

Required Management Plans

A Commercial Sea Cage Facility for Moi Aquaculture in the Reef Runway Borrow Pit in Keehi Lagoon, Honolulu, Oahu, Hawaii



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

Prepared by: Aquaculture Planning & Advocacy, LLC
Kaneohe, Hawaii

Date: May 15, 2014

Required Management Plans

Ocean aquaculture facilities using State marine waters require several Management Plans that must be approved by the Board of Land and Natural Resources, along with the completed Conservation District Use Application (CDUA). Review can proceed concurrently with the CDUA and must be consistent with the Hawaii Administrative Rules, Chapter 13-15, Exhibit 3. This document, which accompanies a completed CDUA, addresses the required information. All figure references are to the figures in the CDUA.

Section A: Required plan information.

1. Project location (e.g. island map, location map, site plan (drawn to scale))

The cage aquaculture project location is the Reef Runway Borrow Pit (RRBP) adjacent to the Honolulu International Airport (HIA) that is situated in the western portion of Keehi Lagoon, Moanalua, Honolulu, Oahu (Fig. 1 a,b, and Fig. 2). Mamala Bay Seafood (MBS) wishes to lease approximately 75 acres of State marine waters encompassing the Borrow Pit (BP) to establish a 10 surface cage commercial aquaculture operation to grow moi, *Polydactylus sexfilis* (Fig. 4). MBS was formed by Mr. Randy Cates to carry out the proposed project. Mr. Cates previously owned and operated Cates International, Inc. which included an offshore aquaculture farm (also known as Hukilau Foods, LLC during part of its operation). For clarity, all further references in this document will be to MBS for the combined aquaculture activities of CI and MBS. The BP is an irregular shaped, man-made structure that was dredged to about 50 ft in depth to provide fill for the Reef Runway.

2. Natural resource assessment including descriptive information about the natural resources in the project vicinity such as biological, archaeological, cultural, geological, coastal, recreational, and scenic resources, where applicable. The presence of any threatened or endangered species shall be disclosed.

- **Biological Resources:** MBS conducted a Biological Assessment of the RRBP and the surrounding area, which included water quality profiles and nutrient analyses; surveys of fish, invertebrates and macro algae; and a survey of coral species and their relative abundance (see Sec. 5.4.2, 5.4.3 and Appendix B, EA). MBS also conducted a Benthic Survey of the benthic portions of the RRBP to provide baseline data that included bottom samples that were analyzed for general appearance, macro fauna, macro algae, oxidation/reduction potential and odor. Subsamples were analyzed for total organic carbon, benthic sand characterization and micro mollusc characterization (see Sec. 5.4.2, 5.4.3 and Appendix C, EA).

Results indicate the RRBP is dominated by open coastal water quality and the benthic environment is composed of fine silt devoid of living animals. Edges of the RRBP have a diversity of coral species.

- Archeological Resources: Previous surveys of the RRBP and the surrounding area, and MBS's recent surveys of the farm site, indicate there are no archeological resources present (see Appendix E, EA).
- Cultural Resources: A previous use and user survey in 2001 and nine years of site visits by MBS have not observed any traditional and customary gathering of resources, e.g., limu or fish, in the RRBP. Though it cannot be stated there is no use of the areas, these long-term observations indicate any use is very limited at best. Biological assessments of the RRBP demonstrate the area is highly disturbed and of low productivity, except for the shallow edges (see the Biological Resources discussion above and Appendix B in the EA). It is evident from close observations that natural resources of cultural significance are not prevalent.
- Geological Resources: The RRBP is an irregular dredged pit, with steep sides that descend to a uniform depth of around 50 ft. The area prior to excavation for fill for the Reef Runway was part of an extensive fringing reef and mud flat, Keehi Lagoon, that extended from Kalihi Channel to the entrance of Hickam Harbor and beyond (Fig. 1 a,b).
- Coastal Resources: Keehi Lagoon is a large fringing coral reef that has been significantly altered by dredging and filling since the 1930s. Three perennial streams provide freshwater influx to the lagoon: Moanalua, Kalihi and Nuuanu streams. Prior to these excavations, the Lagoon was comprised of extensive, shallow mud flats behind the fringing reef. Shallow waters limited any boating until construction of three separate sea plane runways during World War II opened up large navigable channels (Fig. 1 a,b).

