Committee Staff Summary for March 13, 2025 MRC

3A. Application for New Aquaculture Lease

Today's Item **Information ☒** **Action ☐**

Presentation and initial public vetting of Santa Barbara Sea Ranch, Inc. (SBSR) application for a state water bottom lease for aquaculture purposes offshore Santa Barbara County, consistent with the Commission's enhanced leasing process.

Summary of Previous/Future Actions

• Received SBSR's application for a state water bottom lease for aquaculture purposes	June 2018
• Determined the application was in the public's interest	August 2018
• SBSR developed and submitted iterations of a draft initial study to staff, and staff distributed to agencies for review	December 2019 – April 2021
• Marine Resources Committee (MRC) developed and Commission approved a new public interest determination criteria and evaluation framework and an enhanced leasing process	April 2022-August 2023
• **Today's presentation and initial public vetting of SBSR's proposed aquaculture project**	**March 13, 2025; MRC**
• Presentation to the Tribal Committee (TC) and public vetting of SBSR's proposed aquaculture project	April 15, 2025; TC
• Initiate California Environmental Quality Act (CEQA) environmental review process, including public scoping and tribal notification	To be determined

Background

The Commission has the authority to lease state water bottoms for aquaculture in marine waters of the State, under terms agreed upon between the Commission and the lessee (California Fish and Game Code sections 15400 and 15405). Prior to lease approval, the Commission must determine that the lease is in the public interest (Fish and Game Code subdivision 15400(a)).

SBSR Application and Timeline Overview

At its June 2018 meeting, the Commission received an application from David Willitt of SBSR to lease 176 acres of state water bottom in the Santa Barbara Channel. The proposed lease area is located approximately five miles west of Santa Barbara Harbor, and within one mile of shore (Exhibit 1). The potential site would be used to cultivate bivalves. The Commission referred the application to the Department for review and recommendation, beginning with an evaluation of the public interest.

It is important to note that this application preceded the Commission's decision to pause lease application processing to develop enhanced public interest criteria and procedures.

Public Interest Determination and Review

At its August 2018 meeting, the Commission received a Department evaluation and recommendation for a public interest finding for the SBSR lease application. Based on the Department's evaluation and public input, the Commission found that the proposed lease area was available and in the public interest (Exhibit 1). Public input included letters stating that the location would avoid conflicts with commercial fishing grounds for lobster trap and trawl fisheries (Exhibit 2).

Following the public interest finding, staff initiated public notice, outreach, and the preliminary steps of environmental review under CEQA. To date, in addition to the public interest finding, several steps were taken:

- December 2019: Commission staff received a draft initial study from SBSR, including habitat and water quality surveys, and sent the document to three state agencies for an informal initial review; feedback from the review was shared with SBSR.
- March 2021: Commission staff received a revised draft initial study, which was distributed to trustee and responsible agencies for review in April 2021.
- Summer 2021: Based upon comments from trustee and responsible agencies — also shared with SBSR — the Commission executive director notified SBSR that an environmental impact report (EIR) under CEQA is necessary.

Following the executive director's guidance, SBSR shared with staff that it intended to seek funding and a consultant to support the EIR process. In August 2024, SBSR notified staff and the Department that it had secured a consultant and wished to resume the environmental review and leasing process; staff confirmed the need for an EIR. Staff sent a letter to SBSR on March 7 formally confirming the necessity of an EIR and providing guidance for developing a draft notice of preparation to resume the CEQA process.

Integration into Enhanced Leasing Process

In August 2023, the Commission approved an enhanced leasing process for new state water bottom lease applications. The Commmission directed staff to integrate existing lease applications — including the SBSR application — into the enhanced leasing process. The process includes interagency coordination meeting(s) (the first one held in December 2024 for SBSR), initial vetting at MRC and TC meetings, and continuing MRC and TC discussions as the application review and CEQA process develop.

While the enhanced leasing process shifts the public interest determination to a later stage, the change does not apply to the SBSR application, which already has a public interest finding. As such, for this application there is no staff evaluation for "requirements" criteria; however, the SBSR application had to meet legal requirements to receive the public interest determination in 2018. The one exception from the "requirements" criteria is conferring with the Native American Heritage Commission regarding cultural resources; staff is currently undertaking this step. The public interest criteria document and considerations contained within it can still be a resource for public input at MRC meetings, pre-CEQA scoping hearing(s), and later to the Commission as it considers a decision.

Initial Public Vetting and Next Steps

Today, staff will provide an overview of the SBSR lease application, its integration into the Commission's enhanced leasing process, and upcoming process and evaluation steps (Exhibit 3). Following staff's overview, SBSR will present its proposed project (Exhibit 4). Today offers MRC an opportunity to re-engage with the SBSR application, invite initial public input, and provide feedback to help guide SBSR's environmental review.

Discussions today and during the April TC meeting will assist SBSR in embarking on the CEQA environmental review process, which will include staff and Department review, review by other state and federal agencies, and ongoing public engagement (including additional MRC and TC discussions) before the Commission is scheduled to consider the lease request and supporting evaluation and input. While staff cannot provide a specific timeline for future action, the public will be notified well in advance of the Commission considering whether to approve the lease.

Significant Public Comments

A Santa Barbara aquaculture operator expresses concern about the proposed lease application and recommends that the proposed lease area footprint be reduced in size, operations be moved further away from the commenter's own operations, and any approval be for a shorter duration. The aquaculture operator is concerned that the lease as proposed would inhibit expansion and development of their own lease area, referring to a pending lease amendment request submitted to the Commission several years ago to expand the lease area. They express concern about current Department mechanisms to review applications and the cost of permitting causing more intense farming practices to facilitate a reasonable return on investment, leading to potential environmental harm (Exhibit 5).

Recommendation (N/A)

Exhibits

1. Staff summary and associated meeting materials from August 22-23, 2018 Commission meeting, Agenda Item 10, regarding a public interest determination *(for background purposes only)*
2. SBSR's revised project description, received December 5, 2024
3. Staff presentation
4. SBSR's presentation
5. Letter from Bernard Friedman, Founder, Santa Barbara Mariculture, received February 28, 2025

Committee Direction/Recommendation (N/A)

STAFF SUMMARY FOR AUGUST 22-23, 2018
For background purposes only

10. SANTA BARBARA SEA RANCH - NEW STATE WATER BOTTOM LEASE

Today's Item **Information** ☐ **Action** ☒

Determine whether a new state water bottom lease applied for by Santa Barbara Sea Ranch, Inc. would be in the public interest and provide direction to staff.

Summary of Previous/Future Actions

- Receive new lease application — Jun 20-21, 2018; Sacramento
- **Today's potential public interest finding** — **Aug 22-23, 2018; Fortuna**
- Consider approving lease — To be determined

Background

FGC has the authority to lease state water bottoms to any person for aquaculture if FGC determines that such a lease is in the public interest (Section 15400, Fish and Game Code). Requirements for new lease applications and their consideration by FGC are specified in Section 15403 et seq. of the Fish and Game Code.

At its Jun 2018 meeting, FGC received an application from David Willitt of Santa Barbara Sea Ranch, Inc. to lease a new area covering 176 acres of state water bottom of the Santa Barbara Channel; the proposed lease area is located approximately five miles west of Santa Barbara Harbor within one mile of shore (Exhibit 1). The potential site would be used to grow Mediterranean mussels.

Fish and Game Code sections 15400(a) and 15404 require that, prior to considering a new lease application, FGC must find that the lease area applied for is available (i.e., not otherwise leased or encumbered for other uses), and that the lease would be in the public interest. To help inform FGC's finding, DFW has consulted with the California State Lands Commission regarding availability of the area and has provided a review of the application to inform a public interest determination (Exhibit 2).

Should FGC find that the lease would be in the public interest, staff will publish public notice that FGC is considering the lease as prescribed in Fish and Game Code Section 15404, DFW will initiate tribal outreach and interagency coordination, and environmental review will be conducted by the applicant prior to final FGC consideration of the lease application (Exhibit 2).

Significant Public Comments

Mr. Willett submitted a letter from a commercial trap fisherman from Santa Barbara expressing that the area would not interfere with commercial trap fishing grounds in the area, and that local mussel farming as proposed can benefit the fishing community (Exhibit 3).

The Southern California Trawler's Association did not identify any concerns with the proposed farm location and in the future would like to work with the applicant on implementation (Exhibit 4).

STAFF SUMMARY FOR AUGUST 22-23, 2018
For background purposes only

Recommendation

FGC staff: Find the lease is available and would be in the public interest, and direct staff to advance the lease application for public notice, outreach and environmental review, as recommended by DFW.

DFW: Find that the area of the proposed new state water bottom lease for shellfish aquaculture is available and that the lease would be in the public interest, and direct staff to proceed with the next steps in public notice, tribal outreach, interagency coordination, and environmental review (Exhibit 2).

Exhibits

1. Santa Barbara Sea Ranch application for new lease and request for lease renewal, dated Jun 5, 2018
2. DFW memo and map of proposed lease area, received Aug 9, 2018
3. Letter from Steven Escobar, transmitted by David Willett via email, received Aug 8, 2018
4. Email from Mike McCorkle, received Aug 8, 2018

Motion/Direction

Moved by _____and seconded by _____that the Commission finds the state water bottom lease area applied for by Santa Barbara Sea Ranch, Inc. for purposes of shellfish aquaculture is available for lease, and that the lease would be in the public interest. Further, the Commission directs staff to initiate public notice pursuant to Section 15404 of the Fish and Game Code, and schedule for consideration the lease application following tribal outreach and interagency review, and environmental review conducted by the applicant.

Santa Barbara Sea Ranch, Inc.

| dwillett@santabarbarasearanch.com

May 31, 2018

Valerie Termini
Executive Director
California Fish and Game Commission
1416 Ninth Street, Suite 1320, Sacramento, CA 95814

Dear Valerie Termini:

Please find enclosed two copies Santa Barbara Sea Ranch's application for lease of State water bottoms and a check for the $500 application fee.

Thank you for your consideration of our application! I look forward to hearing from you.

Sincerely,

David T. Willett

President & CEO

Santa Barbara Sea Ranch, Inc.

FORM A

State of California Fish and Game Commission Application for Lease of State Water Bottoms for Aquaculture

Applicant Name: Santa Barbara Sea Ranch, Inc. **Phone:** (805) 450-9672

Address: 1829 Loma Street, Santa Barbara, CA 93103

Aquaculture Registration Number: TBD **Exp. Date:** TBD

(Note: Aquaculture registration application will be made when appropriate)

Species of plant or animals to be cultured:

Mytilus galloprovincialis (Mediterranean mussels)

Application is hereby made to the Fish and Game Commission of the State of California for a lease of State water bottoms in the area described in the attached exhibit entitled "Exhibit A - Legal Description," and as shown on the map attached hereto as "Exhibit B." Each exhibit bears the name of this applicant. Such lease will be for the purpose of aquaculture involving the species designated above. In support of this application, the applicant hereby submits the following explanation of the type of operation and cultural practices to be employed:

A. Purpose of operation – research and development or production
B. Plan of development and proposed production schedule – 5 year plan
C. Type of cultural method(s) to be employed: bottom, longline, buoyed habitats, etc.
D. Department of Health Services growing water classification: approved, conditionally approved, prohibited, restricted or unclassified

(Please see additional sheets for detailed explanation)

Date: _____

Santa Barbara Sea Ranch, Inc.

By: _____

David T. Willett – President & CEO

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1. BACKGROUND

A. APPLICANT

Santa Barbara Sea Ranch, Inc. (SANTA BARBARA SEA RANCH), a California corporation, was formed in May 2018 for the express purpose of creating a Santa Barbara based mussel farming operation that provides a locally cultivated, sustainably raised food source that creates economic opportunities for the community and serves to advance state and national goals and objectives for increased domestic aquaculture and secure food supply.

SANTA BARBARA SEA RANCH founder, David Willett, has held senior operations and engineering leadership positions with companies in the wave, tidal, and wind renewable energy sectors. He holds a BS – Electrical Engineering from UCSB, an MS – Electrical Engineering from the University of Wisconsin, and an MBA from Pepperdine University. His experience establishing and leading a wind turbine manufacturing operation with a global supply chain, as well as his ocean engineering experience in tidal and wave energy systems development, gives him the right tools and qualifications to help ensure the success of SANTA BARBARA SEA RANCH's efforts to become a model aquaculture farming operation.

SANTA BARBARA SEA RANCH is working to create a Board of Advisors to help guide the company to successful establishment and commercial operation. Currently, Dr. Michael Chambers, Aquaculture Specialist and Research Scientist at the University of New Hampshire (UNH), is on the SANTA BARBARA SEA RANCH Board of Advisors. Dr. Chambers provides the company with guidance related to best management practices, operations, cultural practices, and technical design. SANTA BARABARA SEA RANCH will work cooperatively with UNH, the University of California – Santa Barbara Bren School of Environmental Science and Management, regulatory agencies, and others to advance scientific knowledge and state-of-the-art aquaculture practices through research and innovation.

B. PROJECT SUMMARY

SANTA BARBARA SEA RANCH will establish a commercial offshore bivalve aquaculture operation based from Santa Barbara Harbor. The project will consist of 176 acres in state waters of the Santa Barbara Channel over a sandy bottom area located approximately five miles west of Santa Barbara Harbor and within one mile of the shore. The site will be used for growing of the Mediterranean mussel (Mytilus galloprovincialis) via submerged longlines. The mussels will be grown and harvested by SANTA BARBARA SEA RANCH and landed at Santa Barbara Harbor.

Initial plantings of juvenile seed mussels, commonly referred to as spat, will be purchased from onshore hatcheries certified by the California Department of Fish and Wildlife (CDFW). If approved by the appropriate regulatory agencies, including CDFW and the California Coastal Commission, subsequent plantings may include wild collected spat.

Growing mussels adhere to special ropes that promote mussel attachment and growth. These ropes will be suspended by submerged longlines and buoys that are anchored to the sandy ocean bottom. When harvested, the mussels will be hauled onboard the harvesting vessel

where they will be separated from the growing ropes, declumped, cleaned, graded, and bagged for transportation to Santa Barbara Harbor for offloading, sale, and distribution.

2. OPERATION AND CULTURAL PRACTICES TO BE EMPLOYED

A. PURPOSE OF OPERATION

SANTA BARBARA SEA RANCH's purpose of operation is to grow, harvest, and sell Mediterranean mussels (Mytilus galloprovincialis) and, by doing so, to provide a locally cultivated, sustainably raised food source that creates economic opportunities for the community and serves to advance state and national goals and objectives for increased domestic aquaculture and secure food supply.

B. PLAN OF DEVELOPMENT AND PROPOSED PRODUCTION SCHEDULE

i. SITE SELECTION AND LOCATION

The proposed site (please see Exhibit A and Exhibit B) is approximately 176 acres, is in state waters, is not in the Halibut Trawl Grounds, is in a Kelp Administrative Bed Boundary with proper zoning for a bottom lease, and does not conflict with aquaculture activity on state leased parcels.

The proposed site is near to state water bottom lease #M-653-02, issued by the California Fish and Game Commission (FGC) and held by the Santa Barbara Mariculture Company (SBMC). SBMC has been successfully farming Mediterranean mussels in this lease location for more than 10 years. Due to its proximity to lease #M-653-02, SANTA BARBARA SEA RANCH believes that the permitting process should be more streamlined, and that growing conditions should be virtually identical. It is anticipated that cooperation between SBMC and SANTA BARBARA SEA RANCH will lead to improved operational efficiencies, improved best management practices, and economies of scale with regard to logistics and supplies, which will benefit both companies and the industry as a whole. There will also be minimal impact to vessel traffic since the proposed site is in line with the SBMC lease, parallel to the shoreline, and inside of the Halibut Trawl Grounds.

Environmental conditions, including depth, wave, current, temperature, and nutrients have all been proven to be satisfactory for successful mussel cultivation. Duck predation has been a problem in the area and will be addressed with new methods recently developed and tested by UNH.

SBMC has requested a modification to its lease location. SANTA BARBARA SEA RANCH's proposed location does not conflict with SBMC's existing, or proposed, locations. SBMC's proposed location is indicated by points SBMC 1, SBMC 2, SBMC 3, and SBMC a' in the map below (**Figure 1**). SBMC's existing lease is shown as the large kelp-shaded rectangle. SANTA BARBARA SEA RANCH's proposed site is indicated by points SR-NW, SR-SW, SR-NE, and SR-SE.

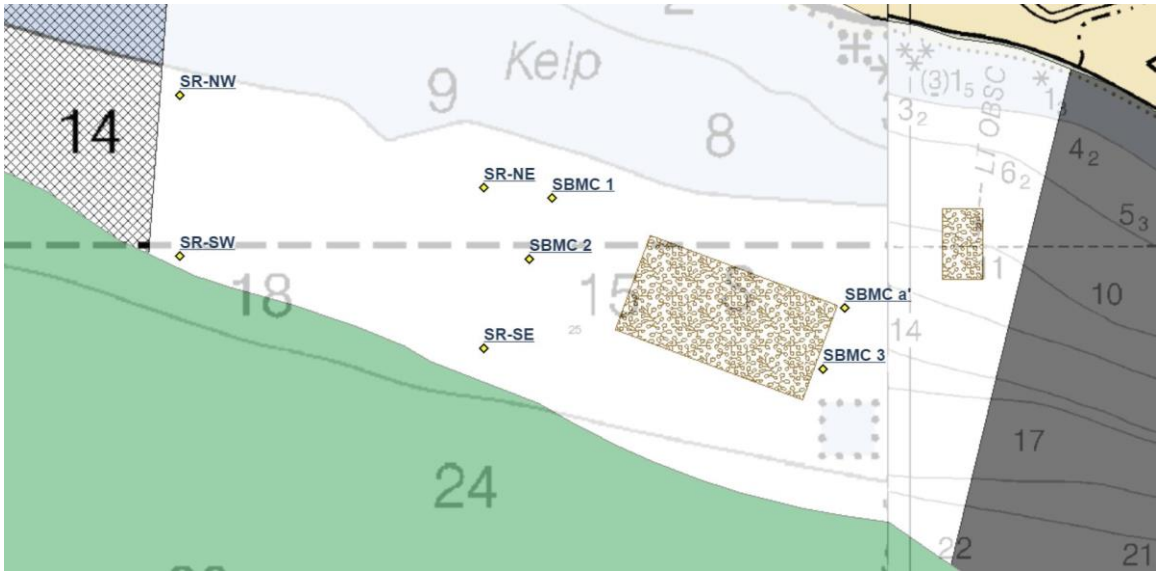


Figure 1: Map Showing the SANTA BARBARA SEA RANCH Proposed Site and the Santa Barbara Mariculture Company's Existing and Proposed Sites

SANTA BARBARA SEA RANCH has surveyed the proposed site for depth and bottom conditions. Sonar was used to take depth measurements at each corner of the site, midway between the corners of the site, and at multiple locations within the site:

Latitude	Longitude	Position	Depth (ft.)
34.40149287	-119.7803543	SR-NW	70
34.39600692	-119.7803543	SR-SW	101
34.39833926	-119.7677058	SR-NE	74
34.3928533	-119.7677058	SR-SE	111

Interior depth measurements in the proposed site were between 70-111 ft., and indicated that the entire site has a smooth sloping bottom.

Bottom conditions were estimated with sonar, and by bouncing a heavy weight on the bottom to feel for impact. All measurements taken indicated a sandy bottom with no growth or structure.

ii. Plan of Development

The proposed site will occupy a 176 acre footprint and hold 100 longlines. Longlines will be arranged in 20 rows of five longlines each, spaced 100 feet apart, and parallel to the shoreline.

We plan to deploy 30 longlines in year one, 35 longlines in year two, and the final 35 longlines in year three. Production per foot of longline will continue to increase gradually after all the longlines are installed, as growout ropes are lengthened, and as production technique is refined.

We will use a modified second-hand fishing vessel for farm operation during the first three years, until cash flow from the farm will support the construction of a dedicated, custom-built vessel. The vessel will require minor modifications to accommodate handling of longlines, and the installation on deck of stripping, declumping, grading, and socking machinery. We plan to construct a new, purpose-built vessel in year three, and begin operating this vessel in year four (around the time the farm is at full scale).

The proposed site will be well marked and monitored. If necessary, warning devices can be installed to warn whales of the site location. Adaptive management and contingency steps will be taken if marine wildlife entanglements are observed or reported at the proposed site.

SANTA BARBARA SEA RANCH will work closely with stakeholders to adopt and adhere to all appropriate best management practices.

iii. Proposed Production Schedule

SANTA BARBARA SEA RANCH plans ramp-up operations according to the following schedule:

Production Schedule	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
New Lines Installed	30	35	35			
Total Lines Operating	30	65	100	100	100	100
Lines Socked	30	50	50	50	50	50
Lines Harvested		20	40	50	50	50
Tons/line		12	13	14	15	16
Tons Harvested		240	520	700	750	800

C. TYPE OF CULTURAL METHODS TO BE EMPLOYED

Mussels will be grown on ropes suspended vertically from longline harness sets in open water at the proposed site. Each harness set will consist of a 400 foot horizontal longline held in place about 20 feet below the surface by submerged flotation buoys, and anchored to the bottom (see **Figure 2** below). Dimensions in Figure 2 are not to scale and, along with specific component selection, will be adjusted and optimized to site specific conditions through disciplined engineering analysis. About 200 culture ropes will be suspended from each longline to a depth of 15-20 feet above the seafloor.

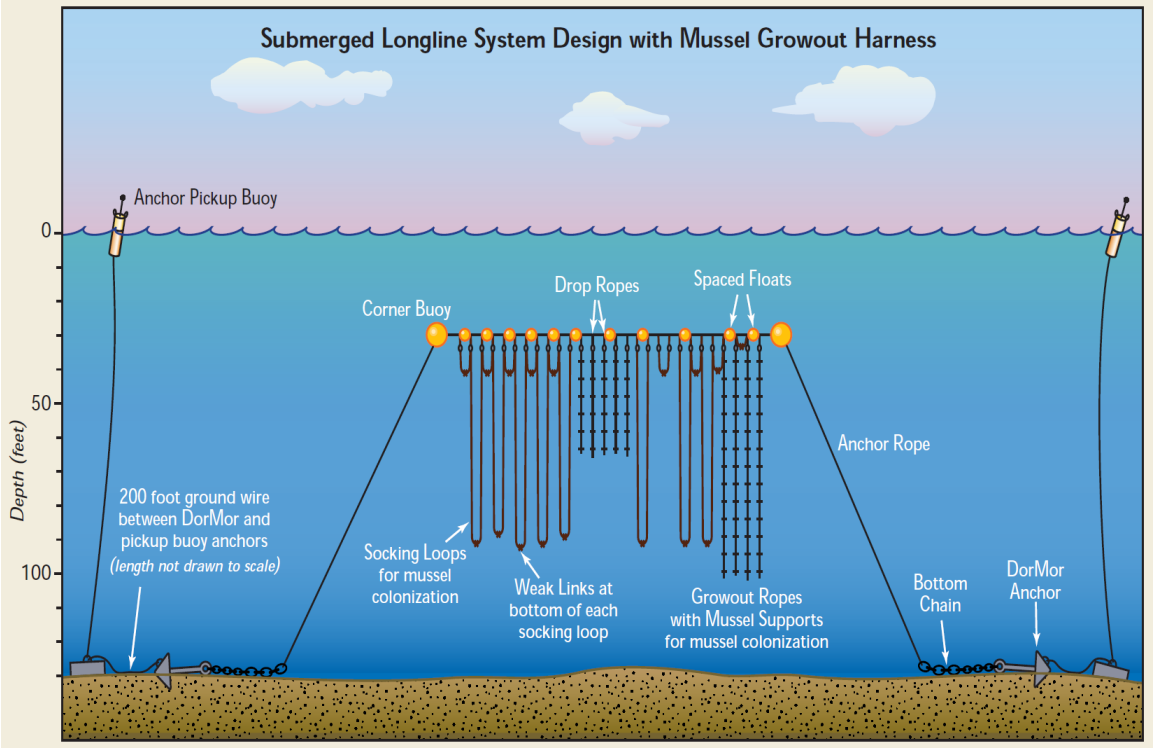


Figure 2 – Drawing of an Open-Ocean Mussel Longline Growout Harness

Longlines are assembled on shore and deployed by a vessel capable of handling the anchors (about 4,500 lbs each). Use of sand screw anchors will also be evaluated in place of gravity and embedment anchor solutions. The expected useful life of the longlines, with partial upgrades and regular maintenance, is 10 years. Deployment operations will require reasonable weather. Once the longlines are in place, production operations go through the following cycle:

- **Mussel spat socking:** Spat, purchased from onshore hatcheries certified by CDFW, are socked in June, July, September, and October. In this operation, juvenile mussels (around 20 mm in size) are graded according to size and "socked" in a biodegradable mesh surrounding the growout rope. This sausage-like "sock" of mussels is then suspended in loops from the longline. The mussels attach to the growout rope and the socking material disintegrates. The entire process is mechanized and performed onboard the vessel to minimize the mussels' time out of the water.
- **Longline maintenance:** Longlines are maintained over the growout cycle until harvest. This includes the occasional removal of fouling and the addition of floatation as the mussels grow and become heavier. Properly scheduled de-fouling will help mussels grow better, preserve the gear, and save money on boat time.
- **Mussel Harvesting:** Mussel harvest begins 9-12 months after socking. Harvesting is staged so that a constant supply of mussels is harvested each month. The longlines remain in place after harvest for the next deployment of socked spat.

D. CALIFORNIA DEPARTMENT OF PUBLIC HEALTH GROWING WATER CLASSIFICATION

The California Department of Public Health (CDPH) has classified the area of the proposed site as "Conditionally Approved" as a shellfish growing area (please see **Figure 3** below).

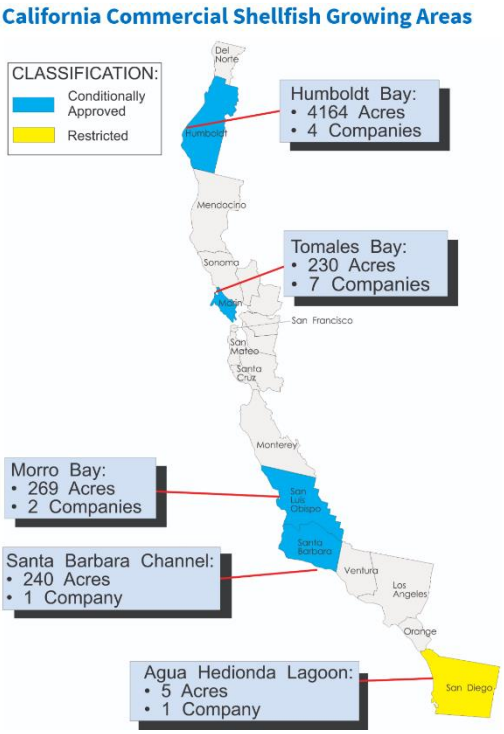


Figure 3 – California Commercial Shellfish Growing Areas

CDPH has also confirmed that the proposed SANTA BARBARA SEA RANCH site is not in a Waste Water Treatment Plant (WWTP) Closure Zone (please see **Figure 4** below).

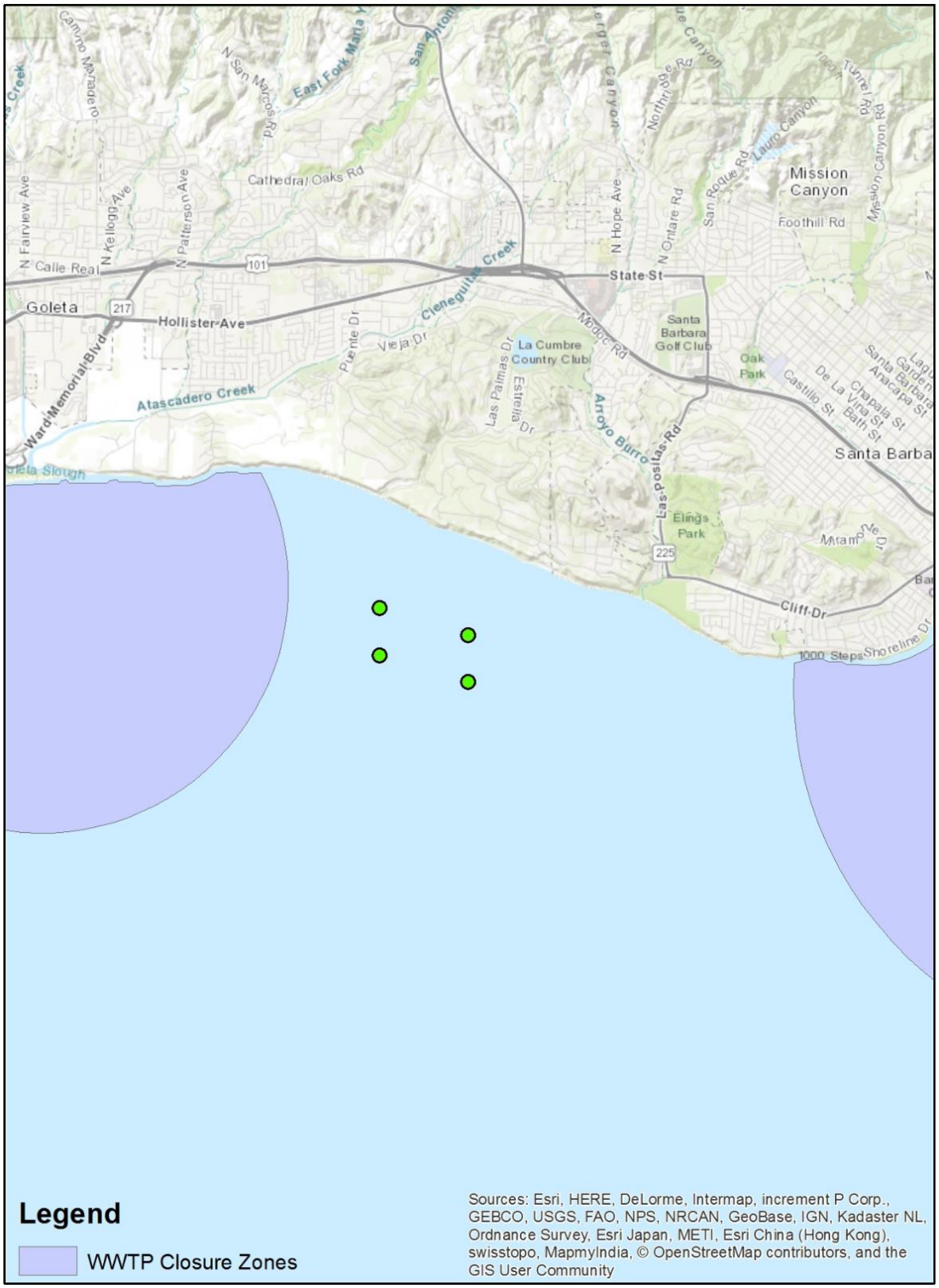


Figure 4 – SANTA BARBARA SEA RANCH Proposed Site Location (green dots) and Local WWTP Closure Zones

EXHIBIT A

Legal description of the proposed water bottom lease for cultivation of Mediterranean mussels (Mytilus galloprovincialis) by Santa Barbara Sea Ranch, Inc.

LOCATION

All that area lying offshore of Santa Barbara, California defined by a four-sided polygon formed by lines connecting the following waypoints (shown in decimal degrees):

Latitude	Longitude	Position
34.40149287	-119.7803543	SBSR-NW
34.39600692	-119.7803543	SBSR-SW
34.39833926	-119.7677058	SBSR-NE
34.3928533	-119.7677058	SBSR-SE

Area: 176 acres, more or less.

EXHIBIT B

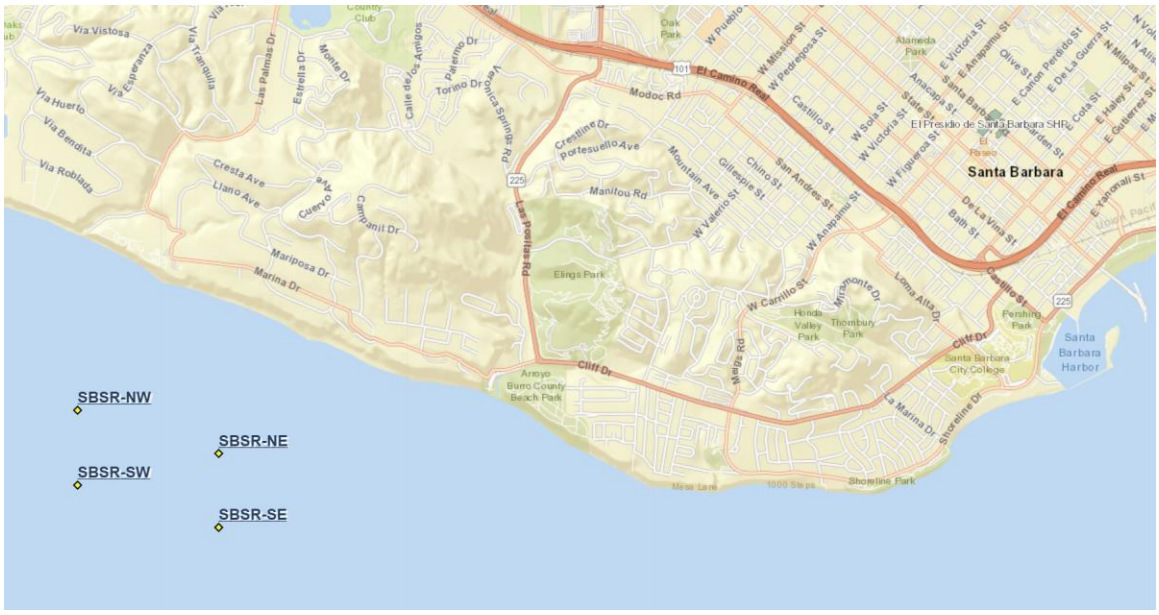
Map of the proposed water bottom lease for cultivation of Mediterranean mussels (Mytilus galloprovincialis) by Santa Barbara Sea Ranch, Inc.

MAP OF THE PROPOSED LOCATION

All that area lying offshore of Santa Barbara, California defined by a four-sided polygon formed by lines connecting the following waypoints (shown in decimal degrees):

Latitude	Longitude	Position
34.40149287	-119.7803543	SBSR-NW
34.39600692	-119.7803543	SBSR-SW
34.39833926	-119.7677058	SBSR-NE
34.3928533	-119.7677058	SBSR-SE

The nearest public access point is the Navy Pier in the Santa Barbara Harbor, approximately five miles from the proposed location.



- Area 176 acres, more or less.
- Distance between SBSR-NW and SBSR-SW = 2,000 ft., more or less.
- Distance between SBSR-NE and SBSR-SE = 2,000 ft., more or less.
- Distance between SBSR-NW and SBSR-NE = 4,000 ft., more or less.
- Distance between SBSR-SW and SBSR-SE = 4,000 ft., more or less.

State of California
Department of Fish and Wildlife

Memorandum

Date: August 8, 2018

To: Valerie Termini
Executive Director
Fish and Wildlife Commission

From: Charlton H. Bonham
Director

Subject: **Request to consider the new state water bottom lease application received from David Willett, doing business as Santa Barbara Sea Ranch, for a 176-acre parcel in offshore waters near Santa Barbara.**

The Department of Fish and Wildlife (Department) requests that pursuant to Fish and Game Code § 15404, the Fish and Game Commission (Commission) finds that the area of the proposed new state water bottom lease for shellfish aquaculture, received from David Willett, doing business as Santa Barbara Sea Ranch (SBSR), is available, finds that the lease would be in the public interest, and direct staff to proceed with next steps in preparation for consideration of the lease (including the posting of public notices, tribal outreach, environmental review, and interagency coordination).

Background:
The Commission received an application for a new state water bottom lease for shellfish aquaculture at its June 20, 2018 meeting under Public Comment. The applicant proposes to establish a commercial offshore bivalve aquaculture operation based from Santa Barbara Harbor. The proposed project would consist of 176 acres in state waters of the Santa Barbara Channel over a sandy bottom area located approximately five miles west of Santa Barbara Harbor and within one mile of shore near Hope Ranch. The site will be used for growing Mediterranean mussels (*Mytilus galloprovincialis*) and Pacific oysters (*Crassostrea gigas*) using submerged longlines in a similar manner to the adjacent operation of Santa Barbara Mariculture Company (SBMC). Harvested product would be landed at Santa Barbara Harbor.

Public Resources Code declares it in the public interest to expand aquaculture activity[1], as does Fish and Game Code in statutory policy that encourages the development of commercial aquaculture[2]. These policies apply in a broader sense, but the public interest consideration may be further informed by site-specific considerations that may be immediately apparent, such as previous encumbrances of the location by other leases issued or recorded by the State Lands Commission, or prohibitions on sanitary or public health grounds as

[1] The Aquaculture Development Act (Pub. Resources Code, § 826.).
[2] Fish & G. Code, § 1700.

managed by the Department of Public Health. The public hearing process of the Commission is meant to provide for more in-depth stakeholder input before approving new leases, so support for recommending this 'public interest' determination should take the form of preliminary site-specific considerations.

In compliance with California Code of Regulations, Title 14, section 237(b)(3), an inquiry was made to the State Lands Commission on July 2, 2018 to certify that the area applied for is unencumbered so as not to preclude its use for the proposed culture. On July 18, 2018, certification was received from the State Lands Commission affirming the absence of conflicting leases within the proposed aquaculture area.

