately for advice on handling and release procedures. Potential increases in vessel numbers due to this project are not likely to increase substantially the interactions between fishermen and monk seals.
Protected species – insular false killer whale	The ESA lists the insular false killer whale (FKW) as an endangered distinct population segment (DPS). No SCREFP would allow activities that may affect Insular false killer whales.	Negligible impacts. The applicant reported no adverse interactions with FKW during other Velella trials. The State of Hawaii reported that there have been no adverse interactions between FKW and FADs. If an interaction were to occur, the applicant would be required to report the event. In the case of an injury or entanglement, the applicant would be required to contact NMFS immediately for advice on safe handling and release of any entangled or injured FKW. The anticipated increases in vessel numbers from the proposed action would not be likely to increase interactions between fishermen and FKW.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
Protected species – other marine mammals	A number of marine mammals occur around Hawaii as described in Section 3.2.2. No SCREFP would allow activities that may affect marine mammals.	Negligible impacts. There were no reports from prior projects of adverse interactions between the gear and marine mammals, and there were no reports of interactions with FADs. The proposed gear is not likely to entangle marine mammals. The applicant would not routinely use chemicals to treat the fish. If necessary treatments would be done in consultation with NMFS and a veterinarian. If an interaction were to occur, the applicant would be required to report the event. In the case of an injury or entanglement, the applicant would be required to contact NMFS immediately for safe handling and release advice of any entangled or injured animals. The increase in vessel number due to this project would not be likely to increase interactions between vessels or fishermen and marine mammals.
Protected species sea turtles	Five species of ESA-listed turtles occur in the waters around Hawaii. Green turtles and hawksbill turtles may encounter the array. NMFS has not designated critical habitat for ESA-listed sea turtles in or near the proposed action area. No SCREFP would allow activities that may affect sea turtles.	Negligible impacts. The project is not likely to affect adversely ESA-listed sea turtles or their critical habitats. The gear is not likely to entangle sea turtles, and they are likely to pass the array without incident. The applicant would not routinely use chemicals to treat the fish. If necessary treatments would be done in consultation with NMFS and a veterinarian. If an interaction were to occur, the applicant would be required to report the event. If the gear entangles a sea turtle, the permit would require the applicant to immediately contact NMFS for advice on the safe handling and release of the animal. Anticipated increases in vessel numbers in the proposed action area would not be likely to increase interactions between fishermen and ESA-listed sea turtles.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
Protected species – seabirds	A number of seabirds occur in waters off Hawaii. The Migratory Bird Treaty Act (MBTA) protect all of these species. Three species of ESA-listed seabirds may occur in the action area. No activities associated with a SCREFP that may affect seabirds would occur.	Negligible impacts. Seabirds are not likely adversely affected by the proposed action. Seabirds, such as boobies, may land on the feed barge or float ring, but would not likely become entangled or injured. Due to the small size of the metal mesh and the tension on it, the net pen is not likely to entangle seabirds. The black plastic frame, copper alloy metal mesh, and synthetic mesh of the net pen would be a barrier between fish and the surface of the water reducing the fishes' visual attractiveness to seabirds. Although troll fishermen would be able to fish around the Velella Delta Array, troll fishermen would not likely hook ESA-listed seabirds due to their known feeding behaviors: none are known to be "plunge divers". The navigational lighting on the Velella Delta Array would not be likely to cause disorientation and collisions with ESA-listed seabirds or seabirds in general or light entrapment.
Designated Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC)	EFHs in the project area include: • BMUS eggs and larva EFH: 0-400 m (1,300 ft); • PMUS egg and larva EFH: 0-200 m (650 ft); • Coral Reef Ecosystem egg, larva, juvenile, and adult EFH: 0-100 m depth (330 ft). • Crab and Lobster egg and larva EFH: 0-150 m (490 ft). No SCREFP activities would affect EFHs or HAPCs under the No-action Alternative.	Negligible impacts. The array is not likely to affect adversely EFH or HAPCs. The applicant would moor the Velella Delta Array in 6000 ft of water. The anchor and riser chain would be located a depth well outside of any designated EFH. Water quality impacts to EFH from the proposed action would likely be negligible. Ambient currents averaging 0.2-0.3 m/second would flush the pen. NMFs compared the expected effluent and conditions at the Velella Delta Array to modeling studies and empirical evidence from larger aquaculture facilities that showed no substantial impacts from effluents to any MUS EFHs. The comparison shows that the effluent from the Velella Delta Array also would not substantially affect water quality. The applicant would not use chemicals or antibiotic to treat the fish for parasites, negating concerns about chemicals or antibiotic agents entering the water column or benthic habitats. Previous Velella trials showed that cultured fish had lower parasite loads than wild fish.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
		The applicant would not use cleaning agents on the Velella Delta Array, eliminating any impacts to the water column EFH from cleaning chemicals. The GPS systems and onboard cameras on the Velella Delta Array would allow detection if any component became unmoored, allowing quick recovery of detached components and preventing the gear from impacting nearshore EFH and HAPCs. If the net pen sank or became detached from the float ring, it would reach a depth below any EFH. Fish inside the cage would be trapped and likely perish in the bathypelagic environment outside of current EFH designations. If a mass mortality event occurred, the applicant would remove all fish from the net pen to a support vessel; and the applicant would consult with NMFS whether to continue the project.
Social-setting:		
Other fishermen – marlin and other pelagic sport fishing (troll fishing)	Commercial and local recreational fishing for big game fishes occurs in the project area. No activities under a SCREFP would affect fishing.	Negligible impact. The small size of the array would not adversely affect fishermen targeting large game fish. Fishermen would likely fish around the array, but would not likely collide with the array or become entangled with the mooring line or tether. The USCG would issue a Notice to Mariners to promote safety at sea by reducing the potential for a collision with the array or the mooring line.
Other fishermen – palu-ahi bait fishing	Commercial fishing for tuna and other pelagic species occurs in the project area. No effects on Palu-ahi fishing would occur under the No-action Alternative.	Negligible impact. The small size of the array is not expected to adversely affect fishermen fishing for tuna and other species around FADs. No FADs are currently near of the proposed action area. Commercial handline fishermen would fish around the Velella Delta Array. NMFS does not anticipate that palu-ahi fishermen would collide with or entangle in the Velella Delta Array.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
Other fishermen – ika-shibi (tuna jigging)	An active tuna jig fishery occurs in waters offshore of Kona. Fishermen fish at night around FADs and use lights to attract tuna. No effects on ika-shibi fishing would occur under the No-action Alternative.	Negligible impact. The minimal navigational lights of the Velella Delta Array could attract tuna; however, the array is relatively small and is not likely to diminish opportunities for ika-shibi fishermen to catch tuna, especially, as no FADs are currently moored near the proposed action area. Ika-shibi fishermen would likely be able to fish around the array and successfully catch pelagic fish.
Troll fishing	The area in which the array would be located is a popular troll fishing area. No effects on troll fishing would occur under the No-action Alternative.	Negligible impact. As with other fisheries, troll fishermen would actively avoid collision and entanglements with Velella Delta Array. Given the small size of the array and two-year duration of the project, NMFS does not expect the project would result in any large changes to troll fishing activity or negatively impact troll-fishing catches.
Fishing Community:	The entire Island of Hawaii is a Fishing Community under the Hawaii Fishery Ecosystem Plan. No effect on fishing community would occur under the No-action Alternative.	No impacts. The applicant would harvest a limited amount of kampachi, and this amount would not likely affect fishing community members. The proposed action would provide a limited amount of high quality fish to the community. Fishermen could fish around the array. This project would not affect wild kampachi stocks, and there is currently no fishery for wild kampachi. Some fishermen have approached the applicant requesting that the applicant replace the mooring buoy currently attached to the mooring system at the end of the trial. Pending approval by the USACE, the applicant may reattach to the mooring buoy currently at the site to the mooring system.
Growth in the Community:	The community in west Hawaii will likely grow due to various developments in the area. No effects on growth would occur under the No-action Alternative.	Minimal impacts. The small size and limited duration of the project are not likely to affect growth or community expansion. The project would require a small amount of staff to support the project during its limited duration.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
Cultural gathering or other use of marine species	Members of the local community may gather or harvest certain marine species in areas close to shore (such as seaweed, sponges, or other marine species). Cultural gathering or other uses of marine species would not be affected under the No-action Alternative.	No impact. The applicant would conduct the project in the U.S. EEZ beyond State waters. The limited amount of natural metabolites and dissolved feeds that would enter the water are likely to disperse very quickly and have no impact on nearshore waters.
Economics:		
Impacts to local fish markets and prices	There is no market for wild-caught kampachi. There is a market for pen-raised kampachi. Various other aquaculture facilities provide cultured kampachi to local markets. There would be no change to markets or local fish prices under the No-action Alternative.	Negligible impacts. Up to 120,000lb (54 mt) of fish potentially harvested from this project would distribute through existing local markets and potentially new markets on the U.S. mainland and Japan. The applicant proposes to harvest fish in about twelve separate batches over two years precluding large impacts to fish prices.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
Other resources/ topics		
Cumulative impacts including potential impacts of climate change	The other activities that occurred in the past, and are currently occurring and that are likely to continue in the project area are fishing activities. There would be no additive cumulative impacts under the No-action Alternative. Climate change is likely to affect substantially the marine environment, but NMFS is not able to determine the specific impacts.	Negligible Cumulative Impacts. Negligible direct and indirect impacts on the human environment are likely. These in combination with past, present, and future actions are not likely to result in cumulative effects. Issuance of the SCREFP does not result in an expansion of future aquaculture activities without application and environmental analysis procedures. The amount of feed obtained would not cause large amounts of greenhouse gasses because of the limited amount of feed required. The project would have negligible impacts on climate change. The applicant would need very little fossil fuels for this project relative to other fishing activities. Negligible greenhouse gas emissions from support vessels the feed barge's generator would be likely if NMFS issues a SCREFP authorizing the proposed action. The impacts of climate change are likely to be substantial, regardless of whether NMFS approves this proposed action.
Environmental Justice	Some people living in west Hawaii are members of minority or low-income groups. Some subsistence harvesting may occur in nearshore areas. There would be no impacts to these groups under the No-action Alternative.	No impacts. The proposed action is of a very small size, located in waters at least 3.75 nm from shore, and of limited duration of two years. The project is not likely to result in large adverse environmental impacts that could disproportionately affect members of either minority or low-income populations, or affect subsistence harvesting of marine resources in coastal areas.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP (with associated Terms and Conditions) to allow fishing for kampachi using the Velella Delta Array
Safety at Sea	Mariners use the project area. There would be no impact to safety at sea under the No-action Alternative.	Negligible impacts. No increase in shark/human interactions in the nearshore areas are expected. The applicant's procedures for divers encountering sharks minimize the potential for injury. Both the Velella Delta Array's feed barge and net pen would be lighted in accordance with USCG requirements and be equipped with radar reflectors and GPS systems. The USCG may issue Notices to Mariners to maintain a safety perimeter around the array. All of these equipment features would reduce the potential for maritime accidents.
Historical or Archaeological or cultural resources	None known in deep waters. Historic, cultural, and archaeological resources occur next to harbors that would be used by vessels traveling to and from the array. There would be no impacts to historical, archaeological, or cultural resources under the No-action Alternative.	Negligible impacts. There are no known historic, archaeological or cultural resources near the proposed site that the proposed action would affect. There are historical, archaeological, and cultural resources near harbors where the applicant would launch the feed barge and net pen system. Loading and unloading gear and fish on maintenance vessels, towing the net pen, and routine vessel transit to and from harbors are not likely to affect any cultural, archaeological, or historical sites including known sites near Honokohau Harbor or Kawaihae Harbor.

4.8 Review of Uncertainty and Risk

NMFS evaluated the potential degree of unknown risk. We note that the presence of uncertainty (missing information) does not automatically require the agency to prepare an EIS; however the analysis of environmental effects must consider the potential effects of the project in view of missing information when evaluating the significance of potential impacts. The agency must explain in an EA what information is missing and whether the missing information is required in order to determine whether a proposed action would have a significant effect on the environment.

The specific gear proposed to be used in this trial is a modification of gear used in previous tests (CuPod gear) and a modification of net pens used in other parts of the world. The proposed gear is described in section 1.4.3. Some aspects of the gear that are not new include the mooring, most of the mooring attachments, the use of a remotely-monitored feed barge and remote feeding mechanism, maintenance methods, and gear and fish monitoring systems and tracking systems.

Modifications are designed to test a different net pen configuration and are expected to be improvements over previous designs. Rather than using a spherical pen, the proposed gear employs a cylindrical net pen suspended below the surface from double floating rings. As was part of previous trials, having the net pen suspended below the surface is intended to reduce stresses on the pen from wind and waves, which are stronger at the ocean's surface (section 1.4.3). A ballast tank is another feature of the new pen design and is designed to maintain tension on the bridle lines which will maintain the shape of the pen in high velocity current situations (section 1.4.3). The net pen would not be entered unless the pen is at the surface and net barriers are up to prevent fish escapes.

The specific gear has not been tested on site, and the purpose of the project is to test the use of the gear to culture and harvest kampachi (section 1.2).

NMFS acknowledges there is uncertainty and unknown risks; however, NMFS concludes that the degree of uncertainty is reduced because many of the gear components (such as connectors, mooring line, and mooring configuration) have been tested in the field. New components have been tested using a computer stress modeling program which found that the gear is likely to be able to withstand environmental conditions of the site. Operations are expected to reduce the risk of fish escapes over previous net pen designs.

Regardless of the uncertainties that exist when deploying and testing a new gear, NMFS considered the potential for gear failure in its evaluation of the potential impacts. The EA describes a range of potential emergency situations including partial or full gear failures (section 1.4.8). The analysis of impacts considers impacts to the environment under the worst-case scenario of catastrophic failure.

Several design and operational features of the proposed project are specifically intended to reduce the likelihood of gear failure or mitigate potential failures. Among these are:

- deploying the net pen at depth away from the surface stressors of waves and wind;

- using net mesh and frame components that have been tested in the local environment and evaluated with computer models;
- using a mooring system configured in a manner that reduces wear;
- requirement that gear be checked during regular maintenance visits;
- having a GPS transponder system that would generate automated alerts should the gear become de-coupled from the mooring

ability to move the feed barge to port prior to storms and allowing the float rings and net pen to ride out a storm at depth while being connected directly to the mooring buoy.

5.0 Coordination with Others and Compliance with Applicable Laws

5.1 List of Agencies and Individuals Consulted

In accordance with regulations covering SCREFPs at 50 CFR 665.224, NMFS is required to furnish a copy of a SCREFP application to the Council, the USCG, the State of Hawaii, DLNR; U.S. Fish and Wildlife Service; and other interested parties who have identified themselves to the Council.

NMFS forwarded copies of the permit application and project information for review to:

Mr. Doug Krofta, Acting Field Supervisor, U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, HI.

RADM Cari B. Thomas, Commander, Fourteenth U. S. Coast Guard District, Honolulu, HI.

Ms. Kitty Simonds, Executive Director, Western Pacific Regional Fishery Management Council, Honolulu, HI

Mr. William J. Aila, Jr. Former Chairperson, Department of Land and Natural Resources, State of Hawaii, Honolulu, HI.

5.2 Coordination with USACE

In accordance with the Council on Environmental Quality's (CEQ) regulations on implementing NEPA, NMFS, as the Lead Agency, invited the USACE to be a Cooperating Agency in accordance with 40 CFR 1501.6. The USACE is a Federal agency with special expertise in marine moorings and has a direct role in the proposed action through its authority to issue a DA Permit to the applicant. In its role as a Cooperating Agency, the USACE provided technical input on the draft and final EA documents and participated in reviewing public comments and made recommendations for considering public comments prior to finalizing the EA.

NMFS collaborated with the USACE on the evaluation of potential effects of the SCREFP and the USACE permit on Essential Fish Habitat. The consultation with NMFS is required under Section 305(b)(1-4) of the Magnuson-Stevens Act. As the lead agency, NMFS also consulted on

behalf of itself and the USACE in accordance with the ESA and MMPA. See section 5.10 for more details.

5.3 Consideration by the Western Pacific Fishery Management Council

On January 16, 2015, the Executive Director of the Council, acting on directions of the Council, sent a letter to NMFS PIRO expressing the Council's support for the proposed action. However, the Council's Executive Director did voice concerns about the proposed action's location and activities (WPFMC 2015). The Council's letter expressed concerns that the presence of the Velella Delta Array could reduce fish catches by trollers and handliners in the proposed action area by causing localized fish stock depletions. The Council also voiced fishermen's concerns that escaped kampachi fish could harm bottomfish stocks by preying on bottomfish and requested that the applicant mark cultured fish for easy identification. The Council discussed the application for the SCREFP for this proposed action at the 162nd Council meeting in March 2015. NMFS considered and analyzed the Council's concerns in the draft EA with further review of potential effects in the final EA.

5.4 Magnsuon-Stevens Fishery Conservation and Management Act

NMFS and the Council manage fisheries of the western Pacific Region in accordance with the provisions of the MSFCMA. NMFS would issue the proposed SCREFP in accordance with the provisions of the approved Hawaii Archipelagic FEP and implementing regulations at 50 CFR § 665.224. Regulations require a SCREFP if gear that is not specifically approved would be used to fish for any Coral Reef Ecosystem Management Unit Species.

5.5 Paperwork Reduction Act (PRA)

The Office of Management and Budget (OMB) has approved the forms used to collect SCREFP fish harvest and interactions with protected species information. If a form expires before the SCREFP-permitted activity ends, NMFS would be responsible for obtaining OMB approval. If for any reason, OMB does not approve the form, NMFS would not collect that information.

The applicant would use forms to report information under the SCREFP that the NOAA NMFS, Pacific Islands Fisheries Science Center (PIFSC) developed. The PIFSC manages data reported on these forms. These forms include:

Special Permit/Low-use Marine Protected Areas Coral Reef Taxa Daily Catch Report; OMB Control No. 0648-0463; Expires 10/31/18.

NMFS Transshipment Log for Coral Reef Ecosystem Management Unit Species; OMB Control No. 0648-0462; Expires 10/31/18.

The Special Permit/Low-use Marine Protected Areas Coral Reef Taxa Daily Catch Report includes protected species interaction reporting for seabirds, turtles, and marine mammals. An additional marine mammal form that would be used to collect information about interactions is

the Mammal Authorization Program, Mortality/Injury Reporting Form, OMB Control No. 0648-0292. Expires 02/29/16.

Although not part of the federally permitted activity, the Applicant would need a State of Hawaii Commercial Marine License to sell marine fish harvested from the operation.

5.6 Coastal Zone Management Act (CZMA)

The CZMA requires NMFS to review proposals for consistency with a state's approved coastal zone management program (CZMP) for any Federal license, permit, or other activity that may affect any coastal use or resource. The state is required to maintain a list of Federal license and permit activities that affect any coastal use or resource, and which the state wishes to review for consistency with its management program. For those license and permit activities that are not on the state's list, the Federal agency is required to provide the state with actual or constructive notice of the proposed action so the state may determine, within 30 days of such notice, whether coastal effects are reasonably foreseeable. Open ocean culturing operations that would be used to fish under this proposed action are not on the list of license and permit activities that the State of Hawaii CZMP wishes to review for consistency.

To ensure the proposed SCREFP activities conform with the CZMA, 50 CFR 665.224 and 15 CFR 930, On May 7, 2015, NMFS mailed a copy of the completed application package to the State of Hawaii Office of Coastal Zone Management Program with a request for recommendations concerning this project. The State of Hawaii responded to NMFS on May 8, 2015, indicating that the proposed action took place primarily in areas that are outside of the State's jurisdiction and that a Federal consistency review was not required.

5.7 Marine Mammal Protection Act (MMPA)

The MMPA prohibits, with certain exceptions, the take of marine mammals in the U.S. and by U.S. citizens on the high seas, and prohibits the importation of marine mammals and marine mammal products into the United States.

The use of the Velella Delta Array would fall within the activities listed as "Hawaii offshore pen culture" which is a Category III fishery as there is a remote likelihood of or no known incidental mortality or serious injury of marine mammals (81 FR 20550, April 8, 2016).

NMFS's review of the proposed action showed that the gear and operations of the Velella Delta Array for a period of up to two years have the potential to result in interactions with marine mammals; however, the likelihood of a serious injury is low for the reasons described in Section 4.2.5.

NMFS found that the most likely effect of the project on marine mammals is anticipated to be behavioral (e.g., individuals engaging in investigative behavior around the array or that prey on wild fish accumulated under the array) as opposed to causing serious injury or mortality (e.g., entanglement). Active pen nets in fixed-point, nearshore aquaculture operations in Hawaii do not generally attract large whale species, but smaller whales and dolphins will occasionally approach

the offshore net pens for short periods of time (Hukilau Farms 2009, KBWF 2009). During a previous project in 2011-2012, that used a small CuPod towed behind a vessel or drifted in the open ocean near the tender vessel, there were 59 sightings of dolphins and whales with no contact, entanglement or resident individuals (Sims and Key 2012). Data taken by an independent student researcher on an opportunistic basis and tabulated on the applicant's website (kampachifarm.com/sustainability.html) show that most of the dolphins and whales passed by the vessel and towed CuPod. Spinner and rough-toothed dolphins circled the vessel and submerged CuPod on some occasions, and were sometimes seen stealing fish from fishermen. One group of spinner dolphins jumped nearby. The researcher noted one humpback whale and several rough toothed dolphins in the 5th and 6th months of the operation remaining around the vessel and CuPod, rather than just passing by. None of these marine mammals entangled in or interacted with the gear. Although sharks were seen associated with the array, the applicant reported no injuries to marine mammals during the previous project from sharks. Fishing activity at and near the array resulted in no marine mammal hooking or direct collisions with the gear.

During the one-year Velella Gamma Trial, which used a fixed mooring in the same location as the proposed action, marine mammals were only observed a total of 8 times during the operation; these were all exclusively Rough-toothed dolphins (*Steno bredanensis*). The animals never interacted directly with the net pen, or with the array (Sims 2014).

Other experience with fixed-point, nearshore aquaculture in Hawaii has been that active net-pen operations do not generally attract large whale species, but bottle-nose dolphins do occasionally approach the pens for short periods of time (HF 2009; KBWF 2009). Two studies support this generalization. The first study is a monitoring project around the Keahole Point farm site (2009 – 2010), conducted independently by a UH Hilo student. This study found only a few individual bottlenose dolphins attracted to the net pens occasionally. The second study is a monitoring project by a UH Hilo student and independent data collection by crew on the Velella Beta Trial, which found no significant impact of the Velella Beta Array on marine mammals (Sims 2014). The applicant would conduct similar monitoring of marine mammal interactions with the proposed action, and they would report interactions to NMFS. Under the terms of the permit, NMFS would be able to assign an observer to the Velella Delta Array at any time.

Entanglement

The proposed action would not likely entangle marine mammals. The applicant would keep all lines and bridles under constant tension by wind, currents, and the net pen's ballast tank preventing loops from forming. Slack lines are the primary source marine mammal entanglements. The length of all lines would provide adequate spaces for marine mammals to pass through. The meshes used to construct the net pen enclosure would have small openings and would be rigid or drawn taut preventing marine mammal entanglements.

Vessel Strikes

The probabilities that collisions with either the Velella Delta Array or associated support vessels would kill or injure marine mammals are discountable. Marine mammals would be able to detect

the presence of the Velella Delta Array and avoid inadvertently swimming into it. The applicant would not operate vessels at speeds likely to injure or kill marine mammals.

Noise

The proposed action would not significantly increase noise levels above ambient levels affecting marine mammals. The project would use a 20-horsepower diesel generator with a sound intensity similar to a recreational fishing boat for about an hour per day. Support vessels would not appreciably increase vessel traffic and significantly add to ambient noise.

Effluents and waste

The proposed action would not likely harm marine mammals through waste and chemical discharges. Modeling studies indicate inputs of soluble and particulate nutrients from the proposed action would not substantially affect the marine environment. The applicant would comply with all Federal, State, and local marine discharge regulations and properly dispose of solid wastes on land precluding ingestion by marine mammals. The project would use small amounts of petroleum to run the generator. No fuel would be stored on the feed barge. The applicant would not use chemicals to clean the net pen or feed barge. The applicant would not use fish feeds with antibiotics.

5.8 Endangered Species Act (ESA)

NMFS's initial review of the proposed action shows that the gear and operations of the Velella Delta Array have the potential to result in interactions with listed sea turtles, marine mammals, and sea birds; however, the gear and activities are not likely to injure turtles, marine mammals and seabirds, as described in Section 4.2.5. Monk seals are the only ESA-listed species with designated critical habitat located where the proposed activities occur. Support vessels for the Velella Delta Array would transit monk sea critical habitat. Vessels passing through critical habitat are not likely to have any effect on the quality or quantity of monk seal prey.

NMFS PIRO SFD in coordination with the USACE consulted with NMFS PIRO Protected Resources Division and the USFWS on the potential effects of the proposed action on ESA-listed species and their designated critical habitat. On December 2, 2015, NMFS determined that the proposed action may affect, but is not likely to adversely affect ESA-listed sea turtles and marine mammals and their designated critical habitat. On January 12, 2016, USFWS concurred with NMFS determination that the proposed action may affect, but is not likely to adversely affect ESA-listed seabirds.

5.9 Essential Fish Habitat (EFH)

The Magnuson-Stevens Act requires that NMFS designate Essential Fish Habitat (EFH) for all management unit species (MUS) within an FEP and that NMFS minimize adverse effects to EFH from fishing. The Magnuson-Stevens Act defines EFH as those waters and substrates necessary for fish spawning, breeding, feeding and growth to maturity. Additionally, the Magnuson-Stevens Act defines Habitat Areas of Particular Concern (HAPC) as areas within EFH that are

ecologically important, sensitive to disturbance, or rare. Thus, HAPCs often require more protection from activities that may adversely affect EFH.

The FEP defines EFH for MUS according to their ecological needs at various life stages (e.g. eggs and larvae, juveniles and adults). Often, designated EFH for eggs and larvae is different from EFH for juveniles and adults. Usually, NMFS does not designate EFH for a single species, but for multiple species grouped together according to their phylogenetic and ecological similarities and requirements. NMFS then defines EFH for each of these MUS groups and, sometimes, MUS subgroups. In Hawaii, NMFS groups MUS into the following categories:

- Bottomfish and Seamount Groundfish[10];
- Coral Reef Ecosystem;
- Crustaceans;
- Pelagic; and
- Precious Corals.

Table 1 summarizes EFH for each MUS group, including life stages, in the Pacific Islands region.

EFH in the project area

The applicant would operate the Velella Gamma Array in waters designated as EFH down to 1,000 m (3,280 ft) depth.

The following EFH occurs in the project area:

Bottomfish MUS: EFH for eggs, larvae, juveniles, and adults includes the water column extending from the surface to 400 m (1,312 ft) depth. In 2011, the Council recommended Amendment 4 to the FEP. Amendment 4 would revise the descriptions of EFH and habitat areas of particular concern for 14 species of bottomfish and three species of seamount groundfish in the Hawaiian Archipelago. Under the changes proposed in Amendment 4, the overall EFH designation for Hawaii bottomfish would remain the same, i.e., waters 0-400 m deep within the EEZ. The Council's recommendations are a refinement with respect to which life stages and species assemblages are associated with a particular EFH designation. NMFS EFH conclusions for the proposed action would not change if Amendment 4 is approved.

Coral Reef Ecosystem MUS: EFH for eggs, larvae, juveniles and adults includes the water column from the surface to 100 m (328 ft) depth.

Crustacean MUS: EFH for lobster and crab eggs and larvae includes the water column from the surface to 150 m (492 ft) depth. EFH for lobster and crab juveniles includes bottom from

[10] NMFS has not designated EFH for seamount groundfish MUS within the proposed action area or nearby. Seamount groundfish MUS were managed under a single fishery management plan with bottomfish. The only seamount groundfish EFH within the U.S. EEZ is located at the extreme northwestern end of the Hawaiian Islands and includes the water column (0-600 m) and benthic habitats (200-600 m) bounded by 29°-35° N and 171°E.-179° W.

shoreline down to 100 meters depth. EFH for deepwater shrimp includes the outer reef slopes between 500-700 m (eggs and larvae) and between 300-700 m depth (juveniles and adults).

Pelagic MUS: EFH for pelagic MUS eggs and larvae includes the water column from the surface to 200 m (656 ft) depth. EFH for pelagic MUS juveniles and adults includes the water column from the surface to 1,000 m (3,280 ft) depth.

Precious Corals MUS: NMFS has not established EFH for precious corals MUS in the project area.

For the water column below 1000 m (3,280 ft), NMFS has not designated the benthic habitat in the project area as EFH for any MUS.

NMFS SFD and USACE concluded that the proposed action would not cause significant impacts to EFH. NMFS PIRO Habitat Conservation Division agreed with this conclusion on November 13, 2015. The agencies considered potential impacts to EFH from the proposed action including:

- Adverse impacts on water quality from fish wastes, excess food, or chemicals;
- Impacts to wild fish populations including genetic impacts from escapes, disease transmission, and disruption of migratory patterns;
- Accidents (gear loss) during deployment and retrieval operations;
- Accidents involving support vessels;
- Velella Delta Array components becoming detached during the trial; and
- Aquatic invasive species

Potential impacts on water quality

The applicant would culture and harvest approximately 60,000 lb of fish per year (15,000 fish of about 4 lb each). This is well below the amount (100,000 lb per year) that the Environmental Protection Agency requires producers to obtain a National Pollutant Discharge Elimination System (NPDES) permit (40 CFR 122.24(c)).

The BOM aquaculture facility within State waters has about 300,000 kampachi of various sizes on-site at any time. It is located 1,969 ft from shore in 197 ft of water. Over eight years, particulate and soluble nutrient inputs from the operation have had no significant impact on water quality. Oxidation reduction potential and total organic carbon analysis at the discharge and control sites over the past three years shows that for both measures, the discharge site readings are consistent with control site baseline readings, indicating no significant impact (BOM 2014). There have been some impacts to benthic communities directly below the site from particulate organic matter settling on the bottom (BOM 2014), but that would not likely be an issue for the proposed action, which would operate in much deeper water.

In light of these results, it is very unlikely that the much smaller Velella Delta Array would have any adverse impacts to water quality. The applicant would operate the array about six miles from shore in 6000 ft of water with continuous flushing from ambient currents. As with the Velella Gamma trial and based on the AquaModel results described above, no effects to the water

column would be expected below 100 ft. Steady water currents flowing through the net pen would quickly dilute the relatively small amounts of dissolved inorganic nitrogen and phosphorus from fish wastes. Pelagic grazers including fish, small pelagic crustaceans, and zooplankton would eat the small amounts of uneaten feed and fish feces. As noted in Section 4.1.1, the applicant anticipates that about three percent of the feed would remain uneaten and enter the water column (Sims 2014). The nearly constant flushing of the pen by currents would quickly dilute these small amounts of feed and fish metabolites entering the water column. The applicant, based on previous experience with larger nearshore aquaculture operations and the proposed action site conditions, anticipates that Velella Delta project would not elevate nutrient concentrations around the array to detectable levels (pers. comm. Neil Sims, Kampachi Farms, July 23, 2015).

Additionally, the proposed action area's distance from shore would preclude effects to benthic EFH because effluents and any increased algal productivity that may occur from the activity would be dissipated to ambient levels before reaching those habitats. The pycnocline, located 1,148-1,230 ft (Flament et al. 1998), would likely inhibit the downward movement of particulate and dissolved wastes from the proposed action. If any nutrient wastes were to pass through the pycnocline, they would be greatly diluted and indistinguishable from ambient nutrient concentrations below the pycnocline, which are much greater than in the epipelagic zone. Therefore, no anticipated adverse effects to EFH from impacts to water quality from the proposed action would be anticipated.

Impacts to wild fish populations including genetic impacts from escapes, disease transmission, and disruption of migratory patterns

Fish escapes are expected to be minimal. Divers would enter the net pen through a hatch on the top panel after staff raise the pen to the surface. The mesh attached to the inside of the net pen's handrail would prevent any fish from escaping the enclosure into the ocean. If fish accidentally escaped, they would remain near the Velella Delta Array and be easily captured using spears or dip nets. Contact between cultured fish from the proposed action and wild kampachi populations is not expected.

NMFS and the USACE considered the potential for the reduction in the genetic diversity of wild kampachi populations that could result if some or all of the fish escaped and interbred with wild fish. NMFS used the Offshore Mariculture Escapes Genetics Assessment model (OMEGA; http://www.nmfs.noaa.gov/aquaculture/science/omega_model_homepage.html) to estimate the impact to wild population fitness if fish escape the Velella Delta net pen. The results indicated that the proportion of the wild population comprised of escapees would peak at less than 1% over the 100-year time span of the simulation, and no significant fitness effects (less than 0.02% decrease over 100 years) are likely even if all 30,000 fish escaped into the wild and survived. Factors contributing to the lack of impacts included, but are not limited to, the small number of stocked fish in the proposed Velella Delta Array relative to wild biomass, short duration of the project, and using wild-caught native fish for broodstock (Kristen Gruenthal, NOAA, pers. comm., May 4, 2015). For these reasons, there would not likely harm wild kampachi populations by reducing genetic diversity.

NMFS does not expect the cultured fish would not experience high levels of disease because the applicant would stock the fish at relatively low densities, and would remove any diseased or dead fish. Additionally, cultured fish from previous Velella trials had lower parasite loads than wild fish. As stated above, it would be unlikely that cultured fish from the proposed action would come into contact with wild populations precluding disease and parasite transmission between populations (Sims 2014). For these reasons, the proposed action would be highly unlikely to transmit disease or parasites to wild kampachi populations.

Accidents (gear loss) during deployment and retrieval operations

Both the float ring and net pen are positively buoyant. The net pen would only become negatively buoyant when the ballast tank is in place and flooded. However, the bottom HDPE ring of the net pen is negatively buoyant, which will help the net pen maintain its shape while on-site. During deployment and retrieval from and to Kawaihae Harbor, the net pen's bottom ring would be supported with lift bags while transiting waters containing benthic EFH for a number of species including bottomfish MUS, coral reef MUS, and crustacean MUS (lobsters and crabs). The lift bags would prevent the net pen from contacting the bottom and nearshore coral reefs. Additionally, the applicant would only use marked channels for egress and entry into Kawaihae Harbor. The float ring and feed barge would not likely make contact with benthic substrates containing EFH.

