Environmental Assessment

for the

Issuance of a Special Fishing Permit to Authorize the Use of an Anchored Pod to Culture and Harvest a Coral Reef Ecosystem Management Unit Species, *Seriola rivoliana*, in Federal Waters West of Hawaii Island (RIN 0648-XC791)

October 25, 2013

Applicant: Kampachi Farms, LLC

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FINDING OF NO SIGNIFICANT IMPACT

for

Issuance of a Special Fishing Permit to Authorize the Use of an Anchored Pod to Culture and Harvest a Coral Reef Ecosystem Management Unit Species, *Seriola rivoliana*, in Federal Waters West of Hawaii Island

(RIN 0648-XC791)

October 2013

Introduction

This Finding of No Significant Impact (FONSI) was prepared according to the guidelines established in National Marine Fisheries Service (NMFS) Instruction 30-124-1 (July 22, 2005) and the requirements set forth in National Oceanic and Atmospheric Administration (NOAA) Administrative Order 216-6 (NAO 216-6, May 20, 1999), concerning compliance with the National Environmental Policy Act (NEPA). This FONSI is supported by the environmental impact analysis prepared in accordance with the requirements of NEPA and documented in the attached environmental assessment (EA), dated October 25, 2013.

The Council on Environmental Quality (CEQ) Regulations state that the determination of significance using an analysis of effects requires examination of both context and intensity, and list ten criteria for intensity (40 CFR 1508.27). In addition, NOAA NAO 216-6 Section 6.01b 1–11 provides eleven criteria, the same ten as the CEQ Regulations and one additional, for determining whether the impacts of a proposed action are significant. Each criterion is discussed below with respect to the proposed action and considered individually as well as in combination with the others.

Federal Action

NMFS plans to issue a Special Coral Reef Ecosystem Fishing Permit (SCREFP) to Kampachi Farms, LLC, in accordance with the Hawaii Fishery Ecosystem Plan (FEP) and consistent with federal regulations for Hawaii fisheries at 50 CFR § 665.224 pertaining to the management of coral reef ecosystem fisheries. A SCREFP is required because the gear proposed to be used for the harvest of a coral reef ecosystem management unit species (MUS) is not currently approved under the Hawaii FEP and fishing regulations.

The permit will authorize Kampachi Farms to harvest Kampachi using a 132-m^3 (approximately 21 ft in diameter) brass-link mesh CuPod which will be tethered to a moored feed vessel (a 28-ft sportfisher). The feed vessel will be connected to a single-point mooring established in waters

that are approximately 1,000 fathoms deep (around 6,000 ft) and located approximately 5.5 nautical miles (nm) west of Keauhou Bay, Hawaii. The Velella array (CuPod and vessel) would be located in Federal waters with the exact position depending on wind and currents. With a mooring scope of 2:1, the array is expected to be anywhere within a circle described as having a radius of no more than 1.75 nm measured at the water's surface directly above the mooring site. The array thus configured would not be closer than 3 nm from shore. The applicant plans to use the Velella array to grow and harvest 2,000 fish. The stock would be first generation offspring of wild-caught native coral reef fish *Seriola rivoliana* (called kampachi, or Almaco Jack, and marketed as "Kona Kampachi®") which will be obtained from a local hatchery. The permit duration is for a one-year period. At the end of the project, the mooring line will be disconnected from the anchor and the gear removed. The anchor and chain will be abandoned at the site consistent with the 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 the gear design and project operations is found in the EA in Section 1.3. The USACE will be making a separate environmental determination in accordance with USACE NEPA Implementation Procedures for the Regulatory Program (33 CFR 325, Appendix B).

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 proposed permit at its public meeting in American Samoa at its 156th meeting held March 12-14, 2013. No public comments were provided to the Council. By letter dated March 25, 2013, the Council's Executive Director provided NMFS some recommendations for the environmental analysis and suggestions for permit conditions. NMFS also coordinated the application with the U.S. Fish and Wildlife Service, NMFS Pacific Islands Regional Office Habitat Conservation and Protected Species Divisions, the U.S. Coast Guard, and the State of Hawaii Department of Land and Natural Resources. Results of the coordination are summarized in Section 5.1 of the EA.

The public was provided an opportunity to review and comment on a draft EA. NMFS prepared a draft EA as the Lead Agency with input and review by the USACE, as a Cooperating Agency. NMFS published a notice of availability of the draft EA on August 13, 2013 (78 FR 49258). A notice was also published by the State of Hawaii's Office of Environmental Quality in the on August 23, 2013 edition of the *Environmental Notice*. Information about how to obtain a copy of the draft EA and how to comment was posted on the Pacific Islands Regional Office's Sustainable Fisheries website, and emailed directly to individuals who commented on a draft EA for a 2011-2012 towed Velella project, those who commented on the USACE's 2013 permit notice, and to individuals who communicated an interested in the project directly to NMFS.

Comments were received from eight individuals. NMFS considered all comments and either made no change to the document or improved information in the baseline and the clarity of the document. None of the comments resulted in substantial changes to the analysis about the significance of impacts of the proposed action on the human environment. Comments and NMFS responses are found in Section 5.4.2 of the EA.

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 both in terms of "context" and "intensity." Each criterion listed below is relevant in making a finding of no significant impact and has been considered individually, as wel1 as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

1) **Can the proposed action reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action?**

No. Issuance of the SCREFP is not expected to jeopardize the sustainability of *Seriola rivoliana* or of any other wild fish. The Applicant will culture kampachi (also known as Almaco jack or *Seriola rivoliana*). The fingerlings that will be stocked in and harvested from the CuPod will be first generation offspring of wild-caught fish (Section 1.3).

The project is not expected to have adverse effects on the wild stock of *Seriola rivoliana*. The CuPod is designed to prevent escapes. The metal mesh material is strong and not expected to tear and divers will use a zippered mesh entryway or enter from the CuPod at the surface while working in the CuPod. Although there is the potential for fish escapes, stocking, raising, harvesting, and transporting the fish will be conducted in a manner that minimizes the risks of accidental release of the target species. While stocking and harvesting, the CuPod would be raised to the surface. For these reasons, escapes are expected to be infrequent and few in number (Section 4.2.1). If accidental escapes were to occur, the escaped fish are expected to remain around the CuPod where they would be recaptured easily, as occurred during the 2011-2012 towed Velella project. In the unlikely event of a catastrophic failure of the CuPod, 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 Section 4.2.1.

The operation is not expected to result in transmission of diseases from the fish in the CuPod to the wild stock. Fish will be stocked at relatively low densities which, together with near constant flushing of sea water through the pen and regular cleaning of the CuPod, is expected to result in a low potential for diseases and parasite infestations (Section 4.2.1).

The operation will not have a significant effect on water quality (Section 4.1.1). Food would be applied while observing the fish as described in Section 1.3 which will minimize feed waste. Fish will be fed to below satiation, which can be determined by observing fish behavior at feeding time. The area is subject to strong currents which will flow through the constrained CuPod and dissipate feed and fish wastes quickly. A water quality impact model that used parameters specific to the proposed operation also found that the proposed activity would not have a significant adverse impact on water quality. The effluents from the culture of 2,000 warm water fish (or approximately 8,000 lb) will be well below the limits for concentrated aquatic animal production above which an NPDES Permit would be needed (e.g., greater than

100,000 lb). See 40 CFR 451. No drugs or chemicals are expected to be used, so there will be no water quality impacts from drugs or chemicals.

2) **Can the proposed action reasonably be expected to jeopardize the sustainability of any non-target species?**

No. As described above, the operation is not expected to result in the transmission of diseases or parasites from the cultured fish to non-target wild species, and is not expected to degrade water quality. The CuPod is expected to aggregate fish, as other floating objects in the pelagic environment do. The effects of the array are not expected to significantly disrupt the migratory habits of pelagic fishes (such as tuna) because the array is relatively smal1, the project will be of limited duration, and research shows that tuna move among FADs and are not retained indefinitely at fish aggregating devices or FADs (Section 4.3). The issuance of the SCREFP is not expected to jeopardize the sustainability of any other wild fish.

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 coordinated the proposed action with the Habitat Conservation Division of NMFS, as described in Section 5.8. The consultation found that the proposed activity may adversely affect essential fish habitat (EFH) but would have only a minimal effect on EFH. No habitat areas of particular concern (HAPC) have been defined for the project area. The project is not expected to result in damage to oceanic or coastal habitats including areas identified as EFH. In the project area, EFH has been identified 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 (Section 5.8). The EA includes an evaluation of impacts to the water column and describes that there would be no large adverse effect to water quality (Section 4.1.1). The anchor would be placed in deep water that has not been identified as EFH for any management unit species. There are no stony corals or precious corals at this depth. The EA describes the gear and the requirement to outfit the feed vessel and CuPod with GPS transponders before deployment (Section 1.3, Proposed Action, and Appendix B, Permit Terms and Conditions). This would allow the applicant to detect a breakaway, and implement a recovery response (see Section 1.3). To reduce the potential for the gear to become detached from the mooring, it will be standard procedure for the Applicant to check all lines, chains, shackles and load points on the vessel and pen every week. If the gear were to break away from the mooring, GPS transponders and automated tracking software and emergency response are all expected to prevent the gear from moving closer to shore and damaging areas designated as EFH and/or HAPC. Other features of the project that would prevent impacts to habitat include a low likelihood of fish escapes, disease or parasite transmission, and the expectation that drugs and other chemicals will not be used (Section 4.2.1, Potential Impacts to Fauna and Habitat).

As part of the EFH consultation, NMFS was provided with conservation recommendations which are described in Section 5.9. The applicant will be provided with a copy of the

recommendations. The small size of the project and temporary duration, as well as features that will help prevent loss of the gear and allow recovery of the gear, should there be a detachment; as well as features of the gear and project setting will all help to prevent significant impacts to the environment including EFH. NMFS agreed with most of the recommendations. (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. The proposed action is not expected to adversely impact public health or safety because it is a relatively small operation and will be lit in accordance with U.S. Coast Guard requirements (72 COLREGS, International Regulations for the Prevention of Collisions at Sea) and will be located away from busier coastal areas. Vessel and gear lighting and a Notice to Mariners issued by the U.S. Coast Guard will help mariners avoid colliding with the gear. Lighting and maritime safety are described in Section 1.3, and the low risk of collisions is described in Section 4.3 (Potential Impacts to Other Fishermen and Ocean Users).

The project will not result in a significant adverse effect to water quality (Section 4.1.1) that could adversely affect fish that may be caught or other marine species that may be collected and eaten (Section 4.3). Feeds that will be used are comprised of fish products and agricultural products manufactured by a leading producer of aquaculture feeds that are safe for human consumption (Section 1.3, Feed and Feeding). The careful application of feed will minimize the amount of feed that would enter the environment (Section 1.3, Feed and Feeding; Section 4.1.1, Potential Impacts to Water Quality). The Applicant does not propose to use any chemicals during the project (Section 1.3).

5) **Can the proposed action reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?**

No. The project is not expected to have an adverse effect on listed species or critical habitat. The project is located in an area in which marine mammals, sea turtles, and seabirds may occur. No critical habitat has been designated in the project area. NMFS coordinated the project with the Protected Resources Division of NMFS and with the U.S. Fish and Wildlife Service, in accordance with the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) (Sections 5.5 and 5.6). NMFS found that the proposed action may adversely affect threatened and endangered marine mammals including the Hawaiian monk seal and a number of whales, and threatened and endangered sea turtles; but would not jeopardize the continuing survival and recovery of listed species. Details of the impact analysis are found in Section 4.2.2 (Potential Impacts to Protected Species). The project, which is categorized as a Category III fishery (Hawaii offshore pen culture), would have a remote likelihood of serious injuries or mortalities and would not negatively impact marine mammals in any manner not previously considered or authorized under Section 118 of the MMPA. (Section 5.6).

Adverse impacts to protected species are expected to be very limited. No interactions between fishermen and protected resources were reported for the 2011-2012 towed Velella project. No seabirds were observed diving on the CuPod. The project is not expected to result in a

measurable degradation of water quality, and chemicals would not be used in the feed or applied to the fish in the CuPod. The CuPod is made of hard plastic with metal mesh that is not expected to entangle listed species and is expected to provide a visual barrier to birds. The tether and mooring line are expected to remain fairly taut due to pressure from currents and winds and due to the mooring line being of braided material that would prevent loops from forming. If a protected species were to encounter the mooring line, the line is expected to pass harmlessly over the animal. Activities at the array include the use of small boats bring staff to and from the array on weekly maintenance visits. Piloting of all vessels will be done in a manner that will prevent vessel collisions or serious injuries to protected species. Operators and crew will maintain watch for protected species and will not operate vessels at high speeds. Noise is not expected to result in large adverse effects to marine life because the level of noise from the generator, power washer, and vessels is at a level that is not known to harm listed species. Kampachi Farms would not start the pressure washer if listed species were in the immediate vicinity of the array. The applicant is expected to comply with federal and state regulations prohibiting the discharge of wastes and oil into the marine environment.

Navigational lighting, required by the Coast Guard, is expected to prevent collisions between other fishing vessels and the array, but is not expected to disorient seabirds. Seabirds are not expected to collide with the array, or become entangled in the CuPod. Should there be an interaction that results in an injury or entanglement with a protected species, Kampachi Farms would contact NMFS and would report the injury, as required under the permit. NMFS would be able to provide recommendations for responding to incidents, and would be aware of injuries and could take additional steps, as necessary to protect listed species.

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. The activities conducted under the permit are not expected to have a substantial impact on the environment including marine species. The deployment of the anchor will crush sessile organisms and the chain could scrape an area of up to 9 acres; however, the benthic habitat is comprised of sand and lava and does not support dense aggregations of fish or large invertebrates including precious corals. No portion of the benthos has been designated as essential fish habitat.

The anchor and chain will be left in place at the seafloor and could result in additional iron in the bottom habitat, but this is expected to be negligible in the cold deep environment (Section 4.2.1).

The project is not expected to result in large amounts of nutrients or particulates entering the environment, and there is not expected to be a change in plankton composition around the array. Carbon- containing waste products are expected to be ingested by pelagic grazers and will settle relatively slowly. As particles are settling, they will be consumed by zooplankton and respired by bacteria. Thus, there will be no large inputs to benthic communities (section 4.1.1.).

Based on observations made during the 2011-2012 towed Velella project, sharks that are attracted to the array are not expected to attack protected species (Section 4.3, Potential Direct and Indirect Socioeconomic Impacts).

The project is also not expected to change migratory patterns of tuna. The array is expected to act as a fish aggregating device and attract wild baitfish, tuna, and other pelagic fishes. Because it is so small, it is not expected to disrupt the migration of pelagic fishes (Section 4.3). Research shows that tuna can move between adjacent FADs, and have the capability to leave FADs.

7) **Are significant social or economic impacts interrelated with natural or physical environmental effects?**

No. The project is a small scale test project of limited duration that is not expected to have significant social or economic impacts that would be interrelated with natural or physical environmental effects. The CuPod, tether, feed vessel and mooring line would be removed at the end of the project (Section 1.3). Although the project will be located in an area used by fishermen, it is well offshore beyond more heavily fished coastal areas and fishermen will be able to fish around the array, as they did on the previous 2011-2012 towed Velella project (Section 4.3). The array would act as a small FAD, but is not expected to result in large changes to natural fish migrations or changes in fish catches. Navigational lighting and a U.S. Coast Guard Notice to Mariners are expected to help prevent collisions at sea (Section 4.3).

The limited amount of fish that will be cultured will not flood markets because the harvests would be done in batches and make use of the company's established market channels. Also, there is no market for wild-caught fish of this species because wild fish are known to contain ciguatera and internal parasites, so the sale of the harvested fish would not compete with fish from other fishermen (Section 4.3).

The project is located offshore and because there is little potential for effluents or particulates to reach shore, the project will not affect coastal resources that may be gathered such as seaweed, sponges or other marine species (Section 4.3).

At the end of the project, the CuPod would be cleaned and towed back to shore, lifted partially out of the water. Based on a previous project, sharks are not expected to follow the empty CuPod when it returns to shore (Section 4.3).

The small size of the project, limited lighting, and limited use of motorized equipment, together with its location over 3.5 nm offshore, are features that reduce impacts to noise and viewplanes. The limited use of a generators and weekly vessel trips to the array are not expected to degrade air quality. (Sections 4.1.2, 4.1.3, 4.1.4).

8) **Are the effects on the quality of the human environment likely to be highly controversial?**

No. As described in Section 4.2.1 of the EA, although the gear type is part of an experimental project, the environmental impacts of this gear are not uncertain or controversial. The anchor and chain are expected to have a nominal impact to deep water habitat in an area that is devoid of habitat structuring benthos. The small size and limited duration of the project, its location offshore in an area subject to strong currents, and design and operational measures that will

prevent adverse impacts to the environment including water quality, other marine species, habitats, and other ocean users, all the potential for significant impacts. The results of the 2011-2012 towed Velella project also provided information for the analysis. NMFS received no comments on the draft EA that provided scientific information that would controvert the environmental impacts analysis in the EA.

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. The transported CuPod 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 (Section 1.3, Transportation). Passage through these areas would be brief, with non-stop passage, and conducted in a manner consistent with other vessel traffic (Section 1.3, Transportation). Stocking, harvesting, and maintenance, would involve a small number of trips by small support vessels moving out of and back into well-used harbors. The project would add a minimal increase to ongoing levels (Section 4.5). Vessels that are used for the project are not expected to damage existing coral reefs because they would use existing channels to enter and exit harbors (Section 4.2.1).

10) **Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?**

No. The effects on the human environment are not highly uncertain or unknown because the CuPod is a tested and commercially-available pod of limited capacity (2,000 fish) that has been commercially deployed in the same area. Impacts from a project using the same gear and fish species that was completed in 2012, impacts from other, larger offshore cage culture projects around Hawaii, as well as opportunities for public input all helped inform the impact analysis. The small scale of the project, limited duration, and provisions that help reduce the potential for loss of fish or the gear, and enhance the potential for recovery if an unforeseen mishap were to occur, help to reduce risks.

11) **Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?**

No. Cumulative Impacts are considered in Section 4.6. The proposed activity was considered in addition to past, present, and reasonably foreseeable future actions, including other activities occurring in the action area, and in consideration of other fisheries and the anticipated impacts of climate change. The small size of the project, temporary duration, and minimal impacts to the environment and other ocean users help to ensure that the environmental impacts of the project would not be significant when considered together with impacts of other projects. The project also, would not have irreversible impacts or result in the irrecoverable use of resources.

The relatively small increase in vessel traffic, additional lighting, and motor and power washer noise will have minimal impacts to air or water quality, noise, and marine species. The project is

not expected to contribute to mortality of any wild fish stocks from either fishery-related or natural causes. The array may aggregate fish, but the array is not expected to affect the migratory patterns of fish or the fishing practices of fishermen, or the management of fisheries. This project will not cause gear conflicts or adversely affect navigation because it is small, located in offshore waters, and will be required to comply with all applicable navigation and lighting requirements so as not to present a hazard and to minimize the risk of collision.

There are no other culture operations in the area, and no known applications for culture operations, and therefore that are no cumulative effects stemming from multiple culture projects in these waters. As described above, the environmental effects of the project are expected to be minimal, and there is no indication that the effects of this off-shore activity would combine with any effects from any culture operations on-shore or in state waters. Operations under this permit are not expected to result in growth of other commercial or recreational activities either on-shore, at the harbors, or in the EEZ, with the possible of exception of a small and temporary increase in the number of fishing boats using the array as a FAD.

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 activities covered by the permit will not result in significant adverse impacts to important or unique ecological areas. The transported CuPod and support vessels will transit through a small portion of the Kaloko-Honokohau National Historic Park when leaving and returning to port (Section 1.3, Transportation). Passage through these areas will be brief, with non-stop passage, and conducted in a manner consistent with other vessel traffic (Section 1.3, Transportation). Stocking, harvesting, and maintenance will involve a small number of trips by small support vessels moving out of and back into well-used harbors. The project will add a minimal increase to ongoing levels (Section 4.5). Vessels that are used for the project are not expected to cause damage to existing coral reefs because they will use existing channels to enter and exit harbors (Section 4.2.1). 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, such as seaweed or sponges.

NMFS coordinated the proposed permit with the State of Hawaii Historic Preservation Division (SHPD). The SHPD has no records of archaeological resources within the area of effect, nor written reports or studies that would indicate the presence of koa (traditional fishing ground) in the proposed project area. The SHPD also did not have knowledge of features that could create koa in the project area. (Sections 4.5, 5.9)

13) **Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?**

No. The gear used in the project will be cleaned on an as-needed basis to reduce bio-fouling. To the extent possible, the gear will be cleaned prior to returning to port (Section 1.3). As the gear will be maintained in as clean a condition as possible, and because the project is in waters

relatively near to shore, it is extremely unlikely that a non-indigenous species will be introduced to Hawaii or spread by the project. (Section 4.6)

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 and the Response to Comments, issuance of this permit would not establish a precedent for approval of future permits. Issuance of this permit is limited to one entity for a single year. A decision to issue this permit will not establish a precedent for approval of future projects. Because the purpose of the project is to evaluate the technological feasibility of raising and harvesting a small number of captive fish using a new gear type in an offshore environment, and is limited in both duration and size, the test will not serve as a springboard for approval of future commercial harvesting operations. While it is possible that a successful test of the gear could result in future applications by the applicant or others, each such application would be reviewed and subject to independent environmental evaluation. Moreover, the current proposal has independent utility, is not linked to any subsequent proposal, and serves a significant purpose even if no follow-on application is made.

NMFS cannot anticipate what those future permit applications might entail. Anticipating the designs of potential future applications by other entities would be speculative. No other entities have submitted permit applications to NMFS for similar culture operations since the first Velella array permit was issued in 2011. (Section 4.6)

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 permit is in compliance with requirements of Federal law and the proposal has undergone intergovernmental review to ensure that it will not threaten a violation of these environmental protection laws and requirements. Coordination of the proposed permit with others as required by regulation was also completed. A description of compliance and coordination with others is provided in Section 5.

16) **Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target or non-target species?**

No. Wild kampachi are associated with coral reefs and bottom areas and are not found in surface waters where this project will operate, so any escaped fish would not immediately their natural habitats. Fish that accidentally escape are expected to remain near the CuPod where they may be readily captured. Kahala are not targeted or kept by fishermen, so wild populations of this species are expected to be healthy. If cultured fish do escape, they are not expected to impact the health or fitness of the wild stock or other non-target species. (Section 4.2.1). Refer to response #11 above for further detail and Section 4.6 of the EA.

Pelagic species could be attracted to the array as it is expected to behave similar to a fish aggregating device; however, any effects would be temporary and the project activities are not

expected to have an adverse effect either on the pelagic species that are attracted to the array or on the fishing activities of others who fish on those species (Section 4.2).

Other Findings

NMFS also considered the effects of the project on climate change and climate change impacts on the feasibility of the project. The project will be anchored in deep water 5.5 nm of shore and would be located between 3.75 and 7.25 nm offshore, and would be passively entrained in currents. The operation would use only a minimal amount of carbon based fuels to run a generator. Weekly trips to the array by small vessels would consume fossil fuels and result in the emission of a very low level of greenhouse gases. This amount of greenhouse gas emissions is not measurably different from the general level of vessel activity in the area. Therefore, issuance of the permit is not expected to have a large adverse effect on levels of greenhouse gas emissions or on climate change. The project would take place at sea where it would not be adversely affected by sea level rise. The limited one year duration of the permit would not be affected by gradual changes in ocean acidity that could be occurring, and current sea level chemistry is suitable for the culture of this species. Therefore, climate change impacts are not expected to affect the success of the project. (Section 4.6)

The EA includes the consideration of potential Environmental Justice impacts. The project is expected to have negligible, if any, environmental impacts and would not have a disproportionately large and adverse effect on members of Environmental Justice populations. (Section 4.4)

Determination

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for the Issuance of a Special Fishing Permit to Authorize the Use of an Anchored Pod to Culture and Harvest a Coral Reef Ecosystem Management Unit Species, *Seriola rivoliana*, in Federal Waters West of Hawaii Island, dated October 25, 2013, I have determined that the proposed action will not significantly impact the quality of the human environment as described above and in the EA. In addition, all 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.

OCT 2 5 2013

Michael D. Tosatto
Regional Administrator

Date

Issuance of a Special Fishing Permit to Authorize the Use of an Anchored Pod to Culture and Harvest a Coral Reef Ecosystem Management Unit Species, *Seriola rivoliana*, in Federal Waters West of Hawaii Island (RIN 0648-XC791)

Date: October 25, 2013

Responsible Agency (NEPA Lead Agency)

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Abstract:

The National Oceanic Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) is proposing to issue a Special Coral Reef Ecosystem Fishing Permit (SCREFP) to Kampachi Farms, LLC, in accordance with the Hawaii Fishery Ecosystem Plan (FEP) and consistent with federal regulations for Hawaii fisheries at 50 CFR 665.224 pertaining to management of coral reef ecosystem fisheries. The SCREFP is required because the gear proposed to be used for the harvest of the coral reef ecosystem management unit species (MUS) kampachi (Almaco jack or *Seriola rivoliana)* is not currently an approved gear under the Hawaii FEP and fishing regulations. The permit would authorize Kampachi Farms to harvest kampachi using a 132-m^3 (approximately 21 ft in diameter) brass-link mesh aquapod (CuPod) tethered to a moored feed vessel (a 28-ft long sportfisher). The feed vessel would be connected to a single-point mooring established at around 6,000 ft deep approximately 5.5 nautical miles (nm) west of Keauhou Bay, Hawaii. The Velella array (CuPod and vessel) would be located in Federal waters

with the exact position depending on wind and currents. It would not be closer than 3 nm from shore.

If the permit is issued, the applicant would use the Velella array to grow and harvest 2,000 fingerlings/juveniles. The stock would be first generation offspring of the native coral reef species, kampachi, (marketed as "Kona Kampachi®") obtained from a local hatchery. The permit duration is for a one-year period.

To implement its project, the applicant must also obtain a Department of the Army (DA) permit from the U.S. Army Corps of Engineers (USACE).

NMFS prepared this Environmental Assessment (EA) with input and review by the USACE. The EA will serve as the basis for a determination by NMFS whether or not issuing the SCREFP permit would be a major federal action with the potential for significant environmental impacts, in which case there would be a need to prepare an environmental impact statement. The document will also inform NMFS in its decision about whether to issue a permit.

The USACE will be using this document to inform its environmental evaluations in accordance with USACE NEPA Implementation Procedures for the Regulatory Program (33 CFR 325, Appendix B).

The small size of the CuPod, and limited number of fish, established procedures for the careful application of feed, and near constant water flow are expected to minimize impacts on water quality. The strong brass mesh net material is resistant to biofouling, tearing, and leaching. The strong mesh material and the use of a mesh entry panel during routine maintenance work would prevent fish escapes. The CuPod and vessel would each have a global positioning system (GPS) transponder to provide ongoing location information and to allow retrieval of the CuPod in the unlikely case of separation from the mooring. In addition to the applicant monitoring the CuPod and feed vessel remotely, NMFS permit conditions would include requirements for avoiding and reporting protected resources interactions and fish escapes, and collecting and discarding dead fish, filing harvest and transshipment reports, and accommodating an observer upon request. These operational features together with the limited scale and duration of the project help to ensure that the project would have a very limited impact on the environment. It is expected that the array (feed vessel and CuPod) would aggregate pelagic fish. Fishermen would be able to fish around the array. The small size of the array is not expected to have a substantial adverse effect on other fishermen off of west Hawaii.

NMFS published a Notice of Availability of a draft EA on August 13, 2013, and provided the public with an opportunity to review and comment on the draft EA. NMFS considered all comments and either made no change to the document or improved information in the baseline and the clarity of the document. None of the comments resulted in substantial changes to the analysis about the significance of impacts of the proposed action on the human environment.

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List of Acronyms and Abbreviations

EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ftm	Fathom(s)
FAD	Fish Aggregation Device
FCR	Feed Conversion Ratio
HAPC	Habitat Area of Particular Concern
Hawaii FEP	Fishery Ecosystem Plan for the Hawaiian Archipelago
IPCC	Intergovernmental Panel on Climate Change
KF	Kampachi Farms
KPH	Keahole Point Hatcheries, LLC
kt	Knots (nautical miles per hour)
lb	Pound(s)
LLC	Limited Liability Company
MMPA	Marine Mammal Protection Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
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
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
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 Kampachi Farms, LLC, in accordance with the Hawaii Fishery Ecosystem Plan and consistent with implementing federal regulations (50 CFR 665.224) pertaining to management of coral reef ecosystem fisheries. A SCREFP is required to harvest any Coral Reef Ecosystem Management Unit Species (CRE MUS) using gear that is not specifically authorized by regulation. The permit would allow the applicant to culture and harvest kampachi, or Almaco Jack, (*Seriola rivoliana*), a Hawaii CRE MUS[1], using one 132-m^3 brass-link mesh cage (approximately 21 ft in diameter) tethered to a moored surface vessel (modified 28-ft Sportfisher made of plywood and fiberglass) deployed and maintained in Federal waters around 6,000 ft deep, approximately 5.5 nm west of Keauhou Bay, Hawaii (Figures 1 and 2). The project would require the deployment of a single-point mooring array consisting of a deadweight anchor (approximately 15,000 lb), mooring line (12,000 ft of 1.5" polypropylene and nylon rope), and a surface buoy (4-ft diameter foam-filled steel sphere). A schematic of the array is shown in Figure 3. This project shares similarities with a prior project authorized by a SCREFP for a one year period in 2011-2012, which tested a Velella array concept by towing a CuPod behind a sailing vessel (the "2011-2012 towed Velella project"). There are notable differences between the two projects, however, including the use of a mooring system under the present application and regulatory oversight by multiple agencies.

The SCREFP would allow the applicant to test the feasibility of harvesting a native marine fish species using an anchored feed vessel and submersible CuPod in waters of the U.S. Exclusive Economic Zone (EEZ). The anchored vessel and CuPod together form the "Velella Array."

NMFS prepared this Environmental Assessment (EA) as the Lead Agency with input from the U.S. Army Corps of Engineers (USACE) as a Cooperating Agency. The EA was prepared in accordance with the National Environmental Policy Act (NEPA) (42 USC § 4321, *et seq*.), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and NOAA Administration Order 216-6 (Environmental Review Procedures for Implementing NEPA).

On August 13, 2013, NMFS published a notice of availability of a draft EA and requested public review and comments through September 3, 2013 (78 FR 49258). NMFS received comments from 8 sources. All comments were considered in finalizing the EA. Comments and NMFS response to comments are provided in Section 5.4.2. None of the comments resulted in substantive changes to the analysis in the EA. NMFS considered all comments and either made

[1] *Seriola rivoliana*, Almaco Jack, is a member of the family, Carangidae, and is included in the Hawaii Archipelago FEP Coral Reef Ecosystem Management Unit Species (CREMUS) (Potentially Harvested Reef Taxa).

no change to the document, changed facts or improved the clarity of the document without changing the analysis in the EA, or improved information in the baseline. None of the comments resulted in substantial changes to the analysis about the significance of impacts of the proposed action on the human environment.

NMFS will use the analysis in this EA to determine whether the issuance of the SCREFP would have the potential to significantly affect the quality of the human environment, in which case there would be a need to prepare an environmental impact statement. The document will also inform NMFS as it makes a decision about whether to issue a SCREFP.

The USACE will use this document to inform its environmental evaluations in accordance with USACE NEPA Implementation Procedures for the Regulatory Program (33 CFR 325, Appendix B).

