CALIFORNIA COASTAL COMMISSION
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F11a

December 17, 2010

To: Coastal Commissioners and Interested Persons

From: Alison Dettmer, Deputy Director
Cassidy Teufel, Analyst, Energy, Ocean Resources & Federal Consistency Division

Subject: STAFF REPORT ADDENDUM for Item F11a
Coastal Development Permit Application E-10-008 (Bio Architecture Lab, Inc., Goleta)

Coastal Commission staff recommends the following minor modification to the staff report. Deletions are shown with ~~strikethrough~~ and additions are underlined.

[MODIFICATION 1: The following deletion to Special Condition 3 on page 5 of the staff report]

3. **Engineering Analysis.** Prior to permit issuance, the applicant shall submit, for Executive Director review and approval, engineering analysis, plans, and/or documents for the cultivation structure and its associated infrastructure that are stamped by a registered or licensed professional engineer and demonstrate that the cultivation structure would ~~require no more than sixteen three ton anchors and fifteen four foot diameter buoys to~~ withstand a 25-year storm event and remain intact and in place.

[MODIFICATION 2: The following insertions and deletions to the fourth paragraph under Section 4.1 – Project Description and Background on pages 5 and 6 of the staff report]

The grow-out structure would be maintained at a depth of approximately ten feet below the surface by way of a perimeter system of bottom anchors and surface buoys. ~~Sixteen three ton~~ Up to 43 4.5-ton concrete anchors and 15 four-foot diameter buoys would be deployed around the perimeter of the structure. The anchors would provide enough tension to keep the lines of the grow-out structures taut while also allowing them to maintain a constant depth relative to the sea surface (Exhibit 2 demonstrates the proposed anchor design). The anchors would be placed in 16 evenly spaced anchor corridors

around the structure. Each anchor is estimated to have a footprint of roughly 22 square feet and the combined footprint of all ~~16~~ 43 anchors would be about ~~350~~ 946 square feet.

[MODIFICATION 3: The following insertions and deletions to the first paragraph under Section 4.2 – Other Agency Approvals on page 6 of the staff report]

Neushul Mariculture currently holds an aquaculture lease from the California Department of Fish and Game for the cultivation and harvest of several species of kelp within a 25 acre area of submerged tidelands (State Water Bottom Lease No. M-654-03). On May 20, 2010, the California Department of Fish and Game (CDFG) provided Neushul Mariculture with authorization to sublease ~~granted to BAL a two year sublease for the 3.9 acre proposed project site and roughly 14.6 additional acres of~~ the 25 acre State Water Bottom Lease No. M-654-03 until May of 2012. Neushul Mariculture subsequently entered into a sublease agreement with BAL for the 3.9 acre proposed project site and roughly 14.6 additional acres within State Water Bottom Lease No. M-654-03. This sublease conveys to BAL the rights to use state tidelands for kelp aquaculture activities until February of 2011~~May of 2012~~. Upon its expiration, BAL and Neushul Mariculture have agreed to extend the terms of this sublease for an additional year – until February of 2012. This sublease extension would authorize BAL's use of the submerged lands of the project site for the entire proposed project term. Because this sublease extension would not extend beyond May of 2012, additional approval of the lease agreement from CDFG would not be required. Authorization from CDFG would ~~also~~ be required before BAL could carry out any proposed relocation or transplanting of eelgrass…

[MODIFICATION 4: The following insertions and deletions to the first paragraph under Section 4.3 – Marine Resources on page 7 of the staff report]

…BAL anticipates the use of up to ~~16 three-ton~~ 43 4.5-ton anchoring devices that would be installed at specific locations designated by divers within 16 anchor corridors evenly spaced around the perimeter of the grow-out structure. Each anchor would have a footprint of about 22 square feet and the total footprint of all ~~16~~ 43 of these anchors would be roughly ~~350~~ 946 square feet. Up to 15 four-foot diameter buoys would also be installed around the perimeter and interior of the structures, as shown in Exhibit 2.

[MODIFICATION 5: The following insertions and deletions to the second and third paragraphs on page 9 of the staff report]

The diver surveys carried out by BAL at the project site suggest that ~~four~~ nine of the proposed anchors would be placed in kelp habitat. These ~~four~~ nine anchors would have a total disturbance footprint of roughly ~~88~~ 198 square feet. The installation of these ~~four~~ nine ~~three ton~~ 4.5-ton anchoring devices and associated lines on and around kelp plants (as well as the potential movement of these devices in response to currents and wave and storm action) is likely to adversely affect both the plants and the underlying substrate to which they are attached.

…This estimate includes the ~~88~~ 198 square feet of kelp habitat at the ~~four~~ nine proposed anchor sites, but does not include the estimated 0.38 acres of naturally occurring surface

canopy forming kelp recorded in the CDFG surveys (this kelp appears to occur mostly in the portion of the project site that BAL was not able to survey completely).

[MODIFICATION 6: The following insertions and deletions to the first complete paragraph on page 13 of the staff report]

The anchoring devices for the proposed grow-out structure would be placed using a roughly 40 foot by 50 foot barge mounted crane. Each of the ~~16~~ 43 proposed ~~three ton~~ 4.5-ton anchoring devices (each of which would have a footprint of roughly 22 square feet) would be placed into pre-designated anchor positions. According to the analysis of BAL and Commission staff, ~~three~~ seven of these anchoring devices are proposed to be located in eelgrass habitat (in other words, an estimated total of roughly ~~66~~ 154 square feet of eelgrass habitat would be disturbed and/or displaced by anchors)…

[MODIFICATION 7: The following insertions and deletions to the third paragraph on page 14 of the staff report]

Despite the minimization measures described above, the project has the potential to result in adverse impacts to over 0.3 acres of eelgrass habitat, including the eelgrass habitat at ~~nine~~ seven of the proposed anchor sites and within the grow-out structure's shading footprint…

[MODIFICATION 8: The following insertions and deletions to the final paragraph on page 14 and first paragraph on page 15 of the staff report]

Due to the ephemeral nature of eelgrass, the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and the California Department of Fish and Game recommends that eelgrass surveys be conducted during the active growth phase of eelgrass (typically March through October in southern California). In addition, the resource agencies state in the Southern California Eelgrass Mitigation Policy that any eelgrass survey performed is only valid until the beginning of the next growing season. Based on these criteria and because BAL was not able to complete substrate surveys of the project site, ~~the eelgrass surveys that were carried out require further validation~~ the area within the grow-out structure's shading footprint that has not yet been surveyed (as shown in Exhibit 3) needs to be surveyed during the active growth phase of eelgrass. Therefore, the Commission is requiring in **Special Condition 1** that a pre-construction eelgrass survey be conducted within the anchoring sites and shading footprint of the proposed project during the period of active growth of eelgrass (typically March through October). The pre-construction survey shall be completed prior to the beginning of construction and shall include the evaluation of a representative reference site.[1]

[1] The Commission previously imposed similar conditions for pre-construction eelgrass surveys on Coastal Development Permits 5-97-230 and 5-97-230-A1 (City of Newport Beach), 5-97-231 (County of Orange), 5-97-071 (County of Orange), 5-99-244 (County of Orange-Goldrich-Kest-Grau), 5-98-179 (Kompaniez), 5-98-201 (Anderson), 5-98-443 (Whyte), 5-98-444 (Barrad), 5-99-005 (Dea), 5-99-006 (Fernbach & Holland), 5-99-007 (Aranda et al.), 5-99-008 (Yacoel et. al.), 5-99-030 (Johnson), 5-99-031 (Lady Jr., et.

Special Condition 1 also requires ~~the applicant~~ BAL to submit for Executive Director review and approval, an Eelgrass Mitigation Plan that replaces the three proposed mitigation measures described above, is consistent with the Southern California Eelgrass Mitigation Policy, and includes: (1) an evaluation…

[MODIFICATION 9: The following insertions and deletions to the second paragraph on page 16 of the staff report]

…Nevertheless, because the structure would be installed in a dynamic environment and exposed to potentially high energy swells and currents that could disconnect or damage its lines, cables, and ropes and spread this potentially dangerous marine debris throughout the project area, the Commission is requiring in **Special Condition 3** that BAL submit, for Executive Director review and approval, an engineering analysis that demonstrates the structure's ability to remain securely in place during a 25-year storm event ~~with the proposed sixteen three ton anchors and fifteen four foot diameter buoys~~.

[MODIFICATION 10: The following insertions and deletions to the first paragraph under Section 4.4 – Fill of Coastal Waters on page 16 of the staff report]

Coastal Act Section 30108.2 defines "fill" as "earth or any other substance or material … placed in a submerged area." BAL proposes to install up to ~~16~~ 43 separate ~~three ton~~ 4.5-ton anchoring devices on the seafloor around the perimeter of the proposed grow-out structure. These anchoring devices would be comprised of concrete blocks and would take up as much as ~~350~~ 946 square feet of the seafloor at the project site…

[MODIFICATION 11: The following insertions and deletions to the fourth full paragraph on page 17 of the staff report]

In addition to the proposed placement of up to ~~16~~ 43 anchoring devices comprised of concrete blocks, BAL and Commission staff also considered several other basic anchor designs - the installation of concrete mooring structures, concrete or steel pilings, and the use of traditional hooked or self-burying anchors…

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al.), 5-99-032 (Appel et. al.), 5-99-108 (Pineda), 5-98-471 (Maginot), 5-99-472 (Bjork), and 5-99-473 (Gelbard), among others.

December 14, 2010

CALIFORNIA COASTAL COMMISSION
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Letter of Support for CDP Application No.: E-10-008

Like much of Southern California, human impacts from urban runoff, ocean sewage outfalls and over-fishing continue to deplete local coastal marine habitats and once abundant fish and shellfish resources. As a native Californian and member of several environmental organizations, I recommend support for the proposed project by Bio Architecture Lab, Inc. (BAL) to temporarily anchor a submerged kelp cultivation structure for research purposes.