Deployment and retrieval of the feed barge from Honokohau Harbor would not be expected to involve any risk to nearshore benthic EFH. The applicant would use only marked channels when deploying and retrieving the feed barge from Honokohau Harbor and NMFS expects no impacts to benthic EFH or nearshore coral reefs. The applicant has demonstrated its ability to safely deploy and retrieve aquaculture gear during the previous Velella trials.

Accidents involving support vessels

The applicant would use large support vessels, approximately 78 ft length overall, during stocking and harvest operations. Staff would conduct routine maintenance using smaller vessels such as recreational vessels or inflatable boats. The applicant would only employ qualified, experienced vessel operators during stocking and harvest operations, and the applicant's staff are experienced with smaller watercraft. The dangers from grounding or sinking when operating these vessels during the proposed action would not be any greater than for vessels currently operating in the area. No project vessel accidents or groundings occurred during the previous Velella trials, and NMFS does not expect these events to occur during the proposed action. Therefore, support vessels associated with the proposed action would not likely increase risks to EFH in any way.

Velella Delta Array components detach during deployment

If any Velella Delta Array component became detached during the project, the GPS transponders would send an alert to the monitoring station and the applicant's cell phones once the component had left the proposed action area. The emergency plans call for notifying the USCG, NMFS, and the USACE; and staff would immediately retrieve the gear. Based on distance from shore, wind,

and average surface current velocity, the applicant would likely retrieve any wayward gear before it could harm nearshore EFH.

If the net pen were to become detached from the float ring with a flooded ballast tank, it would sink to the bottom in deep waters below designated EFH. NMFS expects any fish inside the cage at the time of the sinking to die because the cage would not be accessible, and the fish would be trapped with no food.

Aquatic Invasive Species:

Vessels used for operations are located on the west side of the Island of Hawaii so they are unlikely to introduce invasive species from another location. The applicant would use only new materials, or thoroughly cleaned materials for the Velella Delta Array and associated components to ensure that invasive species are not transported to or from the offshore project site. At the end of the project, the in-water components will be thoroughly cleaned before being transported back to shore.

5.10 National Historic Preservation Act (NHPA)

Section 106 of the NHPA requires an agency to "take into account the effect of (an) undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register (of Historic Places)" 16 U.S.C. § 470f. "Effect" is defined in the regulations to mean, "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register" (34 CFR 800.16(i)). "Historic property" means "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria." (34 CFR 800.16(l)(1)).

There may be qualifying historical properties at Kaloko-Honokohau National Historical Park and Honokohau Settlement National Historic Landmark on State lands on either side of Honokohau Small Boat Harbor and marine waters in the immediate proximity of Honokohau Small Boat Harbor (see Appendix F. Maps). The proposed activities will not affect these properties. The activities would not be different than those currently occurring near these sites. As described in Section 1.4, the proposed action would involve a limited number of support vessels entering and exiting Honokohau Small Boat Harbor on a daily or weekly basis to transport feed and staff. The use of small inflatable and other support vessels as described in Section 1.4.6 would be well within current levels of vessel activity in the area.

There are qualifying historic properties and structures adjacent to Kawaihae Harbor at Pu`ukoholā Heiau National Historic Site administered by the U.S. National Park Service (see Appendix F. Maps). The proposed action would marginally increase traffic near historic sites. The net pen would be constructed, deployed, and returned to Kawaihae Harbor. Activities allowed under the proposed SCREFP would not have any foreseeable impacts to the site.

The proposed action would occur within an area that is used by native Hawaiians and others for pelagic fishing (such as troll and handline). The small size of the array and limited duration of the trial (2 years) would not preclude or otherwise interfere with fishing in this area.

NMFS is unaware of any additional records of archaeological resources or property eligible for inclusion in the National Register at the proposed action site. In 2011, NMFS sent a letter documenting this determination to the Hawaii State Historic Preservation Division. In 2013, Michael Vitousek of the State of Hawaii DLNR Historic Preservation District confirmed their records contain no known archaeological resources within the action area. Accordingly, NMFS has determined that the proposed activity does not have the potential to cause effects to historical properties, assuming historic properties are present, and no further obligations are required under NHPA section 106 (36 CFR 800.3).

6.0 Preparers and Persons Consulted

6.1 Preparers

Staff from NMFS Pacific Islands Regional Office (PIRO), Sustainable Fisheries Division (SFD):

David Nichols, Fisheries Management Specialist - Aquaculture (Project Lead)
Melanie Brown, Supervisory Fish and Wildlife Administrator
Lewis Van Fossen, Resource Management Specialist (Draft EA, other drafts)
Mary Wunderlich, Resource Management Specialist (Draft EA, other drafts)

NMFS Reviewers:

Phyllis Ha, Resource Management Specialist, SFD, PIRO
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USACE Reviewers:

Kate Bliss, Regulatory Biologist, USACE

6.2 Summary of Public Review and Comments

NMFS made the draft EA available for a 21-day public review and comment period (FR 81 4021; January 25, 2016). NMFS received comments through online submittals made at www.regulations.gov at the docket location for this project (RIN 0648-XD961).

NMFS received a total of 13 unique comment letters or postings. Eight comment postings were from individuals including community residents. Three comment letters were received from representatives of 3 non-profit organizations. One comment letter was from the Hawaii

Department of Transportation and one comment posting was from the Federal Aviation Administration.

One commenter requested an extention of the public comment period. NMFS declined to extend the public comment period and promptly informed the requestor by letter of the agency's decision and reasons. A summary of the reason is in the summary table in Appendix H.

NMFS considered all comments as it finalized the EA and FONSI. The comments are also being considered by NMFS in its decision about whether to issue the SCREFP, and whether any additional terms and conditions should be added to the proposed SCREFP.

NMFS summarized the commenters' concerns and provides agency responses in Appendix H. Comment letters are available online at www.regulations.gov, (search on "RIN 0648-XD961") and will be retained in agency files.

As a result of comments, NMFS made the following changes to the draft EA:

- Minor typographic improvements.
- NMFS added more detail about the specifications of the nylon lashing twine (section 1.4.6) and the sufficiency of this lashing was re-evaluated.
- Minor informational change made to Section 1.4.6. Water Quality Testing and information was added to Section 4.1.1, Potential Impacts to Water Quality.
- Suggested alternative to cultivate a different number of fish was added to section 2.3 of the EA (Alternatives Initially Considered but Rejected from Detailed Consideration).
- NMFS added information about the suggested alternatives (requiring a fine be paid for past fish escapes; and including a fine for fish escapes in the proposed SCREFP) to section 2.3
- Information was added to Section 4.1.1 on antifouling and parasite reduction by copper mesh.
- Information was added to the EA Section 4.2.3 to help clarify the analysis of the potential impacts from disease and parasite transmission. Additional information regarding the spread of disease and parasites in comparison to salmon aquaculture facilities was also added.Information was added to Section 4.2.5, Potential Impacts to Protected Species. This information clarified the evaluation of the net pen configuration and entanglement risks.
- Section 4.2.5 was modified to reflect upgraded consideration of potential impacts to seabirds from lighting.

- Information was added to Section 4.6, Cumulative Impacts to further address potential impacts to climate change.

- Information was added to Section 4.3.2, Potential Impacts to Human Safety to address ciguatera concerns to human health and FAA guidance on wildlife attractants near airports,

- The EA was upgraded to clarify in section 4.6 (Cumulative Impacts) that future permit applications would also be evaluated separately for compliance with all applicable laws including NEPA. Section 4.6 was also updated to address concerns of the separate shoreside facility used to raise fingerlings.

- NMFS re-evaluated the potential degree of unknown risk (Section 4.8) to address modified gear design and potential for array to withstand high velocity current situations. NMFS clarified that the Orca Flex test did include performance of the net pen under hurricane conditions (Section 1.4.8. Emergency Response Operations: Possible Gear Failure or Accidents). The test found that the net pen and rings could withstand extreme conditions. This information was already in the draft EA in Appendix G and elsewhere.

- NMFS added a requirement to terms and condition #17 (Appendix B) of the proposed SCREFP that all marine lashings must be inspected on each in-person visit to the array. All marine lashings must be replaced, if required.

- The original SCREFP application has been incorporated into the EA in Appendix I.

In summary:

Some public comments resulted in improvements to the EA. NMFS re-evaluated certain impacts to ensure the effects analysis considered certain impacts in sufficient detail. We enhanced the explanation of potential impacts from a mass escape event. We sought further clarification from experts on the potential for escaped fish to prey upon other fishes. We clarified the explanation with respect to why parasite infestations and diseases are not expected to occur or biomagnify. No substantial changes to the EA, analysis, or findings were made as a result of public comments.

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Appendix A. Regulations

Title 50: Wildlife and Fisheries PART 665—FISHERIES IN THE WESTERN PACIFIC Subpart C—Hawaii Fisheries § 665.224 Permits and fees.

(a) *Applicability.* Unless otherwise specified in this subpart, §665.13 applies to Hawaii coral reef ecosystem permits.

(1) *Special permit.* Any person of the United States fishing for, taking or retaining Hawaii coral reef ecosystem MUS must have a special permit if they, or a vessel which they operate, is used to fish for any:

(i) Hawaii coral reef ecosystem MUS in low-use MPAs as defined in §665.199;

(ii) Hawaii Potentially Harvested Coral Reef Taxa in the coral reef ecosystem management area; or

(iii) Hawaii coral reef ecosystem MUS in the coral reef ecosystem management area with any gear not specifically allowed in this subpart.

(2) *Transshipment permit.* A receiving vessel must be registered for use with a transshipment permit if that vessel is used in the Hawaii coral reef ecosystem management area to land or transship PHCRT, or any Hawaii coral reef ecosystem MUS harvested within low-use MPAs.

(3) *Exceptions.* The following persons are not required to have a permit under this section:

(i) Any person issued a permit to fish under any FEP who incidentally catches Hawaii coral reef ecosystem MUS while fishing for bottomfish MUS, crustacean MUS, western Pacific pelagic MUS, precious coral, or seamount groundfish.

(ii) Any person fishing for Hawaii CHCRT outside of an MPA, who does not retain any incidentally caught Hawaii PHCRT; and

(iii) Any person collecting marine organisms for scientific research as described in §665.17, or §600.745 of this chapter.

(b) *Validity.* Each permit will be valid for fishing only in the fishery management area specified on the permit.

(c) *General requirements.* General requirements governing application information, issuance, fees, expiration, replacement, transfer, alteration, display, sanctions, and appeals for permits are contained in §665.13.

(d) *Special permit.* The Regional Administrator shall issue a special permit in accordance with the criteria and procedures specified in this section.

(1) *Application.* An applicant for a special or transshipment permit issued under this section must complete and submit to the Regional Administrator a Special Coral Reef Ecosystem Fishing Permit Application Form issued by NMFS. Information in the application form must include, but is not limited to a statement describing the objectives of the fishing activity for which a special permit is needed, including a general description of the expected disposition of the resources harvested under the permit (*i.e.*, stored live, fresh, frozen, preserved, sold for food, ornamental, research, or other use, and a description of the planned fishing operation, including location of fishing and gear operation, amount and species (directed and incidental) expected to be harvested and estimated habitat and protected species impacts).

(2) *Incomplete applications.* The Regional Administrator may request from an applicant additional information necessary to make the determinations required under this section. An applicant will be notified of an incomplete application within 10 working days of receipt of the application. An incomplete application will not be considered until corrected in writing.

(3) *Issuance.* (i) If an application contains all of the required information, the Regional Administrator will forward copies of the application within 30 days to the Council, the USCG, the fishery management agency of the affected state, and other interested parties who have identified themselves to the Council, and the USFWS.

(ii) Within 60 days following receipt of a complete application, the Regional Administrator will consult with the Council through its Executive Director, USFWS, and the Director of the affected state fishery management agency concerning the permit application and will receive their recommendations for approval or disapproval of the application based on:

(A) Information provided by the applicant;

(B) The current domestic annual harvesting and processing capacity of the directed and incidental species for which a special permit is being requested;

(C) The current status of resources to be harvested in relation to the overfishing definition in the FEP;

(D) Estimated ecosystem, habitat, and protected species impacts of the proposed action; and

(E) Other biological and ecological information relevant to the proposal. The applicant will be provided with an opportunity to appear in support of the application.

(iii) Following a review of the Council's recommendation and supporting rationale, the Regional Administrator may:

(A) Concur with the Council's recommendation and, after finding that it is consistent with the goals and objectives of the FEP, the national standards, the Endangered Species Act, and other applicable laws, approve or deny a special permit; or

(B) Reject the Council's recommendation, in which case, written reasons will be provided by the Regional Administrator to the Council for the rejection.

(iv) If the Regional Administrator does not receive a recommendation from the Council within 60 days of Council receipt of the permit application, the Regional Administrator can make a determination of approval or denial independently.

(v) Within 30 working days after the consultation in paragraph (d)(3)(ii) of this section, or as soon as practicable thereafter, NMFS will notify the applicant in writing of the decision to grant or deny the special permit and, if denied, the reasons for the denial. Grounds for denial of a special permit include the following:

(A) The applicant has failed to disclose material information required, or has made false statements as to any material fact, in connection with his or her application.

(B) According to the best scientific information available, the directed or incidental catch in the season or location specified under the permit would detrimentally affect any coral reef resource or coral reef ecosystem in a significant way, including, but not limited to, issues related to spawning grounds or seasons, protected species interactions, EFH, and habitat areas of particular concern (HAPC).

(C) Issuance of the special permit would inequitably allocate fishing privileges among domestic fishermen or would have economic allocation as its sole purpose.

(D) The method or amount of harvest in the season and/or location stated on the permit is considered inappropriate based on previous human or natural impacts in the given area.

(E) NMFS has determined that the maximum number of permits for a given area in a given season has been reached and allocating additional permits in the same area would be detrimental to the resource.

(F) The activity proposed under the special permit would create a significant enforcement problem.

(vi) The Regional Administrator may attach conditions to the special permit, if it is granted, consistent with the management objectives of the FEP, including, but not limited to:

(A) The maximum amount of each resource that can be harvested and landed during the term of the special permit, including trip limits, where appropriate.

(B) The times and places where fishing may be conducted.

(C) The type, size, and amount of gear which may be used by each vessel operated under the special permit.

(D) Data reporting requirements. (E) Such other conditions as may be necessary to ensure compliance with the purposes of the special permit consistent with the objectives of the FEP.

(4) *Appeals of permit actions.* (i) Except as provided in subpart D of 15 CFR part 904, any applicant for a permit or a permit holder may appeal the granting, denial, conditioning, or suspension of their permit or a permit affecting their interests to the Regional Administrator. In order to be considered by the Regional Administrator, such appeal must be in writing, must state the action(s) appealed, and the reasons therefore, and must be submitted within 30 days of the original action(s) by the Regional Administrator. The appellant may request an informal hearing on the appeal.

(ii) Upon receipt of an appeal authorized by this section, the Regional Administrator will notify the permit applicant, or permit holder as appropriate, and will request such additional information in such form as will allow action upon the appeal. Upon receipt of sufficient information, the Regional Administrator will rule on the appeal in accordance with the permit eligibility criteria set forth in this section and the FEP, as appropriate, based on information relative to the application on file at NMFS and the Council and any additional information, the summary record kept of any hearing and the hearing officer's recommended decision, if any, and such other considerations as deemed appropriate. The Regional Administrator will notify all interested persons of the decision, and the reasons therefore, in writing, normally within 30 days of the receipt of sufficient information, unless additional time is needed for a hearing.

(iii) If a hearing is requested, or if the Regional Administrator determines that one is appropriate, the Regional Administrator may grant an informal hearing before a hearing officer designated for that purpose after first giving notice of the time, place, and subject matter of the hearing in the Federal Register. Such a hearing shall normally be held no later than 30 days following publication of the notice in the Federal Register, unless the hearing officer extends the time for reasons deemed equitable. The appellant, the applicant (if different), and, at the discretion of the hearing officer, other interested parties, may appear personally and/or be represented by counsel at the hearing and submit information and present arguments as determined appropriate by the hearing officer. Within 30 days of the last day of the hearing, the hearing officer shall recommend in writing a decision to the Regional Administrator.

(iv) The Regional Administrator may adopt the hearing officer's recommended decision, in whole or in part, or may reject or modify it. In any event, the Regional Administrator will notify interested persons of the decision, and the reason(s) therefore, in writing, within 30 days of receipt of the hearing officer's recommended decision. The Regional Administrator's action constitutes final action for the agency for the purposes of the Administrative Procedure Act.

(5) Any time limit prescribed in this section may be extended for good cause, for a period not to exceed 30 days, by the Regional Administrator, either upon his or her own motion or upon written request from the Council, appellant or applicant stating the reason(s) therefore.

Appendix B. Terms and Conditions

Pursuant to Federal regulations found in 50 CFR 665.224, the Regional Administrator may attach conditions to the special permit as may be necessary to ensure compliance with the purposes of the special permit consistent with the management objectives of the Fishery Ecosystem Plan for the Hawaii Archipelago. Failure of the holder of a special permit to comply with the terms and conditions of a special permit is grounds for revocation, suspension or modification of a special permit. Any action taken by the Regional Administrator to revoke, suspend, or modify a special permit will be governed by 15 CFR 904 subpart D and 50 CFR 665.224.

The permit holder shall conduct operations in accordance to the terms and conditions of the special permit, detailed below. NMFS may impose additional conditions under this permit as determined reasonable or necessary to ensure safety of personnel and the environment.

The following terms and conditions apply to the Special Coral Reef Ecosystem Fishing Permit:

1. The special permit authorizes the operation of the Velella Delta Array as described in section 1.4 in the 2016 Environmental Assessment for this permit;

2. The special permit holder shall comply with all applicable Federal, State and county laws, rules and regulations;

3. The special permit holder shall comply with all applicable Federal fishing regulations found in 50 CFR part 665 subpart A and subpart C, including but not limited to reporting and landing notification requirements;

4. The special permit authorizes the use of the 1,018 m^3 (36,600 ft^3) Velella Delta Array net pen as analyzed in the 2016 Environmental Assessment for this permit;

5. The Almaco jack (*Seriola rivoliana*) is the only species approved for stocking of and harvest from the Velella Delta Array. No other federally-managed species is approved for stocking, culturing, or harvesting under this permit;

6. The special permit authorizes the use of the Velella Delta Array to culture and harvest no more than 30,000 individual fish during the term of the permit;

7. Prior to stocking with fish, the Velella Delta feed barge and float ring both must be equipped with an operational radio transmitter/radar reflector buoy(s), and/or an approved gear tracking system (e.g., satellite tracking, GPS);

8. The culture and harvest activities authorized under the special permit are confined to within Federal waters west of Keauhou, Hawaii, bounded by points on a circle approximately 1.75 nautical miles in radius around the following coordinates which are the approximate location of a single point mooring in deep waters:

   19° 33' North; 156° 04' West;

9. With the exception of vessel and gear provisioning, powered transit to and from Federal waters, stocking, transporting harvested fish, and activities related to the installation of experimental equipment at the site, the activities authorized under the special permit may not be conducted within marine waters of the State of Hawaii (0-3 nm), or within the boundaries of the Hawaiian Islands Humpback Whale National Marine Sanctuary;

10. The permit holder must only use marked channels when entering and exiting harbors when operating support vessels;

11. The permit holder must install and remove the array and associated structures, including transport of these to and from shore only during a sea state of 3 (short and moderate waves) or less on the Douglas sea state scale to avoid uncontrolled movement and loss of structures and materials;

12. The permit holder must only operate small (less than 20 ft) vessels for resupply and maintenance during a sea state of 3 (short and moderate waves) or less on the Douglas sea state scale. This condition is intended to reduce the risk of accidental groundings and fuel spills into the marine environment;

13. The permit holder must not operate support vessels at speeds greater than ten (10) knots except in cases of emergency. This condition is intended to reduce the risk of collisions with protected species;

14. The permit holder must secure (i.e., lash down) fuel cans aboard support vessels during transit to, and from, the Velella Delta Array. This condition is intended to reduce the risk of accidental fuel spills into the marine environment;

15. The permit holder must only pass fuel cans between the Velella Delta Array and support vessels after ensuring that all caps on the fuel cans are secure (i.e., tight);

16. The special permit holder shall monitor the condition of the Velella Delta Array on a continual basis, including fish within the Velella Delta Array's net pen to the extent possible. When weather and ocean conditions do not permit physical or remote monitoring, monitoring shall resume as soon as possible;

17. The permit holder must inspect all lines, connections, shackles, hard points on the feed barge and net pen during weekly inspections. The permit holder will repair all damaged components as soon as possible taking into account human safety;

18. The permit holder shall monitor feeding to minimize excess nutrient inputs into the environment;

19. The permit holder shall sample and analyze water samples at four stations 50 ft from the float ring at a depth of 100 ft every month. The stations shall be directly north, east, south and west of the float ring. The permit holder shall analyze the samples dissolved oxygen content and turbidity. The permit holder shall provide NMFS with annual reports of water quality testing results from around the Velella Delta Array by January 31 of the following year;

20. The permit holder must only enter the net pen after raising it to the surface. Additionally, the permit holder must not enter the net pen unless the net on the inside of the net pen's handrail is intact and must prevent cultured fish from escaping into the ocean. This condition is intended to reduce the probability that cultured fish will escape;

21. Dead fish shall not be disposed of in the surrounding waters, but shall be removed from the site and disposed of at a County-approved site;

22. The use of prophylactic antibiotics, medications, chemicals, or other treatments shall not be allowed;

23. The permit holder shall not employ lethal shark deterrents;

24. The special permit holder must comply with the Velella Delta Array Project Emergency Reporting Plan (Appendix D) and the Marine Protected Species Monitoring and Reporting Plan (Appendix E) for the duration of the permit;

25. NMFS PIR reserves the right to inspect and/or provide an observer to the array to monitor the operation as necessary;

26. The special permit holder will clean the float ring, net pen, and feed barge of large accumulations of biofouling and identifiable invasive species before returning to port;

27. The special permit is non-transferable, without specific authorization from NMFS;

28. In issuing the permit, Regional Administrator, NMFS PIR has relied on the information and data that the permit holder has provided in connection with the permit application. If, subsequent to the issuance of the permit such information and data have proved to be false, incomplete or inaccurate, this permit may be revoked, suspended or modified; and

29. Failure to comply with the terms and conditions of the special permit is grounds for revocation, suspension or modification of the special permit.

Notification

The special permit holder must contact the appropriate NMFS official in Hawaii at least 24 hours before landing any Coral Reef Ecosystem Management Unit Species harvested under a special permit, and report the port and the approximate date and time at which the catch will be landed.

The permit holder, Kampachi Farms, LLC, shall be responsible for complying with all applicable maritime and other civil laws in the conduct of its activities under the permit. As with all permits NMFS issues, compliance will be subject to enforcement by NOAA law enforcement officers. The USCG is also authorized to enforce Magnuson-Stevens Fishery Conservation and Management Act regulations.

Other terms

The SCREFP is valid for two years after the date of issue.

Nothing in the permit shall be construed to preclude the institution of any legal action or relieve the permit holder from any responsibilities, liabilities, or penalties established pursuant to any applicable Federal, state, or local statute or regulations. Nothing in the permit shall be construed to preclude the institution of any legal action or relieve the permit holder from any responsibilities, liabilities, or penalties to which the permit holder is or may be subject under applicable Federal, state, or local law or regulation. Nothing in the permit shall be construed to convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of or violation of Federal, state, or local laws or regulations.

Appendix C. National Marine Fisheries Service Official Information Collection

1. Special Permit/Low-use Marine Protected Areas Coral Reef Taxa Daily Catch Report Form - OMB Control Number 0648-0462 (Expires 10/31/2018)

2. NMFS Transshipment Log for Coral Reef Ecosystem Management Unit Species Form – OMB Control Number 0648-0462 (Expires 10/31/2018)

National Marine Fisheries Service
Pacific Islands Fisheries Science Center

OMB Control No. 0648-0462
Expires: 10/31/2018

Special Permit/Low-use Marine Protected Areas

Coral Reef Taxa Daily Catch Report

Name of Licensee: _____ Coral Reef Ecosystem Permit No.:_____
Vessel Name: _____Radio Call Sign: _____Vessel Number: _____
Area Fished; _____ (follow regional fishing area designations)
Type of Gear Used (one report form for each haul with each gear type per day):_____
Date Gear Set:_____/____/____ Time at Start:_____ Units of Gear Set: ___ Units of Gear Lost:__
Date Gear Hauled:_____/____/ Time at End: _____
_____

Wind Speed: _____ Wind Direction:_____ Sea Surface Temperature: _____ Average Depth:_____

Target Species (list all):_____
Observer on board?_____
If gear was lost, give explanation as to reason why (no penalty for lost gear)._____
_____

Describe any observed damage to the coral reef and how it occurred. _____
_____

Species	No. Caught	Lb. Caught	No. Kept	Lb. Kept	If discarded, why?	How processed?

Protected Species* Observations and Interactions

Enter Seal & Turtle numbers: specify other and number	Monk Seal	Turtle	Other (Species name and number)
Observed in area			
Observed in vicinity of gear			
Interfering with fishing operations			
Preying on catch			
Entangled released alive			
Entangled released dead			

*Protected species include all whales, dolphins, seabirds, and scalloped hammerhead sharks.

I certify that the above information is complete and true to the best of my knowledge:

Print Name: _____ Signature: _____ Date: _____

It is prohibited to falsify or fail to make, keep, maintain, or submit any logbook or logbook form or other record or report (50 CFR 665.15(c)).
All information must be logged within 24 hours after the completion of the fishing day.
Submit this form to NMFS at the following address within 30 days of each landing of coral reef harvest: NMFS Pacific Island Fisheries Science Center, Fishery Monitoring Branch, 1845 Wasp Blvd., Bldg. 176, Honolulu, HI 96818

OMB Control No. 0648-0462
Expires: 10/31/2018

NMFS Transshipment Log for Coral Reef Ecosystem Management Unit Species

Vessel:_____ Permit No.:_____ Date:____/____/____
(Vessel receiving fish)

Broker or Shipping Agent:

Vessel:_____ Radio Call Sign:_____
(Vessel offloading fish) Permit Number:_____
Total number of days fished:_____ Type of Gear Used: _____
Average units of gear set per day:_____ Area of Catch:_____

Species	Number Received	Total Weight Received (Lb.)

I certify that the above information is complete and true to the best of my knowledge:

Print Name:_____ Signature:_____ Date:___/____/_____
(Vessel captain / operator)

It is prohibited to falsify or fail to make, keep, maintain, or submit any logbook or logbook form or other record or report (50 CFR 665.15(c)).
All required information must be recorded on the form within 24 hours after the day of transshipment. Submit report to National Marine Fisheries Service at the address below within 7 days following the date the vessel arrived in port to land transshipped fish.

Send log to: NMFS Pacific Island Fisheries Science Center, Fishery Monitoring Branch, 1845 Wasp Blvd., Bldg. 176, Honolulu, HI 96818.
Phone: (808) 725-5360, Fax: (808) 725-5475

[SAMPLE]

Appendix D. Emergency Reporting Plan

Kampachi Farms
Project Emergency Reporting Plan
Velella Delta Project

1. Contacts

a. The NMFS designated Point of Contact is:

David Nichols
Fisheries Management Specialist - Aquaculture
NMFS PIRO
(808) 725-5180
Email: david.nichols@noaa.gov

b. The U.S. Army Corps of Engineers (USACE) Point of Contact is:

Regulatory Chief
Honolulu District
Regulatory Branch
Phone: 808-835-4303
Email: CEPOH-EC-R@usace.army.mil

c. The U.S. Coast Guard Point of Contact is:

LCDR John MacKinnon
Command Center Chief
U.S. Coast Guard, 14th District
Phone: 808-535-3333

2. Notifications

a. NMFS will be notified immediately if any of the following occur:

1) Failure of any major component of the Velella Delta Array including any tether, mooring line, or other component including the feed barge, float ring, net pen, feeding hose, camera, buoy, or anchor; or damage (either willful or unintentional) to the Velella Delta Array's materials or equipment by any third party, or any physical contact between the Velella Delta Array and any third party.

2) Escape of any fish from the Velella Delta Array.

3) Mass mortality of fish in the Velella Delta Array.

4) An interaction with any marine mammal, sea turtle, or Endangered Species Act-listed seabird that results in injury.

5) Release or spill of any toxic or hazardous material.

b. Kampachi Farms shall immediately notify the U.S. Coast Guard if failure of any major component of the Velella Delta Array occurs that results in a detachment of the vessel, float ring, net pen, or spill.

3. Reporting

Kampachi Farms shall report:

a. Any gear lost during activities to NMFS, USCG, and USACE immediately.

b. Within 30 days of the end of the permit period, a summary report to NMFS of any contingencies that occurred and how they were addressed.

4. Repairs

Kampachi Farms shall repair any malfunctioning or damaged Velella Delta Array component as soon as safely possible and notify the NMFS POC of repair progress on a daily basis until repairs are completed.

Appendix E. Marine Protected Species Monitoring and Reporting Plan

KAMPACHI FARMS
Marine Protected Species Monitoring and Reporting Plan
Velella Delta Project

The goal of the Marine Protected Species Monitoring and Reporting Plan is to ensure that there is no significant negative interaction between marine protected species and the Velella Delta project. Marine protected species are marine mammals, sea turtles, and Endangered Species Act (ESA)-listed seabirds.

1. **Contact**

The designated point of contact for NMFS is:

David Nichols
Fisheries Management Specialist - Aquaculture
NMFS PIRO
(808) 725-5180
Email: david.nichols@noaa.gov

2. **Reporting**

A designated representative of the permit holder shall:

a. Report immediately to NMFS:

1) Any observed or reported direct physical contact by any marine mammal, sea turtle, or ESA-listed seabird with any part of the float ring, net pen, feed barge, tether, or mooring lines; or

2) Any observed or reported injured or entangled marine mammal, sea turtle, or ESA-listed seabird within 100 m of any part of float ring, net pen, feed barge, tether, or mooring lines.

Reports submitted under 2.a(1) and 2.a(2) shall include the following information:

1) Species;
2) Date;
3) Time;
4) Position to the nearest minutes;
5) Sighting/Interaction information;
6) Number of animals involved;
7) Sighting method (e.g. remote, on-site, anecdotal)
8) Observer's name; and

9) Whether photos or videos were taken.

b. Report to NMFS any observed approach less than 10 m by any marine protected species to any part of the, float ring, net pen, vessel, tether, or mooring lines. The permit holder shall provide a brief description of the observation or incident including:

1) Species;
2) Date;
3) Time;
4) Position to the nearest minutes;
5) Sighting/Interaction information;
6) Number of animals involved;
7) Sighting method (e.g. remote, on-site, anecdotal)
8) Observer's name; and
9) Whether photos or videos were taken.

Report all marine mammal mortality and injuries due to the project immediately to NMFS by completing the Marine Mammal Authorization Program Mortality/Injury Reporting Form. All reports should be accompanied by a narrative of the event using the space provided on the front of the reporting form and photographs if possible.

3. **Monitoring**

Kampachi Farms may conduct marine mammal surveys in coordination with other entities at the Velella Delta Array.

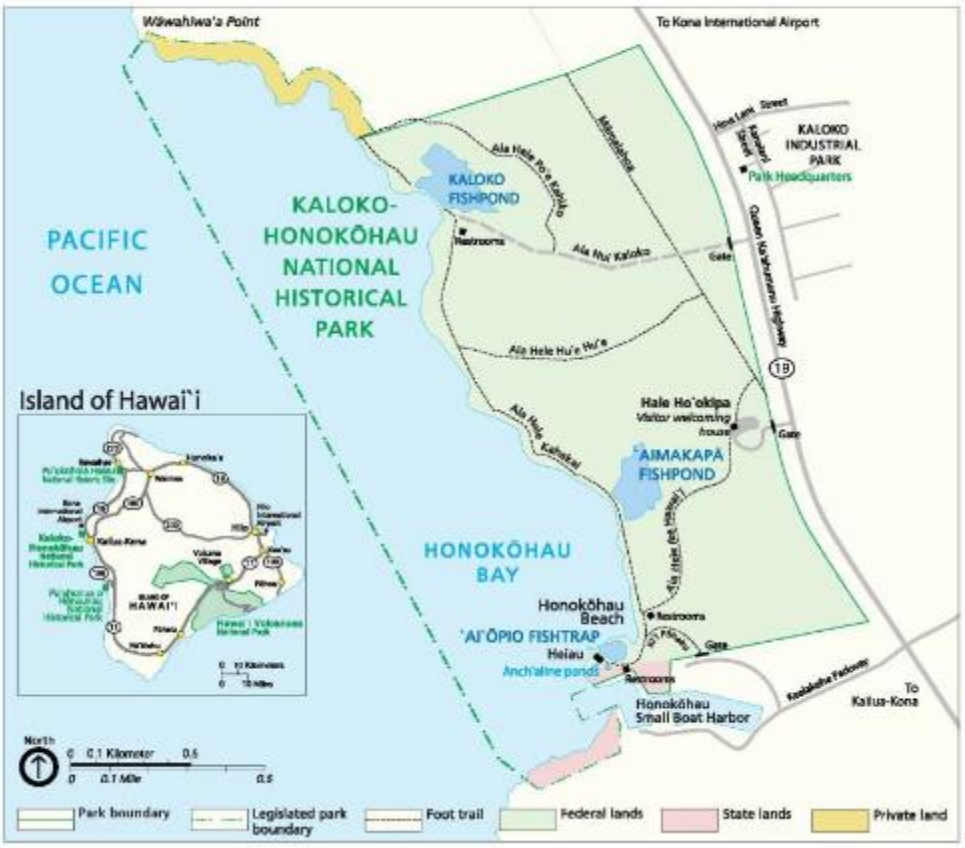
4. **ESA-listed Seabirds Near the Velella Delta Array**

The permit holder shall cease all surface activities, including stocking, harvesting operations, and routine maintenance operations when an ESA-listed seabird comes within 100 ft of the activity until the bird leaves the area. The permit holder shall report all interaction and sighting information to NMFS.