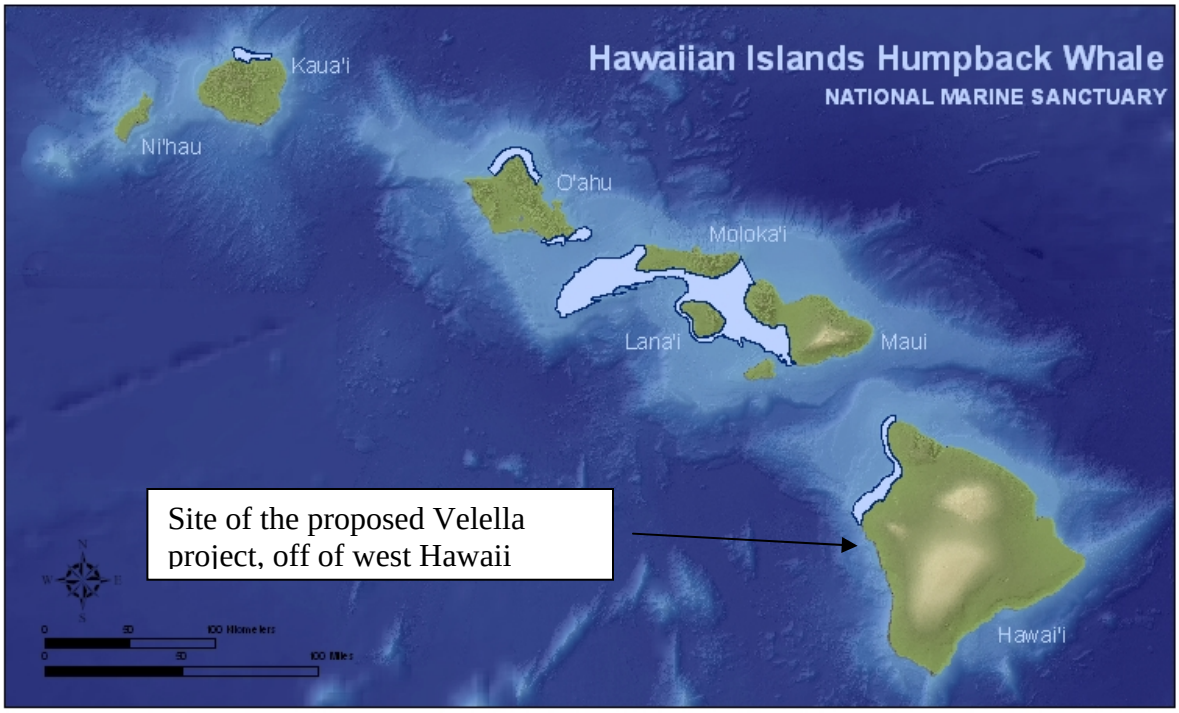

Figure 1. General location of the proposed Velella project off of west Hawaii Island.

Note: The location of the proposed mooring is approximately 5.5 nm west of Keauhou, Hawaii. This figure also shows to the location of the Hawaii Islands Humpback Whale National Marine Sanctuary (lighter outlined areas) which is outside the area of the Velella project. (Map source Hawaii DLNR website: http://hawaii.gov/dlnr/dar/sanctuary.html).

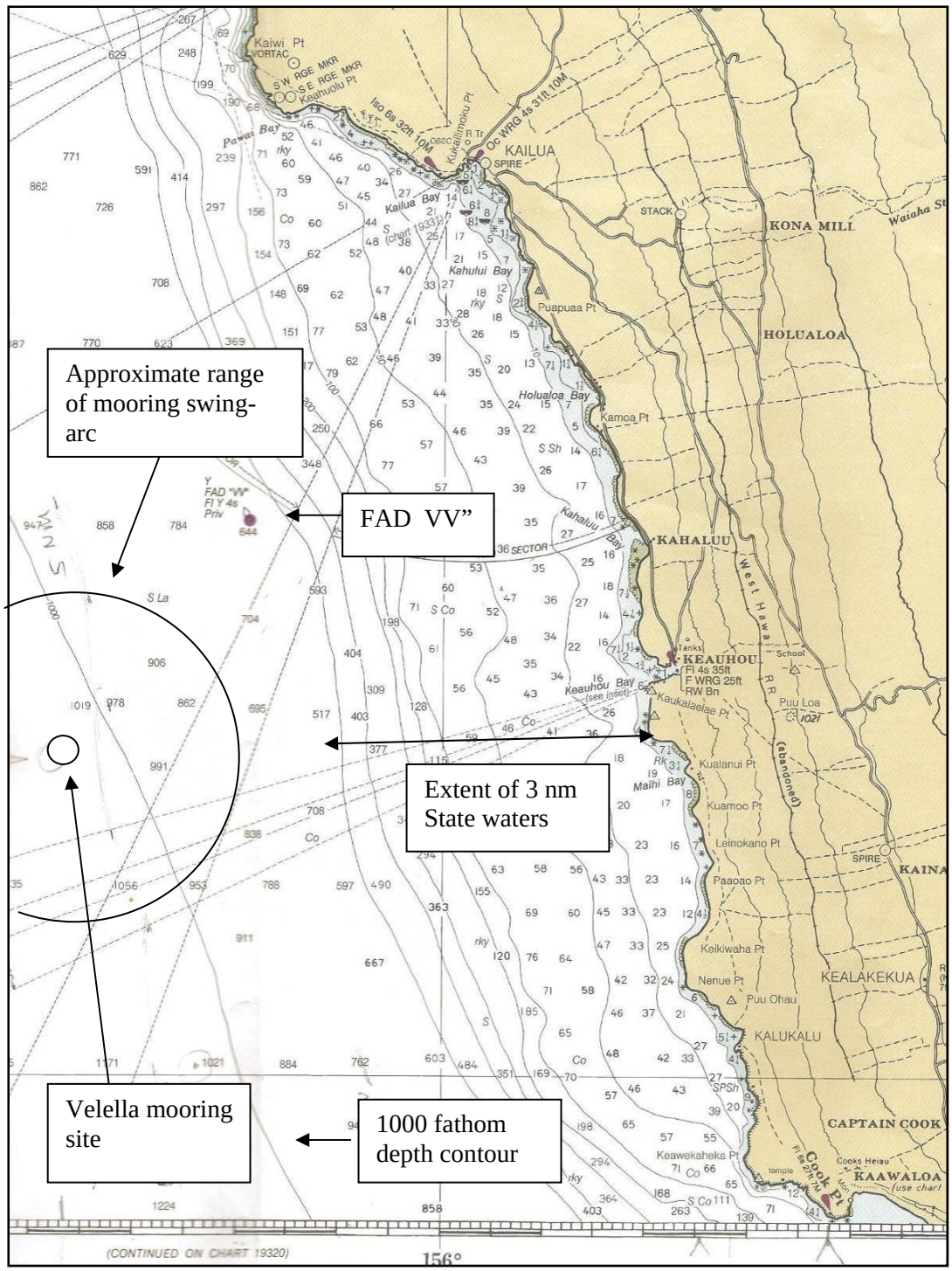

Figure 2. Approximate location of the proposed mooring site and swing arc of the Velella array. Base chart source: NOAA Chart 19327. Note: 1,000 ftm is 6,000 ft (1,828 m). The proposed array would be moored approximately 5.5nm from shore. For reference, FAD VV is located approximately 4nm from shore off of Keauhou Bay at a depth of approximately 600 fm.

1.2 Purpose and Need

The Special Coral Reef Ecosystem Fishing Permit (SCREFP) is needed to allow Kampachi Farms to harvest a Coral Reef Ecosystem Management Unit Species using gear that is not specifically approved in the Hawaii Fishery Ecosystem Plan and authorized by regulations at 50 CFR 665.224 pertaining to the special coral reef ecosystem fishery permit.

The purpose of the permit is to allow the applicant to test the feasibility of raising marine finfish in a deep-water ocean setting using a stationary array. The objective of the proposed activity is to test the feasibility of raising 2,000 marine finfish to harvestable size inside a specially designed submersible cage (CuPod) tethered to a feed vessel that is attached to a single-point mooring in the U.S. Exclusive Economic Zone (EEZ).

1.3 Proposed Federal Action

The proposed federal action by NMFS is the issuance of a SCREFP to Kampachi Farms to authorize the culture and harvest of a Hawaii coral reef ecosystem MUS, kampachi (Almaco jack, or *Seriola rivoliana*), which is classified within the Hawaii FEP as a Potentially Harvested Coral Reef Taxa (PHCRT) using the CuPod and feed vessel (the Velella array) moored in Federal waters off of the western coast of the Island of Hawaii. Technical details and operations of the Velella array are described below.

The applicant would be required to comply with conditions of the SCREFP (Appendix B), and with approved contingency and reporting plans (see Appendices C and D).

Applicant: Kampachi Farms, LLC

Location: The mooring would be set approximately 5.5 nm from shore in Federal waters at around 19° 33’ N. latitude, 156° 04’ W. longitude in waters approximately 1,000 ftm deep. The specific location of the Velella Array would depend on the oceanic conditions (currents and wind); however, the maximum distance from the mooring site is estimated to be 1.75 nm so the project would be located in Federal waters at all times. Movement of the array would be controlled by the action of ocean currents and winds. The array would not operate within any restricted fishing areas, the Humpback Whale Sanctuary waters, State waters, or any marine protected zone. Depending on the location of the array with respect to the mooring site, water depths beneath the array could range from around 800 ftm deep (4,800 ft or 1,463m deep) at the array’s inshore extent to 1,300 ftm deep (7,800 ft or 2,558 m deep) at the deepest.

Duration: The SCREFP would be issued for a 12-month period.

Activity: The SCREFP would authorize the harvest of kampachi (*Seriola rivoliana*) in federal waters using a CuPod (submerged brass mesh-net cage) attached to a fishing vessel moored in Federal waters. Associated activities include grow-out related maintenance of the fish, CuPod, and vessel and monitoring of fish and the immediate environment.

Other activities associated with the project include access by supply vessels, such as small to medium-sized fishing vessels during the course of the project as needed. Access is likely to be daily initially, and is expected to be on a weekly basis for much of the duration of the project.

The Velella Array configuration is shown in Figure 3.

Coral Reef Fish Species: Kampachi Farms proposes to grow and harvest *Seriola rivoliana*, locally called Almaco jack or kahala, under the name "kampachi." The applicant would stock the CuPod with 2,000 fingerlings (greater than 2" in length) obtained from Keahole Point Hatcheries, LLC, a land-based hatchery facility at Keahole Point. These would be first-generation offspring reared from wild-caught broodstock. The hatchery has cultured this species since 2005 and the broodstock are also used in offshore net pens located in State waters (KBWF 2009).

Seriola rivoliana is an indigenous species that occurs in Hawaiian waters in small groups on slopes and off of reefs from the shore down to 87 ftm (522 ft). It is distributed circumglobally throughout the tropics (Randall 2005). In Hawaii, the fish is typically caught as bycatch in association with deepwater jigging and bottomfishing. 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 the wild-caught fish are unmarketable, and considered unpalatable, fishermen regularly discard this species.

Reliable population estimates of the species are not available. The fact that this species of fish is globally distributed in the tropics, is not targeted or retained for food, and is a fecund species that can spawn multiple times in a year (Meyers 1991; Blaico 2004), populations in the wild are considered healthy. The species is a serial spawner and according to Meyers (1991), a single female can spawn once or twice a week for up to three months, and a female weighing 20 kg can produce 20m eggs in a season. Wild *Seriola rivoliana* caught in Hawaiian waters have historically been logged in fishermen's catch reports as "Kahala", which lumps the fish with other species of jacks and may undermine an accurate assessment of the stock at the species level. For example, another species of the amberjack family that is commonly recorded as "Kahala" in catch logs is *Seriola dumerili*.[2,3] *Seriola dumerili* is listed as a bottomfish MUS in the Hawaii FEP. Generalizing the genus as "Kahala" in this way adds to the difficulty in understanding interspecies relationships and catch rate differences between distinct *Seriola* populations found in the region (WPFMC 2011).

Cultured *Seriola rivoliana* (distinguished from wild 'kahala' here as 'kampachi') have a higher fat content (a highly desirable market characteristic) than wild kahala, since they are fed regularly with a high-lipid diet and do not use energy to search for food. The cultured fish may also be distinguishable from wild kahala because they tend to have a thicker and rounder body.

[2] http://hawaii.gov/dlnr/dar/pdf/fishes_of_hawaii.pdf
[3] http://www.fishbase.org/summary/SpeciesSummary.php?genusname=Seriola&speciesname=dumerili

The time between stocking and harvest is anticipated to be between 8 and ten months, but would depend on fish growth. Only a single stocking is proposed to occur. Fish have more room to grow once some have been harvested. Toward the end of the project, the average fish weight at harvest could be four pounds, for an estimate of 8,000 lb of fish total.

Anchor and Chain Riser: The applicant would deploy a single anchor to be used to moor the fishing vessel connected to the CuPod. The mooring anchor would consist of approximately 15,000 lb of steel-reinforced concrete connected by a pin to the mooring line and set in approximately 1,000 ftm of water. Approximately 360 ft of 2" stud link chain would be connected to the anchor. The chain is included in the design to lie along the bottom to prevent the anchor from lifting free. Subject to the terms of the USACE permit, the anchor and chain would be detached from the mooring and abandoned on the ocean bottom at the end of the project.

Mooring line: The mooring line would be 12,000 ft long and made of 2 types of line. The lower rode (section) of line would be made of 6,000 ft of positively-buoyant polypropylene line connected to the bottom chain. The upper rode would be made of 6,000 ft of negatively-buoyant nylon rope (1½"-diameter nylon) that would be connected to a chain riser which in turn would be connected to the vessel at the bow (see schematic diagram, Figure 3). The mooring lines would be spliced together in the middle section of the mooring line. The mooring line would consist of 8-strand plaited line to prevent loops from forming. The resulting mooring scope ratio would be 2:1 (i.e., the line would be twice as long as the depth of the water above the anchor). This mooring scope means that the location of the array would be a maximum of 1.75 nm away from the mooring site. Tension would be maintained on the mooring lines by the force of wind and currents on the feed vessel and CuPod. While heavy ocean swells would create some movement in the feed barge, the predominant factor for loading on the mooring would be the drag from the current on the CuPod. This is expected to be almost constant (Sims, 2013d). Near the surface, the mooring line would be cleaned on an as-needed basis to prevent a buildup of organic matter. The mooring line would be removed at the end of the project.

Tether: The applicant would tether the CuPod to the feed vessel at the stern using 100 ft of 3-strand 1¼" nylon. The umbilical would also have camera cables, air lines, and a feed hose attached by cable ties. The tether would be cleaned on an as-needed basis to prevent a buildup of organic matter. The tether line would be removed at the end of the project.

Feed hose: A 2" diameter feed hose would run from the feed vessel to the interior of the CuPod and would be connected to the tether line with cable ties. The feed hose would be cleaned on an as-needed basis to prevent a buildup of organic matter. The feed hose would be removed at the end of the project.

CuPod: The spherically-shaped, geodesic CuPod consists of plastic structural framing with rigid brass chain-link enclosure panels that allow seawater to flow through the structure while, at the same time, minimize biofouling, tearing, and entanglements, and prevent fish from escaping (Figure 4). The CuPod has a total volume of 132 m^3 (4,662 ft^3) and a diameter of 6.4 m (21 ft) and is intended to be submerged to a predetermined depth during normal operations by means of a float and ballast tanks that help maintain neutral buoyancy. The surface spar buoy attached to

the CuPod would be equipped with a flashing SeaLite M650 buoy lantern with a visibility of 3 nm, as well as a radar reflector and GPS transmitter. The surface buoy would have 2,400 lb net buoyancy. The line to the float buoy would be 45 ft of 1” braided nylon. Figures 5, 6 and 7 are photographs of the CuPod at sea during a towed trial and show the relative size of the CuPod. Once stocked, the CuPod would be submerged so that the top of the cage would be approximately 7.6 m (25 ft) below the surface of the sea to limit effects from surface waves, currents and/or weather anomalies on the CuPod.

The CuPod is positively buoyant in seawater. The Applicant would add 3000 lb of chain to the CuPod to ensure the pen is submerged, unless the ballast tanks are inflated. When the ballast tanks are flooded, the CuPod would sink to the extent allowable by the float string attached to the surface buoy (Sims, 2013e).

To help prevent loss of the CuPod during transport, the Applicant would transport the CuPod when sea conditions are favorable.

The CuPod can be raised and lowered in the water column for stocking and cleaning (i.e., manual scrubbing and/or pressure washing) purposes using compressed air to displace sea water in ballast tanks attached to the pen. The CuPod would be cleaned on an as-needed basis to prevent a buildup of organic matter.

Access to the inside of the CuPod would be through hatches built into the top and bottom of the pod. The bottom hatch would be fitted with a zippered panel to prevent fish from escaping. Entry into the top hatch would occur when the top of the CuPod is above the surface.

The command-and-control software includes an integrated GPS system that would continuously monitor the array’s position and would be programmed to dispatch emails and text messages to the applicant and staff if the array were to move outside of a defined area.

The CuPod would be removed at the end of the project. As a condition of the permit, the CuPod would be cleaned prior to transport to and from shore.

Feed Vessel: The project would use a 28-foot long sportfisher vessel with two 6-cylinder engines as a combined dive-platform and feed vessel. At night, the vessel would be lit by navigational lighting according to Coast Guard regulations (1 all-around white lantern), and buoy lights on the CuPod buoy and along the tether. There would be no staff living aboard the feed vessel. The feed vessel would be remotely monitored from shore using security cameras. Video cameras would have night-vision capability using infra-red LEDs with a range of 50 ft. This light is invisible to the naked eye and is not expected to disturb wildlife. A small generator would be used to deliver feed through a hose to the CuPod. When the motors are attached, the feed vessel would have a maximum speed of around 8 kt. No refueling or oiling of the vessel or vessel components would occur at sea. Refueling would occur in Honokohau Harbor. The feed vessel would be removed at the end of the project. The feed vessel would be cleaned at sea before it is transported to shore to reduce the potential for introducing any potential fouling organisms near shore. Fouling is expected to be minimal as the vessel would be cleaned on a regular basis to remove habitat for fish parasite eggs.

Lighting and Maritime Safety: The array would be operated and lighted at the surface according to Coast Guard requirements (72 COLREGS, International Regulations for the Prevention of Collisions at Sea, as implemented by the International Navigational Rules Act, 33 USC 1601 et.seq., and 33 CFR 80-90) so as to be visible to other mariners. The CuPod would have a lighted surface float (SeaLite M650 buoy light) to mark its position at all times. The mooring point buoy would also contain a lighted surface float. These buoy lights are intended to assist in the prevention of collisions at sea. The CuPod would also be equipped with a strobe, radar reflector and GPS transmitter, so in the event of detachment it would be visible for navigation and would allow the separated gear to be located and retrieved. The U.S. Coast Guard would publish a Notice to Mariners, as appropriate, to provide information that would help prevent a collision.

The feed vessel would have no night lighting except for required navigation lights appropriate for an anchored vessel. This would reduce the attraction effect of the array to migratory seabirds. If working at night were to be necessary, staff would use headlamps and flashlights (Sims, 2013c).

Operations

Transportation: The CuPod would initially be launched and recovered from Kawaihae Harbor. The unstocked, clean CuPod would be towed by a vessel with the CuPod partially elevated out of the water on a tripod of 4,000 lb lift bags during both departure and return. Transit from Kawaihae to the mooring site would involve an expeditious passage through waters in the Hawaiian Islands Humpback Whale National Marine Sanctuary and State waters.

Once operational, vessel runs required for the project would be conducted using smaller, ramp-launched rigid inflatable boats launched out of either Honokohau small boat harbor or Keauhou bay. The feed vessel would be provisioned about once a week or when restocking, maintenance, or other work is necessary. The inflatable boats used to tend the array have a maximum speed of around 24 kt but in most offshore conditions would be operated at less than 15 kt. In the immediate vicinity of the array, they would be used at near idling speed. During maintenance visits, small inflatable vessels would be used. Crew would consist of an operator and at least one other crew member. At any one time, one or the other of these project staff would be monitoring the seaway in front of the vessel to prevent interactions with sea turtles, marine mammals, or other wildlife.

The Kaloko-Honokohau National Historical Park, administered by the National Park Service (NPS) encompasses waters immediately outside of the Honokohau small boat harbor and park lands surround the harbor (see map, Appendix E-1). Since passage through the Park would be brief, non-stop, and conducted in a manner consistent with other vessel traffic, the proposed permit activity is not expected to affect lands or cultural resources on either side of the harbor and vessels.

To help prevent loss of the CuPod during transport, the Applicant would transport the CuPod when sea conditions are favorable. The feed vessel and CuPod must be operated in accordance

with Coast Guard requirements (72 COLREGs, International Regulations for the Prevention of Collisions at Sea, as implemented by the International Navigational Rules Act, 33 USA 1601 *et seq.*, and 33 CFRR Parts 80-90). The specific circumstances under which the array would be towed would be appropriately addressed by the owner and operator, after giving due consideration to prevailing conditions, vessel traffic density, and crew training and experience.

The CuPod and feed vessel would not be stored or anchored in areas that contain coral reef habitat.

Stocking: Fish would be transferred into the CuPod through the access hatch using scoop or surround nets, and specially designed fish pumps, travelling down a hose directly from the transfer vessel to the CuPod. The fish would be transferred into the CuPod with the access hatch raised out of the water to minimize the risk of loss of stock (Sims, 2013e).

Feed and Feeding: The feed that would be used in this test would be the same specially-developed feed formulation that is used to raise kampachi in State waters. This feed was also used during the 2011-2012 towed Velella project. The feed is produced by Skretting, Inc. in Canada, which is a leading producer of aquaculture feeds and the ingredients are comprised of sustainably harvested ingredients according to the manufacturer (Skretting 2010). The feed pellets are composed of fish meal (30%) and fish oil (10%), and agricultural oils and proteins such as soybean meal, corn gluten, wheat gluten, and canola oil. All products used in the feeds are safe for human consumption. There are no prophylactic antibiotics or other medications included in the feed.

Fish in the pen and immediate surroundings would be monitored using an in-water camera which can be remotely monitored and which would be used during feeding to observe fish behavior. Fish would be fed through a 2-in diameter hose from the feed barge that would pump a seawater-and-pelleted food slurry into the submerged pen. Initially, the small fish would be fed five times a day, but as they grow, they would be fed less frequently. Fish would be fed each time at a level just below satiation to ensure minimal feed is wasted. The applicant's experience allows the company to observe fish behavior to determine when the fish have reached the point of near-satiation (Sims 2013d). As was seen in a previous trial using the same delivery hose with a CuPod and camera monitoring, the fish were observed to congregate in a tight ball at the beginning of feeding, and when the fish ball moved toward the bottom of the cage, the fish were considered near satiation and the feed slurry was shut off.

Collection of mortalities: Staff would enter the bottom of the CuPod to collect dead fish, using zippered mesh entry nets to prevent fish from escaping (Sims 2013d). Fish would be disposed of at approved facilities on shore.

Harvesting: The CuPod would be brought to the surface and fish would be harvested from the CuPod using a seine net. The CuPod would be raised to the surface and fish would be dip-needed out of the seine net by the crew and deposited directly into a seawater/ice slurry in a local fishing vessel's hold (Sims, 2013e). Live fish would be transported to shore-based facilities in the support vessel. No fish would be processed at sea. Fish harvests and/or sales would be reported on the appropriate Federal and State forms.

Security: In addition to regular weekly visits, the array would have an onboard surveillance camera and an underwater camera that can be monitored remotely.

Monitoring gear condition: It would be standard procedure for the Applicant to check all lines, chains, shackles and load points on the vessel and pen every week (Sims, 2013d).

Monitoring of the array remotely: GPS transponders would provide regular automated reporting of the array's position. This information would be available only to Kampachi Farms and would not be made available to other mariners. Video feed from security and in-water cameras would be accessible for human monitoring at the shore station 24-hours a day. Streaming video would be available in the applicant's CEO's office and available 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 either the feed vessel or CuPod were to be detected by the monitoring system to be outside of the expected operating location, a signal would be sent to Kampachi Farms that would allow the applicant to launch an emergency response. The estimated time of a response would be under an hour, with 30 minutes to launch a vessel and 20 minutes to find the gear (Sims 2013d).

Monitoring protected resources interactions: Kampachi Farms would work with the University of Hawaii-Hilo (UHH) or other appropriate entity to conduct a third party marine mammal monitoring program. This work has, to date, not identified adverse effects between the CuPod and any marine mammals. More detail on expected interactions with protected species is provided in section 4.2.2 below. In the past, UHH monitoring included above-water and in-water photography and visual observations.

Data collection would also include observations by staff on a routine basis (e.g., during weekly maintenance visits) of any sea turtles, marine mammals, and seabirds seen around the array, as well as fish species that may aggregate around the feed vessel and CuPod, and any recreational or commercial fishing activity, or other boat traffic that is seen.

The applicant would be required to report all interactions that result in injuries to marine mammals or other protected species. See reporting forms, Appendix C, and reporting plans, Appendix D.

Maintenance of the CuPod: During weekly visits, the pen, vessel, and stock would be inspected for wear and tear on the equipment and fish mortalities, which would be removed and preserved for later examination. Repairs would be made at sea as needed, with diver safety being the first priority for any specific operation and for the entire test period. Project standard operating procedure would be to inspect all lines, chains, shackles and load points on the vessel and CuPod on each weekly visit. A weekly vessel inspection would ensure proper leak-free operation of sump pumps, hatch seals and machinery (Sims 2013d).

The applicant proposes to clean the CuPod using both mechanical brushing and power washing. Based on past experience, a rotational duty of at least weekly manual scrubbing would be used over a one month rotation to keep the mesh clear of organic matter. Salt water power washing

would be powered by generator and would use only seawater. The equipment to be used would be a DeWalt pressure washer powered by a 390cc Honda GX gasoline generator operated at around 4,000 pounds per square inch. The estimated noise level would not be louder than a fishing boat engine. The generator is estimated to have a noise rating of 74.5 db.[4].The generator would be enclosed within a plywood container on the feed barge (Sims, 2013e). No chemicals would be used in cleaning the gear. Only accumulated marine biological matter would be returned to the sea, without alteration by any human or industrial processes. The copper-alloy mesh material and that of the pod itself are non-ablative (i.e., does not flake off), so this mechanical cleaning would not result in contaminants entering the water.

Post-project recovery of gear: At the conclusion of the project, the mooring line would be hauled taut and detached using a weighted messenger that would be dropped down the line using either a spring-loaded blade or a small shaped charge that would sever the line at the shackle joining the line to the ground chain allowing the line to be collected. The cleaned CuPod and feed vessel, tether, feed hose, and mooring line would be removed from the site at the end of the project.

Marketing: Kampachi Farms intends to sell up to 8,000 lb of fish, through existing distribution channels for Kona Kampachi.

[4] http://reviews.northerntool.com/0394/165938/northstar-trifuel-generator-390cc-8000-surge-watts-6600-rated-watts-reviews/reviews.htm).

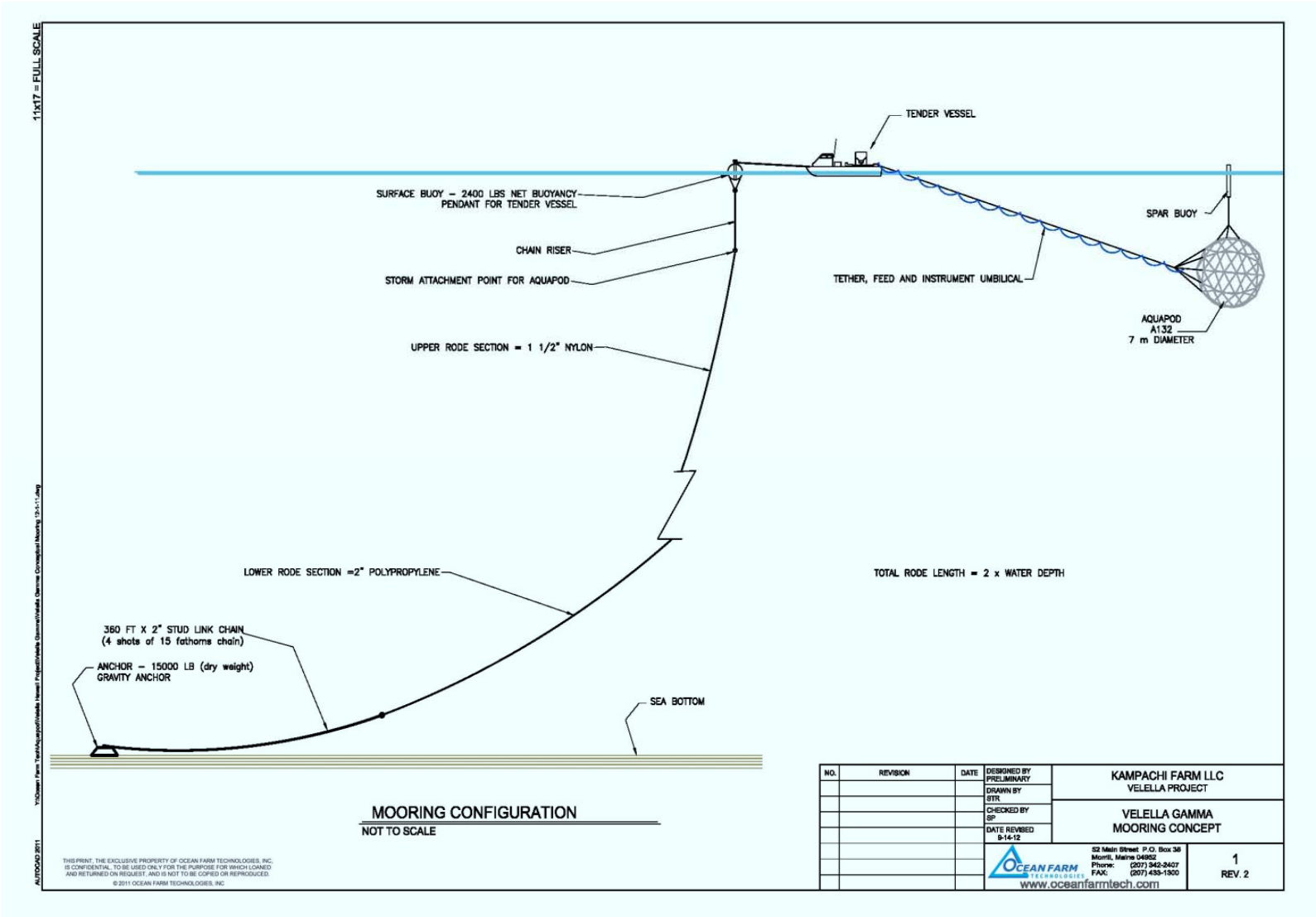

Figure 3. Schematic diagram of the Velella Array (CuPod and feed vessel) and mooring. Source: Ocean Farm Technologies provided NMFS with the schematic diagram in 2012. Not to scale.

Figure 4. Close-up photograph of the brass mesh net of the CuPod.
Source: Kona Blue Water Farms, provided to NMFS in 2011.

Figure 5. Photograph of the unstocked CuPod being towed by 65-foot long schooner, *Machias*, in waters off of Hawaii to show the relative size of the CuPod.

Figure 6. Picture showing a diver preparing to enter the CuPod during the Velella Beta project with a vessel at the surface.

Source: Kampachi Farms website, 2013.

Figure 7. Picture showing a diver and the CuPod stocked with kampachi off of Hawaii during a different project.

Source: Key, 2012; Photo by Jeffrey Milisen.

Contingency Operations:

Storm Contingency Plan: In case of storms, the feed vessel would have its own power (two Detroit Diesel 6 cylinder engines) and would be detached from the CuPod and mooring and motored to Honokohau Harbor prior to the arrival of major storms. The CuPod would remain submerged and would be tethered directly to a ring in the riser chain approximately 30 ft beneath the mooring buoy. This would serve to dampen any forces transferred from the buoy to the pen under adverse ocean and wind conditions.

Response to de-coupling from the mooring line: Uncoupling or breakage of mooring line is not expected because the mooring line selected for the project was recommended by engineers to exceed anticipated loading from the gear. Both the CuPod and the feed vessel are equipped with GPS transponders that would send an emergency signal to the monitoring station and key personnel should the array be located in an area outside of the normal operating area. The CuPod is equipped with a separate floatation buoy. In case of a de-coupling from the mooring, the applicant would notify NMFS and the Coast Guard and launch a vessel to retrieve any gear as soon as possible. An Emergency Plan is provided in Appendix D.

Response to array detachment: Should the feed vessel become detached from the mooring line, the CuPod and feed vessel would drift subject to currents and winds. Prevailing currents in the area run alongshore either south-to-north or north-to-south. The applicant would call the USCG to put out a broadcast notice to mariners. Kampachi Farms would also report the incident to NOAA and the USACE (See Contingency Plan, Appendix D). A buoy would be attached to the mooring line near the surface attachment which would allow the applicant to retrieve the mooring line. GPS transponders located on the CuPod and feed vessel would broadcast the CuPod and feed vessel's locations and Kampachi Farms would charter a suitable vessel to retrieve the CuPod. The engines on the vessel could be used to maneuver the vessel to avoid collision and return it to the mooring.

Response to CuPod detachment: Should the CuPod become detached from the tether to the feed vessel and should the ballast tanks that are attached to the CuPod be deflated at the same time, the CuPod would sink to the maximum depth of the rope on the buoy float and, upon retrieval of the CuPod, the ballast tanks would be re-inflated to bring the pen to the surface. The fish inside the CuPod would likely be unaffected by such an incident.

If the CuPod were to become detached from the feed vessel and remain afloat, Kampachi Farms would contact the U.S. Coast Guard and NOAA to report the incident and any navigational hazards. Appropriate recovery operations would be employed to intercept and secure the CuPod in a timely manner. Real time monitoring of the Velella array using the GPS would aid in its recovery.

If the CuPod's buoy line and tether to the feed vessel were both to uncouple, and if the ballasts were also not functioning, the CuPod would sink to the bottom of the ocean. The cage is strong enough that it is likely the fish would remain inside the cage and would not survive or escape into the wild. At the expected depth of 5,000 or 6,000 ft, the CuPod and the fish inside would most likely be unrecoverable from the ocean bottom.