Giant kelp, *Macrocystis pyrifera,* has suffered from decades of human impacts and with its decline, loss of precious marine habitat diminishes the ocean's ability to remove excessive nutrient loading from urban runoff and sewage outfalls. The proposed pilot project over a seven-month period can provide a potential pathway to mitigate these impacts while offering increased grazing opportunities for local fish stocks. Additionally, research on the productivity of giant kelp to supply algae biofuel may support multiple project goals to:

- utilize kelp farms to increase the overall coverage of kelp along the coast and provide habitat for critical marine species

- evaluate kelp farms contribution to the removal of excess nutrients in California waters and improved water quality

- study and assess the productivity of kelp for renewable fuels as a step towards energy sustainability

Bio Architecture Lab, Inc. (BAL) proposes to temporarily anchor for seven months a submerged kelp cultivation structure within a California Department of Fish and Game kelp mariculture lease area between 900 and 1800 feet from shore upcoast of the Ellwood Pier in northern Goleta. This structure would be used to grow and harvest native giant kelp, *Macrocystis pyrifera,* as part of a pilot scale project to evaluate the performance of the cultivation structure and research the development of a butanol based biofuel made from farmed giant kelp plants. (see http://documents.coastal.ca.gov/reports/2010/12/F11a-12-2010.pdf).

The California Coastal Act Section 30230 supports restoration efforts stating:

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Water quality impacts from adverse human activities and mitigation projects are likewise addressed by Coastal Act Section 30231:

The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of

human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Ocean waters along Southern California will require active measures to address decades of ignorance and neglect. Sustainable, submerged kelp farms properly managed can offer a potentially useful tool to enhance coastal habitats and improve ocean water quality. Biomass in the form of kelp, fish and shellfish will sequester carbon as a climate protection measure. Scientists associated with the Edison Artificial Kelp Reef Mitigation Program off of the city of San Clemente estimate an annual yield in excess of 600 pounds of biomass per acre of kelp.

Increased use of sustainable artificial kelp forests will likely function similar to terrestrial constructed wetlands to build biomass from excess nutrient rich waters while metabolizing a variety of constituents of concern. Urban runoff and sewage discharge plumes presently feed once seasonal algae blooms now lasting throughout the year. Toxic algae blooms in turn produce domoic acid poisoning of sea mammals and shellfish. Artificial kelp forests can compete with microalgae blooms to reduce the incidence and magnitude of this threat to public health and marine life. The public health implications of improved ocean water quality are clear, as is the necessity for better kelp forest habitat to support a growing ecotourism niche in the current depressed economy.

The biofuel potential of giant kelp has recently entered the race to produce biofuel from algae. Giant kelp along California is the fastest growing of all algae species and is being aggressively developed in Chile and other countries with similar growing conditions. The proposed project deploys a kelp growing system common in Asia and other seaweed growing countries for several decades. Research and pilot tests are required to better understand the capabilities of giant kelp to achieve many of the goals we share for restoration of a healthy, vibrant and productive ocean.

Many of us look forward to the results of this project to determine the feasibility of similar measures to mitigate the daily discharge of 5 million gallons of urban runoff from Aliso Creek at the beach and 12 million gallons of treated sewage only 1 mile off of Aliso Beach in South Laguna, Laguna Beach.

Thank you for considering my support of the Bio Architectural Lab Pilot Kelp Project.

Michael Beanan
South Laguna

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F11a

Date Filed:	9-21-10
49th Day:	11-9-10
180th Day:	3-20-11
Staff:	C. Teufel - SF
Staff Report:	12-3-10
Hearing Date:	12-17-10

STAFF REPORT
COASTAL DEVELOPMENT PERMIT APPLICATION

CDP Application No.:	**E-10-008**
Applicant:	**Bio Architecture Lab, Inc.**
Project Location:	Offshore Ellwood Pier, Goleta, Santa Barbara County.
Project Description:	Install and maintain a 3.9 acre kelp grow-out structure consisting of buoys, lines and anchors in nearshore waters for approximately seven months.
Substantive File Documents:	See Appendix A

Summary
Bio Architecture Lab, Inc. (BAL) proposes to temporarily anchor for seven months a submerged kelp cultivation structure within a California Department of Fish and Game kelp mariculture lease area between 900 and 1800 feet from shore upcoast of the Ellwood Pier in northern Goleta (see Exhibit 1). This structure would be used to grow and harvest native giant kelp, *Macrocystis pyrifera*, as part of a pilot scale project to evaluate the performance of the cultivation structure and research the development of a butanol based biofuel made from farmed giant kelp plants.

The grow-out structure would be maintained at a depth of approximately ten feet below the ocean surface by way of a perimeter system of bottom anchors and surface buoys and would be spread over roughly 3.87 acres (see Exhibit 2).

BAL proposes to collect giant kelp spores from naturally occurring giant kelp plants in the project area and germinate these spores in an onshore nursery facility for several months in an attempt to accelerate their growth. Once the kelp plants have germinated and grown to an appropriate size in the lab, they would be transferred back to the ocean and affixed to the interior lines of the grow-out structure. BAL plans to grow roughly 50,000 kelp plants on the structure during the seven month pilot project to measure kelp growth rates, test the performance of the structure and provide a supply of harvested kelp for laboratory research that would be carried out onshore. The kelp plants would be periodically harvested and removed during the growth period by removing the interior grow-out lines on which the plants have been attached. Onshore research on biofuel production and dry preservation and storage techniques would be carried out with these harvested plants. At the completion of the in-water research period, the grow-out structure would be removed from the ocean along with all of its associated anchoring devices, buoys, cables and lines.

Portions of the proposed project site support existing kelp (0.84 acres) and open coastal eelgrass beds (0.3 acres), including areas beneath the submerged grow-out structure and areas in which proposed anchoring devices would be located. To minimize the potential for the installation and presence of these structures to adversely affect biological resources and submerged marine habitat, BAL worked with Commission staff to substantially modify its proposal. These modifications include a reduction in the number of grow-out structures that are proposed to be installed from two to one, a reduction in the size and footprint of the proposed structure from 5.5 acres to 3.9 acres, and the refinement of the proposed location of the structure within the sublease area to minimize the amount of kelp and eelgrass habitat in the shade and anchoring footprints of the proposed structure. Despite these modifications, the proposed project would likely result in unavoidable adverse impacts to eelgrass and existing kelp habitat. The Commission staff is therefore recommending several measures to establish the magnitude of impacts, if any, and to mitigate them. These measures are described in **Special Condition 1** and **Special Condition 2** and include the development, submittal, approval and implementation of kelp and eelgrass habitat mitigation plans that include: (1) pre- and post-project surveys of the kelp and eelgrass habitat within an appropriate reference site and the project's disturbance area (both the anchoring corridors and shading/trimming footprint); (2) an evaluation of these surveys to accurately assess the magnitude of the project's adverse impacts on kelp and eelgrass habitat; (3) mitigation in the form of kelp and eelgrass planting for adverse impacts to kelp and eelgrass habitat that occur; and (4) performance criteria and post-planting monitoring of the mitigation area to ensure the successful restoration of kelp and eelgrass habitat in the project area.

The proposed cultivation structure would be installed in a dynamic offshore area that is exposed to current and swell energy. Significant movement or destruction of the structure, its ropes and/or cables could create marine debris that could pose a risk to marine life in the project area. Therefore, Commission staff is recommending in **Special Condition 3** that BAL submit, for Executive Director review and approval, an engineering analysis that demonstrates that the structure can withstand a 25-year storm event and remain intact and in place.

The Commission staff recommends the Commission **approve** coastal development permit application E-10-008, as conditioned.

1 STAFF RECOMMENDATION

Approval with Conditions
The staff recommends conditional approval of the permit application.

Motion:

> *I move that the Commission approve Coastal Development Permit E-10-008 subject to conditions set forth in the staff recommendation specified below.*

Staff recommends a **YES** vote. Passage of this motion will result in approval of the permit as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of Commissioners present.

Resolution:

> *The Commission hereby approves the Coastal Development Permit for the proposed project and adopts the findings set forth below on grounds that the development as conditioned will be in conformity with the policies of Chapter 3 of the Coastal Act. Approval of the permit complies with the California Environmental Quality Act because either 1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the development on the environment, or 2) there are no further feasible mitigation measures or alternatives that would substantially lessen any significant adverse impacts of the development on the environment.*

2 STANDARD CONDITIONS

This permit is subject to the following standard conditions:

1. **Notice of Receipt and Acknowledgment**. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. **Expiration**. If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. **Interpretation**. Any questions of intent of interpretation of any condition will be resolved by the Executive Director or the Commission.

4. **Assignment**. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

5. **Terms and Conditions Run with the Land**. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

3 SPECIAL CONDITIONS

This permit is subject to the following special conditions:

1. **Eelgrass Monitoring and Restoration Plan.** Prior to permit issuance, the applicant shall submit, for Executive Director review and approval, an Eelgrass Monitoring and Restoration Plan. This plan shall describe the implementation of an eelgrass monitoring and restoration plan consistent with the Southern California Eelgrass Mitigation Policy (revision 11) developed by the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game. The plan shall include: (1) a pre-project survey of the eelgrass at the project site carried out during the active growth season in central California (March through October); (2) selection and pre-project evaluation of an eelgrass reference site that is representative of the environmental conditions at the project site; (3) post-project assessment of direct and indirect impacts to eelgrass at the project site and re-evaluation of the reference sites within 30 days of the removal of the grow-out structure and its anchoring devices; (4) mitigation for all direct and indirect adverse impacts to eelgrass at a ratio of 1.2:1; (5) monitoring the success of mitigation and reference site conditions for a period of five years following initial planting; and (6) performance criteria for the restored eelgrass habitat such that it meets or exceeds the full coverage and density of the reference site within 36 months following initial planting and sustains this condition through at least 60 months following initial planting.

2. **Kelp Monitoring and Restoration Plan.** Prior to permit issuance, the applicant shall submit, for Executive Director review and approval, a Kelp Monitoring and Restoration Plan that does not include the removal of urchins from the project site. This plan shall include: (1) a pre-project survey of the kelp habitat at the project site carried out during the active growth season in central California (March - May); (2) selection and pre-project evaluation of a kelp reference site that is representative of the environmental conditions at the project site; (3) annual post-project assessment of direct and indirect impacts to kelp at the project site and re-evaluation of the reference site for two years beginning within 30 days of the removal of the grow-out structure and its anchoring devices; (4) mitigation for all direct and indirect adverse impacts to kelp that are apparent upon completion of the post-project assessment period at a ratio of 1.2:1; (5) monitoring the success of mitigation and reference site conditions for a period of five years following initial planting; and (6) performance criteria for the restored kelp habitat such that it meets or exceeds the full coverage and density of the reference site within 36 months following initial planting and sustains this condition through at least 60 months following initial planting.