5. **Project Modification**

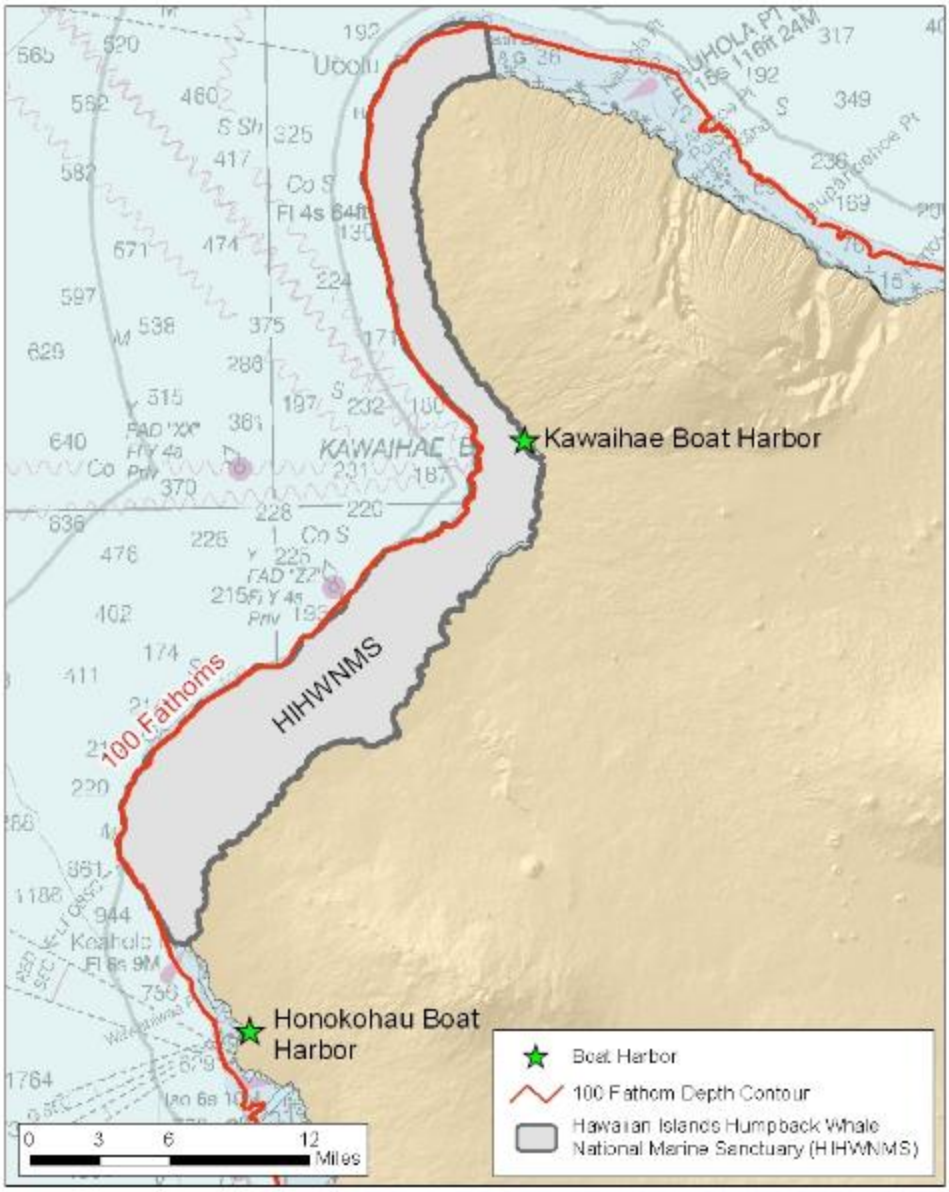
In the event of any instance of significant adverse impact on marine protected species (e.g., collision, entanglement, injury, etc.) is observed to be associated with the project, NMFS will coordinate a consultation as soon as possible between the permit holder and marine protected species experts to determine the most appropriate course of action. After the consultation, NMFS will coordinate with Kampachi Farms and may recommend activity modifications. This could range from increased monitoring to immediate project shutdown and removal of the entire structure, depending on the severity of the impact and its likelihood of reoccurrence.

Appendix F. Maps

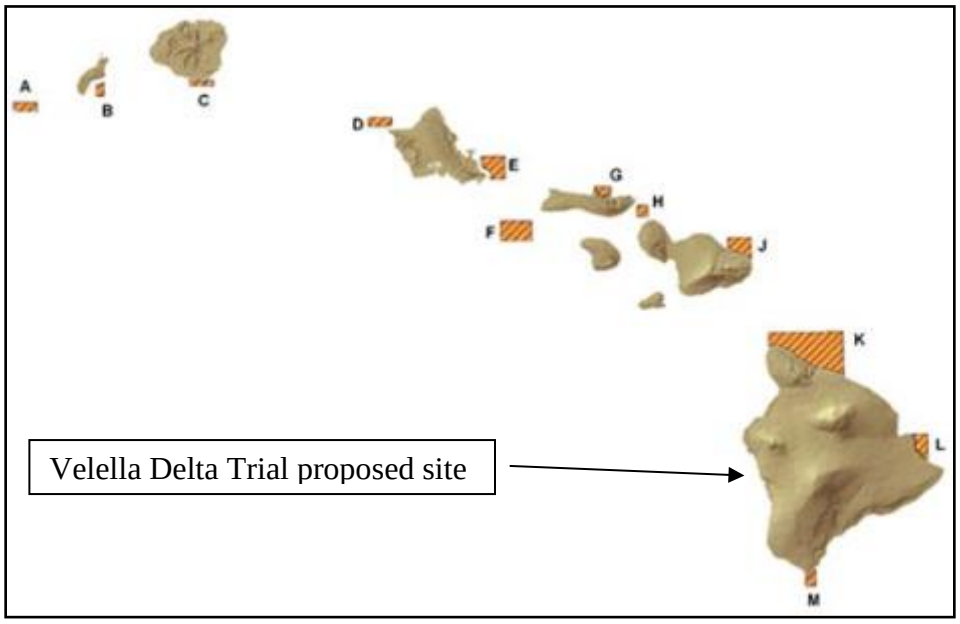


Map F-1. Map of Kaloko-Honokohau National Historical Park and the vicinity of the Honokohau small boat Harbor, Island of Hawaii.

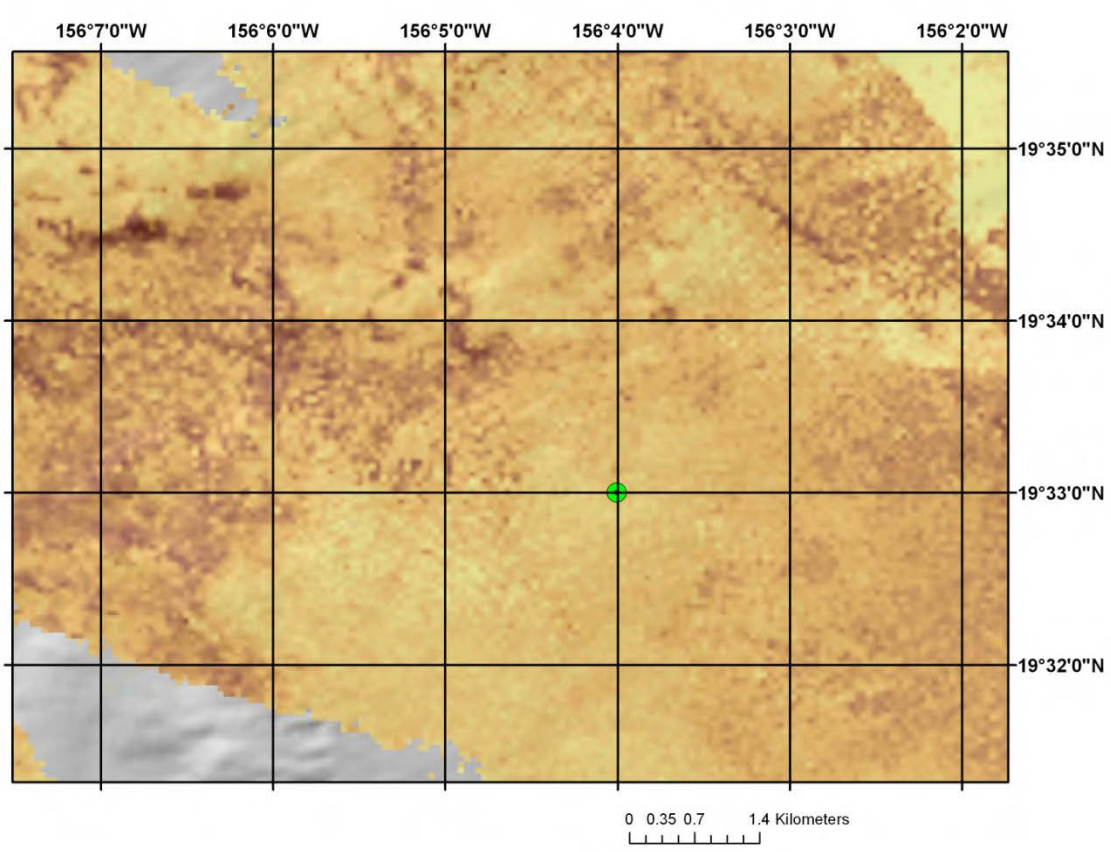
Source: National Park Service: http://www.nps.gov/kaho/planyourvisit/maps.htm



Map F-2. Map of Hawaiian Islands Humpback Whale National Marine Sanctuary boundary in relation to Kawaihae and Honokohau Boat Harbors.



Map F-3. General location of the Velella project relative to State of Hawaii Bottomfish Restricted Fishing Areas (shown in orange). Source of BRFA map: DLNR 2012



Map F-4. Plot of the general bottom topography of the project area using multi-beam backscatter data obtained off west Hawaii. Darker-colored areas indicate higher bottom rugosity; lighter colored areas indicate relatively flat areas with sediments.
Source: The plot was generated and provided to NMFS by Dr. Christopher Kelley, Hawaii Undersea Research Laboratory on September, 2013.

Appendix G. Orca-Flex Modeling

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. Texas A&M University's Offshore Technology Research Center has modelled the forces on the mooring line and other attachment points, and the dynamics of the Velella Delta Array, in Orca-Flex, for sea state conditions that were experienced at the mooring site during Hurricane Iniki, in 1992 (Table G-1: i.e., significant wave height of 4.7 m, or over 15 ft, wave period of 12 seconds, and current speed of 4 kt). The maximum wave height for these conditions is expected to be around 28 ft (9 m). Under these conditions, the mooring components are all within their minimum breaking load, and the mooring chain is not even lifted completely off the bottom (i.e., there is no lifting force on the concrete anchors). The net pen is lifted towards the surface, but is sufficiently stabilized by the ballast that it does not rise fully to the surface. The mean depth of the float ring is around 4 m (13 ft). In the Orca-Flex model, the leading edge of the float ring is submerged to around 4 m (13 ft), but in the Velella Delta Array, this will be supported instead by the mooring buoy or the feed barge. The slight deformation of the float ring is well within the tolerance limits of the double HDPE pipe.

Table G-1. Sea state conditions at the Velella mooring site during Hurricane Iniki, (Sims 2014)

Parameter	Value	Unit
Wave height (H_s)	4.7	m
Wave period (T_p)	12	s
γ	3.3	~
Current speed	2	m/s

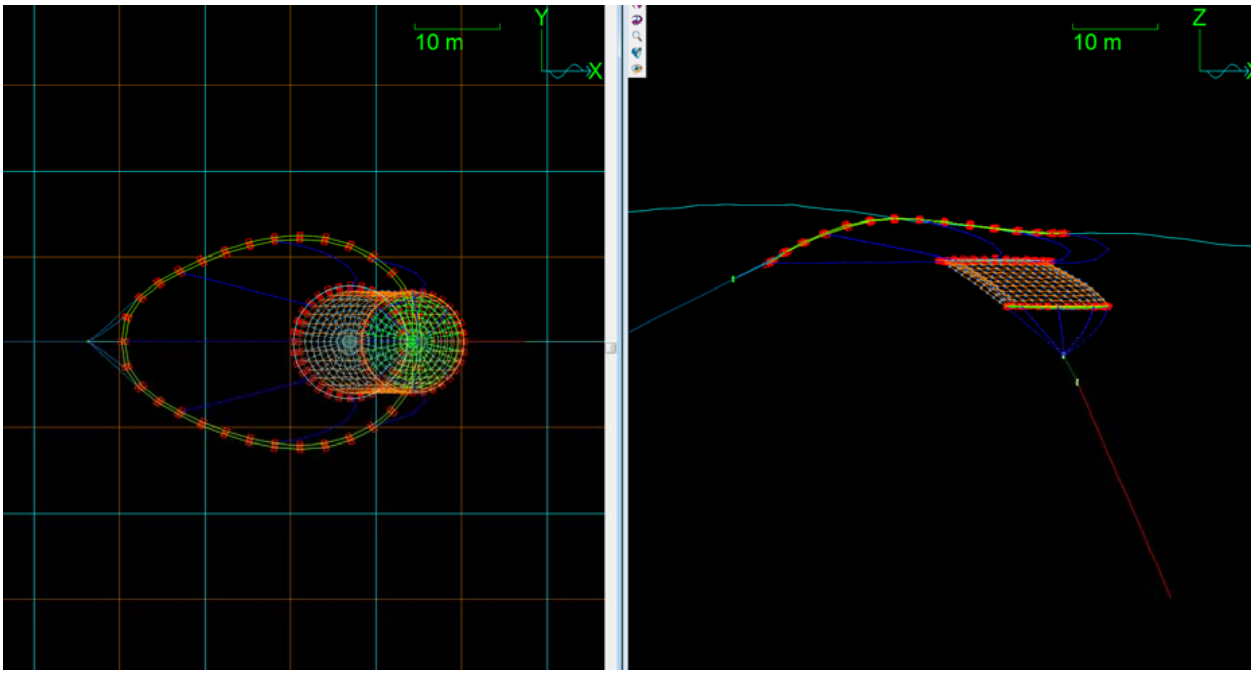


Figure G-2. Orca-Flex model simulation of the Velella Delta array under sea conditions similar to that experienced at the existing Velella mooring location during Hurricane Iniki (Sims 2014).

The unmanned barge will be equipped with extensive void spaces, 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. If a hurricane approaches the operating area during the course of the proposed action, 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 (see figure G-2 for model simulation).

Appendix H. NMFS Responses to Comments

Summary of National Marine Fisheries Service Responses to Public Comments on Draft Environmental Assessment for Proposed Issuance of a Permit to Authorize the Use of a Net Pen and Feed Barge Moored in Federal Waters West of the Island of Hawaii to Fish for a Coral Reef Ecosystem Management Unit Species, *Seriola rivoliana* (RIN 0648-XD961).

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
Comment 1: One commenter requested NMFS extend the comment period for the action to a minimum of 30-days, but preferably to 45-days. The commenter noted that another agency requires 30-day public comment periods for draft EAs. The commenter asserted that the public, their organization and their membership require more than 22 days to review the draft EA and prepare comments on the 135-page document. The commenter asserted that a 22 day comment period could	Response 1: NMFS considered the request for an extension and decided that the 21-day public review and comment period on the draft EA, which ran from January 25, 2016, through February 16, 2016, would not be extended. The Regional Administrator, NMFS Pacific Islands Regional Office, considered the circumstances of the project and the draft EA and determined that the 21 day public comment period was sufficient to provide interested members of the public with a meaningful opportunity to comment on the proposed action while allowing the agency to make a timely decision. NMFS communicated this to the commenter in a letter. NMFS disagrees the agency's public comment period is in violation of the Administrative Procedure Act (APA) or the National Environmental Policy Act (NEPA). NEPA, the Council on Environmental Quality (CEQ) regulations implementing NEPA, NAO 216-6, and the special permit regulations at 50 C.F.R. § 665.224(d) generally do not require NMFS to afford the opportunity to comment on a draft EA.	No change was made to the EA.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
constitute an arbitrary and capricious decision in violation of the Administrative Procedure Act (APA) and NEPA given the fact NMFS has allowed longer periods of time in other instances. (#005)		
Comment 2. One commenter asserted that the project purpose is for NMFS to 'issue a permit for the exact project put forward by the Applicant.' The commenter believes this is too narrow and excludes other alternatives available. The commenter suggested NMFS should revise the project purpose to accommodate a broader array of values and project configurations. (#008)	Response 2: NMFS did not present the project purpose as the commenter asserts. However, NMFS reconsidered whether the purpose and need was too narrow in the EA. The purpose and need are described in the EA, section 1.2. The purpose is the issuance of a SCREFP to authorize the harvest of kampachi farms using gear that has not been authorized by regulations. The authorization would allow the applicant to test a prototype open ocean net pen in a specific location. The applicant's proposed activities under the proposed SCREFP are described in the EA, section 1.3 "Proposed Federal Action." NMFS considered the proposed project presented in the application for a SCREFP consistent with the fishery regulations for Hawaii CRE fisheries and NEPA. NMFS disagrees that it should revise the applicant's project to accommodate the commenter's request for a broader scope of values and/or project configurations because the applicable regulation specifies the information to be submitted for a SCREFP. Upon receipt of the application and consistent with the NEPA, moreover, NMFS considered reasonable alternatives, including alternatives not considered in detail, regarding the proposed project. This information is described in the EA, sections 2.2 "Alternatives Considered in Detail" and 2.3 "Alternatives Initially Considered but Rejected from Detailed Consideration."	No change was made to the EA.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
Comment 3: One commenter asserted that NMFS followed an improper process when issuing the Special Coral Reef Ecosystem Fishing Permit (SCREFP) because the action was inconsistent with the Western Pacific Fishery Managements Council's (Council) aquaculture policy. (#013) <u>A similar comment by the same commenter asserted that NMFS does not have the proper regulatory authority to issue the SCREFP. (#013)</u>	Response 3: To date, NMFS has not received, reviewed, or approved a Council FEP amendment or promulgated regulations to manage and permit aquaculture. Moreover, NMFS is not proposing to issue a SCREFP under a Council aquaculture policy, nor is it required to do so. Rather, the SCREFP would be issued in accordance with the Council's Hawaii Archipelagic Fishery Ecosystem Plan (Hawaii FEP) and implementing regulations (50 C.F.R. § 665.224). The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1811(a)) provides NMFS with authority to manage fisheries in the U.S. EEZ. NMFS may issue a SCREFP under Federal regulations (50 CFR 665.224) to allow a permittee to fish for a coral reef ecosystem Management Unit Species (also referred to as a CRE MUS) with gear that is not authorized. Kampachi (*Seriola rivoliana*) is listed in regulations and the Hawaii FEP as a potentially harvested coral reef taxa or (PHCRT). The Velella Delta array is not an authorized gear that may be used to harvest Kampachi under the Council's Hawaii FEP; therefore NMFS evaluated the proposed action consistent with the applicable regulations. In *KAHEA, Food & Water Watch v NMFS*, 544 Fed Appx 675 (9th Cir. 2013), the Ninth Circuit Court of Appeals affirmed a lower court's ruling that the agency properly used a SCREFP to authorize the culture and harvest of coral reef MUS using an unapproved gear type. Finally, NMFS's decision to issue the SCREFP included consultation with the Council as required by the implementing regulations (50 CFR 665.224).	No change was made to the EA.
Comment 4: One commenter stated that by issuing the SCREFP, NMFS circumvented public input on	Response 4: NMFS has not implemented an aquaculture-permitting program for the Pacific Islands Region through the proposed action. Rather, NMFS proposes to issue a 2-year SCREFP under Federal regulations at 50 CFR 665.224, which regulate the use of unapproved gear types to harvest coral reef ecosystem Management Unit Species (CRE	No change was made to the EA.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
aquaculture permitting in Hawaii. (#013)	MUS), as described in the EA in section 1. Moreover, NMFS provided an opportunity for public review and comments on the proposed issuance of the SCREFP. NMFS also provided opportunities for the public to comment on the Coral Reef Ecosystem Fishery Ecosystem Management Plan (FMP) and implementing regulations at the time the FMP and regulations were promulgated.	
Comment 5: One commenter asserted that NMFS was violating NEPA by allowing aquaculture to proceed in piecemeal steps under separate SCREFPs citing past projects permitted under a SCREFP. The commenter stated in their comment that under this approach, cumulative and long-term impacts are unlikely to be adequately addressed. (#013)	Response 5: NMFS disagrees that the agency has improperly segmented the proposed action to avoid conclusions that a project would have a significant impact on the human environment. To date, NMFS has received three permit applications in total for SCREFPs. Each project permitted has had discrete beginning and end dates or proposed durations (first permit effective July 8, 2011 to July 8, 2012; second permit effective October 25, 2013 – October 24, 2014). Further, each activity has had independent utility and was separated by many months. At the time that NMFS received the applications for the first and second SCREFPs, the agency could not have anticipated future projects because NMFS only had the specific and distinct project proposals before it. The authorization of the first and second SCREFPs did not result in an automatic approval for any SCREFP. Although information obtained from previous SCREFP projects helps to inform the design and effects analysis of the proposed SCREFP, the previous projects will not result in an automatic approval of the proposed SCREFP. The current proposal is being evaluated as an independent project, and any environmental effects from one SCREFP trial project to the next are addressed in the analysis. Two previous trials of Velella arrays were returned to shore at the project conclusion.	The final EA was modified to include this information under section 4.6 Cumulative Impacts.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
	The EA describes the two previous SCREFP permits for similar projects in section 1.5 of the Draft EA, "Prior Permitted Culture-Harvest Projects in the Action Area." NMFS also evaluated Cumulative Effects of the proposed action in section 4.6 of the Draft EA. NMFS is not currently aware of any follow-on projects. Any future applications and project proposals would undergo NEPA and other compliance review once projects are proposed and can be subjected to meaningful analysis. The final EA was modified to include this information under section 4.6 Cumulative Impacts.	
Comment 6: One commenter stated that NMFS did not consider an adequate number of alternatives. The commenter provided several other alternatives the agency could consider including: a) raising all fish on-shore in a closed system, b) siting the project in a different location, c) cultivating non-carnivorous fish, d) cultivating fewer or more fish, and e) using a different pen type. (#008)	Response 6: The commenter proposed at least five additional alternatives the agency might consider. Initially, NMFS notes that, under NEPA, the agency is not required to consider all possible alternatives, but agencies are to consider a reasonable range of alternatives and, if needed, to incorporate features into projects that may be helpful in reducing adverse environmental impacts. A reasonable alternative is one that meets the agency's purpose and need for the action. Section 1.2 of the EA describes the purpose and need: the applicant is requesting that NMFS authorize a SCREFP in order that the applicant may fish for and harvest kampachi (*Seriola rivoliana*) using gear that is not authorized in the Hawaii FEP or implementing regulations. The applicant seeks to test a prototype net pen gear in an open ocean setting over a two year period. See the EA for more details. As more fully explained below, because the commenter's suggested alternatives do not meet the purpose and need, further evaluation of them is not warranted. First, the commenter proposes an alternative that NMFS would not authorize a SCREFP and would require the applicant to raise all fish onshore in a closed system. To the	Suggested alternative to cultivate a different number of fish was added to section 2.3 of the EA (Alternatives Initially Considered but Rejected from Detailed Consideration)

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
	extent this alternative requires denial of the SCREFP application, this is the No-action Alternative which NMFS did consider in the draft EA (Alternative 1). Moreover, to the extent that NMFS would need to examine effects of a closed onshore system, this alternative is not consistent with the purpose and need for action. The applicant requested the SCREFP for a specific project design which included testing of the fishing gear to raise kampachi in offshore marine waters, using a flow-through net pen array. Second, the commenter urges consideration of an alternative requiring that the applicant undertake the proposed project in a different location. Again, NEPA requires action agencies to consider feasible alternatives. A feasible alternative is one that is not remote or speculative, so long as it is reasonably related to the purpose of the project. However, NEPA does not require an agency to undertake separate analyses of alternatives that are not significantly distinguishable from alternatives actually considered. Here, the environmental advantages offered by the commenter of alternative siting are wholly speculative. We note that the applicant has had two successful trials at the proposed site, where there has been no documented adverse impacts to protected and fishery resources, navigation, commerce, or cultural properties. Analyzing alternate siting for the project would introduce signifcant costs to the applicant, including the cost of obtaining new permits and setting a new mooring, and the commenter has not offered any information suggesting that alternative siting would be substantially prefereable to the proposed site. For these reasons we reject an analysis of alternative siting. We do not believe that the agency is required to consider alternative sites in the absence of information that there would be distingishable impacts from the site that has been analyzed, particularly where the applicant is financially constrained to implement the action at the alternative site.	

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	Third, the commenter proposes to require the applicant to cultivate a non-carnivorous fish. However, the applicant proposes to test the gear in order to cultivate and harvest kampachi (*Seriola rivoliana*). Therefore, requiring the applicant to use the gear to test the feasibility of cultivating and harvesting a different species that would not be commercially marketable would not meet the purpose and need of this action. Furthermore, requiring the stocking of a different species of fish from the previous studies would defeat the utility of those prior studies, including the ability to compare differences between the types of gear, the health of the fish stock, and the effectiveness of the gear. Fourth, the commenter suggested an alternative that lowers the total number of fish that could be stocked per cycle and in total. However, requiring the applicant to stock the new gear type with a lower number of fish would not meet the purpose and need for the action. As described in the EA, section 1.3 (Proposed action), the applicant proposes to test a new gear type to cultivate and harvest *Seriola rivoliana*. The applicant proposed 15,000 individual fish per trial for the new gear-type to be consistent with the stocking density of the past gear type tested. The modified gear type proposed in this action is larger, with a stocking density of 0.29 kg per m^3. The stocking density of the previous Velella Gamma trial was 0.30 kg per m^3. Consistent stocking densities between trials would allow appropriate comparisons of fish growth and health to meet the purpose and need of the proposed project. NMFS will add this suggested alternative to section 2.3 of the EA (Alternatives Initially Considered but Rejected from Detailed Consideration), with an explanation that it is not considered in further detail because it does not meet the purpose and need of the action. Fifth, the commenter suggested an alternative requiring the applicant to use a different pen type. However, this suggested alternative would likewise not meet the purpose and need of the action. As described in the EA, section 1.3 (Proposed action), the applicant	

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	proposes to cultivate and harvest up to 15,000 individual fish per trial and conduct up to two trials over the course of two years. The proposed net pen is a new pen that the applicant seeks to test in terms of feasibility for use in the culture and harvest of kampachi. The proposed net pen is a modification from the net pen used in 2 previous trials, based on lessons learned from those trials. Testing the feasibility of the net pen is the purpose of the proposed project. Therefore, the proposed alternative of requiring a different net pen type does not meet the purpose and need for the project.	
Comment 7: One commenter asserted that the No Action Alternative does not equate to a no impact alternative. The commenter suggested that under the no-action alternative the applicant may move their operations to State or foreign waters. (#008)	Response 7: NMFS agrees with the commenter that a no-action alternative may not equate to no impact. The EA includes a description of the No Action Alternative (Alternative 1) in section 2.2 (Alternatives Considered in Detail). Under this alterative, the EA explains NMFS would not issue a SCREFP and the effect of selecting this alternative is that there would be a continuation of current conditions described in section 3 of the EA. NMFS has no information as to what course of action the applicant would pursue if the proposed action is not approved and carried out. NEPA does not require NMFS to speculate on future actions that may be taken by the applicant (or others) that are not reasonably certain to occur.	No change was made to the EA.
Comment 8: One commenter asserted that without being able to see the SCREFP, they (and other interested members of the public) could not determine whether the Draft EA addressed all of the	Response 8: The application submitted to NMFS provided the requisite information about the proposed action under the regulation. NMFS, however, worked with the applicant to flesh out the proposed action to enable NMFS to consider and evaluate it thoroughly. The EA represents the culmination of a two-year dialogue between NMFS and the applicant to capture the proposed project under this permit request. NMFS made the draft EA available for a 21-day public review and comment period in 2016 (81 FR 4021; January 25, 2016). Appendix B of the Draft EA provided the Terms and	The original SCREFP application has been incorporated into the EA in Appendix I.

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various issues related to the permit. The commenter requested NMFS post the SCREFP and EA and extend the public comment period to allow for comparison of the Draft EA with the SCREFP. The commenter also indicated that they wanted to review the SCREFP application.	Conditions of the proposed SCREFP. Appendix D is the Emergency Reporting Plan, and Appendix E is a Marine Protected Species Monitoring and Reporting Plan. We agree that the permit application should be made available to the public. We have incorporated the original SCREFP application into the EA in Appendix I. We note that the application itself represents only the applicant's initial submission. All additional measures, terms, and conditions associated with the application are reflected in the approved permit and EA.	
Comment 9: One commenter stated that by issuing the SCREFP, NMFS was establishing precedent for future aquaculture related actions. The comment letter asserted that the permit approval "is also part of NMFS' attempt to ramp up offshore aquaculture permitting and production in the Pacific Islands." (#008)	Response 9: NMFS disagrees that issuing the SCREFP establishes a precedent for future aquaculture related actions. The proposed SCREFP would be issued in accordance with fishery regulations pertaining to the harvest of coral reef ecosystem MUS using gear that is not specifically approved by regulation (50 C.F.R. § 665.224). The proposed action is not being authorized by an aquaculture permit. As described in the EA, section 4.6 (Cumulative Impacts), approval and issuance of a SCREFP would not automatically result in the approval of any future project including any future proposals for a SCREFP. All applications would be separately evaluated for compliance with all applicable laws including NEPA (EA, section 4.6). Approval of this SCREFP would not represent a precedent or decision in principle that is expected to increase future requests or that drives decisions in the future. Since issuing the initial SCREFP five years ago, NMFS has received only two applications for testing gear type of this nature. In addition, future requests for SCREFP permits will undergo project-specific and site-specific review as appropriate. Note that the EA describes a Council proposal under development and compliance review and that would, if approved, establish an aquaculture permitting and	The EA was upgraded to clarify in section 4.6 (Cumulative Impacts) that future permit applications would also be evaluated separately for compliance with all applicable laws including NEPA.

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	management program in the Western Pacific Region. The proposal is not yet available for review. The current proposal for a SCREFP is not related to that proposed aquaculture management program, although the activity provides information to NMFS that may be useful in environmental and project planning. The EA will be updated to clarify in section 4.6 (Cumulative Impacts] that future permit applications would also be evaluated separately for compliance with NEPA and all applicable laws (to clarify what "permitting procedures" means).	
Comment 10: One commenter stated that the proposed action involved unknown risks claiming that offshore fishing in Hawaii was in its infancy and that the net pen materials are a "new gear design" that modifies a design that is used in other countries. The commenter asserts that many of the risks and impacts are unknown. The commenter also asserts that "there is limited information NMFS can glean from the applicant's previous trials and it is unclear how a larger pen with a new gear configuration may hold up	Response 10: NMFS re-evaluated the potential degree of unknown risk. We note that the presence of uncertainty (missing information) does not automatically require the agency to prepare an EIS; however, the analysis of environmental effects must consider the potential effects of the project in view of missing information when evaluating the significance of potential impacts. The agency must explain in an EA what information is missing and whether the missing information is required in order to determine whether a proposed action would have a significant effect on the environment. In the EA, NMFS describes that the specific gear proposed to be tested is a modification of gear used in previous tests (CuPod gear) and a modification of net pens used in other parts of the world. The proposed gear is described in section 1.4.3 of the EA. Some aspects of the gear that are not new include the mooring, most of the mooring attachments, the use of a remotely-monitored feed barge and remote feeding mechanism, maintenance methods, and gear and fish monitoring systems and tracking systems. Modifications are designed to test a different net pen configuration. Part of the new configuration is intended to improve some aspects of the CuPod gear. Rather than using a spherical pen, the proposed gear employs a cylindrical net pen suspended below the surface from double floating rings. As was part of previous trials, having the net pen	This discussion was added to section 4.8 "Review of Uncertainty and Risk"

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under normal conditions or in strong storms and currents. NMFS should prepare an EIS." (#008)	suspended below the surface is intended to reduce stresses on the pen from wind and waves, which are stronger at the ocean's surface (EA, section 1.4.3). A ballast tank is another feature of the new pen design and is designed to maintain tension on the bridle lines which will maintain the shape of the pen in high velocity current situations (EA, section 1.4.3). The net pen would not be entered unless the pen is at the surface and net barriers are up to prevent fish escapes. The specific gear has not been tested on site, and the purpose of the project is to test the use of the gear to culture and harvest kampachi (EA, section 1.2). NMFS acknowledges there is uncertainty and unknown risks; however, NMFS concludes that the degree of uncertainty is reduced because many of the gear components (such as connectors, mooring line, and mooring configuration) have been tested in the field. New components have been tested using a computer stress modeling program which found that the gear is likely to be able to withstand environmental conditions of the site. Operations are expected to reduce the risk of fish escapes over previous net pen designs. NMFS considered the potential for gear failure in its evaluation of the potential impacts. The EA describes a range of potential emergency situations including partial or full gear failures (draft EA in section 1.4.8). The analysis of impacts considers impacts to the environment under the worst-case scenario of catastrophic failure. This additional discussion about uncertainty and level of risk has been added to the EA in a new section 4.8 entitled, "Review of Uncertainty and Risk" to clarify the issue in the EA.	
Comment 11: Two comment letters provided input that the project risked violating	Response 11: The EA documents NMFS's consideration of consistency with applicable laws. To help ensure the project is consistent with applicable laws, NMFS coordinated the project with a number of agencies and individuals listed in the Draft EA, section	No change was made to the EA

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Federal laws including the MMPA and MBTA. The comment stated that "…NMFS may, upon request, and provided certain conditions are met, authorize take [of marine mammals] in the form of harassment by an Incidental Harassment Authorization…] The comment letter noted a lack of a migratory bird permit from the USFWS. The comment indicated that if there is take associated with permit activities, the project could risk a violation of the MMPA and the MBTA. There were specific comments related to potential incidental take that will be addressed in subsequent responses. (#008, #013)	5.0. The draft EA includes a description of potentially affected marine mammals and seabirds, and other protected species (EA, section 3.2.2) and analyzed potential effects on protected species (EA, section 4.2.5). Additional documentation of compliance with applicable laws including the MMPA is in the EA, sections 5.0 and 5.7. NMFS is not aware of information that would result in a conclusion that the SCREPF and activities conducted under the SCREFP would violate any Federal, State or local law. With respect to the MMPA, under the 2016 List of Fisheries, Hawaii offshore (net) pen culture fisheries (comprising fixed pen facilities) are listed as a Category III commercial fishery that has a remote likelihood of or no known incidental mortality and serious injury (M&SI) of marine mammals (page 20566 in 81 FR 20550; April 8, 2016). By analogy, NMFS has no information to suggest impacts to marine mammals for the current project would be different (EA section 5.7). Summaries of two prior projects that deployed similar gear in the same general location did not report any entanglements or collisions with any protected species (Sims 2014; Sims and Key 2012). There were no reports of interactions between the net pen and Insular False Killer Whale (IFKW). There were no reports of collisions with seabirds. NMFS PIRO SFD in coordination with the USACE consulted with NMFS PIRO Protected Resources Division and the USFWS on the potential effects of the proposed action on ESA-listed species and their designated critical habitat. On December 2, 2015, NMFS determined that the proposed action may affect, but is not likely to adversely affect ESA-listed sea turtles and marine mammals and their designated critical habitat. On January 12, 2016, USFWS concurred with NMFS determination that the proposed action may affect, but is not likely to adversely affect ESA-listed seabirds (EA section 5.8).	The citation for the most current LOF was included in the EA Section 5.7. This change does not affect the analysis.