If, during a detachment incident, the CuPod were to tear, fish could escape. See discussion in Section 4.2.1 for more detailed analysis of potential impacts.

2.0 Alternatives

2.1 Development of the Alternatives

In December of 2012, NMFS received an application from Kampachi Farms requesting a Special Coral Reef Ecosystem Fishing Permit. NMFS reviewed the application and will ensure the project is in compliance with applicable laws.

The applicant seeks to test the gear (CuPod and feed barge) anchored offshore in order to see whether the fish growth would be successful. According to the applicant (Sims, 2013a), the particular location offshore was selected because the area is subject to currents that would help to ensure water flows through the CuPod, providing clean water and ensuring any metabolites are quickly dissipated. The location is relatively close to harbors and would require less time to travel in order for Kampachi Farms to service the vessel and CuPod. The offshore location would help to minimize potential conflicts with coastal waters users. The location is also within the lee (downwind) of Hawaii Island which is expected to reduce wind effects (e.g., storm surf and wind chop) on the array. Finally, the proposed location would allow the array to swing about the mooring site without adversely affecting fish aggregating devices (FADs).

The applicant selected the gear because it is strong, resists corrosion and biofouling, and the metal mesh allows water to flow through the CuPod, providing high quality water in the CuPod.

The applicant selected an anchored project to reduce costs associated with the trial, improve operational efficiencies, and study performance of the fish in an anchored setting. For instance, there would be a savings in fuel costs associated with eliminating the need to tow the pod with a tender vessel.

The small size of the CuPod would allow the applicant to obtain more information on the performance of the fish in waters offshore in a moored array. Although the fish would be sold, costs of the proposed trial would not be covered by fish sales and the applicant intends to rely on funding from other sources in order to meet costs of carrying out the project.

2.2 Alternatives Considered in Detail

2.2.1 Alternative 1: No Action. Do not issue a SCREFP to Kampachi Farms

Under the No-action Alternative, NMFS would not issue a Special Coral Reef Ecosystem Fishing Permit to authorize the harvest of kampachi using an anchored feed vessel and CuPod (Velella array).

The applicant would not test the use of an anchored Velella array to culture and harvest *Seriola rivoliana.* The effects of the no action alternative would be as described in Chapter 3, Affected Environment.

2.2.2 Alternative 2: Issue a Special Coral Reef Ecosystem Fishing Permit to Kampachi Farms (Proposed Action) – to authorize the use of the Velella array to culture and harvest *Seriola rivoliana*

Under Alternative 2, NMFS would issue a Special Coral Reef Ecosystem Fishing Permit (SCREFP) to Kampachi Farms, which would authorize the use of the Velella array to culture and harvest kampachi. Kampachi Farms would test the use of a small CuPod tethered to a feed vessel that would be moored in federal waters approximately 1,000 ftm deep. The SCREFP would be for a 12-month period and the applicant would be required to demobilize at the end of the authorized period of operation. Details of the operations are provided in Section 1 above. Proposed permit terms and conditions, included in the proposed action, are shown in Appendix B.

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

2.3 Alternatives Initially Considered but Rejected from Detailed Consideration

NMFS initially considered whether it would be useful or necessary to request that the applicant consider different locations for the mooring, but decided that consideration of alternative locations was not necessary to permit a reasoned choice. The applicant requested to place the array in the proposed site because it has several features considered important for the project (see Section 2.1 above and Sims (2013b)). In particular, the choice of this location considered the applicant's experience from the 2011-2012 towed Velella project, where the waters in this general area proved to be most favorable to their operations, (being more protected from storm surf and wind chop from the prevailing northeast trades than locations farther north, south or west), and with minimal evidence of user conflicts. Consideration of a location farther west would be in deeper water, requiring an even longer mooring line, with potentially heavier wind and sea conditions. Consideration of a location farther east would locate the project closer to shore, possibly introducing greater potential for user conflicts and exposing the test to higher levels of pollutants from coastal runoff. A location closer to shore would also nullify a primary question that the applicant is seeking to answer (i.e., can the applicant achieve the desired fish growth in a moored pen array while in open ocean conditions?).

NMFS also considered whether alternative mooring designs should be considered. Alternative mooring designs were considered by the applicant and the company's marine engineering collaborators at Ocean Farm Technologies and rejected in favor of the proposed design. The proposed design uses similar components to mooring systems that have been used with success in the State of Hawaii's Fish Aggregation Device (FAD) buoy network. Moreover, NMFS has no information to conclude that alternative mooring methods would introduce environmental impacts different than the proposed alternative. For these reasons, a different mooring design was not considered further.

NMFS considered whether use of a shorter or longer mooring line should be considered in order to reduce the watch circle of the array. The applicant recommended the proposed length (12,000 ft of 1.5" polypropylene and nylon rope), in consultation with its engineers, based on a 2:1 length-to-depth ratio preferred for mooring net pen applications in open ocean conditions (Sims 2013a). A shorter mooring line with lesser scope may increase the potential for shock loading on the array in high seas or strong currents, and may therefore have led to the anchor dragging, separation of the mooring, and possible loss of the pen. Moreover, a shorter mooring line is not expected to result in different environmental consequences under the plan. The shortcoming of a longer mooring line would be that the array might impinge on nearby FADs and get too far from the selected location. For these reasons, an alternative in which a different mooring line length would be used was eliminated from further detailed consideration.

NMFS initially considered whether to consider an alternative requiring the applicant to mark the fish that are stocked into the CuPod in order to distinguish them from wild stock. Marking fish using dyes or fin-clips, or inserting tags, would be invasive and would have the potential to stress the fish and increase the possibility of disease, serious injury, or mortality. Furthermore, the fish that would be stocked in the CuPod would be first generation offspring of wild-caught native fish and, therefore, are genetically the same as the parent stock. The number of fish in the CuPod (2,000) would be a small fraction of the biomass of fish in the wild, so genetic variation would not be at risk. Finally, the design and relatively remote location of the cage, together with standard operating procedures to prevent fish from escaping, would result in a low risk of fish escaping and comingling with wild stock. For all these reasons, tagging of captive stock is considered unnecessary and NMFS did not further consider an alternative requiring the applicant to mark the fish.

2.4 Additional Permit Conditions Recommended by Comments, and Considered but Rejected from Detailed Consideration

Consistent with 50 CFR 665.224, NMFS may require compliance with such terms and conditions that may be necessary to prevent detrimental impacts to coral reef species, EFH, HAPC, and protected species, and to otherwise ensure that the activity is carried out in compliance with the FEP, MSA, and other applicable law. Several recommendations for additional permit conditions were provided during the public comment period and are addressed here. Comments on other topics are summarized in Section 5.2.4.

Recommendation 1. Do not allow genetic modification of proposed species or feeds.

Response 1. As analyzed in the EA, fish that would be grown and harvested are native species and are not genetically modified. The fish to be stocked would be first generation offspring of wild-caught fish. The harvest of genetically-modified fish would require a separate application supported by a new environmental analysis.

Recommendation 2. Require a bond to cover costs for damage that may occur. A fish cage was lost previously.

Response 2. Any liability for the project would be determined in accordance with applicable federal and state law. NMFS has no authority to require a bond or other surety.

Recommendation 3. NMFS should require unused oil absorbing pads and a floating oil containment boom to be stored and available aboard the feed vessel, and that these are deployed/used if there is an oil spill.

Response 3. The permit would authorize the harvest of CREMUS using previously unapproved gear under 50 CFR 665.224. Laws and regulations regarding the safe handling of oil products and the prevention and clean-up of oil spills are administered by the Coast Guard and are not within the scope of this action. However, the applicant would be required to comply with all applicable state and federal pollution laws while carrying out the activity.

Recommendation 4. Place unbiased observers during stocking, monitoring, harvesting and maintenance activities for the entire time period of the proposed project. Suggestions for observers to collect additional information, observe test procedures, and document any sightings or interactions with other marine species

Response 4. The conditions of the permit would allow NMFS to assign an observer to the array at any time. The applicant would also be required to immediately report any interactions with marine mammals that result in injury, and provide NMFS with quarterly reports regarding other observations of protected species.

Recommendation 5. The 28' Californian Sportfisher vessels should be inspected and maintenance activities logs be provided to NOAA observers at the time of their inspections.

Response 5. The Coast Guard administers and enforces vessel safety, examination, and inspection standards for different vessel types and classes under various statutes and regulations. The applicant would be expected to comply with any applicable Coast Guard safety requirements for its vessels during the period of operation. NMFS cannot impose safety or inspection requirements for vessels in excess of those administered by the Coast Guard, and therefore would not include such requirements in the permit.

Recommendation 6. Concern was expressed for staff safety. The commenter recommended the applicant have clear standard operating procedures to ensure worker safety.

Response 6. Employers in the State of Hawaii are required to comply with a variety of federal and state occupational safety and health laws. NMFS does not regulate worker safety, and therefore, would not include employment-related conditions in the permit.

Recommendation 7. The anchor and anchor line should not be allowed to remain in the ocean.

Response 7. NMFS and the USACE initially considered whether to require the applicant to remove the anchor and anchor chain at the end of the project. The retrieval of the anchor and chain from this depth would be difficult and potentially hazardous to staff. After installation, it is more feasible and safer to leave the anchor chain in place, allowing the chain to settle to the

bottom to become part of the benthos. At this depth, the cold water and low oxygen levels are expected to reduce oxidation of the anchor chain, so releases of minerals to the environment are expected to be minimal.

3.0 Affected Environment

3.1 Physical Setting

3.1.1 General setting

The project would be carried out in waters of the U.S. EEZ on the leeward side of the Island of Hawaii, State of Hawaii. The Velella array (feed vessel and CuPod) would move around a fixed mooring located at approximately 5.5nm west of shore and in waters 1,000 ftm deep. Given this configuration, the array could be located anywhere within a circle that covers 12.6 square nm (Figure 8). The exact location of the Velella 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 CuPod is approximately 21 ft in diameter, and the feed vessel would be 28 ft long.

Water depths drop off quickly west 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 array would range from 4,500 ft to 7,800 ft.

Across Hawaii, northeast trade winds prevail blowing 80% of the time at speeds averaging 8 to 12 kt. 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 Big Island land mass provides shelter from sea conditions and trade winds.

Surface water temperatures vary between 18°C to 28°C (64°F to 82°F) over the year and the depth of the mixed layer can vary between 400 ft (122 m) in winter and 100 ft (30 m) in summer (WPFMC 2009a).

The island chain affects the ocean through interactions with large scale ocean currents and wind speed variations in the lee of the islands (Juvik and Juvik 1998). Both warm and cold core eddies are continually recurring features in the lee of the Hawaiian Islands and are the result of the islands and their interaction with winds and currents (Woodworth et al., 2011). Cyclonic eddies displace the underlying nutrient rich waters creating localized biologically enhanced patches. The convergence zone aggregates plankton that attract mid trophic-level species (fish and shrimp) that are prey for cetaceans, birds, marlin, tuna, and sea turtles. (Seki et al., 2002; and Woodworth et al., 2011). Seki et al. (2002) describe oceanographic conditions and their impacts on fish catches by participants in the Kona International Billfish at a time when a cyclonic eddy dominated the ocean conditions and changed catches from the usual catch patterns. Their oceanographic study provided insight into the features of an eddy which was centered about 20 nm off Kailua Kona and was approximately 60nm in diameter. Current velocities at the edge of the eddy exceeded 1.2 kt closest to shore and currents diminished toward the eddy center. The eddy appeared as a strong north-northwest current running up the point toward Keahole Point.

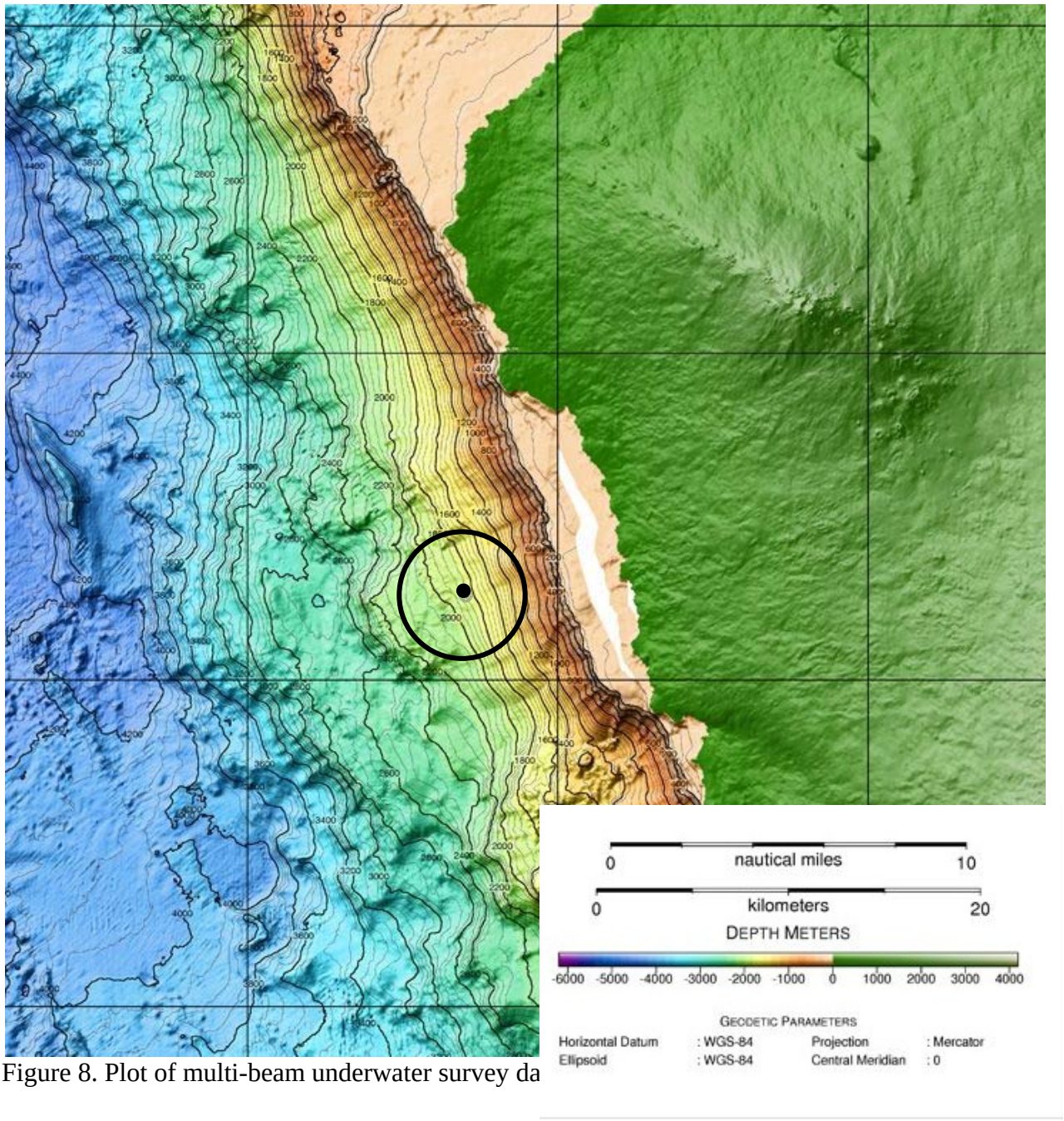

Figure 8. Plot of multi-beam underwater survey da

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

3.1.2 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 have been designated as Class AA marine waters[5] (HAR, Title 11, Ch. 54; Water Quality Standards), 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.

3.1.3 Air Quality

There are no large sources of emissions in the project area. Motorized fishing vessels are a small source of emissions in offshore waters, but these emissions are quickly dissipated under normal conditions. The Kona coast is often subject to high particulate conditions from the active volcano atop Mauna Loa.

3.1.4 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.

3.1.5 Views

The array would be anchored at a distance of 5.5nm from shore. 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. There are no structures in the project area, but fishing and other vessels are common in offshore waters both during the day and at night.

3.2 Biological Setting

3.2.1 Fauna in the Project Area

The Velella Concept test area is located in deep ocean waters. The epipelagic portion of the deep ocean ecosystem (the surface down to 200 m or 656 ft) is home to a variety of primary and secondary producers (phytoplankton and zooplankton), forage species and pelagic fishes (WPFMC 2009a).

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. Fishermen target bigeye and yellowfin tuna (*Thunnus obesus* and *T. albacares*), swordfish (*Xiphias gladius*), blue marlin (*Makaira mazara*), striped marlin (*Tetrapturus audax*), mahi mahi (*Coryphaena* spp.), and wahoo (*Acanthocybium solandri*) (WPFMC 2009a). All of these species are highly migratory and all are likely present in various life stages in the test area. Blue marlin migrate into waters off of west Hawaii and tend to remain within the peripheral eddy area (Seki et al., 2002)

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

Bottomfish fishing, another important commercial and recreational fishery, primarily occurs in State waters in this region.

The array is expected to behave as a fish aggregating device (FAD), as it would naturally attract pelagic fishes. During the 2011-2012 towed Velella project the array attracted small plankton-eating fish (manta rays and whale sharks) and larger fish including tuna, mahimahi and sharks (Sims and Key 2012). Rainbow runners (*Elegatis bipinnulata*), in the same family as *Seriola*, were commonly seen around the moving pen. Also during the 2011-2012 towed Velella trial, recreational, commercial and charter fishermen frequented the general area when the towed CuPod was within 12 miles from shore. Catch data are not available, but the previous observations by the Machias crew, divers, and an unpaid intern surveyor indicate that catches around the Velella compared favorably against catch rates around other FADs.

Although no submarine surveys were done in the project area off of Keauhou, a study of deep submarine canyon life off of Molokai (which can inform this analysis) found relatively high abundances of macro-invertebrates worms, tiny crustaceans, isopods and mollusks (clams and snail-like creatures) on the seafloor near submarine canyons. The study also found, however, that areas outside the canyons showed little of this material.[6] Rattail fish, eel-like fish and giant sixgill sharks were seen on transects off Molokai in waters from 1,000 to 3,000 ft deep. At intermediate depths, the team reported that the concentration of bottom fish species fell off due to an oxygen minimum zone (OMZ) which flows around the Hawaiian archipelago around those depths. The OMZ is a layer of sea water usually at subsurface with depleted oxygen concentrations. NMFS expects there to be a similar lack of bottomfish species in the project area, although some species of deep water fish and invertebrates are likely present.

At the depth at which the anchor would be placed, the sea bottom is likely to be devoid of habitat structuring benthos such as deep corals, sponges and macroalgae (Wiltse 2013). There is no habitat for commercially important bottomfish at these depths. Multi-beam data provided by C. Kelley, Hawaii Undersea Research Laboratory (HURL), show that the anchor would be established in an area of low topographic rugosity and at a depth that has a low likelihood of supporting precious corals (see Appendix E, Map E-4). The project location is not known to support precious corals (C. Kelley, HURL, pers. comm. to NMFS, Sept. 2013).

NMFS has proposed to list three Hawaiian coral species as threatened under the ESA (77 FR 73220, December 7, 2012). The proposed project would not be conducted in areas that contain coral reef resources. Transportation of the CuPod to and from shore would be done using 15,000 lb airbags which would ensure adequate clearance from the ocean bottom and minimize the risk of damage to the CuPod or environment. Small vessels used to transport crew and feed to the array would have no effect on corals, because the vessel operators would use existing channels to exit the harbor and would actively avoid running into corals.

[6] Grabowski and De Leo http://manoa.hawaii.edu/news/article.php?aId=4948; retrieved July 5, 2013.

3.2.2 Protected Species

A number of species that are protected under either the Endangered Species Act (ESA) and/or the Marine Mammal Protection Act (MMPA) occur in the project area year round, or seasonally. No critical habitat has been designated in the project action area; however, there is proposed critical habitat for monk seals that may be transited by the tender vessel and supply vessels using the designated harbors.

3.2.2.1 Sea turtles

Several species of sea turtles occur in Hawaiian waters and may be present in the action area. Threatened green turtles (*Chelonia mydas*) and endangered hawksbill turtles (*Eretmochelys imbricata*) occur in nearshore waters throughout the archipelago. Other species that have been caught outside of 50 nm around Hawaii that could be seen in the waters around the array (although it is unlikely) are endangered loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*), and olive ridley (*Lepidochelys olivacea*) turtles (Gilman et al., 2006; WCPFMC 2009a). Because these last three species are unlikely to be observed around the array, they will not be considered further.

A thorough review of the life history, status and trends, threats, and conservation efforts for sea turtles is available in section 5 of the January 30, 2012 Biological Opinion on the Hawaii-based shallow-set longline fishery (NMFS 2012). Information about Pacific sea turtles' range, abundance, status, and threats can be found 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

Migratory seabirds occurring in the project area include black-footed and Laysan albatrosses (*Phoebastria nigripes* and *P. immutabilis*); Christmas, Newell's, flesh-footed, wedge-tailed, and sooty shearwaters (*Puffinus nativitatis, P. newelli, P. carneipes, P. pacificus, and P. griseus*); masked, brown and red-footed boobies (*Sula dactylatra, S. leucogaster, S. sula*); and the Hawaiian petrel (*Pterodroma sandwichensis*). The endangered short-tailed albatross (*P. albatrus*) is considered a rare visitor to the main Hawaiian Islands and is not likely to be observed in the action area. More detailed information on seabirds and interactions with Hawaii-based pelagic fisheries can be found in the Pelagic FEP (WPFMC 2009c). During the 2011-2012 towed Velella project, seabirds were often seen in the project area and some landed on the CuPod and tender vessel, but no seabird was observed diving on the CuPod and no adverse impacts were observed from the operation of the CuPod.

3.2.2.3 Monk seals

Monk seals (*Monachus schauinslandi*) are found in the Northwest Hawaiian Islands, with many islands serving as reproductive sites. Monk seals also occur in waters around the main Hawaiian Islands (WPFMC 2009b) and have been increasing in recent years. According to NMFS,[7] monk seals have declined in the NWHI since monitoring began in 1995, but since 1981, there has been an increase in the number of monk seals in the main Hawaiian Islands. In 2010, not counting 2 small colonies at Necker and Nihoa Islands, the entire population was estimated at 1,060 seals: 153 individuals in the main Hawaiian Islands, and 907 individuals in the NWHI. The population in the NWHI has been declining annually due to low juvenile survival. Monk seal numbers in the MHI have increased, but seals that live around populated islands face threats to their recovery. Around the MHI, these threats include disturbance, fishery interactions (hooking, entanglement in fishing gear or marine debris); human interactions (including feeding and other harassment); diseases (leptospirosis and toxoplasmosis), and intentional killing.

According to NMFS, the Island of Hawaii had from 5-10 monk seals as of 2010. Monk seals are expected to utilize areas within the proposed critical habitat depth contour (500 m) for foraging, as well as certain coastal areas for pupping, nursing, and haul out. The project area is not within the 500m depth or areas important to seals for pupping.

More information on the life history of monk seals is found online in the stock assessment report http://www.nmfs.noaa.gov/pr/sars/

3.2.2.4 Other marine mammals

Several species of cetaceans are common in waters around the Hawaiian Islands, with some species more abundant on a seasonal basis. For example, the humpback whale population increases during the winter months (November to March) as they migrate to Hawaiian waters to breed. Humpback whales winter in Hawaii and tend to congregate in shallow waters (600 ft. deep or less) about five months of the year, although they are also found well offshore as well.

In total, at least 18 species of odontocetes and 5 species of baleen whales occur in waters around Hawaii (Barlow 2006, Baird, 2013).

[7] Protected Resources Division, NOAA Fisheries, Pacific Islands Regional Office, Hawaiian monk seal, http://www.fpir.noaa.gov/PRD/prd_hms_index.html, retrieved July 18, 2013.

The following cetaceans are classified as endangered under the Endangered Species Act (ESA) and have been observed in the Hawaiian Archipelago and may occur in action area. An asterisk (*) indicates the species was seen during the 2011-2012 towed Velella project.

- Blue whale (*Balaenoptera musculus*)
- False killer whale (*Pseudorca crassidens*)[8]*MHI insular DPS
- Fin whale (*B. physalus*)
- Humpback whale (*Megaptera novaeangliae*) *
- North Pacific Right whale *(Eubalaena japonica)*
- Sei whale (*B. borealis*)
- Sperm whale (*Physeter macrocephalus*)

Marine mammals that are protected under the MMPA, but not listed as threatened or endangered under the ESA, and that may occur in the action area, include the following:

- 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*)

[8] Whether the false killer whale observed was a member of the MHI insular false killer whale distinct population segment (DPS) has not been verified, however, the array is located within the core range of the DPS.

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

The geographic range of the MHI insular false killer whale includes the action area out to 140 km from shore (with a core area from 0-40 km or 0~21 nm).

Individuals and pods of Humpback whales are expected to be present in or around the action area in November and December of 2013 and January through March of 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.

The Island of Hawaii has been identified as a fishing community by the Western Pacific Fishery Management Council and therefore, residents of Hawaii Island 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). Fishermen fishing off of west Hawaii are likely to encounter the Velella array.

3.3.2 Activities by Others in the Action Area

The project area is well known for its fishing. The most common types of fishing in the project area are recreational and charter fishing, pelagic troll, palu-ahi fishing, and night jigging for aku (ika-shibi fishing).

Pelagic troll fishing: As summarized in 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. Up to six lines rigged with artificial lures may be trolled. Trollers typically fish at speeds between 8 and 10 knots. Trollers operate at an average of between 5 and 8 miles from shore but can troll beyond that.

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 and uses baited handlines to target large yellowfin tuna (Yuen 1979). It also catches tombo (albacore or *Thunnus alalunga*), bigeye tuna (*T. obesus)*, and hebi or shortbill spearfish (*Tetrapturus angustirostris*). A survey by Hamilton and Huffman (1997) found that the ika-shibi fishery generally engages in single night trips and fishing occurred between five and 6.5 miles from shore. The 1,000-ftm depth contour off of west Hawaii is a key area for the fishery (D. Itano, NMFS, pers. comm.). Ika-shibi fishermen use three to four weighted handlines attached to a nylon mainline with circle hooks baited with squid or opelu (mackerel scad). Squid, baitfish and tuna are attracted to the

area by using a low wattage light source placed either above or in the water and by chumming the surface with chopped squid and/or whole anchovies or other baitfish. The fishery is seasonal and runs from May to October (or later) with a peak in mid-summer (Glazier 2005). In 1980, the fishery included at least 230 boats (Yuen, 1979); however activity in the fishery has declined considerably since then. A 2004 study estimated there were 130 active vessels in Hawaii, with many of those residing along Hawaii's west and southeast coast (Glazier 2005). The 2003 Hawaii tuna catch (for all islands) by the fishery was 194,909 lb yellowfin; 54,840 lb albacore and 16,796 lb bigeye tuna; reportedly made by 130 State Commercial Marine License holders making 2,307 trips (Glazier 2005).

Palu-ahi fishing is the modern adaptation of pre-contact 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 devices (FADs). FADs VV and F are on either side of the proposed location of the Velella array (see Figure 2).

Other Commercial and Recreational Fishing

Big game fishing off of west Hawaii is an important commercial and recreational social activity. Deep waters are relatively close to shore and in the lee of the mountains which helps calm the waters together with foraging and spawning areas for pelagic fishes result in world class fishing conditions. The Hawaii International Billfish Tournament has been held annually in July or August for over 53 years. Seki et al., (2002) reported on fishing conditions at the 2002 tournament and compared catches with previous years. The project would be located in the area where people fish for billfish. The project would likely be deployed after the 2013 tournament has ended, and would likely be completed before the 2014 tournament. Based on a 2012 survey, there were 197 active charter vessels both moored and trailer-based in Hawaii (C. Beavers, Pacific Islands Fishery Research Center (PIFSC) NMFS, pers. comm. to D. Itano, NMFS, 2013).

An existing longline exclusion zone prohibits commercial longline fishing year-round around the MHI (50 CFR 665.806(c)). The exclusion zone was created in 1992 to reduce conflict between longline fisheries and pelagic troll/handline fisheries (57 FR 7661, March 2, 1992), and was modified in 2012 by the False Killer Whale Take Reduction Plan regulations (77 FR 71260, November 29, 2012). The MHI Longline Fishing Prohibited Area encompasses the action area, and therefore all longline fishing is prohibited within the action area.

There is no commercial bottomfish fishery within the action area.

4.0 Potential Impacts

4.1 Potential Effects on Physical Features

4.1.1 Potential impacts to water quality

Based on information collected from the applicant and from net pen operations in State waters (Hukilau Farms 2009, Kona Blue Water Farms 2009) as well as from modeling based on the site specific characteristics of the current proposed project (Rensel and Kiefer 2013, Appendix F), there is little likelihood that the proposed activity would degrade oceanic water quality. The initial low stocking density of fish that would be in the CuPod, near constant flushing by water moving though the pen, carefully applied feed, and the use of mechanical or power washing of the CuPod, would all help to dilute metabolites and prevent impacts to the water including the water column below the CuPod. Salt water power-washing of the CuPod would only result in the return of accumulated biological matter to the water, without alteration by human or industrial process.

Feed would be applied at levels that are below satiation, so little feed is expected to enter the water. Small amounts of feed and fish metabolites that enter the water are expected to be quickly diluted by water flushing the cage on a nearly constant basis. During the 2011-2012 towed Velella project, which was subject to less thorough flushing because the CuPod and tender vessel were entrained in the gyres for much of time, no degradation of water quality was detected.

Even at the harvest size (4 lb), the amount of effluent is not expected to be large, and would be expected to be quickly diluted.

To further evaluate the potential effects of the proposed operation on water quality, NMFS considered a modeling study by a team of scientists, biologists, computer scientists and oceanographers who applied a modeling program to the proposed activity (Rensel and Kiefer 2013). The model is called “AquaModel” and inputs included the characteristics of the specific location and gear that would be used in the proposed project (see Appendix F).

The model used metabolic inputs developed for moi (*Polydactilus sexfilis*). Moi, a native fish, is harvested at a smaller size than *S. rivoliana*, so the modelers increased the number of moi that were used in the simulation in order to compensate for their smaller size at harvest. Rensel and Kiefer’s previous laboratory research with moi indicated that moi are very active and have a high rate of respiration (oxygen use). This means that the use of moi in order to model effluents from the CuPod would be conservative in terms of results. By applying moi physiological parameters to the inputs in the model, the modeled outcomes would be higher than would be likely to occur in reality.

The model inputs included depth, currents, composition of feed, amount of feed, fish biomass, horizontal diffusion rate, settling rate of fish fecal and waste products, and the type of mooring (single point fixed), to evaluate potential impacts to water quality.

The results of the modeling found the following:

1. No change in water quality vertical profiles at the cage site for dissolved oxygen, phytoplankton and zooplankton biomass.
2. No nearby effect on dissolved oxygen.
3. A very small increase in dissolved inorganic nitrogen at the cage site. The increase at the cage was presented as a worst-case estimate when currents were weak. Under those conditions there would be an increase in dissolved nitrogen, with an average increase of only 0.003 microMoles greater than the ambient concentration of 0.12 microMoles. The low amount of dissolved nitrogen in the water is to be expected for the oligotrophic (nutrient poor) waters of the project area. Under the model, when currents returned to normal, all traces of the increased nitrogen disappeared.
4. Plankton did not respond to the minimal change in dissolved nitrogen and the authors explain that even a very large source of dissolved nitrogen at this location would not change phytoplankton and zooplankton populations because the site is subject to strong currents that tend to set in either the northerly or southerly directions for extended periods of time.

In addition to dissolved inorganic nitrogen, the fate of total organic carbon as the primary waste product was also modeled. Organic containing particles from feed and feces would enter the environment. The model showed that such particles could spread into the ocean but would be in amounts so small they would not be measurable either directly (as an increase in sediments because of the great depth), or by using advanced tracing techniques such as stable isotope assessments. The impacts of organic carbon on water quality would be very limited because:

1. Such carbon containing waste products would be ingested by pelagic grazers including fish and crustaceans and the particles are macroscopic and useful for grazers to ingest.
2. Fish fecal and waste feed particles would settle relatively slowly (1 and 3 cm/s in the model) so it would take time for such particles to reach the bottom. In the model, the average current was set at 24 cm/s (0.5 kt or nm per hour), which is considered strong in comparison to other net pen operations. The average time for fish feces to reach the sediments would be 50.8 hours. During this time, the particles would be consumed by zooplankton and bacteria would also respire (use) the organic carbon. Very little of the waste products would reach the bottom or not be used in the pelagic or benthic food web.

The researchers found that the model validated their initial theory that the culture of 2,000 fish in a small cage in the open ocean over 6,000 ft of depth would not have a measurable biological effect on the environment. They concluded that there would be no risks to water column or benthic ecology functions in the project area from the operation of the fish cage as described in the Kampachi Farms, LLC proposal (Rensel and Kiefer 2013).