3. **Engineering Analysis.** Prior to permit issuance, the applicant shall submit, for Executive Director review and approval, engineering analysis, plans, and/or documents

for the cultivation structure and its associated infrastructure that are stamped by a registered or licensed professional engineer and demonstrate that the cultivation structure would require no more than sixteen three-ton anchors and fifteen four-foot diameter buoys to withstand a 25-year storm event and remain intact and in place.

4 FINDINGS AND DECLARATIONS

The Commission finds and declares as follows:

4.1 Project Description and Background

On May 20, 2010, the California Department of Fish and Game granted to Bio Architecture Lab, Inc. (BAL) a two year sublease for roughly 18.5 acres of the 25 acre State Water Bottom Lease No. M-654-03. State Water Bottom Lease No. M-654-03 is a kelp aquaculture lease that has been held by Neushul Mariculture, Inc. since approximately 1980 and provides for the use of submerged state lands for the cultivation and harvest of several species of kelp. This lease area is adjacent to and directly upcoast of the Ellwood Pier, a private offshore oil and gas support pier located in northern Goleta (see Exhibit 1). Similar to the Neushul Mariculture lease, the BAL sublease specifies that submerged state lands may be used for the cultivation and harvest of native giant kelp, *Macrocystis pyrifera*. The sublease specifies that juvenile giant kelp plants "may be grown from naturally occurring spores in the sublease area that settle and grow on lines strung on recruitment structures or grown from sporophylls excised from plants growing in the sublease area in facilities approved by lessor for transplanting on the sublease area."

BAL proposes to use the sublease and a nearby onshore nursery/laboratory facility located in Goleta for a two-year Department of Energy, Advanced Research Projects Agency-Energy (ARPA-E), funded research endeavor. BAL was awarded a grant through ARPA-E "to determine the commercial viability for energy production of growing and processing kelp from California coastal waters." Specifically, BAL hopes to use giant kelp cultivated at the sublease site to develop and evaluate a process for the production of butanol biofuel and to investigate methods of drying and preserving kelp for later use in abalone aquaculture or biofuel production.

To cultivate kelp in the sublease, BAL proposes to install a 3.87 acre submerged kelp grow-out structure. This structure would measure 643 feet by 262 feet and would support roughly 120 interior kelp grow-out lines (see Exhibit 2). BAL proposes to harvest sporophylls (the "seed structures" of the kelp plant) from naturally occurring kelp plants in the project area and use the spores they contain to germinate and grow juvenile plants in the nursery lab. BAL anticipates that the controlled environment of the nursery lab would allow it to increase the growth rate of the germinated kelp plants. Once the juvenile kelp plants reach a target size in the nursery lab, BAL would transfer them back to the marine cultivation structure and attach them to the interior grow-out lines. BAL proposes to grow approximately 50,000 kelp plants on the structure at a density of roughly two to four plants per meter on the interior grow-out lines.

The grow-out structure would be maintained at a depth of approximately ten feet below the surface by way of a perimeter system of bottom anchors and surface buoys. Sixteen three-ton concrete anchors and 15 four-foot diameter buoys would be deployed around the perimeter of the

structure. The anchors would provide enough tension to keep the lines of the grow-out structures taut while also allowing them to maintain a constant depth relative to the sea surface (Exhibit 2 demonstrates the proposed anchor design). The anchors would be placed in 16 evenly spaced anchor corridors around the structure. Each anchor is estimated to have a footprint of roughly 22 square feet and the combined footprint of all 16 anchors would be about 350 square feet.

BAL proposes to maintain the grow-out structure in the water for approximately seven months spanning the typical peak growing season for giant kelp in central California to evaluate kelp growth rates and the performance of the structure during a variety of growing conditions. During the seven month project period, giant kelp growing on the structures would be periodically hand harvested by detaching and removing the interior line(s) to which the kelp is attached. These lines would be transferred to a vessel and transported to shore for further evaluation. At the conclusion of the seven month study period and prior to the beginning of the typical winter storm and swell season in October, BAL would remove the grow-out structure, buoys and anchors. These removal activities, as well as the initial installation of the structure and its associated anchors and buoys, would be carried out through the use of a barge mounted crane that would be moored in place for up to seven days.

4.2 Other Agency Approvals

On May 20, 2010, the California Department of Fish and Game (CDFG) granted to BAL a two year sublease for the 3.9 acre proposed project site and roughly 14.6 additional acres of the 25 acre State Water Bottom Lease No. M-654-03. This sublease conveys to BAL the rights to use state tidelands for kelp aquaculture activities until May of 2012. Authorization from CDFG would also be required before BAL could carry out any proposed relocation or transplanting of eelgrass. Because a state water bottom lease managed by CDFG covers the project site, BAL is not required to obtain additional authorization from the California State Lands Commission. In addition, the U.S. Army Corps of Engineers (USACE) is currently reviewing a permit under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. Section 403) for the placement of the proposed grow-out structure and associated infrastructure within the navigable waters of the U.S. The National Marine Fisheries Service (NMFS) was consulted as part of the USACE review process.

NMFS provided comments and conservation recommendations to the USACE based on the Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, and the Fish and Wildlife Coordination Act. These conservation recommendations include pre- and post-project biological surveys to determine if impacts to seagrass, kelp, and/or rocky reef habitat occur and a contingency plan to offset any identified adverse effects to Essential Fish Habitat.

4.3 Marine Resources

Coastal Act Section 30230 states:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy*

> *populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Coastal Act Section 30231 states:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

As shown in Exhibit 1, the project site is located between 920 and 1800 feet from shore in an area with water depths of between 20 and 30 feet. The grow-out structure would be comprised entirely of lines and ropes and maintained taut at a depth of ten feet below the ocean surface by way of a perimeter system of bottom anchors and surface buoys. The grow out structure would be located within the larger of the two parcels subleased by BAL so that anchoring lines and devices can be installed around the perimeter at a sufficient distance to remain effective without extending outside of the subleased area. BAL anticipates the use of up to 16 three-ton anchoring devices that would be installed at specific locations designated by divers within 16 anchor corridors evenly spaced around the perimeter of the grow-out structure. Each anchor would have a footprint of about 22 square feet and the total footprint of all 16 of these anchors would be roughly 350 square feet. Up to 15 four-foot diameter buoys would also be installed around the perimeter and interior of the structures, as shown in Exhibit 2.

BAL proposes to use a barge-mounted crane to deploy the anchoring devices when wind and swell conditions provide a suitable opportunity for safe and accurate placement. This barge would be brought to the site by a tugboat and moored in place with a four point mooring system comprised of four 3,000 pound Danforth anchors. Each anchor would occupy approximately 110 square feet of substrate once deployed. Barge moorings would be placed in locations previously identified during preliminary mooring site diver surveys as areas absent of hard substrate or seabed vegetation. Once the mooring anchors are in place, divers and the barge mounted crane would be used to install the grow-out structure lines and associated buoys. Use of the crane would allow the grow-out structure anchors to be installed directly in place without having to be dragged or repositioned on the seafloor. BAL estimates that the barge and its mooring anchors would be in place for approximately seven days during the installation of the grow-out structure.

At the completion of the proposed seven month research period, BAL proposes to disassemble the grow-out structure and remove it from the project site along with all associated anchors and buoys. Anchor devices would be removed through the use of the same barge mounted crane used to install them initially. The barge would be moored in the same location and the mooring anchors would be placed at the same sites used during installation once diver surveys confirmed

the continued absence of sensitive habitat in these areas. BAL estimates that the barge would be in place for approximately five days during the removal process.

Three substrate and habitat surveys carried out by BAL in the summer and fall of 2010 indicate that the seafloor at the project site is made up of a combination of bare sandy substrate, eelgrass (*Zostera pacifica*), kelp (*Macrocystis pyrifera*) beds, and hard substrate reef material. Based on reports from these surveys submitted by BAL and photographs and video taken at the project site, hard substrate reef areas at the project site are made up primarily of low profile siltstone bedrock and mixed bedrock/shallow sand with some areas of higher profile ledges and larger rocks also present. BAL summarizes the results of its surveys as follows (shown graphically in Exhibit 3):

> *The bottom cover of the surveyed anchor areas is composed of 66.7% Deep Sand, 15.8% Shallow Sand, 1.8% Cobble, 0.2% Boulder and 15.5% Siltstone Bedrock (Figure 3). Siltstone Bedrock structure was predominantly found bordering the western edge of Ellwood Pier and at the western edge of the study area (Figure 4). Small and Big Ledges were scarce and mostly found consisting of the Siltstone Bedrock substrate type (Figure 5).*
>
> *Neither federally endangered fish nor invertebrate species were found in the surveyed potential anchor areas. Observed abundances of fish species managed by the Pacific Fishery Management Council are listed in Table 4. The most abundant fish observed was Olive rockfish (Sebastes serranoides), with 15 individuals per 25 m^2 cell, all of which were Young-of-Year (YOY). Other rockfish YOY species included Vermillion (Sebastes minatus), Kelp (Sebastes atrovirens), and Boccacio (Sebastes paucispinis). Adult Brown (Sebastes auriculatus) and Grass (Sebastes rastrelliger) rockfishes were observed in the study area. YOY lingcod (Ophiodon elongatus) and cabezon (Scorpaenichthys marmoratus) were also found.*
>
> *Z. pacifica was sparse in abundance. It ranged from 0 to 65 plants per 25 m^2 sampling cell, or a maximum density of 2.6 plants per m^2 (Table 4). Most Z. pacifica was found in Deep Sand substrate (Figures 6 and 7) not near the pier (Figure 8). M. pyrifera was primarily found on Siltstone Bedrock areas adjacent to the pier and in a swath on the western edge of the study area, but a few small growth centers were found on sand or on Neushul Mariculture, Inc. structures in sand (Figure 9). Abundance of M. pyrifera ranged from 0 to 12 growth centers per sampling cell (Figure 10). The maximum density of growth centers (Table 4) was a clear outlier (Figure 10) and this particular cell had a major substrate composition of Deep Sand (Figure 4 and 9). This outlier can be explained by many small growth centers growing on a NMI structure on top of sand.*
>
> *Abalone (Haliotis spp.) were absent from the entire study area. Purple urchins were the most abundant target invertebrate, with 2875 individuals found. Red urchins were less abundant, with only 300 individuals found. Most urchins were found in holdfasts of M. pyrifera or in ledge structures on the Siltstone Bedrock substrate.*

Kelp

Beds of giant kelp (*Macrocystis pyrifera*) are widely recognized for their contributions to marine biological productivity and biodiversity. This is especially true for those beds that persist at the same location throughout multiple growing seasons and withstand the natural and sometimes dramatic year-to-year fluctuations known to affect this species. Kelp adds spatial complexity to benthic communities, provides substrate and forage for other organisms, contributes to primary productivity, and creates cover from pelagic predators.