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	NMFS notes that the agency does not violate the MBTA by authorizing a project that raises the mere possibility, however remote, that a third party will incidentally take a migratory bird (PEER v Jewell, 25 F.Supp.3d 67 (DDC 2014)). In *Protect Our Communities v. Jewell* (June 7, 2016), the Ninth Circuit found that the "MBTA does not contemplate attenuated secondary liability on agencies when acting in a purely regulatory capacity, and whose regulatory acts do not directly or proximately cause the 'take' of migratory birds, within the meaning of 16 U.S.C. § 703(a)." NMFS' believes that its action in approving this permit falls within *Protect Our Communities*, and thus does not believe there is a violation of the MBTA by issuing this permit. Based on the evaluation of the proposed project and potential impacts, NMFS does not expect that activities under the proposed SCREFP are likely to result in take of marine mammals or harm seabirds. The agency will not request or require the applicant to obtain an IHA or MBTA permit. The citation for the List of Fisheries was updated in the EA.	
Comment 12: Several commenters asserted that NMFS did not adequately address the potential for cultured fish to spread disease and parasites to wild populations. Two commenters stated in their comments that cultured salmon transmit copepod parasites (sea lice) to wild salmon populations. #013, #008	Response 12: The commenters provided studies that would indicate disease reservoirs in fish farms create a significantly higher likelihood of exposure of wild fish to infectious agents (Gardner and Peterson 2003). In the case of sea lice, evidence is accumulating in salmon aquaculture that it does. However, these studies focused on salmon aquaculture facilities and has little relevance to this proposed kampachi net pen trial. As indicated in the Gardner and Peterson (2003) study, the chance of effective contact with pathogens is further increased by the siting of salmon farms on the migration routes of wild salmon. This is different than the proposed kampachi trial as the location of the net pen is in deep ocean water, well removed from the reef and deep bottom habitat of wild kampachi. The Grubman (2014) report notes an inherent risk of amplification and disease transmission in net pen aquaculture due to the high degree of connectivity between the	Information was added to Section 4.1.1 on antifouling and parasite reduction by copper mesh. Additional information regarding the spread of disease and parasites in

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	culture area and surrounding environment. While this may be true for kampachi operations nearer to shore, there is no scientific basis to assume this risk exists in the proposed trial 6 nm offshore in 6000 ft water depth. As mentioned above, this is well removed from the reef and deep bottom habitat of wild kampachi. As discussed in the EA section 4.2.3, the dynamics of infectious diseases and parasites are related to the density of the host population. High densities can lead to increased contact rates among individuals and result in increased transmission and persistence. While the applicant proposes to raise and harvest more kampachi than in previous trials, fish densities actually would be slightly less than in the previous experiments. With the Velella Beta and Gamma trials, skin fluke ectoparasite (*Neobenedenia* sp) infestation levels remained low throughout the grow-out cycle, usually below 5 flukes per fish, and was inconsequential to the health of the animal. By the conclusion of both the Beta and Gamma trials, 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 two preceding Velella trials. Furthermore, the risk of disease introduction and transmission is expected to be low for several reasons. Fish health will be closely monitored by researchers and staff. The fish used to stock the HALO net pen 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 have to originate 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-jacketed mesh, regular cleaning of the pen, and the unidirectional movement of water through the net pen. Should a disease outbreak occur or heavy parasite loading be detected, then all fish would be removed from the net pen and that portion of the trial concluded (pers. com.,	comparison to salmon aquaculture facilities was added to EA section 4.2.3. No other changes were made to the EA.

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	Neils Sims, Kampachi Farms, May 2016). NMFS would be informed of a disease outbreak, as well as the conlusion of this portion of the test trial. For these reasons, NMFS estimates that there would be a low likelihood of the cultured fish to spread diseases and parasites to wild populations. NMFS included additional information to section 4.1.1 regarding the copper mesh antifouling properties and to section 4.2.3 comparing disease and parasite transmission to salmon aquaculture facilities.	
Comment 13: One commenter provided input that NMFS did not assess the cumulative genetic effects to wild fish populations from past escape events. (#013)	Response 13: NMFS does not find that kampachi escapes from previous Velella projects or from operations in State of Hawaii waters have genetically affected wild kampachi populations. The applicant stocks the net pen with fingerling fish that are first generation offspring reared from wild-caught broodstock. These fingerlings are genetically indistinguishable from wild stock. Section 4.2.3 of the Draft EA provides an analysis of potential genetic effects based on a worst-case analysis of the escape of the project's entire stock. In order to address the comment that the draft EA did not consider cumulative effects on wild fish from a previous escape combined with a potential future escape, NMFS reconsidered this topic. The type of potential cumulative effect being considered is whether past escapes of kampachi from previous trials affected the genetic makeup of wild kampachi in a way that was not significant at the time of the first or second escape event, but that might result in significant genetic impacts to wild stocks should there be subsequent escapes under the proposed action.	No change was made to the EA.

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	Section 4.2.3 of the EA (Potential Impacts to Target Species: *Risk of Escapes into the Environment*") describes that 13 fish escaped the net pen during the initial test of a CuPod (Velella Beta) and approximately 1,000 fish escaped during the second test of a CuPod (Velella Gamma). Of the latter, approximately 340 fish may have escaped into the wild; the rest were recaptured or speared. The fish that escaped were also first generation offspring of wild-caught broodstock and, therefore, genetically indistinguishable from wild fish. Based on a previous review of genetic impacts of a potential catastrophic gear failure and potential mass escape that is described in the 2013 EA for the Velella Gamma project (NMFS 2013), NMFS concludes that the previous escape of up to 340 fish did not result in a change to genetic fitness in wild Kampachi. Because there is little likelihood that the previous limited number of fish that escaped the CuPod changed the genetic diversity of wild stocks in the baseline environment, because the fish that would be stocked in the CuPod are genetically indistinguishable from wild stocks, and because the draft EA contains an analysis by fish geneticists and is based on a worst-case analysis, the previous escapes of fish into the wild does not change the environmental effects analysis on wild stocks. The analysis in the EA will not be modified as a result of this comment.	
Comment 14: One commenter stated that escaped fish would adversely affect wild kampachi populations through genetic effects. (#013)	Response 14: As described in section 1.4.2 of the Draft EA, the applicant would stock the pen with fingerling fish that are first generation offspring reared from wild-caught brood stock. These fingerlings are genetically indistinguishable from wild stock. Although NMFS believes that the modification to the gear should address the potential for escapes and thus considers the potential for escape events to be less likely (EA, section 4.2.3), the Draft EA includes a description of the potential genetic effects of a catastrophic loss of the project's entire stock from both trials (EA, section 4.2.3). Results of modeling by fish geneticists (see section 5.9 "Essential Fish Habitat (EFH), *Impacts to wild fish populations including genetic impacts from escapes, disease*	No change was made to the EA.

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	transmission and disruption of migratory patterns), indicate that there would be no substantial impact to genetic of wild fish stocks and no reduction of health or fitness of the wild stock. Because NMFS relied on best available scientific information in the EA, the EA was not modified as a result of this comment.	
Comment 15: Two commenters suggested that NMFS should impose fines on the applicant should any fish escape. One commenter requested NMFS deny the permit until they are fined for any fish escapes. (#009, #013)	Response 15: The applicant is required to meet the terms and conditions of the permit. As described in Appendix B, NMFS has the authority under 50 CFR 600.735, 665.225, and 15 CFR 904, to, among other possible sanctions, revoke, suspend, or modify the permit if any term or condition of the permit is violated. The past fish escapes occurred in association with permits that are now expired for actions that have long been completed. The escapes were accidental and did not violate any condition of the previous permits. Furthermore, the permittee properly notified NMFS at the time of the escape event, and applied appropriate remedies including recovering as many of the fish as possible Under the circumstances, applying sanctions on a separate project in order to leverage compliance with an entirely new permit would not be an appropriate exercise of agency authority, and we decline to do it here. NMFS considered whether it would be beneficial to include a fine for any fish that escape as a condition of the permit. The purpose of the fine would likely serve two main purposes. First, a fine can be intended to induce a permittee to prevent fish escapes and second, a fine could be used as a compensatory mitigation measure should any fish escape, with payment to be used to recover some damage to the environment.	NMFS added information about the suggested alternatives (requiring a fine be paid for past fish escapes; and including a fine for fish escapes in the proposed SCREFP) to section 2.3

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	NMFS does not believe that the project requires a fine in order to induce the applicant to prevent fish escapes. The gear and operational features of the project are specifically designed and intended to prevent fish escapes. For example, the permit holder would only be allowed to enter the net pen when the pen is at the surface (see Condition 20 of the proposed SCREFP which is in the EA Appendix B). Condition 17 of the proposed SCREFP requires the permit holder to conduct regular inspections of gear. The permittee would be required to follow the Emergency reporting Plan (See EA, Appendix D) which includes a requirement for the permittee to notify NMFS immediately of any fish escape. The applicant would be required to attempt to recover the fish if any fish escape (see EA, section 1.4.8, "Emergency Response Operations") The SCREFP terms and conditions allow NMFS to impose additional conditions under the SCREFP determined reasonable or necessary to ensure safety of personnel and the environment (see, EA, Appendix B), and this provides NMFS with the potential to impose more conditions on the permittee, should it be deemed necessary. Because the project is of a limited scale, would be operated on a temporary basis, and because the environmental effects analysis does not indicate that a catastrophic failure of the gear would require significant response by the government to prevent substantial environmental effects, NMFS does not believe that a fine is needed in order to fund future remediation.	
Comment 16: One commenter suggested that NMFS should "implement all possible safeguards to prevent fish escapes including accountability measures such	Response 16: See the above response regarding fish escapes. In terms of NMFS requiring record keeping on the origin of cultured species, as described in the EA in section 1.4.2 (Coral Reef Fish Species to be Cultured), the applicant proposes to obtain kampachi fry from an existing onshore facility located at National Energy Hawaii Laboratory Administration (NEHLA) at Keahole Point on the Island of Hawaii.	No change was made to the EA.

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as … fines for fish escapes… and record keeping on the origin of cultured species." (#013)	NMFS notes that the environmental effects analysis considered that the fish to be stocked are first generation offspring from hatchery-sourced broodstock which were wild-caught. NMFS believes that the data collection reports to be submitted by the applicant (Appendix C) will provide sufficient information for the proposed action.	
Comment 17: One commenter requested that NMFS not permit any more aquaculture projects until it establishes a comprehensive permitting system. (#013)	Response 17: : NMFS has the authority to issue a Special Coral Reef Ecosystem Fishing Permit pursuant to 50 CFR 665.224 to authorize fishing for a potentially harvest coral reef taxa (PHCRT) using gear that is not authorized under 50 CFR 665.227. The Fishery Ecosystem Plan for the Hawaii Archipelago identifies kampachi as a PHCRT. Section 1.2, Purpose and Need, describes the need for a SCREFP. The applicant's request for a SCREFP is before the agency at this time, and, therefore, a decision by NMFS is needed in a timely manner. As explained in the EA in section 4.6, "Cumulative Impacts," in a separate action, the Western Pacific Fishery Management Council has recommended establishing a federal aquaculture fisheries management program for the western Pacific region. NMFS is working with the Council to develop a detailed proposal for developing a management framework for aquaculture in federal waters throughout the Pacific Islands Region.	No change was made to the EA.
Comment 18: One commenter stated that 100 percent of the fish in the Velella Gamma trial escaped. The commenter stated in their comment that the applicant was not able to recapture 340 fish, or one third of all fish in the trial. #008	Response 18: NMFS confirms that an escape event did occur during the Velella Gamma trial and this was described in the EA (sections 2.3 and 4.2.3). The commenter is incorrect; however, in asserting that 100% of the fish escaped from the CuPod during the Velella Gamma trial. The actual proportion of fish that initially escaped was 50% (1,000 of 2,000 fish). Of the 1,000 fish that escaped, approximately 660 were recovered (500 were recaptured, and fishermen caught another approximately 160 fish). A total of 340 fish were not recovered. This amount of fish is estimated to be approximately 17 percent of the total number of fish initially stocked in the CuPod (340/2,000*100), which is less than 1/3 of the fish in the trial.	No substantive change was made to the EA. A typo was corrected in section 4.2.3.

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	NMFS does note a typographic error in section 4.2.3. We will correct the number of fish the fishermen caught to 160, not 150.	
Comment 19: One commenter asserted that the EA erroneously minimized the serious risk that kampachi may escape the net pen in large numbers and then move into nearby essential fish habitat and predate upon reef species in abnormally high numbers. The commenter believes that the risk of a large escape is greater than NMFS is accounting for. The commenter feels the thin lashing would not be sufficient to prevent a large escape event. (#008)	Response 19: NMFS confirms that escape events occurred during two previous trials and the episodes are summarized in the EA (see section 4.2.3). An estimated 340 fish were not recovered. For the current proposed SCREFP, NMFS considered the risk of an escape from the proposed pen to be lower than during a previous project based on operational protocols: the permittee would only enter the net pen when the pen is at the surface and protective netting is raised around the edge of the pen (see permit conditions and sections 1.4.4 thruogh 1.4.8 of the EA). As a response to the comment, NMFS re-considered whether the use of lashing twine is sufficient for the intended use. We address that comment in comment /response pair 21 below. After re-examining the proposed gear, NMFS believes that it is reasonable to forecast that both the net pen gear and operations are sufficient to prevent fish from escaping. NMFS re-evaluated the use of lashing twine and concludes that if the lashings are inspected regularly and replaced, as needed, that this material and method is sufficient to secure the Kikkonet mesh at the top of the net pen around the entry hatch, and to attach the Kikkonet mesh to a rope around the top of the cage. The EA describes a computer modeling evaluation test that was done by a University Research Center to evaluate whether the mooring and array would be strong enough to withstand hurricane forces. The OrcaFlex model simulated the mooring as well as the dynamics of the Velella Delta Array (see EA, section 1.4.3 (Gear: Velella Delta Array Components, Mooring System). The test demonstrated that the mooring components and the array itself would be strong enough to withstand ocean and wind conditions on site under hurricane forces.	No change was made to the EA.

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	Despite our conclusions regarding array integrity and operational constraints to fish escaping, NMFS agrees that there is the potential for some fish or all fish to escape the net pen. Therefore, the environmental effects analysis considers the potential environmental effects of the stock while contained in the net pen, and the potential effects should the permittee experience a loss of the entire stock. The EA describes the results of an analysis based on modeling in which all captive fish were to escape (see section 4.2.3, Potential Impacts to Target Species), and section 5.9, "Essential Fish Habitat (EFH): *Impact to wild fish populations including genetic impacts from escapes, disease transmission and disruption of migratory patterns*). The analysis in the EA concludes that if there were to be a mass escape, the escaped fish are unlikely to be highly successful predators. First, most of the fish are expected to remain around the gear, because they would have been habituated to the net pen and routine feeding (as evidence by the last trial). The cultured fish are expected to be naive in the wild, and are not expected to pose a large threat to other fish as a result. They are more likely to become easy prey for predators in both the open ocean, as well as areas with more cover. The long-term prospects for survival and reproductive success of any escapees are therefore dubious. In addition, any escapes that do survive in the wild are presumably entering a wide-open ecological niche, due to the depletion of other deep-water species – such as the deep-water snappers – from commercial and recreational fishing. There is little likelihood of escapees competing in any significant manner with the remaining wild snapper stocks (Sims 2013).	
Comment 20: One commenter stated that NMFS does not consider the fact that fish that escape could survive in the wild. The commenter states that Kampachi are native to	Response 20: NMFS confirms that kampachi is a fish that is native to Hawaii and that can hunt in both coral reefs and in open waters. NMFS discussed the potential for escapes in response to comment 19 above, and will address the concern that the EA under-estimated the likelihood that escaped fish could survive in the wild, and the environmental effects of this occurring.	No change was made to the EA.

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Hawaii and have evolved to survive in Hawaii's waters. They are pelagic species that are accustomed to hunting in both coral reefs and in open waters. They hunt in schools and opportunistically search for food, which may lead them to coral reef systems off Hawaii. (#008)	As was observed in past escape events, if fish were to manage to escape the net, most of the fish are expected to remain around the net pen because they are habituated to the pen. The fish from the pen are conditioned to routine feeding within the pen and are not likely to be experienced predators. Most escaped fish are likely to be recaptured, speared, caught by fishermen, or eaten by predators. Because the fish would have been raised in captivity their entire lives, they would be very likely to be susceptible to predation (see EA, section 4.2.3 Risk of Escapes into the Environment"). NMFS does not anticipate that a large number of fish are likely to survive in the wild. Despite our conclusion that survival in the wild would be unlikely, some fish might escape and survive. The EA includes an analysis of the potential impacts of 100% of the stocked fish escaping and surviving to reproduce in the wild and the analysis showed that due to the fact that the fish are genetically indistinguishable from wild stocks, and the fact that the population of wild kampachi is unaffected by targeted fishing and is likely large relative to the number of fish that would escape and survive, and the fact that the trial is of limited duration, the potential for escape of the stocked fish is not expected to result in a substantial impact to the environment.	
Comment 21: One commenter stated that the entry hatch was made of 4 mm lashing twine and implying the 4 mm twine lacks the strength to prevent escapes. The commenter had no confidence that 4 mm twine could do the job it was intended to do. #008	Response 21: NMFS reconsidered whether lashing twine would be sufficient to prevent the net from opening when used to securing the top mesh to the sides of the pen or to keep the net pen door shut and clarified line use. The applicant indicated that the top of the pen would be made of mesh panels lashed together and to secure the mesh to the sides of the pen as described in section 1.4.3 (Net Pen). These kikkonet panels will be sewn together using kikkonet monofilament as per manufacturer's recommendations. The applicant further clarified that the entry hatch would be reinforced with double-braided 3/16" STA-set marine grade polyester line (see description of the Net Pen in the EA, section 1.4.3). This same 3/16" STA-set marine grade polyester line would be used to sew the kikkonet top panel together and to attach the mesh panels to a top rope.	NMFS added a requirement to terms and condition #17 (Appendix B) of the proposed SCREFP that all marine lashings must be inspected on each in-person

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	When access is needed to the interior of the pen (for stocking), portions of the top mesh would be opened once the pen was floated at the surface of the water as described in the Draft EA section 1.4.5 (Stocking Operations). To close the panel, the applicant would sew the mesh shut with the 3/16" STA-set marine grade polyester line. Manufacturer description and specifications for this line indicate that this line is an all-polyester braid with a parallel core design. Constructed with a filament/spun cover for improved handling and greater abrasion resistance, STA-Set X has 30 percent less stretch and 20 percent greater strength than other polyester ropes (size for size). • Stretch: 1.6 percent @ 15 percent of breaking strength • Weight: 1.2lbs/100' (17.9g/m) • Tensile Strength: 1,600lbs/726kg After re-reviewing the specifications for this material and the applicant's method of use, NMFS concluded that the use of the double-braided 3/16" STA-set marine grade polyester line is acceptably strong for the uses intended. Because of the potential for any marine lashings to fail, NMFS will require that the permittee inspect lashings during each in-person maintenance visit to the array. Worn lashings would be required to be replaced. This information will be added to the EA, section 1.4.6 (Daily Operations, In-Person Maintenance Visits to the Velella Delta Array). This was also added as a condition to Condition #17 of the proposed SCREFP Terms and Conditions.	visit to the array. All marine lashings must be replaced, if required. More detail about the twine was added to the EA, section 1.4.6.
Comment 22: One commenter stated that cultured kampachi might be more accustomed to natural predators than NMFS determined. The commenter	Response 22: NMFS expects natural predators, such as sharks and billfish to visit the net pen and likely successfully prey on any escaped fish. Fish that are raised in a net pen are not likely to be as skilled at predator avoidance as fish that survive in the wild. Fish raised without predation pressures may not have the same avoidance skills as wild fish and may be more vulnerable to being preyed upon.	No change was made to the EA.

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indicated that because of this, and the fact that kampachi hunt in packs and can live in pelagic and reef habitats that more escaped fish might survive in the wild than assumed. #008	As described in Section 4.2.3 of the EA (Impacts to Target Species), if there were to be an escape event, NMFS expects most of the escaped fish to remain near the gear because they would be habituated to the pen. Escaped fish would not be in their natural habitat areas (e.g., reef areas) and would not have the same experience with evading predators as a wild fish might. These are the reasons NMFS assumes that escaped fish are more likely to be vulnerable to predation than wild fish. In terms of escaped fishing surviving in pelagic waters, ss discussed in EA section 5.9, NMFS considered the potential impacts that could result if some or all of the fish escaped. NMFS used the Offshore Mariculture Escapes Genetics Assessment model (OMEGA; http://www.nmfs.noaa.gov/aquaculture/science/omega_model_homepage.html) to estimate the impact to wild population fitness if fish escape the Velella Delta net pen. The results indicated that the proportion of the wild population comprised of escapees would peak at less than 1% over the 100-year time span of the simulation, and no significant fitness effects (less than 0.02% decrease over 100 years) are likely even if all 30,000 fish escaped into the wild and survived. Factors contributing to the lack of impacts included, but are not limited to, the small number of stocked fish in the proposed Velella Delta Array relative to wild biomass, short duration of the project, and use of wild-caught native fish for broodstock (Kristen Gruenthal, NOAA, pers. comm., May 4, 2015). For these reasons, there would not likely be any harm to wild kampachi populations.	
Comment 23: One commenter stated that a large school of escaped kampachi could significantly alter food chains and harm EFH stating the	Response 23: The analysis in the EA considers the potential impacts of a catastrophic gear failure and mass escape of fish. See page 67 of the EA (Impacts to target stocks from an escape).	No change was made to the EA.

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project could possibly introduce 15,000-30,000 cultured fish into the environment. The commenter stated that kampachi are top predators and could themselves prey on wild species. #008	NMFS expects that most of the fish would remain around the net pen if there were a massive breach where they could be recaptured. However, if escaped fish were not retrieved, NMFS evaluated the potential for impacts on wild kampachi or other species (see previous comment). As the commenter expresses, kampachi are able to traverse pelagic waters to recruit to coral reefs, their natural habitat. NMSF believes that cage-reared kampachi would be naive in the wild. They would be ready targets for predatory fish not having had substantial experience with predator avoidance. Once in the wild, they would also be expected to have far less than optimal foraging skills initially. The EA analysis went further and considered the potential impacts on both wild kampachi and other marine species should all 15,000 fish escape the Velella array (and up to a total of 30,000 fish). Impacts NMFS evaluated included: • Potential impacts to target and non-target stocks • Potential impacts to bottomfish stocks • Potential impacts to ocean habitats including EFH, • And potential impacts to biodiversity and ecosystem function. As discussed in the previous response, NMFS analyzed impacts based on the potential catastrophic gear loss and escape of all fish, NMFS does not expect that an escape of 30,000 fish to result in substantial effects to other wild species because of the small number of stocked fish in the proposed Velella Delta Array relative to wild biomass.	
Comment 24. One commenter asserted that the applicant discarded sick fish on shore. (#009)	Response before 24: The permittee would be required to comply with provisions of the SCREFP. The SCREFP requires operations to be done in accordance with the described activities in the EA. Mortality removal and disposal is described in the EA, section 1.4.6 (Daily Operations *Mortality Removal*). The permittee would be required to dispose of sick and dead fish onshore in accordance with County of Hawaii rules. The	No change was made to the EA.

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	permittee would be required to inspect all mortalities for signs of disease at an accredited laboratory. Details of diseases such as parasite loads and bacterial and viral infections would be documented. This comment did not result in any changes to the EA. However, NMFS will add a requirement to the SCREFP that the permittee be required to report all mortalities and findings regarding diseases and parasite loads in a final report.	
Comment 25: One commenter stated that the applicant's company had admitted to three accidental fish releases and have discarded sick fish on-shore. The commenter stated that the fish should be microchipped and there should be zero tolerance for any released fish. (#009) Another commenter expressed concerns about potential impacts to bottomfish stocks and requested NMFS consider requiring fish to be tagged. (#013)	Response 25. The EA describes prior escapes of fish from two prior Velella trials in section 4.2.3 (*Risk of Escapes into the Environment*). Approximately 13 fish escaped during a preliminary trial (100% retrieval using spears) and up to approximately 1,000 fish escaped during the second trial (with 660 retrieved by dip net or fishermen). Therefore, data to NMFS indicates that the applicant has had 2 releases from Velella gear for a total of approximately 340 fish that escaped that were not recovered; NMFS has no data about a third release. The commenter requests that NMFS have no tolerance for any released fish and this commenter and other commenters are requesting that NMFS require micro-chipping or fin clips to help identify escaped fish should there be an escape from the proposed Velella Delta project. With respect to fish tags, the Draft EA described NMFS' consideration of tagging fish in Section 2.3.1 (Alternatives Considered but Rejected from Detailed Consideration). NMFS determined that the low risk of fish escapes, and low survival probability together with a lack of impacts to wild fish stocks, made it unnecessary to require the applicant to mark fishes. If marked fish are recovered, presumably they could provide information on survivability, movement and range in the wild that could then be used to inform future analyses. However, the species is not targeted by fishermen so it is unlikely that	No change was made to the EA.

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	significant information would be obtained as the marked fish would have a low recovery rate. Additionally, since escaped fish are genetically indistinguishable from wild stock there would be no environmental harm if they interbreed.	
Comment 26: One commenter found a contradiction in the EA. They noted that the Draft EA described that fishing opportunities would increase (page 52) because the array would act as a FAD. The commenter points out a conflicting statement on page 81 in the draft EA that fishing will not likely increase around the EA. The commenter states that this calls into question the agencies' finding that the project would support the Hawaii fishing community by increasing fishing the area. #013	Response 26: The EA describes the relationship of the proposed project to commercial and recreational fishing in Section 3.3.2 (Activities by Others in the Action Area). The project would occur within a well-known recreational and commercial fishing area. The EA notes that fishermen in the past fished around the array and would likely fish around the proposed Velella Delta array. Section 4.2.4 (Potential Impacts to Other Fish Stocks) discusses that the Velella Delta Array would likely aggregate PMUS like any other floating object. The EA explains that the current mooring buoy acts as a FAD and aggregates PMUS even without the array. Because the mooring buoy is in place, adding the Velella Delta array is not expected to result in a substantial effect on pelagic fish populations through changes in fishing. Section 4.3 (Potential Direct and Indirect Social and Economic Impacts) describes the potential impact on the local fishing community and ocean users. It describes that the array would likely act as a FAD. It notes that during the first trial, more than 6 vessels fished around the Array. The EA describes that up to 30 vessels fished around the Velella Gamma Array. Other sections of the EA also refer to the lack of increased fishing activity at the proposed action site should the array be deployed (see "*Fishing Near the Array*", Section 4.2.5 (Potential Impacts to Protected Species). In summary, the EA describes that commercial and recreational fishermen currently fish around the mooring buoy and will likely fish around the Velella Delta Array. The	No change was made to the EA.

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	deployment of the Velella Delta Array is not expected to result in large changes to fishing activity.	
Comment 27: One commenter asserted that the EA did not address the Western Pacific Management Council's concerns about the effects escaped fish to bottomfish stocks and reducing bottomfish catches through localized stock depletions. This includes a request to tag or mark cultured fish. #013	Response 27: See response to Comment 25. NMFS addressed both of these concerns in the Draft EA in Section 2.3.3, Alternatives Initially Considered but Rejected from Detailed Consideration and Section 4.2.4, Potential Impacts to Other Fish Stocks.	No change was made to the EA.
Comment 28: Two commenters stated that NMFS did not properly evaluate protected species entanglement risks from the net pen and downplayed the new net pen design's potential to affect protected species. #008	Response 28: While the configuration of the net pen is different than in previous trials, the lines and bridles securing the pen array would be configured to minimize entanglement risk. The lines on the Velella Delta Array would be under constant tension and free of loops, minimizing the likelihood of entanglements. The net pen consists of small mesh under tension that would preclude protected species entanglements. During stocking and maintenance activities, the applicant would monitor the site for protected species. Should the applicant observe any marine mammal or sea turtle entangled in the rope or other gear, or interacting with any portion of the gear, they would be required to contact NMFS for further instruction on how to respond. Marine mammals and sea turtles are likely to detect the presence of the array and would be able to avoid the gear. The applicant has demonstrated that previous Velella trials did not attract marine mammals or sea turtles. NMFS staff have information from the past 10 years from near-shore aquaculture facilities that employ submerged net pens to	Information was added to Section 4.2.5, Potential Impacts to Protected Species. The comment and additional information do not change the Draft EA's findings.

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	culture kampachi on the Island of Hawaii. These farms have never detected an entanglement. Although those net pens do not have the modifications proposed by the applicant, NMFS determined that the modifications would not present a substantial entanglement risk to protected species On December 2, 2015, NMFS completed an ESA Section 7 consultation on the potential effects of the proposed action on ESA-listed turtles and marine mammals. The analysis for the consultation included project-related effects to listed sea turtles and marine mammals resulting from entanglement. NMFS, Protected Resources Division, concurred with the determination that the proposed action is not likely to adversely affect ESA listed sea turtles or marine mammals or their designated critical habitat. Section 4.2.5 of the EA was updated with additional references in response to this comment.	
Comment 29: Two commenters stated in their comments that NMFS did not meet its obligations under specific laws (e.g., the ESA, MMPA, MSA, and MBTA). They assert that NMFS needs to assess the proposed project's impacts on protected species, marine mammals, and EFH and stated the agency should approve the project under an EIS. #008, #013	Response 29: NMFS disagrees with this comment. The agency complied with all applicable laws and evaluated the project's effects on protected species under the ESA, MSA, MMPA, and MBTA (see: Section 4.2.5 Potential Impacts to Protected Species and Section 5, Coordination with Others and Compliance with Applicable Laws.) In addition, NMFS determined that the impacts of the proposed action did not require the preparation of an EIS.	No change was made to the EA.

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Comment 30: One commenter stated in their comment that the Draft EA was deficient because it did not consider effects to biologically important areas (BIAs) for non-ESA listed marine mammal species. Additionally, the commenter stated in their comment that if the project could harm even one Hawaiian monk seal or false killer whale, the project could adversely affect their populations. #008	Response 30: NMFS evaluated effects of the alternatives, including the proposed action on marine mammals, all of their habitats, and coastal and offshore ecosystems. The potential habitat impacts would include any areas that may also be identified as BIAs that may occur in the action area. NMFS determined that the proposed project would have low adverse impacts on these species. Additionally, NMFS considered the project's effects on ESA-listed species and determined the project is not likely to adversely affect them, concluding informal consultations with NMFS and the USFWS for marine mammals, sea turtles and seabirds. These effects are described in section 4.1 (Potential Effects on Physical Features), section 4.2.5 (Potential Impacts to Protected Species), section 5.7 (Marine Mammal Protection Act , and section 5.8 (Endangered Species Act) therefore no changes will be made to the EA.	No change was made to the EA.

Comment 31: One commenter stated that NMFS's determination that the project did not represent an entanglement risk put the applicant at risk of violating the ESA and, therefore, rendered NMFS conclusions in the EA arbitrary. #008	Response 31: Please see response 28, above (regarding entanglement). NMFS consulted on the proposed action in accordance with the ESA as described in Section 4.2.5 (Potential Impacts to Protected Species). The evaluation included consideration of the potential for listed marine mammals to be adversely affected by the proposed action, including becoming entangled in any part of the gear. The result of the informal consultation was that the proposed action would not likely adversely affect ESA listed species. The finding was based in part on the small size of the Velella Array, as well as mitigation features built into the project that reduce or remove any potential entanglement risk. The applicant would keep all lines and bridles under constant tension by wind, currents, and the net pen's ballast tank preventing loops from forming. Slack lines are the primary source marine mammal entanglements. The length of all lines would provide adequate spaces for marine mammals to pass through. The meshes used to construct the net pen enclosure would have small openings and would be rigid or drawn taut preventing marine mammal entanglements. The applicant must comply with the protected species reporting protocols contained in the SCREFP's Terms and Conditions. If the applicant does not comply with the permit's Terms and Conditions (Appendix B), NMFS may revoke, suspend, or modify the permit. NMFS updated Section 4.2.5 of the EA to reflect additional information about the low likelihood of entanglement from bridles NMFS sought in response to the concern. Information from NMFS from a 10-year period did not show any protected species entanglements or behavior modifications that increase entanglement risks (D. Schofield, pers. comm.). David Schofield (NMFS PIRO Protected Resources Division) has monitored aquaculture facilities in State waters off the Island of Hawaii from 2006 to 2016. Over that period, Mr. Schofield has received no reports of offshore aquaculture facilities causing protected species entanglements or modifying behaviors in ways that would increase entanglement risks. Mr. Schofield reported a single marine mammal interaction with aquaculture gear occurring in 2015: a monk seal biting a cage. Mr. Schofield considers this an isolated incident. The monk seal did not repeat the behavior. (pers. comm. David Schofield, NMFS, February 17, 2016). The monk seal did not become	Information describing lack of entanglements in similar gear was added to Section 4.2.5.