Today, Keehi Lagoon functions as a large, mixed-use commercial and recreational area. The eastern portion is bordered by numerous small businesses, many of which require access to the ocean, e.g., sea plane sightseeing, ship repair, ocean tourism, commercial dockage, etc. Passage to the ocean is primarily through the Kalihi Channel (Fig. 1 a,b). Considerably less activity occurs in the western portion of the lagoon where the RRBP is located.

- Recreational Resources: Keehi Lagoon provides a variety of recreational opportunities for tourists and the people of Hawaii, e.g., recreational fishing, competitive canoe racing, water skiing and jet skiing. There are several shoreline parks, extensive mooring areas for power and sail boats, and launching ramps for trailered small boats that fish mostly offshore. These activities are very much concentrated in the eastern part of the lagoon, while the RRBP is located in the far western portion.
- Scenic Resources: Keehi Lagoon provides a large open space dotted with maritime activities and a number of islands, while offering a panoramic view of the open ocean for upland and residents of Moanalua. The eastern coastal portion of the Lagoon is

highly developed. The RRBP is in the Western portion and directly adjacent to the Reef Runway and airport facilities. The low physical profile fish farm, which will probably be a curiosity for the departing HIA passengers, will occupy less than 2.5 surface acres of the 75 acre BP and at its highest point (the feed/security barge) will be 8 ft above the sea surface. The farm should be very compatible with the existing mix of structures, islands, and uses in Keehi Lagoon.

- Presence of Threatened and Endangered Species: There are two significant protected species concerns to consider for Keehi Lagoon and the RRBP: a shorebird, the Hawaiian stilt (*Himantopus mexicanus knudseni*) and the Green Sea Turtle (*Chelonia mydas*) (see also Sec. 5.5, EA). Small numbers of stilts sometimes are sometimes found on a few of the islands in Keehi Lagoon where they find calm, shallow water to feed and nest. The RRBP and the fish farm infrastructure are not suitable habitat for stilts and should not be an attraction.

Green sea turtles have been occasionally observed in the RRBP, particularly along its edges. Based on experiences with turtles and ocean cage culture in Hawaii to date, i.e., Hukilau Foods and Kona Blue Water Farms, farming operations should not significantly affect turtle use of the edges of the BP for feeding and resting (see also Sec. 6.2.3, EA).

3. Natural hazard assessment including descriptive information of erosion, flooding, slope, tsunami, and volcanic hazards, where applicable.

The MBS aquaculture farm would be subject to any tsunami that hit the south shore of Oahu. Judging from the damage in Keehi Lagoon by the recent Japanese earthquake tsunami, with a similar event the farm would be subject to strong tidal surges. Fortunately, such events are rare and the mooring grid for the farm is designed to be very sturdy. In addition, the anchors being used far exceed requirements.

4. A description of Best Management Practices used during project construction and implementation (e.g., mitigation measures).

The major actions to manage during the initial Phase I construction and installation of the cage system and mooring grid, and subsequent Phases, are:

- installation of the mooring grid and anchors;
- construction and installation of the 10 cages; and
- installation of the feed/security barge.

Assembly of the mooring grid for the five cages of Phase I, comprising 14 anchors and the required connectors, will be carried out, followed by the mooring for the feed/security barge. Work boats with appropriate crane equipment for lifting and lowering heavy frames and 3000 to 6000 lb anchors will be used. Great care will be used to stay away from the edges of the BP during these operations. It is expected that a small amount of silt will be stirred up with the placement of the anchors, but that it will quickly be dissipated by BP

currents (see Appendix A, EA). The necessary precautions and management actions will be taken to avoid leakage of petroleum and hydraulic fluids into the environment.