The diver surveys carried out by BAL at the project site suggest that four of the proposed anchors would be placed in kelp habitat. These four anchors would have a total disturbance footprint of roughly 88 square feet. The installation of these four three-ton anchoring devices and associated lines on and around kelp plants (as well as the potential movement of these devices in response to currents and wave and storm action) is likely to adversely affect both the plants and the underlying substrate to which they are attached.

Although the substrate surveys carried out by BAL did not include the entire project site (specifically, a portion of the site that would be in the shade footprint of the structure was not surveyed – as shown in Exhibit 3), California Department of Fish and Game (CDFG) evaluations of regional kelp surveys carried out in 1989, 1999, and from 2003 to 2006, identify persistent kelp beds in this area. A recent CDFG aerial kelp survey that included the proposed location of the grow-out structure, carried out in 2008, indicates that roughly 0.38 acres of naturally occurring surface kelp exists within the proposed footprint of the grow-out structure (as shown in Exhibit 3). Although incomplete, the substrate surveys carried out by BAL suggest that additional areas at the project site are occupied by kelp plants, some of which do not reach the surface or contribute to a surface canopy. Based on the BAL surveys, at least an additional 0.46 acres of kelp habitat is present within the project footprint. This estimate includes the 88 square feet of kelp habitat at the four proposed anchor sites, but does not include the estimated 0.38 acres of naturally occurring surface canopy forming kelp recorded in the CDFG surveys (this kelp appears to occur mostly in the portion of the project site that BAL was not able to survey completely).

Due to concerns regarding the potential for this naturally occurring kelp to compete for light with the kelp being cultivated on the proposed grow-out structures, BAL has proposed to cut back all of the kelp within the project footprint that reaches the surface and forms a surface canopy. As previously noted, based on the most recent CDFG aerial kelp survey, this would be approximately 0.38 acres of naturally occurring kelp. This amount is a fairly rough estimate, however, and may be larger or smaller depending on natural fluctuations in ocean conditions and associated kelp growth rates and abundances. To carry out this work, BAL has proposed to use divers to hand cut each kelp plant at approximately six feet above the seafloor. This method of removal would allow the kelp holdfasts to remain in place and would likely leave the lower portions of the plant intact, which may facilitate their re-growth and recovery. However, the presence of the grow-out structures and the potentially dense layer of cultivated kelp in the water column above these existing natural plants (once the cultivated kelp becomes established) are likely to substantially restrict the amount of light that is available in the water column below. While complete mortality of the kelp within the proposed shading footprint of the grow-out

structure may not occur, these plants would likely experience limited growth rates and potentially be more susceptibility to other sources of disturbance and degradation as a result.

Additionally, BAL has proposed that "unattached plants drifting across the bottom of the sublease area will also be removed by divers so they do not interfere with mariculture operations" by becoming tangled in the anchoring devices or lines of the grow-out structures. BAL anticipates carrying out this activity on an approximately weekly basis during the routine diver surveys of the grow-out structure.

In total, the proposed project has the potential to result in adverse impacts to approximately 0.84 acres of kelp habitat (based on combining the 0.38 acres recorded in the CDFG aerial survey and the additional 0.46 acres noted in the BAL substrate surveys) at the project site through disturbances related to the placement and presence of anchoring devices, shading from the proposed structure and its associated kelp plants, and through the intentional trimming of existing kelp plants. This area estimate incorporates the commitments and minimization measures that BAL has pursued to reduce the magnitude of the project's potential impacts on giant kelp at the project site. These measures include a reduction in the number of proposed grow-out structures from two to one, a 50% reduction in the size and footprint of the proposed structure, and a commitment to avoid the placement of anchoring devices in areas with existing kelp or hard substrate reef material to the maximum extent feasible. Additionally, in documents submitted to Commission staff, BAL states its belief that:

Kelp that is negatively impacted (by anchor impingement, shading, or manual trimming) is expected to recover rapidly due to the following factors:

- *Because they will compete for light and space with farmed kelp plants, fronds from the natural kelp beds that enter the perimeter of the aquafarm above the culture lines will be trimmed. Since Macrocystis can regenerate new fronds from its holdfast, trimmed kelp plants will have the potential to regenerate.*
- *The locations where the structure may cause adverse impacts are nested within a kelp bed that is approximately 3 times the size of the impact area. This positioning will expose the area below the footprint to an extremely high concentration of Macrocystis zoospores, allowing the areas to recover rapidly via natural recruitment.*

Finally, BAL has also submitted a *Proposed Impact Contingency Plan for Eelgrass and Kelp Habitat* that includes a proposal to mitigate the project's adverse impacts on existing kelp beds by committing 16 diver hours towards the removal of purple urchins from within and around the natural kelp beds in the project area.

Purple urchins are invertebrate herbivores that are known to feed on giant kelp plants – both those that are attached to the substrate and those that are drifting on the bottom. Urchins comprise a key part of the kelp forest ecosystem and a variety of studies carried out in the 1960s and 1970s suggests a strong correlation between urchin density and grazing effort and the abundance of kelp plants in an area. As noted by Cowen et al. (1982), the selective removal of urchins, either experimentally or naturally, often results in an increase in algal (kelp) biomass. Cowen goes on to note, however, that "the composition of the subsequent algal and invertebrate communities and the time required for them to respond to reduced grazing pressures have varied

greatly among these studies. Many factors may affect the structure of a kelp forest community and their relative importance may vary in space and time (Foster, in press). Therefore, responses to changes in grazing in kelp forests separated by even short distances may differ." In other words, the relationship between kelp abundance and urchin density is complex and removal of urchins cannot always be assumed to result in an immediate increase in kelp recruitment, bed expansion, and growth. Also, it should be noted that sea urchins are a natural part of many marine benthic communities and their presence cannot be assumed to be bad. Many hold the opinion that a decline in the abundance of natural predators, especially the California sea otter, has resulted in unnaturally high urchin densities that are detrimental to the health of kelp forest communities. This may be so in some areas and not in others. In any event, without substantially more information about the current density of urchins at the project site and whether or not the presence of these herbivores can be accurately assumed to be a primary limiting factor in the abundance and recruitment of giant kelp in this area, it would be difficult to reach an appropriate conclusion regarding the potential for 16 diver hours of urchin removal to successfully mitigate potential adverse impacts to approximately 0.84 acres of giant kelp habitat. Furthermore, human engineering of natural systems is generally fraught with unintended consequences and should not be undertaken casually – certainly not without the participation of the appropriate resource agencies. Therefore, the Commission finds that the proposed removal of purple urchins from the project site is not an appropriate mitigation strategy for this project and is requiring in **Special Condition 2** that BAL submit a revised kelp mitigation plan that does not include urchin removal activities.

Because the project area is known to support a robust population of fast-growing existing kelp plants, rapid natural recovery is likely to occur following disturbance of kelp habitat in this area. Indeed, some level of disturbance to this habitat likely occurs on a regular basis during some seasons due to storm and wave action. The persistence of kelp plants at this location suggests that the ecosystem is resilient to some temporary disturbances that do not dislodge or destroy the holdfast of the kelp plant. The estimated 0.84 acres of impact to existing kelp would also be temporary.

First, as previously noted, the majority of potential project related adverse impacts (0.46 acres) are associated with a temporary reduction in the amount of light that would penetrate to the kelp habitat that exists within the proposed project's shading footprint. The proposed grow-out structure would be made of ropes and lines and the densest concentration of lines (the interior lines) would be spaces over five-feet apart. It is likely that for the first several months of the project period the kelp plants being cultivated on these lines would not attain a large enough size to form a dense surface canopy and would therefore not significantly limit the sunlight availability in the water column below. Once the proposed grow-out structure is removed, the light levels within the water column at the project site would return to the pre-project condition and kelp plants within the project shading footprint would be allowed to recover. Second, although BAL proposes to trim or cut the upper portions of the large kelp plants growing within the project footprint (0.38 acres), this activity would correspond with the growth of the cultivated kelp and the establishment of a surface canopy above these plants. In effect, the reduction in natural kelp canopy habitat would be offset by the habitat provided by the cultivated plants. While the eventual harvest and removal of these plants would eliminate this artificial habitat, because the lower portions of the trimmed kelp plants were left intact, they may be able to persist

and recover once the grow-out structure is removed. Finally, as noted above, the project area supports a robust population of naturally occurring kelp plants. The presence of these plants means that there is a local supply of kelp spores that may be available to settle and colonize suitable habitat that may become available if the project causes the loss of existing kelp plants.

Accordingly, any kelp impacted by project-related activities may recover naturally. In a similar matter, the Commission (in Coastal Development Permit A-92-6-A2) allowed for two years of natural kelp recovery of the disturbed area prior to evaluating the need to mitigate for lost kelp. The Commission is requiring a similar approach here.

In **Special Condition 2**, the Commission is requiring that BAL submit, for Executive Director review and approval, a revised kelp mitigation plan that includes: (1) pre- and post-project surveys of the kelp beds within an appropriate reference site and the project's disturbance area (both the anchoring corridors and shading/trimming footprint); (2) an evaluation of these surveys to accurately assess the magnitude of the project's adverse impacts on kelp habitat after two years; (3) mitigation, if necessary, in the form of kelp planting at a 1.2:1 ratio[1] for any adverse project related impacts to kelp habitat that persist after this period of natural recovery; and (4) performance criteria and post-planting monitoring of the mitigation area to ensure the successful restoration of kelp habitat in the project area.

Eelgrass

Eelgrass species (*Zostera marina* and *Zostera pacifica*) are marine, flowering plants that grow as individual plants or dense beds in subtidal or intertidal unconsolidated sediments of coastal environments, enclosed bays, and estuaries. Both species are indigenous to the California coast and although naturally restricted in distribution, eelgrass vegetated areas are recognized as important ecological communities because of the multiple biological and physical values that they provide. Eelgrass provides a key structural habitat, refuge, and food source for many varieties of fish, invertebrates and birds and also functions as a nursery area for sensitive species and those that are commercially and recreationally important. As noted in the Southern California Eelgrass Mitigation Policy (SCEMP) adopted by the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game, eelgrass is amongst the most valuable ecosystems, producing high amounts of primary productivity, improving water clarity, cycling nutrients and generating oxygen during daylight hours. Although its ecology, growth patterns, and distribution is less well understood and researched than the eelgrass habitat found in bays and estuaries, beds of *Zostera pacifica* that are found at open coastal sites in the nearshore waters of central California and the Channel Islands are typically regarded as equally important and sensitive to disturbance.