The January 2017 Management Plan for Commercial Shellfish Growing Area M-653-02 (Management Plan) published by the California Department of Public Health (CDPH) provides sanitary management oversight of shellfish cultivation and harvesting activities in compliance with the National Shellfish Sanitation Program in this area that includes an existing state water bottom lease (#M-653-02, operated by SBMC) which is adjacent to the new proposed lease location. The existing SBMC lease is *conditionally approved* as a certified growing area from a public health perspective. The final determination of a proposed new lease's growing area certification is made by CDPH and is based on extensive water quality sampling and a positive certification outcome may not be presumed based solely on the status of a neighboring site. However, a preliminary review of the Management Plan indicates a lack of wastewater treatment plant ocean outfalls or prohibited areas that might immediately advise against this location from the public interest consideration currently being requested of the Commission. A proposed site Sanitary Survey and further coordination between the applicant and CDPH toward growing area sampling and certification will be conducted once the applicant has standing with a Commission-approved state water bottom lease, or sooner under the direction of CDPH.

The applicant has initiated outreach to stakeholders with potential conflicting uses in this area, including commercial trawl fishermen, and has received general support so far for the proposed location that has been corroborated by Department staff (pers. comm.). Future Commission hearings and the CEQA environmental review and disclosure processes will provide additional opportunity for stakeholder input regarding this proposed new operation.

Recommendations:
The Department recommends that the Commission finds that the area of the proposed new state water bottom lease for shellfish aquaculture, received from David Willett, doing business as Santa Barbara Sea Ranch (SBSR), is available, finds that the lease would be in the public interest, and direct staff to proceed with next steps in preparation for that consideration (including the posting of public notices, tribal outreach, environmental review, and interagency coordination).

For additional information on this matter, please contact Randy Lovell, State Aquaculture Coordinator at (916) 445-2008, or at randy.lovell@wildlife.ca.gov.

Attachment

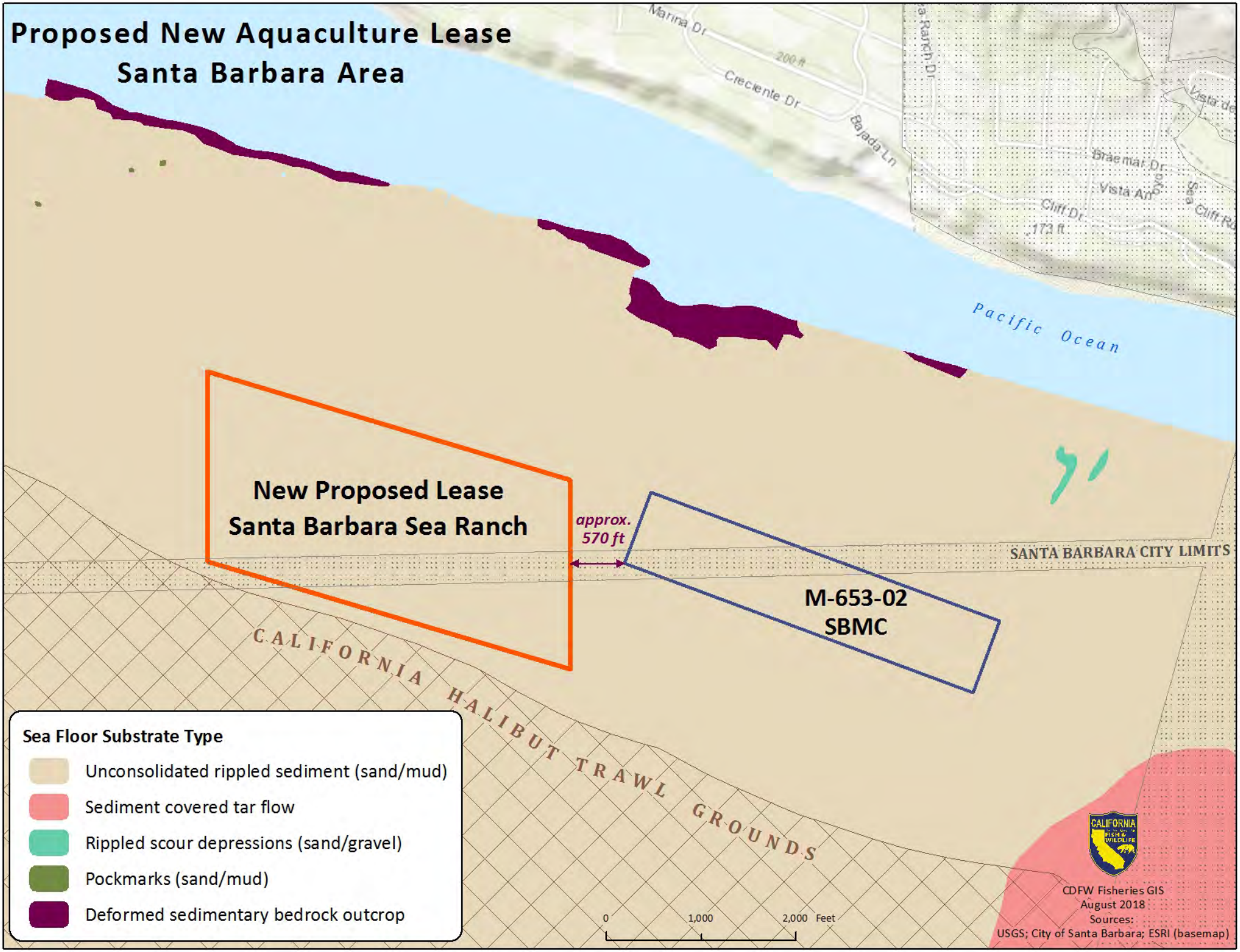
ec: **Department of Fish and Wildlife**

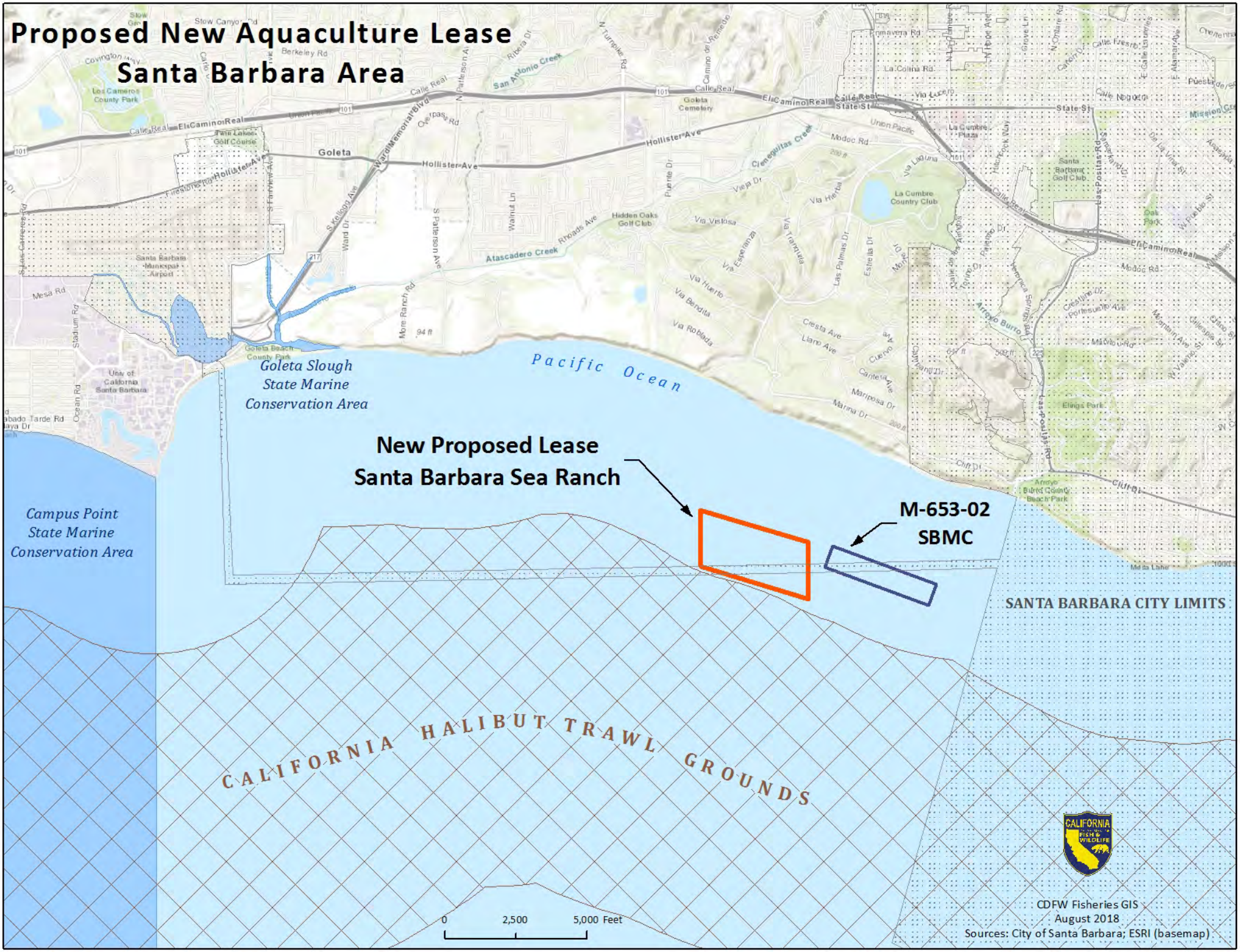
Stafford Lehr, Deputy Director
Wildlife and Fisheries Division
Stafford.Lehr @wildlife.ca.gov

Craig Shuman, D. Env.
Program Manager
Marine Region (Region 7)
Craig.shuman@wildlife.ca.gov

Randy Lovell,
State Aquaculture Coordinator
Randy.lovell@wildlife.ca.gov

Kirsten Ramey
Environmental Program Manager
Marine Region (7)
Kirsten.Ramey@wildlife.ca.gov


Proposed New Aquaculture Lease
Santa Barbara Area
Marina Dr
200 ft
Creciente Dr
Bajada Ln
Braemar Dr
Vista An
Cliff Dr
173 ft
Pacific Ocean
New Proposed Lease
Santa Barbara Sea Ranch
approx.
570 ft
SANTA BARBARA CITY LIMITS
M-653-02
SBMC
CALIFORNIA HALIBUT TRAWL GROUNDS
Sea Floor Substrate Type
Unconsolidated rippled sediment (sand/mud)
Sediment covered tar flow
Rippled scour depressions (sand/gravel)
Pockmarks (sand/mud)
Deformed sedimentary bedrock outcrop
0
1,000
2,000 Feet
CDFW Fisheries GIS
August 2018
Sources:
USGS; City of Santa Barbara; ESRI (basemap)


Proposed New Aquaculture Lease
Santa Barbara Area
Goleta Slough
State Marine
Conservation Area
Pacific Ocean
New Proposed Lease
Santa Barbara Sea Ranch
M-653-02
SBMC
Campus Point
State Marine
Conservation Area
SANTA BARBARA CITY LIMITS
CALIFORNIA HALIBUT TRAWL GROUNDS
0
2,500
5,000 Feet
CDFW Fisheries GIS
August 2018
Sources: City of Santa Barbara; ESRI (basemap)

From: David Willett <dwillett@santabarbarasearanch.com>
Sent: Wednesday, August 8, 2018 11:04 AM
To: FGC
Cc: Ashcraft, Susan@FGC; Lovell, Randy@Wildlife
Subject: Letter of Support for Santa Barbara Sea Ranch Mussel and Oyster Farming
Attachments: Escobar LOS Willett.pdf

Dear Fish and Game Commission,

Please find attached a letter of support for Santa Barbara Sea Ranch's mussel and oyster farming lease application for inclusion in your binder for the August 22nd meeting in Fortuna.

Thank you and kind regards,

David Willett

David T. Willett
President - Santa Barbara Sea Ranch, Inc.

Email: dwillett@santabarbarasearanch.com
Website: www.santabarbarasearanch.com

August 7, 2018

David Willett
Santa Barbara Sea Ranch, Inc.

Santa Barbara, CA 93103

Dear David,

I support your effort to expand Santa Barbara's mussel farming industry for the following reasons. You have selected a location for your farm that minimizes interference with our commercial fisheries. From our conversations and the bio you shared with me, I have confidence at this time that you are capable and have the experience needed to be successful, and you will be a good neighbor to the fishermen.

I have been a commercial fishermen since 1991, working out of the port of Santa Barbara since 2001, and participating in direct marketing of rock crab and other seafood to consumers. The demand for mussels in California and in the U.S. far exceeds the domestic supply. Adding mussel farms to our coast can be a benefit to our fishing community when they are responsibly managed and carefully integrated into our commercial fisheries to minimize conflicts in ocean use.

Sincerely,

Steve Escobar,
Crabby Steve's

From: David Willett <dwillett@santabarbarasearanch.com>
Sent: Wednesday, August 8, 2018 12:35 PM
To: FGC
Cc: Ashcraft, Susan@FGC; Lovell, Randy@Wildlife
Subject: Fwd: From mike

Dear Fish and Game Commission,

Please see below. This email from the president of the Southern California Trawlers Association, Mr. Mike McCorkle, is in support of Santa Barbara Sea Ranch's mussel and oyster farming lease application for inclusion in your binder for the August 22nd meeting in Fortuna.

My email address was misspelled in Mr. McCorkles email to me, so it was forwarded to me from Ms. Kim Selkoe, Ph.D, Executive Director of the Commercial Fishermen of Santa Barbara, Inc.

Thank you and kind regards,

David Willett

David T. Willett
President - Santa Barbara Sea Ranch, Inc.
Phone:
Email: dwillett@santabarbarasearanch.com
Website: www.santabarbarasearanch.com

---------- Forwarded message ---------
From: **Kim Selkoe** <kim@cfsb.info>
Date: Wed, Aug 8, 2018 at 12:12 PM
Subject: From mike
To:

-------- Forwarded Message --------
Subject:mussel farm
Date: Thu, 26 Jul 2018 10:11:55 -0700
From: McCorkle Fishing Enterprises
To:

David, Southern Ca. Trawlers Assn has reviewed your proposal to put in a mussel farm off of Hope Ranch,Santa Barbara, inside the one mile line and have no problem with the proposal at this time. we will be glad to work with you on your implementing your farm in the future. Mike Mccorkle, president SCTA.

Sent from my iPhone

PROJECT DESCRIPTION

SANTA BARBARA SEA RANCH, INC.

OFFSHORE AQUACULTURE PROJECT

December 2024

Lead Agency:
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

Applicant:
Santa Barbara Sea Ranch, Inc.

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LIST OF FIGURES

1 PROJECT AND AGENCY INFORMATION

1.1 PROJECT TITLE

Santa Barbara Sea Ranch, Inc. Shellfish Aquaculture Operations on State Water Bottom Lease Offshore Santa Barbara, California

1.2 LEAD AGENCY AND PROJECT SPONSOR

Lead Agency	Contact Person
California Fish and Game Commission P.O. Box 944209 Sacramento, CA 94244-2090	Melissa Miller-Henson, Executive Director California Fish and Game Commission Melissa.Miller-Henson@fgc.ca.gov (916) 653-9684
Applicant	Contact Person
Santa Barbara Sea Ranch, Inc.	David T. Willett, President & Founder dwillett@SantaBarbaraSeaRanch.com (805) 450-9672

1.3 PROJECT SIZE AND LOCATION

The Project size is 176 acres. The Project location is offshore from Santa Barbara, California, approximately five miles west of Santa Barbara Harbor and within one mile of the shoreline (Figure 1-1). The Project is in state waters, is not within the halibut trawl grounds, is in a kelp administrative bed boundary with proper zoning for a bottom lease, and it does not conflict with aquaculture activity on state leased parcels.

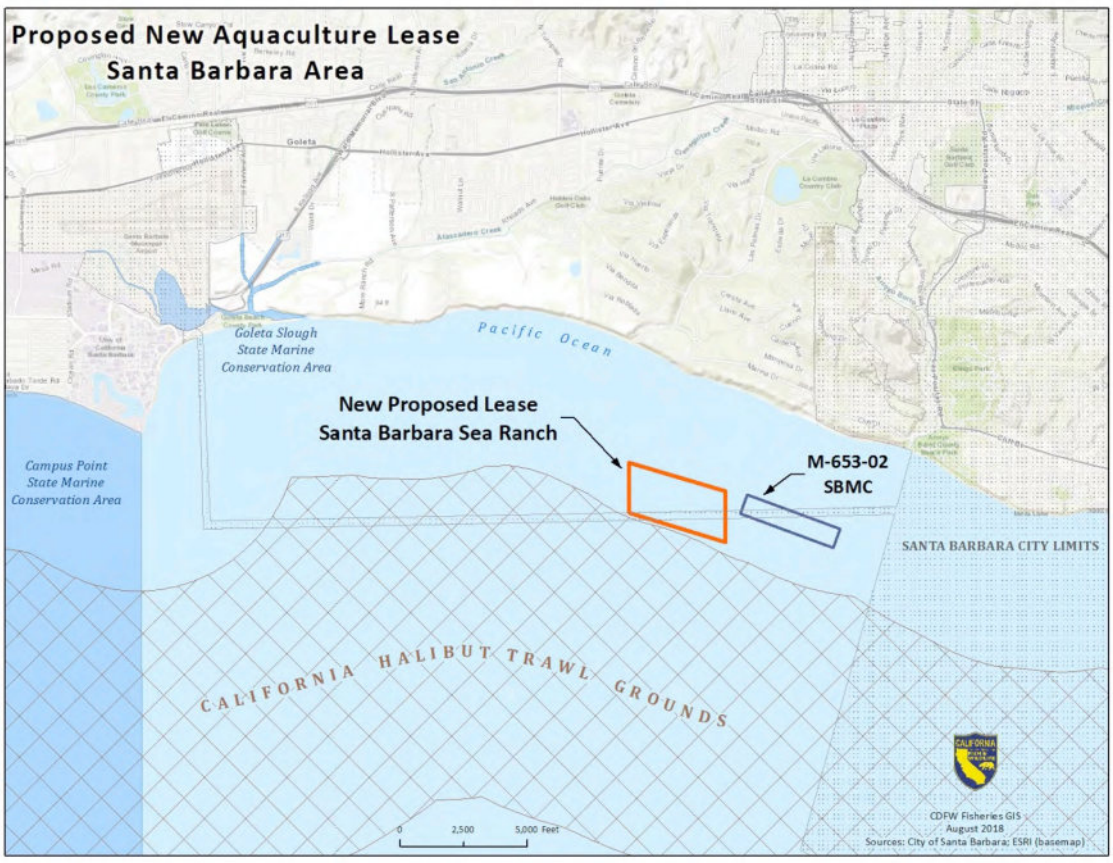


Figure 1-1: Proposed New Aquaculture Lease Santa Barbara Area

The parallelogram shape of the site results from attempting to maximize the potential utilization of the area, which is bounded on the north by shallow water, on the south by the halibut trawling grounds, on the west by a kelp administrative bed boundary (and then, about 8,000 feet to the west, the Goleta Waste Water Treatment Plant closure zone (Figure 1-2)), and on the east by SBMC's lease (with 190 yards of minimum separation between the Proposed lease and the SBMC lease).

Corner locations and depths at the Project site are:

Latitude	Longitude	Depth (ft.)
34.40149287	-119.7803543	70
34.39600692	-119.7803543	101
34.39833926	-119.7677058	74
34.3928533	-119.7677058	111

Interior depth measurements at the Project site are between 70-111 ft. The entire site has a smooth, sloping bottom.

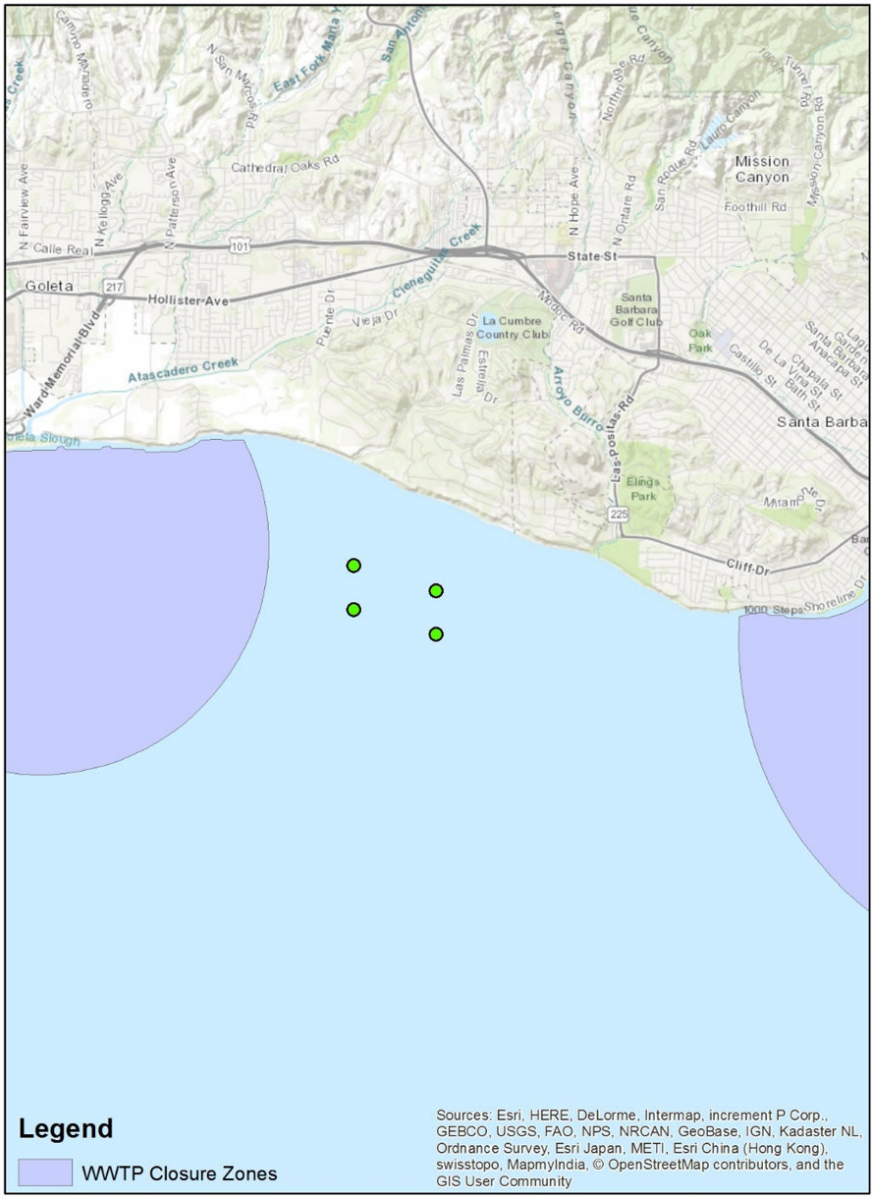


Figure 1-2: Project Location Relative to Wastewater Treatment Plant Closure Zones

1.4 PROJECT BACKGROUND

Santa Barbara Sea Ranch, Inc. was founded in 2018. SBSR applied for a state water bottom lease in May 2018 and has been working diligently with trustee, responsible, and other interested agencies since that time to complete the Initial Study/Mitigated Negative Declaration draft, to survey the bottom at the proposed lease location, and to

perform a bespoke engineering analysis for the longline equipment design that will be employed in the Project.

1.5 APPROVALS AND REGULATORY REQUIREMENTS

1.5.1 California Fish and Game Commission

State law authorizes the California Fish and Game Commission (Commission) to lease State water bottoms or the water column to any person for aquaculture, i.e., "the cultivation of aquatic plants and animals," if such a lease is in the public interest. State law provides authority to the Commission to adopt regulations governing terms of the leases. Specific State laws and regulations pertaining to aquaculture leases and their administration are found in Chapters 1 through 8 of Division 12 of the Fish and Game Code (commencing with section 15000) and the provisions of Chapter 9 of Division 1 of Title 14, California Code of Regulations (commencing with section 235).

1.5.2 Other Agencies

In addition to FGC, the Project is subject to the review and approval of other local, state, and federal entities with statutory or regulatory jurisdiction over various aspects of the Project (Table 1-1). As part of the Project, all permits required for the Project would be obtained before starting installation activities.

Table 1-1: Anticipated Agencies with Review/Approval over Project Activities

AGENCY	PERMIT TYPES
California Department of Fish and Wildlife	Aquaculture Registration
California Fish and Game Commission	State Water Bottom Lease
California Coastal Commission	Coastal Development Permit
United States Army Corp of Engineers	TBD (at the discretion of USACE)
United States Coast Guard	Private Aid to Navigation Permit, Notice to Mariners (Navigational Risk Assessment may be required)
California Department of Public Health	Shellfish Growing Area Certificate, and Shellfish Handling & Marketing Certificate
State Lands Commission	Confirmation to Fish and Game Commission that lease area is not otherwise encumbered, nor privately owned, so as not to preclude its use for the proposed culture.
Central Coast Regional Water Quality Control Board	
National Oceanographic and Atmospheric Administration	
United States Fish & Wildlife Service	
Local Tribal Authorities	

2.1 PROJECT OBJECTIVE

SBSR's purpose of operation is to grow, harvest, and sell Mediterranean mussels (Mytilus galloprovincialis), triploid Pacific Oysters (Crassostrea gigas/Magallana gigas), and purple-hinge rock scallops (Crassadoma gigantea) and, by doing so, to provide a locally cultivated, sustainably raised food source that creates economic opportunities for the community and serves to advance state and national goals and objectives for increased domestic aquaculture and secure food supply.

2.2 SEA FLOOR SUBSTRATE TYPE

The sea floor substrate type at the Project is entirely unconsolidated rippled sediment (sand/mud) (Figure 2-1).

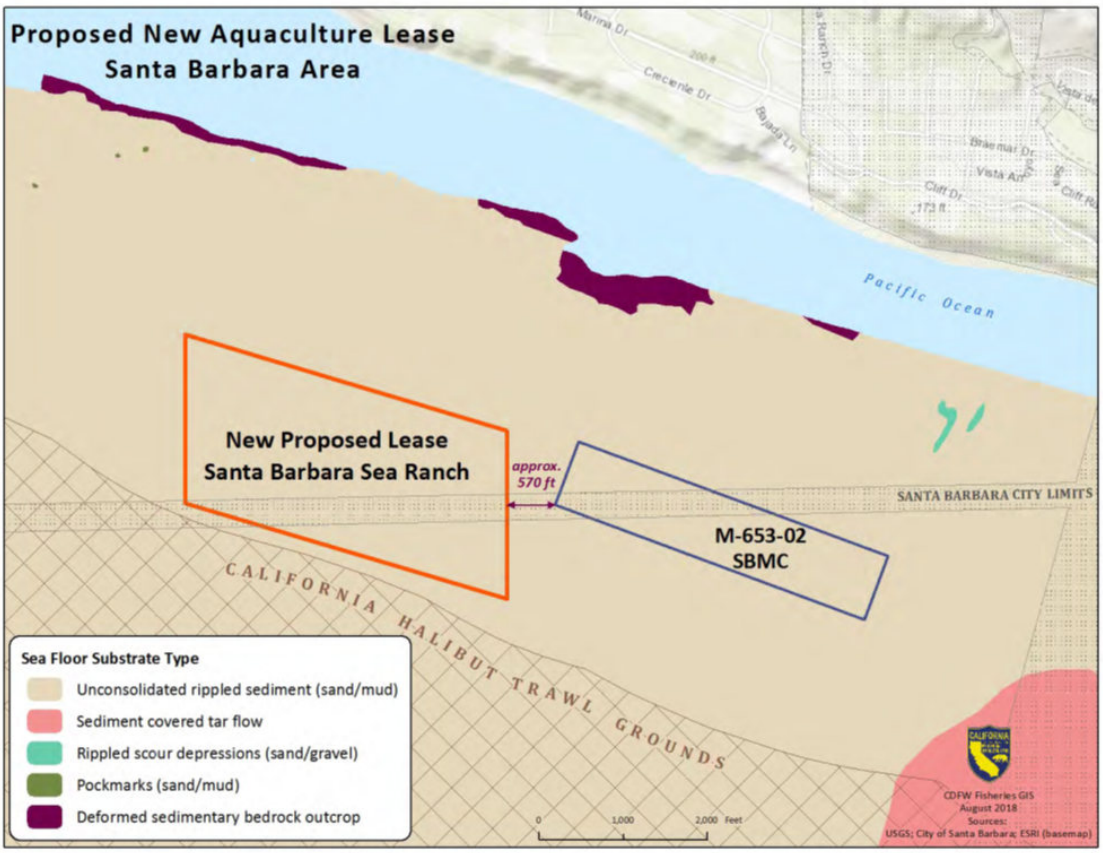


Figure 2-1: Sea Floor Substrate Type at the Project Site

2.2.1 U.S. Geological Survey: California State Waters Map Series No. 3281 – Offshore of Santa Barbara, California

2.2.1.1 California Seafloor Mapping Program

In 2007, the California Ocean Protection Council initiated the California Seafloor Mapping Program (CSMP), designed to create a comprehensive seafloor map of high-resolution bathymetry, marine benthic habitats, and geology within California's State Waters (Johnson, et al., 2013). The program supports a large number of coastal-zone- and ocean-management issues, including the California Marine Life Protection Act (MLPA) (California Department of Fish and Game, 2008), which requires information about the distribution of ecosystems as part of the design and proposal process for the establishment of Marine Protected Areas. A focus of CSMP is to map California's State Waters with consistent methods at a consistent scale.

The CSMP approach is to create highly detailed seafloor maps through collection, integration, interpretation, and visualization of swath sonar bathymetric data (the undersea equivalent of satellite remote-sensing data in terrestrial mapping), acoustic backscatter, seafloor video, seafloor photography, high-resolution seismic-reflection profiles, and bottom-sediment sampling data. The map products display seafloor morphology and character, identify potential marine benthic habitats, and illustrate both the surficial seafloor geology and shallow (to about 100 m) subsurface geology. It is emphasized that the more interpretive habitat and geology maps rely on the integration of multiple, new high-resolution datasets and that mapping at small scales would not be possible without such data.

The California Seafloor Mapping Program (CSMP) is a collaborative venture between numerous different federal and state agencies, academia, and the private sector. CSMP partners include the California Coastal Conservancy, the California Ocean Protection Council, the California Department of Fish and Game, the California Geological Survey, California State University at Monterey Bay's Seafloor Mapping Lab, Moss Landing Marine Laboratories Center for Habitat Studies, Fugro Pelagos, Pacific Gas and Electric Company, National Oceanic and Atmospheric Administration (NOAA, including National Ocean Service – Office of Coast Surveys, National Marine Sanctuaries, and National Marine Fisheries Service), U.S. Army Corps of Engineers, the Bureau of Ocean Energy Management, the National Park Service, and the U.S. Geological Survey.

2.2.1.2 Publication Summary

This publication about the Offshore of Santa Barbara map area includes eleven map sheets that contain explanatory text, in addition to a descriptive pamphlet and a data catalog of geographic information system (GIS) files. Sheets 1, 2, and 3 combine data from four different sonar surveys to generate comprehensive high-resolution bathymetry and acoustic-backscatter coverage of the map area. These data reveal a range of physiographic features (highlighted in the perspective views on sheet 4) such as the flat, sediment-covered Santa Barbara shelf interspersed with tectonically controlled

bedrock uplifts, coarse-grained deltas and sediment lobes associated with coastal watersheds, and patches of irregular seafloor related to hydrocarbon seeps. To validate the geological and biological interpretations of the sonar data shown on sheets 1, 2, and 3, the U.S. Geological Survey towed a camera sled over specific offshore locations, collecting both video and photographic imagery; this "ground-truth" surveying data is summarized on sheet 6. Sheet 5 is a "seafloor character" map, which classifies the seafloor on the basis of depth, slope, rugosity (ruggedness), and backscatter intensity and which is further informed by the ground-truth-survey imagery. Sheet 7 is a map of "potential habitats," which are delineated on the basis of substrate type, geomorphology, seafloor process, or other attributes that may provide a habitat for a specific species or assemblage of organisms. Sheet 8 compiles representative seismic-reflection profiles from the map area, providing information on the subsurface stratigraphy and structure of the map area. Sheet 9 shows the distribution and thickness of young sediment (deposited over the last about 21,000 years, during the most recent sea-level rise) in both the map area and the larger Santa Barbara Channel region (offshore from Refugio Beach to Hueneme Canyon), interpreted on the basis of the seismic-reflection data. Sheet 10 is a geologic map that merges onshore geologic mapping (compiled from existing maps by the California Geological Survey) and new offshore geologic mapping that is based on the integration of high-resolution bathymetry and backscatter imagery (sheets 1, 2, 3), seafloor-sediment and rock samples (Reid and others, 2006), digital camera and video imagery (sheet 6), and high-resolution seismic-reflection profiles (sheet 8). Sheet 11 uses the ground-truth-survey imagery to develop a statistical model and maps that predict the distribution of benthic macroinvertebrates for both the Offshore of Santa Barbara map area and the Santa Barbara Channel region.

2.2.1.3 USGS Findings at the SBSR Project Location

Figure 2-2 below shows that the seafloor character (sheet 5 of the Offshore of Santa Barbara Map Area) for the Project location consists of only fine-to medium-grained smooth sediment.

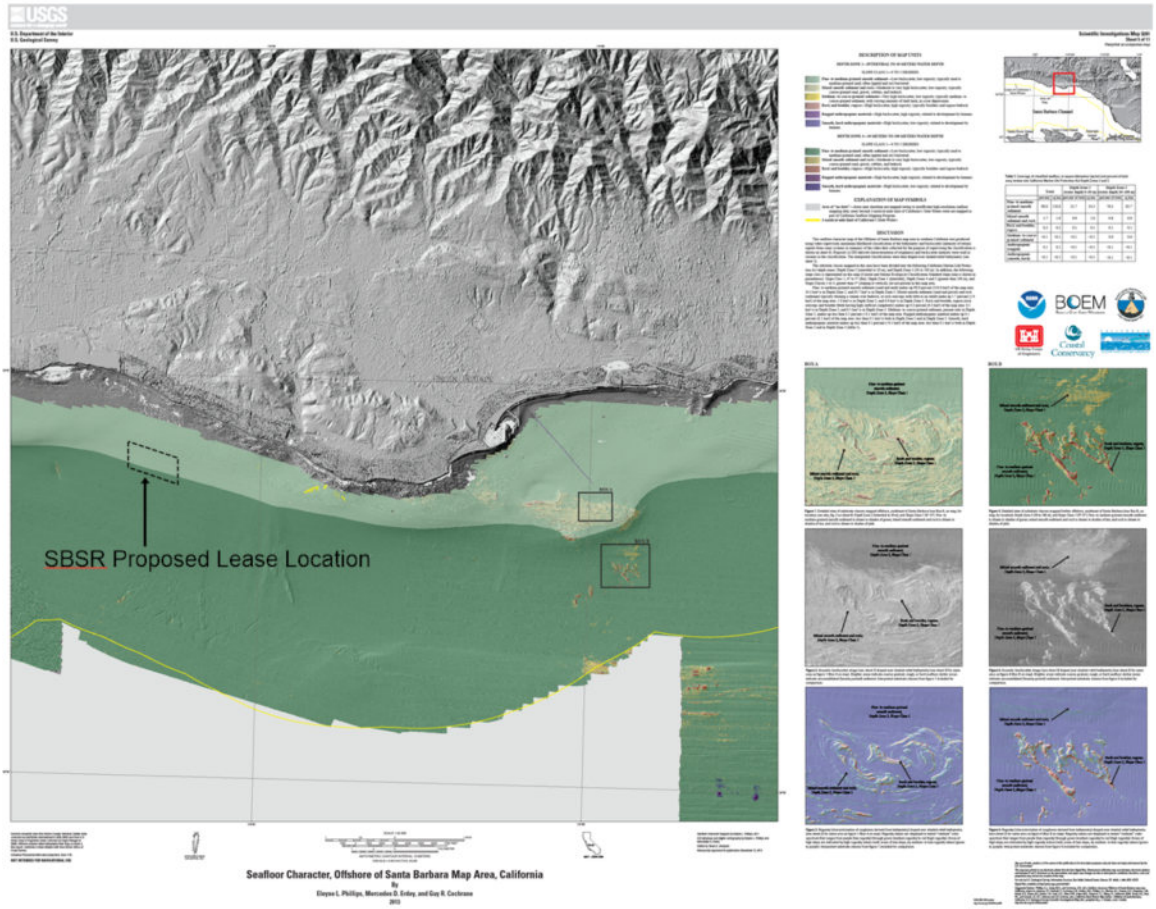


Figure 2-2: Seafloor Character, Offshore of Santa Barbara Map Area, CA (sheet 5)

For ease of reading, Figure 2-3 below shows, enlarged, the "Description of Map Units" section from sheet 5, including some discussion of the findings.