The proposed project does not fall within the requirements for a National Pollutant Discharge Elimination System (NPDES) program. The effluents from the culture of 2,000 warm water fish (or approximately 8,000 lb) would be well below the limits for concentrated aquatic animal production above which an NPDES Permit would be needed (e.g., greater than 100,000 lb). See 40 CFR 451.

The mesh of the CuPod is not expected to adversely affect water quality. The metal mesh is made of UR 30™, 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 mesh is made up 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. The product is strong and also resistant to bio-fouling. The material is not expected to flake off into the water during manual or power washing.

The applicant is not expected to use any chemicals during the project including cleaners, feed additives, paints, solvents, or medications including antibiotics. Fueling would be done either onshore or in harbor. Fish health is expected to remain high and application of chemical treatments is not being proposed. The applicant would use sea water to pressure wash the CuPod, or manual scrubbing to clean the CuPod and the vessel. Finally, no chemical additives would be used in the feed.

4.1.2 Potential impacts to air quality

Any impact the project may have on air quality is expected to be minimal. The limited use of a small generator several times a day to feed the fish and at other times to run a power washer would not result in large emissions. The emissions associated with a limited number of vessel trips taken to service the array are not expected to degrade ambient air quality.

4.1.3 Potential impacts on noise

A small generator (25 horsepower) would run for less than an hour a day to feed the fish periodically. The generator would also be used to power wash the vessel and CuPod on a weekly basis. The limited amount of noise is expected to be dampened by winds and ocean noises and is not expected to carry the full distance to shore (at its closest approach, the array is expected to be at least 3.75 nm from shore). The limited amount of noise from the operation would be well within ambient noise levels and would have a negligible effect on protected species.

4.1.4 Potential impacts to viewplane

Under the status quo, ships are visible in the project area both at day and at night. Under the proposed action, the CuPod and vessel would be required to comply with applicable Coast Guard lighting requirements (72 COLREGS, International Regulations for the Prevention of Collisions at Sea, as implemented by the International Navigational Rules Act, 33 USC 1601 et.seq., and 33 CFR 80-90) . By the time lights from the CuPod and vessel reached shore they would be diminished in brightness. The navigational lights from the array would not be brighter than other fishing vessels in the project area. Because the array would not be closer than 3.75 nm from shore, NMFS does not expect that the lights on the array would be very intense if seen from shore.

The CuPod would be submerged for most of the trial and would generally not be visible from shore. The feed vessel is also relatively small and would not alter views from shore. The feed vessel would, however, be visible to other fishing vessels when they approach the array at sea

both by day and by night. Lighting in accordance with Coast Guard requirements is necessary in order to minimize the risk of collision at sea.

The vessel, CuPod and mooring line would be removed at the end of the trial; therefore, any impacts to viewplanes would be temporary.

4.2 Potential Direct and Indirect Impacts to Biological Resources

4.2.1 Potential impacts to fauna and habitat

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 listed on navigation charts as consisting of lava and sand; and has been identified as an area with low rugosity which indicates the absence of relief that would indicate habitat for deep corals (C. Kelley, HURL, pers. comm. to NMFS, 2013). Stony (Scleractinian) corals are not found in the project area. Precious corals are also not found at the depths within the project area (C. Kelley, HURL, pers. comm. to NMFS, 2013). All of the information in NMFS' records indicates that the seabed is largely devoid of special structures or dense aggregations of marine fauna.

Over the course of the project, the 360 ft-long chain could contact the bottom over an area up to 9 acres (see configuration, Figure 3). Once the project is over, the mooring line would be retrieved, but the anchor and chain would be left in place consistent with ACOE permitting terms and conditions. The chain would no longer scrape the bottom once the mooring line is removed. The presence of the chain would result in some increase in iron into the bottom habitat. The impact of this additional iron is expected to be negligible in this cold, deep, oxygen-limited bottom habitat. Although the deployment of the mooring anchor and chain is expected to crush any sessile organisms that it lands on, there are no corals or protected species, or essential fish habitat (EFH) on the ocean floor in the action area.

There is EFH in the water column in the project area, for adults, larvae and eggs of certain species. However, the project is not expected to adversely affect the water column because the project would not have a large adverse effect on water quality (see Section 4.1.1, above).

Vessels that would be used to transport the CuPod, fingerlings, and harvested fish, and conduct weekly maintenance at the array, would be operated exclusively in maintained channels and in open ocean waters in accordance with inland navigation rules and the 72 COLREGS. Operations are not anticipated in the sensitive coral reef areas because the Applicant would monitor the location of the gear, and could launch a response and retrieval operation should any of the gear become detached. To avoid damage to coral reef ecosystems and essential fish habitat, anchoring would be prohibited in all areas except soft sediment and hard substrate.

<u>Potential for fish escapes</u>: If fish were to escape from the CuPod, there is the potential that they would breed with wild fish. The risk of escape is deemed low because the mesh netting is strong and the entry hatch would have a mesh net that would be zipped behind a diver entering and

exiting the CuPod. In addition, the fish would be raised in an offshore deep-ocean environment where wild stocks are not found.

Kampachi Farms reported that 13 fish escaped from the CuPod during the 2011-2012 towed Velella project (Key 2013). These fish remained in the vicinity of the CuPod and were recaptured by divers using a pole spear (Sims 2013d). Based on previous experience, should any captive fish to escape, NMFS has no reason to believe that they would leave the immediate area of the CuPod.

To prevent escapes during maintenance operations, the zippered mesh panel would only be installed on the bottom door, and would be used by divers to partially enter the cage (inserting an arm, or part of the upper torso) to collect fish samples or mortalities (Sims 2013d). The top entry would not have a zippered mesh panel, but divers would only enter through this hatch when it is out of the water. According to the Applicant, divers would not completely enter the cage while it is submerged, in the interests both of safety, and of stock containment.

Potential for genetic impacts of escaped fish: NMFS considered the potential impact of an escape of all 2,000 cultured fish on the genetic fitness of the wild population. Generally, potential impacts of escapes include the introduction of maladaptive genes and reduced fitness, competition for food and space, and predation on native stocks. In preparing this EA, NMFS consulted with Dr. Michael Rust, the Science Coordinator with the Office of Aquaculture, NOAA Fisheries, on the potential for genetic impacts of escaped fish under the proposed action. The "Omega model" was designed by NOAA and ICF International to measure environmental risks of escape of marine aquaculture fish to their wild counterparts. The Omega model has been used experimentally to compare differences in total abundance trends of escapees and wild fish, as well as to measure the impact to wild populations. Results from the Omega modeling tests in specific case studies, including sablefish, demonstrate that there are several conditions that would be present for measurable impacts to wild fish stocks to occur. These include a constant escape of cultured fish over decades at a rate which would represent a significant percentage of the wild population, and cultured fish that were selected genetically. The OMEGA model is most effective predicting impacts where total landings are in the millions of pounds per year, over many years and requires an estimation of wild population abundance. While neither of these conditions exists for *Seriola* in Hawaii, experience using this model on other species, where data are available, indicates that the maximum number of potential escapes for the proposed project, 2,000, is too small to register any impact on fitness of the wild population (Rust 2013).

NMFS believes that the conditions that could lead to risk of fitness loss in wild fish stocks are not present with this Velella array test project. Even assuming the escape of all 2,000 fish into the environment over the short one-year duration of the project, this number represents a negligible fraction of overall coral reef ecosystem biomass. In addition, because all cultured stock are sourced from the wild population, the genetic difference between wild fish and cultured fish, if any, is so small as to be insignificant.

For these reasons, NMFS concludes that, under a catastrophic scenario, the potential escape of all 2,000 cultured fish would not have an impact on the genetic structure of the wild fish stocks and would not reduce the health or fitness of the wild stock.

Potential for competition for forage: The low likelihood that a large number of any fish that escaped would survive means that competition with any wild fish for forage is unlikely.

Potential for disease or parasite transmission: The potential for the fish raised in the CuPod to become diseased is low, because the fish would be maintained at a relatively low density and any diseased fish would be removed immediately. Bio-magnification of diseases in the CuPod was not observed during the 2011-2012 towed Velella project and has not been observed in aquaculture in net pens established in coastal waters (Hukilau Farms 2009; Kona Blue Water Farms 2009) because the fish in the nets and CuPod are stocked at relatively low densities, and any fish that do die are removed promptly. The CuPod would be subject to near constant flushing of water which is expected to maintain high water quality conditions in the CuPod.

Results from the 2011-2012 towed Velella project showed that the fish skin ectoparasite (fluke) (*Neobenedenia* sp) infestation levels remained low throughout the grow-out cycle, usually below 5 flukes per fish, which is lower than natural rates of infestation (Sims and Key 2012). Therefore, CuPod fish are not expected to host large populations of parasites that could infect wild fishes.

Potential for drugs and chemicals to enter the water: The proposed permit does not authorize the use of any antibiotic, medication, or chemical, unless otherwise authorized by a competent federal or state agency. It is not anticipated that treatments would be necessary for the duration of the trial. No chemicals were applied to the CuPod or fish during the 2011-2012 towed Velella project.

4.2.2 Potential Impacts to Protected Species

Potential Impacts to Seabirds: The proposed action is not expected to harm seabirds. The CuPod would be submerged deeper than 25 ft most of the time. A portion of the CuPod could be raised above the surface during power washing; however, seabirds are not expected to approach the CuPod during power washing. The CuPod does not have hooked or barbed appendages that could potentially ensnare a diving seabird and the small 1-inch mesh is likely too small to create an entanglement hazard. The black plastic and brass mesh of the CuPod are expected to provide a visual barrier between fish and the surface of the water that is expected to reduce the attractiveness of the fish in the CuPod to seabirds. During the 2011-2012 towed Velella project, no migratory seabirds were injured, although some seabirds came to rest on the fishing vessel on occasion. No seabirds were observed diving on the CuPod.

Night lighting would consist of minimal lighting required for navigational and safety purposes. These small lights are not expected to disorient seabirds or result in seabirds colliding with the vessel. The vessel does not have rigging that could present a collision hazard. The navigational lighting is expected to allow seabirds to see and avoid the feed vessel.

The proposed project would likely result in some fishing around the array. In the 2011-2012 towed Velella project, no seabird interaction with fishermen fishing around the vessel was observed. Although seabirds may be hooked by troll fishermen, NMFS has no reports of an

endangered seabird being hooked by any troll fishermen. Juvenile boobies are the seabird most likely to be hooked by troll fishermen. Given the very small number of seabirds of that could be expected to be hooked by this method of fishing, the relatively low level of troll fishing effort in the area, and because no seabird was reported to have been hooked by fishermen fishing around the same type of gear in the 2011-2012 towed Velella project, hooking of a listed seabird in considered so rare as to be unlikely.

Potential impacts to sea turtles, monk seals, and other marine mammals: Potential impacts to sea turtles, monk seals, and other marine mammals are discussed under several categories of risks. These include entanglement in gear, collisions with vessels, noise and disturbance, impacts of wastes or spills, impacts of fishing by others around the array, and competition for forage.

Entanglement: The single-point mooring line and tether are not expected to entangle cetaceans, monk seals, or sea turtles because lines would be made of braided material which, given the force of currents, are expected to be under constant tension and free of loops. The small size and relatively smooth surfaces of the CuPod and rigid cage mesh (1-inch) are expected to prevent any marine species from becoming entangled with the CuPod.

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).

Heavy swells would create some motion in the feed vessel, but the predominant factor for loading on the mooring would be the current drag on the cage. During periods where the current is changing direction, some tension would be maintained on the main mooring line due to wind on the feed vessel, as well as the weight of the nylon and buoyancy of the lower polypropylene section (Sims 2013d). This would prevent loops from forming during heavy swells or during shifts in the current.

Should Kampachi Farms observe any marine mammal or sea turtle become entangled in the rope or other gear, or interact with any portion of the gear, the company would be required to contact NMFS for further instruction on how to respond, as necessary.

Collisions with vessels and the array: The Velella array would be located at the surface, within 1.75 nm of the mooring. The CuPod and feed vessel would be entrained by currents and, at the same time restrained by the mooring. The mooring line and tether are expected to be under tension most of the time. When the currents change, the lines are expected to remain fairly taut even as the currents shift because of the negative buoyancy of the upper 12,000 ft of rope. 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) means that it is unlikely that marine mammals or sea turtles would collide with the moored gear.

It is highly unlikely that a whale or other protected marine animal would come into contact with the mooring line. The mooring design is designed to minimize slack and prevent loops from forming. Even at depth, and at night when there is no light, the taut mooring line is expected to pass harmlessly along marine mammals or monk seals if they were to encounter it.

Collisions with support vessels: 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 (belonging to both MHI insular and Hawaii pelagic stocks) are known to ride the bow or stern wake of vessels and may come into proximity of propellers (Robin Baird, pers. comm., cited in Oleson et al. 2010). A propeller strike from a small support vessel or by motors on the feed vessel 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 a false killer whale or other cetacean, monk seal or sea turtle. No ship-strike related injuries or deaths of false killer whales, or humpback whales have been documented in Hawaiian waters, but Baird (2009) reported a fresh head wound on one false killer whale from the insular population photographed off Oahu in September 2009 that may have been caused by a propeller strike. Monk seals have been observed with propeller wounds, and there have been reports of sea turtles killed or injured by propellers in waters around the State.

NMFS estimates an average of 577,872 total annual trips are taken by all marine vessels statewide, including fishing and non-fishing vessels (NMFS Biological Opinion for the Main Hawaiian Islands Deep 7 bottomfish fishery, NMFS 2008). Given the low density of MHI insular false killer whales and monk seals, and their speed and agility in the water, collision with any type of marine vessel is an extremely rare event. Similarly, humpback whales are also highly visible to small craft mariners.

The support vessels have a maximum operating speed of 24 kt, however in the open ocean conditions around the array, the support vessels are likely to be operated at speeds of less than 15 kt (Sims 2013b) which is slow enough to prevent collisions with marine wildlife and to prevent substantial injury should a collision occur. The support craft operator and other staff would consistently watch out for sea turtles and marine mammals in the water and at these low speeds are unlikely to collide with protected species.

Interactions with whales and dolphins are expected to be low because individuals and pods are expected to pass by the array. If whales or dolphins were to be attracted to pelagic fish schooling under the feed vessel and CuPod, it is expected they could chase prey without colliding with either the vessel or CuPod or the mooring line. When there is activity at the array, such as when the CuPod is being washed, cetaceans and monk seals are expected to avoid the array because of the increased human activity.

Noise and Disturbance: The occasional use of a generator to feed the fish or the use of a generator and pressurized air raise portions of the CuPod for cleaning or in-water activities by divers (cleaning, or working in the CuPod or around the vessel) could disturb monk seals, sea turtles, and other marine mammals if they are in the immediate vicinity. The noise from the power washer is not expected to cause damage to marine species' hearing. The noise level would be similar to that of fishing vessel motors which are not known to cause damage to marine species. Noise emitted from supply vessels could also disturb listed species and marine mammals. Noise disturbance could result in an animal experiencing a temporary increase in stress due to a startle reaction. To prevent such interactions, Kampachi Farms would be on the lookout for marine mammals and sea turtles in the vicinity and wait until any animals are clear of

the array before starting up power washing equipment or raising and lowering the CuPod. Because preventative measures would be adopted, adverse effects to monk seals, sea turtles and other marine mammals are expected to be extremely rare, and any effects minimal.

Wastes and spills: Fish would be fed in a manner that minimizes the delivery of excess feed to the stock, therefore, there should be little uneaten feed released to the environment. Because of the small stocking density, minimal release and anticipated rapid dilution of particulates and fish metabolites, NMFS anticipates that any release would have insignificant effects on the environment.

Federal laws and regulations strictly regulate the discharge of oil, garbage, hazardous substances, waste, plastics, and hazardous substances into ocean waters, including the Clean Water Act (CWA), Oil Pollution Act of 1990 (OPA), Rivers and Harbors Act of 1899, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Act to Prevention Pollution from Ships, MARPOL 1973/1978, and the Marine Protection, Research and Sanctuaries Act of 1972. Violations of these laws may result in severe civil penalties, criminal fines, and imprisonment.

Kampachi Farms would be expected to follow all applicable environmental laws and regulations to avoid releasing wastes, garbage, oil, plastics, or other hazardous substances into the marine environment. If there were to be an accidental spill, such an event is expected to be infrequent, small, and quickly removed or dissipated. Given the extremely small size of the operation and support vessels, any discharge not immediately recovered would likely be diluted or dispersed. Kampachi Farms may carry aboard the feed vessel, supplies that would allow staff to clean up any spills that might occur.

Based on this information, NMFS expects that the risk of discharge of vessel wastes from the proposed Velella array would be minimal.

Fishing by others around the array: The Endangered Species Act and Marine Mammal Protection Act prohibit any actions that take protected species, and provide for criminal and civil penalties when violations occur. Based on a previous 2011-2012 towed Velella project, fishermen are likely to fish around the array. These fishermen are likely to already be fishing at sea, as the array would be located between 3.75 and 7 nm offshore. . Although fishermen frequently fished around the CuPod during the 2011-2012 towed Velella project, no interactions between fishermen and protected species were reported. Fishermen are known to fish in the action area regardless of the presence of the Velella array. Fishermen that fished around the array during the 2011-2012 towed Velella project were not observed to interact with protected species. Monk seal interactions have not been reported around nearby FADs. Accordingly, the relatively small increase in number of vessels, if any, is not expected to result in an increase in interactions between protected species and fishermen.

Direct and indirect competition for forage: The proposed moored Velella project would not involve harvesting of any wild fish so there would be no competition with any marine species for forage species. Kampachi Farms staff would remove any dead fish from the array and would dispose of dead fish ashore. Near constant flushing by water flowing through the CuPod is

expected to reduce diseases and promote fish health within the CuPod, and NMFS does not anticipate any transfer of disease to the wild fish. For these reasons, the operation is not expected to result in adverse effects to fish outside the CuPod that may be prey for marine mammals or sea turtles.

Potential impacts to proposed monk seal critical habitat: Revisions to critical habitat for the Hawaiian monk seal (76 FR 32026; June 2, 2011) have been proposed. Because the array would be operated in waters far deeper than those waters (500m) currently proposed for monk seal critical habitat, the operation of the array is not expected to adversely affect proposed critical habitat. Although support vessels would pass through marine areas around the harbor that have been proposed for monk seal critical habitat, the vessels are expected to be operated at safe speed and in accordance with the inland navigation rules and COLREGS 72 requirements, and are not expected to impair the quality of the marine environment. Continued operation at a safe speed for the prevailing circumstances, with due regard for traffic density and the presence of navigational hazards, and maintenance at all times of a proper look-out by sight and hearing, should allow for the early identification and avoidance of marine species in the path of vessels. NMFS does not expect that the operation of supply vessels would adversely affect protected species or areas being proposed as monk seal critical habitat.

4.3 Potential Direct and Indirect Socioeconomic Impacts

Potential Impacts to Other Fishermen and Ocean Users: The Velella array may be expected to act as a fish aggregating device (FAD) and attract wild baitfish and tuna. Floating objects tend to aggregate pelagic fishes, and the small navigation lighting on the feed vessel and buoy may also attract baitfish and tuna. During the 2011-2012 towed Velella project, yellowfin tuna, mahimahi and sharks aggregated under the cage. The array became popular with local fishermen with over 6 small boats around the array on Veterans Day in 2011 (Sims and Key 2012). Fishermen caught tuna and other pelagic species when fishing around the towed CuPod. At its closest point on its swing arc, the Velella array could be approximately 1 nm from State FAD VV, and 4 nm from FAD F. Acoustic tagging and tracking studies in Hawaii indicate that yellowfin tuna are strongly attracted to FADs and can orient toward and move between adjacent FADs up to approximately 12 miles (20 km) apart, but most of the time FADs act as single aggregation points (Holland et al. 1990, Dagorn et al. 2007, Itano and Holland 2000).

With respect to safety and boat operations, the risk of gear entanglements or collisions with the feed vessel, submerged pod, mooring line, or tethers is no greater than the normal risk associated with multiple vessels fishing around a single FAD. The array's position would be noted, as appropriate, through a U.S. Coast Guard notice to mariners.

The array would be of such a small size, that it is not expected to disrupt the migration or catch rates of blue marlin, tuna, ono, mahimahi, or other pelagic species in the general area.

Under natural conditions, sharks recruit to floating objects, and several species were observed in the vicinity of the previous 2011-2012 towed Velella project. Under the proposed action, standard management practice by the applicant would be to remove any dead fish from the pens on a regular and timely basis; this is expected to reduce the number of sharks attracted to the array. Because sharks may aggregate at the array, there could be a slight increase in fishermen-

shark interactions. However, because the CuPod would not provide a source of sustenance for sharks, any attraction to the device is expected to be temporary. In addition, fishermen may hook sharks at any time when they are fishing, even while troll fishing or at other FADs. Although some sharks could be caught by fishermen fishing around the array, none of the sharks that are likely to be at the array are threatened or endangered, and, therefore, the proposed activity would have minimal impact on shark populations.

Over the course of 2011-2012 towed Velella project, divers encountered a number of sharks, including 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 or Galapagos sharks. Sharks tended to travel on and did not remain with the array. There were no reports of sharks attacking any protected species during the course of the towed project. Kampachi Farms staff do not use shark bang sticks, but they do carry shark sticks that can repel a shark that gets too close. Kampachi Farms staff would maintain a lookout for aggressive sharks and leave the water, if necessary. Safety measures that include the use of buddies during in-water work are also expected to promote worker safety, while reducing the need for lethal measures to be taken.

At the end of this project, after all of the fish have been harvested, the CuPod would be towed back to shore. The CuPod would be cleaned before it would be towed back to shore. Because the CuPod would be empty, and cleaned prior to towing, NMFS does not anticipate that the CuPod would draw sharks nearshore. During the 2011-2012 towed Velella project, the returning empty CuPod was not followed by sharks. Because the CuPod would be empty and cleaned, and because sharks were not observed to follow the CuPod at the end of a previous trial with the same gear, there would no increase in shark threats connected to returning the CuPod and feed vessel to shore during or after the project.

Cultural or other use of materials from the sea (such as seaweed, sponges, or other marine species) is not expected to be affected by the project. Any accidental spills or discharges, or any impacts to water quality from fish feed, is expected to be minimal and would dissipate in the ocean as the array would be located beyond 3nm from shore.

<u>Potential impacts to community growth</u>: The proposed permit would have minimal impacts on community growth because of the small size and limited duration of the project. A limited amount of work would be available; and NMFS estimates that there would be a minimal number of jobs associated with the project and that the work could be done by people who are either from the Kona community or a different community of Hawaii.

<u>Potential impacts to the local economy:</u> An estimated 8,000 lb of fish would be harvested at the end of the project. Harvests are expected to take place in batches. Kampachi Farms would sell the harvested fish as Hawaiian Kampachi through the company's existing marketing and distribution channels. NMFS expects most of the fish would be sold locally, as was done after the 2011-2012 towed Velella project; some portion of the harvest may go to the U.S. mainland or abroad.

The sale of fish harvested from the project would not compete with other fish sales because this species is not currently harvested or marketed in Hawaii other than as Keahole Point Fish, and the fish would be sold using that company's markets. The small size of the production would not result in industry consolidation or overproduction. The sale of the cultured stock is not expected to result in an increased fishing pressure on wild fish stocks, because wild kahala stocks are considered unpalatable and commercially non-viable because they are known to be ciguatoxic and may contain large parasitic worms.

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 project is proposed to operate for a limited duration and disproportionately large and adverse environmental or health effects on members of minority or low income populations are not expected. The project is quite limited in scope (producing only 8,000 lb of product over the term of the permit) and would occur in the ocean waters between 3.75 to 7.5 nm from shore. The action is not expected to cause adverse effects to fish, vegetation, wildlife, or coastal areas that may be used for subsistence fishing and gathering.

4.5 Potential Impacts to Historical, Archaeological or Cultural Resources

The proposed action would not take place in an area known to support significant cultural resources, historic properties or archaeological resources, as none are known to exist in the Velella array's area of operation. The mooring would be established at around 5.5 nm offshore and the array would be located within 1.75 nm of the point of mooring. The State of Hawaii Historic Preservation Division, Kona, informed NMFS that there are no written reports or studies that would indicate the presence of native Hawaiian traditional fishing grounds (known as "koa") in the project area, nor were there any features that could create koa in the project area (Vitusek, 2013).

Kaloko-Honokohau National Historical Park (see map, Appendix E) is adjacent to the Honokohau harbor entrance and contains several sites of cultural significance, including native fishponds (e.g., Kaloko Fishpond)[9], kahua (house site platforms), ki'i pohaku (petroglyphs), holua (stone slide), and heiau (religious site).[10] 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.[11] Stocking, harvesting, and maintenance would involve a small number of trips by small support vessels moving out of and back into well-used harbors. Vessel traffic due to the project, and the use of the harbors, would make a minimal increase to ongoing levels.

4.6 Cumulative Impacts

Cumulative effects result from the incremental impact of the proposed action in addition to past, present, and reasonably foreseeable future actions. The proposed action is a small scale test project that would have minimal impacts to air or water quality, noise, marine species, the ecosystem, or other uses in the area. The gear to be used is designed to prevent breakage and/or loss of the gear and includes buoys with GPS transponders which would allow the applicant to detect separations and recover the gear were it to separate from the mooring. The design of the moored array is expected to prevent decoupling and allow recovery should a decoupling occur and this would prevent adverse impacts from occurring off site. The array and mooring line would be removed from the area at the end of the trial, so any effects would be temporary.

Fishermen would be able to fish around the array, so the impacts of the Velella project on other activities in the same area is expected to be negligible. Although the array is expected to act as a FAD and aggregate fish, given the small scope of the project, it is not expected to change migratory patterns in pelagic fishes or reduce the effectiveness of other FADs accumulating fish.

The project is not expected to impact catch in managed fisheries or change the manner in which the various fisheries are conducted. The existence of the Velella array is not expected to alter the current rates of protected species interaction that existing fisheries in the action area may have, including pelagic troll, palu-ahi fishing, and night jigging. The Hawaii longline fisheries are excluded from the action area due to the MHI Longline Fishing Prohibited Area.

NMFS is unaware of any other fish culture operations in the offshore action area currently in operation, and there are no pending applications for future culture operations.

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 and coordination with others.

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

The gear used in the project would be cleaned as-needed, but no less than weekly, to reduce bio-fouling. The gear would be cleaned prior to returning to port. As the gear would be maintained in as clean a condition as possible, and because the project is in waters relatively near to shore, it is unlikely that a non-indigenous species would be introduced to Hawaii or spread by the project.

The proposed activity would take place in an open ocean environment that is dynamic and subject to the long-term impacts of global climate change. Not all of these impacts are fully understood. 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); 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 each of the 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.

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 be expressed 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 can be found in NMFS 2012 Biological Opinion for the continued operation of the Hawaii-based Shallow-set Longline Swordfish Fishery. 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 during the time span of the project.

The proposed project and accompanying vessel activity is not expected to result in substantial changes in greenhouse gas emissions.

4.7 Effects on Administration and Enforcement

The SCREFP and requirement for reporting are all enforceable in accordance with the provisions of the MSFCMA. Failure to comply with requirements for reporting interactions with protected

species including marine mammal injuries are enforceable under the MMPA and MSFCMA. Failure of the permit holder to comply with requirements of the permit and logbook requirements may result in sanctions and possible revocation of the permit.

There would be a nominal administrative burden to NMFS to issue the permit and collect and process the information provided on log sheets because the fish are expected to be harvested only on approximately 3 separate days, there are not expected to be marine mammal or other protected species injuries to report, and because the permit is not a lengthy document.

The project is of a small size and limited duration and would be located in an area that is approximately 5.5 to 7 nm from shore. Due to the specific and limited nature of the project, substantial law enforcement resources are not expected to be needed.

Table 1. Summary of potential impacts of the proposed SCREFP by alternative.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP to allow the harvest of *Seriola rivoliana* using an anchored feed vessel and CuPod.
Physical environment:		
Water quality:	Water quality is high in the project area. Kampachi fish would not be raised in the offshore area under a SCREFP.	Negligible impact. The low stocking density, monitored application of feed, and near constant water movement through the CuPod are expected to minimize adverse impacts to water quality by diluting any metabolites quickly. Cleaning of the pod and feed vessel would be through manual scrubbing and pressure washing on a rotating basis which together with the antifouling properties of the mesh material is expected to minimize buildup of fouling organisms. No chemicals would be used to clean the vessel. A modeling program applied to the specific site conditions found no risk to water column or benthic ecology functions. The composition of the brass cage material is resistant to biofouling and leaching.
Air quality:	Air quality is high. The area is a popular sportfishing 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 and at other times to run a power washer would not result in large emissions.
Noise:	Current sources of noise from this area would be fishing vessels and other maritime vessels. Noise would remain at 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. The generator would also be used to power wash the vessel and CuPod on a weekly basis. The noise is not likely to carry to shore and would be dampened by water and wind.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP to allow the harvest of *Seriola rivoliana* using an anchored feed vessel and CuPod.
Viewplane:	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.	Negligible impact. To ensure safety of life at sea and prevent the risk of collision, the CuPod and support vessel would operate with required navigational lights. Although visible from shore, ship lighting intensity is expected to attenuate over distances. The CuPod would be submerged for most of the trial. Both the feed vessel and CuPod are quite small and would not be highly visible from shore. They would be visible both by 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. An anchor and chain would not be deployed in association with the SCREFP under the no-action alternative, so deep habitats would be undisturbed.	Negligible impact. The anchor is not expected to result in damage to special benthic areas because the mooring would not be placed in an area that has been determined to support special features. During the one year trial, the 360-foot-long chain riser could impact up to 9 acres of bottom habitat as the chain drags on the bottom. No essential fish habitat is located on the bottom at the depth at which the anchor would be set. No adverse affects would occur when the chain and anchor are left in place and the rest of the structures (mooring line, CuPod, and feed vessel) are removed.
Biological environment:		
Target species:	*Seriola rivoliana* is a native finfish found in waters of Hawaii and throughout the tropics. The species is not generally retained because it is considered unpalatable, and often contains	Negligible impact. The proposed Velella operation would not have an adverse affect on native kampachi. First, the CuPod is robust and would be located in deep (6000 ft) waters, at considerable distance from habitat supporting wild stock. Although escapes might infrequently occur, operational procedures are in place to minimize the risk of escapes and to capture escaped fish as soon as possible. If