The initial two floating cage rings will be assembled off-site and towed by work boats to the RRBP, one at a time. The cages will be connected to the mooring grid by divers. Then the feed/security barge will be brought on site and connected. The same processes will be utilized to install the final three Phase I cages within six months of approval, and within three years, the five cages of Phase II.

5. A description of the Best Management Practices to be used during the lifetime of the project (e.g., mitigation measures).

Key operational Best Management Practices (BMPs) to maintain environmental quality involve management of: fish feeding, water and benthic quality, fish health, and netting and mooring system integrity (see also Sec. 6.2.1, 6.2.2, 6.2.3, EA).

- Fish Feeding: Offshore fish farmers have a strong economic incentive to manage feed consumption and minimize wastage because it is the highest unit cost. MBS's goal at every feeding is to feed the stock to satiation, a state where a majority of the stock refuses any further consumption. To achieve this goal, feeding will be electronically controlled and carefully observed by video cameras and technicians. Adjustments will be made as needed. Further, should small amounts of feed pellets and particles escape the cages, they will be suspended and dispersed by the BP currents and subject to consumption by the fish that aggregate around the cages.
- Water and benthic quality: Both water and benthic quality of the BP will be periodically monitored according to NPDES permit requirements by qualified third party consultants to determine if the project is meeting DOH standards and any other permit conditions, e.g., coral health. If issues of nutrient accumulation arise, a number of mitigation measures can be applied, including:
 1. modifying electronically-controlled feeding schedules;
 2. adjusting stock biomass;
 3. altering cage cleaning schedules; and
 4. if necessary, periodically repositioning cages within the grid (known as following, see Sec. 6.2.1, EA).
- Fish health: MBS will apply well-tested BMPs for maintaining fish health, including:
 1. inspection of fingerlings for disease prior to stocking;
 2. maintaining highly controlled feeding rates to minimize wastage;
 3. utilize low stocking densities suitable for the growing environment; and
 4. regular removal of fish mortalities and cage cleaning.

In addition, stringent biosecurity procedures, adapted from large-scale marine hatcheries in Europe, will be adopted; including highly controlled access to the facility by

visitors and managed movement of staff within the hatchery facility. Plans are for disease inspection at three stages of the grow-out process:

1. stock going into the cage;
2. at 4 months into the grow out; and
3. just before the fish are harvested.

Should a disease event occur in the stock, State officials (DLNR, DOA, and DOH) will be notified and approved treatment and stock disposal procedures for aquatic species will be followed.

- Netting and mooring system integrity: Two important aspects of farm maintenance are:
 1. Inspection and repair of various cage components, including support structures, the anchor system, and cage netting; and
 2. cleaning of mooring lines and cage netting to promote maximum water flow.

The netting and morning system will initially be inspected on a monthly interval to judge wear and tear in the BP environment. The inspection schedule may be modified based on early results. MBS notes that moi are a native species, thus an escape of fish would amount to enhancement of the small wild population.

Both netting materials described in the CDUA are known to resist biofouling, however occasional cleaning will be necessary during the production year. Cleaning will be carried out by farm technicians on a specified schedule using a commercially available power washer that utilizes a water jet. No chemicals will be used. Pulverized material should minimal for any cleaning event and readily suspended and dispersed by the currents to be assimilated and recycled into the food web (see Appendix A, EA).

6. A description of the conservation methods and applications to be used in the short term and long term (e.g., mitigation methods).

It is anticipated that BMPs and applications described in Number 5 above will be used for the life of the project unless more effective methods become available. MBS is committed to good stewardship and closely monitoring production processes and their impacts on the environment of the RRBP.

7. Description of existing uses and facilities, if any.

The RRBP is a 75 acre dredged area adjacent to the HIA. The area has steep sides that descend to a relatively flat floor, uniformly around 50 ft deep, and is protected on the seaward side by an expansive reef flat that extends 2000 to 3000 ft. into the ocean (Fig. 4). There are no existing facilities within the RRBP.