DESCRIPTION OF MAP UNITS

DEPTH ZONE 2—INTERTIDAL TO 30 METERS WATER DEPTH

SLOPE CLASS 1—0 TO 5 DEGREES

Fine- to medium-grained smooth sediment—Low backscatter, low rugosity; typically mud to medium-grained sand; often rippled and (or) burrowed

Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock

Medium- to coarse-grained sediment—Very high backscatter, low rugosity; typically medium- to coarse-grained sediment, with varying amounts of shell hash; in scour depressions

Rock and boulder, rugose—High backscatter, high rugosity; typically boulders and rugose bedrock

Rugged anthropogenic material—High backscatter, high rugosity; related to development by humans

Smooth, hard anthropogenic material—High backscatter, low rugosity; related to development by humans

DEPTH ZONE 3—30 METERS TO 100 METERS WATER DEPTH

SLOPE CLASS 1—0 TO 5 DEGREES

Fine- to medium-grained smooth sediment—Low backscatter, low rugosity; typically mud to medium-grained sand; often rippled and (or) burrowed

Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock

Rock and boulder, rugose—High backscatter, high rugosity; typically boulders and rugose bedrock

Rugged anthropogenic material—High backscatter, high rugosity; related to development by humans

Smooth, hard anthropogenic material—High backscatter, low rugosity; related to development by humans

EXPLANATION OF MAP SYMBOLS

Area of "no data"—Areas near shoreline not mapped owing to insufficient high-resolution seafloor mapping data; areas beyond 3-nautical-mile limit of California's State Waters were not mapped as part of California Seafloor Mapping Program

3-nautical-mile limit of California's State Waters

DISCUSSION

This seafloor-character map of the Offshore of Santa Barbara map area in southern California was produced using video-supervised, maximum-likelihood classification of the bathymetry and backscatter (intensity of return) signals from sonar systems (a summary of the video data collected for the purpose of supervising the classification is shown on sheet 6). Rugosity (a GIS-derived characterization of roughness) and backscatter intensity were used as variants in the classification. The interpreted classifications were then draped over shaded-relief bathymetry (see sheet 2).

The substrate classes mapped in this area have been divided into the following California Marine Life Protection Act depth zones: Depth Zone 2 (intertidal to 30 m), and Depth Zone 3 (30 to 100 m). In addition, the following slope class is represented on this map (Coastal and Marine Ecological Classification Standard slope zone is shown in parentheses): Slope Class 1, 0° to 5° (flat). Depth Zone 1 (intertidal), Depth Zones 4 and 5 (greater than 100 m), and Slope Classes 2 to 4, greater than 5° (sloping to vertical), are not present in this map area.

Fine- to medium-grained smooth sediment (sand and mud) makes up 98.0 percent (110.0 km^2) of the map area: 24.3 km^2 is in Depth Zone 2, and 85.7 km^2 is in Depth Zone 3. Mixed smooth sediment (sand and gravel) and rock (sediment typically forming a veneer over bedrock, or rock outcrops with little to no relief) make up 1.7 percent (1.9 km^2) of the map area: 1.0 km^2 is in Depth Zone 2, and 0.9 km^2 is in Depth Zone 3. Rock and boulder, rugose (rock outcrops and boulder fields having high surficial complexity) makes up 0.2 percent (0.2 km^2) of the map area: 0.1 km^2 is in Depth Zone 2, and 0.1 km^2 is in Depth Zone 3. Medium- to coarse-grained sediment, present only in Depth Zone 2, makes up less than 0.1 percent (<0.1 km^2) of the map area. Rugged anthropogenic material makes up 0.1 percent (0.1 km^2) of the map area: less than 0.1 km^2 is both in Depth Zone 2 and in Depth Zone 3. Smooth, hard anthropogenic material makes up less than 0.1 percent (<0.1 km^2) of the map area: less than 0.1 km^2 is both in Depth Zone 2 and in Depth Zone 3 (table 1).

Figure 2-3: Description of Map Units from Sheet 5

Figure 2-4 below shows the ground-truth studies that were conducted to validate the interpretations of the sonar data (sheet 6 of the Offshore of Santa Barbara Map Area). To avoid cluttering the figure, the Project location is not overlaid on this figure.

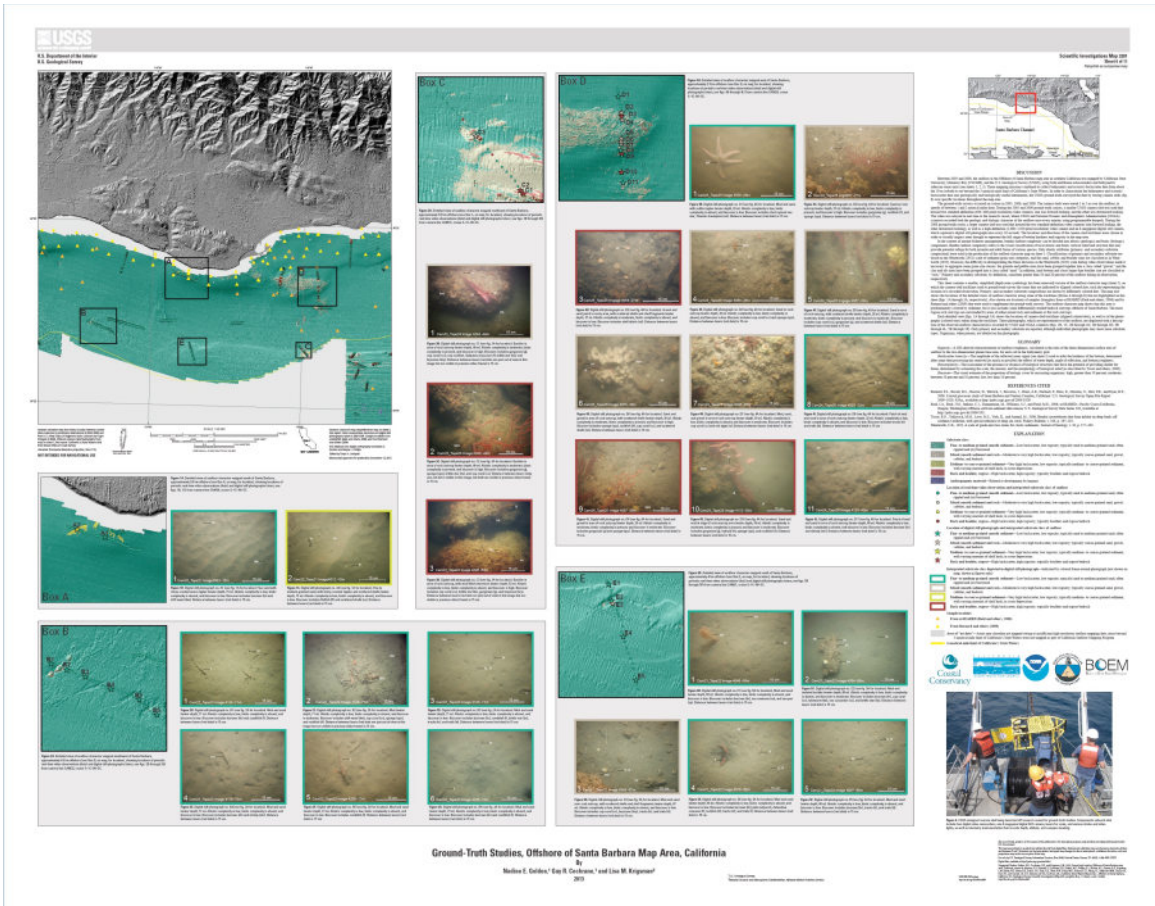


Figure 2-4: Ground-Truth Studies, Offshore of Santa Barbara Map Area, California (sheet 6)

Figure 2-5 below shows the potential marine benthic habitats (sheet 7 of the Offshore of Santa Barbara Map Area). The entire Project area (labeled "Ss(s/m)_r/u" in the sheet) consists of "Soft, unconsolidated, rippled sediment (sand and mud)."

The map on sheet 7 shows "potential" marine benthic habitats in the Offshore of Santa Barbara map area, representing a substrate type, geomorphology, seafloor process, or any other attribute that may provide a habitat for a specific species or assemblage of organisms. This map, which is based largely on seafloor geology, also integrates information displayed on several other thematic maps of the Offshore of Santa Barbara

map area. High-resolution sonar bathymetry data, converted to depth grids (seafloor DEMs; sheet 1), are essential to development of the potential marine benthic habitat map, as is shaded-relief imagery (sheet 2), which allows visualization of seafloor terrain and provides a foundation for interpretation of submarine landforms.

Backscatter maps (sheet 3) also are essential for developing potential benthic habitat maps. High backscatter is further indication of "hard" bottom, consistent with interpretation as rock or coarse sediment. Low backscatter, indicative of a "soft" bottom, generally indicates a fine-sediment environment. Habitat interpretations are also informed by actual seafloor observations from ground-truth surveying (sheet 6), by seafloor-character maps that are based on video-supervised maximum-likelihood classification (sheet 5), and by seafloor-geology maps (sheet 10). The habitat interpretations on sheet 7 are further informed by the usSEABED bottom-sampling compilation of (Reid and others 2006).

Broad, generally smooth areas of seafloor that lack sharp and angular edge characteristics are mapped as "sediment;" these areas may be further defined by various sedimentary features (for example, erosional scours and depressions) and (or) depositional features (for example, dunes, mounds, or sand waves). In contrast, many areas of seafloor bedrock exposures are identified by their common sharp edges and high relative relief; these may be contiguous outcrops, isolated parts of outcrop protruding through sediment cover (pinnacles or knobs), or isolated boulders. In many locations, areas within or around a rocky feature appear to be covered by a thin veneer of sediment; these areas are identified on the habitat map as "mixed" induration (that is, containing both rock and sediment). The combination of remotely observed data (for example, high-resolution bathymetry and backscatter, seismic-reflection profiles) and directly observed data (for example, camera transects, sediment samples) translates to higher confidence in the ability to interpret broad areas of the seafloor.

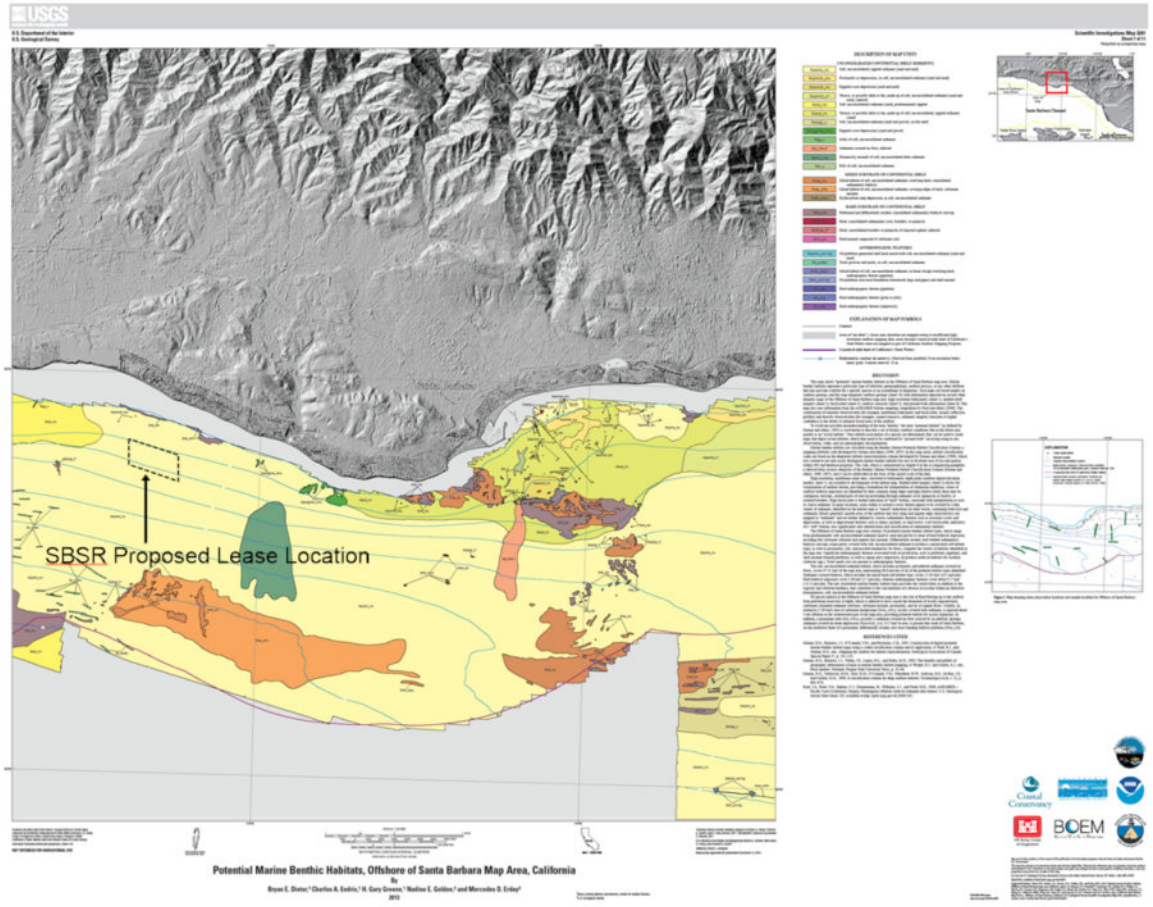


Figure 2-5: Potential Marine Bethnic Habitats, Offshore of Santa Barbara Map Area, California (sheet 7)

Figure 2-6 below shows the description of the map units for sheet 7.

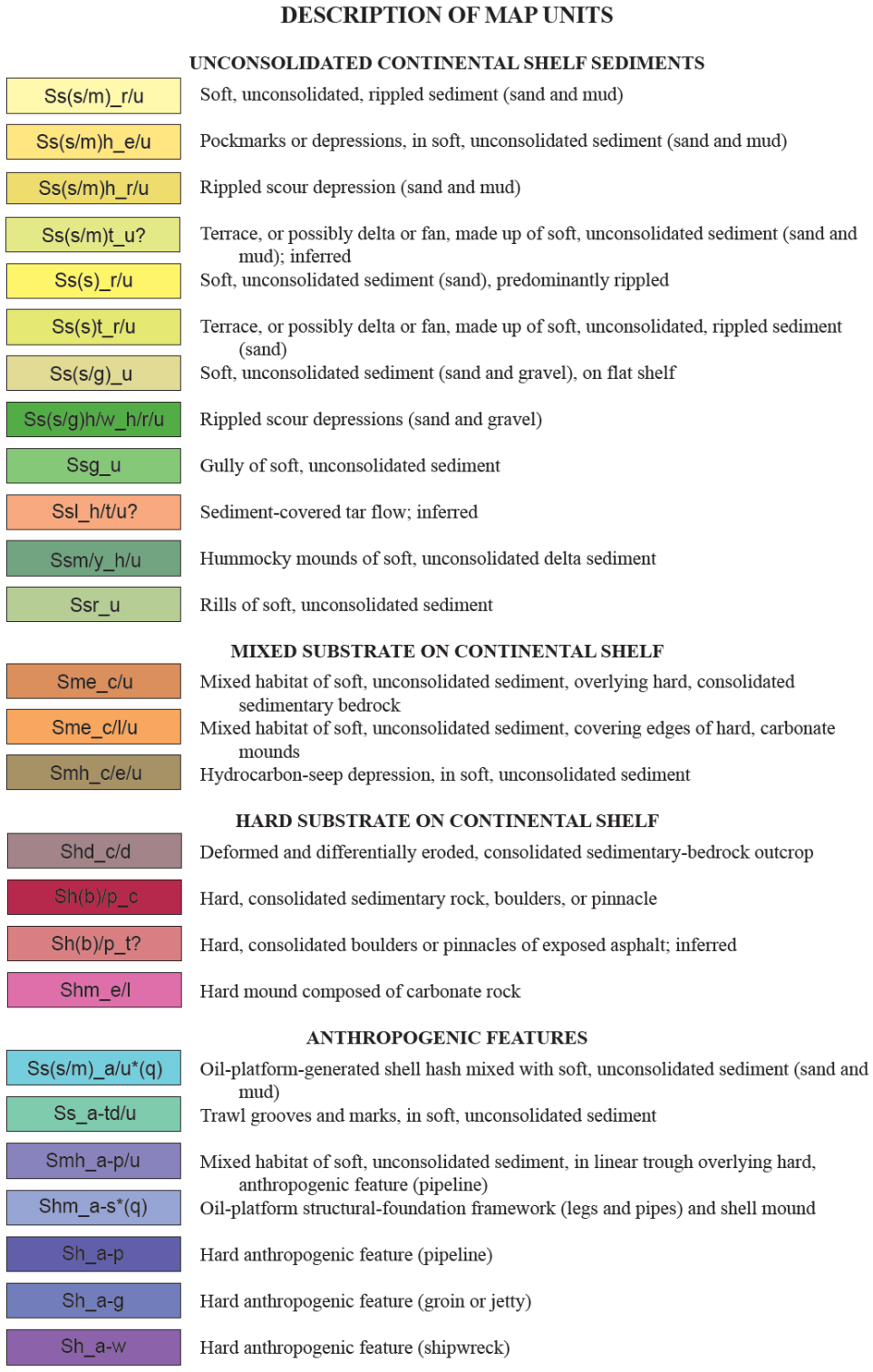
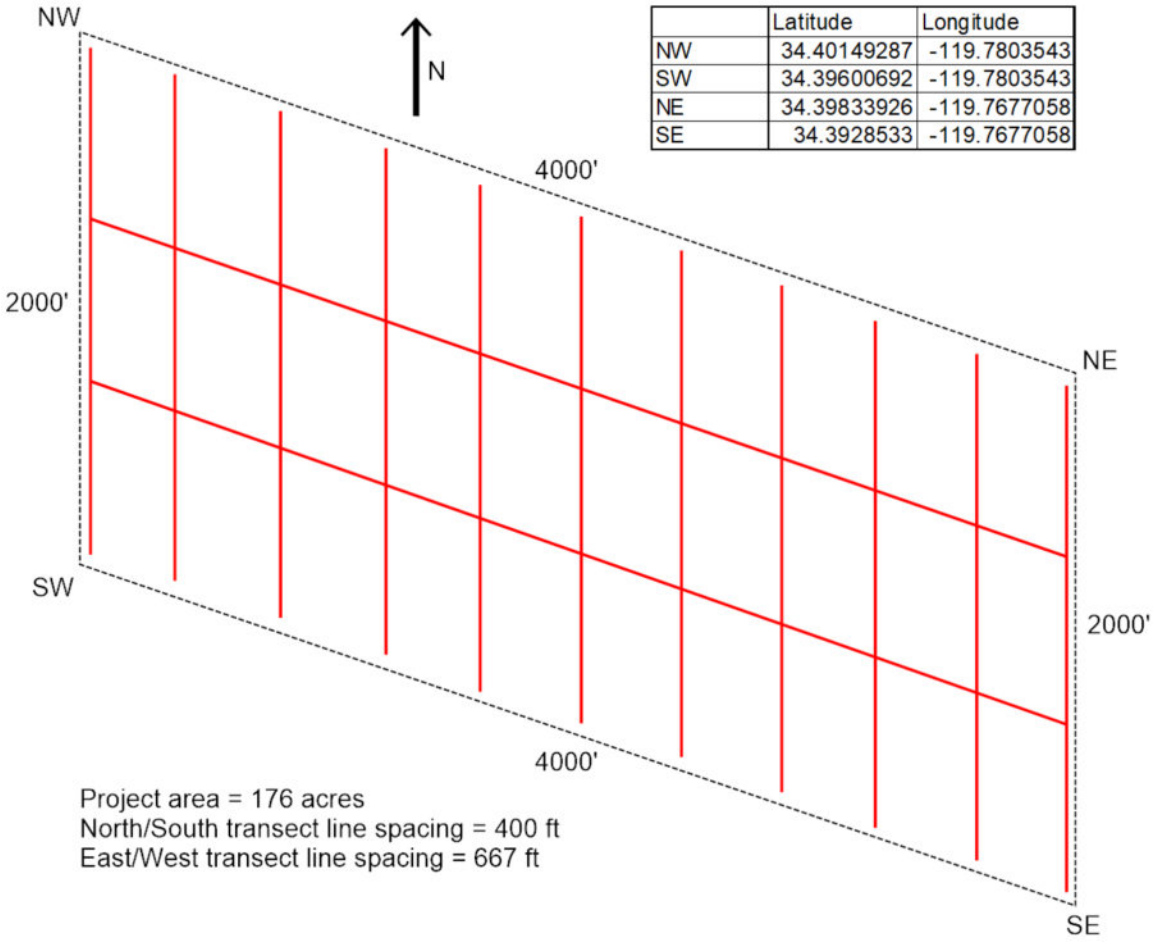


Figure 2-6: Description of Map Units for Sheet 7

2.2.2 SBSR Bottom Survey

At the request of CDFW, SBSR conducted its own video survey of the seafloor at the Project location. A survey transect grid was suggested by CDFW (with input from the California Coastal Commission) to capture a representative sample of the seafloor at the Project location (Figure 2-7). The vertical (north-south) red lines are spaced 400 feet apart and the horizontal (east-west) red lines are spaced 667 feet apart. The dashed black lines mark the perimeter of the proposed lease location.



	Latitude	Longitude
NW	34.40149287	-119.7803543
SW	34.39600692	-119.7803543
NE	34.39833926	-119.7677058
SE	34.3928533	-119.7677058

Figure 2-7: SBSR Project Bottom Survey Transect Lines

2.2.2.1 SBSR Survey Equipment and Methods

SBSR conducted its video survey of the Project site bottom using an ROV mounted to a custom-made tow vehicle that was towed along the sea floor approximately 100 feet

behind the surface vessel over the agreed up transect lines. Because water cloudiness and lack of light made it difficult to document large fields of view, it was necessary that the survey video camera be within a meter of the seafloor. Real-time GPS position information from the surface vessel was overlaid on the 1080p HD video from the ROV. Details about the SBSR survey can be found in **Section 4.**

2.2.2.2 Survey Data

The survey was conducted over a period of three days on August 15, 17, and 18, 2019. Throughout the entire three days of surveying, SBSR captured approximately 35,000 linear feet (6.6 miles) of bottom video over the course of about 8.5 total hours of filming. The average speed of the ROV during the video capture had to be limited to just 0.68 knots to provide good quality video capture. The video and data files associated with this SBSR bottom survey are available upon request.

2.2.2.3 SBSR Survey Findings

- All of the video captured during the entire course of the SBSR survey indicated that the bottom conditions were consistent with the findings of the USGS survey. The entire survey found only "fine to medium-grained smooth sediment."
- With a video capture width of 26" over 35,000 linear feet, the total area captured on video was 1.73 acres, or approximately 1% of the total 176 acre proposed lease area.
- Throughout the entire survey, the only thing that SBSR encountered that wasn't smooth, shallow sloped sand/mud bottom was what may have been an abandoned mooring line that the ROV got temporarily entangled in.
- The SBSR survey results, coupled with the USGS survey results, indicate beyond any reasonable doubt that the entire area of the proposed lease consists only of soft, unconsolidated, rippled sediment (sand and mud) on a shallow sloping bottom.

2.3 PROJECT CHARACTERISTICS

2.3.1 Shellfish Farm: Culture Methods and Species

2.3.1.1 Longlines

The Project will have 80 longlines (Figure 2-8), each with a backbone (the horizontal section) length of 250 to 266 meters (820 to 873 feet). Anchor lines connected to the backbone will be 19 to 32 meters (62 to 105 feet) long and will be attached to helical sand screw anchors. Each longline will be custom designed according to the depth of its two anchors to optimize geometry, control backbone depth, and meet structural design requirements. Submerged and surface buoys will be used to give the longlines the correct shape, to maintain tension, and to provide variable flotation as the mass of the shellfish crops increase over time. The longlines will lie parallel to shore and be spaced 30.5 meters (100 feet) apart in 20 rows of 4 longlines each (Figure 2-9). The backbone and anchor lines will be 40 mm (1.57”) diameter rope and the system (along with buoys) will produce a fairly rigid structure to which the cultivation ropes and lantern baskets will be attached. The backbones will support 1,690 to 2,130 meters (5,444-6,988 feet) of continuous “fuzzy” cultivation line per backbone. Longlines that are used to grow oysters and/or scallops in lantern baskets will need to support less weight than the maximum design weight (fully loaded with mussels). Cultivation lines are characterized by extra filaments that provide substrate for mussels to attach. These “fuzzy ropes” will be attached to and suspended from the tensioned backbone rope as individual lengths (spat lines from the hatchery), or as continuous grow ropes when growing mussels to full market size. The length of the “fuzzy ropes” may be less depending on the lifting capacity of the servicing vessel, or if the backbone needs to be positioned lower in the water column in more shallow portions of the proposed lease to avoid predation.

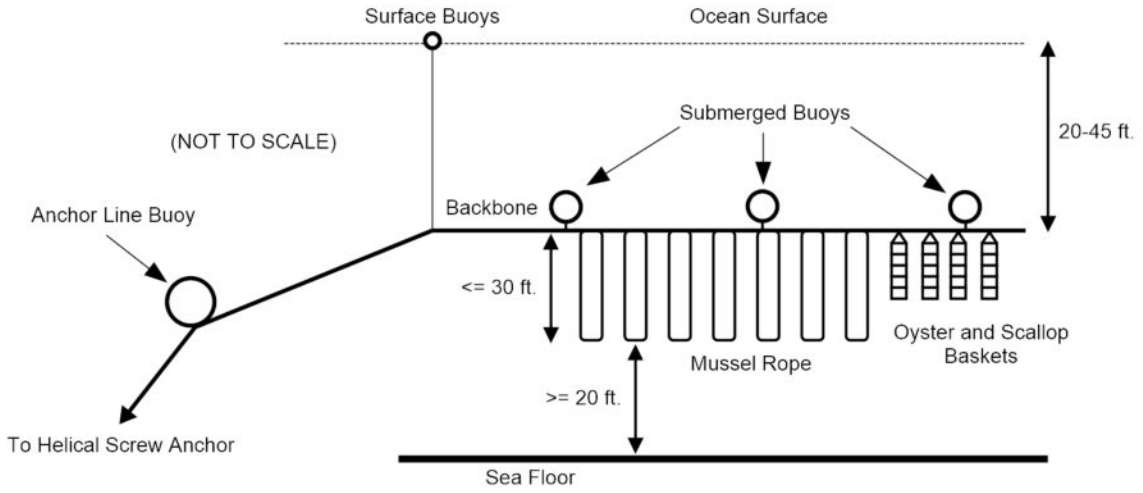
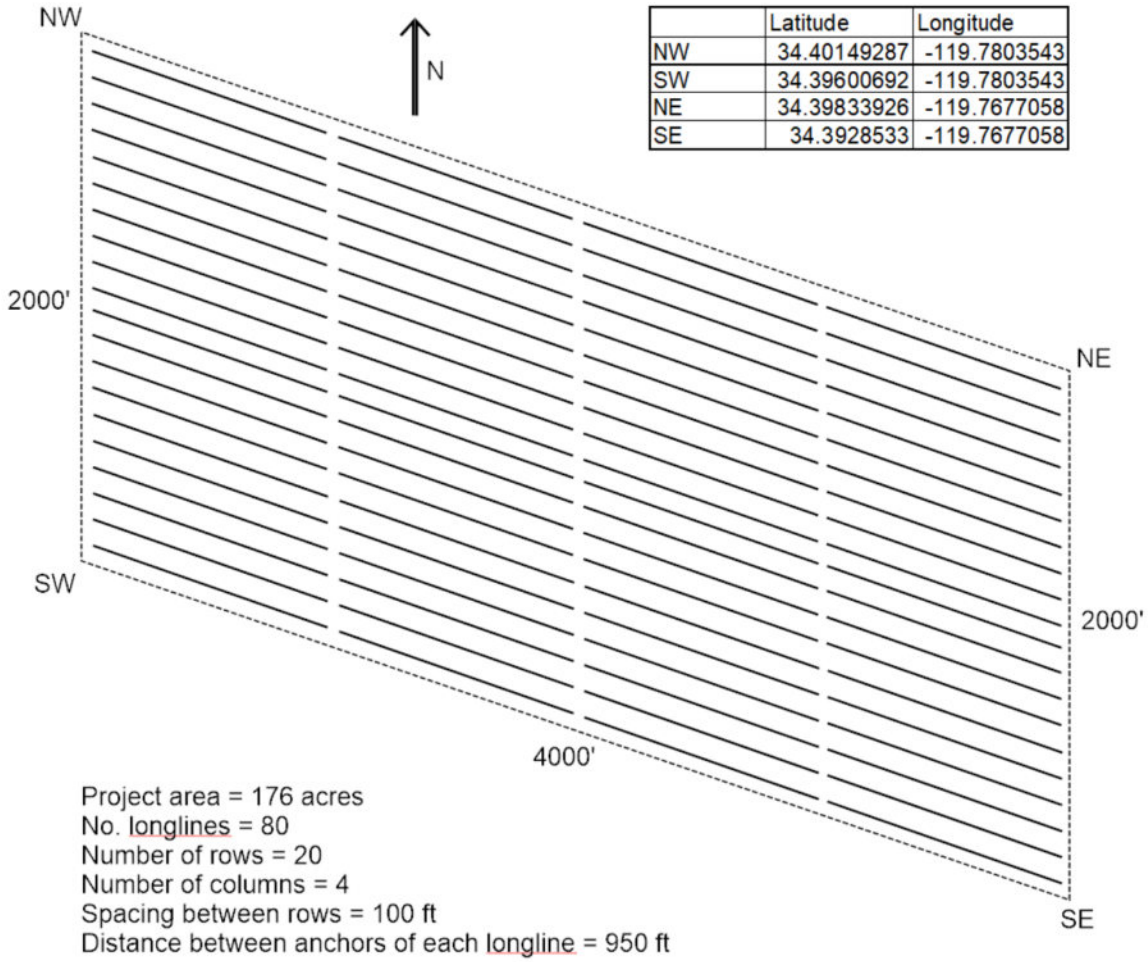


Figure 2-8: Submerged Longline Section



	Latitude	Longitude
NW	34.40149287	-119.7803543
SW	34.39600692	-119.7803543
NE	34.39833926	-119.7677058
SE	34.3928533	-119.7677058

Figure 2-9: SBSR Longline Arrangement in Lease Area

Dynamic analysis of the longlines has shown that slack will not occur in the structural lines during either calm or storm conditions. Therefore, either sinking or floating rope may be used for the backbone and anchor lines. However, sinking lines will be used for the tethers that connect the buoys to the backbone, and will be of a loaded breaking strength matched to the buoy volume. Sinking lines have been proposed to help prevent marine mammal entanglement (Price and Morris 2013; Ludwig et al. 2014) and have been adopted by lobster fisheries as a method to reduce entanglement risk (Johnson et al. 2005; Knowlton et al. 2012). As an additional precaution against entanglement, grow ropes will be attached to the headrope with a low-breaking-strength twine (0.16-inch diameter), which will facilitate rapid detachment in the unlikely event of any interaction with the longline as well as a 2,000-pound breakaway link which will be installed between the surface buoys and vertical lines. If a surface buoy becomes disconnected from its attachment line, the rope will sink below the connection point and not pose a hazard to vessels prior to retrieval.

SBSR will solicit industry expert review of its final detailed equipment specifications and operating plans prior to installing any equipment. SBSR will initially install and plant 10 longlines, with some longlines in both deep and shallow areas of the proposed lease area, to validate the design and operation prior to installation of all 80 longlines. Installation of the longlines will be performed under the supervision of SBSR President and Founder, David Willett, and other industry experts as required (this will be necessary for helical screw anchor installation, for example). Mr. Willett has over 30 years of engineering experience, including seven years of ocean engineering management experience (which included offshore mooring system design) in the tidal and wave energy sectors. He has also owned and operated ocean-going vessels for over 25 years and holds a USCG 25T Merchant Mariner Credential.

SBSR is aware of the very unfortunate mistakes made by Catalina Sea Ranch. SBSR believes that their problems were caused because they ignored permit requirements from the California Coastal Commission and the U.S. Army Corps of Engineers, did not

perform required inspections, and failed to repair equipment. It is also believed that Catalina Sea Ranch ignored enforcement letters demanding compliance with state and federal rules, and, reportedly, used old tractor batteries instead of proper anchors. To SBSR, this seems to be just gross incompetence and gross negligence.

2.3.1.2 Anchors

Using helical screw anchors in a mooring system is more environmentally friendly than using drag-embedment or gravity anchors, disturbing less than one square meter of seabed, and only during installation. Helical screw anchors (Figure 2-10) have been shown to exhibit superior holding power as compared to other anchoring systems. Screw anchors also have the advantage of being removable at Project decommissioning. Screw anchors will be installed by a hydraulic drill with a drill head that operates from a rig lowered to the ocean floor. The rig contains a gearbox and a hydraulic motor that produces an insignificant noise level when in operation, far less noise than the engine of even a small recreational fishing boat. The anchors will be screwed into the sandy bottom ocean floor approximately 10 to 20 feet deep into the sediment.

During installation of the screw anchors, the torque of the hydraulic motor in the installation rig is monitored and used to verify proper installation and holding power. If the installation torque is either too low or too high, the diameter and/or length of the anchor will be adjusted to ensure adequate holding power of each anchor. See **Section 7** for details about the anchor installer that SBSR plans to use, the methods and equipment that will be used to install the anchors, and the duration of installation activities.

Figure 2-10: Helical Screw Anchor

2.3.1.3 Floats and Buoys

Buoys marking the corners of the proposed lease area will identify the cultivation area for navigational safety and will comply with all USCG regulations for height, illumination, and visibility, including radar reflection. The USCG may require a navigational risk assessment which may impose additional navigational risk mitigation requirements. SBSR is currently in communication with the USCG to make that determination.

Permanent surface buoys for each longline will consist of 11-15, 300-liter LDPE (low density polyethylene) surface buoys spaced at 15-meter (49 foot) intervals along the central (farmable), horizontal portion of the backbone line and one 35-liter (16" diameter) LDPE round buoy marking each anchor. One 480-liter LDPE buoy (or four 120-liter LDPE buoys) will be attached to each anchor line at a distance from the anchor that is two meters less than the water depth at the anchor. These anchor line buoys will give the longline its initial shape and set the unloaded depth of the backbone. During the mussel growth cycle, submerged floats attached to the backbone line will be used to maintain tension on the structural backbone line and to prevent the crop from sinking to the bottom as its weight increases over time. These will consist of 33 to 43, 120-liter LDPE buoys affixed two meters above the backbone line and five meters apart. The combination of surface and submerged buoyancy is designed to create a tensioned but flexible structure that can respond dynamically to surface waves and storms.

All buoys will be uniquely marked with "SBSR," the state issued lease number, and the SBSR telephone number.

Longlines that are used to grow oysters and scallops will have a lower mass per linear foot of backbone line than longlines growing mussels and, therefore, will require less added subsurface buoyancy to maintain proper backbone tension and shape.

To avoid predation, the horizontal portion of the backbone line will be located 6-9 meters (20-30 feet) below the surface. If predation becomes a problem with the backbone lines that will be set nearer to the surface (in the shallower portion of the proposed lease area), the length of the grow ropes will be shortened, and the backbone lines will be positioned further below the surface.

For a complete list of longline materials, see **Section 5**

2.3.1.4 Structural Engineering Analysis

Upon detailed review of both the Ventura Shellfish Enterprise (VSE) engineering analysis and the Santa Barbara Mariculture Company's (SBMC) use of a Bay of Biscay, Spain project's engineering analysis as a proxy (CFGC, 2018), SBSR concluded that neither the VSE nor the SBMC analysis would suffice for a SBSR proxy. The VSE location, environmental conditions, and longline design were too dissimilar, and even though SBSR's proposed lease location is near to SBMC, SBSR concluded that SBMC's proxy approach was not adequately representative of the local environmental conditions or the SBSR longline design, and therefore could not be used to satisfactorily mitigate Project risk. Hence, a detailed location and design-specific dynamic structural engineering analysis of the SBSR longline designs was performed (**Section 6**).

SBSR, with the support of Jacob Technologies and Orcina, LTD, conducted detailed static and dynamic analysis of the SBSR longlines in extreme storm conditions (Figure 2-11) using Orcina's OrcaFlex finite element analysis software, the world's leading package for the dynamic analysis of offshore marine systems. A total of 48 separate load cases were evaluated for extreme wave, current, and wind conditions with bespoke longline designs optimized for specific water depth.

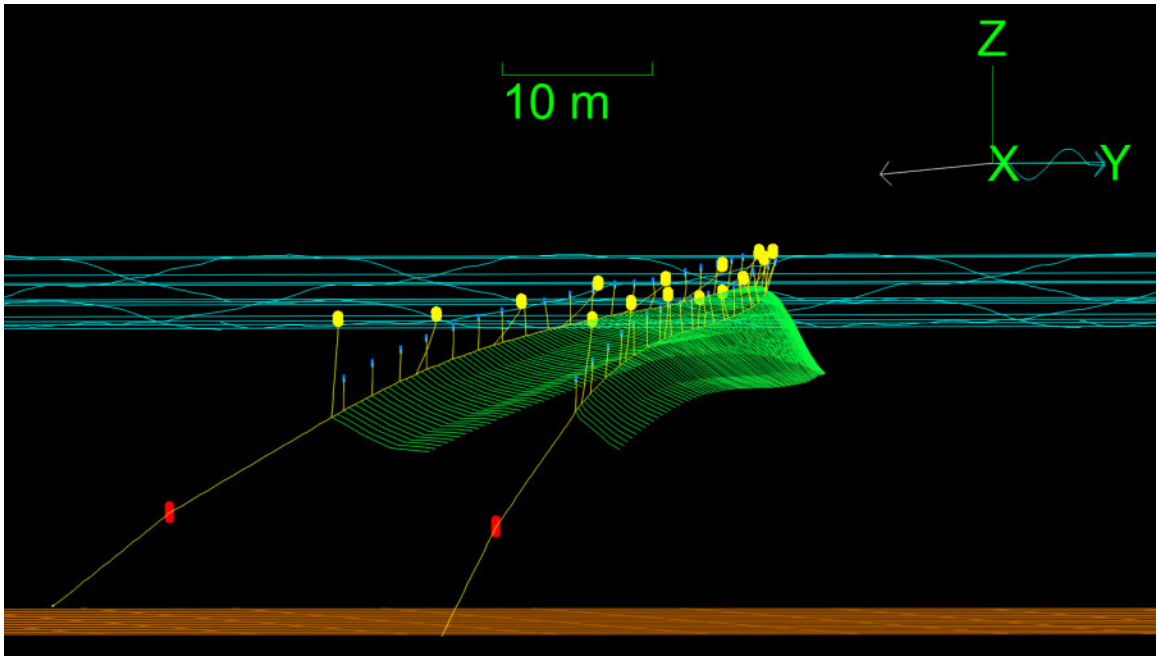


Figure 2-11: SBSR Longline in 100-Year Waves from 273 Degrees and 10-Year Current from 180 Degrees (SBSR longlines will lay 286/106 degrees)

Minimum requirements for breaking strength of the structural lines, buoy lines, and holding power of the anchors have been specified to achieve safety factors recommended for offshore structures by the American Petroleum Institute (API RP2SK). Load cases were designed exceeding Norwegian Standard NS-9415 recommendations for evaluation of both wave-dominated and current-dominated extreme events.