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP to allow the harvest of *Seriola rivoliana* using an anchored feed vessel and CuPod.
	ciguatera toxin, so there is no market for the wild caught fish. Kampachi is cultured in pens in State waters. Kampachi would continue to be cultured under the No-action Alternative.	the fish that are being contained were to escape, NMFS anticipates they would remain around the CuPod and be recaptured. In the unlikely event escaped fish survive to reproduce, there would be no adverse effect to health or fitness of the native fish population and genetic introgression is not expected to occur. The limited number of fish that would be held in the CuPod and weekly maintenance are expected to reduce the likelihood of diseases, making transmission of diseases to wild fishes unlikely. During the 2011-2012 towed Velella project, the level of naturally occurring parasites (flukes) on the kampachi in the CuPod was lower than the level found naturally affecting wild fish. Therefore, there it is not likely that the CuPod would result in a transmission of flukes to native fish.
Non-target species:	A variety of pelagic fishes occur in the project area. Some individuals are attracted to floating objects including privately owned and State FADs. Fisheries targeting these species around FADs are sustainably managed by the Council and NMFS in accordance with international management for some species. Pelagic fish stocks would continue to be harvested sustainably by fishermen fishing in Hawaii.	Negligible impact. The proposed project would not adversely affect pelagic fish species. Some individual fish, including tunas, sharks and other species, are expected to be attracted to the array because it is natural for fish to recruit to floating objects. The vessel and CuPod are small and are not expected to disrupt recruitment by fish to nearby FADs. The closest the Velella array might get to the VV Fad is within approximately 1nm; the actual distance would depend on currents and winds. The array would remain at least 4nm from the F FAD to the southwest at all times.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP to allow the harvest of *Seriola rivoliana* using an anchored feed vessel and CuPod.
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. Coral reefs and seaweeds would not be affected by activities associated with a SCREP under the No-action Alternative.	No impact. The proposed project would not affect corals, seaweed or other nearshore marine organisms. The array would remain at least 3.75 nm from shore and this is in very deep waters. The mooring itself was designed to prevent the mooring line from breaking; however, if the CuPod or the feed vessel were to become detached, GPS systems on both units are expected to allow detection of a decoupling and recovery. There is no expected measurable effect on water quality that could adversely affect coral reefs or seaweeds. If the mooring, floatation buoy, and ballast tanks were all to fail, the CuPod would be expected to sink to the bottom far from coral reef areas.
Deep-water benthic organisms	Deep-water benthic organisms are likely to include sessile invertebrates as well as motile fishes. Deep-water benthic organisms would not be affected by a chain and anchor under the No-action Alternative.	Negligible impact. The anchor would crush sessile organisms directly in the path of the cement block. The types of organisms that are expected to be impacted are not expected to 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. It is expected that most motile fish would be able to escape the anchor by detecting the pressure wave as the anchor nears the seabed, thus avoiding being crushed. The 360-foot chain may be expected to contact the bottom. The impact area could be up to 9 acres. The impact of this contact is not expected to be large because the type of habitat and infauna are likely to be found in broad areas of similar bottom habitat.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP to allow the harvest of *Seriola rivoliana* using an anchored feed vessel and CuPod.
Protected species: monk seal:	Monk seals are recovering in the main Hawaiian Islands. Some monk seals occur off of Hawaii Island. Monk seals would not be affected by activities associated with a SCREP under the No-action Alternative.	Negligible impact. Monk seals are generally not expected to occur in the project area due to the distance from shore (3.75 nm). If a monk seals were to visit the array, it would be unable to obtain fish from the cage. Monk seals are not expected to become entangled in the gear. Feeding monk seals is prohibited by ESA and MMPA, and may result in criminal and civil penalties. 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 the procedure to be followed to release the animal. The increase in vessels due to this project is not expected to measurably increase the low likelihood of a collision between a monk seal and a vessel.
Protected species – insular false killer whale	The insular false killer whale (FKW) is listed as an endangered distinct population segment (DPS). Its core range includes the area proposed for the project. Insular false killer whales would not be affected by activities associated with a SCREP under the No-action Alternative.	Negligible impacts. There were no reports in a prior project of adverse interactions with the gear and FKW, and there are no reports of interactions with FADs. FKW are not expected to become entangled in the gear. 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 the procedure to be followed to release the animal. The increase in vessels due to this project is not expected to measurably increase the low likelihood of a collision between a FKW and a vessel.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP to allow the harvest of *Seriola rivoliana* using an anchored feed vessel and CuPod.
Protected species – other marine mammals	A number of marine mammals occur around Hawaii as described in Section 3.2.2. Marine mammals would not be affected by activities associated with a SCREP under the No-action Alternative.	Negligible impacts. There were no reports in a prior project of adverse interactions with the gear and marine mammals, and there are no reports of interactions with FADs. Marine mammals are not expected to become entangled in the gear. 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 the procedure to be followed to release the animal. The increase in vessels due to this project is not expected to measurably increase the low likelihood of a collision between a marine mammal and a vessel.
Protected species sea turtles	Five species of listed turtles occur in the waters around Hawaii. Green turtles and hawksbill turtles may encounter the array. Sea turtles would not be affected by activities associated with a SCREP under the No-action Alternative.	Negligible impacts. The project is not expected to adversely affect sea turtles. Sea turtles would not become entangled on the mesh or in lines and are expected to pass the array without incident. 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 the procedure to be followed to release the animal. The increase in vessels due to this project is not expected to measurably increase the low likelihood of a collision between a sea turtle and a vessel.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP to allow the harvest of *Seriola rivoliana* using an anchored feed vessel and CuPod.
Protected species – seabirds	A number of seabirds occur in waters off of Hawaii. Seabirds would not be affected by activities associated with a SCREP under the No-action Alternative.	Negligible impacts. Seabirds are not expected to be adversely affected by the moored feed vessel and CuPod. Seabirds might land on the feed vessel but are not likely to be ensnared or injured. Due to the small size of the metal mesh, the CuPod is not expected to entangle seabirds. The black plastic frame of the CuPod and metal mesh are expected to serve as a barrier between fish and the surface of the water and reduce the visual attractiveness of fish in the CuPod to seabirds. Although troll fishermen would be able to fish around the CuPod, the rarity of listed seabirds is expected to result in a very low potential for troll fishermen to hook a listed seabird. With the exception of navigational lighting, and lights on the tether and CuPod, and hand held flashlights or head lamps, no other night lights would be used on the vessel or CuPod.
Designated Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC)	EFH in the project area includes: the water column EFH for bottomfish and seamount groundfish eggs and larvae down to 400 m depth (1,200 ft); the water column EFH for eggs and larvae of pelagic species down to 200 m depth (600 ft); the coral reef ecosystem EFH for eggs and larvae and for juveniles and adults down to 100 m depth (300 ft); the water column EFH for eggs and larvae of lobsters and crabs down to 150 m depth. EFH would not be affected by activities associated with a SCREP under the No-action	The array is not expected to adversely affect EFH. Feeding at below satiation is expected to reduce feed waste. The CuPod design and location in an area with currents, is expected to result in near constant flushing and minimize fish disease. The applicant does not intend to use chemicals to treat the fish, or in the feed. The project includes measures to prevent the loss of the CuPod or vessel (e.g., floats on the gear) and a means of automatically notifying the Applicant of a detachment from the mooring. GPS and monitoring would allow the Applicant to initiate a response and retrieve the gear in case either or both should become detached from the mooring. These include GPS devices on both the feed vessel and the CuPod, and floats on both the mooring line and the CuPod. Detachment or a mass fish mortality event is considered to be unlikely; however, if there should be a catastrophic failure of the CuPod, such that it becomes separated from both the feed vessel and its own buoy, the CuPod would sink the bottom. Security cameras would be in place onboard and underwater to provide an additional safety measure for the array.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP to allow the harvest of *Seriola rivoliana* using an anchored feed vessel and CuPod.
	Alternative.	Other features of the project intended to prevent large adverse effects to EFH are described in Section 5.8.
Social-setting:		
Other fishermen – marlin and other pelagic sportfishing (troll fishing)	Commercial and local recreational fishing for big game fishes occurs in the project area. Fishing would not be affected by activities associated with a SCREP under the No-action Alternative.	Negligible impact. The small size of the array is not expected to adversely affect fishermen fishing for big game fish. They could fish around the array and are expected to actively avoid colliding with the array or becoming entangled with the mooring line or tether. The array and mooring line would be removed at the end of the trial. The Coast Guard 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. Palu-ahi fishing would not be affected by activities associated with a SCREP 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. They could fish around the array provided they avoid a collision or entanglement with the mooring line. The array and mooring line would be removed at the end of the trial.
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. Ika-shibi fishing would not be affected by activities associated with a SCREP under the No-action Alternative.	Negligible impact. The minimal navigational lights of the Velella array could attract tuna; however, the array is relatively small and is not expected to diminish opportunities for ika-shibi fishermen to catch tuna. Fishermen would be able to fish around the array and are expected to successfully catch pelagic fish around the array. The moored array would be in place for up to 12 months. At the end of the trial, the array and mooring line would be removed. For these reasons there would be no large impacts to the ika-shibi fishery off of west Hawaii.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP to allow the harvest of *Seriola rivoliana* using an anchored feed vessel and CuPod.
Troll fishing	The area in which the array would be located is popular for troll fishing. Troll fishing would not be affected by activities associated with a SCREP under the No-action Alternative.	Negligible impact. As with other fisheries, troll fishermen are expected to actively avoid colliding with the array and becoming entangled. Given the small size of the array and 12-month duration of the project NMFS does not expect the project would result in any large changes to troll fishing activity or success at catching pelagic fishes.
Fishing Community:	The entire Island of Hawaii is a Fishing Community under the Hawaii Fishery Ecosystem Plan. No fishing community would be affected by activities associated with a SCREP under the No-action Alternative.	No impacts. The limited amount of kampachi that would be harvested would not affect fishing community members. A limited amount of high quality fish would be available to the community if the permit is issued. Fishermen could fish around the array. The array and mooring line would be removed at the end of the trial. This project would not affect wild kampachi stocks and there is currently no fishery for wild kampachi.
Growth in the Community:	The community in west Hawaii is expected to grow as a result of various developments in the area. Growth would not be affected by activities associated with a SCREP under the No-action Alternative.	Minimal impacts. The small size and limited duration of the project are not expected to affect growth or community expansion. The project would require a small amount of staff to support the project during its limited duration.
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 by activities associated with a SCREP under the No-action Alternative.	No impact. The project would be conducted in the U.S. EEZ beyond State waters, and the limited amount of natural metabolites and dissolved feeds that would enter the water are expected to be dissipated very quickly.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP to allow the harvest of *Seriola rivoliana* using an anchored feed vessel and CuPod.
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 associated with a SCREFP if the No-action Alternative were to be selected.	Negligible impacts. Up to 8,000 lb of fish that would be harvested from this project would be distributed through existing company market channels. Any effect of the harvests on the prices of other cultured kampachi or other fish would be temporary, as the number of fish that would be harvested is limited.
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 expected to continue in the project area are fishing activities. Climate change is affecting the environment, but the specific impacts are not known with certainty.	The proposed project would not have an adverse effect on other ocean users, as described above, including other fishermen, gatherers of marine species for cultural or other uses, or on the safety of ocean users as a result of sharks that may be attracted to the array. The project is not expected to have adverse effects that when considered together with climate change would produce larger impacts. Although there would be very minor greenhouse gas emissions, vessel use would be primarily limited to weekly maintenance trips and overall, there would be no large change in greenhouse gas emissions as a result of authorizing the project.

Topic or Resource	Alternative 1: No Action – Do Not Issue a SCREFP – Continue Baseline Conditions	Alternative 2. Proposed Action – Issue a SCREFP to allow the harvest of *Seriola rivoliana* using an anchored feed vessel and CuPod.
Environmental Justice	Some people living in west Hawaii are members of minority or low income groups. Some subsistence harvesting may occur in nearshore areas.	None. The proposed project is of a very small size, located in waters at least 3.75 nm from shore, and of limited duration of a year. The project is not expected to result in large adverse environmental impacts that could disproportionately affect members of either minority or low income populations, or affect subsistence gathering or harvest in coastal areas.
Safety at Sea	Mariners use the project area.	Negligible impacts. The Velella array would be lighted in accordance with Coast Guard requirements and the CuPod has a separate navigation light to indicate its position. The Coast Guard 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 and archaeological resources have been identified next to harbors that would be used by vessels traveling to and from the array.	No impact. There are no known historic or cultural resources in the area that would be affected by the anchor; and none is likely to be present in such deep waters well off the coast of west Hawaii. The impact to native Hawaiians and other residents who fish in the project area would be minimal, because fishing could continue in the area. The project is temporary, and the mooring line and array would be removed at the end of the trial.

5.0 Compliance and Coordination with Others

5.1 Coordination with Others by NMFS

In accordance with regulations covering permits, NMFS is required to furnish a copy of a SCREFP application to the Western Pacific Fishery Management Council, the U.S. Coast Guard, the State of Hawaii, Department of Land and Natural Resources, the U.S. Fish and Wildlife Service and other interested parties who have identified themselves to the Council. On February 15, 2013, NMFS forwarded copies of the permit application and project information for review to:

Dr. Loyal A. Mehrhoff, Field Supervisor, U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, HI

RADM Charles W. Ray, Commander, Fourteenth Coast Guard District, Honolulu, HI

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

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

Two responses were received.

By letter of March 25, 2013, Ms. Simonds, Executive Director of the Council provided comments and suggestions on the project summary, location and activities, which were considered in the development of the proposed action and EA. Ms. Simonds provided information about the large sportfish fishery off of Kona and about the use of the Keauhou ledge being a high traffic area for pelagic trollers and ika-shibi fishermen and recommended the area be studied prior to deployment. The letter requested information about the potential for the array to behave like a FAD, and requested that the EA include consideration of impacts to false killer whales. Ms. Simonds recommended an observer be aboard the vessel during stocking, monitoring and/or harvesting, suggested that distinguishing marks or characteristics of the cultured species be documented with comparisons to wild stock to provide outreach to the fishermen and the community, and suggested an emergency plan be developed prior to the approval of the permit. Finally, Ms. Simonds requested that the navigational not be described as that which would be required for trawling vessels as such a description was in error.

In response to the Council's recommendations, NMFS confirms that:

The EA documents NMFS' study of the project area prior to issuance of the permit and stocking of the CuPod. NMFS also corrected the description of the navigational lighting requirements. The EA includes a discussion of other fisheries activities, and potential impacts to protected species. The area within which the array would operate is outside of State waters and due to its small size and limited impact on water quality would not impact either the environment of the

Keauhou shelf area or fishing in the area. Finally, the applicant has committed to accommodating a NMFS-provided observer upon request.

A discussion of NMFS' consideration of distinguishing cultured fish by marking the fingerlings is provided in Section 2.3. Only 13 fish were documented as escaping from the 2011-2012 towed Velella project which was of the same size as the proposed project, and all 13 fish remained near the CuPod and were re-captured. NMFS rejected a requirement to apply tags or marks to the fish after considering the following factors: (1) the low number of fish that escaped in the previous towed trial; (2) evidence provided that when properly utilized by divers, the zippered mesh openings will not provide an escapement route for fish; (3) the successful recapture of all escaped fish from the previous trial, which remained near the CuPod, (4) the low risk of genetic introgression occurring as a result of any escapes, and (5) the use of tags would be invasive and would have the potential to stress the fish and increase the possibility of disease, serious injury, or mortality.

NMFS received input from the U.S. Fish and Wildlife Service suggesting that the CuPod and feed vessel be fitted with GPS units to allow intercept of the vessel or CuPod in case either was to become detached. NMFS notes that this is already part of the proposed project.

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, as the USACE is a Federal agency with special expertise in marine moorings. In its role as a Cooperating Agency, the USACE reviewed the draft EA and participated in finalizing this EA.

Kampachi Farms requested a Department of the Army Permit. On March 12, 2013, the U.S. Army Corps of Engineers (USACE), Honolulu District, published a Public Notice of Application for Permit. The notice described the proposed mooring and use of the mooring for the Velella project. USACE solicited public comments over a 30-day public comment period.

The USACE is coordinating with NMFS to consult on the proposed project with NMFS Habitat Conservation Division in accordance with requirements of Section 305(b)(1-4) of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), pertinent to coordinating with NMFS on potential impacts to Essential Fish Habitat. NMFS and USACE are also coordinating on required reviews in accordance with the Marine Mammal Protection Act and Endangered Species Act.

5.3 Consideration by the Western Pacific Fishery Management Council

The application for the SCREFP for this project was discussed at the 156th meeting of the Council in American Samoa, March 12-14, 2013, under agenda item 16.D.3. The Council did not make a recommendation regarding the permit and no public comments were received during the meeting. The Council included a member from Hawaii Island. The Council submitted comments

to NMFS as required under the Hawaii Fishery Ecosystem Plan, as summarized in Section 5.1, above.

5.4 Compliance with NEPA

The environmental impact analysis of this NEPA analysis fulfills the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations, National Oceanic and Atmospheric Administration's (NOAA) Administrative Order 216-6 covering the agency's review of the potential environmental impacts of a proposed federal action.

The purpose and need and description of the proposed action are in Section 1. The proposed alternatives and alternatives rejected from detailed consideration are described in Section 2. The affected environment is in Section 3, and an analysis of the potential impacts, including impacts to climate change and Environmental Justice considerations, are in Section 4. Compliance with other laws and coordination with others is provided in this Section, Section 5. Literature cited is listed in Section 6. Appendices provide additional information.

The project was coordinated with interested and affected parties as described in Section 5.4.2 below.

5.4.1 Preparers and Reviewers

Phyllis Ha, Resource Management Specialist, Sustainable Fisheries Division (SFD), Pacific Islands Regional Office (PIRO)

Emilee Stevens, Regulatory Biologist, USACE (review and commenter)

Reviewers:

Alan Everson, Aquaculture Coordinator, PIRO

Acknowledgments:

Neil Sims, M.Sc., of Kampachi Farms, LLC, prepared the application and provided information on the proposed activity and impacts which was used in this EA

Toby Wood, Resource Management Specialist, SFD, PIRO (preliminary draft)

NOAA NMFS Pacific Islands Regional Office, Divisions of Protected Resources and Habitat Conservation provided information on potential impacts to protected species that was used in this EA

NOAA's Office of Program Planning and Integration, provided review and suggestions for compliance with NEPA.

5.4.2 Public Review and Comments

NMFS published a Notice of Availability of the draft EA in the Federal Register on August 13, 2013 (78 FR 49258), and provided the public with an opportunity to review the draft. Comments were due by September 3, 2013. The draft EA included detailed instructions on where to obtain a draft EA and how to provide comments. Information on how to obtain the draft EA and comment on the draft EA was posted on the NOAA NMFS' Pacific Islands Regional Office's website. This information was also provided in an email that was sent directly to 44 individuals who either submitted comments on the 2011 draft EA for the towed Velella Project, submitted comments to the USACE's announcement of a proposed permit for the anchored CuPod project, or expressed interest in the project.

The public had several other opportunities to learn of the proposed project. The proposed SCREFP was discussed at a public meeting by the Western Pacific Fishery Management Council in American Samoa in March 2013. The State of Hawaii's Office of Environmental Quality Control published information about the proposed SCREFP, the availability of the draft EA, and opportunity to comment on the draft EA in its newsletter, The Environmental Notice, on August 23, 2013. Furthermore, the USACE published a "Notice of a Request for a Department of the Army Permit" on March 12, 2013. USACE provided the public with a 30-day review and comment period on its decision to issue a DA permit for the same project, and provided details about the proposed activity in its notice. Two comments were received by the USACE on its proposal to issue a DA permit for this project.

Summary of public comments and responses to the comments

NMFS received a total of 8 separate comment submissions on the draft EA, from individuals and the non-governmental organizations Food and Water Watch and Recirculating Farms Coalition.

Comment letters may be seen online at: www.regulations.gov, searching on RIN 0648-XC791, or by writing to the Responsible Official listed on the cover page.

NMFS considered all comments and either made no change to the document, changed facts or improved the clarity of the document without changing the analysis in the EA, or improved information in the baseline. None of the comments resulted in substantial changes to the analysis about the significance of impacts of the proposed action on the human environment. .

Specific comments that addressed other sections of the EA (other than permit conditions) and NMFS' response are provided below for information. Comments have been paraphrased and may be combined when more than one comment was made on the same topic or expressed the same concern. The USACE, in their capacity as a Cooperating Agency, reviewed and provided input on the responses to the comments.

Comment 1. Some commenters suggested additional permit conditions.

Response 1. Refer to the discussion in Section 2.4 for a detailed response to proposed additional permit conditions.

Comment 2. Two comment letters from the two NGOs dispute that NMFS has the authority to issue the permit for the aquaculture facility under the Magnuson-Stevens Fishery Conservation and Management Act.

Response 2. NMFS disagrees. The Magnuson Stevens Fisheries Conservation and Management Act provides NMFS and the Regional Fishery Management Councils with broad authority to manage the nation's fisheries. Under the MSA, 16 U.S.C. § 1811(a), the United States claims and exercises sovereign rights and "exclusive fishery management authority over *all fish* … within the exclusive economic zone…" Accordingly, NMFS' and the Council's authority extends to both wild and cultivated fish stocks in the U.S. EEZ.

Moreover, the MSA broadly defines "fishing" to include, in relevant part, "the catching, taking, or harvesting of fish," and also includes "any other activity which can reasonably be expected to result in the catching, taking, or harvesting of fish," and "any operations at sea in support of, or in preparation for" the catching, taking, or harvesting of fish. 16 U.S.C. §1802(16). Thus, the definition of fishing not only includes harvest activities, but all activities that support or result in the harvest of fish.

NMFS's interpretation of "fishing" to include the harvesting or gathering of cultivated MUS is a long-standing interpretation, as memorialized in NOAA Office of General Counsel legal memoranda dated July 2, 1993 and June 9, 2011. Moreover, since 1994, NMFS has consistently applied this interpretation to require permits for the harvest of aquacultured live rock from the Gulf of Mexico Exclusive Economic Zone. 50 C.F.R. § 622.70(a)(2) ; *see also*, 59 Fed. Reg. 66776 (Dec. 28, 1994)).

Additionally, regulations at 50 CFR 665.224(a)(1) provides that "any person … fishing for, taking, or retaining Hawaii coral reef ecosystem MUS (management unit species) must have a special permit" when using "any gear not specifically allowed …" The activity at issue in the application meets these criteria because the activity involves (1) fishing and retaining; (2) a coral reef management unit species, *Seriola rivoliana* (50 CFR § 665.221); and (3) a gear, the Velella array, that is not specifically allowed. Accordingly, NMFS has authority to permit this activity, which involves the catching, taking, or harvesting of MUS, as well as operations that support or result in the catching, taking, or harvesting of MUS, using gear not previously authorized in the U.S. EEZ. No changes were made to the EA as a result of this comment.

Comment 3. The commenter asserted that NMFS failed to comply with the Administrative Procedures Act and MSA's requirements for rulemaking when NMFS defined aquaculture as fishing without taking comments on any proposed rule.

Response 3. NMFS disagrees. The commenter incorrectly focuses on the term "aquaculture", a term never defined by NMFS in rulemaking. A rulemaking that is subject to the Administrative Procedure Act has prospective effect and affects the rights of broad classes of individuals. Here, NMFS is making a decision on a permit application that affects only the individual applicant in accordance with procedures set forth in existing federal regulations, 50 CFR 665.224. Moreover,

NMFS' decision is properly concerned with the nature of the activity that constitutes fishing, and the specific MUS (*Seriola rivoliana)*, rather than whether such activity is called aquaculture. No changes were made to the EA as a result of this comment.

Comment 4. Commenter states that the project is legally deficient because the Executive Director of the West Pacific Fishery Management Council did not recommended its approval of the project.

Response 4. NMFS disagrees. The Council's March 25, 2013 letter, signed by the Executive Director, states that the Council 'does not object to the permit application' and provided suggestions for NMFS to consider as a way to minimize any environment impact. NMFS has properly considered the Council's recommendations consistent with the FEP and implementing regulations. Council approval of the project is not required. See 50 CFR 665.224(d)(3)). No change was made to the EA as a result of this comment.

Comment 5. The commenter considers NMFS to be wasting taxpayer dollars and agency time to explore outdated and a globally documented problematic means of raising fish in open waters.

Response 5. NMFS disagrees. Federal regulations authorize the use of unapproved gear types to harvest coral reef management unit species (MUS) under certain conditions, as set forth in 50 CFR 665.224. The applicant, not NMFS, is carrying out the activity and testing the efficacy of the new fishing gear. The permitted activity is expected to be conducted consistent with the MSA, Hawaiian Archipelago FEP, regulations governing fisheries management in the western Pacific, and other applicable law. No changes were made to the EA as a result of this comment.

Comment 6. A comment states that fish farms need to be removed from ocean waters and moved on land instead. Two alternatives were suggested (using tanks on land, and raising fish and plants together in the same closed-loop, land-based system).

Response 6. The special permit regulations at 50 CFR 665.224 do not restrict the type of unapproved gear that an applicant may seek to use to fish for a management unit species. The applicant did not seek to use a land-based gear type, and land-based gear would not have fulfilled the purpose and need of this action. No change was made to the EA as a result of this comment.

Comment 7. NMFS should extend the comment period by 30 days and hold public hearings along the leeward coast of the Island of Hawaii with adequate notice.

Response 7. NMFS provided the public with 23 days to review and comment on the draft EA. Additionally, consistent with procedures in 50 CFR 665.224(d)(3), NMFS provided notice of the application to known interested parties. The public was also notified in March 2013 of the USACE's proposal to permit the same activity. The USACE provided a 30-day comment period, and two letters were received during that agency's request for comments. For these reasons, we disagree that additional time for public comments or public hearings are necessary. Because NMFS and the USACE have provided opportunities for public comment on the draft EA and proposed project, no change will be made to the EA as a result of this comment.

Comment 8. NMFS should include consultation with the Office of Hawaiian Affairs, Native Hawaiian organizations and individuals, and recreational and commercial fishermen and other users regarding the socio-economic, cultural and safety impacts of the proposed operation.

Response 8. Consistent with procedures in 50 CFR 665.224(d), members of the public, including OHA, the State of Hawaii Historic Preservation Division, and other organizations, had an opportunity to comment during the 23-day comment period. In addition, a Notice of Availability was published in the Federal Register at 78 FR 49258 (August 13, 2013), and the State of Hawaii's Office of Environmental Quality Control newsletter, "The Environmental Notice," included a notice of availability of the draft EA. Sections 4.3, 4.4, and 4.5 of the EA address the potential socio-economic, cultural and safety impacts of the proposed operation. Because NMFS followed standard agency procedures to determine potential effects to social, economic, cultural, and historic resources, and addressed potential impacts in the EA, no changes were made to the EA as a result of this comment.

Comment 9. The commenter stated that impacts to fishermen and recreational users are highly uncertain and controversial, and will likely harm public safety and such impacts are thus "significant" and mandate an EIS. The Velella project would be placed in an area that is a high traffic area for fishermen. The Council recommended studying the area to ensure the project is not interfering with known fisheries in the area and that an observer be allowed on the tender vessel.

Response 9. NMFS disagrees. NMFS notes that in a similar but distinct project, the 2011-2012 towed Velella project, no gear conflicts, such as entanglements with the CuPod or vessel, were reported. Fishing by others is described in Section 3.3.2 and impacts to other fishermen and safety are described in section 4.3. The notice of availability was provided to interested parties including fishermen from Hawaii. The Coast Guard has been notified of the project and may provide notice to mariners, as appropriate. The array and vessel would be lighted in accordance with Coast Guard requirements to prevent collisions at sea. The small size of the array, distance well offshore, U.S. Coast Guard safety notices, and lights would all help prevent other vessels from colliding with the array.

The applicant would be required to accommodate an observer, upon request, and this would allow NMFS to gather more information about safety, gear conflicts, if a need were to arise.

Comment 10. A commenter estimated that the project would be a FAD that attracts an average of more than 4.33 fishermen per day (using information about numbers of fishermen around the previous towed trial when the Velella array was closer than 5.5nm) and stated that the EA does not analyze the impacts to fishermen given the fact that the proposed project would be located closer to shore than the previous project.

Response 10. The EA states that some fishermen fish recreationally, commercially, or using chartered vessels in the area, and describes that fishermen fished around the CuPod and tender vessel during the previous towed CuPod project. The analysis took into consideration that the array would be lit for navigational purposes and that the Coast Guard would issue a Notice to Mariners, as appropriate. Overall, the proposed action would result in a slight increase in local

vessel traffic due to recreational vessels fishing around the array; however, given the low number of vessel visits (estimated to average about 4 daily), there would be a negligible increase in traffic and accident risks, resulting in negligible impacts. Section 4.3 of the EA has been updated to reflect this information.

Comment 11. The project would result in an umbra of the project of 9.2 square nautical miles where fishermen would have lesser access. The size of the area of impact was not disclosed in the more widely distributed draft EA, although it was in the USACE's public notice.

Response 11. The draft EA included a full description of the project area in which the array could be located. The approximate range of the mooring swing arc is shown in Figure 2. The location of the array would be a maximum of 1.75 nm from the mooring site at any given time. Section 3.1.1 explains that the array could be located within a circle that potentially covers 12.6 square nautical miles. The distance of 12.6 square nm was based on NMFS' estimation that did not take into effect a likely reduction in the maximum distance due to the catenary curve of the mooring line. The vessel and gear would operate in an extremely small part of the overall project area, which would remain open to navigation and would not impede vessel traffic in the area. No closed area would be designated. Because the analysis in the EA took into consideration a larger overall potential area of impact and because no closure within the potential area of impact is being proposed, no change was made to the EA as a result of this comment.

Comment 12. The commenter remarked that while the EA indicated fishermen will be allowed to fish around the project, it does not indicate how close they can get. An EIS is required to detail what measures Kampachi Farms will take to minimize conflicts with fishermen.

Response 12. NMFS disagrees that an EIS is required. No closure would be established around the permitted activity, and navigation in the area would continue subject to compliance with the 72 COLREGS, International Regulations for the Prevention of Collisions at Sea. The Coast Guard may issue a Notice to Mariners, as described in Section 1.3. Section 4.3 of the EA addresses the potential for gear conflicts or collisions, which NMFs expects to be no greater than current risks to mariners fishing around other FADs. No changes were made to the EA as a result of this comment.

Comment 13. A commenter expressed concern that, while the EA indicates the array's position would be noted through a U.S. Coast Guard notice to mariners, the analysis in the EA does not indicate that there would be continuous or even regular reporting of the facility's location despite the use of GPS transponders.

Response 13. The vessel and buoy above the CuPod would be marked and lighted in accordance with the 72 COLREGS, International Regulations for the Prevention of Collisions at Sea. In addition, transponders would inform Kampachi Farms of the location of the array; however, this information would not be available to other mariners. Mariners proceeding in the area are at all times responsible for maintaining a proper look-out for both anchored and underway vessels, and to take proper and effective action to avoid collision, with due regard for the prevailing circumstances. The location of the array would be monitored by command and control software. An alert would be issued to Kampachi Farms staff if the gear were to be detected outside of an

approved range. As this information was already in the EA, no change to the analysis was made as a result of this comment.

Comment 14. A commentor stated that the EA did not adequately address whether there might be other better locations for the facility. The commenter suggested that there are other locations nearby with similar features in State waters. The commenter preferred the project be subject to State regulation rather than to NMFS' streamlined regulations.

Response 14. Action alternatives should fulfill the requirements of the stated purpose and need of the project, which in this project was the testing of the CuPod and feed vessel anchored in deep ocean waters such that the CuPod would be subject to constant flushing action in order to maintain high water quality conditions in the CuPod. Section 2.1 describes the features required for the permitted action, and Section 2.3 describes that alternatives without those features were rejected from detailed consideration. Nearshore State waters have the potential for greater user conflicts, and do not provide for the desired strong currents and clean water conditions, and were not selected by the Applicant on these bases. A location further from shore might offer a slightly lower, but not appreciably lower, risk of collision and user conflicts. As explained in Section 2.3, NMFS and the USACE considered whether it would be necessary to require the applicant to move to a different location. As described in Section 2.3, NMFS and the USACE found no a compelling reason to require the applicant to move elsewhere.

NMFS and USACE cannot speculate on the motivations attributed to the applicant by the commenter for seeking a NMFS SCREFP instead of a State permit. Under 50 CFR § 665.224, the applicant is allowed to apply for a special permit to harvest coral reef ecosystem MUS in the U.S. EEZ using an unapproved gear.

Comment 15. A commentor gave input that there are highly uncertain controversial socioeconomic effects that must be analyzed when they are interrelated to natural or physical environmental effects. The commentor further stated that there are negative cultural impacts and the project may cause loss or destruction of significant scientific, cultural, or historical resources subjecting it to an EIS because native Hawaiians use the proposed area as their traditional fishing grounds.

Response 15: NMFS is not aware of the existence of any traditional Hawaiian cultural resources in the action area, or of environmental or socioeconomic impacts on the use of cultural resources by Native Hawaiians, that would result from the proposed action. NMFS further notes that the comment does not point to any specific socioeconomic harms or negative cultural impacts that the agency neglected to consider. An EA must analyze effects of the proposed action that are reasonably foreseeable, as opposed to speculative. Please see Section 4.5 of the EA for a discussion of potential impacts to historic and cultural resources; and Section 4.3 for a discussion of the potential socioeconomic and cultural impacts of the proposed action.

Comment 16. The EA does not disclose possible safety issues to recreational users of waters near the facility and how it may attract sharks and cause them to come closer inshore, where they could harm such users. An EIS is needed to assess these significant safety threats to those who recreate inshore from the cage.

Response 16. NMFS evaluated the potential for the project to act as an attractant to draw sharks to the shore (see Section 4.3; Potential Impacts to Other Fishermen and Ocean Users). The EA includes information that the CuPod would be towed to shore empty, and therefore NMFS does not expect that sharks would follow the empty cage to shore. During the 2011-2012 towed Velella project, sharks did not follow the empty cage. The project would be located at least 3.75 nm from shore, so any sharks that visit the cage, or that recruit to it, are not expected to affect coastal users. A statement describing this lack of connected effect will be added to the impacts to safety analysis in Section 4.3.

Comment 17. A commenter stated that there are highly uncertain and safety impacts from the prospect of the cage becoming detached from the feed vessel and remaining afloat. The EA fails to mention a loss of two cages during a testing phase. One cage sunk, the other was lost and reported as a navigational hazard. The Draft EA claims that the GPS would aid in the recovery, but never discusses why this was not possible with the first attempt which also was fitted with a GPS.

Response 17. NMFS notes that the two CuPods that were referred to by the commenter were from a different project involving a distinctly different configuration and operation in the 2011-2012 towed Velella project. As documented in a different EA, dated July 6, 2011, that project initially involved the simultaneous deployment of two CuPods, which–during initial deployment trials using empty CuPods–became detached after gale force winds and rough seas caused bridle failure near attachment points due to chaffing. Following that loss, the project was modified to include only one CuPod using a hardened, multiple-attachment point tow bridle with chafe-point protection.

The gear and monitoring of the array, as well as Contingency Operations are described in section 1.3. Operational protocols and gear selection have been developed to address and minimize the potential for mishaps. The design and deployment practices for the gear incorporate mitigation and recovery methods and redundancy. Should the CuPod break away from the array or mooring, operational protocols are in place to minimize or avoid anticipated potential impacts on the human and ocean environments.