Past and present public use studies indicate there is very little use of the interior of the BP where the farm will be (see Appendix D, EA). Further, there is very limited recreational use (e.g., fishing and diving) of the seaward reef flat. MBS also notes that the RRBP is part of a State designated Thrill Craft Zone, but during more than 80 trips to the site over 8 years, no

jet skis have been observed by MBS, and anecdotal information indicates it is not a preferred area for the jet ski community (see Sec. 5.6, EA). Efforts will be made to move the RRBP area from the Thrill Craft Zone.

8. Description of proposed facilities and uses, including phases, if applicable.

Briefly, MBS has proposed to locate a commercial aquaculture operation in the RRBP that will grow the native species, moi, for the local market and possibly export. The farm will consist of 10 surface cages with a fixed mooring system (installed in two phases of five cages over a period of three years). Each 114 ft in diameter cage will have a 4 ft work platform that encircles the structure. In addition, a 74 ft by 24 ft feed/security barge will be permanently anchored near the center of the cage array (Fig. 4). At full build-out, the cages and barge will take up 2.39 acres and the entire system, including the mooring grid, will occupy about 59 acres of the site. MBS will designate a 100 ft wide transit lane around the site so that the Airports Division, DOT can access the Reef Runway at any time and the public can access the outer reef during daylight (see Sec. 6.2.4, EA for details).

9. Project schedule including description of project sequencing from project construction to project completion and on-going maintenance plans, including a description and timing of natural resource monitoring and maintenance plans.

Upon approval of a CDUA lease and right of entry by BLNR, the general installation plan with estimated timeframes, will be carried out as follows:

Phase I

Step 1: The mooring grid for the five cages, 14 anchors and the required cables, fasteners and lines will be installed followed by the mooring for the feed/security barge. Work boats with appropriate crane equipment for lifting and lowering heavy frames and anchors will be used. (Timeframe - 5 days)

Step 2: The newly deployed anchor grid will undergo final adjustment of the tensions in the connecting system. (Timeframe - 2 days)

Step 3: The initial two floating cage rings will be assembled off site and towed to the RRBP one at a time. The cages will be connected to the mooring grid as recommended by the manufacturer. (Timeframe - 7 days)

Step 4: The feed/security barge will be towed to the site and installed at the appropriate grid location. (Timeframe - 2 days)

Step 5: Netting materials for each cage will be assembled into net sections off site and brought to the site by work boat. Netting will be assembled and deployed for each cage, with the assistance of a boat-mounted crane and farm technicians and SCUBA divers.

Attachment of the netting to the floating ring will be made using the brackets and connectors provided. (Timeframe - 10 days)

Step 6: Once cages and netting are in place, the feeding hoses will be run from the feed/security barge to the initial cages. (Timeframe - 1 day)

Step 7: Within 6 months and additional 3 cages will be added to the grid, by repeating the steps described above. (Timeframe - 14 days)

Phase II

Step 8: Within 3 years of approval and successful operation of the first five cages, installation of the remaining five cages and mooring system will be carried out in the western portion of the site, as described above (Fig.4). (Timeframe - 40 days)

In summary, the estimated installation time for the first 5 cage array in Phase I is approximately 41 days or less. Phase II could also take up to 40 days to deploy. Factors affecting these estimated timetables include: weather, scheduling of equipment and personnel and availability of fingerlings from the Company's hatchery for stocking.

Once surface cages are deployed they will be stocked at 10 kg/m^3 with fingerlings from the Company's land-based hatchery (site being determined). Initial feeding schedules will be developed based on the biomass per cage, e.g., on the order of once or twice a day. Infrastructure inspections and cleaning will initially be every one or two months to judge the regular frequency needed. At full build-out, harvesting should be about once a month.