Substrate surveys of the project site were carried out in August, September, and November of 2010. Except for the most recent November survey, these surveys were carried out towards the end of the seasonal eelgrass growth period and should therefore accurately represent the extent of eelgrass habitat in the project area for 2010. Each of the surveys was conducted by BAL and/or its consultant researchers and in total, these surveys cover approximately 80% of the project site

[1] The rationale for this ratio is based on: (1) the time necessary for a mitigation site to reach full functionality; (2) the need to offset any productivity losses during this recovery period; and (3) the variable level of success of restoration work.

(due to ocean conditions, BAL was not able to complete its survey work and therefore, detailed habitat density information for a portion of the grow-out structure's shading footprint is not available[2]). The surveys that were carried out indicate that eelgrass (*Zostera pacifica*) is present in scattered patches of low to moderate density within a portion of the grow-out structure's shading footprint and within several of the proposed anchor locations (see Exhibit 3).

The anchoring devices for the proposed grow-out structure would be placed using a roughly 40 foot by 50 foot barge mounted crane. Each of the 16 proposed three ton anchoring devices (each of which would have a footprint of roughly 22 square feet) would be placed into pre-designated anchor positions. According to the analysis of BAL and Commission staff, three of these anchoring devices are proposed to be located in eelgrass habitat (in other words, an estimated total of roughly 66 square feet of eelgrass habitat would be disturbed and/or displaced by anchors). At the end of the seven month project period, the crane barge would return to the site and remove all of the anchoring devices from the water. This removal operation would take roughly five days and would also require the temporary placement of the four mooring anchors within their designated mooring sites once again. Surveys of these mooring sites would be carried out prior to the placement of the mooring anchors to ensure that they are not placed in areas that support sensitive habitat.

Surveys of the project site by BAL have indicated that eelgrass habitat is also present within the area of seafloor which would be directly below the proposed grow-out structure. Although the proposed grow-out structure would be initially comprised entirely of cables, ropes, and lines and would therefore be unlikely to substantially restrict or reduce the penetration of sunlight to the seafloor below, as the kelp cultivated on the structure grows and expands throughout the season, it would increasingly act as a source of shade. As noted by the National Marine Fisheries Service in the draft 2010 California Eelgrass Mitigation Policy:

> *Shading is known to alter eelgrass physiology (Peralta et al. 2001; Burdick and Short 1999; Shafer 1999), decrease primary productivity (Stutes et al. 2006), alter predator-prey interactions (Helfman 1981), change invertebrate assemblages (Glasby 1999), and reduce the density of benthic invertebrates (Struck et al. 2004). Reduced light conditions also limit the ability of fishes, especially juveniles and larvae, to use visual cues for spatial orientation, prey capture, schooling, predator avoidance, and migration (Hanson 2003).*

The depth and location of eelgrass habitat within the proposed project's shading footprint increases the likelihood that it would be adversely affected by a reduction in the amount of available light. Light availability is widely regarded as a primary factor in limiting the depth distribution of eelgrass and depths of 20-30 feet are typically acknowledged as the threshold beyond which eelgrass growth rates and distribution declines sharply. Much of the eelgrass

[2] However, BAL did carry out a preliminary diver survey along a transect that bisects this area and provided Commission staff with representative photographs, narrative observations, and habitat extrapolations of this area based on this survey. While not sufficient to make accurate assumptions regarding the specific amount and type of habitat present in this area, these efforts suggest that the area supports a mix of hard substrate reef material, kelp plants and sandy substrate.

within the proposed project's shading footprint is located at or near these depths. This suggests that the eelgrass habitat within the project site may be especially susceptible to a reduction in the amount of available light. Accordingly, there is a potential for the proposed project to adversely affect the eelgrass habitat within its shading footprint. Based on surveys carried out at the project site by BAL, approximately 0.3 acres of eelgrass habitat exists in the project shading footprint.

BAL is proposing to both minimize and mitigate potential adverse impacts to eelgrass that are expected to result from the placement and presence of the proposed kelp cultivation structure. To minimize impacts, BAL has significantly modified its proposal by: (1) deciding not to pursue the installation of a second grow-out structure within an area that is heavily colonized by eelgrass plants; (2) reducing the footprint of the proposed structure by 50% in order to avoid impacts to eelgrass area on the eastern and western ends of the sub-lease; (3) changing the locations of the anchor corridors to avoid impacting areas with kelp and/or eelgrass densities of more than one plant per square meter; and (4) proposing to locate the reduced footprint in an area that will most likely avoid shading of areas with eelgrass densities of more than one plant per square meter.

Despite the minimization measures described above, the project has the potential to result in adverse impacts to over 0.3 acres of eelgrass habitat, including the eelgrass habitat at nine of the proposed anchor sites and within the grow-out structure's shading footprint. BAL is proposing to mitigate these impacts to eelgrass by: (1) collecting all the eelgrass from within the proposed anchor corridors and transplanting it to areas adjacent to the existing eelgrass bed that are outside of the project's disturbance footprint; and (2) collecting stock material from donor sites within the shading footprint of the project site prior to construction, preparing the material for transplanting, and replanting the eelgrass at a mitigation site outside of the proposed project's disturbance footprint. Specifically, BAL proposes to transplant 25% of the eelgrass turions (shoots) in the shaded footprint to areas outside of the footprint before or during the first 2 months after the installation of the grow-out structure (because the majority of shading is expected to occur as a result of the canopy that would develop above the cultivated kelp plants, substantially less shading would be likely during the first few months of the project when the cultivated kelp plants remain small). BAL also proposes to carry out an eelgrass habitat data survey that would contribute to the understanding of open coast eelgrass systems. This survey would include a commitment of 32 diver hours allocated to collecting eelgrass habitat data in the region.

Due to the ephemeral nature of eelgrass, the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and the California Department of Fish and Game recommends that eelgrass surveys be conducted during the active growth phase of eelgrass (typically March through October in southern California). In addition, the resource agencies state in the Southern California Eelgrass Mitigation Policy that any eelgrass survey performed is only valid until the beginning of the next growing season. Based on these criteria and because BAL was not able to complete substrate surveys of the project site, the eelgrass surveys that were carried out require further validation. Therefore, the Commission is requiring in **Special Condition 1** that a pre-construction eelgrass survey be conducted within the anchoring sites and shading footprint of the proposed project during the period of active growth of eelgrass (typically March through

October). The pre-construction survey shall be completed prior to the beginning of construction and shall include the evaluation of a representative reference site.[3]

Special Condition 1 also requires the applicant to submit for Executive Director review and approval, an Eelgrass Mitigation Plan that is consistent with the Southern California Eelgrass Mitigation Policy and includes: (1) an evaluation of the pre- and post-project surveys to accurately assess the magnitude of the project's adverse impacts on eelgrass habitat; (2) mitigation in the form of eelgrass transplanting at a 1.2:1 ratio[4] for any adverse impacts to eelgrass habitat that occur; and (3) performance criteria and post-planting monitoring of the mitigation area to ensure the successful restoration of kelp habitat in the project area.

Marine Mammals

Data published by the National Marine Fisheries Service – Southwest Region in 2007 indicates the presence of a harbor seal haul-out site/rookery within several miles of the proposed project site. In addition, gray whales pass the project area during both southerly and northerly migrations along the California coast. Other types of marine mammals including whales, dolphins, otters, and pinnipeds may also forage in or transit through the project area.

Because the proposed project includes the placement of a network of submerged lines, ropes, and cables in nearshore waters that may support transient or resident marine mammal populations, there is a potential risk that marine mammals may inadvertently become entangled in the structure and experience injury or death. Several aspects of the project serve to lessen this risk, however. For whales, the proposed location of the grow-out structure in fairly shallow nearshore waters (20-30 feet in depth) in close proximity to the existing Ellwood Pier would be expected to reduce the risk by contributing to the unsuitability of the area to foraging or transiting whales. The structure is proposed to be in the water only during the period of northerly migration for the gray whale (March – May) and whales traveling close to shore would likely be diverted offshore and around the project site by the physical barrier presented by the Ellwood Pier.

The potential entanglement risk to smaller marine mammals such as dolphins, seals, and otters would be reduced by the spacing of the interior grow-out lines. Spaced over five feet apart and covered by growing kelp during much of the project period, these lines would likely be far enough apart and visible enough to marine mammals so that they could be avoided. The project design further reduces the risk of marine mammal entanglement posed by the proposed structure. Specifically, the structure is designed to be held taut between a series of surface buoys and

[3] The Commission previously imposed similar conditions for pre-construction eelgrass surveys on Coastal Development Permits 5-97-230 and 5-97-230-A1 (City of Newport Beach), 5-97-231 (County of Orange), 5-97-071 (County of Orange), 5-99-244 (County of Orange-Goldrich-Kest-Grau), 5-98-179 (Kompaniez), 5-98-201 (Anderson), 5-98-443 (Whyte), 5-98-444 (Barrad), 5-99-005 (Dea), 5-99-006 (Fernbach & Holland), 5-99-007 (Aranda et al.), 5-99-008 (Yacoel et. al.), 5-99-030 (Johnson), 5-99-031 (Lady Jr., et. al.), 5-99-032 (Appel et. al.), 5-99-108 (Pineda), 5-98-471 (Maginot), 5-99-472 (Bjork), and 5-99-473 (Gelbard), among others.

[4] The Southern California Eelgrass Mitigation Policy establishes this mitigation ratio. The recently completed draft California Eelgrass Mitigation Policy developed by the National Marine Fisheries Service (NMFS) also notes that this 1.2:1 ratio is appropriate for central California based on the success of restoration projects in this region over the past 25 years and use of the "The Five-Step Wetland Mitigation Ratio Calculator" (King and Price 2004) developed for the NMFS Office of Habitat Conservation.

bottom anchors such that the lines would be held at tension without becoming loose or slack. As noted by BAL in response to entanglement concerns raised by the National Marine Fisheries Service, research carried out on a network of approximately 900 rope-and-line submerged aquaculture structures of a similar design has suggested that loose, thin, lines pose the greatest entanglement threat to whales and dolphins while thicker, more visible lines held at tension carry little entanglement risk. The potential risk to both large and small marine mammals would also be reduced by the temporary nature of the project and the relatively short period of time it would be in place.