2.3.1.5 Culture Species

Mediterranean mussels (Mytilus galloprovincialis), Pacific oysters (Crassostrea gigas), and purple-hinge rock scallops (Crassadoma gigantea) are the three species that SBSR proposes to culture in this Project.

Mediterranean Mussel: Wild mussels present along the California coast include three main species: Mytilus galloprovincialis (M. gallo), Mytilus trossulus (M. trossulus), and Mytilus californianus (M. californianus). Another species, Mytilus edulis (M. edulis), has historically been cited as the west coast "bay" mussel in state regulatory documents and the scientific literature, conforming with taxonomic understanding at the time. However, M. edulis is now recognized by taxonomists as the species found in Atlantic

waters, and previous west coast references to M. edulis are now, by convention, referring to M. trossulus or M. gallo as the west coast "bay" mussel (Suchanek, 1997). Due to morphological similarity, distinguishing between the three mussel species making up the so-called "M. edulis complex": M. edulis, M. trossulus, and M. galloprovincialis, is a continuing challenge for scientists who must rely on genetic testing to do so. The distinction is further complicated by these species' sympatry and readiness to hybridize when found in suitable proximity for such broadcast-spawners (so-called "hybrid zones"), and their similar ecological function (e.g.: congener filter feeders in the same habitats, with many of the same predators and space usages). Recent studies have confounded attempts to correlate oceanographic factors like temperature and salinity in predicting patterns of distribution and relative competitive success of M. trossulus and M. gallo in locations defining hybrid zones along the California coast (Babry & Somero 2006; Hilbish et al.,2010).

Although M. gallo is not originally native to California, there is abundant evidence that it is well-established across southern California and has been present in the ecosystem since the early 1900's. Several studies suggest that the native bay mussel, M. trossulus was displaced by M. gallo in the early part of the twentieth century. M. gallo is now the dominant of the two bay mussels (galloprovincialis vs. trossulus) across the entire southern half of California. The distribution of M. gallo is restricted to more protected and sheltered habitats, as it is not tolerant of wave exposure. Although M. gallo can be found in rocky intertidal habitats, the California mussel, M. californianus dominates most of the rocky intertidal habitat across the entire coast of California and is well documented to be the competitive dominant in rocky intertidal ecosystems. Not only is M. gallo not tolerant of wave exposure, but it is also quickly consumed by a variety of predators and preferred over M. californianus, likely due to its weaker shell.

The Bay Mussel, and specifically, Mediterranean mussel, (M. galloprovincialis), is an approved culture species under the terms of the SBMC lease with the FGC and under Aquaculture Registrations issued by the CDFW.

Pacific Oyster: The Pacific oyster (C. gigas) is the most widely cultivated oyster species worldwide, with west coast aquaculture production occurring along the Pacific Ocean from Alaska to Mexico. It is an approved culture species under the terms of the SBMC lease with the FGC and under Aquaculture Registrations issued by the CDFW.

Rock Scallop: The purple-hinge rock scallop, Crassadoma gigantea (formerly Hinnites giganteus/multirugosus), is native to the West Coast of North America from Baja California, Mexico to northern Alaska. It has been an approved culture species under Aquaculture Registrations issued by the CDFW, including the adjacent SBMC lease.

2.3.2 Shellfish Farming Operations

2.3.2.1 General

Initial farming operations will be conducted from a modified fishing boat capable of installing and handling the longlines and stripping, de-clumping, cleaning, sorting, bagging the shellfish. When the Project is in full production, operations will include three boats specifically designed to support farming, or possibly just one smaller boat for longline maintenance and operations and one larger planting and harvesting vessel. The second and third (if needed) boats will be optimized to support farming operations. Each boat will visit the farm a maximum of five days a week, year-round, for approximately eight hours per day, including travel time to the Project location from Santa Barbara harbor berth(s) near the Navy Pier. Each boat will make only one trip per day. Trips by the second and third boats will mirror those of the first, with effectively the same emission and vessel impacts from each boat. If only a second, larger, planting and harvesting boat is added, its emissions may be slightly higher than those of the individual smaller boats but may be lower than those from two additional smaller boats combined.

All farming and boating activities will take place during the day and, while farming operations will change in frequency throughout the year, there are no clear operational peaks, as harvesting, seeding, and maintenance will take place incrementally

throughout the year. Mussel, oyster, and scallop seed will be planted in the fall and the spring (or when available from the hatcheries), and harvesting will begin in the late summer to fall of the next year. Mussels will take about 12 months to reach market size, oysters 18-30 months, and scallops 24-48 months. Throughout the process, the longline will be raised to the surface to handle the shellfish, and buoys will be added to the backbone to maintain consistent depth as the shellfish grow and become heavier. All shellfish products will be landed in Santa Barbara harbor and placed in certified cold storage within ten (10) hours from the commencement of the day's harvest activity.

In a typical growth cycle, there will be approximately 25% of the longlines dedicated as seed grow-out lines. No wild seed collection lines will be utilized. All seed will be obtained from CDFW-approved commercial hatchery stock, which will be planted directly to grow-out lines by the hatchery (for mussels) or into hanging nets (for oysters and scallops) by SBSR. Some lines will lie fallow between harvest and re-seeding for varying periods of time. Specific numbers of fallow/seed/harvest lines for the Project will always be in flux. Product mix will vary depending on market conditions. Farming operations will be tuned over time to maximize production levels and optimize product mix to meet market conditions.

2.3.2.2 Mussel Farming Operations

The mussel culture begins by hanging 10-foot seed ropes on the backbone. The seed ropes are obtained from a shellfish hatchery and already have settled mussels on them. Each rope can carry as many as 50,000 mussels, which are referred to as "spat" once they are permanently attached to a surface. After 3 months, the mussel spat have grown to 0.25-inch in size. The seed ropes are stripped, and the mussels are placed into a machine that re-distributes them onto another continuous "fuzzy" mussel rope using a biodegradable net sock to hold them in place until the mussels attach themselves to this fuzzy rope. The mussel rope is tied and draped below the backbone in 5-10 meter (16-32 foot) loops (to be determined by water depth at each longline location and depth required to avoid predation) spaced one meter (3-feet) apart (Figure 2-12). At harvest

time, the end of the mussel rope is untied from the backbone and inserted into a shipboard harvesting machine run by the boat's hydraulic system. The machine strips the rope of its mussels and rotates them through spinning brushes to break the mussels apart and clean them of any fouling. The most common fouling on mussels is filamentous algae and barnacles, which is washed by seawater and returned to the ocean from whence it came. Prior to return to the ocean, the sea water will be screened, and any invasive species that is found will be collected and disposed of onshore. Washing mussels during harvesting is recommended by the National Shellfish Sanitation Program (FDA, National Shellfish Sanitation Program, 2017). After passing through the machine, the mussels are transferred into a barrel of seawater before being placed onto a sorting table. The market-size mussels are rinsed and placed into 25-pound bags and stored in barrels of seawater for transport back to landing. Undersized mussels are collected for re-attachment to ropes for continued grow-out.

Figure 2-12: Mussels Hanging Below the Backbone Line

2.3.2.3 Oyster Farming Operations

The culture of oysters begins by placing 7mm oysters into baskets with 6mm mesh nets hung from the longline backbone (Figure 2-13). The oysters are transferred into baskets with larger 12-mm mesh nets as they grow. About four hundred market-sized oysters

can be grown in a basket. During harvest, oyster nets are brought onto the boat and dumped on deck. The oysters are shoveled onto the sorting table where the market-sized oysters are counted and placed into trays. The undersized oysters are placed back into the baskets for further growth. The market-sized oysters are washed with seawater and placed into mesh bags for market. After transfer or harvest, the mesh nets are pressure cleaned on the deck with ocean water using a hydraulic pump (using non-toxic and biodegradable hydraulic oil) and hose and then stored on land until the next crop cycle.

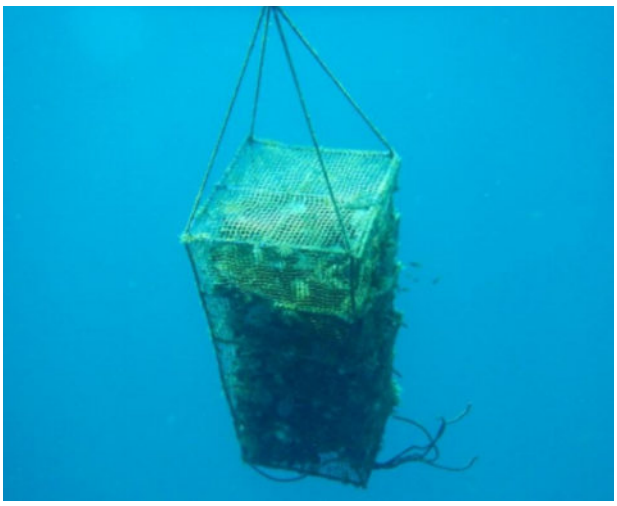


Figure 2-13: Basket of Shellfish Hanging on a Backbone Line

2.3.2.4 Scallop Farming Operations

The rock scallop is an emerging culture species along the West Coast, including in California. Its potential for culture was first studied in the late 1970s and early 1980s in California (Leighton and Phleger 1981). Since that time, it has been the focus of several studies further evaluating seed collection, hatchery rearing and grow-out in California, Washington, Alaska, and British Columbia, with resulting culture techniques described (e.g., Monical 1980; Olsen 1984; Bourne et al. 1989, 1991; McDonald and Bourne 1989; Leighton 1991; Chew 1999; Culver et al. 2006). Much of this work was done in the 1980s and early 1990s when there was an increased interest in developing aquaculture, and government funding was available. Throughout this time, US West Coast growers

have cultured and sold rock scallops sporadically when natural sets of seed have settled in grow-out gear being used to culture other shellfish (oysters, mussels). For example, in California, commercial rock scallop culture and sales occurred in Drakes Estero (Leighton 2001), and in the Santa Barbara Channel in association with harvesting at offshore oil and gas platforms just east and west of the proposed lease site (Richards et al. 2009), and at times elsewhere. While markets have been strong for this highly valued – $3.00 to $7.00 per scallop depending on size - species, limited seed availability has precluded continuous commercial production of rock scallops.

With the renewed national interest in aquaculture, the rock scallop is once again receiving attention as a primary candidate for aquaculture expansion along the West Coast. In the 10-Year NOAA Sea Grant Aquaculture Plan (Sea Grant Association 2016), it is included in a list of seven viable commercial candidate aquaculture species warranting further research to improve production. Researchers both in California and Washington are actively working with growers on various aspects of rock scallop culture, including seed production. Small batches of seed have been produced and grow-out trials have been conducted, with efforts now focused on commercial scale production. In California collaborative efforts are ongoing at UC Santa Barbara and CSU Moss Landing Marine Labs, with work previously also at UC Davis's Bodega Marine Lab (C. Culver, pers comm).

Seed: Because commercial scale seed production is still lacking, SBSR plans to obtain seed from: 1) natural sets at our lease site, and 2) CDFW-approved hatchery-produced seed as it becomes available. Growers have relied solely on seed that naturally sets on grow-out gear to culture small batches of rock scallops. SBSR is not sure how much seed will naturally recruit at the Project site but will collect and use scallop seed that does. Scallop collectors include mesh bags that enable water to flow through it with substrate – such as frayed rope – inside of it. Our oyster baskets and mussel lines may also provide surfaces where young scallops will settle. Recognizing that natural sets of seed will be sporadic and unpredictable, and that seed is not yet available from commercial

hatcheries, SBSR also will collaborate and support ongoing efforts in hatchery-production of seed. SBSR will obtain a broodstock collecting permit and provide broodstock from CDFW-approved locations to those working on rock scallop seed production. Samples of resulting seed will be provided to CDFW for certification prior to being moved out on the SBSR Project.

Nursery and Grow-out Phases: The rock scallop is a bivalve, similar to mussels and oysters. It too filter feeds, obtaining nutrition from phytoplankton in the water column. It also utilizes dissolved and particulate organic matter as food. Many types of shellfish grow-out gear have been and can be used for rock scallop culture (as described within much of the literature), but some modifications are required due to the cementing habitat of the scallop. Rock scallops initially attach to substrates using byssal threads and then later cement (typically around 20-35 mm, depending on location) and conform to a hard substrate. Such permanent attachment can make rock scallops difficult to harvest, as the culture gear and scallop itself can be damaged upon removal. To address this biological characteristic, rock scallops are typically grown in two phases; nursery and grow-out. Seed scallops (scallops ≤ 25 mm) can be grown in pearl nets, oyster baskets and other bivalve grow-out gear that has mesh small enough to hold the scallops while also permitting water to flow through it. Small seed will be placed into stacked mesh culture bags (Figure 2-14), or shellfish grow-out trays lined with mesh (Figure 2-15). The cost and maintenance for each of these gear types vary, with the required maintenance influenced by site-specific fouling. SBSR will evaluate which gear works best at the site and use it.

Figure 2-14: Individual and Stacked Mesh Culture Bags

Figure 2-15: Shellfish Grow-out Tray with Mesh Lining

As rock scallops approach cementing size, SBSR will then transfer them into shellfish grow-out trays (Figure 2-16), where they will remain until they reach market size. Because scallops will want to cement within these trays, SBSR will artificially attach them to substrates (flat PVC panels) using techniques that currently are being modified and evaluated by researchers at UC Santa Barbara (Figure 2-17). These techniques include inducing attachment by positioning the scallop with its growing edge against a flat surface and securing it there with quick drying adhesive or plastic mesh over it such that the scallop eventually uses its own glue to attach. Manipulation of the cementing stage will enable SBSR to control where the scallops cement such that SBSR can

optimize space within the grow-out gear. Further, investigations of attachment found that rock scallops grew significantly faster when artificially attached at a small size (~ 25 mm) (Culver et al. 2006).

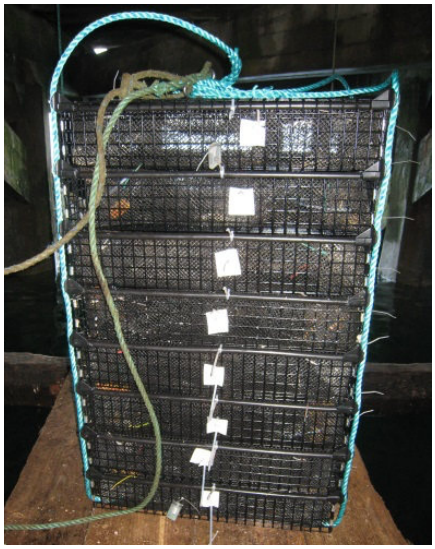


Figure 2-16: Stack of Shellfish Grow-Out Trays

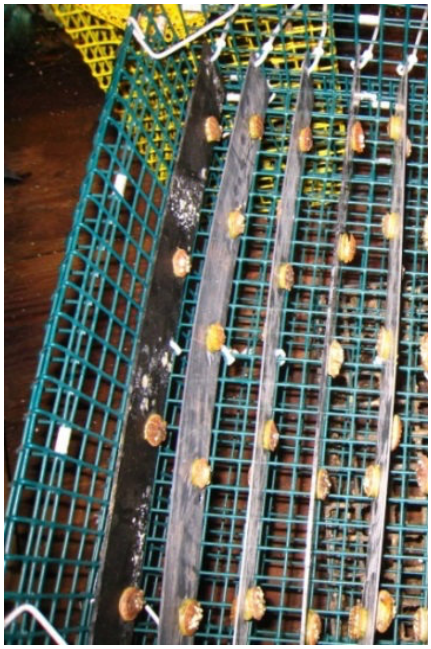


Figure 2-17: Flat Panels Inside Grow-Out Trays

After sufficient growth, the small scallops will be transferred to shellfish grow-out trays where they will be grown until they reach market size. As the scallops grow, they will be periodically brought on deck, trays will be cleaned using pressurized seawater and market-sized scallops removed, washed, counted, and placed into bags for market. Undersized scallops will remain in the cleaned grow-out trays and returned to the sea for further growth. Empty grow-out gear will be cleaned on deck with pressurized seawater, taken onshore and stored for reuse with the next crop.

Harvesting: Prior to sale, scallops will be sampled and tested in accordance with the National Shellfish Sanitation Program guidance in cooperation with the California Department of Public Health (CDPH). Like mussels and oysters (and other bivalves), rock scallops are susceptible to naturally occurring biotoxins which they obtain when they consume toxin-producing phytoplankton. Although data for California are limited, rock scallops have been found to contain saxitoxin, the toxin responsible for paralytic shellfish poison (PSP), but not domoic acid (DA), the toxin associated with amnesic shellfish poisoning and most common in the Santa Barbara Channel (Beitler 1991; Lewitus et al. 2012; CDPH Biotoxin Data; Culver unpublished data). Unlike mussels that are known to have rapid uptake and short retention of biotoxins, rock scallops

accumulate saxitoxin more slowly, but also retain it for longer. Similar to most organisms, the biotoxins accumulate primarily in the digestive gland. Because rock scallops typically are not consumed whole, this high-risk tissue can be, and often is, discarded. However, saxitoxin also has been detected at levels above the public health critical level in the adductor muscle of rock scallops – the tissue that is typically consumed – although the toxin levels are generally much lower in the adductor muscle than in the digestive gland that is often discarded (Beitler 1991). CDPH issues advisories recommending that rock scallops (which are harvested recreationally) not be consumed during PSP-producing blooms.

Once a crop is harvested, grow-out gear will be cleaned on deck with pressurized seawater, taken onshore, and stored for reuse with the next crop.

2.4 PROJECT TIMING

The Project will reach full production by year four of operation. Ten lines will be installed and planted in the first planting season so that any issues can be resolved prior to large-scale deployment. Thirty-five additional lines will then be installed and planted in each of the following two planting seasons.

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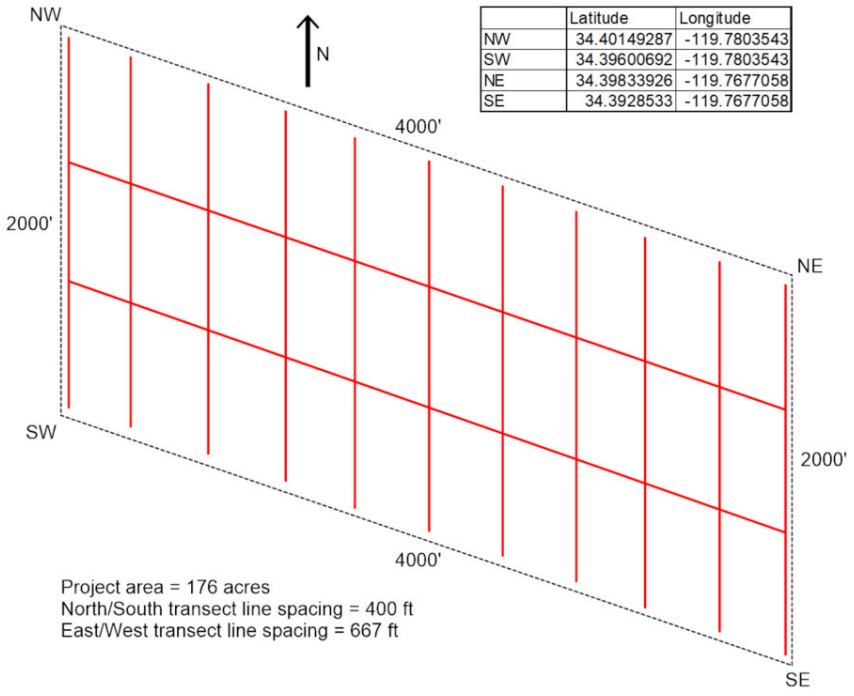
At the request of CDFW, SBSR conducted its own video survey of the seafloor at the proposed Project location. Because water cloudiness and lack of light make it difficult to document large fields of view and necessitate that the survey video camera be within a meter of the seafloor, a survey transect grid was suggested by CDFW (with input from the California Coastal Commission) to capture a representative sample of the seafloor at the Project location (Figure 4-1). The vertical (north-south) red lines are spaced 400 feet apart and the horizontal (east-west) red lines are spaced 667 feet apart. The black lines indicate the intended location of the Project's longlines, and the dashed black lines mark the perimeter of the proposed lease location.



	Latitude	Longitude
NW	34.40149287	-119.7803543
SW	34.39600692	-119.7803543
NE	34.39833926	-119.7677058
SE	34.3928533	-119.7677058

Figure 4-1: SBSR Project Bottom Survey Transect Lines

4.1 SBSR Survey Equipment and Methods

Due to the extraordinarily high cost associated with hiring a third party to conduct this type of survey, SBSR chose to build its own survey equipment and to conduct the survey from aboard its own Project support vessel, a Radoncraft Bahia.

For the purpose of conducting the survey, as well as future inspection of crops, gear, and seafloor conditions, SBSR purchased and built a Blue Robotics BlueROV2 Heavy Configuration ROV with 1080p HD video, high-power LED lights, temperature and depth sensors, sonar, and a 100-meter depth rating (Figure 4-2). Two powerful green lasers were mounted on the ROV to give an indication of scale in the video footage (similar to the USGS video). GPS surface vessel position information was communicated to the ROV via its data/tether cable and is displayed, in real-time, in the video footage. During the survey, the ROV was towed approximately 100 feet behind the surface vessel at all times.

Figure 4-2: SBSR's BlueROV2 Heavy Configuration ROV

Initially, SBSR planned to use the ROV's own sonar and altitude control software to maintain constant elevation of the ROV above the seafloor in order to be able to focus the camera and get good quality video capture. However, when this method of control proved to be unsuccessful, SBSR built a subsea tow vehicle to mount the ROV on, which could be pulled along on the seafloor behind the surface vessel. Figure 4-3 shows the ROV mounted on the tow vehicle at the Santa Barbara Harbor launch ramp when it was being adjusted for proper buoyancy. With the ROV mounted on the tow vehicle, its video camera is maintained at 16" above the seafloor when under tow.

Figure 4-3: SBSR ROV and Tow Vehicle for Bottom Surveying

4.2 Survey Data

The survey was conducted over a period of three days on August 15, 17, and 18, 2019. Figure 4-4 shows the surface vessel position, as well as the location of the individual survey videos that were captured each day. The vessel positions each day are indicated by blue, grey, and yellow lines. Start and stop points for each day are labeled. This position data was extracted from the ROV's data log files and indicates the surface vessel's positions when the ROV was enabled (not just when video was being recorded). The red, yellow, green, and blue dots on the vessel trail lines indicate vessel position, at five-minute intervals, at times when video was being captured.

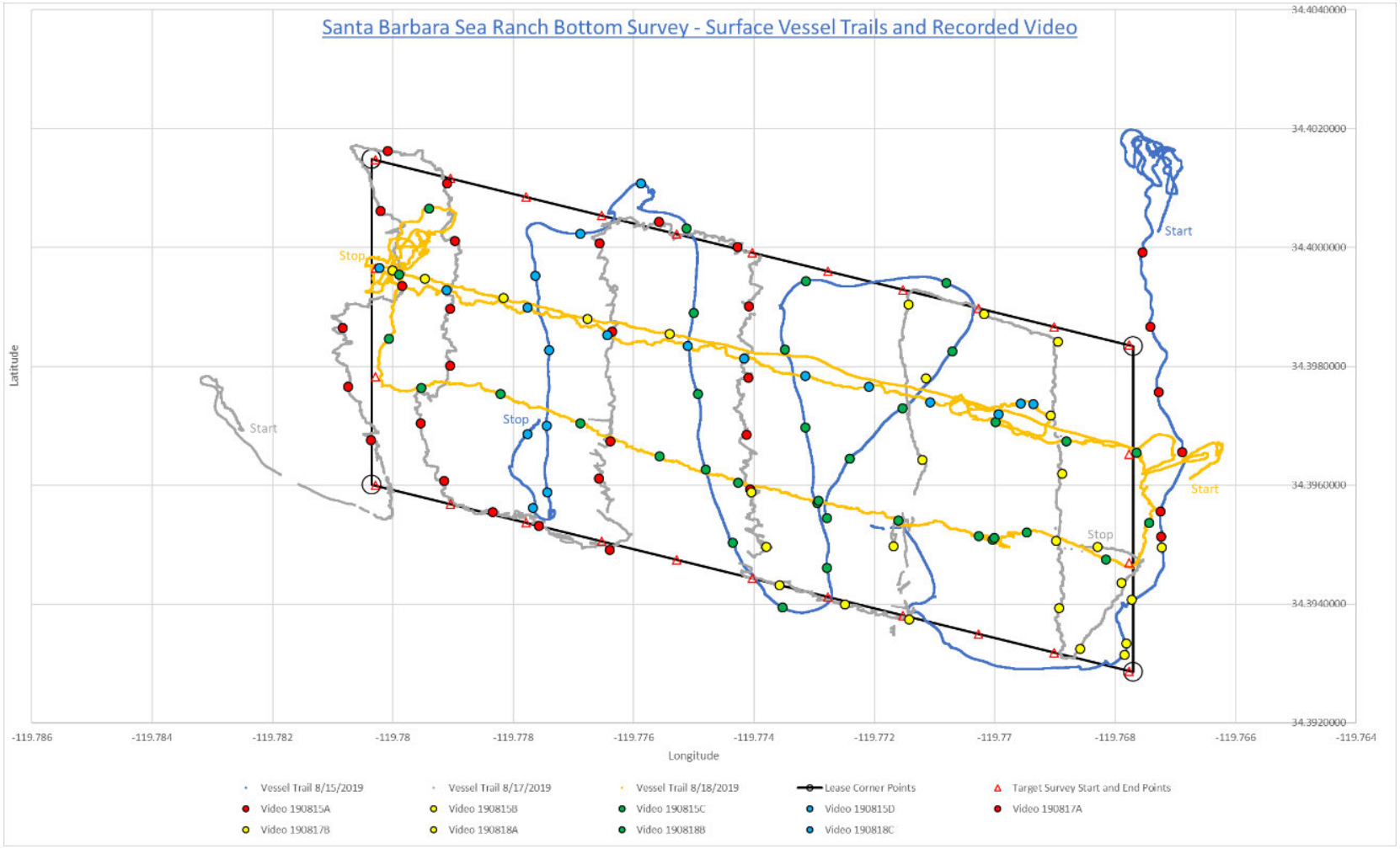


Figure 4-4: SBSR Bottom Survey - Surface Vessel Trails and Recorded Video

There were many SBSR learning opportunities throughout the process and more than one setback along the way. As one can see from Figure 4-4, the ability to hold the intended vessel course while towing the tow vehicle significantly improved on the second day of the survey once SBSR figured out how to compensate for wind and/or current conditions without using excessive engine power, which would have resulted in an ROV speed-over-ground that was too high for good video capture.

SBSR intended to have two parallel green laser beams 26" apart operating during the entire survey to indicate scale, but one of them failed on the first day due to water intrusion.

Throughout the entire three days of surveying, SBSR captured approximately 35,000 feet (6.6 miles) of bottom video over the course of about 8.5 hours of filming. The average speed of the ROV during the video capture had to be limited to just 0.68 knots in order to provide good quality capture.

The video files and spread sheet associated with this SBSR survey are available upon request.

Figure 4-5 is a still frame from one of the videos files captured in the survey (Note: one of the two underwater green lasers had failed). The window in the upper right corner labeled "Values" lists the following information that was captured in real-time throughout the video:

- ROV depth in meters
- Surface vessel latitude and longitude (tow vehicle within 100 ft of surface vessel)
- Pitch, heading, and roll of the ROV
- Temperature inside the ROV
- Water temperature outside the ROV
- Battery voltage in the ROV

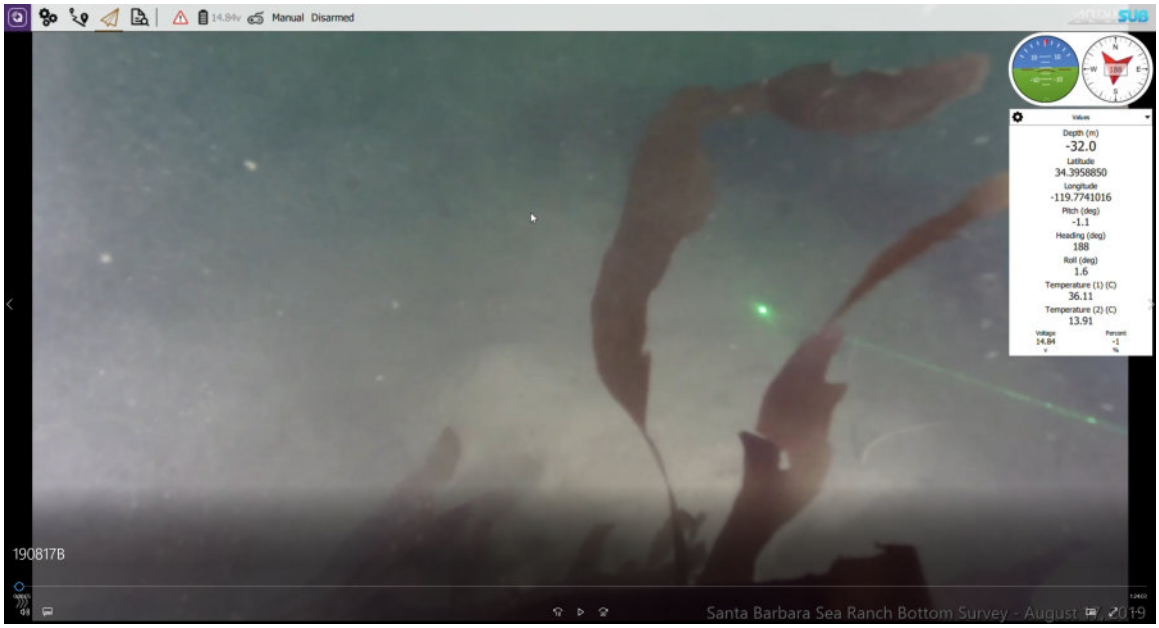


Figure 4-5: Example of a Still Frame from SBSR Survey Video

As mentioned before, it was necessary to be very close to the seafloor for the camera to be able to focus on the seafloor and not on particles in the water. The large majority of the video shows white sand/mud bottom with few features to provide contrast. However, whenever there was something other than white sand/mud bottom (such as the odd piece of dead kelp, a sea pen, a star fish, etc.) the camera did bring it into focus. Although there was very little live kelp seen in the survey videos, this still frame was selected to illustrate the ability of the ROV to capture detailed images when something other than sand/mud was present.

The video taken by USGS (https://www.axiomdatascience.com/maps/usgs.php#map?lg=5b9152b0-673d-11e2-b541-00219bfe5678&z=15&ll=34.39302%2C-119.76795) nearby the SBSR proposed lease area is very similar in nature and in findings to that captured by SBSR.

4.3 SBSR Survey Findings

1. ALL OF THE VIDEO CAPTURED DURING THE ENTIRE COURSE OF THE SBSR SURVEY INDICATED THAT THE BOTTOM CONDITIONS FOUND BY SBSR WERE CONSISTENT

WITH THE FINDINGS OF THE USGS: CALIFORNIA STATE WATERS MAP SERIES NO. 3281 – OFFSHORE OF SANTA BARBARA, CALIFORNIA SHOWN IN **SECTION 2.2.1** ABOVE, IN WHICH THE SUBSTRATE CLASS WAS FOUND TO BE "FINE – TO MEDIUM-GRAINED SMOOTH SEDIMENT THROUGHOUT.

2. With a video capture width of 26" over 35,000 linear feet, the total area surveyed was just 1.73 acres, or approximately 1% of the total 176 acre proposed lease area.
3. Throughout the entire survey, the only thing that SBSR encountered that wasn't smooth, shallow sloped sand/mud bottom was what may have been an abandoned mooring line that the ROV got temporarily entangled in.
4. THE SBSR SURVEY RESULTS, COUPLED WITH THE USGS RESULTS, INDICATE BEYOND ANY REASONABLE DOUBT THAT THE ENTIRE AREA OF THE PROPOSED LEASE CONSISTS ONLY OF SOFT, UNCONSOLIDATED, RIPPLED SEDIMENT (SAND AND MUD) ON A SHALLOW SLOPE.

5 APPENDIX B: SBSR EQUIPMENT LIST

Item	Description	Location	Total Quantity	Installed or Day Use Only
Anchors	Helical screw anchor	In the sea floor at the end of each longline	160	Installed
Anchor lines	40mm diameter rope, 19-32 meters	Connection between anchors and backbone line	160	Installed
Backbone Lines	40mm diameter rope, 250-266 meters	Horizontal portion of the longlines	80	Installed
Ancor Line Buoys	480-liter LDPE submerged buoys	Attached to the anchor lines	160	Installed
Submerged Backbone Buoys	120-liter LDPE submerged buoys	Two meters above the backbone line	Approximately 3,040	Installed
Surface Buoys	300-liter LDPE surface buoys	On surface above the farmable section of the backbone	Approximately 1,040	Installed
Anchor Marker Buoys	120-liter LDPE surface buoys	On the surface above the anchors	160	Installed

Item	Description	Location	Total Quantity	Installed or Day Use Only
Radar Reflective Bouy	Buoy(s) with radar reflectors as required by USGS	Likely located at lease corners	1-4	Installed
Surface Buoy Ropes	0.5-inch co-polymer rope, 25 feet long	Between surface float and breakaway links	Approximately 1,040	Installed
Breakaway Links	1,100 lb. breakaway links for marine mammal entanglement mitigation	Between Surface buoy ropes and backbone rope	Approximately 1,040	Installed
Anchor Buoy Ropes	0.5-inch co-polymer rope, 70’-110’ long	Between anchors and anchor buoys	160	Installed
Seed Lines (10-ft.)	Co-polymer rope blend, 10-ft. long, 2.5” diameter, cotton fabric attached, connected to backbone line with 1/8” breakaway line for marine mammal entanglement mitigation	Connects backbone line to seed lines	Approximately 1,000, dependent on crop mix	Installed
3-mm Oyster Mesh Nets	Five tier square lantern nets, 25”x25”, five feet long, connected to backbone line with 1/4” line	Hung from backbone line	Up to 100 per longline	Installed
12-mm Oyster Mesh Nets	Five tier square lantern nets, 25”x25”, five feet long, connected to backbone line with 1/4” line	Hung from backbone line	Up to 100 per longline	Installed
Mussel Growout Line	Continuous polypropylene “fuzzy” culture rope	Hung from backbone line	Up to 7,000 ft. per longline	Installed
Lashing Line	4mm polyethylene line, 6ft’ each,	Between backbone line and growout line	Two per loop of mussel droppers	Installed

Item	Description	Location	Total Quantity	Installed or Day Use Only
Harvesting Equipment	Socking, stripping, cleaning, and sorting machines.	Onboard harvest vessel	One set per vessel	Day use only
Hydraulic Pump	Hydraulic pump for running harvesting equipment	Onboard harvest vessel	One per vessel	Day use only
Harvest Bags	25 lb. bags with SBSR labeling	Onboard harvest vessel	Variable	Day use only
Small Boat	35-38’ boat for farm maintenance and harvesting	Santa Barbara Harbor	1-3	Day use only
Large Boat	Up to 80’ boat for high-volume mussel harvesting	Santa Barbara Harbor	1	Day use only
Shackles, etc.	Miscellaneous connectors for anchor and backbone lines	Longlines	TBD	Installed

6 APPENDIX C: SBSR LONGLINE STRUCTURAL ENGINEERING ANALYSIS

6.1 Executive Summary

Upon detailed review of both the Ventura Shellfish Enterprise (VSE) engineering analysis and the Santa Barbara Mariculture Company's (SBMC) use of a Bay of Biscay, Spain project's engineering analysis as a proxy, SBSR concluded that neither the VSE nor the SBMC analysis would suffice for a SBSR proxy. The VSE location, environmental conditions, and longline design were too dissimilar, and even though SBSR's proposed lease location is near to SBMC, SBSR concluded that SBMC's proxy approach was not adequately representative of the local environmental conditions or the SBSR longline design, and therefore could not be used to satisfactorily mitigate Project risk. Hence, a detailed location and design specific dynamic structural engineering analysis of the SBSR longline designs was required.