Environmental (natural resource) monitoring plans will be developed according to the requirements of responsible agencies. MBS will work with the Clean Water Branch (CWB) of DOH to develop a National Pollution Discharge Elimination System (NPDES) program and Zone of Mixing (ZOM) permit addressing water quality monitoring and meeting State receiving water standards. Approved regular monitoring plans will be implemented for water quality, benthic quality and nearby coral reefs, with an anticipated quarterly sampling schedule (see Sec. 6.2.1, 6.2.2 and Appendix B, EA). Qualified third party consultants will be hired to conduct the work.

10. A description of the annual reporting requirements.

As part of the requirements of the lease of State marine waters, MBS will provide an annual report to DLNR that will describe farm production for the year and the lease rent owed, along with payment. Another annual report is required by DLNR to maintain the aquaculture license, which addresses the quantities of moi on site.

It is anticipated that environmental monitoring and reporting for water quality, benthic quality and corals will occur on a quarterly basis. These reports will be made available to all interested government agencies, in addition to DLNR and DOH.

Section B: Details of Emergency Response and Monitoring and Maintenance Plans

1. Emergency Response Plan

The Emergency Response Plan describes the actions to be taken by MBS personnel to respond to severe weather, theft and vandalism, tsunami alerts, and other potential and unknown crisis and disaster situations at its RRBP aquaculture site. In any of these instances, the Company's actions will adhere to the following priority concerns:

- a) Safeguarding the life and health of all personnel and individuals involved.
- b) Safeguarding the ocean environment from spills of oil or other detrimental liquids and materials.
- c) Securing the sea cages to prevent escapement of stock or work vessels and equipment to prevent loss to the ocean environment.
- d) Timely notification of appropriate Federal and State agencies of the event and its impacts to seek consultation as required.

In any emergency situation, personnel on site will notify senior management of the situation. Management will guide and direct responses to the situation. Staff will have communication capabilities with radios and cell phones. Every staff member will be given training in emergency response procedures. A copy of the agencies to contact in case of various situations will be kept in the main office and on each MBS vessel.

Specifically, in the event of the occurrence of the situations noted below, the several procedures and protocols to be followed are listed.

Severe Weather (including hurricane)

- 1) All sea cages and moorings will be inspected to prepare for the storm.
- 2) In the event of hurricane conditions, the feed/security barge will be towed to MBS's Keehi Lagoon facility and secured.
- 3) The Company's land-based support facilities and hatchery will be appropriately secured.
- 4) Any resulting post-storm damage or recovery actions will be reported to DLNR (Department of Land and Natural Resources), the U.S. Coast Guard and other agencies as needed.

Theft and Vandalism

- 1) Staff will secure the affected facilities and fish stocks to prevent escape or further damage.
- 2) The DLNR OCCL will be notified of the problem and any further actions requested will be followed.
- 3) The Honolulu Police Department and the U.S. Coast Guard will be contacted to report the incident. Theft from an aquaculture operation is a Class C felony.

Tsunami

- 1) In the event of a tsunami warning, all sea cages will be well secured.
- 2) The feed/security barge will be secured and remain on site.
- 3) Company boats at sea will go to sea and a safe distance from shore.
- 4) Land-based facilities will be secured given time and staff will seek higher ground.
- 5) Any post-tsunami problems will be reported to DLNR, the U.S. Coast Guard and other agencies, as required.

Collision and Sea Cage Breakaway

- 1) In the event of collision with the sea cages, work boats or the feed/security barge, the first action will be safeguard human life and the safety of the people involved.
- 2) Management will contact the U.S. Coast Guard and the OCCL, DLNR as soon as practicable and report the incident and the actions taken.
- 3) In the event of a sea cage breakaway, MBS will act to retrieve and secure the sea cage, as soon as practicable and return it to the grid. The incident will be immediately reported upon discovery to the U.S. Coast Guard and the OCCL, DLNR and assistance will be requested if needed.
- 4) In the event of any spill of pollutants, the Clean Water Branch, Department of Health will be notified and action will immediately be taken to control the situation.