Despite the low risk of entanglement, BAL has committed to monitor the project structure at least three times per week with an on-site technician. Potentially dangerous conditions at the grow-out structure could therefore be addressed quickly. In addition, all project buoys would be marked with an emergency contact phone number so that any other observers in the area would be able to report problems as soon as possible. Inspections would also be made as soon as possible after storm events to ensure that the structure has not moved or lost tension. BAL has designed the grow-out structure to withstand storm conditions but in the event that the lines lose tension due to dislodgement of anchors or severing of the lines, BAL will either remove loose lines or restore tension to the system. Nevertheless, because the structure would be installed in a dynamic environment and exposed to potentially high energy swells and currents that could disconnect or damage its lines, cables, and ropes and spread this potentially dangerous marine debris throughout the project area, the Commission is requiring in **Special Condition 3** that BAL submit, for Executive Director review and approval, an engineering analysis that demonstrates the structure's ability to remain securely in place during a 25-year storm event with the proposed sixteen three-ton anchors and fifteen four-foot diameter buoys.

In order to maintain the seaweed and the grow-out structure free of harmful debris that may contribute to the entanglement of marine life, BAL will check and clean the structure on a weekly basis.

For the reasons described above, the Commission finds that the project, as conditioned, will be carried out in a manner that maintains marine resources and the biological productivity of coastal waters and is therefore consistent with Coastal Act Sections 30230 and 30231.

4.4 Fill of Coastal Waters

Coastal Act Section 30233(a)(7) states:

> *(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:*
>
> …
>
> *(7) Nature study, aquaculture, or similar resource dependent activities.*

Coastal Act Section 30108.2 defines "fill" as "earth or any other substance or material … placed in a submerged area." BAL proposes to install 16 separate three ton anchoring devices on the

seafloor around the perimeter of the proposed grow-out structure. These anchoring devices would be comprised of concrete blocks and would take up as much as 350 square feet of the seafloor at the project site. This proposed installation of anchoring devices on the submerged seabed constitutes "fill" of open coastal waters, as that term is defined in the Coastal Act.

The Commission may authorize a project that includes filling of open coastal waters if the project meets the three tests of Coastal Act Section 30233. The first test requires that the proposed activity fit within one of seven use categories described in Coastal Act Section 30233(a)(1)-(7). The second test requires that no feasible less environmentally damaging alternative exists. The third and final test mandates that feasible mitigation measures are provided to minimize any of the project's adverse environmental effects.

Allowable Use

The overall purpose of the project is to cultivate giant kelp for research purposes. Coastal Act Section 30100.2 defines "aquaculture" as "a form of agriculture as defined in Section 17 of the Fish and Game Code." The relevant portion of Section 17 of the Fish and Game Code defines aquaculture as "that form of agriculture devoted to the propagation, cultivation, maintenance, and harvesting of aquatic plants and animals in marine, brackish, and fresh water." Under these definitions, the proposed project is an aquaculture activity. The deposit of fill in the coastal zone for aquaculture activities is described as an allowed use in Coastal Act Section 30233(a)(7). Therefore, the Commission finds that the project meets the allowable use test for fill of open coastal waters under Coastal Act Section 30233(a).

Least Environmentally Damaging Feasible Alternatives

The Commission must further find that there is no feasible less environmentally damaging alternative to placing fill in open coastal waters. Coastal Act Section 30108 defines "feasible" as "…capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social and technological factors."

In addition to the proposed placement of 16 anchoring devices comprised of concrete blocks, BAL and Commission staff also considered several other basic anchor designs - the installation of concrete mooring structures, concrete or steel pilings, and the use of traditional hooked or self-burying anchors. Although the use of permanent concrete mooring structures would have required less seafloor area – stabilization of the proposed grow-out structures could likely have been accomplished with as few as six to eight concrete devices - this alternative would also have resulted in a more permanent use of nearshore substrate at each anchor site. Benthic marine life would have been displaced from these sites and the concrete mooring devices would have posed an ongoing entanglement risk to fishing gear once the grow-out structures were removed at the completion of the proposed study period. While removal of concrete mooring structures would be possible, because these structures are typically very large and heavy, their removal often requires the use of demolition techniques that may result in substantial risk to marine life.

Similarly, driving fixed anchoring posts or piles into the seafloor would also have resulted in more permanent adverse impacts to the seafloor and future fishing activities at the project site. Further, the installation of piles or posts would likely have required the use of a pile driver, auger or similar mechanized equipment. The use of such equipment in the marine environment carries

with it a risk of adverse impacts to marine mammals and fish due to the elevated underwater sound levels that these heavy machines generate when they are active. The potential for adverse impacts to marine resources is often associated with the removal of these types of devices as well. Typically, the buried portion of the pile is abandoned in place upon removal, resulting in the permanent displacement of benthic organisms and the loss of benthic habitat.

Finally, traditional hooked or self-burying anchors were also considered in place of the proposed concrete blocks. The use of this type of smaller, lighter anchor would have required a greater number of devices to be installed – thus increasing the amount of substrate that would be disturbed – and would have potentially proven less effective at maintaining the grow-out structures in a stationary position. Movement of the anchors across the seafloor and the grow-out structures through the water column would increase the potential for existing kelp beds and rocky reefs around the project site to be disturbed. In addition, the presence of buried and exposed hard substrate throughout much of the sublease area would have made it difficult to set these anchors properly.

In addition to these anchoring options, BAL also considered alternative project designs and configurations, including the placement and use of two structures instead of one. The installation and use of two grow-out structures was initially proposed by BAL to increase the amount of kelp that could be grown and harvested. These structures, one large and one small, would have been placed at separate locations in the two subleased parcels. However, the use of two grow-out structures would have required the installation of additional anchoring devices and a corresponding increase in the amount of benthic habitat that would be displaced and disturbed while the devices were in the water. Additionally, several more acres of nearshore coastal waters would have been occupied while the structures were in use. BAL therefore rejected this larger project design alternative and has proposed to install a single grow-out structure that would have the minimum dimensions and minimum number of anchoring devices necessary to achieve the project goals.

Several alternatives were also considered for the proposed placement of this structure and its anchoring devices within the sublease area. Although the limited size of the sublease area provides a constraint on placement options for the structure, BAL made use of benthic habitat surveys to propose a location that would be at a maximum distance from persistent kelp beds in the project area and the highest density eelgrass beds as well. Of the project design, location and size options that were considered to be feasible, the proposed project would have the lowest likelihood of resulting in adverse impacts to the marine environment.

For the reasons described above, the Commission finds that the proposed use of concrete anchoring blocks is the least environmentally damaging feasible alternative and therefore the second test of Coastal Act Section 30233(a) is satisfied.

Project Impacts Mitigated to the Maximum Extent Feasible
The final requirement of Coastal Act Section 30233(a) is that filling of coastal waters may be permitted if feasible measures have been provided to avoid, minimize and mitigate any potential adverse environmental impacts. As described in greater detail in the coastal and marine resources section of this report, the proposed research project could adversely affect existing kelp

and eelgrass within the project area, and pose a risk (albeit low) of entanglement to marine mammals. BAL has worked with the natural resource agencies to locate and design the project such that these potential impacts are avoided or minimized. BAL will actively monitor the grow-out structure for its structural integrity and any impacts to marine mammals and the Commission is requiring in **Special Condition 3** that BAL submit an engineering analysis demonstrating the structure's ability to withstand a 25-year storm event. The Commission is also requiring in **Special Conditions 1** and **2** that any project-related impacts to existing eelgrass and kelp be adequately mitigated.

The Commission believes implementation of these measures will minimize the project's adverse environmental impacts and thus finds that the third and final test of Coastal Act Section 30233(a) has been met.

Because the three tests have been met, the Commission therefore finds the proposed project consistent with Coastal Act Section 30233(a).

4.5 Commercial and Recreational Fishing

Coastal Act Section 30234.5 states:

> *The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.*

Coastal Act Section 30220 states:

> *Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.*

The proposed project area is located approximately 15 miles from Santa Barbara Harbor, the nearest significant launch site for commercial and recreational fishing vessels. Commercial fishing for lobster, marine snails (whelks), and crabs is known to occur in the project area. In addition, Haskell's Beach is known to be a beach launch site for recreational kayak anglers. The public parking lot and access trail for Haskell's Beach is located approximately one-half mile downcoast of the project site. While fishing activities would not be prohibited from occurring at the project site, for the seven months it is in the water, the presence of the submerged grow-out structure could restrict the entry and/or passage of fishing vessels in this approximately 3.9 acre area. The grow-out structure and its associated lines, buoys, and anchors could also inadvertently entangle fishing gear and cause it to be damaged or lost.

To determine the importance of the site to commercial fishing interests, BAL interviewed members of the commercial sportfishing, lobster, crab, and whelk fishing communities. These interviews suggested that while there is commercial sport fishing on the reefs and artificial structures surrounding the project site and on the Naples Reef (an upcoast area that was recently proposed for designation as a state marine protected area), the project site itself is not targeted because the low relief doesn't support fishable standing stocks of nearshore fishes. Commercial fishermen for lobster and crab reported to BAL that they sometimes fish the mariculture site, but that the yields from it are minor both for themselves and the Santa Barbara Harbor fishing fleet.

To reduce the potential for the proposed project to result in adverse impacts to fishing, the grow-out structure would be installed near the end of the lobster fishing season (mid-March) and would be removed prior to the start of the next season (late-September/early-October). In addition, the project site and surrounding waters would be marked with U.S. Coast Guard approved warning buoys to provide notice to anglers and vessel operators of a submerged hazard. This notification would decrease the likelihood that fishing equipment would be inadvertently placed near the grow-out structure in such a way that it would interact negatively with it. Further, the marker buoys would also include a contact phone number that could be used in case gear is lost. If, despite these safeguards, there is interference with commercial fishing activity, BAL also proposes to employ its available resources (boat, captain, and divers) to assist in remediation and recovery of lost or damaged fishing gear.

Overall, the small size of the project site, the limited time the grow-out structure will be in the water (approximately seven months), as well as the proposed use of marker buoys and BAL's commitment to aid in the recovery of lost or entangled fishing gear at the project site, would reduce the likelihood that the project would adversely affect commercial and/or recreational fishing. Therefore, the Commission finds that the proposed project is consistent with Coastal Act Section 30234.5.