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	entangled in the net pen gear, nor was the monk seal reported as becoming habituated to the net pens.	
Comment 32: One commenter stated in their comment that the flexibility of the new cage presented an entanglement risk if the net pen's mesh panels enfolded marine mammals. #008	Response 32: The net pen materials, while somewhat flexible, would not fold or wrap around animals like a net. The copper alloy mesh is rigid and the Kikkonet mesh on top of the pen would be kept taut except when the mesh is opened for harvest or stocking or other operations. At such times, human activity in the array would likely discourage approach by marine mammals. Reviews of the proposed project under the ESA and MMPA found it to be highly unlikely that a marine mammal would become entangled in the gear. On December 2, 2015, NMFS completed an ESA Section 7 consultation on the potential effects of the proposed action on ESA-listed turtles and marine mammals. The analysis for the consultation included project-related effects to listed sea turtles and marine mammals resulting from entanglement. NMFS, Protected Resources Division concurred with the determination that the proposed action is not likely to adversely affect ESA listed sea turtles or marine mammals or their designated critical habitat. Section 1.4.3 and 4.2.5 of the Draft EA provide information on the gear components and the potential impacts to protected species, respectively.	No change was made to the EA.
Comment 33: One commenter stated in their comment that the Draft EA did not analyze how the larger net pen would affect its FAD properties compared to previous Velella trials. The commenter cited a source discussing the relationship between FAD	Response 33: The analysis in the EA considered the potential for interactions to occur between protected species and fishermen that fish around the Velella Delta Array. The report cited by the commenter notes that many fishermen and scientists believe a relationship exists between the amount of marine growth on drifting objects and the presence of pelagic fish. Lots of marine growth means lots of fish, or a greater chance of fish aggregating. Little growth means fewer fish, or less chance of aggregation. The same sort of relationship is believed to exist with the size or the amount of shelter provided by the flotation device. While the increase in size could potentially attract more fish, NMFS does not expect this temporary and routinely cleaned array to attract a	No change was made to the EA.

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size and the number of fish attracted to the FAD. The commenter stated in their comment that NMFS did not consider that the project might increase the number of interactions between protected species and fishermen. The commenter further postulated that the larger net pen may attract more marine species, and thus, more nearby fishing boats, causing additional fishing-related injuries to protected species.#008	larger number of fish that would result in an increase in fishing pressure. However, if fish and consequently fishing effort were to increase NMFS does not expect substantial adverse interactions. Based on previous experience in previous trials and with similar gear, no fishermen have reported or been observed to hook a protected species. Should a fisherman hook or entangle a marine mammal or other listed species (such as a monk seal or seabird), they are required to report the interaction to NMFS. For these reasons, NMFS does not expect substantial adverse interactions between fishermen attracted to the net pen acting as a FAD and protected species. See section 4.2.4 (Potential Impacts to Other Fish Stocks) and Section 4.2.5, (Potential Impacts to Protected Species, *Fishing near the Array*).	
Comment 34: One commenter stated in their comment that NMFS did not fully consider the effects of the project on seabirds through lighting effects and entanglement. The commenter mentioned a phenomenon called light entrapment. Light-entrapped seabirds, in the presence of bright lights, often do not forage and become exhausted, sometimes dying. #008	Response 34: Potential impacts to seabirds were considered in the Draft EA, section 4.2.5. NMFS reviewed whether the lights on the array would result in light entrapment or increase the potential for collision with the gear. Night lighting would be limited to minimal navigational lighting on the float ring, and on the feed barge, and the proposed project is not expected to result in light-entrapped seabirds. The barge would be equipped with required navigational lighting according to U. S. Coast Guard (USCG) regulations (one all-around white lantern, 33 CFR part 84). Similar lighting configuration was used in a previous trial and did not result in birds either colliding with the mast or rigging or becoming light entrapped. NMFS will add information about the concept of light entrapment into the final EA.	Section 4.2.5 was modified to reflect upgraded consideration of potential impacts to seabirds from lighting.

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Comment 35: One commenter stated in their comment that the proposed protected species monitoring requirements were inadequate and expressed concern that the applicant would not monitor below-surface activity. The commenter also stated in their comment it was unclear if all cameras were above the surface. The commenter also stated in their comment that in-person monitoring is very limited and only expected to occur once a week according to the feeding schedule. The commenter also stated the applicant should hire a trained biologist to observe for protected species interactions or require that the applicant and staff receive protected species identification training.#008	Response 35: The Draft EA included a description of marine mammal monitoring in Section 1.4.6. NMFS considers the applicant's proposed monitoring regime to be adequate in order to detect and respond to events in which there is an interaction between the array and protected species. Based on the applicant's past experience with an array of a very similar design and in the same location, interactions with marine mammals are not expected to occur with any frequency, and adverse interactions are expected to be unlikely. As described in section 1.4, the applicant would have cameras both above and below the surface to monitor feedings and array and cage integrity and these cameras would allow staff at the remote monitoring site to detect interactions with protected species. In-person visits to the array could occur at any time, and are proposed to occur at least once a week. NMFS will make the protected species identification material available to the applicant and staff. NMFS is available to the applicant at any time through phone calls. As part of the terms and conditions, NMFS may assign an observer at any time. The terms and conditions of the permit provide for NMFS to deploy an observer if needed to the array.	No change was made to the EA.
Comment 36: One commenter expressed concerns that the Draft EA did not adequately address effects to benthic	Response 36: The EA analyzed potential impacts on benthic habitats in section 4.2.1 (Potential Impacts to Benthic Habitats). No chemicals are proposed or authorized for use in this trial (see permit condition 22 in EA). A small amount of excess feed and fish waste could reach deep-water benthic habitats. Currents in the area would disburse the	No change was made to the EA.

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habitats from chemicals, fish wastes, and uneaten food associated with the project. #013	small amounts of excess feed and fish wastes that make it through the water column over a large area on the bottom (Rensel et al. 2015). The small amounts of solid nutrient inputs reaching the bottom would not likely cause eutrophication due to the relatively high dissolved oxygen content of the water near the bottom. The small amount of nutrients reaching the bottom, these inputs could cause imperceptible increases in productivity to deep-water benthic ecosystems in the proposed action area.	
Comment 37: One commenter expressed concern that the project's anchor and anchor chain would damage marine plants and corals. Existing damage caused by the applicant's operations should preclude ensuring further harm does not occur. #013	Response 37: Marine benthic habitats are described in section 3.2.1 of the EA. NMFS Evaluated whether the proposed project would affect corals. Reef building corals, like plants, require light. The project's anchorage in the aphotic zone at 6,000 ft deep means that there are no effects on marine plants or corals that need light to grow. The benthic substrate in the action area is listed on navigation charts as lava and sand (C. Kelley, HURL, pers. comm. to NMFS 2013) and is likely devoid of habitat structuring benthos such as corals, sponges and macroalgae. NMFS has identified this area as a location with low rugosity, which indicates the absence of topographic structure (relief) that would indicate the area serves as habitat for deep corals. Researchers have not found stony (Scleractinian) corals in the project area. They also have not found precious corals at the depths within the project area. Given the depths of the location, and marine survey information from the general vicinity, the seabed is largely devoid of special structures or dense aggregations of marine fauna. The EA describes that the project would use an existing mooring. The mooring is connected to an anchor that lies at approximately 6,000 feet of water. At the anchor, there is a chain that, depending on the current strength, could move around the bottom. NMFS does not anticipate that adding the Velella Array to the mooring is going to have impacts to the bottom habitat that would substantially change motion on the bottom anchor.	No change was made to the EA.
Comment 38: One commenter expressed concern about the	Response 38: Effects of the copper net pen on water quality were discussed briefly in section 4.1.1 of the draft EA. (Potential Impacts to Water Quality). NMFS included	Information added to

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
use of copper in the structure of the cage. The commenter asserted that the draft EA did not discuss the risks to the environment associated with the copper alloy used in the [cage] or consider an alternative action requiring the use of a cage without copper. (#013)	additional information on the effects of copper, including risks to the environment, to section 4.1.1. This section now includes a more focused consideration on recent studies regarding the potential effects of high copper levels in the environment. These recent studies do not show increased copper leaching from pens in a marine environment. The new information does not change the analysis that the copper allow meshes proposed to be used would result in adverse effects on water quality. NMFS did not consider requiring non-copper cages because the data and information indicate that the environmental effects of the proposed action are not significant and there are numerous advantages to using copper alloy net pen. The proposed copper alloy net pen is strong, resistant to biofouling and designers commonly use this material in net pen construction. Because the alloy that would be used would not have an adverse effect on water quality, NMFS is not requiring the applicant to use a different type of pen material.	Section 4.1.1, Potential Impacts to Water Quality. The comment does not change the Draft EA's findings.
Comment 39: One commenter asserted that the EA did not adequately explain or justify the water quality monitoring the applicant would be required to undertake. The commenter was concerned that aquaculture project water quality studies have been subject to a wider variety of water quality tests (including NO_3, NO_2, NH_4, total dissolved nitrogen, chlorophyll-a, temperature,	Response 39: Section 1.4.6 of the EA (*Water Quality Testing*) and the permit Terms and Conditions (#19) provided in Appendix B of the Draft EA provide information on the water testing requirements. According to condition #19 of the proposed SCREFP, "The permit holder shall sample and analyze water samples at four stations 50 ft from the float ring at a depth of 100 ft every month. The stations shall be directly north, east, south and west of the float ring. The permit holder shall analyze the samples for dissolved oxygen content and turbidity. The permit holder shall provide NMFS with annual reports of water quality testing results from around the Velella Delta Array by January 31 of the following year." To collect water quality information specific to the Velella project that could be used to further understand potential water quality impacts, the terms and conditions require the applicant to perform the minimum water quality monitoring that would detect any	Minor informational change made to Section 1.4.6. Water Quality Testing.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
and turbidity, etc.) and the EA should have described what the applicant would test for and why. (#008)	potential impacts that the project may have on water quality. NMFS determined that tests for dissolved oxygen and turbidity would be sufficient water quality indicators that would show whether there are substantial water quality impacts. NMFS described potential impacts to water quality in the EA, in sections 4.1.1 and 5.9. The analysis shows that given water currents in the area and the limited amount of fish feed that would be applied, and given the number of fish that would be held in the pen, no effects to the water column are expected below 100 ft based on the results of the AquaModel analysis for a BOM project. The BOM project is an appropriate comparable project. The BOM project has a higher production than the proposed action and is located in areas with less likely dispersion of effluents. Therefore, NMFS does not anticipate measurable changes to water quality and additional monitoring for other water quality indicators is not indicated by the circumstance of the project. In response to the comment, NMFS will incorporate this information in the EA, section 1.4.6, to indicate that dissolved oxygen and turbidity testing provides a simple and effective way of determining whether the proposed action is polluting the environment.	
Comment 40: One commenter stated that NMFS did not adequately consider the proposed action's impacts on water quality including eutrophication. The commenter pointed out that aquaculture operations located in shallow enclosed waters (e.g., bays) tend to have	Response 40: The EA does address the impact to water quality in Section 4.1.1. As noted in that section, past water quality monitoring and modeling of the Velella Delta indicate that nutrient inputs from the proposed project are not expected to rise above detectable levels for the duration of the project. Moreover, as discussed in section 4.2.1 (Analysis of impacts to deep-water benthic habitats) because the proposed action would occur in ocean depth of 6,000 ft, in an area with ocean currents and high dissolved oxygen content, eutrophication is not expected.	No change was made to the EA.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
significant water quality effects.#013		
Comment 41: One commenter stated that the SCREFP should contain requirements and conditions to protect the area's water quality and ecosystem and NMFS should require the applicant to repair environmental damage caused by the project's water quality effects. #013	Response 41: Based on the information and analysis in the EA, NMFS concluded that the proposed action would not have a substantial effect on water quality or quality of the marine ecosystems (see section 4.1.1, Potential Impacts to Water Quality). NMFS may revoke, suspend, or modify the permit if the applicant fails to comply with any permit condition, including water quality monitoring and response to any environmental damage would be required under applicable laws (e.g., Oil Spill Prevention Act).	No change was made to the EA.
Comment 42: Two commenters stated that NMFS did not comprehensively address the proposed project's impact on climate change, including greenhouse gas effects caused by feed manufacturing and the energy costs of feed manufacturing. One commenter stated that contrary to the assertion of the EA, there will be a net positive production of greenhouse gas from the project, not a net negative one. At a minimum, the EA	Response 42: NMFS described that the proposed project would not result in large changes to the emission of greenhouse gases related to any and all aspects of the proposed operation. The project duration is a relatively short term, production size is relatively limited, and the use of support vessels is not substantially different from the amount of vessel use that occurs in the vicinity (EA, section 4.6, Cumulative Impacts). In response to the comment, NMFS added additional consideration of the project's carbon footprint from the production of feed manufacturing. The additional evaluation allows NMFS to conclude that the small size of the project, and short term duration would not increase short-term or long-term greenhouse emissions by a substantial amount due to production by feed suppliers. Section 4.6 of the EA was updated to reflect this information.	Information was added to Section 4.6, Cumulative Impacts. The comment does not change the Draft EA's findings.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
must quantify project-related greenhouse gas emissions in order to serve the informational purposes of NEPA. #008, #013		
Comment 43: One commenter stated in their comment that the EA did not adequately address native fishing rights and effects to culturally significant sites in the action area including koas, that NMFS needed to complete an EIS to address native fishing rights. Further, the commenter requested that NMFS consult with the State of Hawaii, Office of Hawaiian Affairs to ensure that the project did not adversely affect Native Hawaiian rights, cultural sites, and fishing privileges. #013	Response 43: NMFS consulted with the State of Hawaii on the action area, which provided no information regarding koas (EA, section 4.4 (Environmental Justice Impacts) and section 5.10 (National Historic Preservation Act). The Draft EA (section 4.5) adequately addressed effects to native fishing rights and cultural sites. The proposed action would occur in Federal waters between 3.5 and 7.5 nm off the leeward coast of the Island of Hawaii in waters 3,000-7,500 ft deep. On July 31, 2013, the State of Hawaii Historic Preservation Division, Kona, informed NMFS that no written reports or studies exist that indicate the presence of native Hawaiian traditional fishing grounds, or "koa", in the project area, nor are there any features that could create koa in the project area. The proposed site does not affect significant cultural resources, historic properties, or archaeological resources, as none exist at the proposed action site. Further, NMFS provided all interested parties, including State agencies, with the opportunity to comment on the action according to 50 CFR 665.224(d)(3). NMFS did not receive comments from the Office of Hawaii Affairs or any other State agency regarding these issues.	No change was made to the EA.
Comment 44: One commenter stated in their comment that the public would bear hidden costs from the project resulting from ongoing	Response 44: NMFS does not believe a test project of the size proposed and short temporal duration, would result in environmental degradation that would lead to hidden "clean up" costs. The EA addresses the impacts to the environment in Section 3.0. Further, NMFS is not aware of monetary costs borne by the public and resulting from past gear trials.	No change was made to the EA.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
environmental degradation.#013		
Comment 45: One commenter stated in their comment that cultured kampachi could pose a risk to human health through ciguatera toxicity. The commenter states that there is insufficient information in the EA about ciguatera #008.	Response 45: NMFS does not anticipate that kampachi raised during the project would develop dangerous ciguatoxin concentrations. First, the Velella Delta Array is located in deep offshore waters subject to near-constant water movement. The project site would not overlap with habitats typically associated with *Gambierdiscus* spp., which is associated with ciguatoxin, preventing fish in the net pen from eating tainted natural prey. Second, the applicant would only use U.S. Department of Agriculture-approved feeds made from anchovies and soybean meal as described in Section1.4.6. Anchovies inhabit offshore environments where *Gambierdiscus* spp. are not likely to occur, and are plankton feeders that are not likely to bioaccumulate ciguatoxin. Soybean meal would not contain ciguatoxins as soybeans are not produced in a marine environment with *Gambierdiscus spp*. Therefore, kampachi raised and harvested during the Velella Delta trial would not ingest ciguatoxins from natural or synthetic sources. Additionally, Grubman (2014), cited by one commenter, indicates that raising kampachi in an aquaculture setting eliminates ciguatera risks. Kampachi grown during the project would not concentrate ciguatoxins in their tissues from the time they hatch to the time the applicant harvests them. Kampachi harvested during the project pose no foreseeable threat to human safety from ciguatoxin. Section 4.3.2 of the EA was updated to reflect this information. The comment does not change the Draft EA's findings.	Information was added to Section 4.3.2, Potential Impacts to Human Safety.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
Comment 46: One commenter posted guidance from the FAA Advisory Circular 15/5200-3B. The circular details the FAA's guidance on siting activities that could attract wildlife to airports creating a danger to aircraft passengers. (#015)	Response 46: NMFS reviewed FAA Advisory Circular 15/5200-3B and evaluated bird-aircraft strike data for airports in Hawaii in section 4.3.2 and found that aquaculture operations offshore of west Hawaii have not resulted in increased reports of bird-aircraft collisions with aircraft at the Kona International Airport. The proposed Velella Delta Array is not expected to be a hazardous wildlife attractant. Fish would be maintained within a net pet submerged well below the surface. The Velella Gamma project, which was conducted in the same area using a submerged net pen and moored feed vessel did not aggregate seabirds. For these reasons, NMFS does not expect the proposed Velella Delta projects would aggregate seabirds nor would the project ultimately create a human safety issue by creating a bird-aircraft strike hazard. The comment does not change the Draft EA's findings. However this information was included in section 4.3.2, Potential Impacts to Human Safety.	Information added to Section 4.3.2, Potential Impacts to Human Safety.
Comment 47. A comment letter requested the project not use shiny materials that could potentially blind pilots. (#014)	Response 47: The proposed gear that would be used for the Velella Delta project does not use shiny materials. The materials are described in the EA, section 1.4.3. The net pen would be maintained majority of the time submerged below the surface. The floating double ring would be at the surface and would be matte HDPE plastic. When wet, the plastic could glisten, but would not create temporary blindness in pilots. Ropes, Kikkonet, marker buoys and the feed vessel would not be made of shiny materials. Lighting on the buoys and on the vessel would be similar to those used in a previous trial that were not noted as causing a safety issue. Therefore, we conclude that the project would have no likelihood of causing temporary blindness in pilots. This conclusion will be added to the analysis of impacts on safety (EA, section 4.3.2, Potential Impacts to Human Safety.	Add statement to section 4.3.2 of the EA.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
Comment 48. A commenter expressed concern that the proposed project would open the door to larger projects whose effects were not properly analyzed. (#014)	Response 48: The approval of a permit for the proposed action would not result in the automatic approval of any future project, including any potential follow-on projects. Any future permit applications to test gear not authorized under existing regulations would undergo appropriate reviews, including NEPA compliance. Therefore, NMFS does not believe issuance of this permit opens the door for larger projects. This evaluation of the potential for follow-on projects or enhanced likelihood of project approvals is in the EA section 4.6 (Cumulative Effects).	No change was made to the EA.
Comment 49: One commenter asserted that the EA did not appropriately evaluate the cumulative effects of the action in relation to an expanding aquaculture industry in Hawaii. By permitting operations in its waters, the State of Hawaii has indicated it plans to increase aquaculture in this area as well. Thus, increased production in both federal and state waters is reasonably foreseeable. (#008)	Response 49: NMFS considered the cumulative effects of the project in conjunction with other foreseeable activities, including aquaculture, in Hawaii in section 4.6 of the EA (Cumulative Impacts). While NMFS anticipates the possibility of future projects, we are unable to predict and evaluate speculative future project details. NMFS is not aware any federal permit authorizing a similar activity near the Velella Delta, nor is NMFS aware of other State permits or sanctioned projects for additional or expanded operations culturing and harvesting fish within the vicinity of the Velella Delta project. Moreover, as discussed in the EA, the project is of short temporal duration and is not a large project compared to existing marine aquaculture operations in Hawaii. The proposed permit to test the Velella Delta is for a two-year period. Because of the limited size, scope, and duration of the operation, NMFS has determined that the proposed action's impacts would not result in large adverse environmental effects (see analysis, section 4.6 of the EA). Future proposals would undergo compliance reviews when project details are known in accordance with applicable laws and policies. NEPA does not require NMFS to speculate on future project details in the absence of a concrete proposal.	No change was made to the EA.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
Comment 50: One commenter expressed concern because the EA did not evaluate the effects of a second party raising kampachi fingerlings on shore. The commenter notes that onshore aquaculture has been criticized for causing high concentrations of pollution and near-shore algal blooms. (#008)	Response 50: The applicant will obtain kampachi fry from an onshore facility located at National Energy Hawaii Laboratory Administration (NEHLA) at Keahole Point on the Island of Hawaii. The NEHLA is already producing fry and the proposed operation would require a very nominal amount of fry and would not affect production activity at the NEHLA. The State permits all activities at this facility, including Clean Water Act requirements. Aquaculture facilities at NEHLA dispose of their wastewater using a State-permitted injection well. The site does not discharge effluents into the ocean. State of Hawaii monitoring has not found any adverse environmental effects from HEHLAs saltwater disposal system. Section 4.6 was updated to reflect this information.	Information added to Section 4.6, Cumulative Effects.
Comment 51: One commenter expressed their support for the project citing its potential to provide employment, their view that the project sustainably used ocean resources, and the project's potential to act as a FAD. (#004)	Response 51: NMFS acknowledges the comment.	No change was made to the EA.
Comment 52: One commenter expressed their support for the project and related their observation that the previous Velella trial at this site had not caused any environmental problems. The commenter	Response 52: NMFS acknowledges the comment.	No change was made to the EA.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
also stated that the project would provide a needed substitute for missing or unmaintained fish aggregating devices (FAD) in the region and would benefit the local economy through employment, food, and recreational opportunities. (#003)		
Comment 53: One commenter expressed their support for the project citing Kampachi Farms reputation for environmental responsibility and technical innovation. Additionally, the commenter called for funding the applicant. (#010)	Response 53: NMFS acknowledges the commenter's support for the project. The proposed action (to authorize a SCREFP) does not include a decision regarding funding from NMFS.	No change was made to the EA.
Comment 54: One commenter expressed their support for the applicant’s project citing aquaculture's potential to relieve pressure on wild fish stocks by creating alternative seafood sources. (#012)	Response 54: NMFS acknowledges the comment.	No change was made to the EA.
Comment 55: One commenter expressed support for the project citing its scientific and	Response 55: NMFS acknowledges the comment.	No change was made to the EA.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
technical innovation. The commenter also stated that the project is an important step in developing sustainable aquaculture. (#011)		
Comment 56: One commenter expressed their support for the project stating the proposed project would bring sustainable and environmentally friendly ocean use to the Island of Hawaii. Additionally, the commenter stated in their comment that aquaculture could provide food and support global fisheries. (#007)	Response 56: NMFS acknowledges the comment.	No change was made to the EA.
Comment 57: One commenter stated that the Draft EA may have minimized the possibility of ship strikes to protected species. The commenter stated there was a discrepancy between the applicant's possible maximum vessel speed and the 10-knot speed limit in the permit's terms and conditions.	Response 57: The Draft EA considered potential threats to protected species including ship strikes. See Section 4.2.5, Potential Impacts to Protected Species, Section 5.7, Marine Mammal Protection Act (MMPA), and Section 5.8, Endangered Species Act (ESA). The EA described that the project would not result in large changes to vessel traffic in the area because fishing vessels currently motor and sail in the area and fish around the mooring buoy. The EA also described that under the permit terms, the applicant would be required to operate vessels at a maximum speed of 10 knots (Appendix B) except in times of	No change was made to the EA.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
(#008)	emergency. The applicant's vessels would be able to exceed this limit only in emergencies (e.g. human safety, retrieving detached components) (see Appendix B of EA). As part of the terms and conditions of the SCREPF, the permittee would be required to conform to the activity as described in the EA. Thus, although the maintenance vessels can travel faster than 10 knots, the applicant and their staff would not be allowed to exceed 10 knots under most circumstances while working in association with the project.	
Comment 58: One commenter asserted that open sea-cage aquaculture of farmed fish causes declines in wild fish populations. The comment indicates that host-parasite systems are the cause of this. The commenter states that inaccurate monitoring of local fish population levels should not be an excuse for allowing destructive practices to go forward. (#006) A related comment stated that there are numerous incidences of mortality events for farmed *Seriola* species. The commenter asserted that the	Response 58: NMFS considered the potential for parasite bio-magnification and subsequent transmission to wild kampachi in the EA, section 4.2.3 (Potential Impacts to Target Species: *Potential Impacts from Disease or Parasite Transmission*). As described in that section, the applicant would stock fry at approximately 20g each, for an initial stocking density of 0.29 kg/m.^{3} This is a similar stocking density to that which is used in much larger commercial operations (see BOM 2014) and that has not resulted in disease outbreaks. Results from two previous trials are described in the EA. The results showed that infection rates were generally below five flukes per fish, and by conclusion of both trials, the skin fluke parasite infestations were lower than one fluke per fish, which is the baseline for wild *Seriola.* NMFS bases its conclusion that the proposed activity would have a low likelihood of causing declines in wild fish populations for the following reasons: 1. Fish stocking and culture densities for two similar projects did not result in disease or parasite biomagnification or transmission to wild fish. No reports were obtained that parasites or disease in either the caged fish or fish caught near the cages was an issue in the previous projects.	Discussion added to the EA Section 4.2.3 to more clearly articulate consideration of the issue in the final EA.

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
EA should analyze the potential impacts in terms of spreading disease and parasites rather than discount the high risk of disease and parasite transmission. (#008)	2. The location of the project is not in an area known to aggregate conspecifics in the wild. No wild kampachi were noted around the gear in previous projects. 3. Location of project far from other culture facilities culturing the same species. 4. Expected low likelihood of large scale release of the caged fish to the wild. 5. Regular monitoring for disease and parasites and work to prevent parasite establishment. 6. Experience in previous project that did not show diseases or high levels of parasites or high mortalities. 7. Requirement for permittee to monitor diseases and dispose of mortalities on shore. Even should the entire stock escape, NMFS does not believe that there would be a substantial adverse impact to wild fish stocks for the following reasons: 1. Escaped fish are most likely to remain near the gear where they can be recaptured, speared, caught by fishermen or be preyed upon by wild predatory fish. 2. Escaped fish are likely to have low success in the wild and are not all expected to survive. They are expected to be more readily eaten by predators, and would not have substantial experience at hunting for prey. 3. Wild populations of the species are expected to be at carrying capacity, with limited availability of resources for the escaped fish resulting in a lower likelihood for escaped fish to survive for long in the wild. Although there are numerous studies that were cited in the comment letter that showed problems of fish mortality and prevalence of parasites with *Seriola* cage culture facilities in Australia, the proposed project would be in a location and conducted at a smaller scale than these studies. Furthermore, based on two previous trials with the same species in open ocean conditions, substantial parasite infestations did not occur and are not expected to occur.	

NMFS Summary of Comments Received (# refers to unique comment or comment letter)	NMFS Response for the Agency Administrative Record	Action Taken and Relevant EA Section
	Should a disease outbreak occur or heavy parasite loading be detected, then all fish would be removed from the net pen and that portion of the trial concluded (pers. com., Neils Sims, Kampachi Farms, May 2016). Such an occurrence would be reported to NMFS.	
Comment 59: One commenter stated in their comment that it is questionable if PIRO has the authority under MSA to permit Open Ocean Aquaculture as fishing, and aquaculture is classified in the FEP as a "nonfishing" activity. #013	Response 59: This comment misunderstands the authority to issue the SCREFP. The SCREFP would be issued in accordance with the Council's Hawaii FEP and implementing regulations. The MSA (16 U.S.C. 1811(a)) provides NMFS with authority to manage fisheries in the U.S. EEZ. NMFS may issue a SCREFP under Federal regulation (50 CFR 665.224) to fish, including culturing and harvesting, for a coral reef MUS species with gear that is not authorized. The Velella Delta array is not an authorized gear to harvest Kampachi under the Council's Hawaii FEP, and therefore NMFS evaluated the proposed action consistent with the applicable regulation. See Response to Comment 3.	No change was made to the EA.

Appendix I. Permit Application

The application submitted to NMFS provided the requisite information about the proposed action under the regulation. NMFS, however, worked with the applicant to flesh out the proposed action to enable NMFS to consider and evaluate it thoroughly. This EA represents the culmination of a two-year dialogue between NMFS and the applicant to capture the proposed project under this permit request.

We note that the following application represents only the applicant's initial submission. All additional measures, terms, and conditions associated with the application are reflected in the approved permit and EA.

NOAA National Marine Fisheries Service

Pacific Islands Regional Office ATTN: SFD Permits
1601 Kapiolani Blvd. Suite 1110

OMB Control No. 0648-0463
Expiration Date: 9/30/2015

Special Coral Reef Ecosystem Fishing Permit Application Form

Applicant Information (Please print legibly) Date: 08 /22 / 2014

Full Name or Business Name: Kampachi Farms, LLC

Taxpayer Identification Number (EIN or SSN): [redacted]

Date of Birth/Incorporation: July 18, 2011; State of Incorporation: Hawaii

Business Mailing Address: P.O. Box Kailua-Kona HI 96745-
Street Apt.# City State ZIP

Business Phone: 808 331 1188 x 201 Cell: [redacted] Fax: 808 331 8689

Email: neil@kampachifarm.com, and gavin@kampachifarm.com

Vessel Operator? Yes ☑; No ☐ (If Yes, complete the vessel information)

Vessel Name: Velella Delta - Submerged Polar-Cirkel pen plus feed barge Home Port: Honokohau Harbor, Kona

Length (ft): 40 Net Tonnage: N/A Gross Tonnage: N/A

Vessel: (check one) USCG Documentation ☐; State License ☑

Vessel Registration Number: Under construction; Radio Call Sign:

Privacy Act Statement: Federal Regulations (at 50 CFR Part 665) authorize collection of this information. This information is used to verify the identity of the applicant(s) and to accurately retrieve confidential records related to federal commercial fishery permits. The primary purpose for requesting the TIN is for the collection and reporting on any delinquent amounts arising of such person's relationship with the government pursuant to the Debt Collection Improvement Act of 1996 (Public Law 104-134). Personal information is confidential and protected under the Privacy Act (5 U.S.C. 552a). Business information may be disclosed to the public.

Is this permit solely to transship coral reef ecosystem taxa received from another vessel around the EEZ of the Northwestern Hawaiian Islands, the Pacific Remote Island Areas, or any other MPA? ☐

Do you agree to accommodate an observer on board while fishing, if required? ☑

Does vessel have an individual Vessel Monitoring System? ☐

Do you agree to submit daily log data within 30 days of returning to port? ☐ or transshipment log data within 7 days of returning to port? ☐

Describe your intended target and incidental species, expected catch, processing, and reason for harvesting:

Target Species or Taxa				Expected Incidental Species or Taxa		
Species Name	Expected Catch (lb) (#, wt.)	How will it be processed?[1]	Why harvested? [2]	Species Name	Expected Catch (lb) (#, wt.)	Keep?
Seriola rivoliana	120,000 lbs	Fresh	For sale as food	None		N/A
	(60,000 lbs per year)		Velella Delta Project			

[1] Live, fresh, frozen, preserved, other
[2] Food, ornamental, research, other

Use another page, if necessary; total expected catch during permit period for target species required for permit approval.

(continue on next page)

In which EEZ Management Subarea will fishing be conducted? (check only one)
Main Hawaiian Islands [✔] American Samoa [ ] Guam [ ] Guam's Southern Banks [ ]
CNMI [ ] PRIA (specify)_____

Fishing Gears To Be Used:

1) Submerged 1000 cu m PolarCirkel pen ; 2) Feed barge in Velella Delta array ; 3) _____

Check any special exemption for which you qualify and would like to be eligible for under this permit application (attach description of conditions under which you apply):

Other FMP [ ] Scientific Bioprospecting [ ] General Indigenous [ ]
Indigenous use of live rock/coral [ ] Aquaculture seed stock of coral [ ]

Required Documents:

1) Attach statement describing objectives and details of proposed fishing operation, estimated ecosystem, habitat and protected species impacts, and any additional information to help support approval of this application.
2) Attach copy of current USCG vessel documentation or state/territory vessel registration.

It is prohibited to file false information on any application for a fishing permit (50 CFR ' 665.15(b)).

Applicant Name (print): Kampachi Farms, LLC

Applicant Signature: [redacted] **Date**: 08/22/2014

Paperwork Reduction Act Information

Public reporting burden for this collection is estimated to average 120 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Regional Administrator, NMFS Pacific Islands Region, 1601 Kapiolani Blvd., Suite 1110, Honolulu, Hawaii, 96814-4700.

This information is being collected to provide the information needed by NMFS to regulate and monitor the coral reef fisheries and resources managed under the Fishery Management Plan for Coral Reef Ecosystems of the Western Pacific Region (FMP) and to evaluate the effectiveness of management by assessing the status of stocks and the status of the fisheries. The information provides a basis for determining whether changes in management are needed to sustain the productivity of the stocks or to respond to interactions between fishing vessels and protected species and to address economic problems in the fishery. The information is also used to provide a basis for evaluating the magnitude and distribution of impacts resulting from changes to the regulations. Responses to the collection are required under 50 CFR 665.13. Proprietary data provided concerning the vessel and/or business of the respondents are handled as confidential under the Magnuson-Stevens Fishery Conservation and Management Act (Sec.402(b)).

Notwithstanding any other provisions of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the Paperwork

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

EXECUTIVE SUMMARY

Date: October 19, 2014

Kampachi Farms, LLC wishes to hereby request a SCREFP to allow us to conduct two grow-out trials of kampachi (*Seriola rivoliana*) over the course of a two year period (the Velella Project's "Delta test"), to allow us to fully evaluate the commercial potential for this fish production system.