In the previous incident with the two CuPods, there were no GPS transponders installed on the two cages. As a result of that incident, Kampachi Farms has since modified its procedures and would install the transponders before transporting the CuPod. Further, as a condition of the permit, the permittee must equip the CuPod with a radio transmitter/radar reflector buoys(s), and/or an approved gear tracking system (e.g., satellite tracking, GPD) prior to stocking the CuPod. As described in the EA, in the unlikely event that the CuPod should become detached from the feed vessel, the GPS transponder would assist Kampachi Farms in initiating a recovery response. Because the project would employ different equipment and operational procedures, and because contingency operations are already described in the EA in Section 1.3, no change to the EA will be made as a result of this comment.

Comment 18. The commenter stated that an EIS is required to analyze the potential environmental effects of a sunken cage on coral reef or other essential fish habitat.

Response 18. An environmental impact statement (EIS) is required for any major federal action that significantly affects the quality of the human environment. NMFS evaluated the potential for a CuPod to sink and to impact coral reef essential fish habitat and found that it is unlikely this would occur. The description of the impact on coral reefs previously described in Section 5.8 in the draft EA was moved to Section 4.2.1 (Potential impacts on fauna and habitat) of the final EA. The analysis describes that the project includes features and operational measures to prevent a loss of the CuPod or vessel in case of a detachment from the mooring. Should the CuPod or vessel detach from the mooring, floats are expected to prevent loss of the gear. Should the float or ballast tank fail, the CuPod is expected to sink in deep water where there is no essential fish habitat including coral reefs. Furthermore, the gear location would be monitored consistently and if the gear were to be detected outside of a pre-set zone, an alert would be issued that would allow the Applicant to launch an emergency response. It is expected that the gear could be retrieved and reattached to the mooring. Because the EA includes an analysis of the potential impacts of a sunken cage on coral reefs or other EFH, no change to the EA will be made as a result of this comment.

Comment 19. A commenter expressed concern about uncertain effects associated with fish escapes. The commenter was concerned that escapes from existing operations were said to have had an effect on bottomfish as far away as Maui. The commenter disputed the statement that only 13 fish escaped from a the 2011-2012 towed Velella project and explained their calculation that based on a 2% mortality rate and the reported harvest of 1,765 of the 1,998 fish stocked, an estimated 193 fish escaped. The commenter also described that they did not receive any document in response to a Freedom of Information Act request that showed that Kampachi Farms reported any escapes, despite requirements of the permit terms and conditions. The commenter stated this demonstrates a substantial controversy over the likelihood of escapes and appropriateness of mitigation measures such as independent observers.

Response 19. NMFS disagrees that the difference between observed escapes and theoretical calculated escapes demonstrates a substantial controversy over the likelihood of escapes or appropriateness of mitigation measures. Kampachi Farms reported that 13 fish escaped through entry ports (Sims 2013d). The reported number is based on divers' direct observation of fish escapes, and given the lack of any report or evidence of a breach in the CuPod's brass-link mesh surface, NMFS has no basis with which to conclude that such report is inaccurate. The allegation of 193 escapes provided by the commenter is an estimate based on the total number of fish harvested, as reduced by a predicted mortality rate of 2%. That these two numbers do not precisely conform does not demonstrate a "substantial controversy" over the likelihood of escape.

Section 4.2.1 describes the potential for fish escapes. Escapes, although possible, are expected to be rare because of the zippered mesh netting that would provide divers with access while preventing fish from escaping. In addition, experience during the 2011-12 towed Velella project confirmed that the few escaped fish remain around the CuPod where they were easily caught by pole spears. If a fish were to escape it would be recaptured as soon as possible using spears. The analysis describes that any escapees would not be expected to survive because the fish would be naive to wild conditions and would be easy prey for other species. As discussed in Section 4.2.1,

were escaped fish to survive and reproduce, they are not genetically distinct from wild fish. Because this information is considered in the EA, no change will be made to the EA.

Comment 20. One commenter expressed concern that this project will have uncertain effects and is likely to have unique impacts not analyzed with the 2011-2012 towed Velella project. For example, with the 2011-2012 towed Velella project, NMFS indicated one of the factors that mitigated against harmful FAD effects on marine mammals was that the project was in constant motion. This stationary project, on the other hand is likely to have far different impacts that must be analyzed under an EIS.

Response 20. NMFS agrees that the proposed project, which is anchored to the ocean bottom, is a distinct project that is subject to its own environmental evaluation, but disagrees that expected impacts require an EIS. Although information from the towed Velella project may be helpful to inform this environmental analysis, the current EA is not limited to the prior analysis. The EA includes an analysis of impacts to marine mammals while the array is at anchor in Section 4.2.2. The analysis in the EA also includes discussion about the potential for collisions with the mooring line underwater and more discussion about the actual noise that would be created during power washing.

Although the gear type is part of an experimental project, the effects of this gear are not uncertain. This is a small activity to test the feasibility of using a new gear type in ocean waters, limited in both time (one year) and scope (no more than 2,000 cultivated fish in one CuPod). As described in Section 4.2.1of the EA, the anchor and chain are expected to have a minimal impact to deep water habitat in an area that is devoid of habitat structuring benthos. The array would be lighted and operated according to Coast Guard navigation requirements. Certain components of this action, such as feeding the fish, are similar to the 2011-2012 towed Velella project and the results of that project helped inform the environmental analysis for this project. These considerations, combined with the small-scale of the project and low-density stocking of fish, help NMFS find that the effects of the project are not uncertain.

Comment 21. Two comments expressed concern that NMFS did not consider the precedential impacts of issuing a fishing permit for this project and for the 2011-2012 towed Velella project. The commenter asserted that this is the first stationary commercial aquaculture facility permitted under the MSA. The commenter mentioned that the purpose is to “allow the applicant to test the feasibility of harvesting a native marine fish species using an anchored feed vessel and submersible CuPod in waters of the U.S. EEZ.” There is concern that issuing the permit will open the door to the expansion of fish farms off the coast of Hawaii and the EEZ.

Response 21. NMFS disagrees that issuing this permit would establish a precedent for future actions. As described in the Cumulative Effects Section (4.6), NMFS would issue the SCREFP to one permittee for a period of one year. Because the purpose of the project is to evaluate the technological feasibility of raising and harvesting a small number of captive fish using a new gear type in an offshore environment, and is limited in both duration and size, issuance of the permit and conduct of the test would not serve as a springboard for approval of future commercial harvesting operations. It is of course possible that a successful test of the gear could result in future applications; however such applications would be reviewed and subject to

independent environmental evaluation. Moreover, the current proposal has independent utility, is not linked to any subsequent proposal, and serves a significant purpose even if no follow-on application is made. NMFS is not aware of any other pending permit applications for a similar project in waters of the western Pacific region.

Because of the unique nature and limited purpose of this project, NMFS does not expect that issuance of this permit would spur an influx of permit applications for similar projects, or for projects involving commercial applications. Moreover, 50 CFR 665.224 does not limit the types of gear for which an applicant may request a special permit. Accordingly, NMFS is not able to anticipate what may or may not be part of future permit applications by either this permittee or other applicants. To the extent NMFS may receive permit applications involving other types of culture operations, NMFS cannot speculate as to the design and nature of those potential applications. NMFS notes that since the first Velella array permit was issued in 2011, no other entities have submitted permit applications to NMFS for a similar culture operation.

Issuing this permit is also not expected to result in growth or community expansion of any other related businesses or activities. Operation under the permit does not require any supporting, third-party operations in the EEZ, and only minimally impacts activities or businesses at the harbors. NMFS estimates that the number of jobs that would become available as a result of this small and limited duration project is minimal. This impact is documented in Section 4.3 of the EA.

Comment 22. A commenter stated that NMFS should insure naturally occurring forage species (opelu, akule, i'ao, nehu, etc.) are not harvested to create the feed. The commenter was concerned that harvesting naturally occurring forage species for the project feed could escalate to an industrial scale with potentially irreversible effects.

Response 22. No locally occurring fish would be used in feed that would be used in the proposed project. The project feed was described in Section 1.3, and the ingredients are comprised of sustainably harvested ingredients. No change was made to the EA in response to this comment.

Comment 23. Do not allow exclusive use of public waters as [doing so] could be a bad precedent that could lead to privatization of Hawaii's EEZ.

Response 23. The permit would not convey exclusive rights to ocean waters. Vessels transiting the area would be expected to observe standard navigation rules for the prevention of collisions at sea (72 COLREGS), as they would with any other vessel in the vicinity. This was specifically stated as part of the permit terms and conditions shown in the Appendix B, so no change was made to the EA or Appendix B.

Comment 24. A commenter stated that the first attempt to tow a cage resulted in the cage sinking and it has not been recovered. The concern is that the technology to support the CuPod has not been proven.

Response 24. Information about the loss of a CuPod prior to a previous towed Velella project is provided in Response 18, above. No gear loss occurred during the conduct of the 2011-2012 towed Velella project. No change was made to the EA as a result of this comment.

Comment 25. A commenter could not find the draft EIS.

Response 25. The Draft EA was available on the regulations.gov website and a link to the EA was posted on NMFS' PIRO website. NMFS also published a notice of availability in Federal Register on August 13, 2013 (78 FR 49258), and provided contact information for requesting a copy of the EA.

Comment 26. A commenter suggested that Kampachi Farms funding is opaque and must be made clear and that they have a history of multiple owners and unstable financing.

Response 26. Under criteria set forth at 50 CFR 665.224, NMFS PIRO is required to consider applications to fish for CREMUS using gear not previously approved. Unsupported allegations that the applicant has a history of multiple owners and unstable financing do not provide a basis for disapproving the application.

Comment 27. A commenter stated that a prior project does not prove the theory that currents and flow of water would keep the aquapod clean. [In the past project, the diesel engine was required to maintain constant movement [of the CuPod] instead of the theory that natural forces (wind and currents) would be sufficient.

Response 27. Under the current project, ocean currents and flow of water alone are not expected to keep the CuPod clean. The EA explains in Section 1.3 "Maintenance," that Kampachi Farms would keep the CuPod, lines, and vessel clean through manual scrubbing or through the use of a pressure washer used on a periodic basis. This supplemental cleaning would help prevent parasitic infestations. Unlike the previous towed array project, where the CuPod drifted in the gyres or was towed by a vessel, the current project would attach the CuPod to the anchored feed vessel. This would restrain the CuPod against the ocean currents and allow currents to produce a flushing action by moving through the CuPod. Currents off of west Hawaii are known to be quite strong. The flushing action of the water is expected to result in high quality water inside the CuPod by helping to dissipate wastes quickly. Because these concepts were described in the draft EA, no change was made to the EA in response to this comment.

Comment 28. A commenter stated that the public does not trust the success of the previous project.

Response 28. NMFS used the best available information to develop the environmental assessment. The permittee from a previous towed project using the same CuPod towed behind a vessel reported a high level of fish survival, no adverse impacts to water quality, a limited number of escapes all of which were recaptured, no adverse effects from interactions with protected species, and the successful use of mechanical, non-chemical methods to clean and maintain the gear and reduce sites for parasites to lay eggs. The results of the project are available in a report that was published and is available from NMFS. The results of that project,

and from other offshore aquaculture projects, helped to inform the analysis in the EA. The information from the previous trial was described in the draft EA, so no change was made to the EA as a result of this comment.

Comment 29. The commenter had questions about the viability of the project even with its small scope and limited time frame. The commenter suggested the permit be revoked if there are any questionable events or practices.

Response 29. Failure to comply with the terms and conditions of the SCREFP and the procedures analyzed in the EA would be grounds for revocation, suspension, or modification. This information is in Appendix B, Proposed Terms and Conditions, therefore, no changes were made to the EA in response to this comment.

Comment 30. A commenter stated that the process of issuance of a SCREFP circumvents the development of a detailed fishery management plan for open ocean aquaculture, an issue debated in court whether NMFS is correct in treating offshore aquaculture as "fishing" for regulatory purposes. Hawaiian organizations and individuals have challenged this question in regards to the first project.

Response 30. See response to Comment 2, above.

Comment 31. The Draft EA notes that the last CuPod project created a fish aggregate device attracting numerous species including sharks - demonstrating an impact on the environment. This could lead to shark and fishermen interactions. Sharks have bitten through fish cages numerous times causing fish to escape. One tiger shark was killed in defensive measures.

Response 31. Section 4.3 of the EA describes the potential FAD effect of the array; i.e., the tendency to aggregate fish including sharks, as was observed in a 2011-2012 towed Velella project. The FAD effect is normal for stationary and near-stationary floating objects at sea, including the CuPod and feed vessel. The EA describes that, because sharks may aggregate at the array, there could be a slight increase in fishermen-shark interactions. However, because the CuPod would not provide a source of sustenance for sharks, any attraction to the device is expected to be temporary. In addition, fishermen may hook sharks at any time when they are fishing, even while troll fishing or at other FADs. Although some sharks could be caught by fishermen fishing around the array, none of the sharks that are likely to be at the array are threatened or endangered, so fishing would have minimal impact to shark populations.

The CuPod mesh is made of durable metal, and would, therefore, be resistant to intrusion or tearing by sharks. NMFS is aware that a tiger shark was killed around a near-shore aquaculture farm off of Oahu in 2005, in response to a life-threatening situation when the shark acted aggressively toward the employee. No similar incident occurred during the 2011-2012 towed CuPod project. Kampachi Farms staff would maintain a lookout for aggressive sharks and leave the water, if necessary. Safety measures that include the use of buddies during in-water work are also expected to promote worker safety, while reducing the need for lethal measures to be taken. This information was added to Section 4.3 of the EA to clarify operations when sharks are in the

vicinity of the project and to document. An explanation of the potential effects on sharks by fishermen fishing around the array was also included in the EA.

Comment 32. The company already lost sea cages during a trial run. It has been responsible for thousands of dollars worth of coral damage due to irresponsible placement of an unused cage.

Response 32. Please see response 18, above. In that response, we clarify that one CuPod was lost during sea trials prior to the 2011-2012 towed Velella project. NMFS has no information that a lost CuPod caused coral damage. Operational procedures to respond to a separation of the CuPod are described in Section 1.3. Potential impacts to coral habitats are analyzed in Section 4.2.1. This comment does not require a change to the EA.

Comment 33. A commenter suggested that at a minimum, a bottom survey for the proposed project site should be done prior to and at the end of the project, and that [NMFS] can't rely on bottom survey off of Molokai to make assumptions about impacts of the kampachi project.

Response 33. NMFS was unable to find specific information about the benthos in the project area; and, therefore, used data derived from Molokai deep water surveys, NOAA charts, and information about bottom topography and precious coral surveys to help determine what the physical and biological baseline is. The information is from a survey undertaken at another island in the main Hawaiian Islands and not from other Pacific Islands or some other ocean. In general, agencies may often encounter areas where access is restricted or limited, and adjacent areas must be observed instead to gather data as appropriate to weigh effects of a proposed action. The Molokai deep water surveys described deep areas rich with fauna that are found near underwater channels, and described that fauna richness dropped off substantially outside of these canyon areas. The study of deep submarine canyon life was done at depths of 1,000 to 3,000 feet which is shallower than the area that would be used for the current trial. That study described how, at intermediate depths, the concentration of bottom fish species fell off due to an oxygen minimum zone. During its Essential Fish Habitat consultation, NMFS obtained additional information that the deep water site in which the anchor would be established is not likely to contain deepwater corals. This information was added to the description of the affected habitat (Section 3.2.1) and a map of the bottom topography will be added to Appendix E. Because NMFS could not locate other specific information about the project area, no other change was made to the EA as a result of this comment.

Comment 34. One commenter asked how the feed barge and array would be monitored.

Response 34. Cameras on the feed barge and in the CuPod will send information to a land-based monitoring station. The cameras would be monitored on a periodic basis, and at least twice a day to control feeding. This detail was added to the EA in Section 1.3, under “Activity.” The draft EA already described above board monitoring using cameras that are remotely viewed. The addition of this clarifying statement does not change the impact analysis.

Comment 35. Farming of carnivorous finfish in open waters presents issues with disease transfer between wild and farmed fish populations.

Response 35. The potential for disease transfer is covered in Section 1.3 (Potential for disease or parasite transmission). The likelihood that the proposed project would result in disease transfers to wild fish is very low because the CuPod would be routinely cleaned, which would minimize habitat for parasite eggs. Furthermore, the CuPod would be nearly constantly flushed which would result in high water quality in the CuPod which, in turn, is expected to promote health in the fish.

Comment 36. One commenter was concerned about the potential for wild fish populations to be depleted in order to feed farmed fish.

Response 36. The feed that would be used is described in Section 1.3. The feed manufacturer uses sustainably harvested fish species. Because this information was already in the EA, no change was made to the EA as a result of this comment.

Comment 37. A commenter was concerned about pollution from fish wastes and excess feed.

Response 37. NMFS considered the potential impacts of the project on water quality. Impacts to water quality and features of the project that are expected to prevent large adverse impacts to water quality are described in Section 4.1.1. Because this information was already in the EA, no change was made to the EA as a result of this comment.

Comment 38. A commenter was concerned that escaped fish can alter and weaken wild fish populations through intermixing or competition for food.

Response 38. NMFS evaluated the potential for fish to escape and found that there would be a low risk of escape because the metal mesh of the CuPod is strong and resistant to tearing, and the entry hatch has a mesh net that would be zipped behind a diver entering or exiting the CuPod (Section 4.2.1). The EA describes that although there is a limited potential for escapes through the zippered mesh hatch while divers enter or exit the CuPod, any fish that escapes is very likely to be quickly recaptured by divers. Fish that are not recovered from the operation are not expected to survive as they would become prey for other fish. Finally, the fish that would be stocked in the CuPod are not genetically distinct from wild fish. These impacts are described in Section 4.2.1). Because this information was already in the EA, no change was made to the EA as a result of this comment.

The low likelihood of survival means that competition with any wild fish for forage is unlikely. This will be added to the EA in Section 4.2.1, in a new section entitled, “Potential for competition for forage.” This is a minor change to the impact analysis.

One commenter provided questions, these are answered as follows:

Question 1. Will the feed barge be actively monitored? Will someone be on the feed barge monitoring the array? Would email and text message system tell someone on land that the array is moving outside the defined area?

Answer 1. The feed barge would be monitored remotely using a command-and-control software program that can detect whether the CuPod is within a pre-defined operating area. If the CuPod were to be detected outside of the approved operating area, the computer has the capability to generate alerts to the main station and to send alerts to staff cell phones. The feed barge would be unstaffed, except during maintenance visits. The lack of staffing of the barge, except during maintenance visits will be clarified in the EA. The addition of this clarifying statement does not change the impact analysis.

Question 2. Request for more information about how the applicant will know when the fish are satiated.

Answer 2. The feed would be delivered as a slurry. At first the fish move into a fairly compact ball as they feed. The in-water camera would allow the operator to watch the fish feeding at the feed ball. When the fish become more dispersed and less intensely interested in the feed, the feeding would be stopped. This information was added to the EA in Section 1.3, under "Feed and Feeding." The addition of this clarifying statement does not change the impact analysis.

Question 3. The description of security indicates the array does not have an active human monitoring presence. How long is the response time for someone to get out to the array if something catastrophic were to happen? Will the underwater camera be monitored constantly during the daytime? Is there an archiving system for the onboard surveillance camera? Will the above board camera be viewed in real time?

Answer 3 The response time is estimated to be less than an hour. The camera would not be monitored constantly, but camera information would be available online 24 hours a day. No on-board archiving is available. This information was added to the description of the security system in Section 1.3. The addition of this information does not change the impact analysis.

Question 4. How loud is the pressure washing?

Answer 4. The pressure washer is a gasoline-powered DeWalt pressure washer operated at a rating of 4,000 psi and connected to a Honda generator. The noise level would be no louder than the sound of a fishing boat engine and would be between the sound of a lawn mower and a small motorcycle (Sims, 2013d). The generator, the loudest part of the equipment has a noise rating of 75.5 decibels. The generator would be completely enclosed within a plywood container on the feed vessel (Sims, 2013e). This information was added to the EA. Because a noise level of this level was considered in the analysis, the change does not change the analysis in the EA.

Question 5. Is Kampachi Farms or NOAA required to undertake site specific surveys? Relying on deep sea survey information from Molokai to apply to the Big Island could be fraught with error. The potential for scouring 9 acres seems potentially destructive.

Answer 5: Although federal agencies are generally not required to undertake new studies in order to complete an environmental analysis, the EA should identify the missing or incomplete information (in this case, site-specific data about the substrate), and explain the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable adverse impacts on

the human environment. In this case, NMFS searched for information about the benthos in the project area and initially did not find substantial amounts of site specific information related to the presence of biological organisms. Therefore, we used data derived from Molokai deep water surveys, NOAA charts, deepwater benthic habitat surveys and information about precious coral beds to help determine the physical and biological baseline. NMFS added information about the rugosity of bottom topography of the project area to the EA. The deep habitat that would be affected by the anchor and chain is not likely to contain deep coral habitat, and is likely sparsely occupied silt, sand and lava rock. NMFS included a description of the information that was missing and how available information was used determine that the proposed project would not have a large adverse impact on deep water organisms in Sections 3.2.1 and 4.2.1.

Question 6. The impacts to seabirds might be based on the size of the mesh not presenting an entanglement since some seabirds can dive to over 50 meters deep. Were shearwaters seen diving on the CuPod?

Answer 6 NMFS clarified in the EA that the small mesh size is not expected to entangle seabirds. No seabirds were observed diving on the CuPod in the 2011-2012 towed Velella project and seabirds are not expected to dive on the proposed CuPod. In addition, the USFWS concurred in NMFS' determination that ESA-listed seabirds were not likely to be adversely affected by the project. This was a minor technical correction that does not change the impact analysis.

Question 7. Some marine mammals are listed in the table twice, and corrections to spelling need to be made. The SARS do not list common or white-sided dolphins in Hawaii.

Answer 7. Corrections to the list of species and spelling were made to the EA. The table was rechecked and errors corrected. This is a minor technical correction that does not change the impact analysis.

Question 8. What would the risk of entanglement be at night? How would it be visible to protected species at night?

Answer 8. No protected species is expected to become entangled in the tether or mooring line because the lines would be made of braided material that would prevent loops from forming. Also, the tether and mooring lines are expected to remain fairly taut. This information was in the EA in Section 4.2.2. NMFS consulted marine mammal experts who provided information that if marine mammals were to encounter the line at depth and in the dark of night, it is expected to pass harmlessly over them. This information was added to the EA. The information does not change the outcome of the analysis.

Question 9. In a big swell, would the lines become slack and then tight? There could be slack in the lines due to ocean conditions.

Answer 9: Heavy swells would create some motion in the feed vessel, but the predominant factor for loading on the mooring would be the current drag on the cage. During periods where the current is changing direction, some tension would be maintained on the main mooring line due to the effect of wind on the feed vessel as well as the weight of the nylon and buoyancy of the

lower polypropylene section. Because the mooring line would consist of 8-strand plaited line rather than twisted rope, no coils or loops are expected to form (Sims 2013d). Information addressing the behavior of the mooring line and tether in ocean currents and tides is added to Section 4.2.2, under Entanglement. This information did not change the impact analysis.

Question 11. Would the support craft operator that would be looking out for sea turtles and marine mammals also have other duties (communicating via radio, checking instruments)? Could this impair their ability to detect protected species?

Answer 11. The vessel operator and another crew member aboard the small vessel would monitor the seaway in front of the vessel. This clarifying information was added to the description of operations in Section 1.3. This did not change the analysis in the EA.

5.4.3 Magnuson-Stevens Fishery Conservation and Management Act

Issuance of the proposed SCREFP would be done in accordance with the provisions of the approved Hawaii Fishery Ecosystem Plan and implementing regulations. Regulations require a permit if gear that is not specifically approved would be used to fish for any Coral Reef Ecosystem Management Unit Species. The applicant would comply with required procedures for applying for and responding to a decision about a SCREFP, and NMFS would comply with required procedures for accepting, reviewing, processing, and denying or approving the SCREFP. Furthermore, the impacts of the proposed action on target, non-target species, and other biological and socio-economic environment would be considered prior to issuing a permit. Coordination of the potential impacts of issuing the permits would be completed in accordance with the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) prior to issuing a permit. For these reasons, once the coordination and reviews are completed, as appropriate, the proposed action would be in compliance with the MSFCMA.

5.4.4 Paperwork Reduction Act (PRA)

Forms used to collect information about fish harvested under a SCREFP have been approved by the Office of Management and Budget (OMB) and include:

NOAA Fisheries Service, Pacific Islands Fisheries Science Center forms:

Special Permit/Low-use Marine Protected Areas Coral Reef Taxa Daily Catch Report; OMB Control No. 0648-0462; Expires 10/31/15.

NMFS Transshipment Log for Coral Reef Ecosystem Management Unit Species; OMB Control No. 0648-0462; Expires 10/31/15.

Forms used to collect information about interactions with the Velella array include:

National Marine Fisheries Service, Marine Mammal Authorization Program Mortality / Injury Reporting Form; OMB Control No. 0648-0292; Expires 02/29/16.

5.5 Coastal Zone Management Act (CZMA)

The CZMA requires that any required federal license, permit, or other activity that may affect any coastal use or resource be reviewed for consistency with a state's approved coastal zone management program. The State is required to maintain a list of federal license and permit activities which 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 activity so the State may determine, within 30 days of such notice, whether coastal effects are reasonably foreseeable. Open ocean culturing operations are not on the list of license and permit activities which Hawaii wishes to review for consistency.

Pursuant to 50 CFR §665.224 and 15 CFR § 930, as a condition of issuing a special permit under the Hawaii FEP, on February 15, 2013, NMFS mailed a copy of the completed application package to the State of Hawaii with a request for recommendations concerning this project. No recommendations were provided within the 30-day response period.

The State of Hawaii Coastal Zone Management Program reviewed the proposed activity as described in the USACE's Public Notice of Application for a Permit for Kampachi Farms, LLC. By letter of March 25, 2013, to George Young, Chief, Regulatory Branch of the USACE, Honolulu Branch, the Director of the Office of Planning informed the USACE that the Hawaii Coastal Zone Management (CZM) Program reviewed the public notice for the project located 6 nm west/offshore of Keauhou Bay and 7nm south-southwest of Kailua Bay, Kona Coast, Hawaii. The Office of Planning found that a CZM federal consistency review is not required. No request for review was submitted to NMFS within 30 days of notice.

5.6 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 the importation of marine mammals and marine mammal products into the United States.

The use of the Velella array falls within the activities listed as "Hawaii offshore pen culture" which is a Category III fishery as there is a remote likelihood of /no known incidental mortality or serious injury of marine mammals.

NMFS's review of the proposed activity showed that the gear and operations of the Velella array for a period of up to a year 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 4.2.2.

NMFS coordinated the proposed activity with NMFS PIRO Protected Species Division in accordance with the MMPA and in coordination with the USACE. NMFS found that the most likely effect of the project on marine mammals is anticipated to be more behavioral (e.g., individuals that engage 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 (HF, 2009; KBWF, 2009). During a previous project in 2011-2012, that used the same small CuPod which was 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 Kampachi Farms website (kampachifarm.com/sustainability.html) show that most of the dolphins and whales passed by the vessel and 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. One humpback whale and several rough toothed dolphins were noted 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 became entangled in or interacted with the gear. Although sharks were seen associated with the array, no injuries to marine mammals were reported during the previous project from sharks, hooking, or direct collisions with the gear.

Entanglement

The potential exists for marine mammals to become entangled in nets and lines used for ocean activities. Marine mammals that encounter the array are not expected to become entangled because the cage mesh is rigid, the mooring line and tethers are expected to be under tension and kept free of loops due to the pressure of currents on the CuPod and force of wind on the feed vessel. Aquaculture facilities located in State waters and that also use anchoring lines, particularly Hukilau farms (HF) and Kona Blue Water Farms (KBWF), have not reported incidents of protected species entanglements over the course of their operations (HF 2009, KBWF 2009). No entanglements were reported during the 2011-2012 towed CuPod project. For these reasons, the potential for entanglement is unlikely.

Vessel Strikes

The maximum speed of the vessel towing the CuPod on site is estimated to be about 2 knots. The small, inflatable support vessels that would be used for weekly maintenance visits have a maximum operating speed of 24 knots; however, in the open ocean conditions around the array, the vessels would be expected to travel at speeds less than 15 knots and operators would maintain a vigilant lookout for protected species (Sims, 2013). The small size of the vessels that would be used and relatively slow operating speeds are expected to reduce the risk of serious injuries to an animal if a collision were to occur. In the vicinity of the array they would be used at near idling speed. To help avoid collisions with marine mammals, crew members on board support vessels would actively monitor the ocean en route to and from the array. Slow speeds, careful piloting and constant observation by crew members will minimize the potential for marine mammal collisions with support vessels. Any interactions that result in injury will be reported which will allow NMFS to keep informed of interactions and injuries and consider additional management requirements (see Appendix B and D, EA). For these reasons vessel strikes are expected to be so rare as to be discountable and there would be such a low risk of serious injury that impacts from vessels are expected to be negligible.

Noise

Noise from the unstaffed feed vessel and CuPod is expected to be minimal; the only sound when the array is unstaffed would be the sound of feed being pumped to the fish in the CuPod which would occur several times a day, When Kampachi Farms is present at the array, sounds may include the raising and lowering of the CuPod using ballast tanks, and the generator and water noise associated with power washing the CuPod and tether lines. When raising or lowering the CuPod, air entering and leaving the CuPod's ballast tanks is expected to emit a soft hissing sound that may be heard underwater. The sound is similar to typical hydraulic systems used in commercial or recreational operations that regularly set or retrieve gear. Power washing noise is expected to have negligible effects on marine mammals as the noise level would be similar to fishing vessel engines. To prevent accidental injuries to marine mammals from a startle response, Kampachi Farms would do visual scans to ensure marine mammals are not in the immediate vicinity when the power washer is started up.

Noise emitted from the support vessels is not expected to be any different than any other vessel operating in waters around Hawaii. When fish are initially stocked, the pump that would be used to channel the fish into the CuPod is expected to be on the scale of a ballast pump, and would only be used a few times during stocking. For the above reasons it is expected that project noise will have negligible impacts to marine mammals.

Effluents and waste

Fish will be fed in a manner that minimizes the delivery of access feed to the stock, hence, there should be little uneaten feed released to the environment as an attractant. The small stocking density, minimal release and anticipated rapid dilution and assimilation of particulate and dissolved uneaten feeds or fish metabolites are not expected to result in degradation of water quality in any manner that could impact marine mammals. Effluents from the fish in the CuPod are expected to be diluted and would have negligible impacts on marine mammals. More analysis about the potential impacts to water quality is in Section 4.1.1 of the EA.

Local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. Kampachi Farms personnel will avoid disposing of any contaminants into the water, and violation of such established regulations would be grounds for permit revocation. Kampachi Farms is expected to follow all applicable environmental laws and regulations regarding the release of wastes, garbage, oil, plastics, or other hazardous substances into the marine environment. Kampachi Farms does not intend to refuel at sea or use oils. If there were to be an accidental spill, such an event would be expected to be infrequent, small, and quickly removed using absorbent pads. Given the small size of the operation and support vessels, any discharge not immediately recovered would likely be diluted or dispersed. For these reasons, the impacts of effluent and waste discharges on marine mammals would be negligible.

5.7 Endangered Species Act (ESA)

NMFS's initial review of the proposed activity shows that the gear and operations of the Velella array for a period of up to a year have the potential to result in interactions with listed sea turtles, marine mammals, and sea birds; however, turtles, marine mammals and seabirds are not expected to be injured by the gear or activities as described in Section 4.2. NMFS coordinated the proposed action and its finding that the project may affect, but is not likely to adversely affect listed species with NMFS PIRO Protected Species Division (PRD) and with the U.S. Fish and Wildlife Service (for listed seabirds) in accordance with the ESA, and in coordination with the USACE.

By letter of September 19, 2013, the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Service Office concurred with NMFS' determination that issuance of the SCREFP to Kampachi Farms is not likely to adversely affect endangered seabirds given the small number of listed seabirds in the area, the small size of the metal mesh and visual barrier between fish and seabirds that would reduce the potential for seabirds to become entangled, and because the lights on the project would be limited to the minimal amount required for navigational and safety purposes.

By letter of September 25, 2013, NMFS Protected Species Division (PRD) confirmed that the issuance of the SCREFP to Kampachi Farms is may affect, but is not likely to adversely affect endangered or threatened species or proposed Hawaiian monk seal critical habitat. Based on the analysis of potential impacts to listed species, PRD concluded that the effects from potential entanglements, vessel strikes, and exposure to waste and effluents would be discountable and the potential effects from noise to be insignificant. PRD also found that potential impacts to proposed monk seal critical habitat would be insignificant

5.8 Critical Habitat

No critical habitat has been established in the project area. Proposed critical habitat for endangered monk seals or corals proposed to be listed would not be adversely affected by the project as described in Section 4.2.2.