4.6 Visual Resources

Coastal Act Section 30251 states:

> *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration or natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.*

The proposed grow-out structure would be maintained underwater and its only visible elements would be the 15 four-foot diameter surface buoys placed at intervals around its perimeter. In addition, several U.S. Coast Guard approved warning buoys would also be placed at the edge of the sublease area to provide notice of a submerged hazard to mariners and ocean vessels. Each of these buoys would extend several feet above the water line and would be brightly colored to maximize its visibility. At the completion of the proposed seven month project period, the grow-out structure and all its ancillary equipment would be removed, including all of the proposed buoys. No visible project elements would remain.

The nearest public beach to the project site is Haskell's Beach, located roughly one-quarter mile downcoast of the Ellwood Pier. Views of the project site and the proposed buoys from Haskell's Beach are expected to be blocked by the intervening visual presence of the Ellwood Pier. While Haskell's Beach is contiguous with the shoreline directly inland of the project site and upcoast of the Ellwood Pier, the coastal bluffs that extend to the shoreline in this area can restrict pedestrian

passage and use of this area because there is frequently little or no beach between the bluffs and sea. The land above these bluffs is part of the private Eagle Canyon Ranch. In general, public use of the area upcoast of the Ellwood pier is sporadic and limited.

Given the temporary nature of the proposed project, its small visual footprint, and the limited public access and use of the areas from which the proposed project would be most visible, it is unlikely that the project has the potential to result in adverse impacts to the visual resources of the project area.

Therefore, the Commission finds that the proposed development is consistent with Coastal Act Section 30251.

5 CALIFORNIA ENVIRONMENTAL QUALITY ACT

Section 13096 of the Commission's administrative regulations requires Commission approval of coastal development permit applications to be supported by a finding showing the application, as modified by any conditions of approval, to be consistent with any applicable requirements of the California Environmental Quality Act ("CEQA"). Section 21080.5(d)(2)(A) of CEQA prohibits approval of a proposed development if there are feasible alternatives or feasible mitigation measures available that would substantially lessen any significant impacts that the activity may have on the environment. The project as conditioned herein incorporates measures necessary to avoid any significant environmental effects under the Coastal Act, and there are no less environmentally damaging feasible alternatives or mitigation measures. Thus, as conditioned, the proposed project will not result in any significant environmental effects for which feasible mitigation measures have not been employed consistent with CEQA Section 21080.5(d)(2)(A).

APPENDIX A

Substantive File Documents

California Coastal Commission. Staff report for coastal development permit application number 5-06-438, November 16, 2006.

California Coastal Commission. Staff report for coastal development permit application number E-92-6-A2, May 23, 1997.

California Fish and Game Commission, Letter to Neushul Mariculture re: sublease of State Water Bottom Lease No. M-654-03, May 25, 2010.

Bio Architecture Lab, Inc., *Essential Fish Habitat Report – Kelp Growing Study, Ellwood, Santa Barbara County*, August 20, 2010.

Bio Architecture Lab, Inc., Letter to CCC and U.S. Army Corps of Engineers re: Response to NMFS Comments on Proposed Kelp Mariculture Project, October 19, 2010.

Bio Architecture Lab, Inc., Coastal Development Permit Application No. E-10-008, June 7, 2010.

National Marine Fisheries Service, Letter to U.S. Army Corps of Engineers re: Proposed Kelp Cultivation Project, September 27, 2010.

National Marine Fisheries Service, U.S. Fish and Wildlife Service and California Department of Fish and Game, *Southern California Eelgrass Mitigation Policy – Revision 11*, July 31, 1991.

National Marine Fisheries Service, Draft California Eelgrass Mitigation Policy, October 11, 2010.

U.S. Army Corps of Engineers, Letter of Permission Pre-Construction Notification SPL-2010-00706-TS, September 1, 2010.

EXHIBIT 1 Project Area and Site (Lease M-654-03)

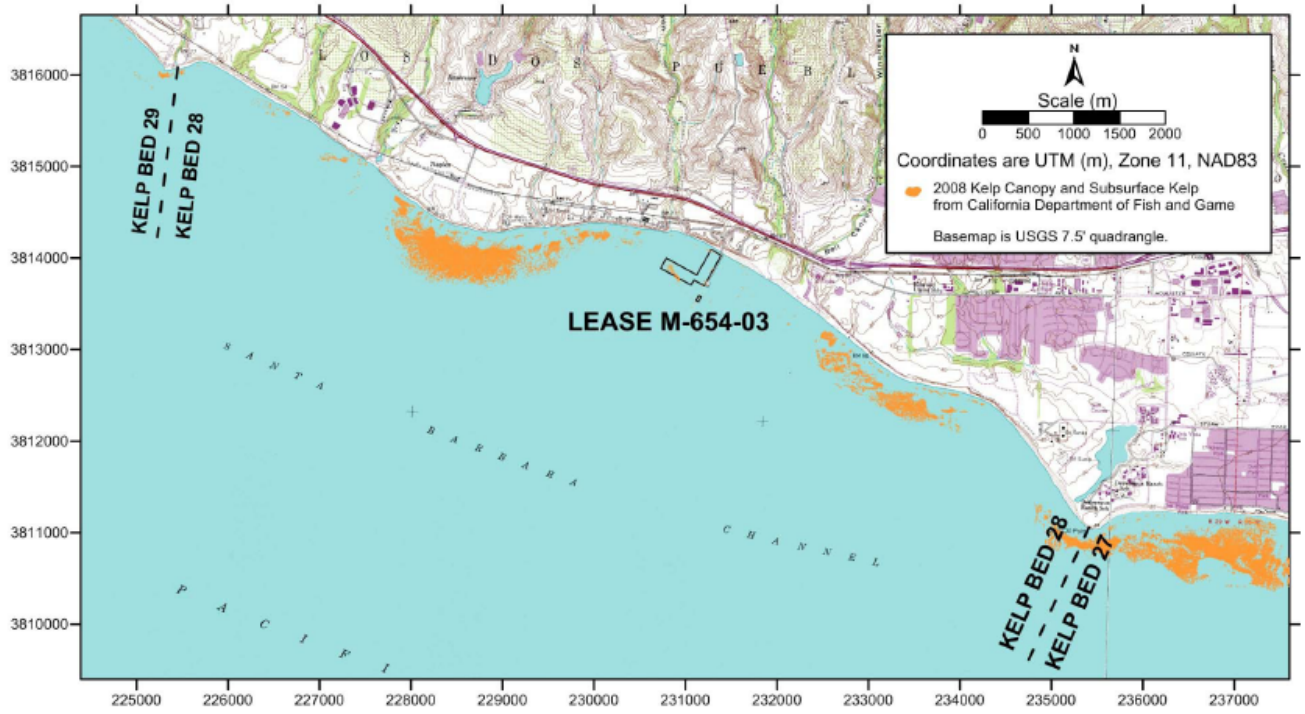


EXHIBIT 1

Project Area and Site

EXHIBIT 2 Cultivation Structure Design Schematic

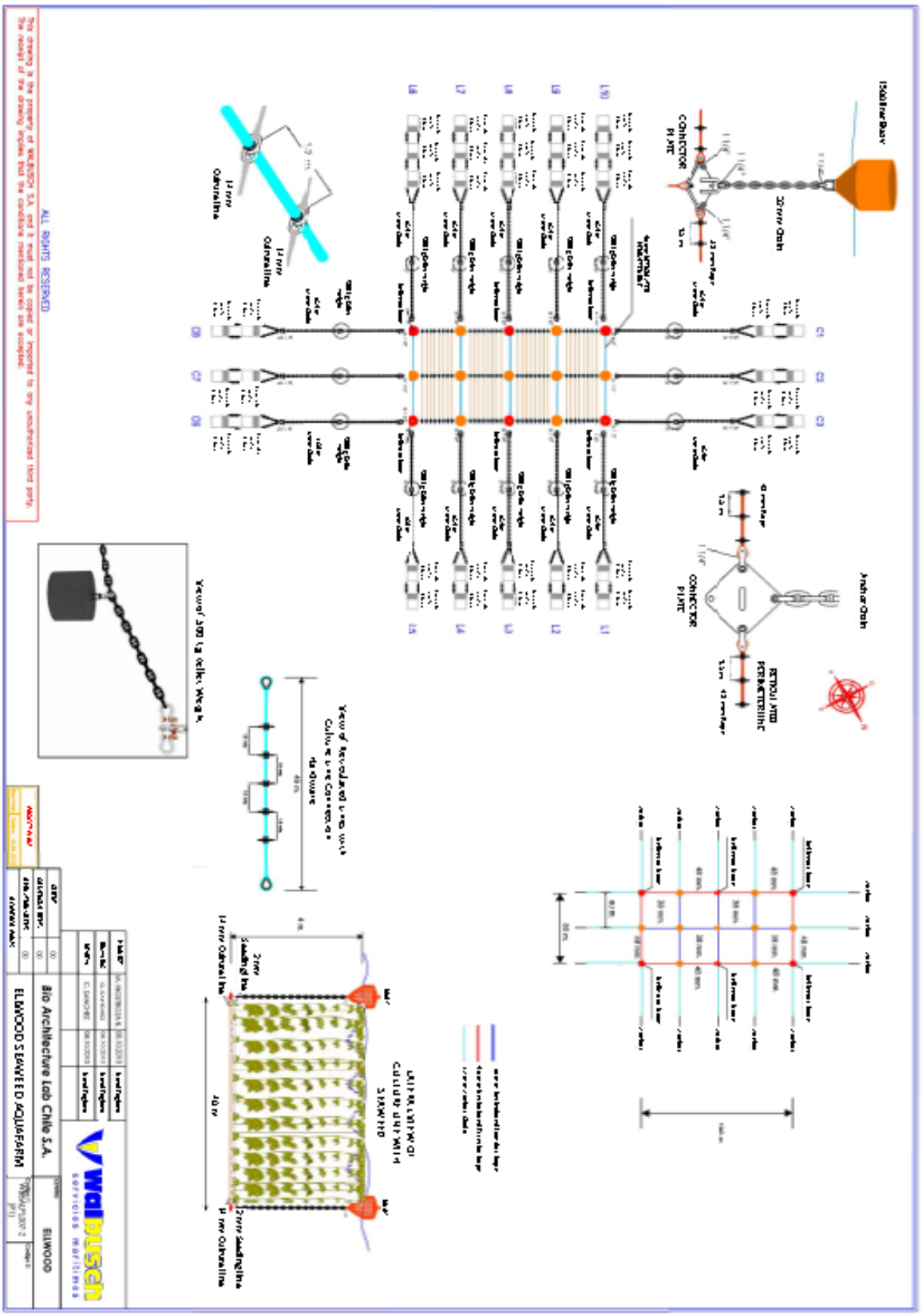


EXHIBIT 2
Cultivation Structure Design Schematic

EXHIBIT 3 Habitat Survey Results (Eelgrass)