Minimum requirements for breaking strength of the structural lines, holding power of the anchors, breaking strengths for breakaway links for surface float lines, and breaking strength for mussel dropper connections and sub-surface float connections have been specified to achieve safety factors recommended for offshore structures by the American Petroleum Institute (API RP2SK). Load cases were designed exceeding Norwegian Standard NS-9415 recommendations for evaluation of both wave-dominated and current-dominated extreme events. NOAA selected site-specific extreme wave, current, and wind data for use in the analysis.

6.2 Numerical Modeling of the Backbone System

6.2.1 Numerical Modeling Approach

SBSR, with the support of Jacob Technologies and Orcina, LTD, conducted detailed static and dynamic analysis of the SBSR longlines in extreme storm conditions using Orcina's "OrcaFlex" finite element analysis software.

OrcaFlex is the world's leading software package for the design and analysis of a wide range of marine systems.

6.2.2 Numerical Model Setup

Dynamic models of the SBSR longline system were developed for both shallow and deep portion of the proposed lease area. A total of 24 separate load cases were evaluated for extreme wave, current, and wind conditions with bespoke longline designs optimized for specific water depth. The lengths of the anchor lines and backbones were adjusted with change in water depth to maintain the desired geometric design characteristics of the longlines.

SBSR also developed a detailed and proprietary spreadsheet for calculation of optimal longline geometry, closed-form solution for the farmable section of the backbone, and the required surface and subsurface buoyancy for maintaining tension and floatation.

The structural and hydrodynamic properties of the mussel lines were taken from (Dewhurst, 2016). The diameter of the mussel ropes was set so that the dry weight of the mussels was 8 pounds per foot of mussel rope, which represents the highest reasonable estimate of maximum growth and presents the maximum expected load.

Since each backbone in the array has its own anchors and is independent of the other backbones, an individual backbone was examined.

6.2.3 Location

The Project location is offshore from Santa Barbara, California, approximately five miles west of Santa Barbara Harbor and within one mile of the shoreline (Figure 6-1).

Figure 6-1: Proposed New Aquaculture Lease Santa Barbara Area

Corner locations and depths at the Project site are:

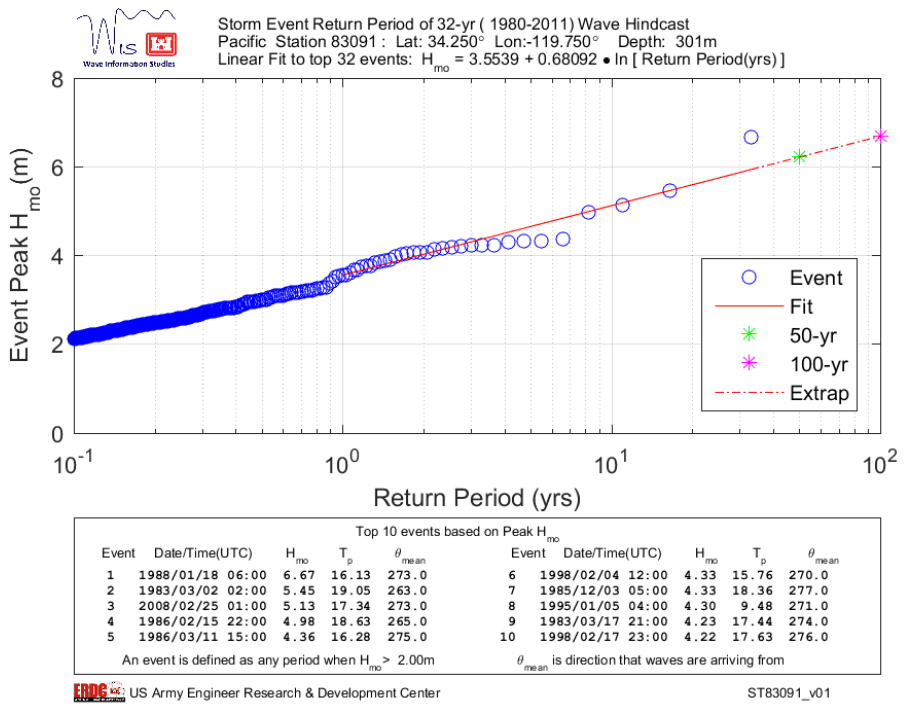
Latitude	Longitude	Depth (ft.)
34.40149287	-119.7803543	70
34.39600692	-119.7803543	101
34.39833926	-119.7677058	74
34.3928533	-119.7677058	111

6.2.4 Environmental Parameters

6.2.4.1 Waves

Extreme wave statistics were based on continuous, long-term wave observations from the US Army Corps of Engineers Pacific Wave Information Studies Station 83901 (Figure

6-2 and Figure 6-3) located approximately nine nautical miles south of the proposed SBSR lease location.



Event	Date/Time(UTC)	H_{mo}	T_p	θ_{mean}	Event	Date/Time(UTC)	H_{mo}	T_p	θ_{mean}
1	1988/01/18 06:00	6.67	16.13	273.0	6	1998/02/04 12:00	4.33	15.76	270.0
2	1983/03/02 02:00	5.45	19.05	263.0	7	1985/12/03 05:00	4.33	18.36	277.0
3	2008/02/25 01:00	5.13	17.34	273.0	8	1995/01/05 04:00	4.30	9.48	271.0
4	1986/02/15 22:00	4.98	18.63	265.0	9	1983/03/17 21:00	4.23	17.44	274.0
5	1986/03/11 15:00	4.36	16.28	275.0	10	1998/02/17 23:00	4.22	17.63	276.0

Figure 6-2: Storm Event Return Period of 32-yr (1980-2011) Wave Hindcast Pacific Station 83901 (34.250 degrees North, 119.750 degrees West)

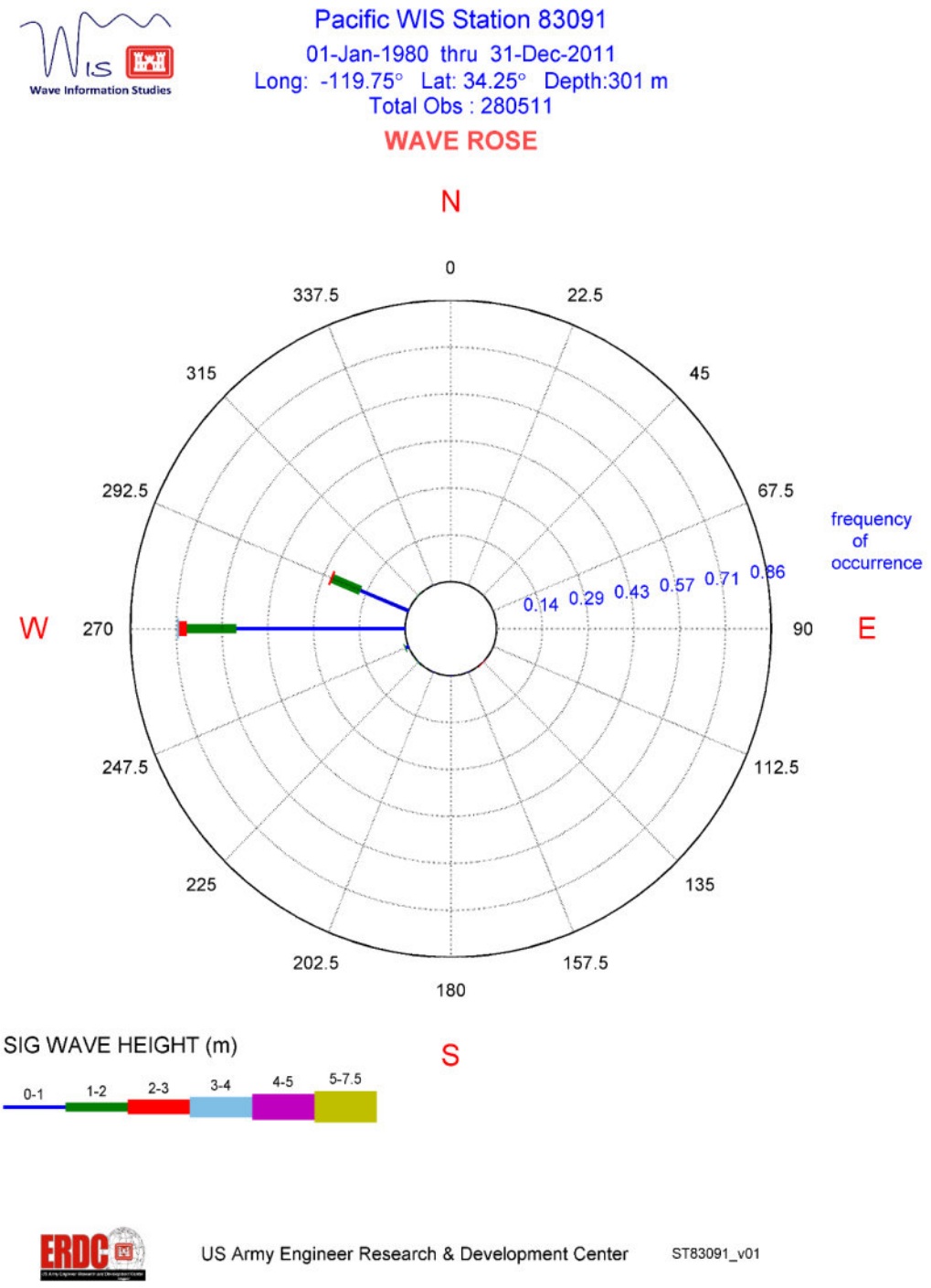


Figure 6-3: Wave Rose – Pacific WIS Station 83091

Table 6-1 lists the 10-year and 100-year extreme wave heights and associated peak wave periods.

Table 6-1: Extreme Significant Wave Heights, Associated Peak Periods, and Direction

Return Period (years)	Significant Wave Height, H_{mo} (m)	Peak Period, T_p (s)	Direction, θ_{mean} (degrees)
10	6.67	16.13	273
100	5.13	17.34	273

6.2.4.2 Currents

Extreme current statistics were based on 2012-2019 CA Roms 3 km data provided to SBSR by NOAA for an area defined by the following latitude and longitude coordinates and shown in Figure 6-4 below.

Lat	Long
34.37514	-119.805
34.3755	-119.775
34.34484	-119.775
34.34483	-119.805

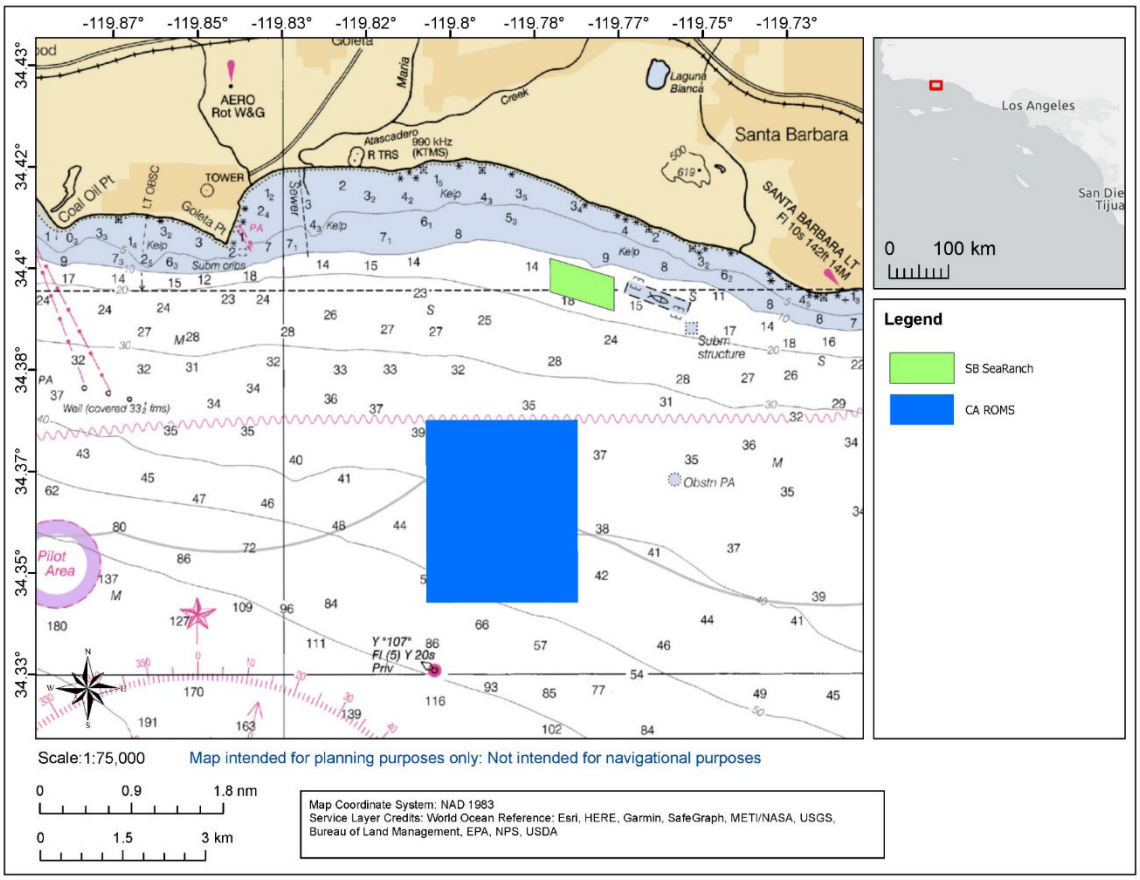


Figure 6-4: CA Roms Current Measurement Location Nearest to SBSR Proposed Lease Location

Seven years of hindcast data were fit to a Gumbel distribution and extrapolated to compute extreme values. The Gumbel distribution and linear fit are shown in Figure 6-5 and the extreme event return values are show in Table 6-2.

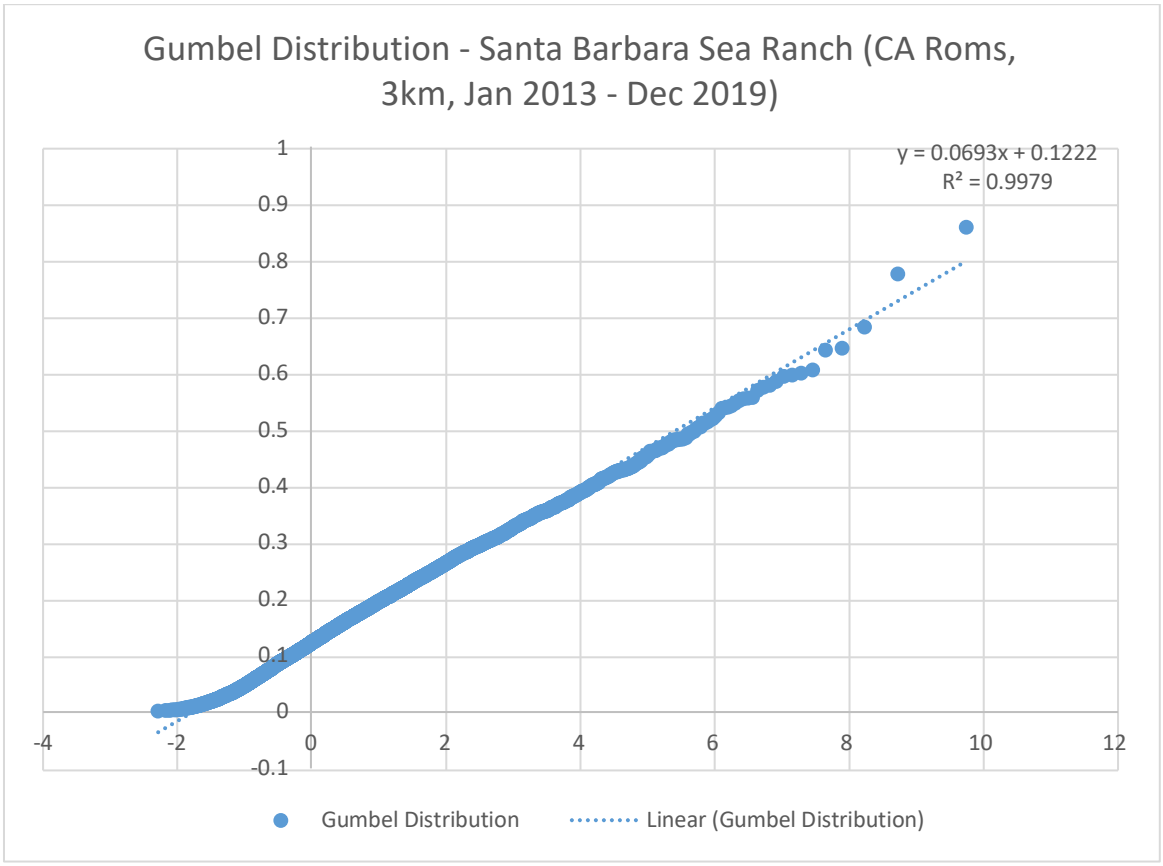
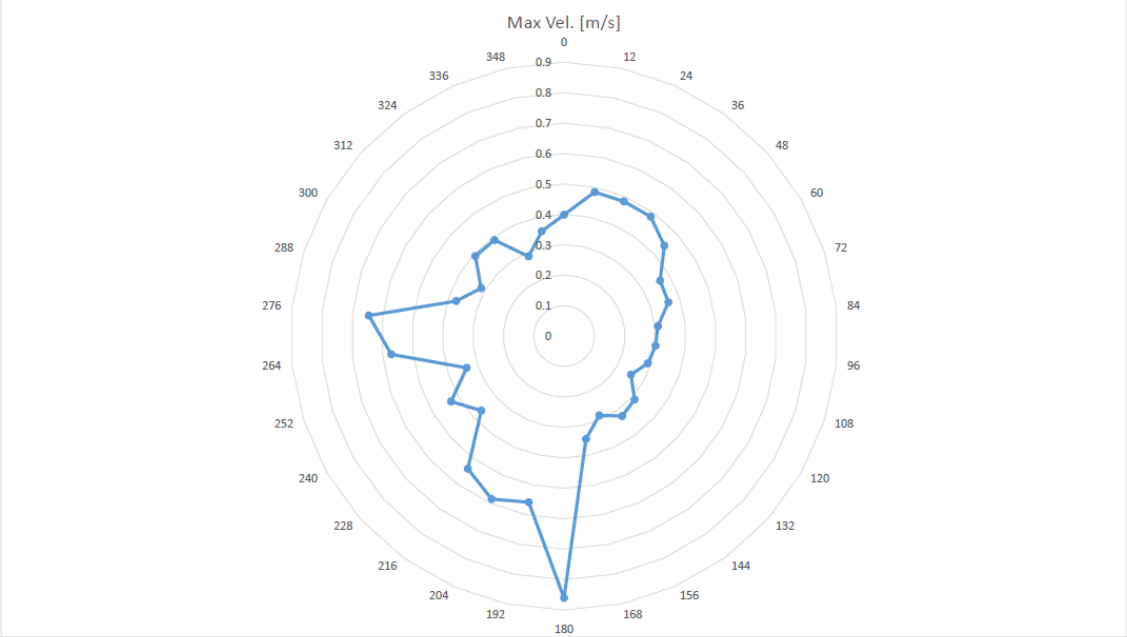


Figure 6-5: Gumbel Distribution – SBSR (CA Roms, 3km, Jan 2013 – Dec 2019)

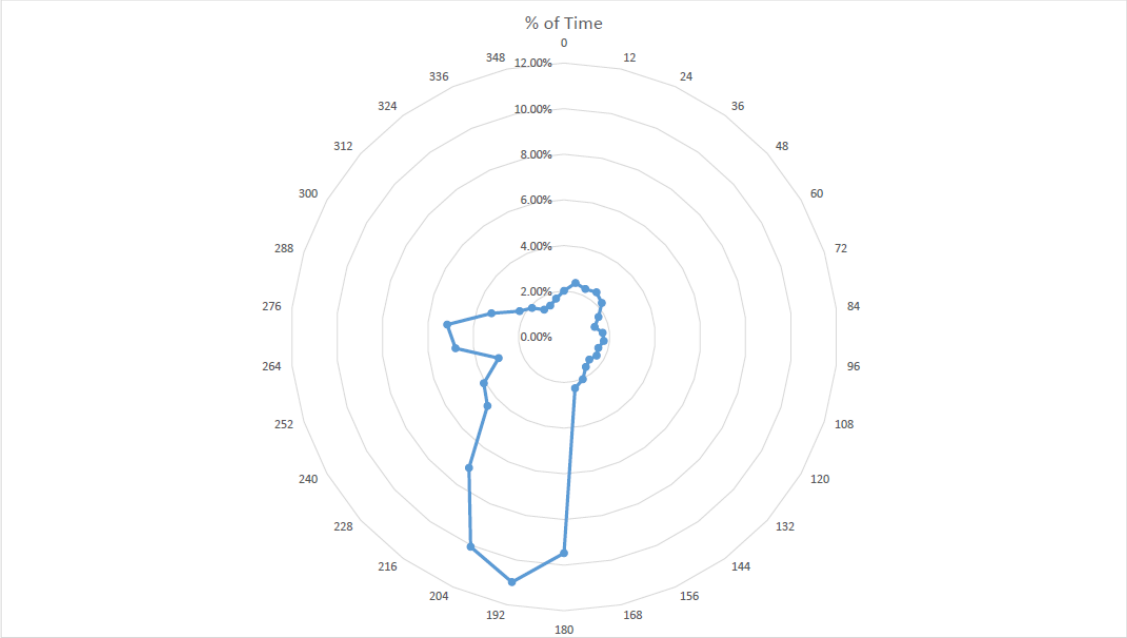
Table 6-2: Extreme Current Return Period and Velocity

Return Period (years)	Current (m/s)
0.1	0.4673
0.2	0.5155
0.3	0.5436
0.4	0.5636
0.5	0.5791
0.6	0.5917
0.7	0.6024
0.8	0.6116
0.9	0.6198
1	0.6271
2	0.6752
3	0.7033
4	0.7232
5	0.7387
6	0.7513
7	0.7620
8	0.7712
9	0.7794
10	0.7867
20	0.8347
30	0.8628
40	0.8828
50	0.8982
60	0.9109
70	0.9216
80	0.9308
90	0.9390
100	0.9463

Maximum current velocity & direction and percent of time & direction are given in Figure 6-6.



Maximum current velocity and direction at the surface offshore Santa Barbara, 2012 - 2019 CA Roms 3 km resolution.



Percent of current direction at the surface offshore Santa Barbara, 2012 - 2019 CA Roms 3 km resolution.

Figure 6-6: CA Roms 3 km Current Data in m/s and % of Time vs. Direction

6.2.4.3 Wind

Extreme wind events were calculated from wind data from long-term wind observations from the US Army Corps of Engineers Pacific Wave Information Studies Station 83901. Using a Gumbel distribution, the 10-year extreme wind velocity was predicted to be 20.53 m/s from 315 degrees. This extreme wind condition was applied to all 48 load cases. However, due the fact there is very little drag produced by the surface buoys in air by comparison to the rest of the gear underwater, the wind was seen to have a negligible impact on the loading of the system.

6.2.4.4 Load Cases

100-year waves, wind, and current do not generally occur simultaneously. Norwegian Standard NS 9415 recommends examining both wave-dominated and current-dominated extreme events (Standards Norway, 2009). For the 50-year current dominated event, the 50-year current speed is combined with 10-year waves and wind. Similarly, the 50-year wave event is combined with 10-year return period currents. In the present analysis, the 10-year return period was used for the non-dominant forcing (waves or current) for the 100-year events, thus the present analysis is an even worse case than the one recommended in NS 9415.

Wave Direction. 10-year and 100-year extreme wave come from a mean direction of 273 degrees. Three wave directions, 273 degrees and 273 +/- 30 degrees, were used in the load table to account for some potential variation in extreme wave direction.

Current Direction. The highest amplitude current (from the current rose) are seen to come from the south. Three current directions, 180, 225, and 273 degrees were used to represent:

1) The likely direction of extreme currents
2) The likely direction plus 45 degrees
3) The same direction as the extreme currents.

Wind Direction. Extreme wind was always in the direction of extreme waves (273 degrees), but as mentioned above, wind has a negligible effect on loads.

The 24 load cases evaluated for wave, current, and wind are listed in Table 6-3. All 24 load cases were evaluated for longlines designed for both shallow and deep water (21-meters and 34-meters water depth) portions of the Project (a total of 48 specific load cases were analyzed).

Table 6-3: Extreme Load Cases for Waves, Current, and Wind

Load Case	Wave Direction (degrees)	Wave Return (years)	Current Direction (degrees)	Current Return (years)	Wind Direction (degrees)	Wind Return (years)
1	273	100	273	10	315	10
2	273	10	273	100	315	10
3	273	100	180	10	315	10
4	273	10	180	100	315	10
5	273	1	273	1	315	10
6	273	1	180	1	315	10
7	273	100	225	10	315	10
8	273	10	225	100	315	10
9	303	100	273	10	315	10
10	303	10	273	100	315	10
11	303	100	180	10	315	10
12	303	10	180	100	315	10
13	303	1	273	1	315	10
14	303	1	180	1	315	10
15	303	100	225	10	315	10
16	303	10	225	100	315	10
17	243	100	273	10	315	10
18	243	10	273	100	315	10
19	243	100	180	10	315	10
20	243	10	180	100	315	10
21	243	1	273	1	315	10
22	243	1	180	1	315	10
23	243	100	225	10	315	10
24	243	10	225	100	315	10

6.2.4.5 Minimum Allowable Capacity of Structural Components

Offshore industry standards (e.g. API RP2SK) require safety factors of 2.0 for pile anchors and 1.67 for mooring lines (API, 2005). Here, the safety factor is the ratio of ultimate capacity (e.g. breaking strength) to the maximum expected demand (e.g. the maximum expected tension). The American Bureau of Shipping (ABS) recommends increasing safety factors by 20% for synthetic lines, bringing the mooring line safety factor up to 1.82. The API recommended safety factor of 2.0 was applied to helical anchors. The minimum breaking strength of the structural lines (backbone and anchor lines) and the minimum holding power of the anchors required to achieve these safety factors was calculated.

6.3 Calculation of Minimum Required Capacity of Structural Components

For each longline design (21-meter and 34-meter water depths) under all 24 load cases, with the mussel lines fully stocked (eight pounds per foot), the maximum expected tension and forces in a 20 minute storm were calculated. A Rayleigh distribution of the calculated loads was also performed, but maximum loads were found to be slightly less than peak loads for the worst-case load cases, so the peak loads were used for calculation of the minimum breaking strength of the structural lines and minimum holding power of the anchors required to achieve safety factors recommended by API and ABS for offshore structures. In the present analysis, the anchor safety factor of 2.0 was applied to both the vertical and horizontal forces on the helical anchors.

6.4 General Design Considerations

6.4.1 Navigation Hazards

6.4.1.1 Buoy lines

All buoy lines must be sinking lines, so they do not float on the surface under any conditions.

6.4.1.2 Backbone and Anchor Lines

The backbone and anchor lines must not reach the surface under any condition, static or dynamic.

6.4.2 Anchor Loads

Since helical screw type anchors will be used, the anchor loading under dynamic conditions must be resolved into vertical and horizontal components to ensure adequate design margin when selecting anchors.

6.4.3 Vessel Lifting Capacity

Longline geometry, crop weight, and submerged floatation all factor into the required lift capacity of the vessel.

6.5 Design 1: Shallow Water, 21-Meter Water Depth

6.5.1 Static Conditions

Figure 6-7 and Figure 6-8 show the 21-meter longline design fully loaded with 10-meter mussel droppers in static conditions. Static pretension in the backbone line under fully stocked conditions was 4.76 kN (1,071 pounds).

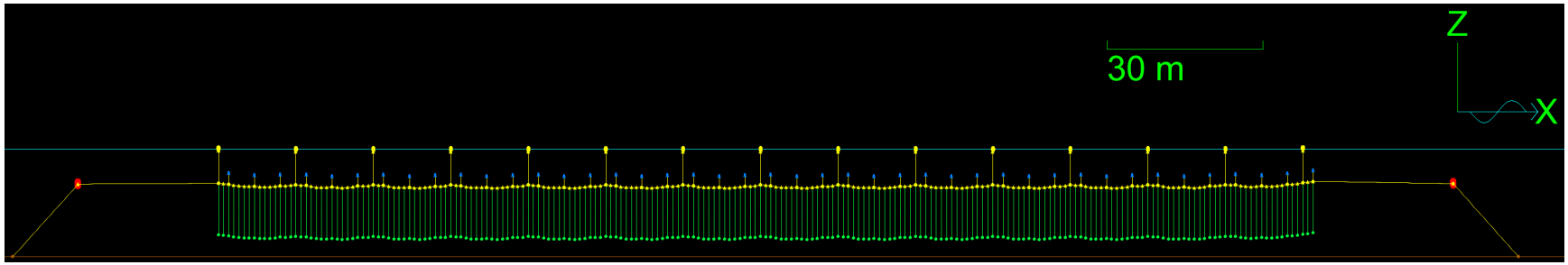


Figure 6-7: 21-Meter Depth Longline, Fully Loaded, Static Conditions (2D View)

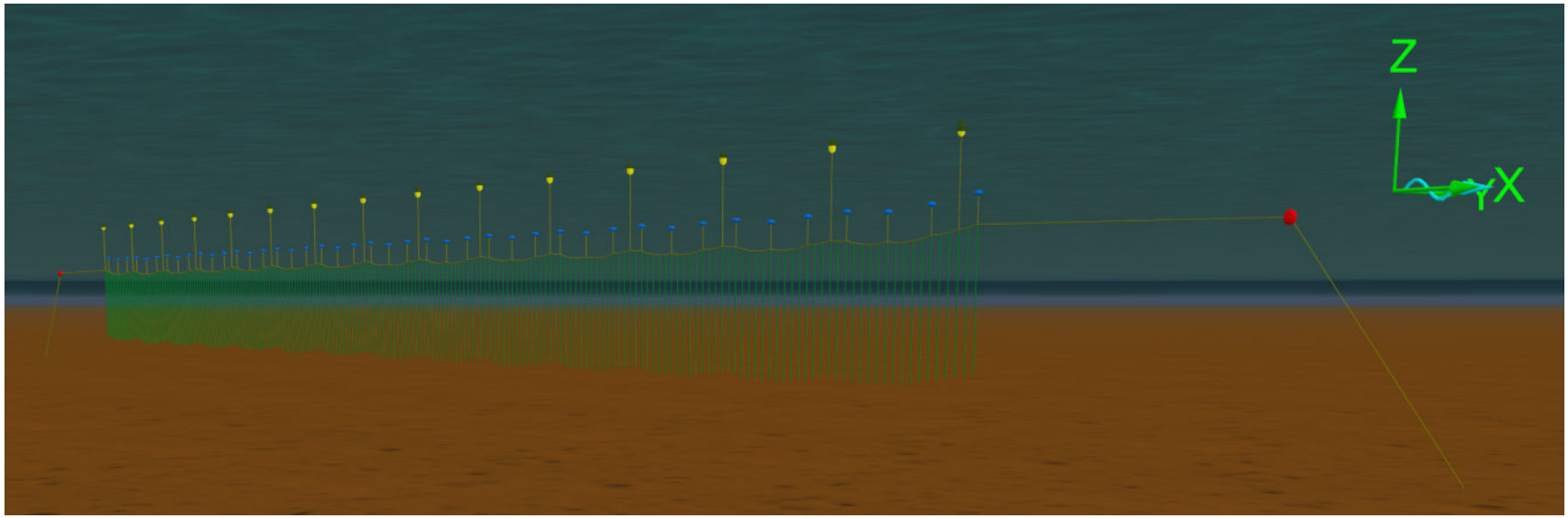


Figure 6-8: 21-Meter Depth Longline, Fully Loaded, Static Conditions (3D Shaded View)

6.5.2 Prevention of Backbone and Crops from Reaching the Surface

To prevent the backbone line and crop lines from reaching the surface in high-current conditions, the subsurface floats along the backbone line are connected with two-meter ropes and the corner float are attached to the anchor lines at a distance two-meters less than the water depth at the anchor. In Figure 6-9 and Figure 6-10, under the worst cast conditions of 100-year current (in-line with the backbone and perpendicular to the backbone, respectively), the backbone line and crop lines all remain at least two meters below the surface at all times, thus significantly reducing navigational risk due to vessel entanglement with structural lines. Figure 6-11 shows the side view of the longline system in 100-year current perpendicular to the longline.

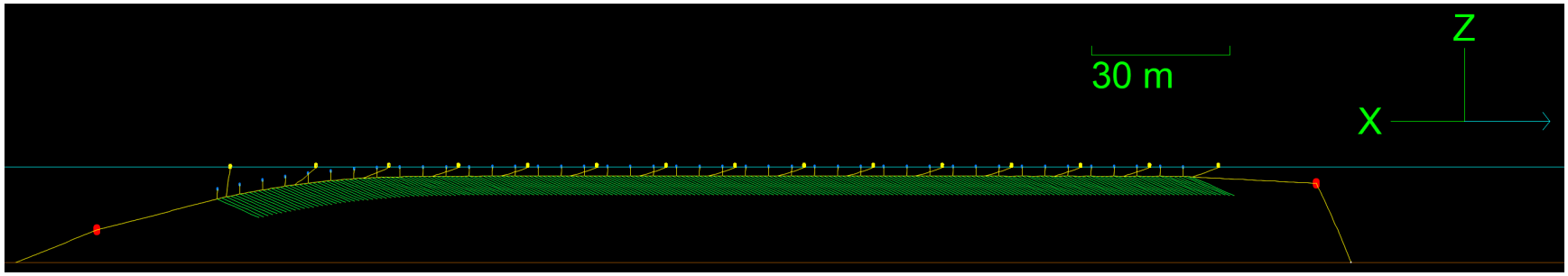


Figure 6-9: 100-yr Current In-line with the Longline, Backbone and Crop Lines Remain 2-Meters Below the Surface

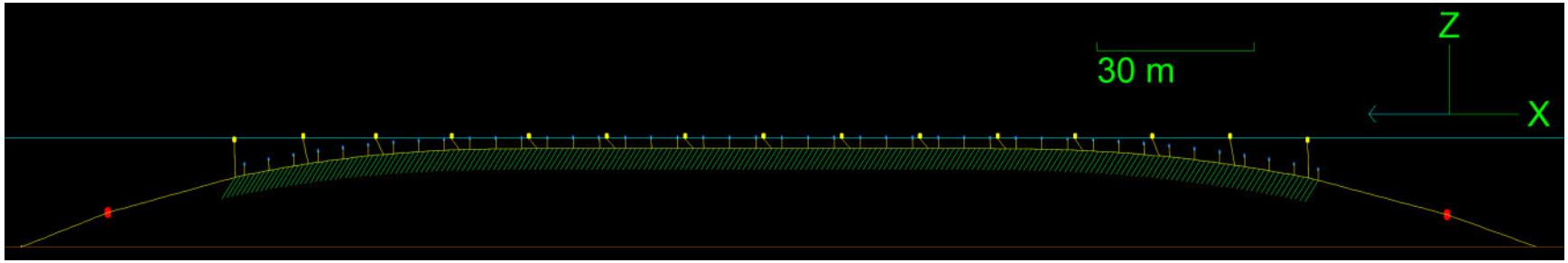


Figure 6-10: 100-yr Current Perpendicular to the Longline, Backbone and Crop Lines Remain 2-Meters Below the Surface

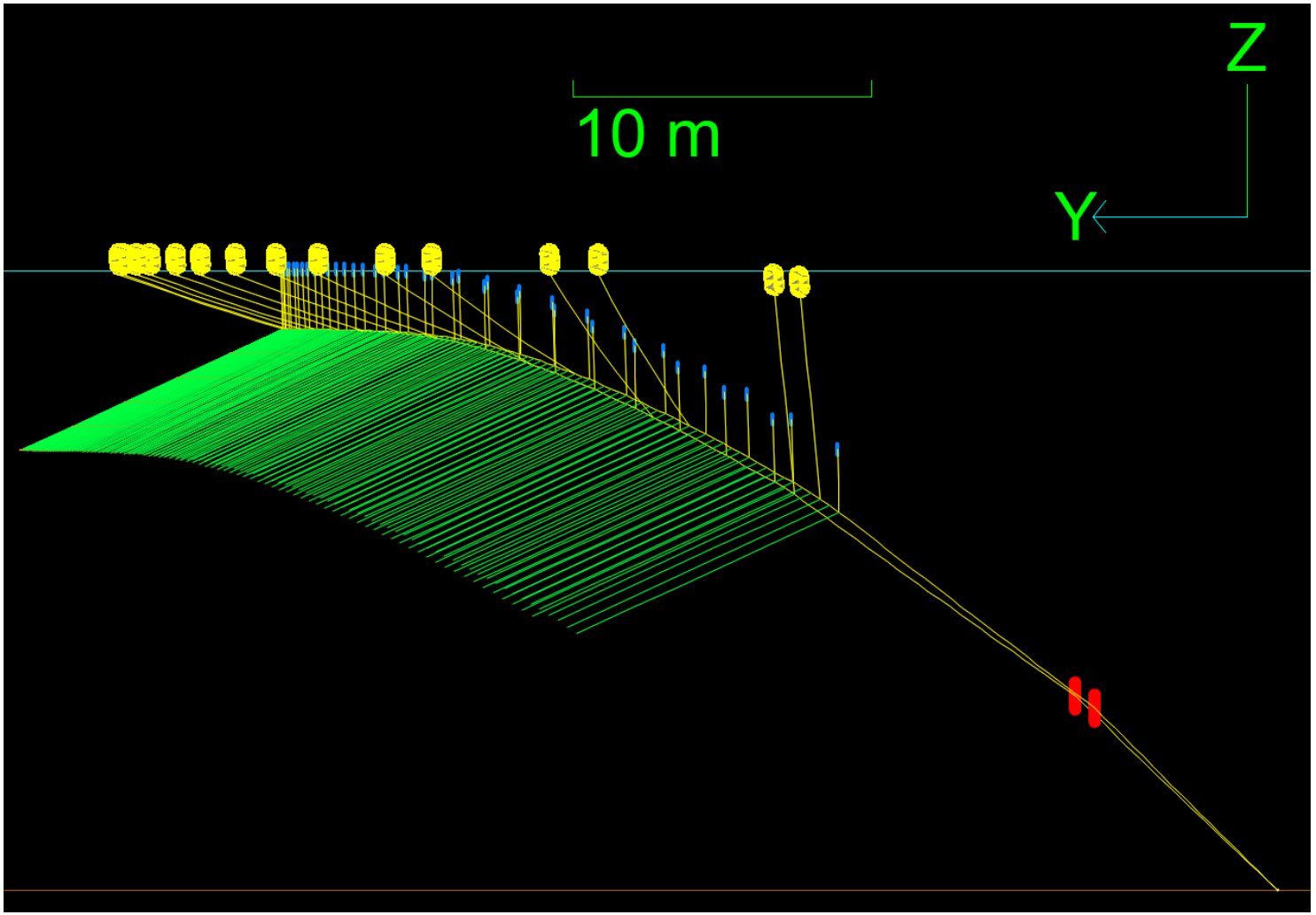


Figure 6-11: Side View, 100-yr Current In-line with Longline, Backbone and Crop Lines Remain 2-Meters Below the Surface, 21 Meter Depth

6.5.3 Dynamic Loading

The maximum expected tensions and forces in the longline system for each of the 24 separate, fully stocked load cases analyzed are shown in Table 6-4.