The applicant has recently successfully conducted two previous aquaculture trials in Federal waters around Hawaii. The Velella Beta test involved use of a 7 m diameter copper-allow meshed Aquapod®, stocked with around 2,000 kampachi (*Seriola rivoliana*), tethered to a drifting feed barge / tender vessel, with no mooring line attached to the bottom. This was the world's first unanchored net pen trial, and was awarded one of TIME Magazine's "25 Best Inventions of the Year" for 2012. The Velella Gamma test used the same net pen, species and number of fish, but utilized a single-point mooring located in 6,000 ft deep water, some 6 Nm offshore of Keauhou, on the Kona Coast, in Hawaii, together with a remotely-controlled, unmanned feed barge to facilitate "over-the-horizon aquaculture".

For the Velella Delta test, two cohorts of kampachi would be stocked into a HALO (HDPE Artificial Lagoon, Offshore) net pen – a submerged Polar-Cirkel style pen that will share many similarities with the Aquapod that we have used for the Velella Beta-test and Gamma-test (except, most notably, it will be cylindrical, rather than spherical). It will comprise of a stainless-steel and copper-alloy mesh material on the floor and walls, and a Kikkonet™ mesh material on the top of the pen. The pen will be of 12 m diameter and 10 m depth (total volume around 1,000 cubic meters), and would be framed by a series of rings of HDPE pipe. The cage will be suspended from a HDPE pipe float ring (the 'halo') for residual buoyancy, and will be submerged to a depth of 10 m below the surface.

We propose to use the precise same mooring as for the Velella Gamma-trial, with a specially-refitted feed barge (between 40 – 65 ft in length) which will be directly attached to the mooring line (rather than attached to a buoy which was attached to the barge, as in the Gamma-trial; this reduction in surface elements should further reduce concerns of negative impacts of surface structures, and reduce potential for entanglement). A tether/umbilical line will run from the barge to the cage to provide feed for the fish, airlines, camera cables and other data feeds. The barge will again provide remote command-and-control connection to our staff on shore over a wireless bridge.

The fish will all be hatchery-reared. No fish will be collected from the wild to stock these pens. The fish will be fed with standard compound diet pellets, as per prior trials and the existing offshore mariculture operation off Keahole Point. We propose to run the project over two grow-out cycles, each of up to 10 months, from first stocking as fingerlings until harvest around 4 lbs. We therefore request that the permit be issued for a two year period. We intend to stock up to 15,000 fish per cohort, for a maximum harvest for each cohort of around 60,000 lbs, and a total harvest volume over the two years of around 120,000 lbs. Kampachi Farms would again be pleased to continue to collaborate with NOAA in gathering additional information on aggregations of wild fish, recreational fishing activity or marine mammals around the Velella structure over the course of the Delta-test.

Based on the results from the Velella Beta-test and Gamma-test, we expect no significant impact from these trials on the ocean ecosystem. If successful, the company may apply for a permit for commercial production of kampachi or other Federally managed species in a larger-scale net pen system, but this commercial permit application would be reviewed, and granted or refused, independently of this permit. In addition, a commercial permit would require a change in the appropriate Fisheries Management Plan by the Western Pacific Regional Fisheries Management Council. Approval of this SCREFP application therefore in no way obligates NOAA to any action that might be considered a cumulative impact.

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Project Description:

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

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

The issuance of a Federal permit would allow the applicant to further evaluate the commercial 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 a 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 applicant has recently successfully conducted two previous aquaculture trials in Federal waters around Hawaii as part of the ongoing Velella Project (named after a genus of drifting pelagic hydrozoans). The Velella Beta test involved use of a 7 m diameter copper alloy-meshed Aquapod®, stocked with around 2,000 kampachi, attached only to a drifting feed barge / tender vessel, with no mooring line attached to the bottom. This was the world's first unanchored net pen trial, and was awarded one of TIME Magazine's "25 Best Inventions of the Year" for 2012. The Velella Gamma test used the same net pen, species and number of fish, but included a single-point mooring located in 6,000 ft deep water, some 6 Nm offshore of Keauhou, on the Kona Coast, in Hawaii, together with a remotely-controlled, unmanned feed barge to facilitate "over-the-horizon aquaculture".

The requested permit would allow the permittee, Kampachi Farms, to demonstrate further refinement of the Velella Concept (Fig. 1) in Federal waters. This Velella Delta test would involve culturing up to 15,000 hatchery-sourced native fish in a new submergible net pen system (the HALO Pen), tethered behind a vessel adapted to serve as a feed barge and communications station, which would in turn be affixed to the seafloor via 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 40' aluminum-hulled landing craft (or similar, perhaps up to 65 ' in length), modified to function as an unmanned, remotely-operated feed barge. The HALO net pen would be stocked with *Seriola rivoliana* (Almaco jack) from a land-based hatchery (either Kampachi Farms' hatchery or Blue Ocean Mariculture's) 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 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 12 m diameter by 10 m deep submergible PolarCirkel net pen (1,018m^3 or 36,600 ft^3 in volume) and feed barge to culture fish, as well as authorize the harvest and transshipment of the fish to and from the HALO using a U.S. Coast Guard registered support vessel. Land-based activities (in hatcheries and 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 has already been obtained from the Army Corps of Engineers, and a request has been filed to extend this permit to allow the Velella Delta trial.

The project depends upon a deep water mooring structure, that is already installed at the intended site, and which was previously used for the Velella Gamma project (Figure 1(a)). The proposed modified net pen array for the Velella Delta trial is shown in Figure 1(b).

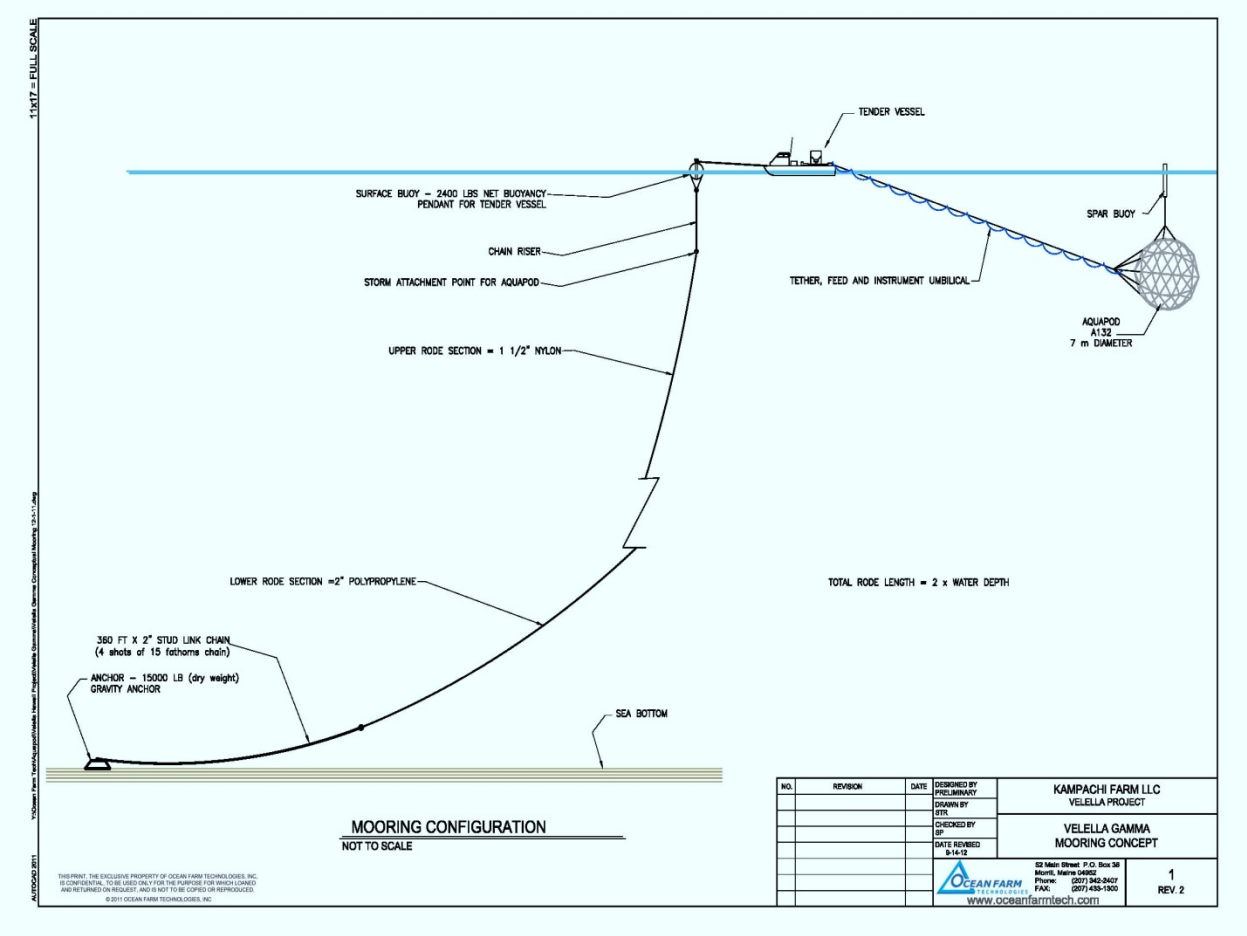

Figure 1(a): The mooring configuration of the Velella Gamma project, including the deep water anchor, mooring rode, surface float, feed barge, umbilical line, Aquapod and spar buoy (which was later modified to a float string).

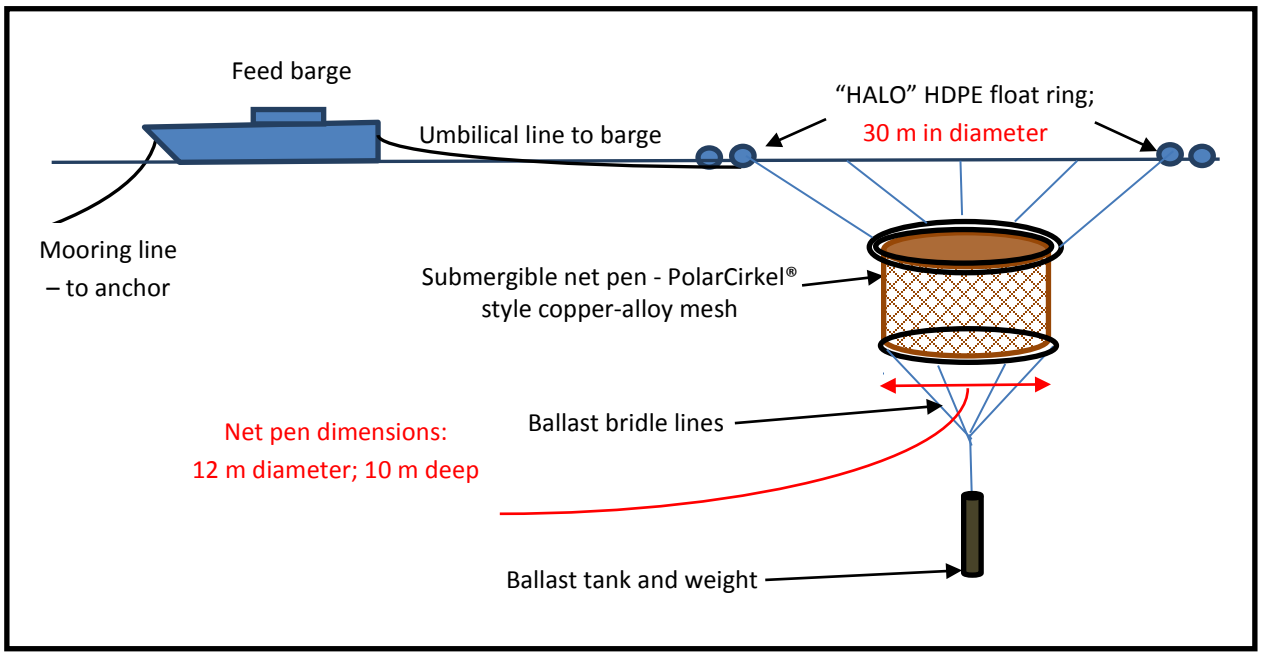

Figure 1(b): The modified net pen array, as proposed for the Velella Delta trial. The deep water anchor, mooring rode, feed barge and umbilical line would all be almost identical to those used in the Velella Gamma test. The Aquapod will be changed for a submergible PolarCirkel net pen (12 m diameter by 10 m deep), and the spar buoy will be changed to a HDPE "HALO" float ring (30 m diameter). (Not to scale)

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, and either motored under its own power or towed to the site through State and Federal waters, and attached to the existing mooring line. The unstocked HALO net pen would be constructed and deployed from Kawaihae Harbor, and towed to the existing mooring location, 5.5 nautical miles (nm) from shore in Federal waters. The single-point mooring has already been deployed at a position of latitude 19°33' North, longitude 156°04' West. A mooring scope ratio of 2:1 has been 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 does not impinge on bottomfish restricted fishing areas, the Humpback Whale Sanctuary, State waters, or any other marine protected zone. The stocking, culture and harvest

of the fish for the Velella Delta trials 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 HALO net pen 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 HALO net pen is attached to the feed barge, the feed barge will 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 25 m in length. The surface floatation ring (the "halo" above the HALO net pen) will also be equipped with a yellow flashing SeaLite M650 buoy lantern with a visibility of 3 miles, to mark the pen's position at night in accordance with USCG "special aids to navigation" standards, as well as a radar reflector and a GPS transmitter.

The proposed location is readily accessible by recreational and artisanal 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 and Gamma trials both proved to be very effective FADs, and have been exceedingly popular among local fishermen, catching primarily small ahi (Yellowfin Tuna, *Thunnus albacares*), but also aku (Skipjack Tuna, *Katsuwonus pelamis*) and occasionally mahimahi (*Coryphaena hippurus*). The Velella Gamma crew has observed up to 30 small boats fishing in the vicinity of the Velella on more than one occasion.

In moving between Kawaihae Harbor and the desired location in federal waters, the vessels towing the HALO net pen 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 and Gamma projects. 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 small amounts of 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 the harbor and vessels would transit park waters in the same manner as other vessels already using the harbor and adjacent waters.

The hatchery facilities that would be the source of fingerlings are operated by Kampachi Farms, LLC, and Keahole Point Hatcheries, both of which are located within the Natural Energy Laboratory of Hawaii Authority (NELHA).

[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

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.

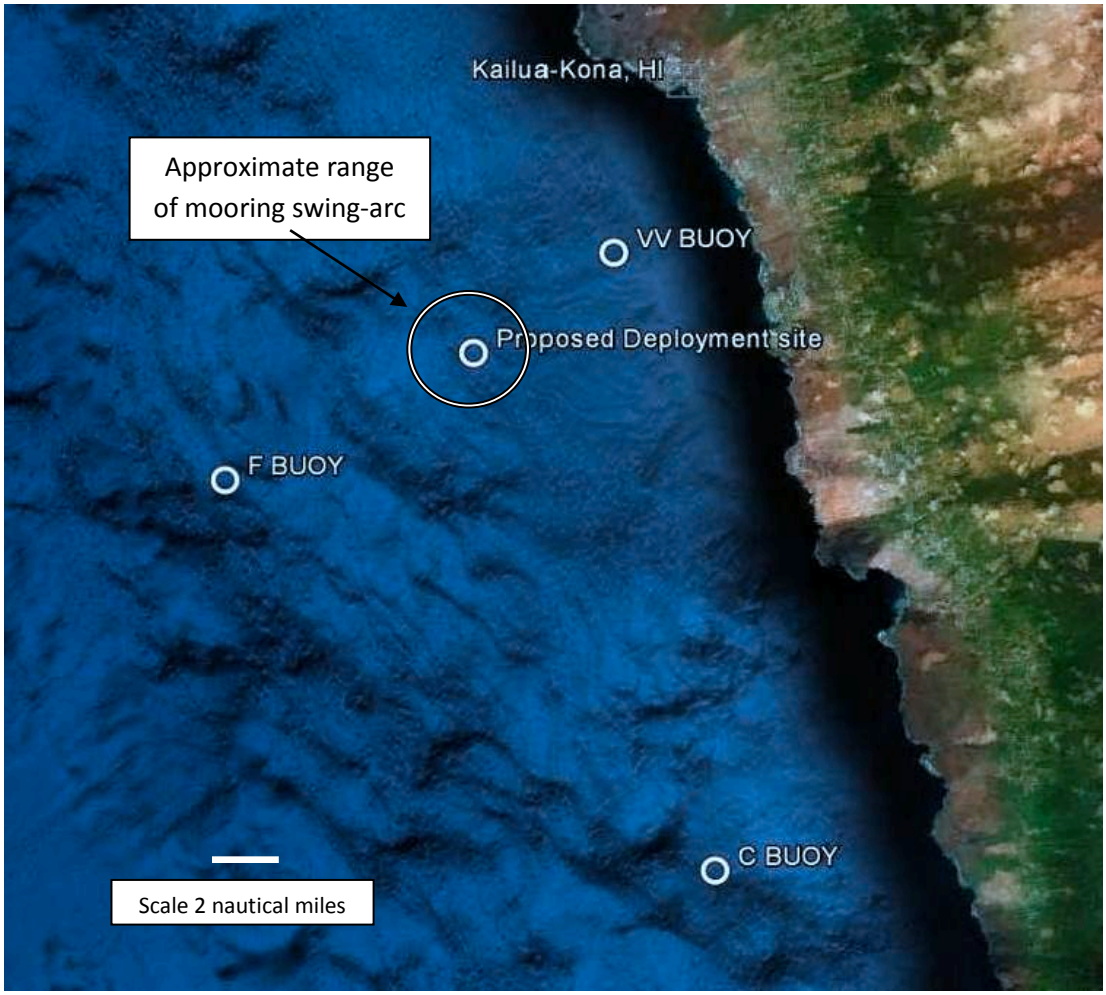

Figure 2a. Proposed action area for the Velella Delta Trial directly west of Keauhou Bay, Kona Hawaii. (latitude 19º33'North, longitude 156º04' West), in relation to existing FADS in the Kona area. C Buoy (19-23.1' N, 155-59.2'W) is about 12.9 miles further South-East from the proposed site; F Buoy (19-30.4' 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.

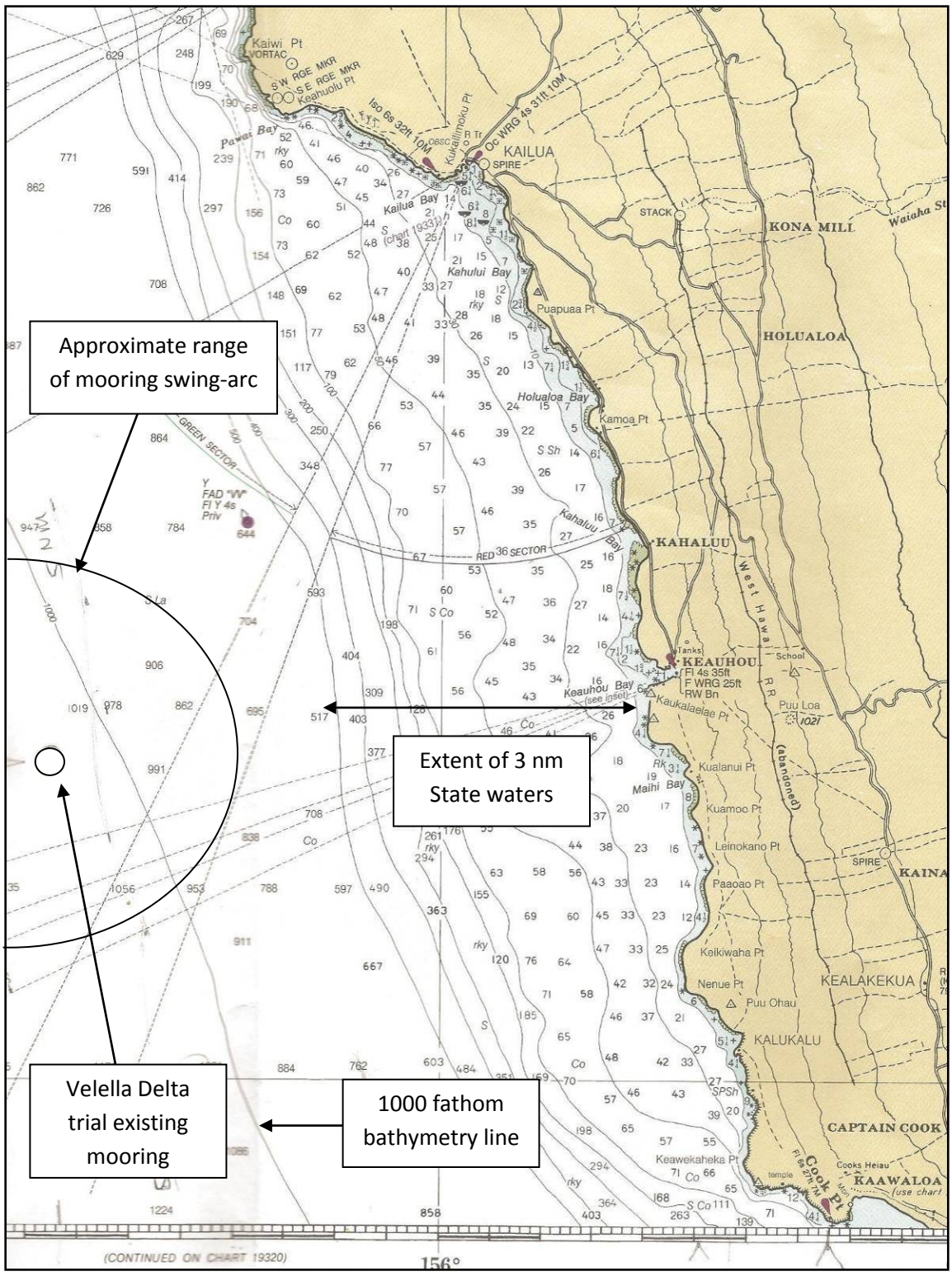

Figure 2b. Proposed action area for the Velella Delta trial directly west of Keauhou Bay, Kona Hawaii, in waters over 1,000 fathoms deep, and beyond the 3 nautical mile boundary of State waters.

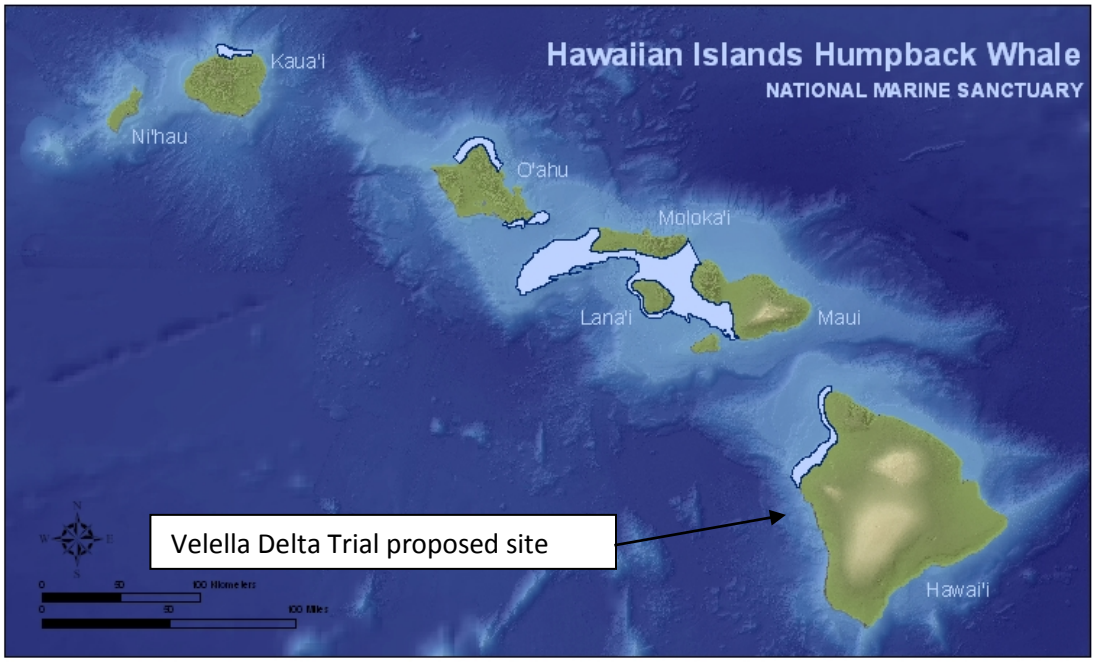

Figure 3. Proposed action area for the Velella Delta trial relative to Hawaii Islands Humpback Whale National Marine Sanctuary. (Source: DLNR 2012)

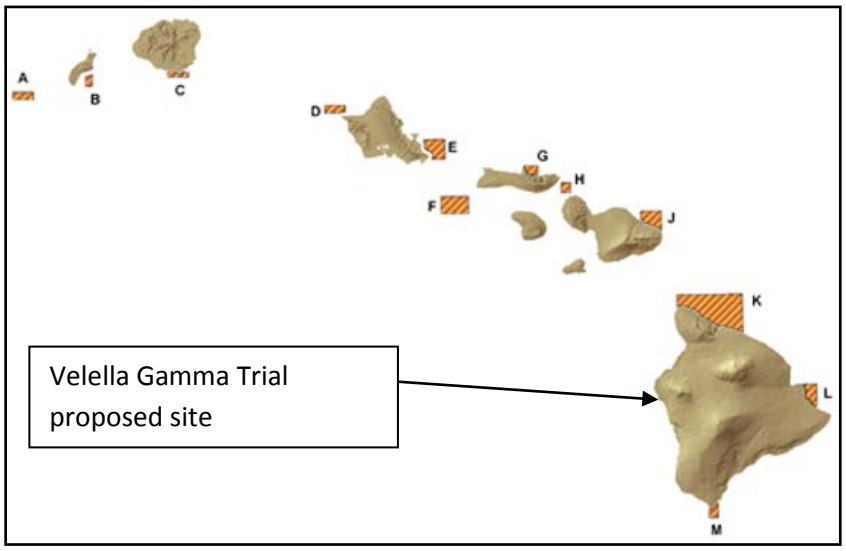

Figure 4. Proposed action area for the Velella Delta Trial relative to Bottomfish Restricted Fishing Areas. (Source: DLNR 2012)

Technical and Operational Characteristics of the Velella Delta Array

The HALO net pen that would be used for the project would be made of similar materials to the CuPod Aquapod™ net pen that was used for the Velella Beta and Gamma trials. Instead of being a geodesic sphere, however, the HALO net pen will instead be cylindrical, with a diameter of 12 m (40 ft) and a depth of 10 m (33 ft), and a volume

of 1,000 m^3 (36,000 ft^3). The HALO net pen is intended to be submerged to a predetermined depth during normal operations by means of bridles to the surface "halo" ring, with a pendulum ballast tank beneath the net pen (see Figs. 1, 5 and 6). The HALO net pen 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 the ballast tank. The HALO net pen consists of High-Density Polyethylene (HDPE) plastic pipe framing (as is used for most commercial marine fish culture, throughout the world) with rigid, chain-link mesh netting. The netting material consists of copper-alloy-coated, marine-grade stainless-steel (Fig. 5), which minimizes biofouling, but also provides greatest strength-for-weight to minimize the risks of tearing or breaches by predators (resulting in a risk for fish to escape) or entanglements by marine mammals or other animals. The HALO float ring is a similar double-ring of 40 cm diameter HDPE pipe, in a circle of 30 m diameter, covering an area of around 7,800 square feet.

Access to the inside of the HALO net pen will be through a swing-door hatch built into the topside panel of the cage. This hatch will be positioned and reinforced to prevent opening under current load (as happened on one instance during the Velella Gamma trial). The hatch will only ever be opened when the pen is raised to the surface of the water, so that there is no chance of fish escaping when divers ever enter or exit the pen. This is part of the perceived advantage of the modified HALO pen design.

The deepwater single point mooring (SPM) system (Fig 1) is already in place. This consists of two large anchors (each 10,000 lbs of concrete), with 360 feet of ground chain, 6,000 feet of floating 2" polypropylene rode, 6,000 feet of sinking nylon rode (providing a mooring scope of 2:1), a chain riser to reduce the risk of near-surface severing, and a surface mooring buoy. 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 Velella Delta array would be attached to the existing mooring. The array itself will consist of a 40' landing craft (or similar), which has been re-fitted as an automated, remotely-operable feed barge. The feed barge will be connected to the SPM system by a chain riser shackled to pad-eyes on the hull of the vessel, and to the HALO pen by heavy nylon tethers, such as proved highly serviceable during the Velella Gamma trial. This nylon 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 HALO net pen by several umbilical lines: a feed hose, an armored air hose to supply the ballast tank, 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, HALO the net pen would be stocked. Fingerling/juvenile fish would be obtained from the Kampachi Farms hatchery and / or the Blue Ocean Mariculture hatchery 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 and Gamma trials, 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 HALO net pen 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 HALO net pen. Once

stocked, the hatch would be secured and locked, and the HALO net pen would be submerged so that the top of the cage would be approximately 10 m (33 ft) below the surface of the sea to limit effects from surface waves, currents and/or weather anomalies on the HALO net pen. 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 net pen would be held at the specified depth by at least six bridle lines that lead to the 'halo' – the residual-buoyancy surface float ring, comprised of a double-ring of HDPE pipe (Fig. 1). A GPS transmitter and radar reflector would also be attached to vertical stanchions on the HALO float ring, so that in the event of detachment from the tender vessel and the mooring line, the HALO net pen 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 HALO net pen while submerged.

In the event that the net pen should become detached from the HALO float ring, and if the ballast tank was flooded at the same time, the HALO net pen 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 Aquapod then in use 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 purged with compressed air to bring the pen to the surface. The fish inside the Aquapod appeared to be unaffected by the incident. If the float ring and the umbilical were to both part from the net pen, the HALO net pen 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 approximate depth of 6,000 feet, the HALO net pen and the fish inside would most likely be unrecoverable from the ocean bottom. If the HALO net pen 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 incident and any resultant navigational hazards, while acting to recover the cage with a secondary tow vessel.

Raising and maintaining the stock within the HALO net pen 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 will again be accomplished through a hose that will extend from the feed barge to the HALO net pen, as in the Velella Beta and Gamma trials. The feed pump and auger will be controlled remotely, and feeding will again 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. This system worked sufficiently well that, by the conclusion of the Velella Gamma trial, project staff only needed to visit the array once each week, to top up the feed hopper and the fuel tank for the generator. Staff were able to feed the fish, and observe the fish in the net pen from any internet connection in the world (at one stage, feeding the fish from the lobby of the Seattle Convention Center, during the World Aquaculture Society Conference).

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 HALO net pen (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 HALO net pen 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 HALO net pen 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%). The Velella Gamma trial also had very low mortalities (though precise numbers were not estimable, because of the one large escape event, which resulted in escape of around 340 fish – most of which were recovered by Kampachi Farms employees, or recreational fishermen around the pens). A survival rate of around 97.5% is anticipated for the Velella Delta trial. Therefore, from an initial 15,000 fish stocked, the final harvest is expected to be over 14,600 fish, with around 375 mortalities over the course of the grow-out. Any fish carcasses would be removed from the HALO net pen 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, dead or alive, would be intentionally released 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 HALO net pen, 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 HALO net pen 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 30,000 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 only around 3% 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 Delta trial.

Because the Velella Delta would use a single-point mooring (as did the Velella Gamma trial), periodic 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) will include a roughly circular area with a radius of 10,400 ft (1.73 nm), and 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. When currents change or slacken, then the windage on the feed barge, the weight in the nylon line, and the buoyancy in the polypropylene line will maintain some level of tension between the net pen and the anchor to minimize the risk of the line chafing, hockling, or becoming an entanglement hazard for 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. Texas A&M University's Offshore Technology Research Center has modelled the forces on the mooring line and other attachment points, and the dynamics of the Velella Delta array, in Orca-Flex, for sea state conditions that were experienced at the mooring site during Hurricane Iniki, in 1992 (Table 1: i.e. significant wave height of 4.7 m, or over 15 ft, wave period of 12 seconds, and current speed of 4 knots). The maximum wave height for these conditions is expected to be around 28 feet.

Under these conditions, the mooring components are all within their minimum breaking load, and the mooring chain is not even lifted completely off the bottom (i.e. there is no lifting force on the concrete anchors). The net pen is lifted towards the surface, but is sufficiently stabilized by the ballast that it does not rise fully to the surface.

(Mean depth of the float ring is around 4 m, or 13 ft). In the Orca-Flex model, the leading edge of the float ring is submerged to around 4 m, but in the Velella Delta array, this will be supported instead by the mooring buoy and/or the feed barge. The slight deformation of the float ring is well within the tolerance limits of the double HDPE pipe. (Figure 5).

Table 1: Sea state conditions at the Velella mooring site during Hurricane Iniki.

Parameter	Value	Unit
Wave height (H_s)	4.7	m
Wave period (T_p)	12	s
γ	3.3	~
Current speed	2	m/s

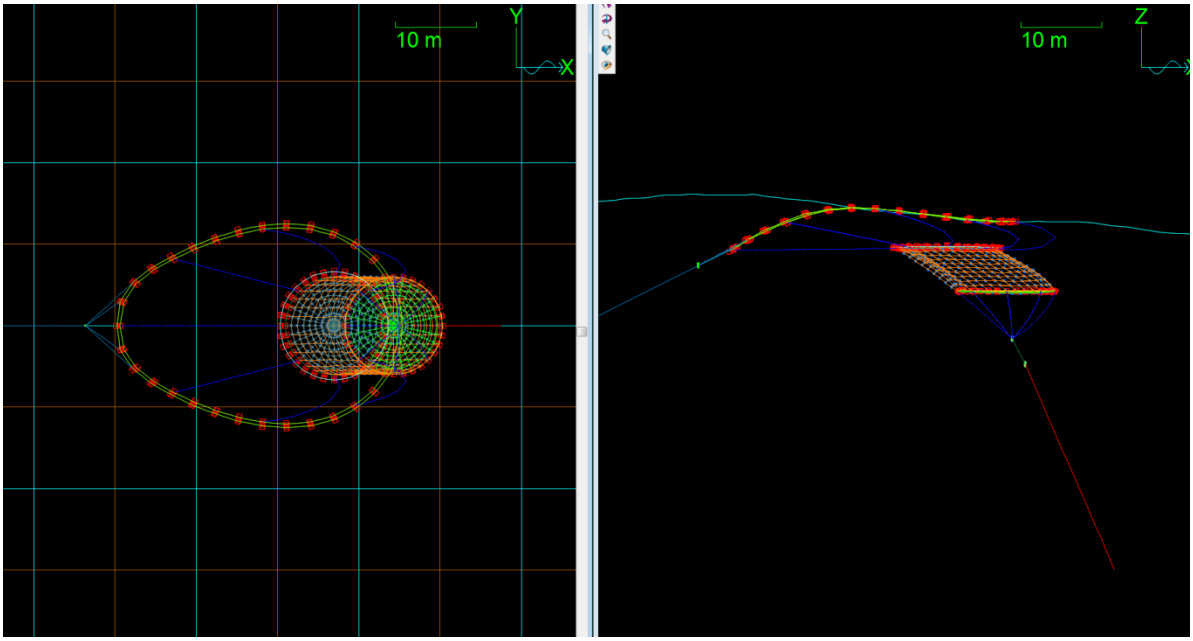

Figure 5: Orca-Flex model simulation of the Velella Delta HALO array under sea conditions similar to that experienced at the existing Velella mooring location during Hurricane Iniki.