5.9 Essential Fish Habitat (EFH)

The MSFCMA identifies EFH as those waters and substrates necessary to fish spawning, breeding, feeding and growth to maturity. Habitat Area of Particular Concern (HAPC) is defined as areas where ecological function of the habitat is important, habitat is sensitive to anthropogenic degradation, development activities are, or would stress the habitat, or the habitat type is rare.

The proposed Velella project would be operated in waters that have been defined as Essential Fish Habitat (EFH) as follows:

- The water column is EFH for bottomfish and seamount groundfish eggs and larvae down to 400 m depth (1,200 ft)

- The water column is EFH for eggs and larvae of pelagic species down to 200 m depth (600 ft)
- The water column is EFH for coral reef ecosystem species eggs and larvae and for juveniles and adults down to 100 m depth (300 ft)
- The water column is EFH for eggs and larvae of lobsters and crabs down to 150 m depth (492 ft).

There is no HAPC defined for the project area.

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

The relatively small amounts of uneaten feed and the particulate and dissolved waste products of fish metabolism are not expected to accumulate in or near the array since water is expected to be almost constantly moving through the CuPod. Very low levels of fish wastes would enter the environment and no degradation of water quality or benthic habitat quality would occur. The applicant would not use chemicals on the fish or on the array. The applicant would carry out routine cleaning of the array to prevent buildup of fouling organisms. This would also help reduce sites for parasite eggs. The applicant would be encouraged to provide water quality sampling results to NMFS and the USACE at the end of the project.

The CuPod design includes zippered mesh pockets to prevent fish escapes when divers enter the CuPod. Should a fish or fishes escape, they are predicted to remain around the array where they would be caught by staff. Being second generation offspring of wild caught fish, and given the high numbers of this species in the wild, the chance of genetic introgression from escaped fish is low.

The array is not expected to harbor diseases or parasites that could be passed along to wild fish. The number of fish in the CuPod is relatively low resulting in low grow-out densities, and the maintenance of the CuPod and vessel using manual methods or power washing is expected to maintain clean conditions that would reduce the potential for fluke infestations. Manual removal of fish mortalities is also expected to help ensure the stock remains healthy.

The project includes features and operational measures to prevent loss of the CuPod or vessel in case of detachment from the mooring. These included navigational beacons on the CuPod and vessel, and floats on both the mooring line and the CuPod. Neither the CuPod nor the feed vessel is expected to become detached from the mooring; however, if that should occur, floats connected to both the vessel and CuPod would allow the gear to remain afloat. The GPS transponder would provide the ability for a command and control center computer to continually monitor the location of the gear. If the gear were to be detected as being located outside of the normal operating area, an alert would be sent to the Applicant which would enable the Applicant to initiate an emergency response. In the extreme case that the ballast tanks should fail and the CuPod should become detached from its buoy, the CuPod would sink in deep waters. In all

cases, none of the gear is expected to have an adverse impact on nearshore and coastal marine environments including coral reefs.

The proposal and initial findings with respect to impacts to essential fish habitat (EFH) were coordinated with NMFS PIRO, Habitat Conservation Division (HCD). By letter of September 6, 2013, the HCD provided its finding that NMFS HCD supports NMFS Sustainable Fisheries Division and the Army Corps of Engineer's EFH determination that the proposed action "may adversely affect EFH but would have only a minimal effect on EFH". The HCD provided eight EFH conservation recommendations to reiterate the importance of effectively implementing the proposed mitigation measures and permit conditions and to bring attention additional measures for ensuring that impacts to EFH are minimal. The following summarizes the additional EFH conservation recommendations and NMFS response to the recommendations.

Recommendation 1. *The applicant should schedule the installation and removal of the array and associated structures, including the transport of these to and from the shore, during calm ocean conditions to avoid uncontrolled movement and loss of structures and materials.*

Response: We agree that the applicant should take into account weather and sea conditions, and schedule key operations (e.g., towing, stocking, harvesting) during favorable conditions to avoid accidental loss or discharge of substances and materials that may harm EFH. We note that the tender and array must be operated in accordance with Coast Guard requirements (72 COLREGS, International Regulations for the Prevention of Collisions at Sea, as implemented by the International Navigational Rules Act, 33 USC 1601 *et seq*., and 33 CFR Parts 80-90). The specific circumstances under which the array would be towed would be appropriately addressed by the owner and operator, after giving due consideration to prevailing conditions, vessel traffic density, and crew training and experience. We will inform the applicant of this conservation recommendation.

Recommendation 2. *The applicant should avoid mooring/storing the CuPod in shallow waters on top of, directly above or near bottom habitat other than soft sediment and/or un-colonized hard substrate during any phase of the project to avoid risk of impact to coral reef resources.*

Response: We agree with this recommendation, which will be included in the permit terms and conditions. We will update Section 1.3 of the final EA to clarify that, absent an emergency and to avoid risk of impacts to coral reef resources, the CuPod or feed vessel should not be moored or anchored on bottom habitat other than soft sediment or uncolonized hard substrate.

Recommendation 3. *The applicant should use new materials, or thoroughly cleaned materials, to ensure that invasive species are not transported to or from the offshore project site.*

Response: We generally agree with the objective of this recommendation. We are not aware of any increased risk of the transportation of invasive species between the nearshore mooring site and the local harbor. We note that section 1.3 of the final EA describes mechanical cleaning procedures for the CuPod and related equipment. The applicant would be required to follow the procedures described in the final EA, under the terms of the permit. We will inform the applicant of this conservation recommendation.

Recommendation 4. *The applicant should conduct an assessment and take measures to ensure that the single point anchor-system including chain and line does not cause damage to any precious corals that may be present on the bottom within the approximately 1.73 nm radius of Velella array footprint. The proposed anchor location is deep, however precious corals have been observed down to 2000 m depth, and the distributions of these have yet to be fully explored. Contact the Hawaii Undersea Research Laboratory (e.g. Christopher Kelley, ckelley@hawaii.edu) to determine the probability of precious corals being present in the project footprint.*

Response: Habitat Conservation Division clarified that the recommendation was intended to encourage NMFS to determine whether or not there have been observations of precious corals in the project footprint, or if the habitat in this location would be likely to support precious corals, and, if so, to take measures to install the anchor system in such a manner as to minimize potential habitat damage (scarring). We reviewed the best available information, including a 3-dimensional scatter plot of the project area provided by Hawaii Undersea Research Laboratory, and discussed previous coral surveys in the area with Dr. Kelley. We determined that precious corals are not present in the project area, and that the location in which the anchor and chain could scrape the bottom does not contain three-dimensional bottom habitat that would support precious corals. Accordingly, NMFS is satisfied that precious corals would not be affected by the placement of the anchor in the project area. The Final EA will be updated at section 4.2.1 (Potential impacts to fauna and habitat), and Appendix E to reflect this information.

Recommendation 5. *The applicant should implement innovative measures to minimize the introduction of organic material from undigested feed, fish waste and sloughing off of fouling biota to the marine waters surrounding the CuPod. While this particular pilot project is small and temporary in nature, and it is understood that the organic material will be quickly dissipated in the water column due to open ocean currents, the goal should be no net introduction of organic material to the environment. While a comprehensive water quality monitoring program as per a NPDES permit is not required due to the size of the operation, we encourage collection of data, commensurate with the scope of the pilot project, to support the statements and models that indicate that there are no to minimal impacts to water quality from the operation. This is particularly valuable if the intent is to scale up the operations in the near future.*

Response: We generally agree with the concerns expressed in this recommendation. Section 1.3 of the EA describes specific measures that would be taken to minimize feed entering the environment, which the applicant is required to follow. Fish would be fed at below satiation to minimize waste. We note that the small quantities of organic material re-entering the water column from salt water power-washing, manual brushing, and fish wastes pose no threat to water quality, and would be, as noted, well below minimum threshold requirements for NPDES permitting. This organic matter is expected to be readily dissipated, and much of it consumed by grazers. Although not required under the NMFS permit, the applicant has agreed to provide water quality data to improve our understanding of the impacts, if any, of this project and possible future projects. As with the previous project, the applicant would provide NMFS with water quality data reporting at the end of the project.

Recommendation 6. *The applicant is encouraged to record and ideally quantify the Velella Array's effect as a fish aggregation device (FAD), and how this in turn may affect ecosystem dynamics. As expressed above, data specific to Hawaiian waters and this type of operation helps support statements provided indicating that there are no to minimal impacts to the ecosystem due the array's FAD effect. Again, this is especially important if the intent is to scale up the operations in the future.*

Response: We agree with this recommendation. While we do not require this action, upon issuance of the permit, NMFS would encourage the applicant to collect data on any observed FAD effect for evaluating potential ecosystem impacts.

Recommendation 7: *The applicant should take full responsibility for retrieving, securing and/or removing the CuPod in the event of loss of the CuPod from the anchor system, even when this may be due to causes outside of the applicant's control such as vandalism or weather. The applicant should also take full responsibility for restoring any near shore habitat should such be impacted in association with such a loss*.

Response: We generally agree with this recommendation, except as noted below. The permit would require the applicant to take action to retrieve, secure, and/or remove the CuPod in the event of loss, failure, or damage to any component of the array, including the CuPod, mooring, and anchor system. However, liability for any damage, loss, or injury resulting from the deployment or operation of the CuPod would be determined under applicable Federal or state law, and is not properly determined as a term or condition of this permit.

Recommendation 8. *The applicant should develop a decommission plan for when the operation ceases to provide assurance that this project will not contribute to the accumulation of marine debris in the environment which could come to cause habitat impact. This plan should specify the manner in which all structures installed will be removed, which if any structures will be left in place, how biota that may come to colonize or otherwise be dependent on the structures will be handled, and financial assurances that the plan will and can be implemented.*

Response: We generally agree with this recommendation. Although this information was in the draft EA, section 1.3 of the final EA will include a more detailed description of how the CuPod, feed vessel, tether, and mooring line would be removed at the end of the project. Compliance with these procedures would be required under the permit.

With respect to the potential for biota to colonize the structures, large coral colonies are not expected to colonize the gear including the mooring line because of regular maintenance of the CuPod, tether, and feed vessel, and the relatively short duration (one year) of the project. During retrieval of the gear and prior to returning to shore, the gear would be cleaned of organic matter. Any small amount of organic material would mix with ocean water and disperse. This information will be included in section 1.3 of the final EA.

Regarding financial assurances that the decommissioning would occur, the applicant is responsible for complying with all applicable Federal, state, and local laws and regulations in carrying out the permitted activity. NMFS has no authority to require the applicant to provide

financial assurances or sureties to address possible third party claims. The permittee's liability for any tortious acts or omissions shall be determined under existing Federal and state law, as applicable.

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 regulation 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)).

Although 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 map, Appendix E-1), the proposed activities conducted as a result of issuing the SCREFP do not have the potential to affect the properties. As described in Section 1, the proposed activity is expected to 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 would be well within current levels of vessel activity in the area.

The deployment of the anchor and operation of the array on the mooring would not result in the destruction or alteration of any known historic properties. The mooring would be in waters 6,000 ft deep and 5.5 nm from shore. The moored CuPod and feed vessel would be at least 3.75 nm from shore and sometimes farther.

The proposed activity would occur within an area that is used by native Hawaiian and others for pelagic fishing (such as troll and handline). The small size of the array and limited duration of the trial would not preclude or otherwise interfere with fishing in this area. Two FADs are located within 5 nm of the CuPod and are used extensively by fishermen. As stated previously, it is expected that the moored CuPod would aggregate fish in a similar manner as these FADs and fishermen would be able to fish around the CuPod. The array and mooring lines would be removed at the end of the trial.

NMFS is unaware of any records of archaeological resources or property eligible for inclusion in the National Register within the area of affect.

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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 activity; 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

Special Permit 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 Hawaii Fishery Ecosystem Plan. 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 CuPod as analyzed in the 2013 Environmental Assessment.

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 132 m^3 (4,662 ft^3) CuPod as analyzed in the 2013 Environmental Assessment;

5. The Almaco jack (*Seriola rivoliana*) is the only species approved for stocking of and harvest from the CuPod. No other species is approved.

6. The special permit authorizes the use of the CuPod to culture and harvest no more than 2,000 individual fish during the term of the permit;

7. Prior to stocking with fish, the CuPod must be equipped with a radio transmitter/radar reflector buoy(s), and/or an approved gear tracking system (e.g., satellite tracking, GPS);

8. The 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 in radius around the following coordinates which are the approximate location of a single point mooring in deep waters:

   19°33' North latitude; 156°04'west longitude;

9. With the exception of vessel and gear provisioning and powered transit to and from federal waters, 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 National Marine Sanctuary;

10. The use of prophylactic antibiotics, medications, chemicals, or other treatments shall not be allowed unless authorized by a competent federal or state agency, or duly licensed veterinary personnel;

11. The special permit holder shall monitor the condition of the CuPod on a continual basis, including fish within the CuPod, to the extent possible. When weather and ocean conditions do not permit physical or remote monitoring, monitoring shall resume as soon as possible;

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

13. The special permit holder will comply with the Velella Project Emergency Reporting Plan and the Marine Protected Species Monitoring and Reporting Plan for the duration of the of the permit;

14. NMFS PIR reserves the right to inspect and/or provide an observer to the demonstration project to monitor the operation as necessary;

15. The special permit holder will clean the CuPod and feed vessel before returning to ports.

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

17. In issuing the permit, Regional Administrator, NMFS PIR has relied on the information and data which the applicant 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

18. 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 CRE MUS harvested under a special permit, and report the port and the approximate date and time at which the catch will be landed.

The permit applicant, Kampachi Farms, shall be responsible for complying with all applicable maritime and other civil laws in the conduct of its test operations under the permit. As with all permits NOAA issues, compliance will be subject to enforcement by NOAA law enforcement officers. The Coast Guard is also authorized to enforce MSFCMA regulations.

Other terms

The SCREFP is valid for one year after the date of issue.

Nothing in the permit shall be construed to preclude the institution of any legal action or relieve the applicant 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 applicant from any responsibilities, liabilities, or penalties to which the applicant 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: NOAA Fisheries Service, PIRO Official Information Collection Forms

1. Special Permit/Low-use Marine Protected Areas Coral Reef Taxa Daily Catch Report Form

2. NMFS Transshipment Log for Coral Reef Ecosystem Management Unit Species Form

3. Marine Mammal Authorization Program Injury and Mortality Reporting Form

OMB Control NO. 0648-0462
Expiration Date: 10/31/2015

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:_____
Date Gear Hauled:___/___/____ Time at End:_____ Units of Gear Lost:_____
Wind Speed:_____ Wind Direction:_____ Sea Surface Temperature:_____ Average Depth:_____
Target Species (list all):_____
Observer on Board (Y/N):____
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:_____
_____

Coral Reef Taxa - Daily Catch Report

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

Protected Species Observation

Enter Seal & Turtle numbers: identify other in appropriate box	Monk Seal	Turtle	Other
Observed in area			
Observes in vicinity of gear			
Interfering with fishing operations			
Preying on catch			
Entangled – released alive			
Entangled – released dead			

Print name:_____ _____ Signature:_____ Date:___/___/____

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 Islands Fisheries Science Center, Fishery Monitoring Branch
2570 Dole Street, Honolulu, HI 96822; FAX (808) 983-2902

NOAA Fisheries Service
Pacific Islands Fisheries Science Center

OMB Control No. 0648-0462
Expiration Date: 10/31/2015

NMFS Transshipment Log for Coral Reef Ecosystem Management Unit Species

Catch Vessel Information

Catch Vessel name: Permit Number: Radio Call Sign:

Total number of days fished: Type of Gear used:

Average units of gear set per day: Area of Catch:

Receiving Vessel Information

Receiving Vessel Name: Permit Number: Date: ___/___/____

Broker or Shipping Agent:

Transshipment Information

Species	Number Received	Total Weight Received

Print Name:_____ Signature:_____ Date: ___/___/____
(*Transshipment Vessel Captain/operator*)

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.
NMFS Pacific Islands Fisheries Science Center, Fishery Monitoring Branch
2570 Dole Street, Honolulu, HI 96822; FAX: (808) 983-2902

MARINE MAMMAL AUTHORIZATION PROGRAM

MORTALITY/INJURY REPORTING FORM

National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910

PLEASE PRINT NEATLY AND IN CAPITAL LETTERS

1- LAST NAME OF VESSEL OWNER/OPERATOR

2- FIRST NAME OF VESSEL OWNER/OPERATOR

3-MI

4-MAILING ADDRESS

5- CITY

6- STATE

7- ZIP

8- VESSEL NAME

9- COAST GUARD DOC. NO. OR VESSEL STATE REG. NO.

10- STATE COMMERCIAL VESSEL NO.

11- FISHERY I.D. NO.

12- FISHERY GEAR TYPE AND TARGET SPECIES

13- DATE OF MORTALITY/INJURY (MM DD YYYY)

14- APPROXIMATE TIME OF MORTALITY/INJURY

AM/PM

15- LOCATION OF MORTALITY/INJURY

LATITUDE o '

LONGITUDE o '

16- TYPE OF INTERACTION (PLACE AN "X")

INCIDENTAL

INTENTIONAL

17- ENTER SPECIES CODE, TYPE OF MORTALITY/INJURY (SEE LIST OF CODES ON PREVIOUS PAGE), AND THE NUMBER OF EACH SPECIES INVOLVED. MAKE ONE ENTRY FOR EACH SPECIES INVOLVED IN THIS INCIDENT. YOU MAY MAKE UP TO THREE MORTALITY/INJURY CODES PER SPECIES.

SPECIES	MORTALITY/INJURY CODE			NUMBER

18- DESCRIPTION OF UNKNOWN SPECIES OR CIRCUMSTANCES OF MORTALITY/INJURY INCIDENT

OMB CONTROL NO. 0648-0292 (expires 02/29/2016)

MARINE MAMMAL AUTHORIZATION PROGRAM

MORTALITY/INJURY REPORTING FORM

National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910

INSTRUCTIONS FOR COMPLETING THE MORTALITY/INJURY REPORTING FORM

This reporting form is required ONLY WHEN there is an incidental mortality or injury to a marine mammal during commercial fishing activities. You are required to report the incidental mortality or injury within 48 hours after the end of the fishing trip (even if an observer is on board), or, for non-vessel fisheries, within 48 hours of an occurrence of an incidental mortality or injury. A separate report form is required for each fishery, for each date, and for each location.

PLEASE PRINT NEATLY AND IN CAPITAL LETTERS.

The reporting form should be detached from this instruction sheet, folded, and sealed prior to mailing. No postage is necessary for mailing. Forms may also be faxed to NMFS at (301) 713-4060. Questions regarding completion of this form, and requests for additional forms, may be directed to the NMFS Office of Protected Resources, 1315 East-West Hwy., Silver Spring, MD 20910-3226, (301) 713-2322.

MORTALITY/INJURY REPORT FIELD DEFINITIONS

1 - **LAST NAME:** Enter the last name of the vessel owner/operator or permit holder.
2 - **FIRST NAME:** Enter the first name of the vessel owner/operator or permit holder.
3 - **MI:** Enter the middle initial of the owner/operator of the vessel or permit holder.
4 - **ADDRESS:** Enter the street address or P.O. Box number of the vessel owner/operator or permit holder.
5 - **CITY:** Enter the city name of the vessel owner/operator or permit holder.
6 - **STATE:** Enter the 2-digit state code of the vessel owner/operator or permit holder.
7 - **ZIP:** Enter the zip code of the vessel owner/operator or permit holder.
8 - **VESSEL NAME:** Enter the name of the vessel as it is identified for commercial fishing operations. For non-vessel fisheries, leave this blank.
9 - **COAST GUARD DOCUMENT NO.:** Enter the vessel's Coast Guard Documentation number; OR Enter the **VESSEL'S STATE REGISTRATION NO.:** One of these numbers must be provided. For non-vessel fisheries, enter the state fishery permit number.
10 - **STATE COMMERCIAL VESSEL LICENSE NO.:** Enter the vessel's state commercial vessel license number, if applicable.
11 - **FISHERY IDENTIFICATION NO.:** (Category I or Category II fisheries) Enter the NMFS' fishery I.D. number (indicated on the vessel's MMAP authorization certificate) for the fishery in which this incident occurred. If the fishery ID number is unknown, or the vessel is not registered under the MMAP, fill in gear type and target species under item 12.
12 - **GEAR TYPE AND TARGET SPECIES:** (Category III fisheries) Enter the type of fishing gear used and the target species being fished when this incident occurred.
13 - **DATE OF MORTALITY/INJURY:** Enter the date the mortality/injury occurred. For example: November 1, 2009 is entered as 11/01/2009.
14 - **TIME OF MORTALITY/INJURY:** Enter the approximate time of day the mortality/injury occurred. Indicate AM if the mortality/injury occurred between midnight & noon, or PM if the mortality/injury occurred between noon and midnight.
15 - **LOCATION OF MORTALITY/INJURY LATITUDE & LONGITUDE:** Use standard entries in degrees and minutes.
16 - **TYPE OF INTERACTION:** Enter whether this incident was incidental or intentional.
17 - **SPECIES INCIDENTALLY KILLED OR INJURED:** Enter the species code and the mortality/injury code of the animal(s) involved. (Refer to the species and mortality/injury code lists included on page 2 of these instructions.) Enter the number of animals involved in each mortality/injury. You may enter up to three (3) injury codes per species. Make as many entries as apply to the date, time, and location entered in items 13-15.
18 - **DESCRIPTION OF UNKNOWN SPECIES:** If you have entered a species code for an unidentified species, please provide a detailed description of the animal involved, including color patterns, length, and body shape (drawings are helpful). State whether the animal involved was a cetacean (whale, dolphin, or porpoise), pinniped (seal or sea lion), walrus, manatee or sea otter. You may also use this space for other comments regarding this incident.

OMB Control No. 0648-0292 (expires 02/29/2016)

MARINE MAMMAL AUTHORIZATION PROGRAM

MORTALITY/INJURY REPORTING FORM

National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910

SPECIES AND STOCK CODES FOR MARINE MAMMALS

Pinnipeds (seals and sea lions)

100- Steller (northern) sea lion
101- California sea lion
105- Northern (Pribilof) fur seal
115- Harbor seal
116- Spotted seal
117- Ringed seal
121- Ribbon seal
124- Gray seal
127- Hawaiian monk seal
129- Northern elephant seal
130- Bearded seal
131- Harp seal
132- Hooded seal
203- Unidentified sea lion
204- Unidentified seal
205- Unidentified pinniped

Small Cetaceans (dolphins and porpoises)

047- Atlantic white-sided dolphin
049- Pacific white-sided dolphin
053- Common dolphin
054- Bottlenose dolphin
055- Grampus (Risso's) dolphin
058- Spotted dolphin
060- Spinner dolphin
061- Striped dolphin
063- Northern right whale dolphin
068- Harbor porpoise
072- Dall's porpoise
235- Unidentified small cetacean (porpoise or dolphin)

Large Cetaceans (toothed whales and baleen whales)

002- North Atlantic right whale
005- Gray whale
007- Fin whale
010- Minke whale
011- Humpback whale
012- Sperm whale
016- Beluga whale
038- False killer whale
039- Killer whale
221- Pilot whale
230- Beaked whale
231- Bryde's whale
232- Dwarf sperm whale
210- Unidentified baleen whale
220- Unidentified toothed whale

Other Marine Mammals

114- Walrus
135- Sea otter
139- Manatee

MORTALITY/INJURY CODES FOR MARINE MAMMALS

01 - Visible blood flow
02- Loss of/damage to appendage/jaw
03- Inability to use appendage(s)
04- Asymmetry in shape of body or body position
05- Any noticeable swelling or hemorrhage (bruising)
06- Laceration (deep cut)
07- Rupture or puncture of eyeball
08- Listlessness or inability to defend
09- Inability to swim or dive
10- Equilibrium imbalance
11- Ingestion of gear
12- Released trailing gear/gear perforating body
13- Other wound or injury
14- Killed

COLLECTION MANDATE

This collection of information is mandated by the Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361 *et. seq.*), and by implementing regulations contained at 50 CFR 229.4. The information supplied on this form will be used by the National Marine Fisheries Service to estimate levels of incidental mortalities and injuries in U.S. commercial fisheries. Certain information supplied on this form may be considered proprietary and therefore subject to data confidentiality restrictions of 50 CFR Part 229.11.

Public reporting burden for this collection of information is estimated to average 0.15 hours 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 Director, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Hwy., Silver Spring, MD 20910-3226.

The National Marine Fisheries Service may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a current and valid OMB control number. The OMB control number for this form is 0648-0292, which expires on 11/30/2012.

OMB Control No. 0648-0292 (expires 02/29/2016)

Appendix D: Project Contingency Plans

D-1. Velella Project Emergency Reporting Plan
D-2. Marine Protected Species Monitoring and Reporting Plan

Appendix D-1. Kampachi Farms Project Emergency Reporting Plan

Kampachi Farms
Project Emergency Reporting Plan for the Velella Gamma Project

1. **Contacts**

a. The NOAA designated Point of Contact is:

Al Everson
Pacific Islands Regional Aquaculture Coordinator
NMFS PIRO
(808) 944 2212
Email: alan.everson@noaa.gov

b. The USACE Point of Contact is:

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

c. The U.S. Coast Guard contact information is:

Travis Araki
Private Aids Program
U.S. Coast Guard, 14th District
Phone: 808-535-3408 office
Fax: 808-535-3414 fax

2. **Notifications**

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

1) Failure of any major component of the array including any tether, mooring line, or other component including the feed vessel, CuPod, feeding hose, camera, buoy, or anchor; or damage (either willful or unintentional) to array materials or equipment by any third party, or any physical contact between the array and any third party.

2) Escape of any fish from the CuPod.

3) Mass mortality of fish in the CuPod.

4) An interaction with any marine mammal, sea turtle, or seabird that results in injury.

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

b. U.S. Coast Guard shall be notified if failure of any major component of the array occurs that results in a detachment of the vessel or spill.

3. Reporting

Kampachi Farms will report:

a. Any gear lost during the trial shall be reported to NMFS and USACE immediately.

b. At the end of the trial, Kampachi Farms will provide NMFS with a report summarizing any contingency that occurred and how it was addressed.

Appendix D-2. Marine Protected Species Monitoring and Reporting Plan

KAMPACHI FARMS

MARINE PROTECTED SPECIES MONITORING AND REPORTING PLAN

Velella Gamma 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 Velella project.

1. Contacts

a. The designated point of contact for NMFS is:

Al Everson
Pacific Islands Regional Aquaculture Coordinator
NMFS PIRO
(808) 944 2212
Email: al.everson@noaa.gov

2. Reporting

A designated representative of the applicant shall:

a) Report immediately to NMFS

1) Any observed or reported direct physical contact by any marine mammal or sea turtle with any part of the pen, cage or moorings.

2) Any observed or reported injured or entangled marine mammal or sea turtle within 100 m of any part of the pen, cage or moorings.

b) Report within one week to NMFS.

3) Any observed approach less than 10 m by any marine protected species to any part of the CuPod, vessel, tether, or mooring lines.

The applicant shall file a Marine Mammal Injury Report form including:

1. Name of observer (and reporter, if not reported by observer)
2. Date and time of report
3. Date and time of incident
4. Contact number of observer (and reporter, if not reported by observer)

5. Marine protected species identification if possible
6. Brief incident description

All interactions with marine mammals (including sightings) will be reported in accordance with the Marine Mammal Protection Act using Marine Mammal Injury/ Report Forms (see Appendix C).

Marine mammal interaction reports shall be provided to NMFS every 4 months.

Sea turtle interaction reports shall be reported every 4 months.

All interactions with seabirds shall be maintained and reported to NMFS every 4 months.

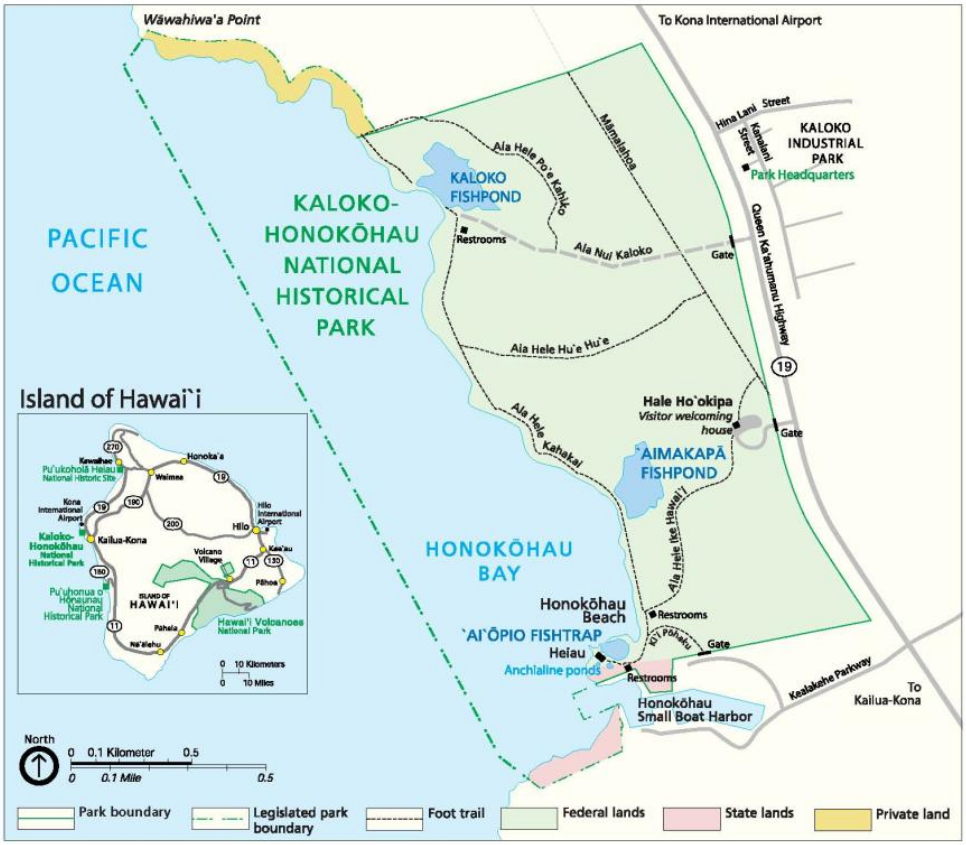
3. Monitoring

Kampachi farms may conduct marine mammal surveys in coordination with other entities aboard the Velella project.