Table 6-4: Maximum Expected Tensions and Forces on Structural Components in Extreme Storm Conditions, 21-Meter Depth

							Maximum Line Loads (N)					
Load Case	Wave Direction (degrees)	Wave Return (years)	Current Direction (degrees)	Current Return (years)	Wind Direction (degrees)	Wind Return (years)	Anchor Line 1 (anchor end)	Anchor Line 1 (top end)	Backbone End 1	Backbone End 2	Anchor Line 2 (top end)	Anchor Line 2 (anchor end)
1	273	100	273	10	315	10	67,166	70,665	67,309	24,266	22,813	23,636
2	273	10	273	100	315	10	65,701	67,827	65,832	18,045	16,840	17,397
3	273	100	180	10	315	10	78,941	79,978	79,066	70,625	70,532	73,313
4	273	10	180	100	315	10	68,875	70,533	69,003	72,873	72,751	74,070
5	273	1	273	1	315	10	48,176	50,252	48,332	11,921	10,894	12,773
6	273	1	180	1	315	10	57,172	58,659	57,326	57,338	57,178	58,605
7	273	100	225	10	315	10	88,500	90,889	88,587	56,920	56,714	57,601
8	273	10	225	100	315	10	84,398	84,908	84,519	54,391	54,201	55,419
9	303	100	273	10	315	10	59,491	61,176	59,653	20,016	19,725	23,649
10	303	10	273	100	315	10	59,915	61,935	60,054	13,350	12,543	15,860
11	303	100	180	10	315	10	68,444	69,908	68,581	71,642	71,542	73,827
12	303	10	180	100	315	10	54,974	56,172	55,147	74,795	74,681	75,799
13	303	1	273	1	315	10	47,474	49,559	47,631	9,627	6,787	10,233
14	303	1	180	1	315	10	52,646	54,139	52,819	60,782	60,645	62,336
15	303	100	225	10	315	10	74,848	76,679	74,966	62,159	62,014	63,377
16	303	10	225	100	315	10	66,756	68,743	66,894	55,596	55,450	57,465
17	243	100	273	10	315	10	78,863	79,999	78,991	43,516	42,867	43,408
18	243	10	273	100	315	10	62,322	63,850	62,485	26,934	26,291	27,379
19	243	100	180	10	315	10	149,235	146,940	149,326	122,882	122,798	124,600
20	243	10	180	100	315	10	106,288	105,724	106,394	96,366	96,255	97,437
21	243	1	273	1	315	10	52,116	53,989	52,266	16,479	15,818	17,733
22	243	1	180	1	315	10	81,717	82,158	81,842	74,965	74,837	76,069
23	243	100	225	10	315	10	132,854	132,167	132,957	113,007	112,903	113,809
24	243	10	225	100	315	10	124,627	124,778	124,712	94,214	94,082	94,907

The maximum expected vertical and horizontal components of anchor load for each of the 24 separate, fully stocked load cases analyzed are shown in Table 6-5.

Table 6-5: Maximum Expected Vertical and Horizontal Anchor Loads in Extreme Storm Conditions, 21-Meter Depth

							Maximum Anchor Loads (N)			
							Horizontal		Vertical	
Load Case	Wave Direction (degrees)	Wave Return (years)	Current Direction (degrees)	Current Return (years)	Wind Direction (degrees)	Wind Return (years)	A1H:	A2H:	A1V:	A2V:
1	273	100	273	10	315	10	66,650	19,598	23,479	17,234
2	273	10	273	100	315	10	61,083	11,669	29,483	13,682
3	273	100	180	10	315	10	74,520	53,887	29,169	58,754
4	273	10	180	100	315	10	66,094	49,852	27,719	67,732
5	273	1	273	1	315	10	47,124	9,855	20,549	8,960
6	273	1	180	1	315	10	54,060	46,412	26,666	52,141
7	273	100	225	10	315	10	85,754	45,572	31,315	44,564
8	273	10	225	100	315	10	77,994	51,634	33,777	42,052
9	303	100	273	10	315	10	57,553	21,419	20,740	12,718
10	303	10	273	100	315	10	55,778	9,961	26,923	12,342
11	303	100	180	10	315	10	66,014	59,401	23,320	60,069
12	303	10	180	100	315	10	51,684	51,739	24,152	69,128
13	303	1	273	1	315	10	46,474	7,082	21,134	7,976
14	303	1	180	1	315	10	50,915	46,567	23,825	52,870
15	303	100	225	10	315	10	72,860	45,184	26,561	45,923
16	303	10	225	100	315	10	64,550	42,795	28,873	41,812
17	243	100	273	10	315	10	75,870	29,705	25,370	31,787
18	243	10	273	100	315	10	58,706	17,069	26,270	21,453
19	243	100	180	10	315	10	135,981	105,998	56,062	90,265
20	243	10	180	100	315	10	98,818	70,990	44,016	74,586
21	243	1	273	1	315	10	49,311	13,082	22,480	12,194
22	243	1	180	1	315	10	73,554	58,288	37,248	57,671
23	243	100	225	10	315	10	121,866	84,509	52,142	85,271
24	243	10	225	100	315	10	116,627	69,354	50,443	71,875

Figure 6-12 shows an example of the 21-meter depth longline in 100-yr waves from 273 degrees, 10-yr extreme current from 180 degrees, and 10-year extreme wind from 315 degrees (load case 3). Given the actual historical environmental conditions at the Project, load case 3 is most likely the worst case loading that the system will experience. However, for extra precaution, forces and tensions seen in load case 19 will be used to size longline components.

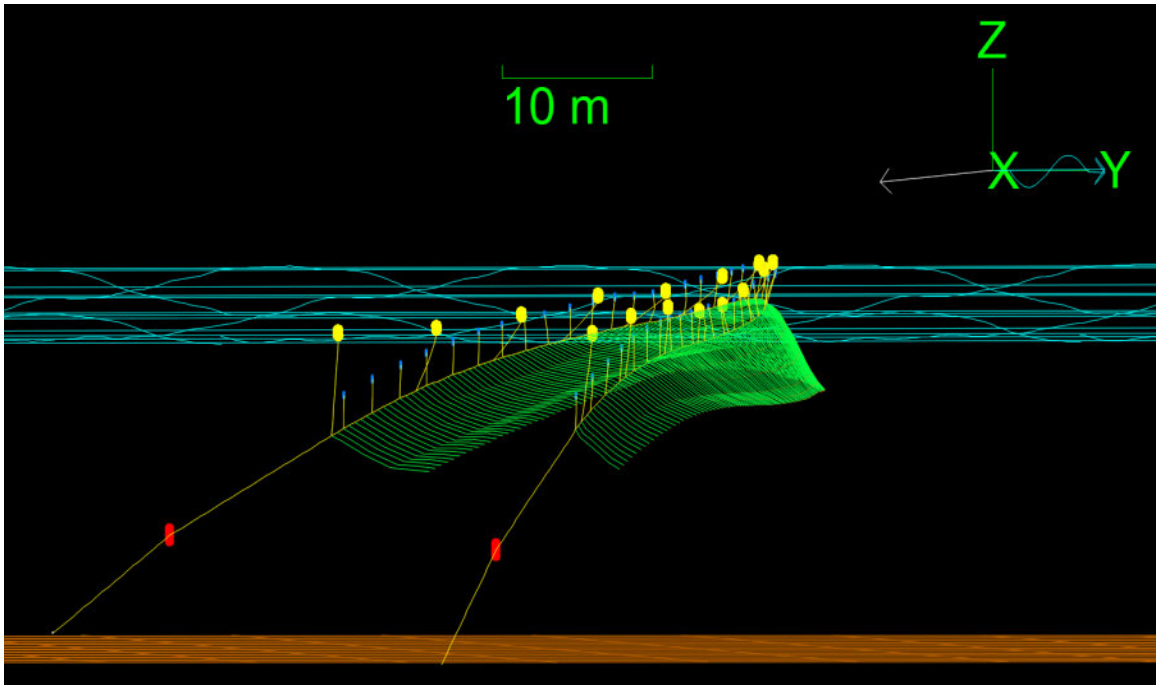


Figure 6-12: Longline Simulation, Load Case 3, 21-Meter Depth

6.5.4 Vessel Lift Requirement

Figure 6-13 shows the longline being lifted at the end of the farmable portion of the backbone line to three meter above the surface by two simulated cranes that are six meters apart to simulate likely vessel lifting conditions. Figure 6-14 show a similar lift in the center of the backbone line. The maximum lift force required is 15 kN (3,375 lbs.).

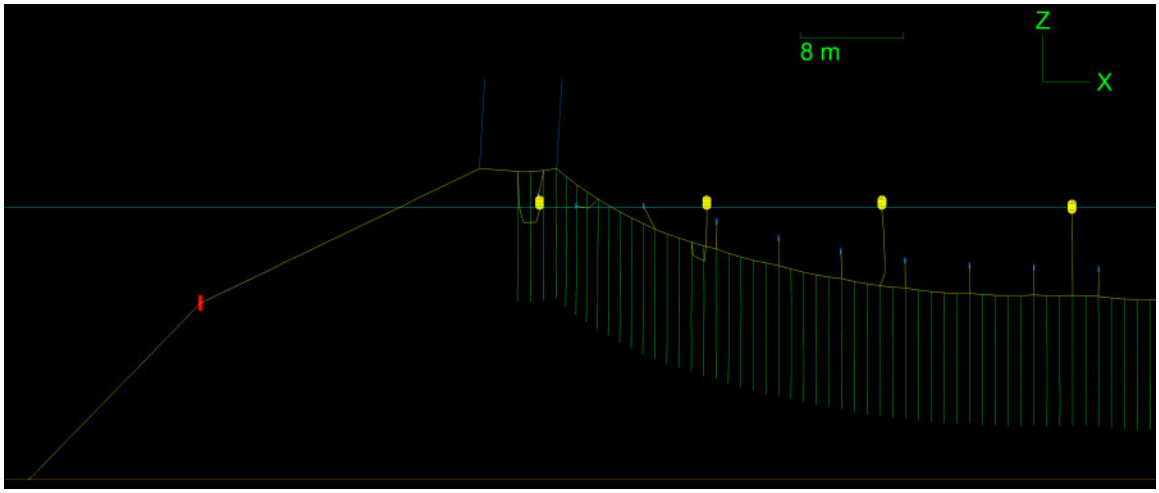


Figure 6-13: Longline End Lift - 21 Meter Depth

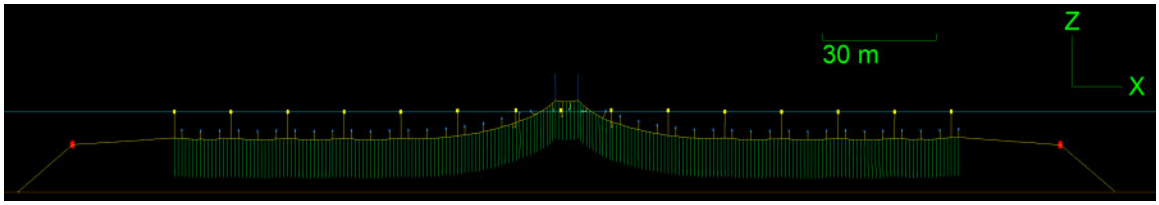


Figure 6-14: Longline Center Lift - 21 Meter Depth

6.6 Design 2: Deep Water, 34-Meter Water Depth

6.6.1 Static Conditions

Figure 6-15 shows the 34-meter longline design fully loaded with 10-meter mussel droppers in static conditions. Static pretension in the backbone line under fully stocked conditions was 4.12 kN (927 pounds).

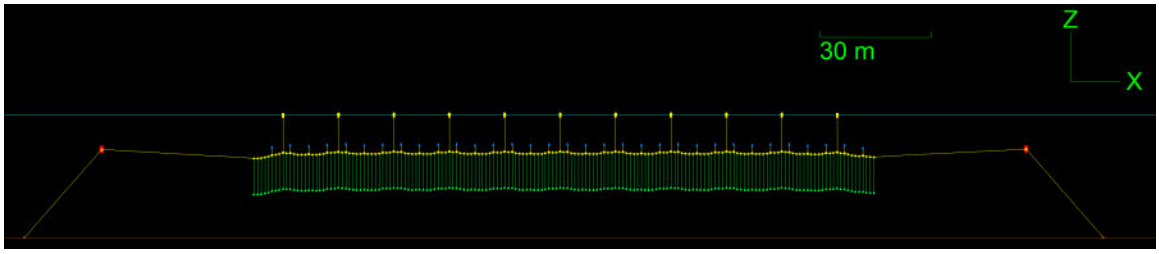


Figure 6-15: 34-Meter Depth Longline, Fully Loaded, Static Conditions (2D View)

6.6.2 Prevention of Backbone and Crops from Reaching the Surface

Similar to the 21-meter depth design, to prevent the backbone line and crop lines from reaching the surface in high current conditions, the subsurface floats along the backbone line are connected with two-meter ropes and the corner float are attached to the anchor lines at a distance two-meters less than the water depth at the anchor. Under the worst cast conditions of 100-year current (in-line with the backbone and perpendicular to the backbone) the backbone line and crop lines all remain at least two meters below the surface at all times, thus significantly reducing navigational risk due to vessel entanglement with structural lines.

6.6.3 Dynamic Loading

The maximum expected tensions and forces in the longline system for each of the 24 separate, fully stocked load cases analyzed are shown in Table 6-6.

Table 6-6: Maximum Expected Tensions and Forces on Structural Components in Extreme Storm Conditions, 34-Meter Depth

							Maximum Line Loads (N)					
Load Case	Wave Direction (degrees)	Wave Return (years)	Current Direction (degrees)	Current Return (years)	Wind Direction (degrees)	Wind Return (years)	Anchor Line 1 (anchor end)	Anchor Line 1 (top end)	Backbone End 1	Backbone End 2	Anchor Line 2 (top end)	Anchor Line 2 (anchor end)
1	273	100	273	10	315	10	52,726	54,634	52,932	16,966	15,381	16,895
2	273	10	273	100	315	10	50,764	52,081	50,915	13,389	9,375	12,977
3	273	100	180	10	315	10	67,825	67,838	67,997	53,625	53,503	56,406
4	273	10	180	100	315	10	57,401	58,597	57,574	48,574	48,386	49,955
5	273	1	273	1	315	10	45,555	47,634	45,715	8,103	5,744	9,568
6	273	1	180	1	315	10	56,597	57,880	56,762	42,604	42,429	44,716
7	273	100	225	10	315	10	80,249	80,406	80,394	42,455	42,295	44,725
8	273	10	225	100	315	10	72,022	73,335	72,157	41,359	41,177	43,307
9	303	100	273	10	315	10	49,935	52,477	50,066	15,023	12,802	13,549
10	303	10	273	100	315	10	51,101	52,440	51,249	9,018	7,289	9,500
11	303	100	180	10	315	10	45,624	46,872	45,841	55,613	55,454	57,382
12	303	10	180	100	315	10	39,581	41,197	39,811	51,023	50,852	52,491
13	303	1	273	1	315	10	44,425	46,698	44,583	5,991	4,491	7,408
14	303	1	180	1	315	10	37,582	39,219	37,804	55,086	54,932	56,791

15	303	100	225	10	315	10	58,873	60,422	59,024	41,667	41,464	43,409
16	303	10	225	100	315	10	54,954	57,192	55,090	38,762	38,428	40,248
17	243	100	273	10	315	10	72,591	74,234	72,726	19,845	18,813	20,892
18	243	10	273	100	315	10	58,268	60,123	58,415	13,842	12,592	14,555
19	243	100	180	10	315	10	127,612	128,448	127,692	103,938	103,846	105,841
20	243	10	180	100	315	10	99,894	101,194	99,999	81,263	81,150	82,814
21	243	1	273	1	315	10	47,677	49,466	47,855	8,322	7,141	9,818
22	243	1	180	1	315	10	67,968	69,188	68,100	63,011	62,867	64,444
23	243	100	225	10	315	10	118,316	118,830	118,406	80,939	80,821	82,262
24	243	10	225	100	315	10	102,369	103,575	102,462	72,136	71,983	73,356

1 The maximum expected vertical and horizontal components of anchor load for each of
2 the 24 separate, fully stocked load cases analyzed are shown in Table 6-7.

Table 6-7: Maximum Expected Vertical and Horizontal Anchor Loads in Extreme Storm Conditions, 34-Meter Depth

							Maximum Anchor Loads (N)			
							Horizontal		Vertical	
Load Case	Wave Direction (degrees)	Wave Return (years)	Current Direction (degrees)	Current Return (years)	Wind Direction (degrees)	Wind Return (years)	A1H:	A2H:	A1V:	A2V:
1	273	100	273	10	315	10	51,442	9,594	20,107	13,910
2	273	10	273	100	315	10	48,897	7,355	22,334	10,691
3	273	100	180	10	315	10	62,849	38,377	25,532	44,092
4	273	10	180	100	315	10	54,193	31,984	24,454	46,698
5	273	1	273	1	315	10	43,502	5,558	21,248	8,282
6	273	1	180	1	315	10	52,766	33,212	25,646	38,425
7	273	100	225	10	315	10	74,453	29,025	30,363	35,632
8	273	10	225	100	315	10	67,634	32,049	30,583	36,279
9	303	100	273	10	315	10	49,418	7,751	19,034	11,113
10	303	10	273	100	315	10	49,233	6,240	21,313	7,832
11	303	100	180	10	315	10	42,938	33,619	19,292	49,494
12	303	10	180	100	315	10	37,951	32,654	18,735	48,347
13	303	1	273	1	315	10	42,821	4,894	20,758	6,421
14	303	1	180	1	315	10	35,999	40,569	19,978	43,989
15	303	100	225	10	315	10	56,298	25,281	25,955	35,491
16	303	10	225	100	315	10	53,487	24,055	25,733	33,942
17	243	100	273	10	315	10	68,723	14,376	28,069	17,135
18	243	10	273	100	315	10	55,523	8,378	23,065	12,044
19	243	100	180	10	315	10	118,986	68,700	48,385	80,515
20	243	10	180	100	315	10	93,341	53,418	39,084	68,567
21	243	1	273	1	315	10	45,208	5,627	21,523	8,329
22	243	1	180	1	315	10	62,707	40,749	29,237	55,715
23	243	100	225	10	315	10	109,994	51,084	44,965	66,230
24	243	10	225	100	315	10	94,763	46,426	42,293	60,476

6.6.4 Vessel Lift Requirement

The lift force required to lift the backbone line to three meters above the surface by two simulated cranes that are six meters apart at the center of the backbone line (the heaviest part) is 14.5 kN (3,260 lbs.).

6.7 Minimum Allowable Breaking Strength of Major Structural Components

Table 6-8 shows the worst case required capacity (e.g. breaking strength) for the major structural components under all 24 load cases for both designs. These requirements will be used to size the structural components of the system. As expected, the worst-case loads were associated with the 21-meter design due to the higher crop mass and shallower water depth by comparison to 34-meter design. These loads occurred with 100-yr waves from 243 degrees and 10-yr waves from 180 degrees. However, hindcast wave information shows that the highest waves at the project site will always come from 273 degrees (load cases 1-8), so the maximum expected loads and required breaking strength and holding capacities are those shown in Table 6-9. In this case, the system will be considerably overdesigned.

Table 6-8: Worst Case Loads and Required Structural Components Capacities (Not likely due to improbable wave direction)

	Load Case	Maximum Load (N)	Safety Factor	Minimum Breaking/Holding Strength (N)	Minimum Breaking/Holding Strength (lbf)
Line Load	19	149,326	1.82	271,773	61,149
Anchor Horizontal Load	19	135,981	2.0	271,962	61,131
Anchor Vertical Load	19	90,265	2.0	180,530	40,619

Table 6-9: Maximum Expected Loads and Required Structural Component Capacities

	Load Case	Maximum Load (N)	Safety Factor	Minimum Breaking/Holding Strength (N)	Minimum Breaking/Holding Strength (lbf)
Line Load	7	90,889	1.82	165,418	14,719
Anchor Horizontal Load	7	85,754	2.0	171,508	38,589
Anchor Vertical Load	4	67,732	2.0	135,464	30,479

6.8 Minimum Allowable Breaking Strength of Mussel Line Attachments and Float Lines

The maximum line loads for surface buoy lines, submerged buoy lines, and dropper connection lines are given in Table 6-10. As expected, maximum loading for these lines occurred with the 21-meter design since the backbone is set at 6-meter depth (the 34 meter backbone line depth is set at 9 meters) and because the water depth is shallower.

Table 6-10: Maximum Loads for Surface Buoy Lines, Submerged Buoy Lines, and Mussel Dropper Connections – 21 Meter Depth Design

							Maximum Line Loads (N)								
Load Case	Wave Direction (degrees)	Wave Return (years)	Current Direction (degrees)	Current Return (years)	Wind Direction (degrees)	Wind Return (years)	Surface Buoy End 1	Surface Buoy Middle	Surface Buoy End 2	Submerged Bouy End 1	Submerged Bouy Middle	Submerged Bouy End 3	Mussel Dropper End 1	Mussel Dropper Middle	Mussel Dropper End 2
1	273	100	273	10	315	10	4,989	2,109	3,505	1,449	1,997	1,959	1,050	1,268	1,196
2	273	10	273	100	315	10	4,278	2,097	1,480	1,312	1,772	1,944	532	756	729
3	273	100	180	10	315	10	3,851	2,588	3,533	1,575	1,517	1,457	484	766	1,016
4	273	10	180	100	315	10	3,159	2,310	2,913	1,267	1,294	1,234	463	492	472
5	273	1	273	1	315	10	2,899	1,974	1,028	1,173	1,313	1,573	386	609	618
6	273	1	180	1	315	10	2,838	1,911	2,886	1,149	1,225	1,148	373	448	394
7	273	100	225	10	315	10	4,408	2,190	4,031	1,444	2,243	1,568	638	1,402	1,803
8	273	10	225	100	315	10	3,396	1,984	3,309	1,324	1,485	1,306	460	658	710
9	303	100	273	10	315	10	4,632	2,090	2,614	1,403	1,670	2,410	471	909	1,976
10	303	10	273	100	315	10	3,768	2,088	1,265	1,290	1,438	1,970	441	653	918
11	303	100	180	10	315	10	3,464	2,579	4,233	1,484	1,593	2,288	421	704	1,725
12	303	10	180	100	315	10	3,014	2,075	3,209	1,256	1,319	1,287	429	514	473
13	303	1	273	1	315	10	2,874	1,970	1,021	1,175	1,213	1,615	371	476	744
14	303	1	180	1	315	10	2,802	1,912	2,911	1,132	1,242	1,164	368	442	471
15	303	100	225	10	315	10	3,898	2,196	4,736	1,366	1,496	1,541	382	941	968
16	303	10	225	100	315	10	3,191	2,119	3,657	1,318	1,282	1,245	417	495	604
17	243	100	273	10	315	10	4,350	2,337	3,699	1,389	1,944	1,955	495	800	656
18	243	10	273	100	315	10	3,589	2,255	1,984	1,263	1,579	1,673	399	666	648
19	243	100	180	10	315	10	4,252	3,276	3,600	1,285	1,607	1,456	628	810	528
20	243	10	180	100	315	10	3,395	2,104	3,032	1,244	1,276	1,245	353	474	391
21	243	1	273	1	315	10	2,846	2,065	926	1,170	1,222	1,271	370	455	398
22	243	1	180	1	315	10	3,027	2,012	2,848	1,165	1,214	1,280	355	451	381
23	243	100	225	10	315	10	4,756	2,480	3,954	1,358	1,509	1,542	583	695	1,077
24	243	10	225	100	315	10	3,642	2,139	3,428	1,279	1,594	1,469	433	631	660

Table 6-11 shows the worst case required capacity (e.g. breaking strength) for the buoy lines and mussel dropper attachments under all 24 load cases.

Table 6-11: Minimum Breaking Strength of Buoy Lines and Mussel Dropper Attachments

	Load Case	Maximum Load (N)	Safety Factor	Minimum Breaking Strength (N)	Minimum Breaking Strength (lbf)
Surface Buoy Line	1	4,989	1.82	9,080	2,043
Submerged Buoy Line	9	2,410	1.82	4,386	987
Mussel Dropper Attachment	9	1,976	1.82	3,596	809

6.9 Conclusion

To mitigate the risk of structural failure in extreme storms, key components of the backbone and mooring system must meet or exceed the required structural capacities in Table 6-8.

To mitigate the risk of buoy and mussel dropper attachment failure in extreme storms, those attachments and any breakaway links used must meet or exceed the required minimum breaking strength in Table 6-11.

7 APPENDIX D: ANCHOR INSTALLATION INFORMATION

7.1 Introduction to Fielder Marine Services, Ltd

Background

Fielder Marine Services Ltd, formerly Coromandel Dive, has been operational in New Zealand for over 25 years. The primary focus of the company is in servicing the Aquaculture Industry both in the Coromandel and more recently Australia, France and the UK. Our core businesses are FMS Screw Anchor and FMS rock anchor installations, underwater maintenance and commercial diving. Graham Fielder, one of the directors of the company, has an honors degree in Marine Engineering and brings a wealth of international experience to the business. Graham has spent many years working in the Royal Navy, as a construction diver and as a Field Engineer within the oil industry, before moving to New Zealand.

Screw Anchors

Screw anchors are a proven technology that has been used in the anchoring of marine farms for many years now. Not only are the anchors cost effective, they also provide an environmentally friendly mooring system which minimizes disruption to the seabed. Fielder Marine Services Ltd has developed a superior underwater screw anchor system, in which the entire drilling rig is portable. This enables installations to be carried out from most vessels currently used in the aquaculture industry, and gives our clients the option of using their own vessels or FMS to charter a suitable vessel for them.

All anchors/moorings are positioned using a RTK differential GPS system, giving sub meter real time accuracy.

FMS anchors are of a shaft design, multiple lengths can be joined using , giving anchor lengths of 3 - 18 meters. This allows FMS to adapt the anchors to suit the bottom composition at the installation site. The anchor plates are manufactured from steel plate pressed into a helical pitch with diameters 150 - 1200mm, again allowing

adaptations to suit bottom conditions. The anchors are all manufactured in house to a high engineering standard giving FMS the ability to constantly improve our products. All this combined provides a high-quality mooring system with superior vertical and lateral holding power.

FMS have also developed a range of anchors suitable for rock substrates with similar holding power and advantages of screw anchors, again with minimal disturbance of the seabed and fast and efficient installation times.

Underwater Maintenance and Farm design

The company services and maintains the majority of the marine farm mooring systems in the Coromandel and provides consultancy to aquaculture projects around the World, with the emphasis being placed on practical solutions, with farm layout, design and line handling solutions to maximise returns while minimising ongoing costs.

FMS's preventative maintenance services minimises crop loss and line breakages, ensuring that the Aquaculture farmers get the maximum harvest possible. Our underwater profiling survey's, help the Farmers to understand the underwater stresses on their farms, and work out effective management systems to ensure maximum productivity.

Mussel Farms NZ

FMS have spent the last 15years changing over existing lines to screw anchors and installing new farms, with several thousand anchors installed.

Eastern Sea Farms Opoitiki - First Offshore Mussel farm

FMS have been involved in offshore farm from the very beginning, from advice on farm layout to installing the anchors and lines, FMS then took on the role of the day-to-day maintenance and development of the open ocean farm, to make Open Ocean Mussel framing a reality.

This farm now has over 300 lines in the water and are presently building their own processing factory.

UK Offshore Shellfish Limited Lyme Bay UK

FMS have been involved from the very first trial lines in the water to the development of the first large scale offshore farm in the UK,

Europe

FMS are currently involved in a number of trial projects across Europe for Mussels , Seaweed, and Oysters

Pearling Australia NT

FMS have worked with Paspaley Pearling to gradually change their line moorings from conventional to screw and rock anchors, with over 10,000 lines originally in the water , we have introduced production gains and cyclone proofing to their farms.

Jervis Bay Australia

Installation of anchors in an area of outstanding beauty and protection of seagrass beds.

Catalina USA

FMS installed the first Mussel farm anchors in federal waters off the coast of California

7.2 Screw Anchor Standard Operating Proceedure

PREPERATION

1. Bolt on winches using 4 ht 16mm bolts each.
2. Attach clump weights insuring all shackles are moused.
3. Run hydraulic hoses and plumb into vessel.
4. Load gantry drum with 15 mm nylon rope long enough to reach bottom.
5. Attach arms to drill and suspend on 16mm rope with a safety.
6. Position GPS receivers and run cables.
7. Wire up PC, load software, and check transmission link.
8. Bolt first plate to anchor.
9. Test all hydraulic functions.

AT LOCATION

1. Lower weights over side of barge with crane.
2. Lower weights until just off bottom.
3. Steam vessel to first anchor location.
4. Lower weights to seabed, insure wire remains tight, parallel and as vertical as possible.
5. Clip drill arms to wires.
6. Lower first anchor over side if single shaft pulls into drill chuck lock pin and remove crane.
7. If multiple shafts, hold bottom section with gantry and remove crane.
8. Pick up top section with crane and position over bottom section.
9. Use gantry to pull two sections together and bolt up using 6 ht 16 mm bolts and washers.
10. Remove gantry and repeat 6.
11. Lower depth measuring rope to bottom and lift up 2 m.
12. Remove safety from drill and lower.
13. Stop lowering when anchor touches bottom.
14. Start drilling.
15. Start assembly of next anchor.
16. Keep lowering drill as tension increases approx 2 M per minute penetration.
17. Monitor depth left to drill with depth rope and hydraulic pressure.
18. Stop on full penetration (arm approx 1.5 M off seabed.)
19. Back off pressure on drill and complete paperwork.
20. Take weight off drill.
21. Release pin.
22. Pull drill to surface and replace safety rope.
23. Pull up depth rope and tie off.
24. When skipper ready lift weights just off bottom, as vessel moves away check warp does not tangle with winch wires.

25. Move vessel to next location and repeat from 4 omitting 5 as already done.

ON COMPLETION OF DRILLING

1. Lift clump weights to surface and one at a time attach crane and lift on board.
2. Unclip drill and bring onboard.
3. Repeat preparation instructions in reverse.

HAZARD ANALYSIS

1. Operating winches ensure operator trained and has a clear view of the winches.
2. All personnel to keep body parts and clothing clear of winches and wires at all times.
3. No one under the drill unless secured by a safety stop.
4. When moving lead clump weights keep clear, use crane and winches to reduce any swing and ensure boat motion is within safe limits.
5. Do not wrap depth measuring rope around hand or any other body part unless drill is fully on bottom or secured by safety on surface.
6. Keep hands clear when moving anchors or plates. Use a crowbar or rope.
7. Do not go under anchors when being lifted by crane, use hard hats and safety foot wear.
8. Keep fingers clear when assembling anchors and putting anchor into drill chuck.
9. Be aware of the tripping hazards on board with hydraulic hoses, anchors and ropes.
10. Secure load during transit with tie down straps and ropes , to ensure it cannot move with boat motion.
11. If weather to severe to safely bring weights on board , leave just under surface and steam to calm water.
12. Stop job if weather prevents safe assembly of anchors or placement into drill.
13. Hard hat to be worn during crane use.
14. Use ear defenders during rattle gun use.
15. Wear gloves and steel capped boots when handling anchors and plates.

16. Be sun smart.

7.3 Screw Anchors – General

VESSEL

Normally use an appropriate vessel used for farm maintenance that has suitable stability and gantries for lifting the lines. A crane is desirable but not essential.

HYDRAULICS REQUIRED 2500PSI AND 12 GALLON PER MINUTE

TIME FRAME

Expect to install between 12 and 24 anchors per 8 hours of vessel time on site with suitable weather

EQUIPMENT

FMS HYDRAULIC DRILL

FMS WINCHES, WEIGHTS AND SWELL COMPENSATORS

Triimble GPS

Hazards

WEATHER: Only work in suitable weather.

Hydraulic Oil: Carry suitable spill response kit and check all hoses for wear and damage before commencing work.

Use PPE suitable for work on the water and construction activities.

ANCHORS

Designed to suit the bottom conditions, steel shaft and plates in black steel, between 4.5m and 18m in length, designed to have a minimum of 25 year life expectancy.

Anchors are constructed on site and real time measurements are taken during drilling to optimise anchors to ground conditions. Anchors are designed to disturb less than 1m^2 of seabed on installation.

ANCHOR ROPES

No chains or hardware used to minimize environmental damage of the seafloor.

Process Overview for Vetting Application for New Aquaculture Lease

Applicant: Santa Barbara Sea Ranch, Inc.