The unmanned barge will be equipped with extensive void spaces, 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. 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; HALO net pen net pen to Kawaihae Harbor). The mooring line, chain riser, and buoy would ideally be left in place, and maintained as a FAD by Kampachi Farms, as a community benefit. Kampachi Farms has received numerous verbal requests by

local fishermen in Kona to leave the existing mooring in place. It is currently the only functioning FAD between Keahole Point and Milolii (i.e. over 60 Nm of heavily-fished coastline).

If the mooring line needs to be retrieved for any reason, then a bladed messenger device provided by Sea Engineering of Honolulu, HI, will be used. The line will be hauled tight using a capstan or winch-head, 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, and 6000lb buoy if present) to be retrieved.

The test of the Velella Delta 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 was 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 Delta trial would be immeasurably small. This trial only consists of two separate cohorts of 15,000 fish, each with a maximum biomass at harvest of around 30,000 lbs. The Velella Beta trial yielded a Feed Conversion Ratio of around 1.6 : 1, implying a total feed level for this cohort of around 48,000 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 water quality*. This represents a total feed amount 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 Delta project therefore would entail less than 3% 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 480 lbs per day. This is perhaps equivalent to the mass of *palu* (chopped fish) used by, say, ten 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 Delta 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 will be supplied by a yacht-type wind generator and/or small photovoltaic array.

As the Velella Delta 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 generated 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 Delta 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 Delta array is similarly equivalent to that of a single fishing boat. The Velella Delta therefore should have no perceptible impact on the view-plane or seascape. Any night work lighting would be downshielded and would 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. As the anchor and chain is already deployed, the Velella Delta project is not expected to significantly change the impacts to the substrate. The bottom topography in this area 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 HALO net pen. There is a concern that this could result in genetic inbreeding and introduction of diseases. The likelihood of escapes is considered to be low, and the operation has been designed to prevent and minimize adverse impacts. The HALO net pen cage is designed to reduce the chances of any of the cultured fish escaping. The brass mesh used on the Aquapod 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 were then amended to prevent further 'leakage' escapes, and no diver-associated escapes were experienced during the Velella Gamma trial. The two failures during the Velella Gamma trial were equipment-related: in one instance, a shark broke the Dacron® stitched attachment points to the brass mesh on the Aquapod frame; on another, the Aquapod hatch tore open under extreme current conditions. In all instances, the escapees during the Velella Beta and Gamma trials remained very close to the pen for periods of up to several weeks (if allowed to persist), and were readily captured by divers with three-prong pole spears, or by recreational fishermen.

Even if some breach were to occur during the Velella Delta trials (e.g. through failure of the Dyneema stitching of the Kikkonet top-net to the HDPE frame), it is highly unlikely that the fish would leave the general area of the HALO net pen. The relatively 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 broodstock, in an effort to help minimize potential impacts of escapees. The fish are never genetically altered, nor exposed to any prophylactic drugs.

The fish would be maintained at generally low densities. Biomagnification of diseases in the net pen was not observed during the Velella Beta or Gamma tests, and is not expected to be a problem in the proposed trial. The

minimal biofouling and the 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.

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 project will make use of an existing mooring, and so this would occur whether or not the net pen was attached to the mooring line. 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 is approximately 9 acres. If the mooring line is later 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 marine-grade Duplex stainless-steel mesh cage and operational aspects of the project are designed to minimize fish escapes. The use of the HALO net pen would allow access through a hatch in the top of the cage that would be above water while the HALO net pen is raised to the surface, in an effort to improve upon conventional designs and to reduce accidental escapes of cultured stock into the wild. There will be no bottom access to the net pen.

Should fish accidentally escape during the Velella Delta trial, genetic impacts to wild stocks are not anticipated for several reasons. First, the number of fish that would be cultured (15,000) 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, and – as evidenced during the Velella Gamma escape incident – exceptionally heavy fishing pressure. Third, any fish that may escape would probably remain in close proximity to the HALO net pen, where they could readily be speared by divers, as noted during the Velella Beta and Gamma trials. 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 HALO net pen 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 to originate 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-jacketed mesh, regular cleaning of the pen, and the unidirectional movement of water through the net pen on the SPM. With the Velella Beta and Gamma trials, 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 inconsequential to the health of the animal. By the conclusion of both the Beta and Gamma trials, 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 two preceding Velella trials, and fish survival was exceptionally high/

Impacts of Drugs and Chemicals

No therapeutants were used during the Velella Beta or Gamma project. The proposed permit for the Velella Delta 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 Delta 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 configuration, 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 HALO net pen would

[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/

be subject to a constant flow of water and located in the deep open ocean. The Velella Delta 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 Delta Trial is located around 14 miles from the Keahole Point farm site, and will only involve around 15,000 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 net pen, 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). Re-use of the existing deadweight anchor and chain are not expected to result in any major changes to the benthic habitat beyond the immediate anchor area; any impacts would occur whether or not the Velella Delta project proceeds. The anchor is 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 will continue to impact a circular area with a radius of up to 360 feet, totaling approximately 9 acres. The proposed activity would not result in any change to anchor or groundchain already in place, or to their level of impact on the surrounding substrate.

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.

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. Fishing mortality would also be very high. Those fish that survive for any period of time would not leave the area of the array and would be eventually 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 HALO net pen 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 (15,000 fingerlings each cohort) in relation to the wild population; a reduced likelihood of survival after escape; a low risk of being a disease carrier due to careful health 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 will once again act as a floating fish aggregation device or FAD. The effects of previous pen iterations as fish aggregating devices have not resulted in large or adverse impacts on the migratory habits of pelagic fishes because the pens are relatively small (compared to commercial-scale aquaculture cages), and the projects have been only be of limited duration. The proposed activity should be no different.

The impact of the mooring chain movement is not expected to have any major effects to fish, molluscs, crustaceans, corals, or other marine life because 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 (which would have already occurred), and the disturbance of epifauna due to scraping within the mooring chain radius (which has probably also already occurred). The proposed activity would therefore have no additional impacts on benthic marine life.

Impacts of Feeds and Feeding on Wild Fish Stocks

As discussed above, the fish food that would be used in the Velella Delta 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 HALO net pen (containing a limited number of fish,) there should be little uneaten feed released to the environment.

The fish feed is especially formulated using low levels of fish meal (30%) and fish oil (10%). In this trial and at the Kampachi Farms' 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*), mahimahi (*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.

Bottomfish are also a component of the epipelagic zone. Bottomfish are found on deep slopes, and bottomfishing around Hawaii Island is another important commercial and recreational fishery. Bottomfishing activities are usually

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

limited to waters shallower than 200 fathoms (1,200 feet), and so this trial will have no potential for interaction with this fishery.

Marlin, an important commercial recreational species, regularly occurs along the deep waters of the 1,000 fathom line, and this area is important for a commercial charter catch and release fishery. The mooring is within this activity area. Kampachi Farms understands that other fishermen access the same waters depicted in the action area and would work to minimize and/or help to mediate user conflicts if they were to arise. The experience with the Velella Beta and Gamma trials to date has been highly favorable in this regard, with the arrays acting as exceptional Fish Aggregating Device (FAD), attracting and holding schools of mahimahi, yellowfin and albacore tuna. Local recreational, commercial and charter fishermen have been very positive in their response to the presence of the Velella. Catch data is not available, but observations and reports by local fishermen suggest that catches around the Velella compared favorably against catch rates around other FADs.

Socioeconomic Impacts

The scale and duration of this iteration of the test of the Velella Concept is limited, and economic impacts of the project are expected to be small and of limited (two years) duration. KF would lease space at Kawaihae Harbor as needed and utilize existing facilities at Honokohau Harbor to support the effort. Direct jobs generated could be few or none depending on how many KF existing staff are involved in the project. UH graduate students would be used as observers to conduct wildlife monitoring and oceanographic research during the duration of the project.

KF anticipates up to 60,000 pounds of fish would be harvested for each of the two cohorts, and records would be kept of the amount initially stocked, the number harvested and stock survival as prescribed under the special permit reporting requirements for the Gamma Test. If this Delta test is successful, KF's intention is to market the harvested fish as Hawaiian Kampachi through existing established marketing and distribution channels. As with the Velella Gamma Trial, it is anticipated that most of the fish would be sold locally, while some portion of the harvest may go to the U.S. mainland or abroad.

The harvest of the fish from the test project would not compete with the market because this species is not currently harvested or marketed in Hawaii other than by Blue Ocean Mariculture, and the fish would be sold using that company's own existing markets. The small size of the production would not result in industry consolidation or overproduction. The production of this species in culture is not expected to result in an increased fishing pressure on wild fish stocks, because wild kahala stocks are often ciguatoxic and may contain large parasitic worms and, therefore, are considered unpalatable and are not harvested commercially.

The operation would not be expected to negatively affect other fishermen and communities because of the small size of the array and its location beyond 3 nm and outside of the majority of popular fishing areas. As with the Velella Beta and Gamma trials, the array is expected to attract various pelagic fish species and other marine species, acting as a FAD. This would continue to attract offshore fishermen and other vessels to the array. There have been no instances of conflict with local fishermen during the operation of the Velella Beta or Gamma trials. Local fishermen were highly supportive of the presence of both the towed array, and the moored net pen at its current location. Fishermen generally have remained a safe distance from the Velella.

The location of the proposed array along the 1,000 fathom depth contour is not expected to have an adverse effect on marlin or on the recreational fishing industry. The pen would be accompanied by a surface feed barge

that would be visible, and the mooring lines lie in a direct line to the mooring block. In general, this configuration places the mooring lines approximately parallel to the coast. Marlin and other pelagic fish species, have not and are not expected to interact with the mooring line itself.

The Velella Delta trial will not interfere with existing FADs. VV buoy and F buoy have both recently come adrift and have not been replaced, and there are no other FAD buoys within a 30 mile range of Honokohau Harbor (the main fishing port on the Kona Coast). Permitting the proposed activity would not grant Kampachi Farms special rights, or a lease to exclusive use of any part of the ocean, or any of the fish that are attracted to the array. The entire action area would remain open to all ocean activities to the same degree it is accessible prior to the issuance of a permit.

Impacts on Protected Resources

Seabirds

The proposed action is not expected to cause harm to seabirds in the region. Attraction of protected species of seabirds (i.e., Short-tailed albatross, Newell's shearwater, and Hawaiian petrel) has not been an issue to date with either of the two existing nearshore aquaculture farms utilizing submerged cage technology (i.e., Hukilau Foods off of Ewa Beach, Oahu and Kona Blue Water Farms, Kailua-Kona, Island of Hawaii: HF 2009, KBWF 2009). No protected bird species or significant numbers of other birds were attracted to the Velella Beta trial in these waters from July, 2011 to the conclusion of the trial in February, 2012. Several Brown boobies (*Sula leucogaster*) were frequently observed resting on the feed barge in the Velella Gamma trial (October, 2013 to June, 2014), but these birds were not in any way harmed, are not protected or otherwise vulnerable, and they departed the site once the feed barge was removed. Because the proposed action consists of a HALO net pen that spends the vast majority of time submerged, there is little or no opportunity to attract oceanic seabirds or pose an entanglement risk. Moreover, the cage is made of small-sized (largest diameter of 50 mm or 2 in), rigid, brass mesh material rendering the interior of the pen inaccessible to seabirds. Pursuant to 50 CFR §665.224, PIRO will need to send information pertaining to the application of the Velella Delta test project to the U.S. Fish and Wildlife Service (USFWS) which has jurisdiction over listed seabirds. Any night work lighting will be dimmed and down shielded to prevent interactions with night-flying birds.

Potential Impacts to Sea Turtles and Marine Mammals

Monk seals occur in the Hawaiian Archipelago, and while historically associated with the Northwestern Hawaiian Islands, the population of monk seals around the main Hawaiian Islands has been increasing in recent years, making it possible that a monk seal could visit the Velella Delta array. Also, monk seals are strong swimmers and have been known to swim long distances. No monk seal was encountered during the previous Velella Beta or Gamma trials, and very few interactions have been recorded with the moored net pen farm site off Keahole Point. If a monk seal were to be attracted to the new Velella array, the staff would make observations of the monk seal without interacting with the animal in any way. Monk seals would not be fed from the array and so would not be expected to remain in the area. If any monk seal did persist, Kampachi Farms would notify NMFS.

Sea turtles are also known to inhabit the region year round. Potential interactions with any endangered species are expected to be minimal given the lack of entanglement risk due to the rigidity of the mesh on the HALO net pen and the tension on the mooring line. Hence, the most serious effect from the proposed activity on

endangered species is anticipated to be more behavioral (e.g., the result of a marine mammal investigating the HALO net pen or engaging in predation nearby), as opposed to the HALO net pen and tender vessel or other operations causing injury or mortality (e.g., entanglement).

Marine mammals were only observed a total of 8 times during the operation of the Velella Gamma array; these were all exclusively Rough-toothed dolphins (*Steno bredanensis*). The animals never interacted directly with the net pen, or with the array.

Other experience with fixed-point, nearshore aquaculture in Hawaii has been that active net-pen operations do not generally attract large whale species, but bottle-nose dolphins do occasionally approach the pens for short periods of time (HF 2009; KBWF 2009). This generalization has been more recently confirmed by two studies: (a) a monitoring project around the Keahole Point farm site (2009 – 2010, conducted independently by a UH Hilo student), which found only a few individual bottlenose dolphins attracted to the net pens occasionally, and (b) a monitoring project by a UH Hilo student and independent data collection by crew on the Velella Beta Trial, that found no significant impact of the Velella array on marine mammals. (see www.kampachifarm.com/sustainability). Similar monitoring of marine mammal interactions with the Velella Delta trial would be conducted, and any significant interactions would be reported to NMFS. Under the terms of the permit, NMFS may require that an observer be posted on the tender vessel at any time.

The Velella Gamma array is very popular with local fishermen, and they continue to use the Velella mooring as a FAD even after the removal of the net pen and feed barge. However, it is clear that the array is not a particular attractant to dolphins. There is therefore only minimal risk of any increased fishing interactions with dolphins and other marine mammals from the extension of the permit to allow deployment of the new net pen and feed barge. The potential for any negative interactions between fishermen and dolphins around the Velella Delta is not any greater than the potential for such interactions around the other FADs around the Hawaiian Islands.

Because of this prior experience, the small scale of the project, staff monitoring, handling, consulting, and reporting requirements, the project is not expected to result in adverse effects on protected species that may be attracted to the array.

Entanglement

A concern with protected species, particularly marine mammals and turtles, is entanglement in nets and lines used in ocean activities. The mooring, float and weight lines to be used in the project will be made of nylon and polypropylene rope, equal to or greater than 1 inch in diameter. The first 360 ft (approximately) of the existing mooring is chain, and the upper 6,000ft of the mooring line is negatively-buoyant 8-strand nylon rope, which maintains tension even in slack water (no current). Additionally, observations of the gear and any protected species nearby would be made prior to the controlled raising or lowering of the HALO net pen (e.g., when cleaning or harvesting). For comparison, the float ring and tether rigging used in the Delta project would be similar to other fishing or towing operations (e.g., tug boats) where gear or tow lines are maintained at or below the surface behind a vessel. Aquaculture facilities located in State waters, specifically Hukilau farms (HF) and Kona Blue Water Farms (KBWF), had no reported incidents of protected species entanglements in a combined 15 years of operation (HF 2009, KBWF 2009). In addition, all staff and crew are expected to adhere to the same marine mammal management and reporting plan as used at the Keahole Point site (formerly operated by KBWF), and report any contacts to, and immediately discuss any problems with, appropriate Federal officials.

Vessel Strikes

Vessel strikes on marine mammals or sea turtles are not expected to occur, as the duration of tow from the harbor to the mooring site would be at a slow speed. The maximum speed of the Velella array under tow is estimated to be about 2 knots (kt). By comparison, NOAA's general guidance for vessels transiting areas where there are known populations of whales shows that collisions are minimized when traveling less than 10 kt (HIHWNMS, 2011b). Support vessels that frequent the Velella array during the operation (e.g., weekly or monthly) are expected to also be vigilant against the possibility of endangered species strikes and the permittee would be responsible for recording and reporting interactions if they were to occur. Speeds of the support vessels are expected to be on the scale of any other average recreational vessel operating in Hawaii. One model that was developed to assess the effect of vessel speed on whale strikes resulted in the finding that a conventional ship moving at 20 to 25 kt can reduce the possibility of a ship striking a whale by 30 percent simply by slowing down to 12 or 13 kt, and by 40 percent by slowing to 10 kt (Kite-Powell, et al. 2007). At 2 kt, the risk of collisions with marine mammals is almost negligible. If a collision were to occur, a report would be filed with NOAA NMFS as a condition of the permit requirements (see Appendices C). None of the sea trips that were used to support the activities of the Velella Beta and Gamma trials had any interactions with sea turtles or marine mammals.

Noise

Noise from the moored tender boat is expected to be minimal, as would be the occasional sound of feed being pumped to the fish in the HALO net pen and the raising and lowering of the pen using the ballast tank. The generator engine on the feed barge (the prime source of noise on the mooring) is a diesel engine rated at 20 horsepower. The proposed tender vessel for the activity is a landing craft that has been previously in service on the Kona Coast, and noise from main engines or propeller cavitation is not any more a concern than for other vessels. Noise emitted from the support and supply vessels is not expected to be any different than any other recreational vessel allowed to operate in waters around Hawaii. When raising the cage, air entering and leaving the HALO net pen's ballast tank may emit a soft hissing sound that could be heard underwater, similar to typical hydraulic systems used in other commercial or recreational operations that regularly set or retrieve gear. When fish are transferred to and from the HALO net pen they would likely be scooped with nets. However, if a pump were to be used, the sound as heard underwater is expected to be on the scale of a ballast pump, and would only be used a few times during the entire operation. Overall, impacts of noise from the proposed activity on protected species are expected to be negligible, and noise levels are expected to be much quieter than those associated with active commercial and recreational fishing operations where it is common practice to operate hydraulic lifts and line reels. The level of activity, and the location of the pod array beyond 3nm would result in no noise impact to residences in West Hawaii.

Effluents and waste

The impacts of effluents associated with aquaculture projects on protected resources are another potential concern. Fish feeding will be closely-managed, to minimize the delivery of excess feed to the stock; hence, there should be little uneaten feed released to the environment which would serve as an attractant. The low number of fish, minimal amount of wastes and uneaten feed released from the net pen, and anticipated rapid dilution and assimilation of particulates - including uneaten feeds or fish feces - are anticipated to be of low concentration and not expected to be measurable or impact protected species.

Exposure to general vessel wastes can be harmful to marine mammals and sea turtles as well. Plastic trash and bags may be ingested, cause suffocation, or, along with discarded ropes and lines, may entangle animals. Because the automated feed barge would be unmanned, general trash and wastewater would not be present onsite. The applicant intends to remove all vessel-generated wastes using the same vessels that resupply the array, and is

aware that local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment and violators may be subject to civil penalties. Violation of such established regulations may also be grounds for permit revocation. Finally, as regulations and permit conditions require, the applicant would keep records on any interactions with protected species resulting from effluents and wastes, and would report such activity should it occur.

NMFS evaluated the potential indirect impact of the Aquapod net pen (used in the Velella Gamma trial) on false killer whales or other marine mammals which could be attracted to the array because of the fish aggregating below it. NMFS did not expect mortality or injury of false killer whales or other marine mammals to be a common occurrence at the Velella array in part because the pod is quite small and poses little risk of entanglement, sharks would have other prey to hunt, and marine mammals are mobile and are likely to escape predation. The same conclusions would also apply to the HALO net pen. The attractant effect of the Velella Delta array toward sharks would be minimized through operational procedures that would not allow disposal of dead fish in the ocean, and minimize the amount of feed that enters the environment beyond the pen. Compared to the baseline environment where sharks and marine mammals interact at FADs, the HALO net pen array is not expected to induce a change that would result in harm to marine mammals. Divers and staff would be required to record any adverse interactions and report such interactions to NMFS.

During the Velella Beta trial, the only interaction between sharks and marine mammals was in one instance, when two individual false killer whales were observed to be harassing a juvenile whale shark (*Rhincodon typus*). The final outcome of this interaction was not determined, as the whale shark swam to deeper water. This was also the only sighting of false killer whales reported during the entire trial period. A complete log of marine mammal sightings, including behavioral observations and a Google Earth GPS map is at www.kampachifarm.com/sustainability.

Critical Habitat

Currently there is no designated critical habitat within the action area. The small number of vessel trips to stock and harvest the fish, and the low number of vessel trips required to restock feed by the tender vessel, are well within normal maritime traffic levels for the area, and activity would not degrade the quality of habitat being considered for potential future monk seal critical habitat (see section 7.7.1).

Potential Impacts on Sharks, and of Sharks on Human Safety

Nearshore aquaculture has caused public concerns over attraction of sharks to the vicinity of the HALO net pen, and closer to coastal areas as the HALO net pen is towed back to port. In nearshore net pen situations in Hawaii (i.e., the two existing operations, Hukilau Foods (HF) and Blue Ocean Mariculture, sharks have been observed on occasion, but generally with no particular pattern of attraction or avoidance to the pens (HF 2009). Under the proposed action, standard management practice by Kampachi Farms is to remove any dead fish from the pens on a regular and timely basis, which is expected to reduce that potential attractant. There has been one incident, reported by KBWF, where a diver working around nearshore pens (within 3 miles) was directly threatened by a tiger shark, which was eventually selectively euthanized (via “bang-stick”) due to diver safety concerns (KBWF 2009).

Over the course of the Velella Beta Trial, divers encountered a number of sharks - Oceanic white-tip sharks (*Charcharinus longimanus*), Galapagos sharks (*C. galapagensis*), Silky sharks (*C. falciformis*) and – on several occasions – Whale sharks (*Rhincodon typus*). Dive safety procedures were established for different levels of

response to shark sightings and aggression. On several occasions, divers exited the water because of aggressive behavior by Oceanic white-tip and Galapagos sharks. Sharks tended to travel on and did not stay with the array.

Interactions with sharks were less common when the Velella Beta array was closer to shore (inside, say, 10 nm of the coastline). Similar protocols to ensure diver safety were employed during the Velella Gamma trial. Few sharks were observed around the CuPod array by Kampachi Farms staff during the Velella Gamma trial, but on one occasion spearfishermen hunting around the array reported a Galapagos shark attacking the copper-alloy mesh on the pen, and creating a small breach where the chain-link mesh was lashed to the plastic frame. The mesh itself was undamaged, and the amount of such seam lashing is significantly minimized in the HALO net pen design.

While sharks can be expected to be attracted to the Velella array, the proposed activity is not expected to attract sharks to inshore coastal environments. Since no fish would be in the HALO net pen when departing or returning to port, there is no reason to believe that sharks would remain with the Velella array any more so than other boat traffic in the vicinity. No sharks were associated with the Velella Beta or Gamma arrays when the unstocked pens were being towed from shore to the area of operation. Because the grow-out operation would take place in deep ocean waters, 5.5 nm offshore, away from nearshore and coastal recreational areas, there is no reason to believe that sharks would be attracted in greater numbers to coastal and beach areas as a result of the proposed activity.

Potential Impacts of the Array on Sharks

There are nine species of pelagic sharks that are found in the open ocean environment and all are rarely encountered by transiting vessels, and generally do not frequent coastal waters with regularity (WPFMC 2009b). Regardless, any dead fish would be removed from the pen regularly and a shark management plan that focuses on diver safety and non-lethal shark control, similar to the one established for previous operations in state waters and on the Velella Beta and Gamma trials, would be followed for the duration of the Delta trial (KBWF 2009). Non-lethal shark control calls for the removal of any dead fish from the pen for disposal ashore. This is expected to limit encounters with sharks, and to also minimize potential adverse effects of the permit activity on sharks such as changing their natural activity and behavior patterns beyond their natural attraction to floating objects. Bang sticks or other potentially lethal measures will not be employed to remove sharks around the array.

Potential Impacts on Air Quality, Viewscape, and Energy Resources

The proposed action would involve a single tender vessel that would be moored off a single-point mooring and tethered to a small (approximately 39 foot diameter) HALO net pen stocked with 15,000 fish in Federal waters between 3.5 and 7.5 nm off the leeward shoreline of the Island of Hawaii. During virtually the entire two ten-month grow-out test periods, the HALO net pen would be submerged 35 ft (approximately) below the surface. The circular HDPE float-ring, other marker buoys and the tender vessel would all be readily visible, and would have appropriate Coast Guard markings and beacon lighting for navigational safety.

Lighting is not expected to be intense, except for the occasional need to use work lighting at night, when the lumens would be limited to that needed for ocean safety. Any barge lighting would be shielded to reduce impacts.

Given that the location of the tender vessel and HALO net pen would be far from the coast and operating in a large expanse of ocean generally in areas with water depths of 3,000 to 7,500 ft; and given the fact that the array position would be maintained by the mooring rather than diesel engines, no adverse impacts on air quality or viewscapes are expected. There is also not expected to be a requirement for energy resources beyond the marine diesel fuel used by the barge's generator and occasional trips by small vessels to support the operation.

Potential Impacts on Water and Seafloor Quality

The proposed action would see no additional gear deployed to the seafloor (a depth of approximately 6,000 feet). The only additional equipment to be added will be at the surface (the feed barge and the HALO float ring) or close by the surface (the submerged net pen). Local experience with commercial offshore net pen culture in State waters, and the Velella Beta and Gamma trials in the open ocean, indicates that water and sea floor quality effects from this type of activity are anticipated to be negligible to non-existent.

This test proposes to grow out approximately 15,000 fish over two ten month periods to an average weight of four pounds. A specially formulated, compounded feed in pelletized form would be utilized and carefully distributed so as to avoid overfeeding. Feeding would be observed by cameras or divers. The Feed Conversion Ratio (FCR), the ratio of how many pounds of feed to produce on pound of fish, is expected to be less than 2:1, judging from Kona Blue Water Farm's experience with its State lease (KBWF 2009), and the applicant's experience with the Velella Beta and Gamma trials. Therefore, approximately 120,000 pounds of feed is expected to be used during each ten month trial. It is anticipated that about 10,000 pounds of particulates and fish metabolites would be generated over that time period, based on a fish feed assimilation efficiency of around 90% (i.e., an estimated 90% of the feed would be metabolized by the fish).

Water and substrate quality concerns with net pen aquaculture in general focus on the resulting particulate (uneaten food and feces) and dissolved metabolites (largely ammonia which converts to ammonium at the pH of sea water). For the current project, no reduction in water quality is expected to occur. Neither particulates nor dissolved metabolites are expected to accumulate due to the near constant flushing of the pen by strong offshore currents that dissipate wastes, and a low stocking and growout density.

Other project characteristics that are expected to reduce the likelihood of particulate accumulation include the careful application of feed; and the nutrient-poor (oligotrophic) nature of the deep tropical ocean and its inherent assimilation capacity for nitrogen byproducts of metabolism. Furthermore, the fixed mooring of the pen in the current would result in very large volumes of water passing through the pen to "instantly" mix and dilute fish metabolites and particulates (HF 2009; KBWF 2009). These water currents, movement of the array around the pivot point of the mooring, and extreme water depth are features of the environment and the design that would help dissipate and assimilate any wastes and prevent adverse impacts to the oceanic and benthic environments.

Potential Impacts on Other Ocean Uses and Environmental Justice Issues

The tender and submerged net pen array would be attached to the existing single-point mooring that pivots around the mooring point, in ocean waters between 3.5 and 7.5 nm from the leeward coast of the Island of Hawaii. The array will be operated in accordance with U.S. Coast Guard safety and navigation requirements. The tender vessel will be equipped with modern telecommunications equipment and radar suitable for long distance trips over the open ocean and for communicating with other boat traffic. Encounters with other sea-going commercial, military, and recreational vessels would be subject to Coast Guard rules established under the International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS) (Miller 2010).

The moored array would be signaled by standard lights and flags. Dive flags would be displayed when divers are in the water. The Velella Beta and Gamma trials provide the best examples of potential interaction with local fishing vessels. When on-site, crew members in the Velella Delta trial would similarly communicate via radio or otherwise

the disposition of the moored array and any work being done to approaching vessel operator(s) and seek cooperation. Kampachi Farms recognizes that commercial and recreational fisherfolk are eager to fish near the array (as the mooring has proven to be a strong attractant for pelagic species of game fish), and is highly supportive of such ancillary benefits. The special permit requested here would not grant any exclusive geographic ocean access to the applicant. Indeed, Kampachi Farms believes that the benefits enjoyed by Kona's fishermen around the Velella Beta and Gamma trials are representative of the synergies that could be possible between aquaculture and fishing.

Other ocean users include recreational yachters, commercial barges and military activities (both surface and submarine).

Environmental justice promotes fair treatment of all people to ensure that the environmental impacts of proposed government programs, policies, and activities do not have disproportionately large or adverse effects on members of minority ethnic groups or low income groups. In the case of this action, the granting a permit for a limited scope and duration trial of a new method of harvesting fish from the U.S. EEZ would not result in large or adverse environmental impacts that could affect members of Environmental Justice populations. The project would not affect subsistence use of any resources. This conclusion is supported by the following: 1) the activity would occur between 3.5 to 7.5 nm from shore and the limited light and noise associated with the proposed array would dissipate over this distance; 2) the project does not inhibit access to the ocean, nor result in preventing the use of the ocean by others except in the immediate vicinity of the HALO net pen; 3) the use of harbor facilities and roads is not on a large scale and is not expected to result in impacts to others; and 4) the proposed use of the ocean site and these public facilities would be of a limited duration.

Potential Impacts on Historical, Archaeological or Cultural Resources

The proposed action has no potential to affect cultural resources or historic properties. The culture and growout activity would be carried out in Federal waters between 3.5 and 7.5 nm off the leeward coast of the Island of Hawaii in water with depths ranging between 3,000 ft and 7,500 ft. There are no historical or archaeological resources known in these deep ocean waters of the action area. Support facilities for the project are located at well-developed, well-used State harbors at Kawaihae and Honokohau, and Keauhou Bay, on the Island of Hawaii. Appendix E provides a map of Kaloko-Honokohau National Historic Park and the location of the Pu'ukohola Heiau National Historic Site, both operated by the U.S. National Park Service. Kaloko-Honokohau National Historical Park is adjacent to the harbor entrance and contains several sites of cultural significance, including native fishponds (e.g., Kaloko Fishpond)[7], kahua (house site platforms), ki'i pohaku (petroglyphs), holua (stone slide), and heiau (religious site).[8] Pu'ukohola Heiau National Historic Site, just south of Kawaihae Harbor, also includes important cultural resources of Hawaii, including submerged ruins of an ancient temple.[9] However, the proposed activity has no potential to adversely affect these sites. Stocking and harvesting would involve a small number of trips by small support vessels moving out of and back into the harbor as fish are transported to and from the array. Vessel traffic would not increase over current levels. Vehicles used to transport fish to and from the array would follow usual traffic guidelines around the harbor and so would not adversely affect any cultural and archaeological resources located adjacent to the harbor.

[7] http://www.nps.gov/kaho/index.htm
[8] http://nationalparks.org/discover-parks/index.cfm?fa=viewPark&pid=KAHO
[9] http://www.nps.gov/puhe/index.htm

Potential Impacts Related to Global Climate Change

This trial would take place in an open ocean environment that is dynamic and subject to the long-term impacts of global climate change. The global mean temperature has increased by 0.76° C over the last 150 years, and the linear trend of temperature over the last 50 years is nearly twice that for the last 100 years (IPCC 2007a). Ample evidence now exists supporting the wide-ranging ecological impacts of global climate change (Walther et al. 2002). Observed changes in marine systems are associated with rising water temperatures, changes in ice cover, salinity, oxygen levels, circulation, and ocean acidity. Changes to marine systems include shifts in ranges; changes in algal, plankton, and fish abundance (IPCC 2007b); and damage to coral reefs (Scavia et al. 2002), and other impacts. A more complete summary of climate change and climate change impacts can be found online at http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#1.

In general, large scale climate cycles can impact winds, currents, ocean mixing, temperature regimes, nutrient recharge, and affect the productivity of all trophic levels in the North Pacific Ocean (Polovina, et al., 1994). These impacts are expressed as variability in stock size, recruitment, growth rates, or other factors. Pelagic fishes, as well as protected species that interact with the fisheries, are currently affected by these large-scale climate fluctuations, and would continue to be affected in the same way under both alternatives. Climate change may impact the availability of tunas and this may in turn impact all pelagic fisheries; however, how and to what extent is not known. Climate change would not adversely affect the applicant's ability to further test the feasibility of using the moored Velella to culture *Seriola rivoliana*. Future impacts of climate change have been considered in view of the potential cumulative impacts on fishery target and non-target species and protected resources. No impacts to the HALO net pen and tender vessel array are expected to result from large scale global climate change. The use of a tender vessel, and support vessels, is not expected to result in any substantial increase in greenhouse gas emissions, nor any large adverse impacts to marine resources or the ocean environment that would interact with climate change to result in cumulative adverse effects.