2. Monitoring and Maintenance Plans

MBS's operational approach to management of natural resources monitoring, maintenance, and reporting requirements are described in more detail above, in the body of the CDUA and the EA. This section will briefly highlight approaches to monitoring, reporting, and mitigation for: water quality and benthic health, fish health, shark issues and marine protected species.

Water Quality and Benthic Health

When the MBS aquaculture farm reaches 100,000 lbs biomass, it must have an NPDES/ZOM permit from the CWB, DOH in place to permit discharge from the facility. The permit will designate certain receiving water standards for a variety of nutrient and other parameters

that the project must meet. MBS will hire qualified consultants to sample for water quality, as well as benthic parameters and other required values, initially on a quarterly basis. In addition there will be an approved Coral Monitoring Program to look at coral health and abundance in the vicinity of the farm (see Appendix B, EA). Results will be reported quarterly to the DOH, DLNR and any other responsible agencies. Should excess nutrients or unacceptable changes be detected, mitigation measures are available to the company to correct the situation:

1. modifying electronically controlled feeding schedules;
2. adjusting stock biomass;
3. altering cage cleaning schedules; and
4. if necessary, periodically repositioning cages within the grid (known as fallowing, see Sec. 6.2.1, EA).

Fish Health

Central to maintaining fish health in the grow-out cages, is maintaining stock health in the MBS hatchery. The Company will apply stringent biosecurity procedures, adopted from large-scale marine hatcheries in Europe. Further, plans are for disease inspection at three stages of the grow-out process:

1. stock going into the cage;
2. at four months into the grow-out; and
3. just before the fish are harvested.

MBS will apply well-tested BMPs to maintain fish health on the farm. Notably, moi culture in the open ocean has not been troubled by disease issues. BMPs available are:

1. inspection of fingerlings prior to stocking;
2. maintaining highly controlled feeding rates to minimize wastage;
3. utilizing low stocking densities suitable for the RRB growing environment; and
4. regular removal of fish mortalities and cleaning.

Should a disease event occur, State officials (DLNR, DOA and DOH) will be notified and approved treatment and stock disposal procedures (landfill disposal) for aquatic species will be followed.

Shark Issues

To date, there is no scientific evidence that aquaculture farms attract increased numbers of sharks, and in particular, the pelagic sharks, e.g., the Tiger Shark (*Galeocerdo cuvier*). Numerous visits to, and dives in, the RRB by MBS and others over the years have not seen any sharks. Moreover, experts indicate the RRB is not appropriate habitat for highly transient pelagic sharks and MBS's experience with its former offshore farm is while sharks of several kinds may occasionally be seen, long term presence is rare (see Sec. 6.2.2, EA). MBS will tell employees to take note of any sharks that are seen and will not use lethal

means to manage the situation, should an adverse event occur. The Company will report these incidents and seek consultation with DLNR

Marine Protected Species

The RRBP, as a dredged near shore area, is well removed from the suitable ocean habitat for dolphins, humpback whales and monk seals; species protected by Federal and State laws and regulations. Green sea turtles, also a regulated species, have been observed in the BP at its edges. The reef flats surrounding the BP have a low coverage of corals; however on the shallow edges of the RRBP corals are more abundant with a greater diversity (see Appendix B, EA).

MBS staff will watch for any significant farm impacts on the sea turtles, though experience with the offshore fish farming here indicates farming operations will not significantly affect turtle use of the area (see Sec. 6.2.3, EA). Regarding corals, MBS has done a baseline study and will implement an approved coral monitoring program to determine any significant farm impacts on recruitment and health (see Appendix B, EA). It is anticipated the coral results will be reported annually. Further, MBS will routinely adhere to recommended BMPs for avoiding protected species entanglement by maintaining taut mooring lines and netting.

Should any protected species be encountered or in the case of corals damaged, the appropriate Federal and State agencies will be contacted per a pre-approved agreement.