March 13, 2025

Marine Resources Committee
California Fish and Game Commission

Kimi Rogers
Environmental Scientist
California Fish and Game Commission

Today’s Overview

- Introduction to application
- Integrating applicant into new process
- Today’s goals
- Next steps

Proposal

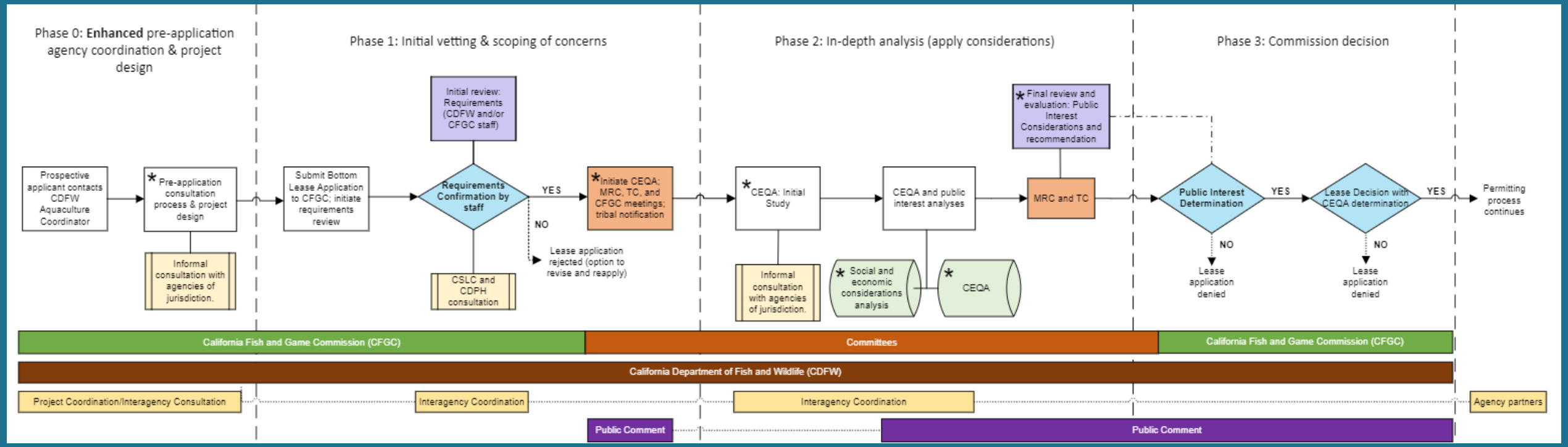
- 176 acres of state water bottom in Santa Barbara Channel
- Bivalve cultivation

Santa Barbara Sea Ranch (SBSR) Application

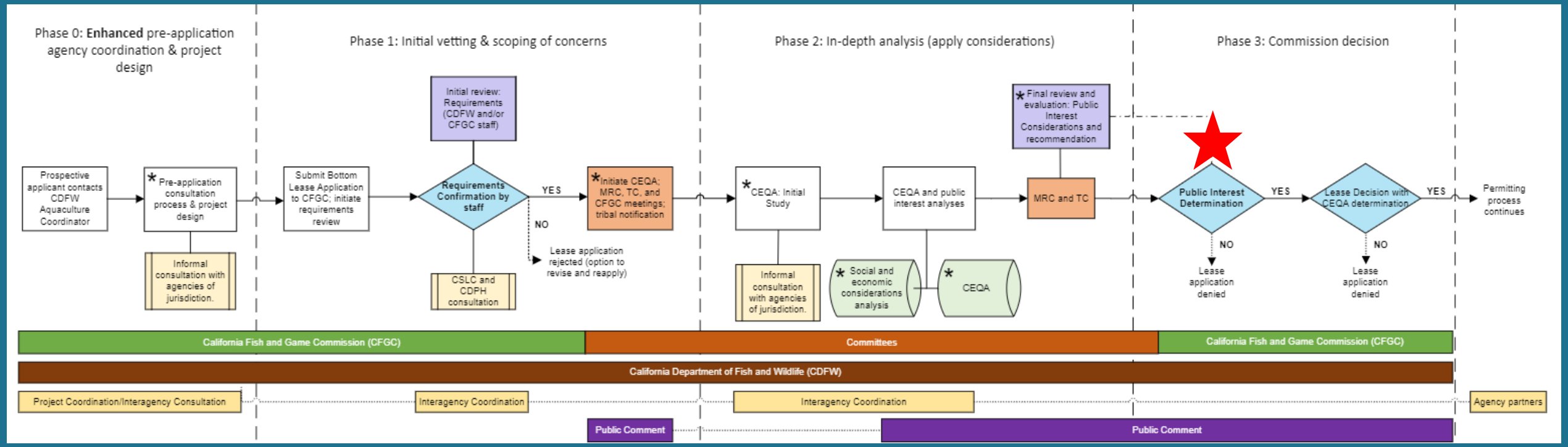
- 2018: Commission public interest finding
- 2019-2021: Applicant submitted iterations of a draft initial study for agency review
- 2021: Recommendations by agencies to pursue an environmental impact report (EIR), pursuant to California Environmental Quality Act (CEQA)
- 2021-2024: Application paused while applicant sought funding for environmental review
- 2024: Application resumed

Integrating SBSR's Application into the Enhanced Leasing Process

Enhanced Leasing Process – Approved August 2023



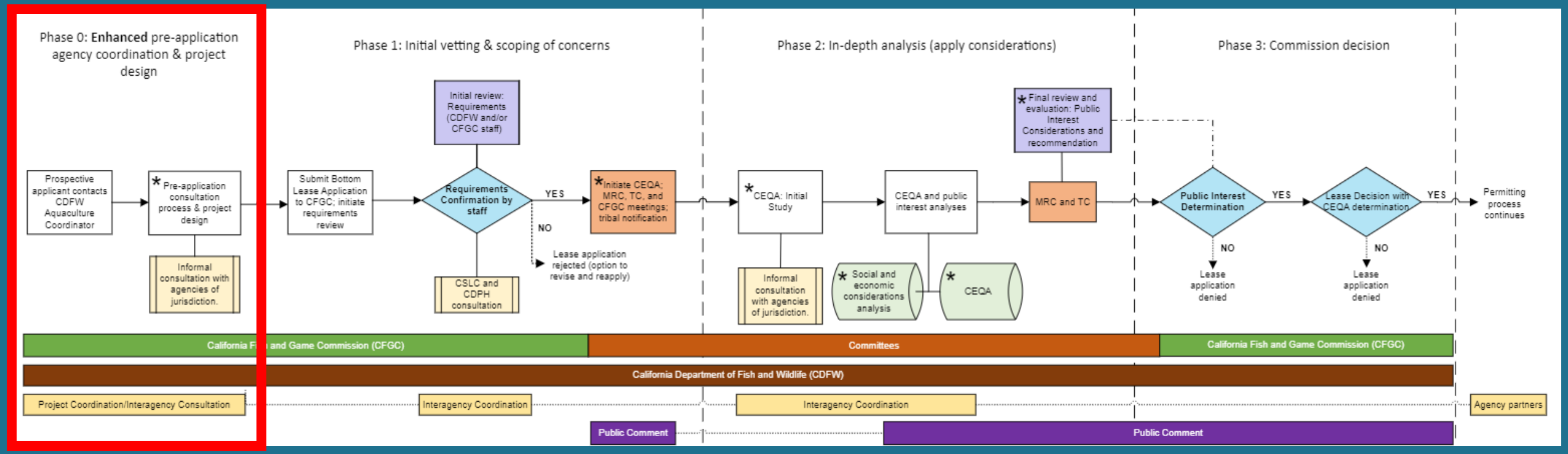
Enhanced Leasing Process – Approved August 2023



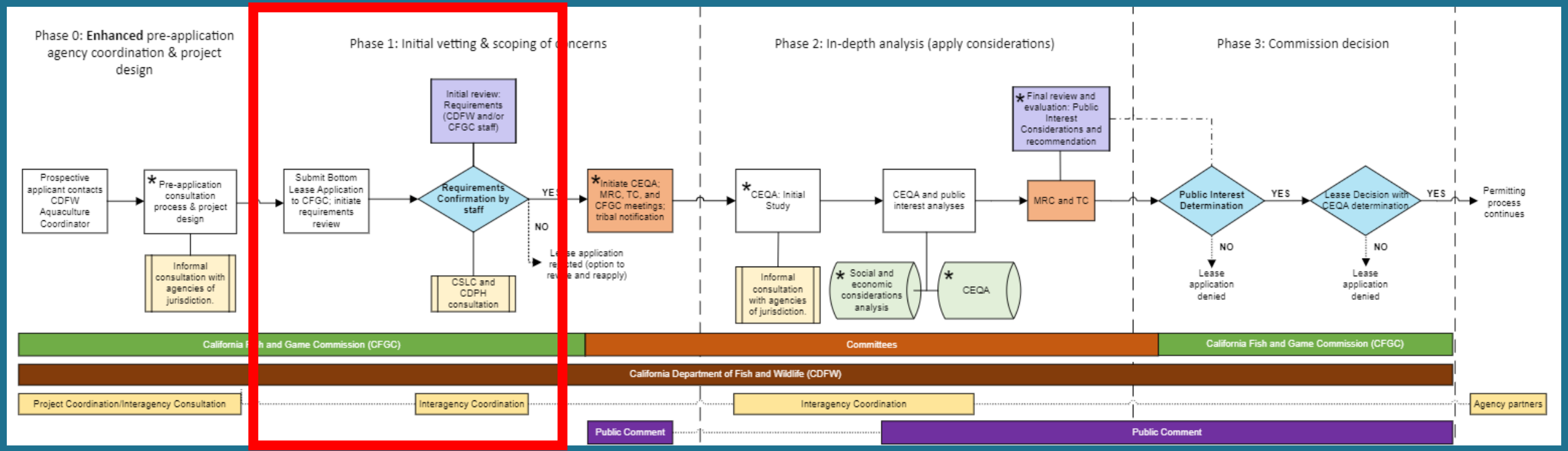
SBSR Application Continued

- Independently met with agency representatives
- Legal requirements met prior to public interest determination
- Significant work and effort by SBSR, including:
  - Meeting with agencies
  - Independent bottom surveys, iterations of draft initial study and independent environmental review
  - Developing engineering models for gear

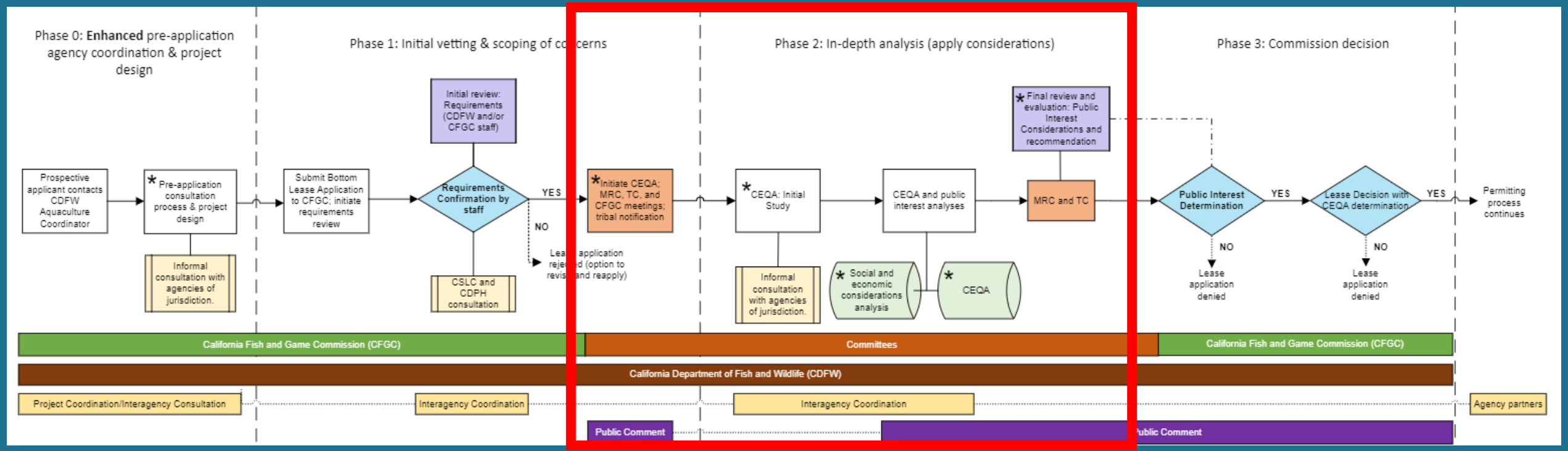
Enhanced Leasing Process



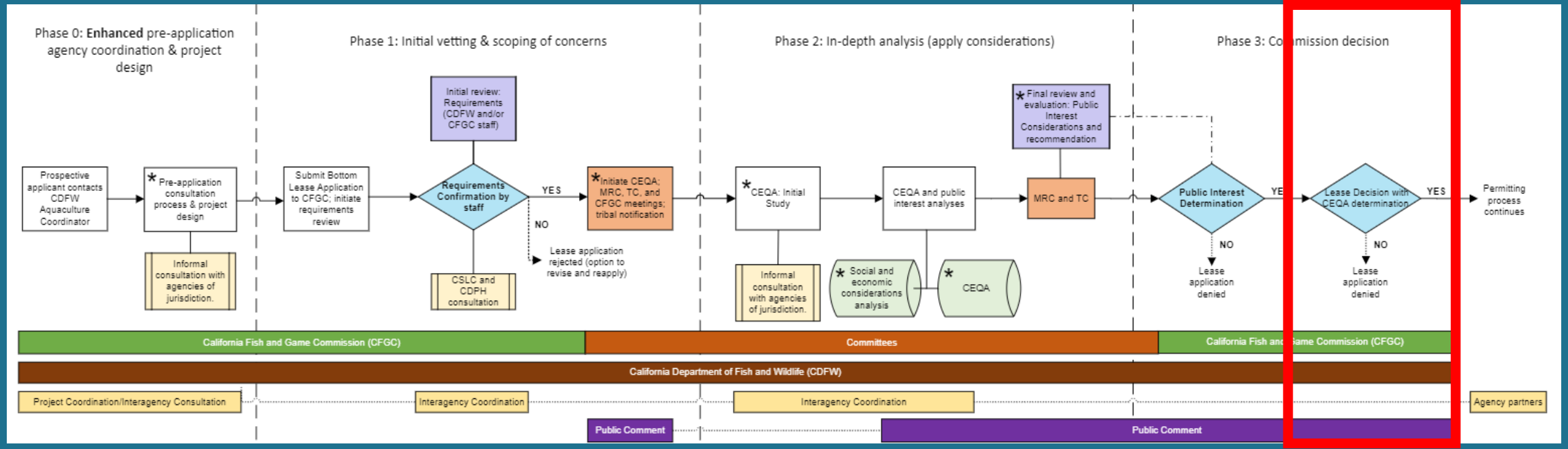
Enhanced Leasing Process



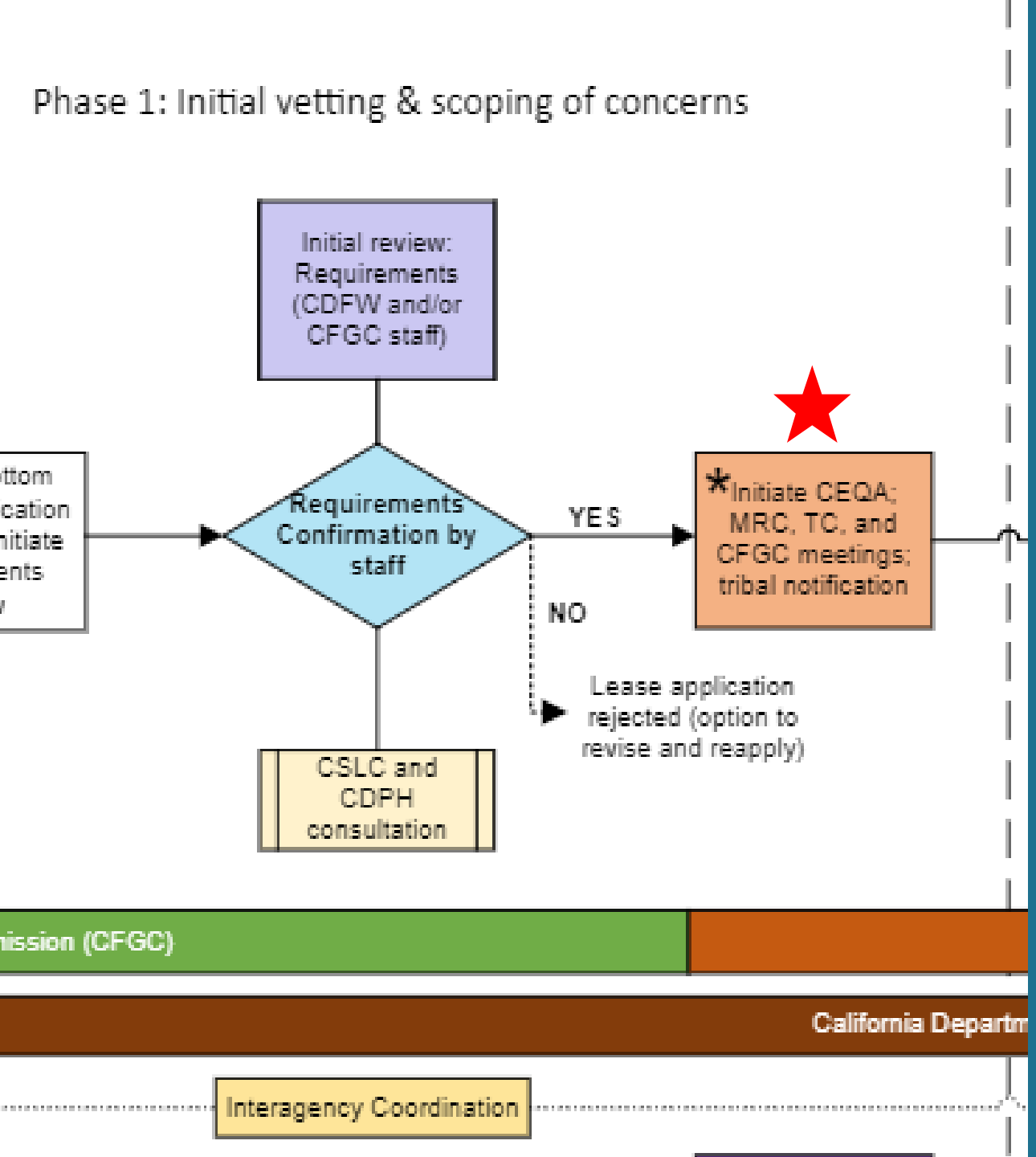
Enhanced Leasing Process



Enhanced Leasing Process



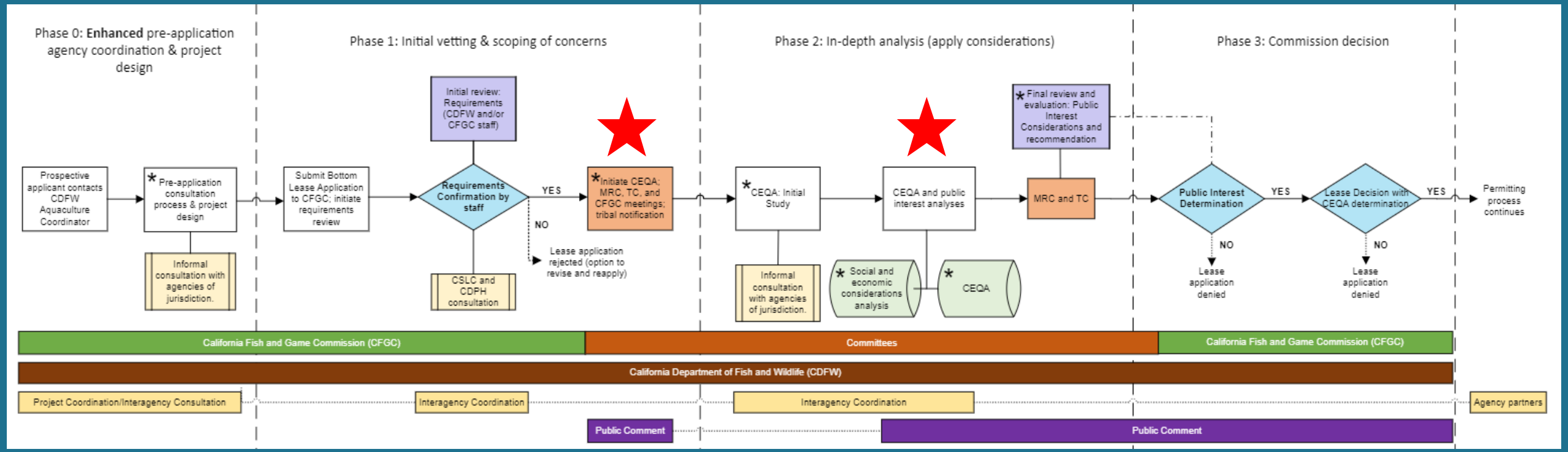
Where are we at in this process?

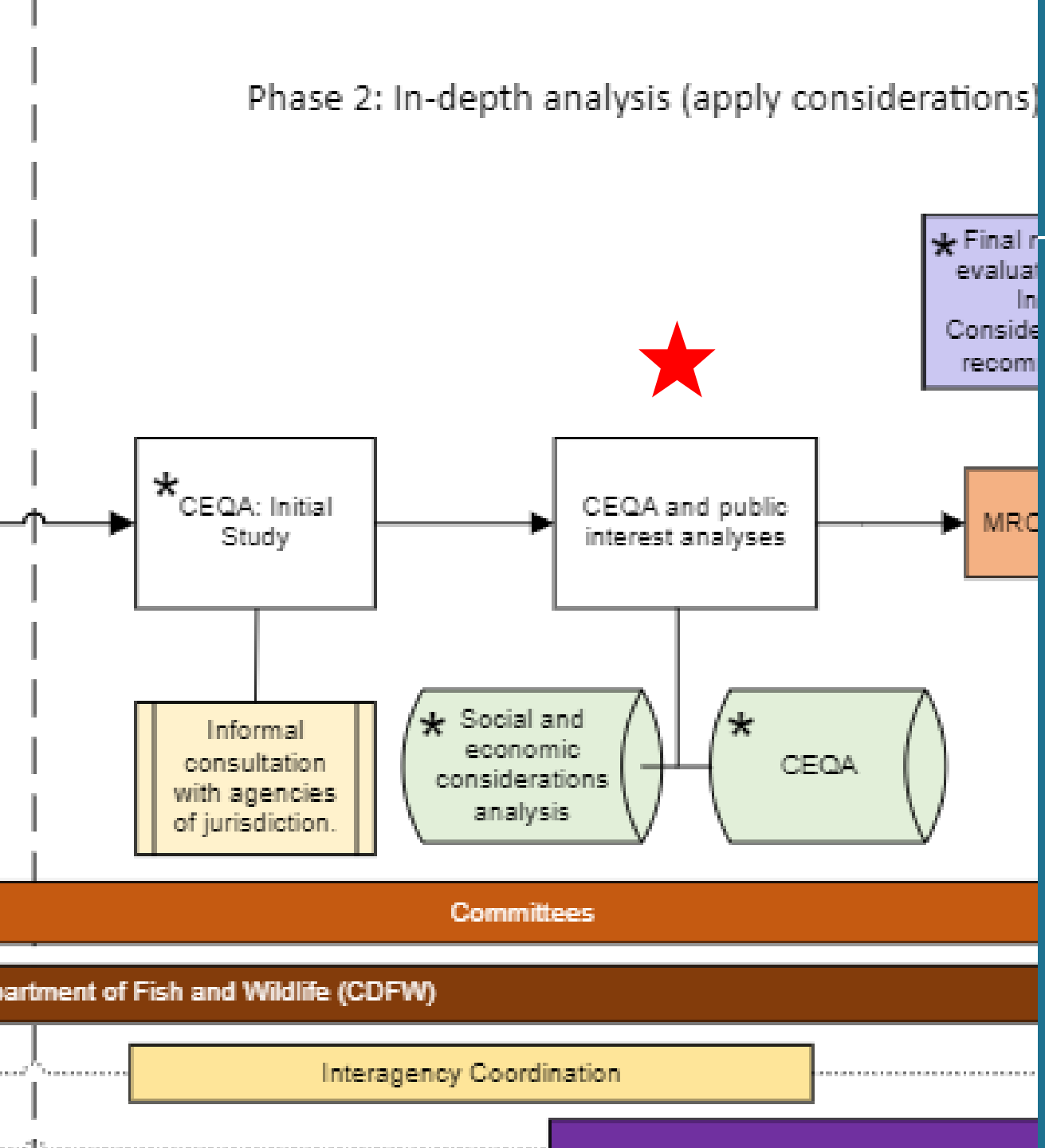


Today's Meeting

- Initial public vetting of application
- Highlight any benefits and concerns related to proposed project
- Inform CEQA EIR

SBSR is Here:


Phase 0: Enhanced pre-application agency coordination & project design
Phase 1: Initial vetting & scoping of concerns
Phase 2: In-depth analysis (apply considerations)
Phase 3: Commission decision
Prospective applicant contacts CDFW Aquaculture Coordinator
* Pre-application consultation process & project design
Informal consultation with agencies of jurisdiction.
Submit Bottom Lease Application to CFGC; initiate requirements review
Initial review: Requirements (CDFW and/or CFGC staff)
Requirements Confirmation by staff
YES
NO
CSLC and CDPH consultation
* Initiate CEQA; MRC, TC, and CFGC meetings; tribal notification
Lease application rejected (option to revise and reapply)
* CEQA: Initial Study
Informal consultation with agencies of jurisdiction.
CEQA and public interest analyses
* Social and economic considerations analysis
* CEQA
* Final review and evaluation: Public Interest Considerations and recommendation
MRC and TC
Public Interest Determination
YES
NO
Lease application denied
Lease Decision with CEQA determination
YES
NO
Lease application denied
Permitting process continues
California Fish and Game Commission (CFGC)
Committees
California Fish and Game Commission (CFGC)
California Department of Fish and Wildlife (CDFW)
Project Coordination/Interagency Consultation
Interagency Coordination
Interagency Coordination
Agency partners
Public Comment
Public Comment



Next Steps

Complete Phase 1

- Tribal Committee vetting
- Report out at Commission meeting

Continue Phase 2

- CEQA EIR
- CEQA analysis

Thank you!

Kimi Rogers
Environmental Scientist
California Fish and Game Commission
FGC@fgc.ca.gov

Proposed Santa Barbara Sea Ranch Offshore Aquaculture Project

- Introduction, Environmental Considerations & Mitigation Strategies
- Presented by: Capt. David Willett – President and Founder
- March 13, 2025

INTRODUCTION

Proposed Project Overview:

- ***176-acre offshore shellfish farm, 5 miles west of Santa Barbara Harbor***
- ***Cultivating Mediterranean mussels, triploid Pacific oysters, and purple-hinge rock scallops***
- ***Using 80 submerged longlines with helical sand screw anchors***

Goal:

- ***Sustainable aquaculture with minimal environmental impact***
- ***Compliance with all Agency & CEQA requirements and regulations***

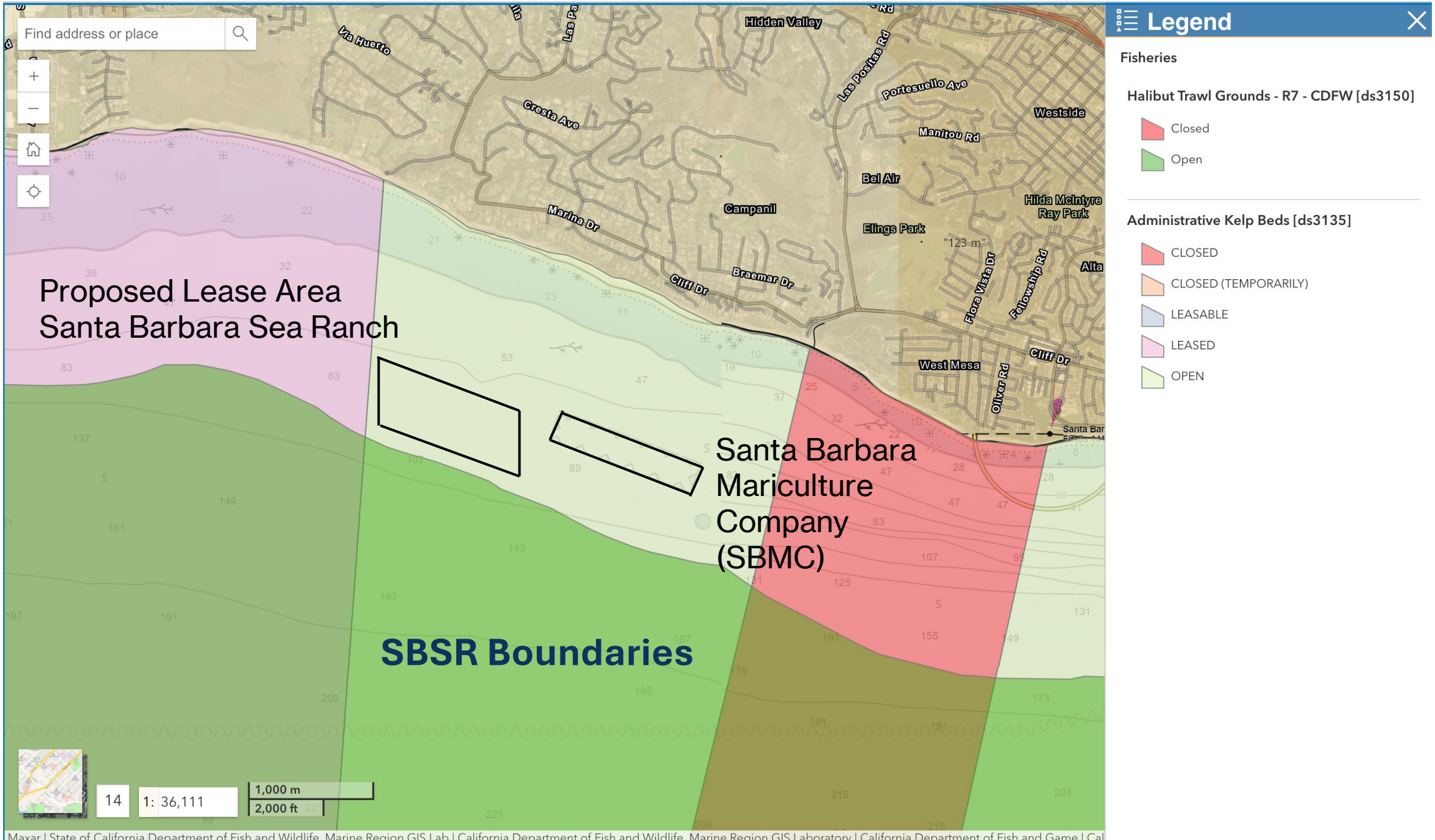
- **Lease Application and Public Interest Determination:** 2018
- **Founder and President:** David Willett - USCG Licensed Master, MBA, MSEE
- **LinkedIn:** linkedin.com/in/dwillett
- **Website:** www.SantaBarbaraSeaRanch.com

PROPOSED LEASE AREA SELECTION

CRITERIA:

- Proposed lease area not in:
  - Halibut trawling grounds
  - Marine protected area
  - Incompatible kelp administrative bed
  - Waste water treatment plant closure zone
- Smooth sloping sand & mud bottom with NO STRUCTURE
- Correct water depth for longlines
- Minimal impact to commercial and recreational use
- Reasonable proximity to SB Harbor
- Large enough area to be commercially viable

SANTA BARBARA SEA RANCH EST. 2018




Proposed New Aquaculture Lease
Santa Barbara Area
Marina Dr
Crecente Dr
Bajada Ln
Braemar Dr
Vista Arr
Cliff Dr
Pacific Ocean
There will be a minimum distance of 190 yards between the two farms (enough room to drive two enterprise-class aircraft carriers through).
New Proposed Lease
Santa Barbara Sea Ranch
approx.
570 ft
SANTA BARBARA CITY LIMITS
M-653-02
SBMC
CALIFORNIA HALIBUT TRAWL GROUNDS
Sea Floor Substrate Type
Unconsolidated rippled sediment (sand/mud)
Sediment covered tar flow
Rippled scour depressions (sand/gravel)
Pockmarks (sand/mud)
Deformed sedimentary bedrock outcrop
0
1,000
2,000 Feet
CDFW Fisheries GIS
August 2018
Sources:
USGS; City of Santa Barbara; ESRI (basemap)

FARMING OPERATIONS

Mussels

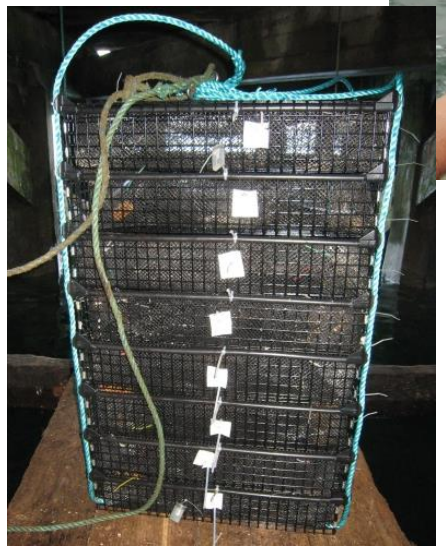
- Shellfish hatcheries provide seed rope
- Mussels grown to market-size on continuous, looped fuzzy rope
- Mussels stripped, cleaned, sorted, and bagged onboard

Oysters

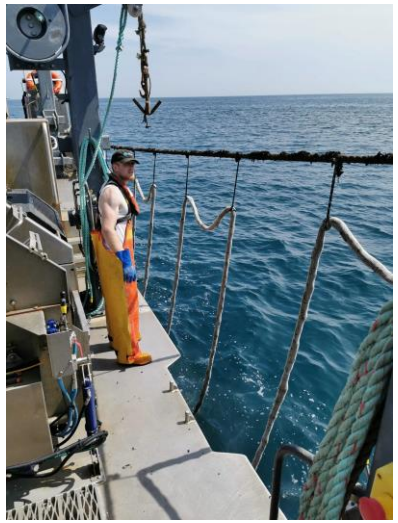
- 7mm oysters grown in baskets with 6mm mesh nets
- Oysters are transferred into baskets with larger 12-mm mesh nets as they grow
- Market-size oyster are washed and put into mesh bags onboard

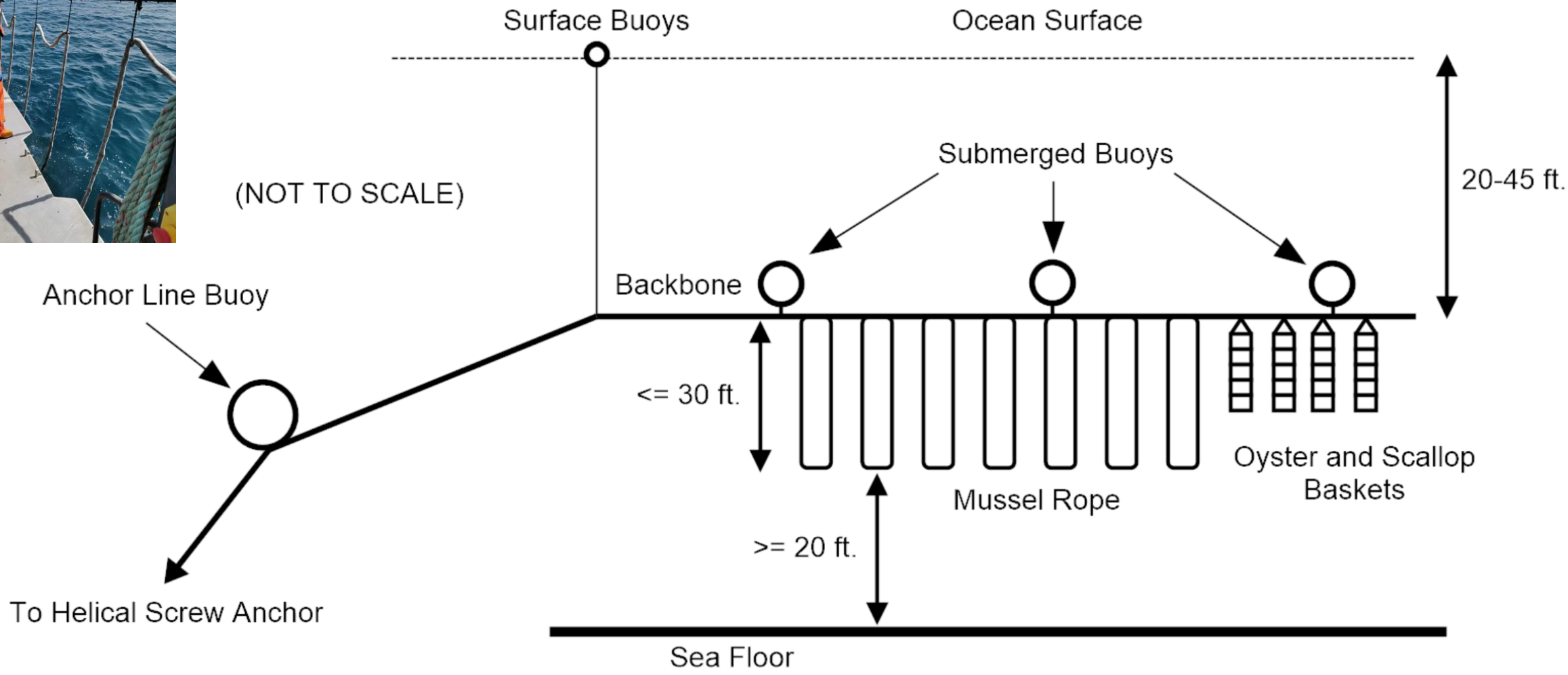
Rock Scallops (eventually)

- Commercial-scale seed production is still lacking
- Small seed will be placed in grow-out trays lined with mesh
- Methods for growth to market size are still under development



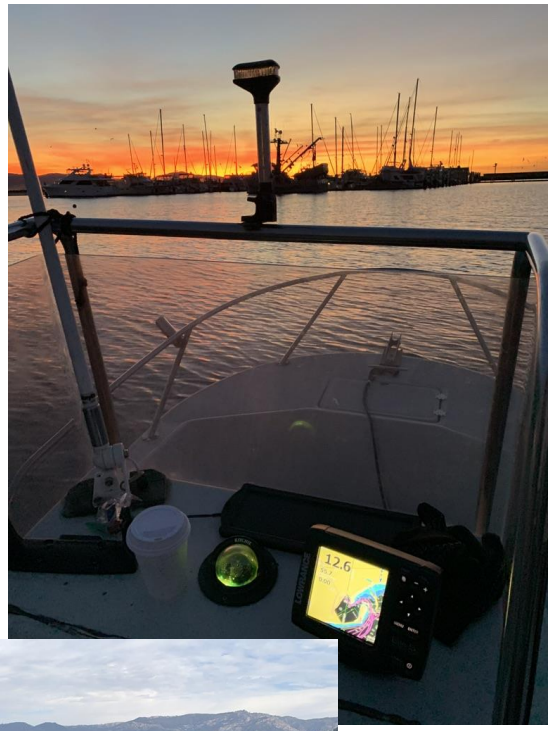
Submerged Longline Section

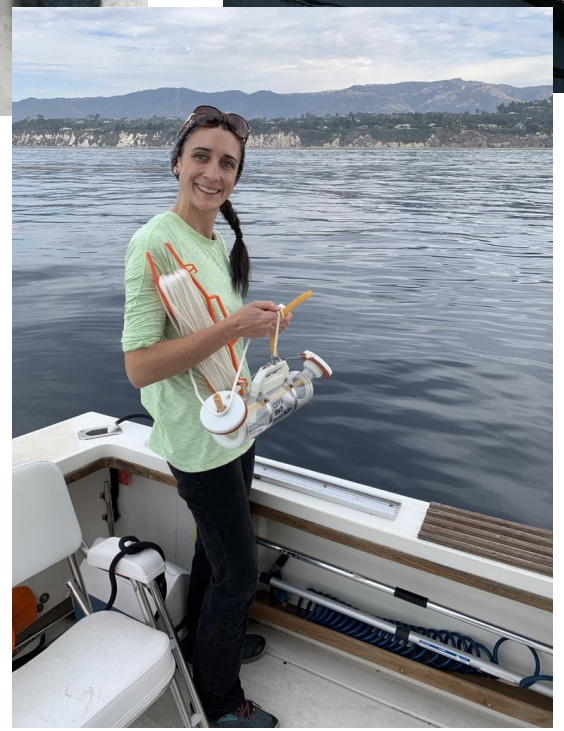




Water Quality Testing

- Water quality testing was performed from November 16, 2018, through April 2, 2020, according to a CDPH designed test plan.
- **Test results show excellent water quality!**