4. Project Modification

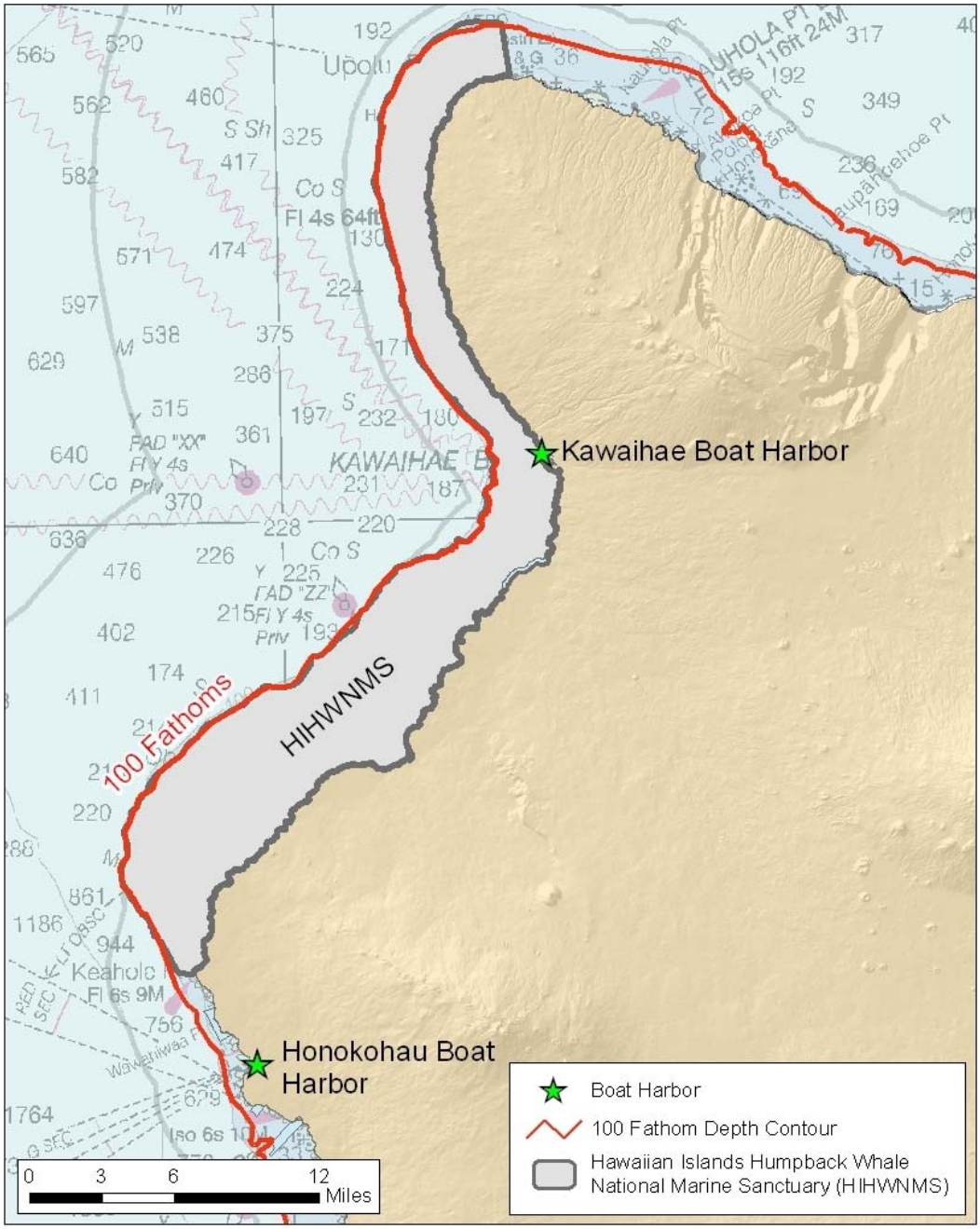
In the event any instance of significant adverse impact on marine protected species (e.g., collision, entanglement, injury, etc.) is observed to be associated with the project, NMFS would coordinate a consultation as soon as possible between the applicant and marine protected species experts to determine the most appropriate course of action. After the consultation, NMFS would 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 E. Maps



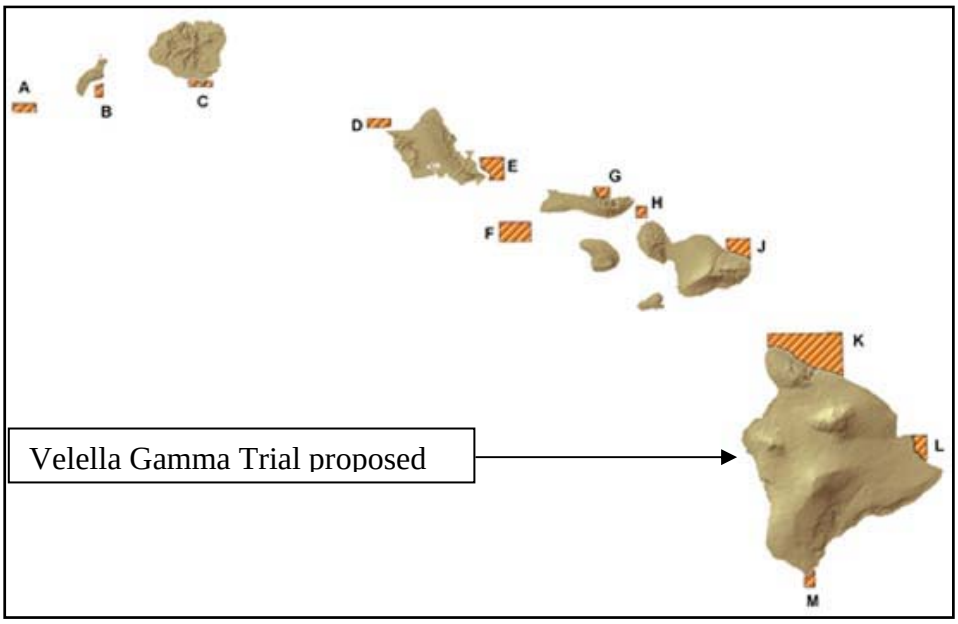
Map E-1. Map of Kaloko-Honokohau National Historical Park and the vicinity of the Honokohau small boat Harbor, Island of Hawaii.

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

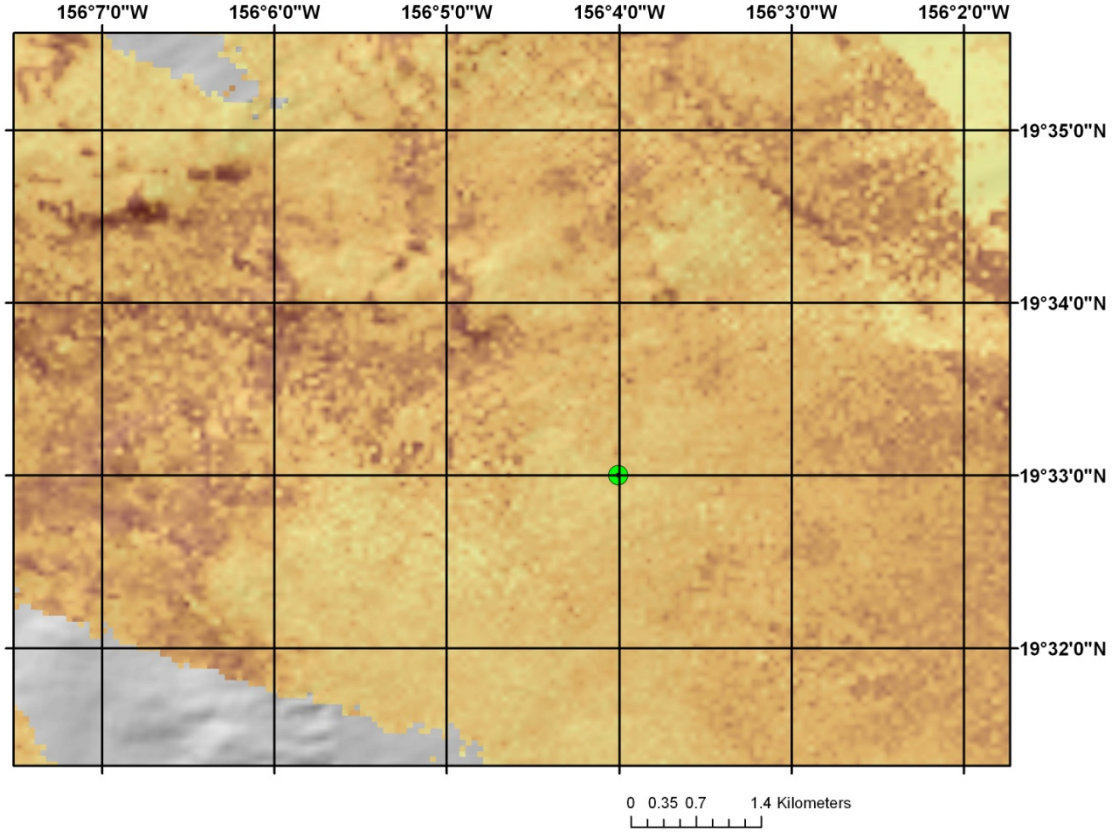


Map by: R. O'Conner 06/17/2011
Data Sources: State of Hawaii and NOAA Office of Coast Survey. Depth soundings in fathoms.

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



Map E-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 E-4. Plot of the general bottom topography of the project area using multi-beam backscatter data obtained off of 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 F. Review of project summary: Culture and Harvest of a Managed Coral Reef Fish Species (Seriola rivoliana) Using a Fixed Mooring and AquaPod in Federal Waters West of the Island of Hawaii, State of Hawaii (Rensel and Kiefer 2013)

Review of project summary: Culture and Harvest of a Managed Coral Reef Fish Species (Seriola rivoliana) Using a Fixed Mooring and AquaPod in Federal Waters West of the Island of Hawaii, State of Hawaii.

Applicant: Kampachi Farms, LLC. Kailua-Kona, Hawaii.
Prepared for National Oceanic and Atmospheric Administration, Honolulu Hawaii
Report Date: 31 March 2013
Prepared by System Science Applications, J.E. Jack Rensel Ph.D. and Dale A. Kiefer Ph.D.

Introduction

We are members of a team of biologists, oceanographers and computer scientist who have developed AquaModel, a computer modeling system to estimate the effects of fish cages on pelagic and benthic environments. Previously our team conducted water column and sediment simulation modeling of fish aquaculture along the nearby Kohala Coast of the Island of Hawaii as part of a Small Business Innovation Research Grant for USDA. Although that USDA program allows the recipients to keep their technology and finds private, we elected to post a formal report on the project online. See O'Brien, Kiefer and Rensel (2011) for more detailed modeling setup and methodologies and www.AquaModel.org for more background and a list of publications.

We were asked by NOAA staff members in Honolulu to independently assay the probable water column and benthic effects of a proposed small cage of 2,000 fish to be placed far offshore of the Island of Hawaii. As a pro bono effort for NOAA, I reviewed the proposed project summary prepared by Kampachi Farms and prepared a computer simulation of the proposed project. This model was initialized with the same or similar ambient water and sediment quality parameters previously established for assessment of single and multiple pens. Although the Kampachi Farms proposal called for farming *Seriola rivoliana*, the only metabolic model of a Hawaiian species that we have available is moi (*Polydactylus sexfilis*) that are harvested at a smaller size than *S. rivoliana*. Accordingly, we increased the number of fish cultured to produce similar biomass. Our prior laboratory research with moi indicated that they have a high rate of respiration (oxygen use) and as a very active fish would be a conservative replacement for *S. rivoliana*.

Site Characteristics and Model Calibration

The proposed fish pen would be located offshore of the Island of Hawaii (Figure 1) with the following characteristics:

Location: 19˚33'North, 156˚04'West
Depth: approximately 6,000 feet deep
Distance from shore: Approximately 5.5 nautical miles
Volume of spherical AquaPod cage: 132 m^3
Moorage type: Single point moorage (SPM)

The model was arrayed with the following characteristics:

Initial fish size: 10 g
Biomass of fish produced: 3.6 metric tons (0.5 kg fish)
Duration of simulation: 5 months
Feed assimilation rate (optimized routine)
Additional feed loss estimate: 3% (for modeling purposes)
Feed C composition (Fraction): 0.44
Feed N composition (Fraction): 0.07
Horizontal diffusion rate Kh: 0.400 $m^2 s^{-1}$
Background sediment total organic carbon content: 1%
Pelagic POC oxidation rate: 2%/d
Vertical diffusion rate Kv (surface / deep): 0.010 / 0.005 $m^2 s^{-1}$
Fish fecal and waste feed settling rates: 1 cm/s and 3 cm/s
Moorage type (conservatively) modeled: Fix moorage (no swing around SPM)
Source of circulation data: PACiOOS (see O'Brien et al. 2011)
Circulation domain area: 92 x 111 km = 10,212 km^2 (about 60% ocean, balance land)

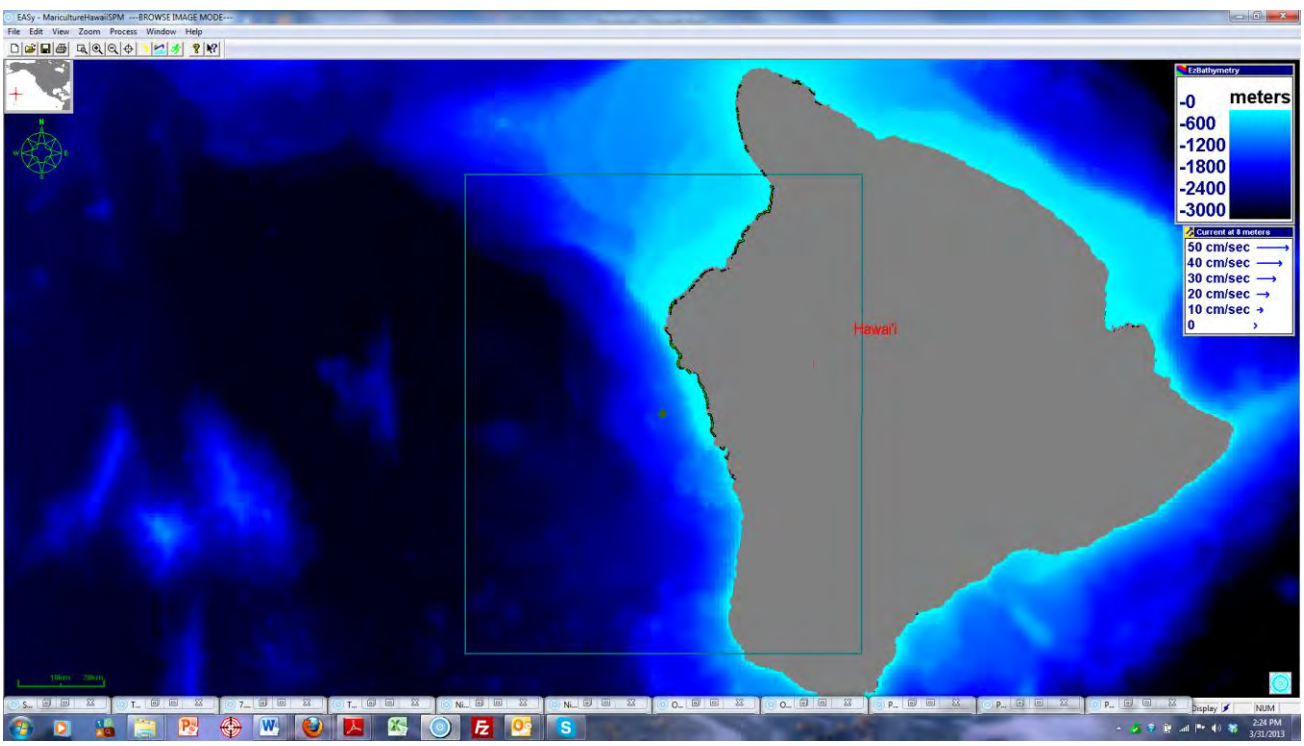


Figure 1. Vicinity bathymetric map of model domain (inside green rectangle) with proposed site in center as the small green and red dot.

Modeling Results: Water Column

The proposed cage location and initial water column conditions are shown in Figure 2, which shows a basemap of the bathymetry, contains plots of the initial conditions at the start of the simulation. Four of the plots are vertical profiles located at the center of the farm. These profiles, which are within the surface mixed layer, show the depth distributions of dissolved oxygen, dissolved inorganic nitrogen(DIN), and phytoplankton and zooplankton biomass. Two of the figures are "curtain" plots showing the depth distribution of oxygen and DIN along a transect indicated by the red line in the base map.

Figure 3 shows the same information as Figure 2 but at the conclusion of the simulation. Comparing the 2 figures, one can see that there was no change in water quality vertical profiles taken at the cage site for dissolved oxygen, phytoplankton and zooplankton biomass. There was also no nearby effect on dissolved oxygen as shown in the transect profile but a very small increase in DIN at the pen site. This increase at the cage averaged only 0.003 µM DIN(blue area of Figure 3 DIN plot) higher than the ambient concentration of 0.12 µM. Such low concentrations of DIN are to be expected in such oligotrophic waters.

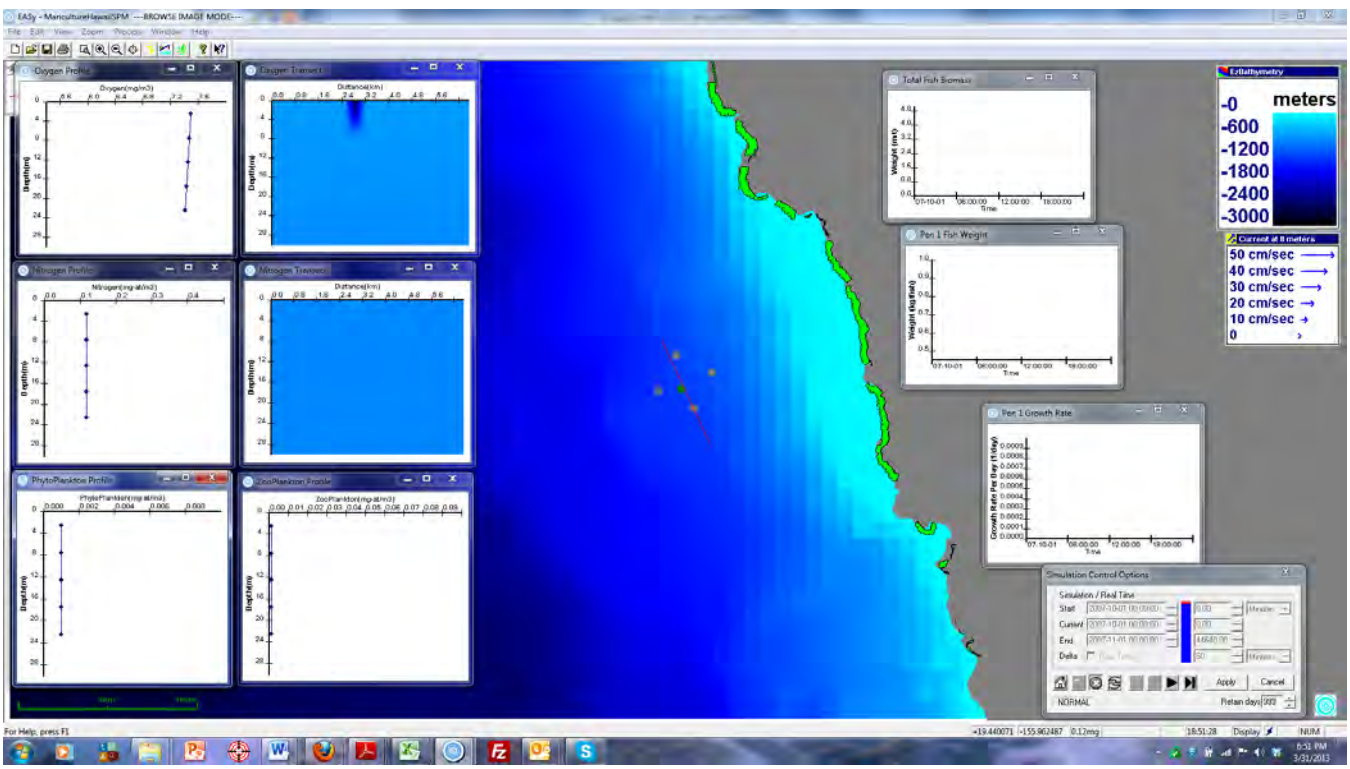


Figure 2. Initial water column conditions: green circle that represents the cage site and is surrounded by four grey dots. Data were collected at all five locations (cage site + surrounding sites). The diagonal red line through the cage site represents a continuous transect to define any possible upstream/downstream changes in transect profile plots. Green shoreline features represent coral reef areas.

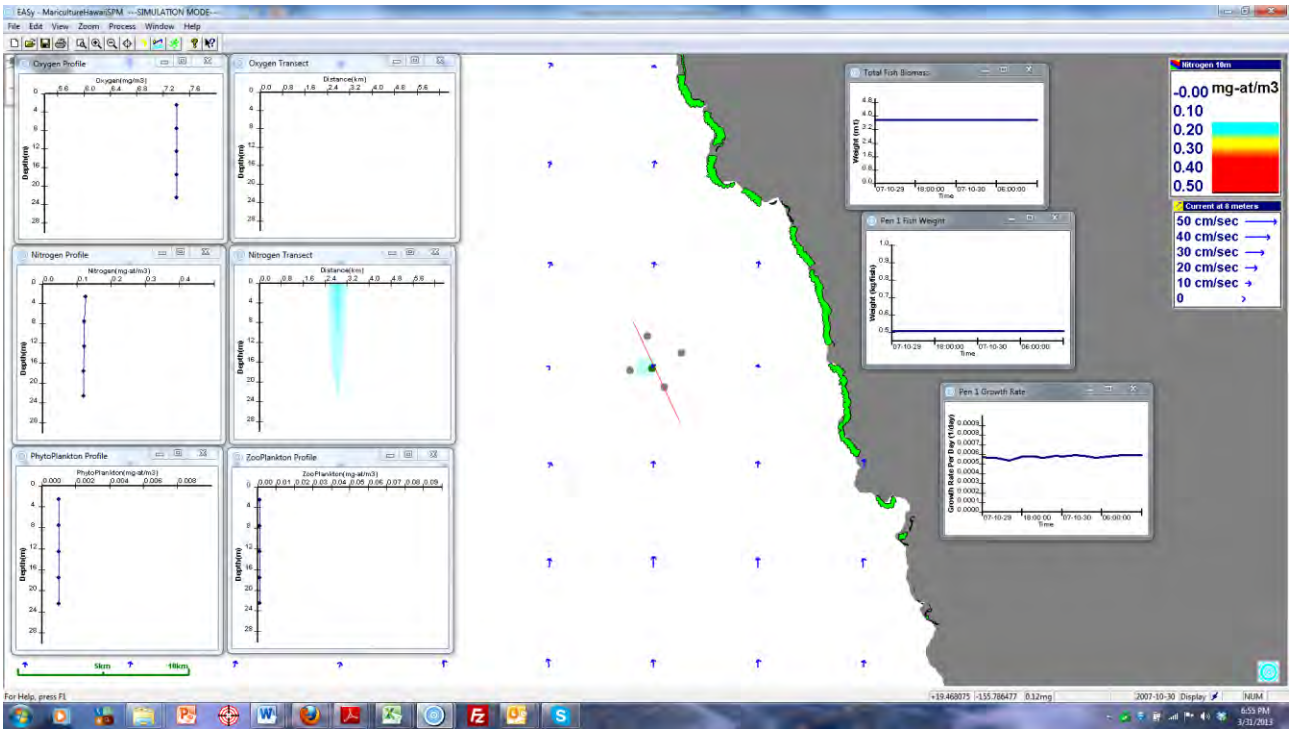


Figure 3. Water column conditions at the conclusion of the simulation. This snapshot was taken when currents were very weak and therefore at a time when perturbations to ambient conditions would be largest

Figure 3 is a single snapshot of thousands of images produced by the simulation; it illustrates a worst case condition. The average 0.003 µM increase in the pens versus outside the pens was determined statistically from all observations recorded in the model's database output file. Figure 3 is from a period when the current flows were very slow (note the small length of the flow vector arrows), but when flows returned to normal, all traces of the change disappear (additional figure not shown for brevity).

The plankton response to the minimal change in the concentration of DIN was, predictably, undetectable as shown by the lack of change in the vertical profiles. Even a very large source of DIN at the selected location would not (positively or adversely) perturb the phytoplankton and zooplankton populations, due to active physical oceanographic nature of the site and its strong currents that tend to set in either northerly or southerly directions for extended periods of time.

DIN introduced to the open ocean should not necessarily be viewed as a pollutant or contaminant as is the case in many coastal waters where eutrophication is a problem (e.g., Sutton et al. 2013). DIN is essential and the limiting nutrient for phytoplankton and the food web and without it the ocean would become a devoid of life as it is an essential component of protein. Moreover, there is evidence that large areas of the open oceans are actually becoming increasingly nutrient poor due to a lack of DIN, as summarized in an often cited publication by Galloway et al. (2004). There are, of course, exceptions to this generalization such as portions of the southern ocean, the equatorial Pacific, and the North Pacific (high nutrient, low chlorophyll zones). But clearly the Hawaiian region of the open Pacific Ocean is a low nutrient, low chlorophyll zone. The present project would make no difference in near or far field

conditions and these comments go more to the future of open ocean aquaculture in Hawaii and the misconceptions about DIN pools and flux in the region.

Modeling Results: Sea Bottom

Initial conditions for sea bottom sediment are shown in Figure 4. From top to bottom and left to right the XY profile plots (again, along the red transect line under and away from the single cage) indicate: sediment aerobic organism biomass, sediment anaerobic organism biomass, sediment sulfide profile, sediment oxygen profile in the top two centimeters, sediment total organic carbon fractional profile and total organic carbon rate of delivery to the sea bottom.

By comparing these initial results to the final results of Figure 5 it is seen there has been no perturbation of the seabottom with regard to these important parameters. Total Organic carbon (TOC) is of interest as it is the primary waste product of fish farms that demands oxygen use for respiration of benthic infauna and bacteria. The model examines all these factors interactively, the biomass of aerobic and anaerobic organisms, the TOC concentration and delivery rate as well as resultant sulfide profile that may occur if deposition is too great for the aerobic organism to process the wastes.

Figure 5 shows some additional features requiring explanation. Around the single cage location the reader will note a series of small yellow or olive green dots in an irregular shape. These dot represent the waste feed (yellow) and fish feces (olive green) distribution over a few hours prior to the time the snapshot view collected. Because of the great depth at the site, these organic carbon containing particles (i.e., particulate organic carbon) are spread over a relatively large area of several kilometers, but will not be measurable from the proposed project either directly as any measured increase in the sediments or using advanced tracing techniques such as stable isotope assessments. Low levels of organic enrichment to the seabottom produce a beneficial population ecology effect of increased diversity of organism, as first published by Pearson and Rosenberg (1987).

There are several factors involved in the above conclusion that the model is correct in forecasting no adverse effect on the seabottom. First, in the open, deep, oligotrophic ocean fish fecal or waste feed particles are subject to ingestion by pelagic grazers, including fish and crustaceans and the particles that fish farming produces are macroscopic and useful for grazers to ingest. Second, fish fecal and waste feed particles settle relatively slowly (set to 1 and 3 cm/s in this model application) so it takes a long time for these particles to reach the bottom. The average current velocity at the cage site for this simulation was 24 cm/s (0.5 nautical miles per hour) which is considered strong for a net pen operation anywhere. The average time for fish feces to reach the sediments in this model application was 3,049 minutes (50.8 hours). Not only are the particles consumed by zooplankton, but in the warm waters of the tropical Pacific Ocean bacteria will gloom onto the particles and oxidize (respire) the organic carbon. The rate for this was set conservatively at 2% per day, so only about 4% of the waste fecal matter was removed via this process in the model over the 51 hour settling period. Very little of the waste products from this operation will actually reach the bottom or not be used in the pelagic or benthic food web. Organic carbon from fish farms is very labile, i.e., easily consumed and assimilated by other organisms compared to terrigeneous forms of carbon such as tree and plant materials that include refractive organic carbon forms.

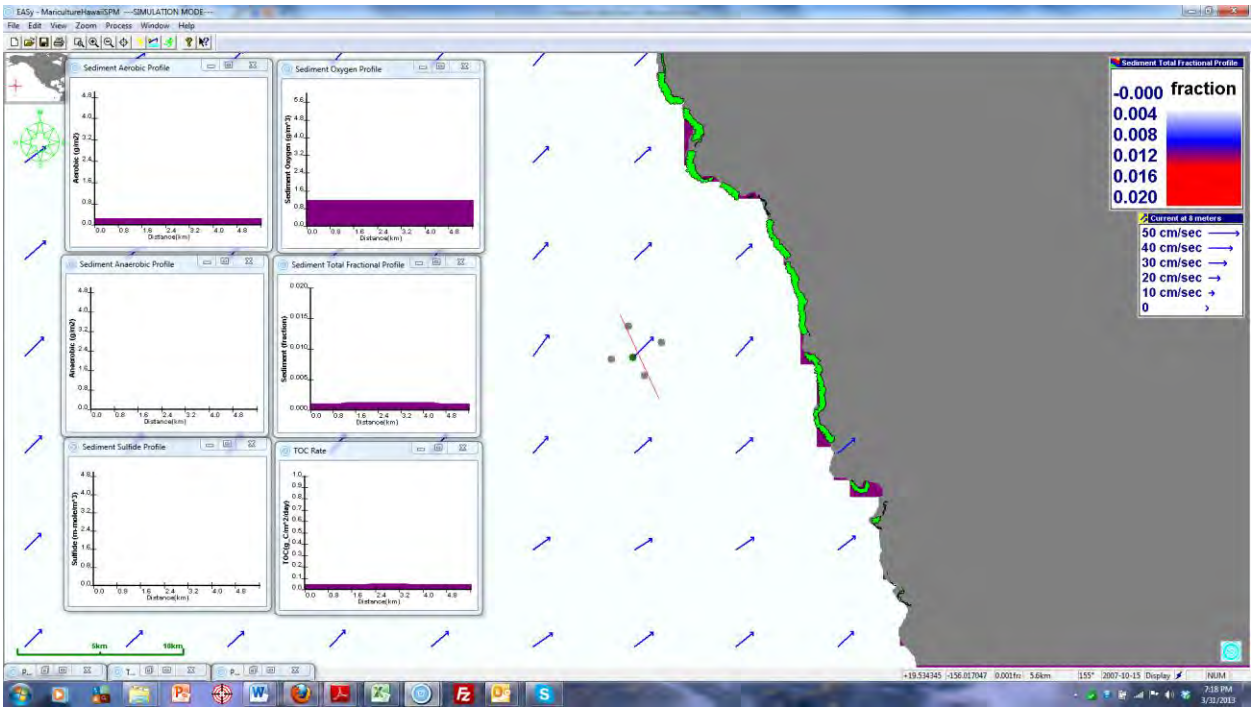


Figure 4. Initial conditions for sea bottom sediments, before fish introduction.

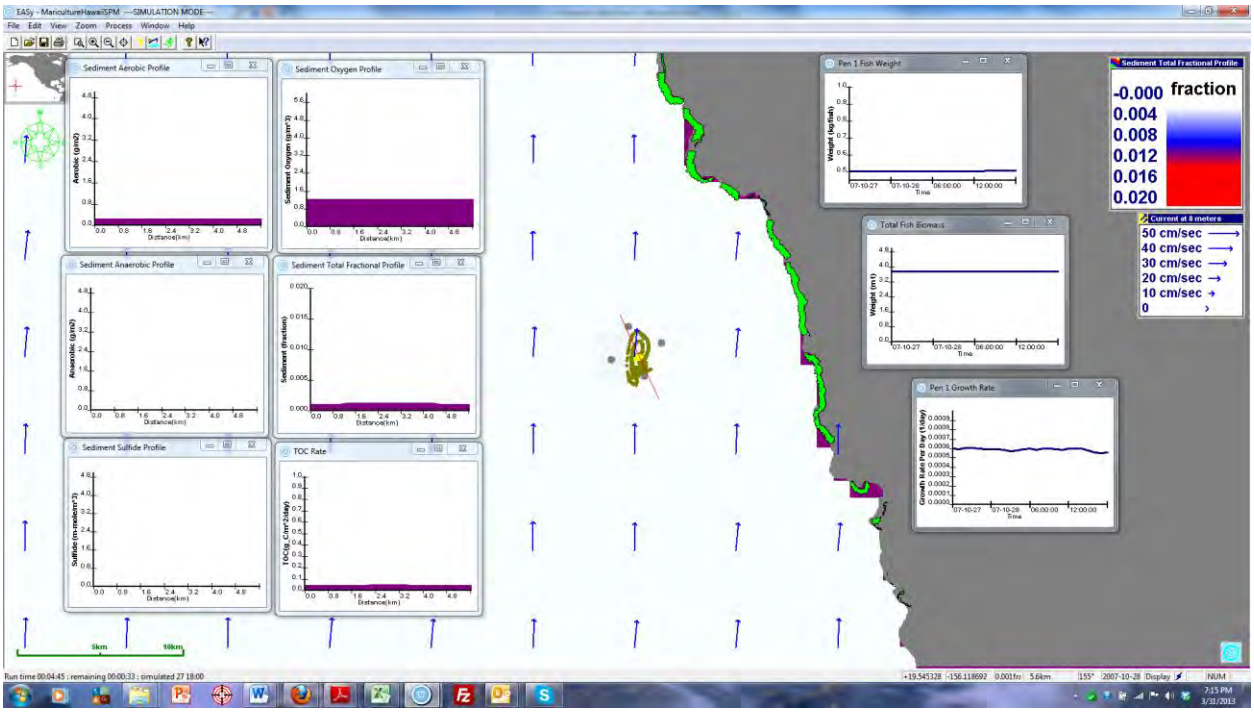


Figure 5. Final conditions for sea bottom sediment conditions, when the theoretical fish cage population achieves a mean size of 500 grams and a biomass of 3.6 metric tons. Note no change compared to initial conditions.

Summary

While it seems unlikely that 2000 fish in a small cage in the open ocean over 6,000 feet of depth could have any measurable or biological effect on the water column or sea bottom processes discussed herein, we took on this independent and unpaid review as a valuable exercise to further validate AquaModel. We not only validate through modeling existing farms, but also examine model response in differing ecoregions when no fish are present or extremely large numbers of virtual fish are cultivated to consider model performance against measured and hypothetical outputs that would be expected.

Our team is the most experienced in the U.S. and North America in practical hands-on monitoring and computer modeling of floating aquaculture effects. We believe our findings of no adverse or measurable water column or benthic effects are legitimate and defensible. We have endeavored to publicize AquaModel in many venues, through many means and have even published our principal controlling equations and conceptual model construction. Our conclusions are specific to the water column and benthic issues discussed herein, and do not include other topics or issues that may be raised about net pen aquaculture at this site or in general.

We conclude that there are no risks to water column or benthic ecology functions in the subject area from the operation of the fish cage as described in the Kampachi Farms, LLC proposal.

We have not been paid by any individual, organization or government for this review, model operation or statement of findings.

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