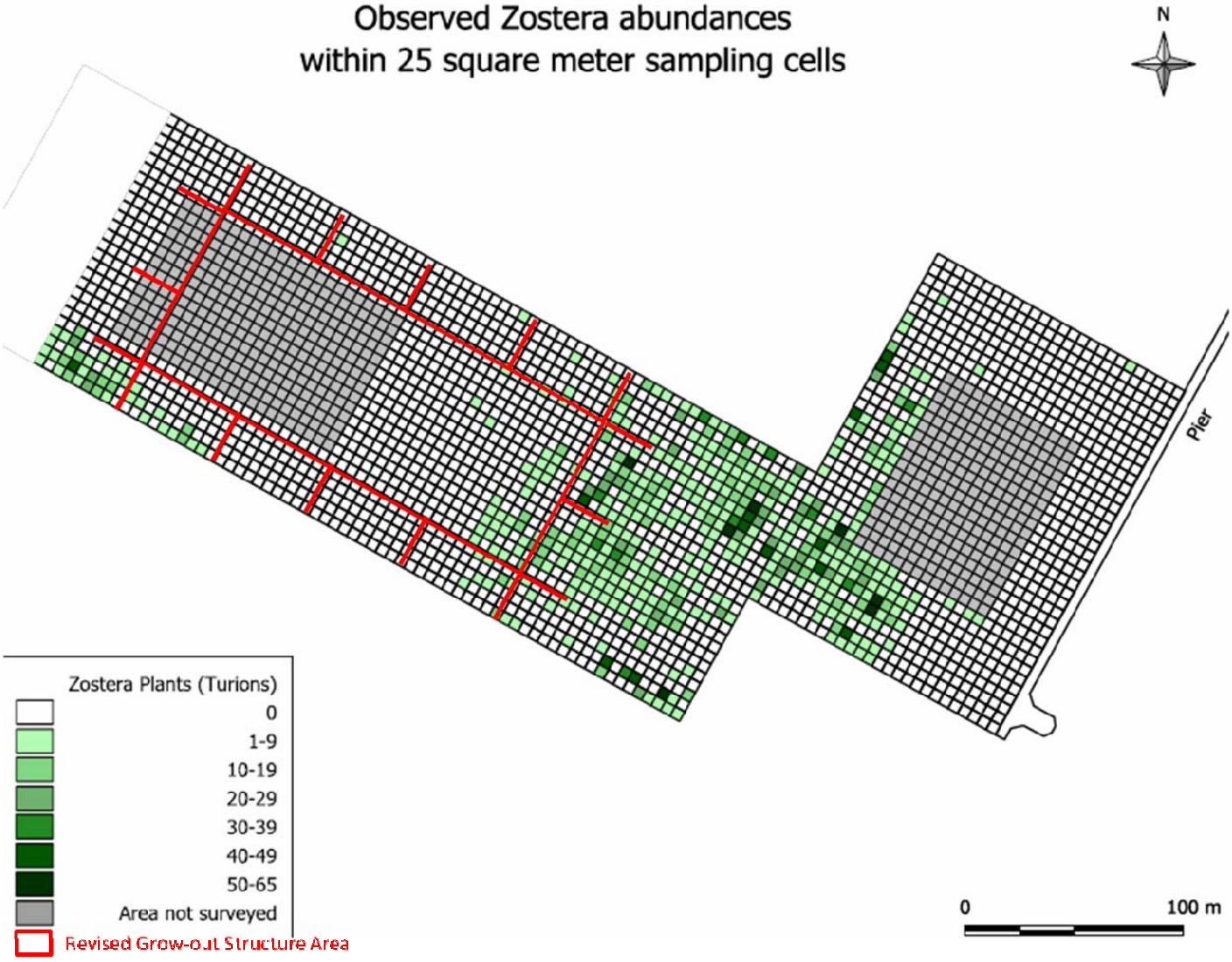
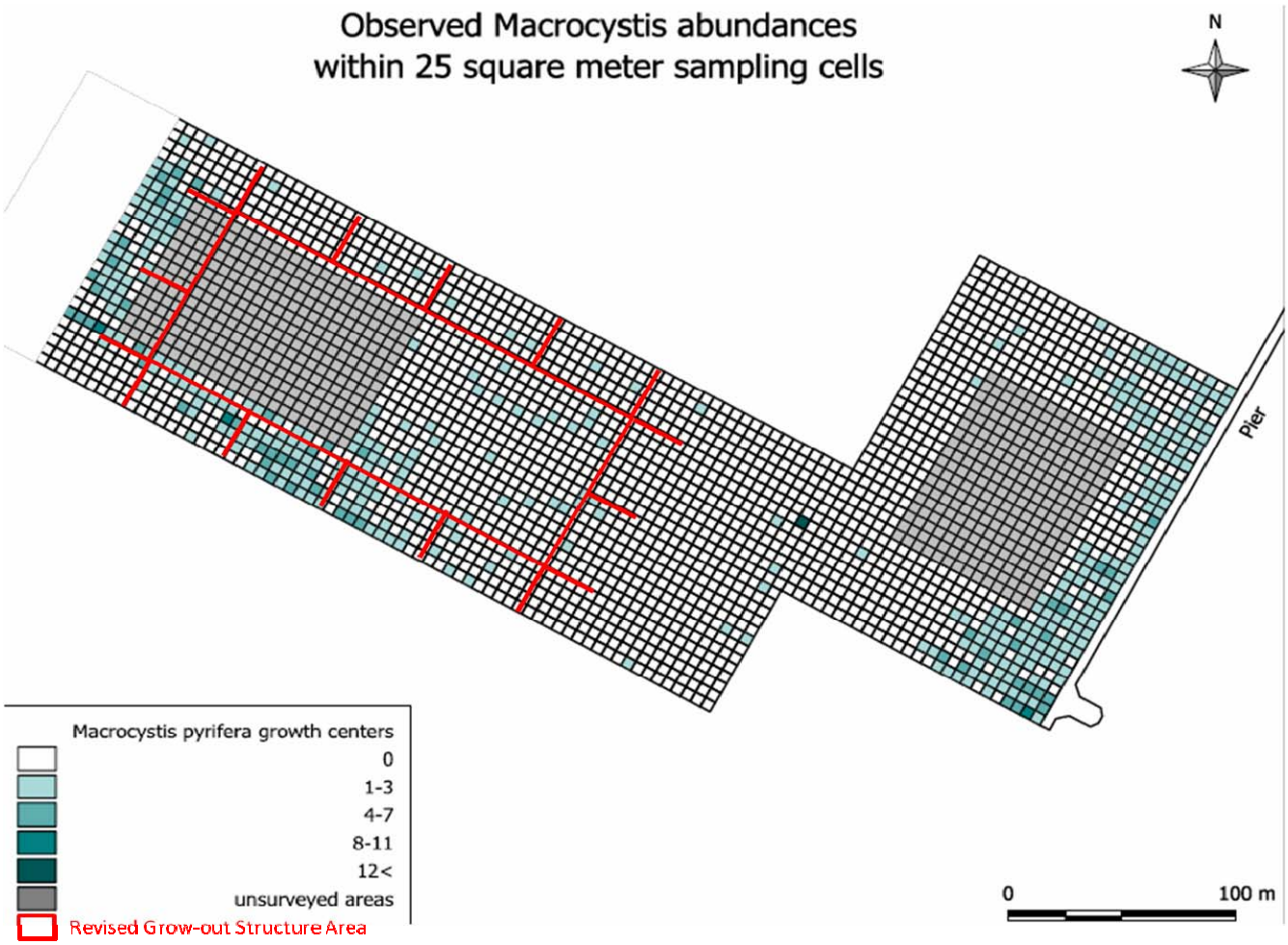


EXHIBIT 3

Habitat Survey Results

EXHIBIT 3 Habitat Survey Results (Kelp)



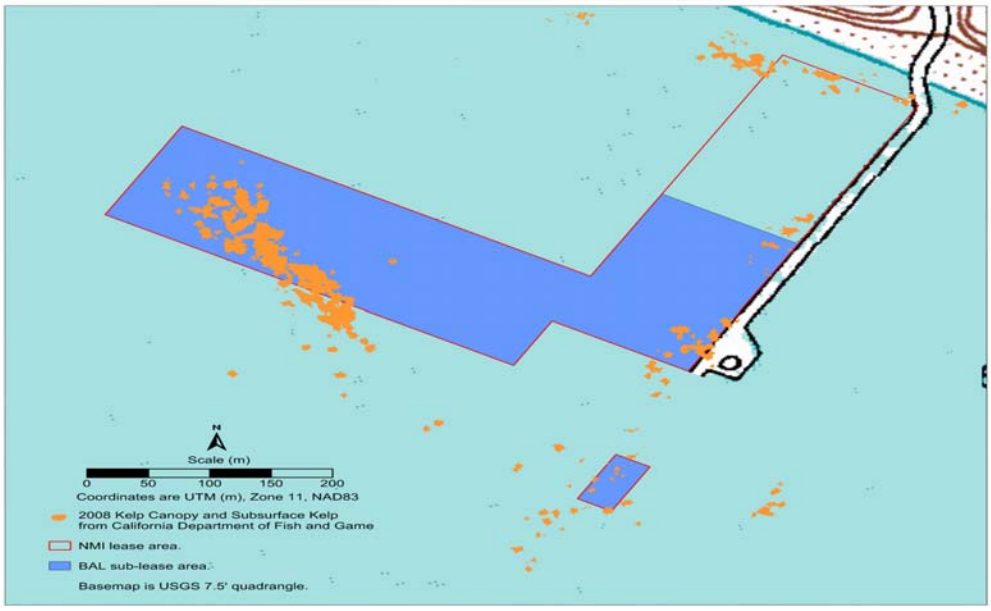


EXHIBIT 3

Habitat Survey Results