Impact of a Disabled Ship and/or an Abandoned or Breakaway HALO net pen

Operational protocols and gear selection have been developed to address mechanical mishaps. In the event of mechanical, weather, or equipment related issues, projected environmental effects are anticipated to be minor. The design and deployment practices for the gear incorporate mitigation and recovery methods and redundancy. The mooring and the array have been modeled and tested under simulated extreme ocean conditions by Texas A&M University's Offshore Technology Research Center and has been found to be well within the minimum breaking loads of the materials, as specified.

Should the feed barge become disabled or the HALO net pen become broken or break away from the array, operational protocols are in place to minimize or avoid anticipated potential impacts on the human and ocean environments. Kampachi Farms would follow procedures described in the Velella Project Emergency Reporting Plan (Appendix D), and would rely on the experienced judgment of marine operators and salvage professionals (e.g. Bill Austin, captain of the S/V *Machias*, which was the tender vessel during the Velella Beta trial, and Tate Marks of Pineapple Customs, LLC) to assist in recovery. The failure risks considered in the design of the trial and risk mitigation measures are briefly described below.

The feed barge will be normally unmanned, but will allow continuous video monitoring of the site from a directional Wi-Fi bridge backed up by a commercial 3G-4G wireless connection, as during the Velella Gamma trial. In any event of a break in HALO net pen structure, attempts would be made to repair the problem at sea.

Assistance and materials to repair a problem can be brought by boat from the project base through Honokohau Harbor. The pen can be raised to the surface by using an air compressor on the diver support vessel that is connected to the ballast tank beneath the pen via an air hose. The HALO net pen is marked with a light and a buoy float and has the residual buoyancy – with the ballast inflated, or removed - to remain at the surface indefinitely. If separation from the mooring occurs, an assessment of the situation would be made and a decision as to whether or not to continue the trial would be made in consultation with NMFS. Impacts of stock escape are discussed elsewhere in this EA. Support for the overall operation and transport boats would be available at any time of day from the Honokohau Harbor support base.

Detachment of the barge or HALO net pen from the mooring would require larger scale remedial or corrective actions. In order to minimize risks and avoid mechanical failures, the HALO net pen towing bridle and barge bowline would be inspected frequently and the pen would be under regular observation by vessel crew, staff, and cameras on the pen. Should the pen become independently detached, the lighted surface float ring would have enough residual buoyancy to keep the entire array afloat indefinitely. Also, the surface float ring would be equipped with GPS transmitter and radar reflector for tracking purposes and to facilitate re-location. The barge itself will be equipped with navigational lights and its own GPS transmitter to facilitate relocation should the pen and barge become separated from the mooring, and from each other. The mooring buoy is engineered to remain attached through any conceivable weather event, but will be equipped with its own marker lantern to ensure that it does not become a night-time hazard should the Velella array become detached from the mooring.

In the unlikely event that the HALO net pen must be scuttled, or becomes simultaneously separated from the mooring, the vessel, and the suspending float ring while submerged, the HALO net pen and ballast - without the float ring - is negatively buoyant and would be expected to sink, so as not to cause further navigational hazards. No oil, oily waste, or chemicals are carried onboard the HALO net pen that might degrade the environment. If stocked with fish at the time, the entire stock would not be expected to survive at the anticipated depths.

The barge will contain a generator with limited amounts of diesel fuel and motor oil that could be released should the vessel sink or capsize. To reduce this risk the barge will be equipped with four redundant bilge pumps and large foam blocks installed below decks to increase survivability. The barge would also be returned to port and replaced with a foam-filled, appropriately marked mooring buoy in advance of any extreme weather events.

Cumulative Impacts

The proposed action is a small scale project that would have minimal impacts that are of short-duration, and accordingly would not likely contribute significantly to cumulative impacts. The proposed action is the only one of its kind within the geographic area. The impact of deploying a mooring system is not relevant, as the mooring line and anchor are already installed.

As the proposed action is for two cohorts only, each consisting of a small number of fish and of a short duration, it is not expected to add significantly to or interact with the environmental impacts from existing and long-term, larger-scale mariculture projects already occurring in State waters. The proposed project would not result in incremental impacts that could become significant when considered with existing projects in federal waters because no other aquaculture projects are currently operating in federal waters around Hawaii. The few aquaculture projects that are operating are located far from the location of the proposed project site, so environmental impacts would not combine together to result in a larger environmental impact. The proposed

permit would not result in extraction of biological resources from the environment and inputs, in terms of particulates and metabolites, are expected to be insignificant and quickly diluted beyond even detectable levels.

NOAA encourages the research, development, and demonstration of emerging technologies, including offshore and open ocean aquaculture, to increase domestic supplies of seafood and has issued a Final Aquaculture Policy to guide development. Issuance of a permit for the conduct of the proposed gear test to culture and harvest a MUS does not, however, obligate NMFS, PIRO, WPFMC, or any other Federal agency to approve another trial of the Velella Concept at any scale in the proposed region or any other site in Hawaii. If another gear trial is proposed in the future, an application for a permit would begin a new approval process with appropriate environmental review based on results from the proposed test deployment and in compliance with associated legal requirements at the time. Any large scale commercial operations applying to operate in the EEZ around Hawaii would have to undergo an environmental impact analysis and be consistent with the NOAA aquaculture policy.

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FINDING OF NO SIGNIFICANT IMPACT

Issuance of a Permit to Authorize the Use of a Net Pen and Feed Barge Moored in Federal Waters West of the Island of Hawaii to Fish for a Coral Reef Ecosystem Management Unit Species, *Seriola rivoliana*
(RIN 0648-XD961)

July 2016

Introduction

The National Marine Fisheries Service (NMFS) prepared this Finding of No Significant Impact (FONSI) according to the guidelines established in NMFS Instruction 30-124-1 (July 22, 2005), the guidelines for fisheries management actions, and the National Oceanic and Atmospheric Administration's (NOAA) Administrative Order (NAO) 216-6, as amended, concerning requirements for compliance with the National Environmental Policy Act (NEPA). The environmental effects analysis in the attached environmental assessment (EA) dated March 14, 2016, supports this FONSI. NMFS also prepared the EA in accordance with the requirements of NEPA and agency guidelines.

Federal Action

The proposed Federal action is the issuance of a SCREFP to Kampachi Farms, LLC for fishing for kampachi with the Velella Delta Array in Federal waters. The permit includes terms and conditions, and emergency, monitoring, and reporting plans and reporting forms to ensure compliance with the management objectives of the FEP. NMFS would issue the SCREFP for a two-year period. The applicant proposes to test the culture and harvest of kampachi using the Velella Delta Array to fish for kampachi. The array design is in Section 1.4 and shown in Figure 4, Figure 5, and Figure 9. The proposed permit will authorize fishing for two cohorts for an estimated total production of up to 30,000 fish (approximately 120,000 lb).

The Velella Delta Array mooring is currently anchored in deep water (~6,000 ft) approximately 5.5 nm offshore west of Keauhou Bay on the Island of Hawaii. The exact position of the array will depend on wind and currents, but roughly within a known 1.75 nm radius. The entire array would never enter state waters, 0-3 nm from shore. The net pen and barge will each have a global positioning system (GPS) transponder to provide ongoing location information and allow the applicant to retrieve the net pen in the case of separation from the mooring. More details on the array location are in Section 1.4.

The applicant will be required to comply with regulations for a SCREFP (50 CFR 665.224, Appendix A), with the terms and conditions of the SCREFP (Appendix B. Terms and Conditions), and with the emergency, monitoring, and reporting plans (Appendices D and E). The permit will require the applicant to submit completed reporting forms (Appendix C). Both

the barge and float ring will have all required navigational safety lighting. More details about the proposed equipment and operations are in Section 1.4.

At the end of the project, the applicant will adhere to terms of a Department of the Army (DA) permit issued under Section 10 Rivers and Harbors Act 1899 (33 U.S.C. 403). More detail about gear design and project operations are in Section 1.4 of the EA. The U.S. Army Corps of Engineers (USACE) will make a separate NEPA environmental determination in accordance with USACE NEPA Implementation Procedures for the Regulatory Program (found in Appendix B of 33 CFR 325).

Coordination and Public Involvement

Consistent with procedures for processing a SCREFP, NMFS coordinated the request for a SCREFP with the Western Pacific Fishery Management Council (Council). The Council discussed the project at its 162nd public meeting in Honolulu, Hawaii held in March of 2015. By letter dated January 16, 2015, the Council's Executive Director provided NMFS some recommendations for the environmental analysis and suggestions for permit conditions. Additionally, the Council related fishermen's concerns about escaped cultured fish directly affecting bottomfish stocks through predation and the array's siting potentially interfering with recreational troll fishermen. NMFS also coordinated the application with the U.S. Fish and Wildlife Service, the U.S. Coast Guard, and the State of Hawaii Department of Land and Natural Resources. Section 5.0 of the EA summarizes the results of this coordination.

On January 25, 2016, NMFS published a notice of availability and provided the draft EA for public review and comments through February 16, 2016 (81 FR 4021). NMFS received comments from 13 sources including individuals, non-governmental organizations, and State agencies. NMFS considered all comments when finalizing the EA and made no changes to the environmental effects conclusions. NMFS did, however, update information and/or expanded its discussion in the EA based on public comment.

Significance Analysis

NAO 216-6 contains criteria for determining the significance of the environmental impacts of a proposed action. In addition, the Council on Environmental Quality's (CEQ) regulations at 40 CFR 1508.27 state that the significance of an action should be analyzed in terms of both "context" and "intensity." Each criterion listed below is relevant in making a finding of no significant impact and NMFS considered each individually and in combination with the others. We analyzed the significance of this action based on the NAO 216-6 significance criteria and CEQ context and intensity criteria. NAO 216-6, Section 6.01b 1–11 provides eleven criteria, the same ten as are in the CEQ Regulations and one additional criterion for determining whether the impacts of a proposed action are significant. The following questions and answers refer to the analysis in the attached EA for the selected alternative (Alternative 2).

1) Can the proposed action reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action?

No. NMFS does not expect that issuance of the SCREFP would jeopardize the sustainability of wild *Seriola rivoliana* or of any other wild fish. The applicant would culture kampachi (also known as Almaco jack or *Seriola rivoliana*) using first generation offspring of wild-caught fish to stock the net pen (EA, section 1.4.2).

NMFS does not expect the project would have a significant adverse effect on wild *Seriola rivoliana* stocks. Impacts to wild stocks are described in the EA, section 4.2.3.

The project would use fingerling fish from an existing facility that harvests ten fish per year to maintain adult broodstock. The project would not result in substantial increase in harvest of wild kampachi.

The popularity of the cultured fish would not likely lead to an increase in fishing pressure on wild stocks by commercial or recreational fishermen due to the wild conspecific's potential to contain ciguatera toxin that can, in turn, lead to ciguatera poisoning in humans. High parasite loads in wild fish would also contribute to a continued lack of interest in targeting wild kampachi.

The project would use a net pen design believed to have improved ability to withstand weather and predators as well as allow fish to move within the pen more easily. The netting material would consist of copper-alloy-coated, marine-grade stainless-steel mesh (bottom and sides) and KikkoNet mesh (top). The strength of the materials would minimize the risks of accidental tearing by predators that could result in fish escapes. Access to the inside of the net pen would be through a swing-door hatch built into the topside panel of the cage. Staff would reinforce the entry hatch with 4-milimeter nylon lashing cords to prevent opening under heavy current loads, as happened during the Velella Gamma trial. Staff also would open the entry hatch only after raising the pen to the surface. Fish escaping when divers enter or exit the pen is not expected given the new design. The potential advantage of the Velella Delta net pen design is that, during normal operations, kampachi would not likely escape into the environment due to the net pen design, construction materials, and the permit's terms and conditions.

If accidental escapes were to occur, NMFS expects the escaped fish to remain near the Velella Delta Array allowing easy recapture, or spearing, as occurred during the two precious Velella projects. In the unlikely event of a catastrophic failure of the Velella Delta net pen, the release of all cultured fish would not impact the genetic structure of the wild fish stock and would not reduce the health or fitness of the wild stock, as discussed in EA Section 4.2.3.

NMFS does not expect the activity to transmit diseases to wild stocks. Previous Velella projects did not have any disease outbreaks, and the cultured fish from those projects had lower parasite loads than wild *Seriola rivoliana* in Hawaii. The applicant would stock fish at relatively low densities. This combined with near constant flushing of sea water through the pen and cleaning of the Velella Delta net pen would reduce the potential for diseases and parasite infestations. The

proposed action's isolation from other net pen operations and wild stocks would also lessen the likelihood for disease and parasite outbreaks (EA Section 4.2.3).

2) Can the proposed action reasonably be expected to jeopardize the sustainability of any non-target species?

No. The Velella Delta Array is expected to aggregate fish, similar to other floating objects. NMFS does not expect the proposed activity to transmit diseases or parasites to non-target species that gather around the array.

The project is not expected to degrade water quality from either excess feed or fish metabolites (EA, section 4.1.1.), nor is the project expected to result in phytoplankton blooms in the action area. The use of a copper alloy is not expected to accumulate in fish tissues.

Although the array would act as a fish aggregating device (or FAD), as other floating objects do, the array will not significantly disrupt the migratory patterns of pelagic fishes (such as tunas and sharks) due to the array's small size. Additionally, the project would be limited in duration, and research shows that tuna move among fish aggregating devices (FADs) after temporarily aggregating around them (EA , section 4.2.4).

The potential impact to other fish stocks was considered in section 4.2.4. NMFS found that the projects is not likely to significantly adversely affect any other species for the following reasons:

The likelihood of kampachi escaping the pen is considered low because of net pen design, construction materials, and permit requirements (see EA, Risk of Escapes section 4.2.3). If there were to be escapes, the likelihood of an escaped fish (or a number of escaped fish) to remain in the wild is low because most of the fish are expected to remain around the pen where they will be caught, speared, or eaten by predators (section 4.2.3). Thus, the project is not likely to reduce bottomfish stocks through direct predation or competition for forage (section 4.2.4).

Additionally, Northwest Fisheries Science Center Researchers modeled the potential impact to wild populations from a catastrophic failure and release of all captive fish. The results indicated that the proportion of the wild population comprised of escapees' descendants would peak (e.g., have a maximum composition of the population) at less than 1% over the 100-year timespan of the simulation. The results also show no significant fitness effects (less than 0.02% decrease in fitness over 100 years) if all 30,000 fish escaped into the wild and survived. The researchers described their findings as "negligible." Factors contributing to the predicted negligible impacts included, but were not limited to, the number of stocked fish in the proposed Velella Delta Array relative to wild biomass, short duration of the project, and use of wild-caught native fish for brood stock (E.A. Section 4.2.4).

For these reasons, NMFS does not expect issuing a permit for the project would jeopardize the sustainability of any non-target fish species.

3) Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act and identified in Fishery Management Plans?

No. NMFS completed an essential fish habitat (EFH) consultation under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), as described in the EA Section 5.9. The EA also describes potential EFH impacts in section 4.2.2.

The consultation and analysis found that the proposed activity may adversely affect essential fish habitat (EFH) and habitats of particular concern (HAPC) but would have only a minimal effect on EFH or HAPC. NMFS does not expect the project to result in substantial damage to oceanic or coastal habitats and EFH due to the offshore location of the Velella Delta Array; the limited size and duration of the project; operational features that would result in minimal impacts to water quality and that prevent adverse impacts to shallow habitats. The project has features to help ensure that if gear becomes detached a notification signal will be sent and the gear retrieved. There is limited vessel activity associated with the project.

The Council defined EFH for Pelagic Management Species (PMUS) as 0-1,000 m depth in the offshore environment. NMFS expects the action to negligibly affect PMUS EFH. In the project area, the Council has identified EFH as the water column at various depths down to a maximum of 200 m (600 ft) for eggs, larvae juveniles and adults of bottomfish and seamount groundfish, pelagic and coral reef ecosystem species, and lobsters and crabs (EA, sections 4.2.2 and 5.9).

The EA includes an evaluation of impacts to the water column and describes that there would be no significant adverse effect to water quality (EA, section 4.1.1). No stony corals or precious corals live at the depth at which the anchor and chain are located.

The EA describes the gear and the requirement to outfit the feed vessel and Velella Delta Array with GPS transponders before deployment (EA, Appendix B, Permit Terms and Conditions). To reduce the potential for the gear to become detached from the mooring, the applicant would check all lines, chains, shackles and load points on the vessel and pen every week (EA, section 4.1). If the gear were to break away from its mooring, GPS transponders and automated tracking software and emergency response actions would notify Kampachi Farms and they could launch a retrieval response and prevent the gear from moving near to shore and damaging areas designated as EFH or HAPC (EA, section 1.4.8).

As part of the EFH consultation, NMFS included conservation recommendations described in the EA Section 5.9 in developing the terms and conditions of the permit. NMFS expects that the small scale of the project, temporary duration, features to help prevent gear loss and allow quick recovery, and the project setting would prevent signficant damage to ocean and coastal habitats and EFH and HAPC. (EA, section 5.9 (EFH) and Appendix B. Proposed Terms and Conditions of the SCREFP).

4) Can the proposed action reasonably be expected to have a substantial adverse impact on public health or safety?

No. NMFS does not expect the proposed action to adversely affect public health or safety. The applicant will light the array in accordance with U.S. Coast Guard (USGC) requirements (33 CFR Part 84), and the array is located outside of busier coastal areas. Lighting on the feed barge and the float ring and a Notice to Mariners issued by the USCG would help mariners avoid colliding with the gear. Sections 1.4 and 4.3.2 of the EA describe lighting and maritime safety. Sections 4.3 and 4.3.2 describe the low risk of vessel collisions.

Section 4.3.2 describes that the array is not expected to increase the risk of shark attacks because sharks are not expected to follow the pen when it is retrieved at the end of the project.

The project would not substantially affect water quality (EA, section 4.1.1).

The applicant would use feeds that are comprised of fish products and agricultural products safe for human consumption (EA Section 1.4.6). The applicant would not use any chemicals during the project, eliminating the risk of exposure to chemicals by project staff (EA Section 1.4.6 and Appendix B).

The fish from the pen are not expected to develop dangerous ciguatoxin concentrations because the feed source would not be derived from sources likely to bioaccumulate ciguatoxin and because the array will not be located in areas associated with ciguatoxin (EA, section 4.3.2)

The array is not expected to create a hazardous wildlife attractant with a potential to adversely affect flights at Kona International Airport EA, section 4.3.2).

5) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?

No. NMFS does not expect the activity to adversely affect Endangered Species Act (ESA)-listed species, their designated critical habitat, or other marine mammals or seabirds. Any interactions that do occur would be reported to NMFS immediately and NMFS could assist with a response (see EA, section 4.2.5). Protected species that occur in the project area and are described in the EA and include marine mammals, sea turtles, and seabird (section 3.2.2.). Potential impacts to listed species are evaluated in section 4.2.5.

The proposed project is not expected to have significant adverse effects on listed seabirds. Endangered short-tailed albatross occasionally visit the main Hawaiian Islands but is not a deep diver. Other listed birds are not expected to be attracted to the pen or become entangled. Staff working two previous trials did not see ESA-listed seabirds. Navigational lighting is not expected to result in collisions, or result in trapping or disoriented seabirds including ESA-listed seabirds.

NMFS knows of no observations or reports of interactions between fishermen fishing around the array and any protected species during the two previous Velella projects.

No monk seal or sea turtle was observed near either the towed Velella Beta or Vella Gamma trials (EA, section 3.3.2; section 4.2.5.

No critical habitat has been designated in the array location. On August 21, 2015, NMFS established monk seal critical habitat (80 FR 50925) in the Hawaiian Islands and critical habitat occurs in areas through which the applicant's vessels would transit during deployment, retrieval and during operations and maintenance visits to the Velella Delta Array (see Monk seal Critical Habitat Area 16: Hawaii, Figure 17, in the EA). The terms and conditions of the permit require operations that reduce the potential of the proposed action to affect Hawaiian monk seals and their critical habitat (EA, section 4.2.5 and Appendix B).

A number of other marine mammals occur in the proposed project area: Listed marine mammals include Humpback Whale, and False Killer Whale. NMFS consulted under Section 7 of the ESA on the potential effects of the proposed action on ESA-listed marine mammals, sea turtles, and seabirds and on their designated critical habitat (EA, sections 4.2.5 and 5.8). NMFS determined that the proposed action is not likely to adversely affect ESA-listed species and their designated critical habitat.

The net pen is not expected to result in entangling any large protected species including monk seals or cetaceans (EA, sections 4.2.5 and 5.7). No incidents of protected species entanglements have been reported for FAD moorings in Hawaii. Monk seals and cetaceans are expected to be able to see and avoid the pen. No monk seal has been reported as being entangled in mesh net fish pens in Hawaii. The small mesh on the net is not expected to result in entanglement of sea turtles. Also, no sea turtles were observed on previous Velella trials.

NMFS addressed marine mammals not listed under the ESA that may occur in the action area under the Marine Mammal Protection Act (MMPA). NMFS categorizes the proposed action as a Category III fishery (Hawaii offshore pen culture) having a remote likelihood to cause serious injuries or mortalities to marine mammals, and not negatively affecting marine mammals in any manner not previously considered or authorized under Section 118 of the MMPA (EA, section 5.7). The terms and conditions of the permit require operations that reduce the potential of the proposed action to injure or kill marine mammals (EA, section 4.2.5 and Appendix B). Rough-toothed dolphins were observed in the vicinity of the previous moored trial, but were not observed to interact with the net pen or the array. The length of all lines would provide adequate spaces for marine mammals to pass through; while the net meshes would be rigid or taut, preventing marine mammal entanglements (EA, section 4.2.5 and 5.7).

The project activity is not expected to result in collisions between protected species and the array or vessels. There were no such incidents in two previous trials, and the applicant will operate vessels at sea in a manner that would reduce the risk of collisions with marine mammals and sea turtles. No marine mammals were reported as being hooked by fishermen fishing around the previous Velella array (EA, section 5.7).

NMFS does not expect the project to a cause a measurable degradation in water quality that may affect protected species (EA, section 4.1.1). The applicant does not propose using any chemicals

during the project including cleaners, feed additives, paints, solvents, or medications including antibiotics. If necessary, the applicant would manually scrub the net pen and the vessel. Finally, the feed would contain no chemical additives, hormones, or antibiotics. (EA. 4.2.5, and section 4.1.1). If treatment with hydrogen peroxide is required, it would be done in consultation with NMFS and a qualified veterinarian and would not affect larger organisms (EA, section 4.1.1).

Federal and State regulations prohibit the applicant from discharging wastes and oil into the marine environment, and the terms and conditions of the permit would require the applicant to follow operational procedures that minimize the risk of wastes and discharges that may affect protected species (EA, section 4.2.5 and Appendix B).

The project is not expected to result in large amounts of noise that would significantly adversely affect wildlife (EA, section 4.1.3).

6) Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?

No. NMFS does not expect the activities conducted under the permit to have a substantial effect on biodiversity or ecosystem function. The project's mooring has been in place since 2013, and is not expected to result in additional impacts to benthic organisms or habitats (EA, section 4.2). The project is not expected to result in significant amounts of feed or fish waste from entering the water column or affecting epipelagic, mesopelagic, or benthic habitats.

The operation would not significantly affect water quality from the gear or from the rearing activities (EA Section 4.1.1).

Negligible amounts of iron could continue to enter bottom habitat with no significant adverse effect on the ecosystem (EA Section 4.2.1).

The Council has not designated any portion of the benthos below the Velella Delta array as EFH (EA Section 4.2).

Based on observations made during the previous two Velella projects, sharks attracted to the array not likely to become habituated to the array area, and therefore the prey and predator interaction in the area of the array is not likely to change due to the proposed action. Thus, the ecosystem function and biodiversity in the area of the array is not likely to be changed through changes in predator and prey interactions. (EA Section 4.2.4).

Research shows that tuna can move between adjacent FADs, and have the capability to leave FADs. Tuna would not likely change their migratory patterns due to the array. The array will temporarily aggregate wild baitfish, tuna, and other pelagic fishes; however, we expect no significant disruptions to fish migration patterns (EA Section 4.2.4). Therefore, the biodiversity including the occurrence of tuna and ecosystem function of tuna near the array is not likely to be affected by the proposed action.

7) Are significant social or economic impacts interrelated with natural or physical environmental effects?

No. NMFS does not expect the project to cause social or economic impacts interrelated with natural or physical environmental effects. The proposed project's small size, species cultivated, location, gear used, duration of two years, and required operations of the project limit the natural and physical environmental effects that may be interrelated to potential social and economic impacts.

Although troll fishermen operate in the area of the array, NMFS does not expect user conflicts. The project would not affect heavily fished coastal areas, and troll fishermen would be able to fish around the array, similar to previous Velella projects (EA, section 4.3). The array would act as a small FAD, but would not result in large changes to natural fish migrations or affect fish catches. Navigational lighting and a USCG Notice to Mariners would prevent collisions at sea (EA, sections 1.4 and 4.3). The applicant would continue to use the mooring system in accordance with the terms of their USACE permit.

The limited amount of fish the applicant intends to culture would not likely cause market disruptions. The applicant would harvest fish in batches and use the company's established market channels. Also, there is no market for wild-caught kampachi because wild fish often contain ciguatera and internal parasites. The sale of the harvested fish would not compete with fish from other fishermen (EA, section 4.3.4).

Features that reduce impacts to noise and view planes include the small size of the project, limited lighting, limited use of motorized equipment, and the project's location over 3.5 nm offshore. The limited use of a generators and weekly vessel trips to the array would not likely degrade air quality. (EA, sections 4.1.2, 4.1.3, and 4.1.4)

NMFS considered potential Environmental Justice impacts and found the project is located well out to sea where no people live (EA, section 4.4). Effluents or particulates would not likely reach coastal habitats because of the project's offshore site and the low concentration of effluents. The project would not affect coastal resources that may be gathered such as seaweed, sponges or other marine species (Sections 4.3.1).

8) Are the effects on the quality of the human environment likely to be highly controversial?

No. The analysis of effects is not considered to be highly controversial. The environmental effects are not likely to be unknown or unique. The gear type is part of a project designed to test the feasibility of the specific production system, and the environmental impacts of this gear are not uncertain or controversial. The proposed project is a modification of a prior project conducted in the same location. The proposed project uses many of the same system components, but at a somewhat larger scale and with a new cage design. The overall size of the pen is 33 feet deep x 40 feet wide. The small size and limited duration of the project, its location offshore in an area subject to strong currents, and design and operational measures will help

prevent significant adverse impacts to the environment. Information from the previous Velella projects informed the analysis for this proposed action.

NMFS coordinated the proposal with interested and affected parties including agencies and individuals with specific jurisdiction and expertise (EA, section 5). NMFS used results of modeling the project done by experts to evaluate potential effects of the operation on water quality (EA, section 4.1.1), potential risks to fitness of wild stocks under a worst-case analysis (EA, section 4.2.3), and the ability of the gear to withstand environmental conditions (Appendix G) to inform its analysis of potential effects on the human environment.

NMFS provided a 21-day public review and comment period. NMFS received comments from 13 sources including 2 letters from government entities with information about public safety issues. None of the comments provided information that the proposed project would result in significant adverse environmental impacts.

9) Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?

No. The activities covered by the permit would not result in significant adverse impacts to important or unique ecological areas or to cultural/historic resources. During deployment and final retrieval, the net pen and support vessels will transit through portions of the Hawaiian Humpback National Marine Sanctuary and a small portion of the Kaloko-Honokohau National Historic Park when leaving and returning to port (EA section 1.4.4). Passage through these areas will be brief, with non-stop passage, and conducted in a manner consistent with other vessel traffic and in a manner that will prevent uncontrolled movement, loss of structures and materials, and in a manner to prevent contact with the bottom and nearby corals.

Stocking, harvesting, and maintenance will involve a small number of trips by small support vessels moving out of and back into well-used harbors (EA sections 1.4.5, 1.4.6, 1.4.7). The project would add a minimal increase to ongoing traffic levels (EA section 4.6). NMFS does not expect Kampachi Farms' vessels to damage existing coral reefs because Kampachi Farms would use existing channels to enter and exit harbors (EA section 1.4.4). See response to 12 below.

10) Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

No. The project would not affect the human environment in highly uncertain or unknown ways. The proposed gear: a cylindrical net pen, is commercially available and used throughout the world, so risks of using the gear are not highly uncertain and do not involve unique or unknown risks. Results from two previous Velella projects using similar gear and fish species completed in 2012 and 2013, impacts from other larger offshore cage culture projects around Hawaii, as well as opportunities for public input informed the impact analysis. Modeling of water quality effects reduce the amount of uncertainty when estimating potential effects on water quality (EA section 4.1.1). Modeling of the mooring system and net pen performance under specific sea state conditions reduces the uncertainty about gear stability and performance at sea. The small scale of

the project, location in the vicinity of previous Velella projects, general similarity to previous Velella projects, operational requirements, use of a native fish species, and limited duration of the project all contribute to reducing the potential risks (sections 4.1, 4.2, and 4.3).

11) Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

No. Section 4.6 of the EA considers cumulative impacts. NMFS evaluated the proposed activity while considering past, present, and reasonably foreseeable future actions, including other activities occurring in the action area. The small size of the project, temporary duration, and operational features intended to reduce environmental effects would have minimal impacts to air or water quality, noise, marine species, the ecosystem, or other uses in the area.

There are no other fish culture operations in Federal waters offshore west Hawaii and no known applications for culture operations. There is an aquaculture operation in State waters at least 6nm from the action area that is not expected to interact with the proposed action to result in cumulatively significant impacts.

The issuance of the SCREFP would not result in the irretrievable or irrecoverable loss of resources. A decision to issue this permit would not automatically result in the approval of future projects. Future permit applications, if any, would be subject to independent environmental evaluation, coordination with others, and permitting procedures.

There is fishing activity at the project site because the mooring buoy acts as a FAD. Attaching the array to the mooring is not expected to result in changes in fishing effort that would result in increased fishing mortality or affect fish landings or increase rates of interactions between fisheries and protected species.

The amount of feed that would be used would be insignificant and would be a negligible proportion of the amount of feed currently produced. The project is temporary and would not create an increase in the demand for the products used in manufacturing or otherwise supplying the feed. Vessel use would be within the background levels currently occurring in the project area. Therefore, the project is not expected to result in a substantial change to greenhouse gas emissions (EA, section 4.6).

Although NMFS and the Council have proposed to establish an aquaculture management program in federal waters in Hawaii (and other areas of the Pacific Islands region), details of that future project are in development and it is not possible to identify potential future effects that may be used in a cumulative effects analysis (EA, section 4.6).

12) **Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources?**

No. The proposed action is not likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or significant scientific, cultural, or historical resources.

The transported feed barge and support vessels would transit through a small marine portion of the Kaloko-Honokohau National Historic Park when leaving and returning to port. There are several sites of cultural significance in the area as described in the EA in section 4.5. Kampachi Farms will transit these areas briefly in a manner consistent with other vessel traffic (EA Section 1.4.4, section 4.5). Stocking, harvesting, and maintenance would involve a small number of trips by small support vessels moving out of and back into well-used harbors. Deployment of the feed barge and net pen would be performed during favorable weather and sea traffic conditions to avoid uncontrolled movement and loss of structures and materials (EA, section 1.4.4.)

The project would add a minimal increase to ongoing traffic levels (EA, section 4.5).

Vessels used for the project are not likely to cause damage to existing coral reefs because they would use existing channels to enter and exit harbors (EA Section 4.2.2).

Because any impacts to water quality is expected to be minimal, the action is not likely to adversely affect marine resources that may be used in cultural practices (EA, section 4.3.1).

NMFS consulted with the State of Hawaii regarding archaeological resources or property eligible for inclusion in the National Register at the proposed action area. The State identified no such resources or properties in the proposed action area nor written reports or studies that would indicate the presence of koa (traditional fishing ground) in the proposed project area. The State also did not have knowledge of features that could create koa in the project area. (EA, sections 4.5 and 5.10). NMFS concludes that the proposed action does not have the potential to adversely affect historical properties, assuming historic properties are present, and no further obligations are required under NHPA Section 106 (36 CFR 800.3) (EA Section 5.1).

13) Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?

No. The applicant would clean all gear, as needed, to reduce bio-fouling and before returning to port. (EA Section 1.4.4). Neither the array or support vessels will leave Hawaii; therefore, the project will not introduce or spread non-indigenous species. Additionally, the project's location relatively close to shore would reduce the likelihood of introducing new species from pelagic environments. For these reasons, the project would not likely introduce or spread non-indigenous species. (EA Section 4.2.6)

14) Is the proposed action likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?

No. As discussed in the EA Section 4.6, issuance of this permit would not establish a precedent for approval of future permits. Issuance of this permit is limited to a single entity for a two-year period. Because the purpose of the project is to evaluate the technological feasibility of raising

and harvesting a relatively small number of captive fish using a new gear type in an offshore environment, and is limited in both duration and size; and because any future SCREFP permit applications would need to undergo compliance review at the time a project is proposed, the approval of the SCREFP will not lead to the approval of future commercial harvesting operations. While the possibility exists that a successful test of the gear could result in future applications by Kampachi Farms or others, NMFS would review each application subject to environmental analysis under NEPA. Moreover, the current proposal is not linked to any subsequent proposal.

15) Can the proposed action reasonably be expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment?

No. Issuance of the SCREFP would comply with Federal law and the proposal has undergone compliance reviews to ensure that the proposed activity will not result in a violation of Federal, State, or local laws and requirements. A description of compliance and coordination with others is in the EA, Section 5.0.

16) Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

No. See response to Question 11. The target species would be stocked, grown, and harvested in a semi-enclosed system. The size, duration, location, gear type, and operational requirements of the proposed action are not expected to result in adverse cumulative effects the environment on wild kampachi or other wild fish species (EA, section 4.6).

Determination

Based on the information in this document and the analysis contained in the EA, I have determined that the environmental effects of issuing the SCREPF will not have significant impacts on the quality of the human environment. All relevant potential beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an Environmental Impact Statement for this action is not necessary.

7/7/16

Michael D. Tosatto
Regional Administrator

Date

Attachment