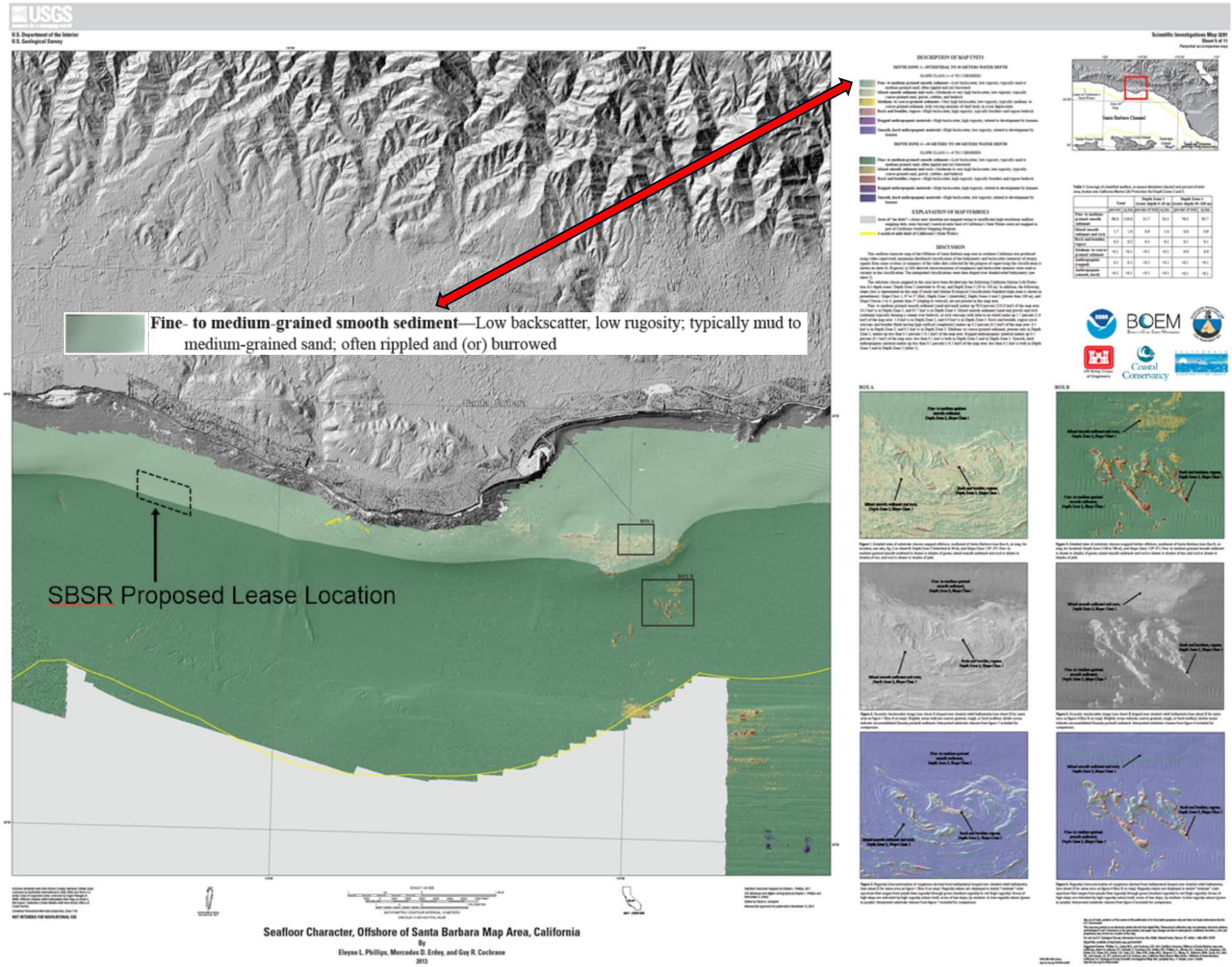
ENVIRONMENTAL CONCERNS

- **Key Environmental Concerns Identified by CDFW Marine Region Staff:**
  - EC #1: Benthic Impacts
  - EC #2: Commercial and Recreational Fisheries Impacts
  - EC #3: Modification of Local Currents
  - EC #4: Marine Species Entanglement
  - EC #5: Marine Debris Management
  - EC #6: Phytoplankton Levels & Water Quality
- **Our Approach:**
  - Proactive Mitigation Strategies
  - Advanced Engineering Analysis for Robust Longline Design & Entanglement Prevention
  - Rigorous Compliance with all Permitting and Leasing Agency Monitoring and Reporting Requirements

EC #1: Benthic Impacts

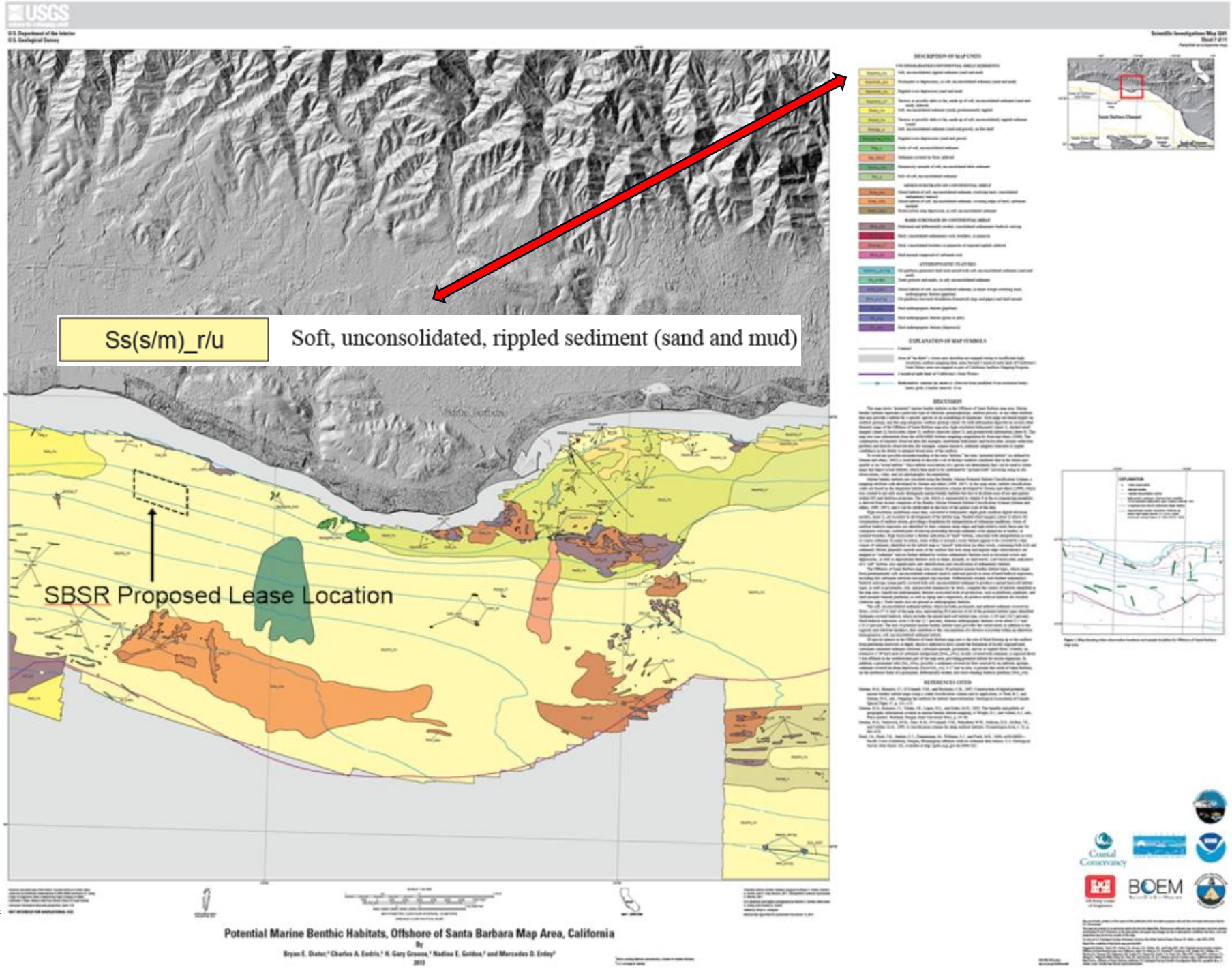
- **Concern:**
  - Potential habitat disruption from longline structures and bio-deposits
- **Mitigation Plan:**
  - Sonar and Video Surveys (already conducted)
  - Benthic Monitoring Pre & Post Installation for 4 Years
  - Sediment & Fauna Analysis
  - Use of Helical Sand Screw Anchors: Minimize seabed disturbance

USGS: Seafloor Character



Source:
https://cmgds.marine.usgs.gov/catalog/pcmsc/SeriesReports/DS_DDS/DS_781/SantaBarbara/SeafloorCharacter_OffshoreSantaBarbara_metadata.faq.html

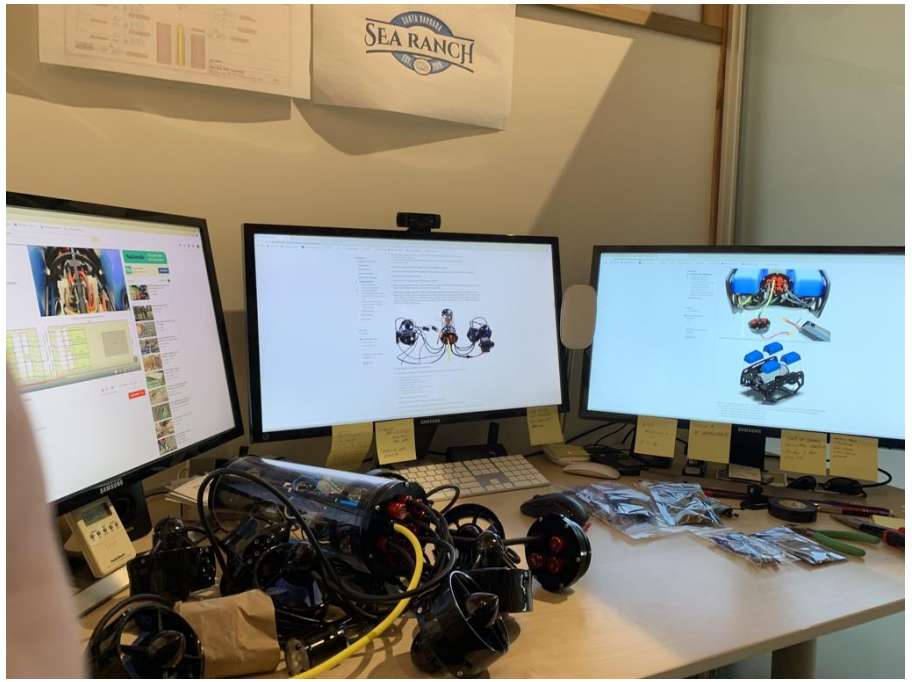
USGS: Potential Marine Benthic habitat



Source:
https://cmgds.marine.usgs.gov/catalog/pcmsc/SeriesReports/DS_DDS/DS_781/SantaBarbara/SeafloorCharacter_OffshoreSantaBarbara_metadata.faq.html

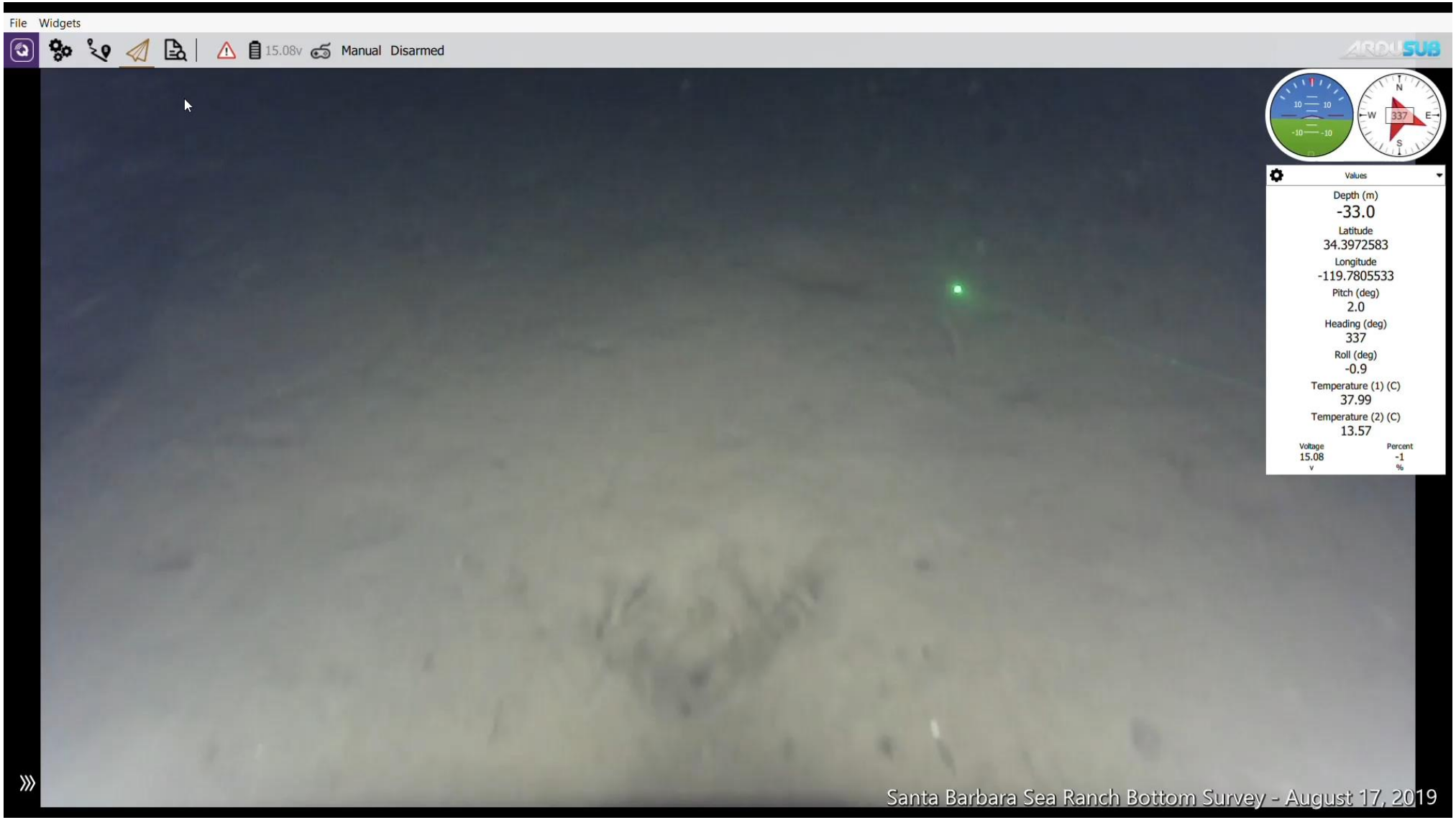
SBSR Bottom Survey

- In 2019, at the request of CDFW (with input from the California Coastal Commission), SBSR conducted a water bottom survey at the proposed project location on a 400’ transect.
- SBSR built a custom ROV and tow vehicle and captured over 7 miles of high-resolution sea floor video.
- **Results were consistent with those of the USGS: NOTHING BUT SAND AND MUD.**

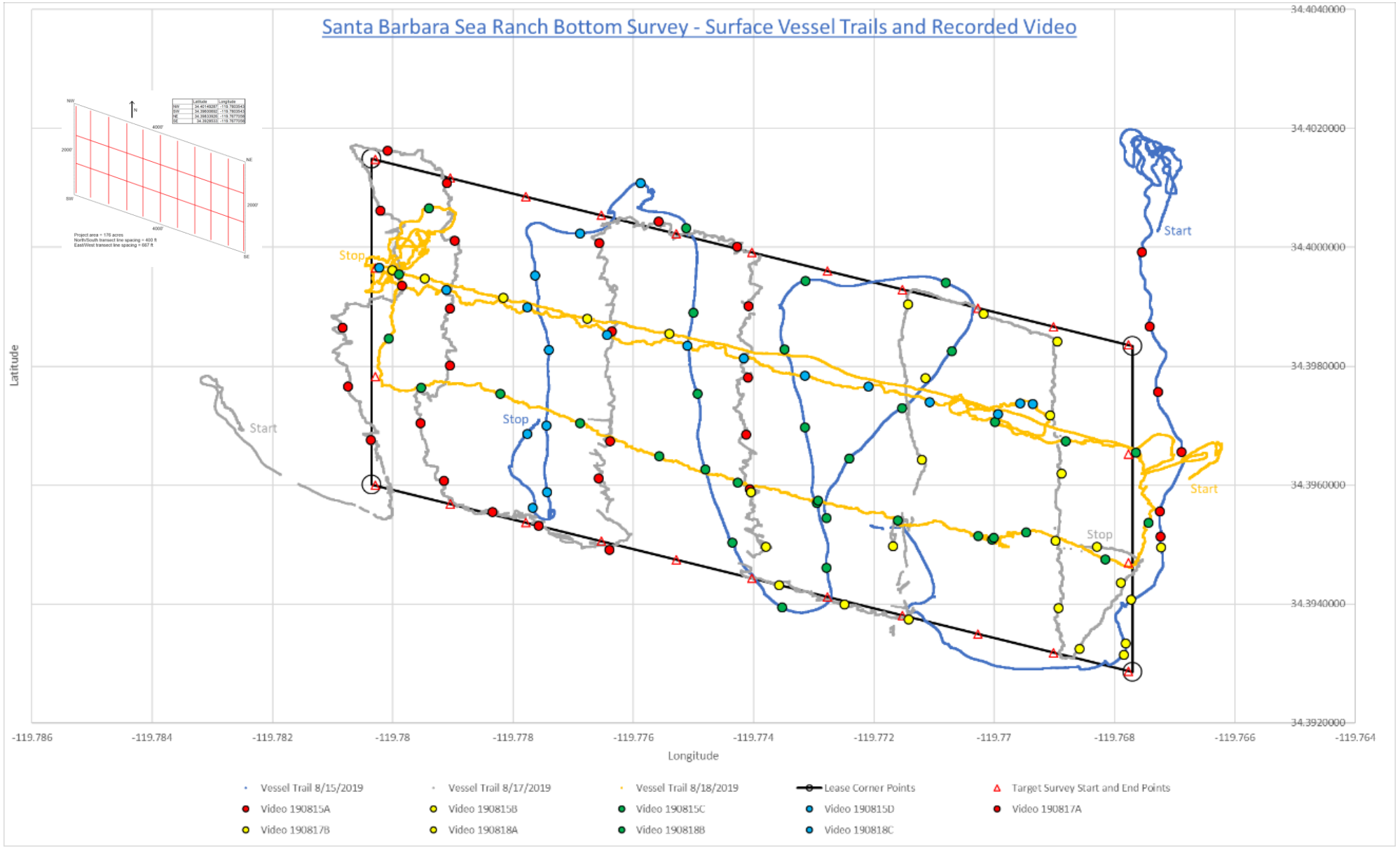


USGS California Seafloor Mapping Program video and photography portal: Map Portal.
http://www.axiomdatascience.com/maps/usgs.php - map?lg=5b9152b0-673d-11e2-b541-00219bfe5678&p=proj3857&b=google_hybrid&z=15&ll=34.39394,-119.76716

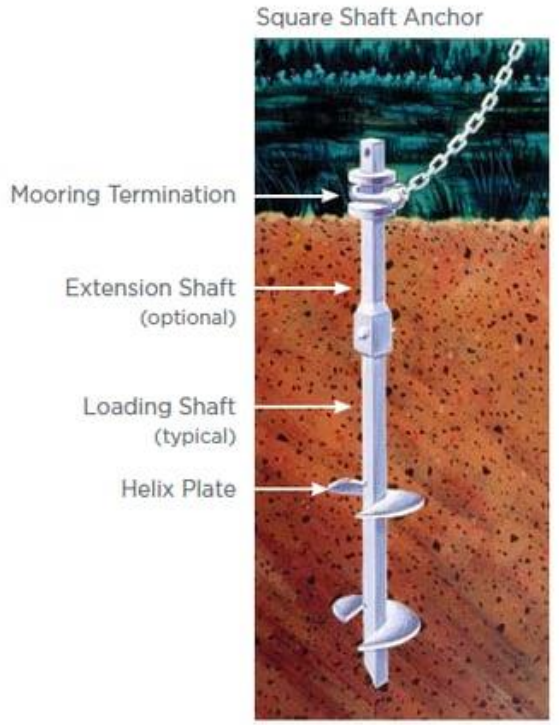
SBSR Bottom Survey Video Sample



SBSR Bottom Survey Path



Helical Screw Anchors



Minimal Seafloor Disturbance

- < 1 sq. meter per anchor
- ***For 160 anchors in 176 acres, only 0.025% of the seafloor will be disturbed (1/4000th of the total area)***

Expert Installation

- Fielder Marine Services, LTD
- 10 years' experience
- https://www.fieldermarine.com/

EC #2: Commercial and Recreational Fisheries Impacts

- **Concern:**
  - Proximity to edge of California halibut trawl grounds (150 feet to boundary)
  - Possible impact on market squid & recreational fisheries
- **Mitigation Plan:**
  - USCG approved aids to navigation (buoys and lights)
  - Fisheries Impact Analysis in EIR
  - Continued engagement with local fishermen

Southern California Trawlers Association Support (letter from Mike McCorkle, former President, SCTA)

---------- Forwarded message ---------
From: **Kim Selkoe** [redacted]
Date: Wed, Aug 8, 2018 at 12:12 PM
Subject: From mike
To [redacted]

-------- Forwarded Message --------
Subject:mussel farm
Date: Thu, 26 Jul 2018 10:11:55 -0700
From: McCorkle Fishing Enterprises [redacted]
To: [redacted]

David, Southern Ca. Trawlers Assn has reviewed your proposal to put in a mussel farm off of Hope Ranch,Santa Barbara, inside the one mile line and have no problem with the proposal at this time. we will be glad to work with you on your implementing your farm in the future. Mike Mccorkle, president SCTA.

Sent from my iPhone

Santa Barbara Commercial Fisherman Support

Steve Escober (SBSR Partner & Commercial Fisherman)

Board member: Commercial Fishermen of Santa Barbara

August 7, 2018

David Willett

[redacted]

Dear David,

I support your effort to expand Santa Barbara's mussel farming industry for the following reasons. You have selected a location for your farm that minimizes interference with our commercial fisheries. From our conversations and the bio you shared with me, I have confidence at this time that you are capable and have the experience needed to be successful, and you will be a good neighbor to the fishermen.

I have been a commercial fishermen since 1991, working out of the port of Santa Barbara since 2001, and participating in direct marketing of rock crab and other seafood to consumers. The demand for mussels in California and in the U.S. far exceeds the domestic supply. Adding mussel farms to our coast can be a benefit to our fishing community when they are responsibly managed and carefully integrated into our commercial fisheries to minimize conflicts in ocean use.

Sincerely,

Steve Escobar,

[redacted]

Santa Barbara Recreational Fisherman Support

Jason Diamond (SBSR Advisory Board)

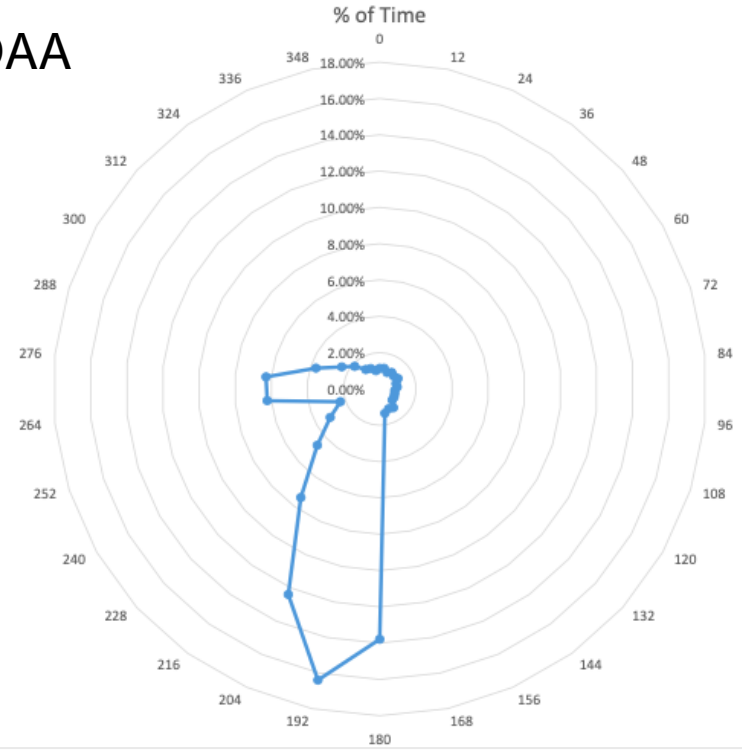
Owner - Stardust Sportfishing - https://www.stardustsportfishing.com/

EC #3: Modification of Local Currents

- **Concern:**
  - Potential reduction in current speed affecting larval transport, nutrient & sediment distribution, and potential accumulation of shell debris and bio-deposits on seafloor below the farm
- **Mitigation Plan:**
  - Baseline and ongoing monitoring of current speeds and bottom conditions
  - Longline layout for low frontal area in the direction of the Santa Barbara Mariculture Co.

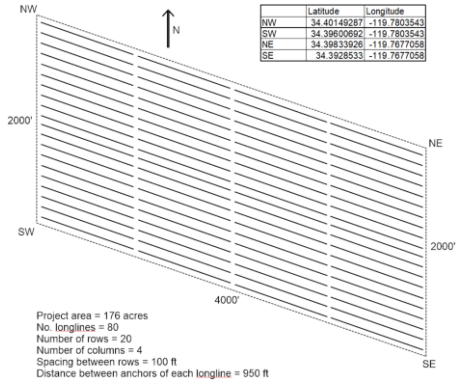
First-Order Flow Discussion:

Source: NOAA



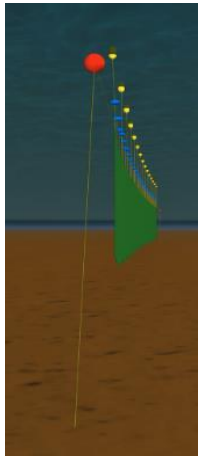
Percent of current direction at 10 m depth offshore Santa Barbara, 2012 - 2019 CA Roms 3 km resolution.

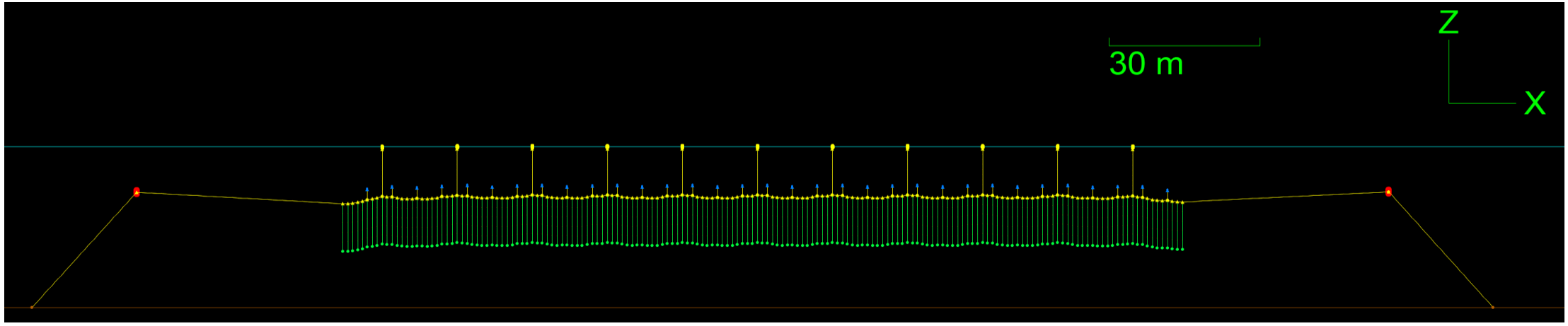
Current from 180 Degrees	
Farm frontal area (sq.ft.)	280,000
Longline Frontal Area (sq.ft.)	43,362
Percent Obstruction:	15%
Current from 270 Degrees	
Farm frontall area (sq.ft.)	140,000
Longline Frontal Area (sq.ft.)	660
Percent Obstruction:	0.47%



	Latitude	Longitude
NW	34.40149287	-119.7803543
SW	34.39600692	-119.7803543
NE	34.39833926	-119.7677058
SE	34.3928533	-119.7677058

Conclusion: Principal flow direction and low-percentage frontal area will have minimal impact on flow and SBMC.





EC #4: Marine Species Entanglement

- **Concern:**
  - Risk of entanglement for whales, sea turtles, and other marine life
- **Mitigation Plan:**
  - Use of breakaway links and non-floating lines
  - Longline design ensures all lines always under tension
  - Entanglement monitoring
  - Annual reporting to agencies (NOAA, USACE, FGC, CDFW, CCC)

EC #5: Marine Debris Management

- **Concern:**
  - Potential for lost equipment contributing to marine debris
- **Mitigation Plan:**
  - Marine Debris Prevention Plan
  - All gear marked with ID tags
  - Regular inspections and retrieval plan
  - Annual reporting to agencies (NOAA, USACE, FGC, CDFW, CCC)

EC #6: Phytoplankton Levels & Water Quality

- **Concern:**
  - Over-harvesting shellfish affecting phytoplankton carrying capacity
  - Potential alteration of nutrient levels
- **Mitigation Plan:**
  - Phytoplankton, sediment, and nutrient level monitoring and annual reporting

UCSB Statement: Mariculture Impact on Phytoplankton in the Santa Barbara Channel

Statement, Analysis and Calculations by Dave Siegel, Bob Miller and Tom Bell - April 5, 2013

Contact:
David A. Siegel, PhD
Director, Earth Research Institute, and
Professor of Marine Science, Department of Geography
University of California, Santa Barbara

A. STATEMENT

Subject: Statement concerning impacts of SB Mariculture expansion on plankton levels in the Santa Barbara Channel

Dear Bernard,

Last April, you asked me what the impacts of the expansion of your mariculture facility could be to phytoplankton in the Santa Barbara Channel. This kind of calculation is something I am well versed at as I have long been assessing the impacts of kelp forests on the pelagic ecology of the Channel as a coPI of the Santa Barbara Coastal Long Term Ecological Research site (http://sbc.lternet.edu).

Working with Dr. Bob Miller of the UCSB Marine Science Institute, we estimated what the maximum impacts of the mussel farm could be to the standing stock of phytoplankton biomass flowing past your facility. We assumed that your mussel farm is fully stocked and that the mussels are operating at their maximum clearance rates and ingestion efficiencies to calculate the time scale which sea water will flow through the mussels. We then compared that to an estimate the maximum residence time for water to flow through the farm. We found that these two time scales differ by more than two orders of magnitude and that the mussel farm will have an inconsequential impact on phytoplankton (and for that matter zooplankton populations) in the Channel. Taking it one step further, we calculated the maximum expected reduction in chlorophyll concentrations of water flowing through your facility. We found approximately a 0.06% reduction which corresponds to 0.0012 mg /m3 reduction in chlorophyll concentrations from a baseline value of 2 mg /m3 (a typical value for the Santa Barbara Channel). This decrease is unmeasurable by any techniques I know of. A copy of this calculation is attached.

In summary, I cannot see how your proposed expansion in isolation would have any measurable impact on the plankton distributions of the Santa Barbara Channel. When you first told me about it I thought you were joking. Of course if your proposed expansion were maybe 1000 times larger there would likely be actual impacts that are measurable and need to be considered. But this action in isolation should result in no measurable changes to the plankton communities of the Santa Barbara Channel.

-David Siegel

LONGLINE DESIGN & SAFETY MARGIN

- SBSR, with the support of Jacob Technologies and Orcina, LTD, conducted **detailed static and dynamic analysis** of the SBSR longlines in **extreme storm conditions** using Orcina's **OrcaFlex** finite element analysis software.
- **Accurate** physical representation of all components.
- Hindcast environmental conditions used in the analysis were **provided by NOAA and USACE.**
- A total of **48 separate load cases** were evaluated for extreme wave, current, and wind conditions with bespoke longline designs optimized for specific water depth.
- Maximum loading is calculated for all lines and **proper safety factors applied**.

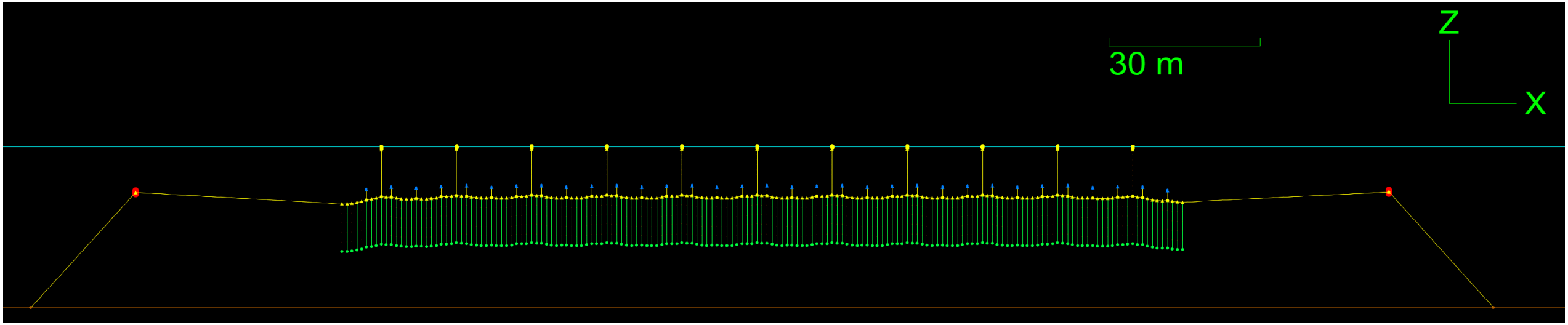
Jacobs

orcina

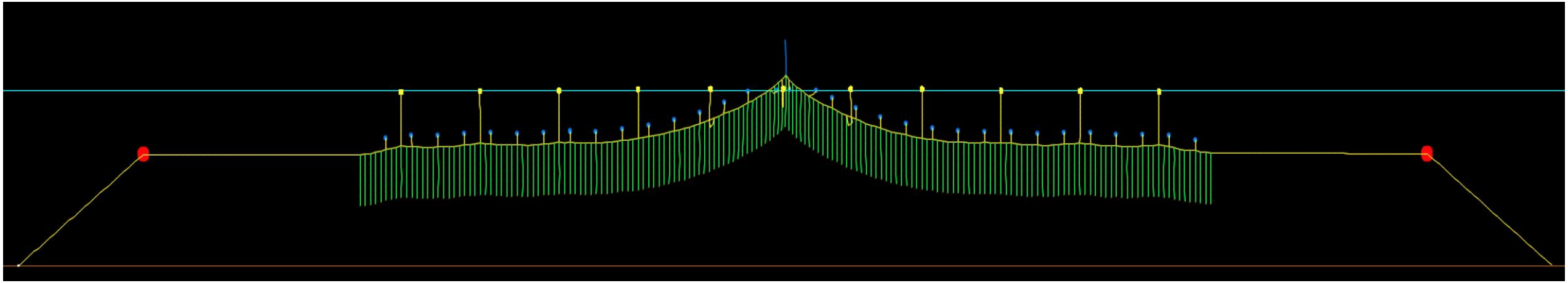
https://www.orcina.com/orcaflex/

OrcaFlex is the world's leading package for the dynamic analysis of offshore marine systems.

Accurate Physical Modeling and Safety Margin



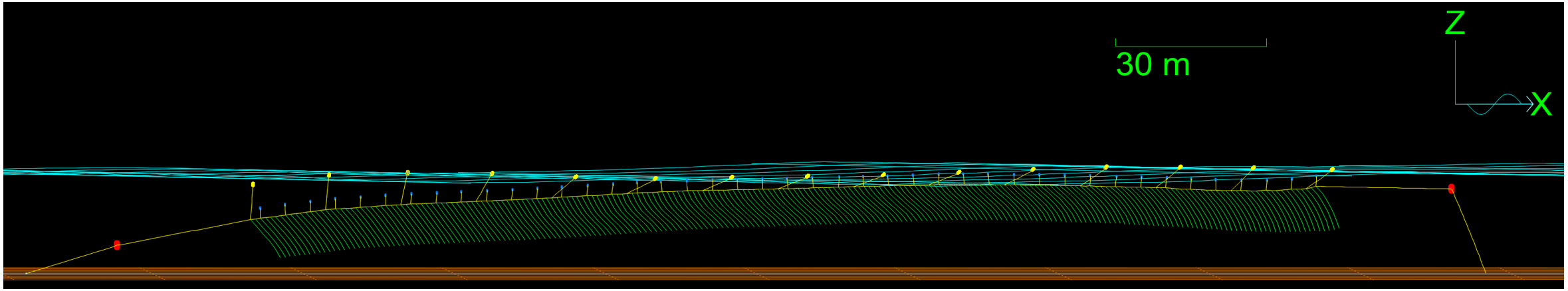
Longline in Still Water

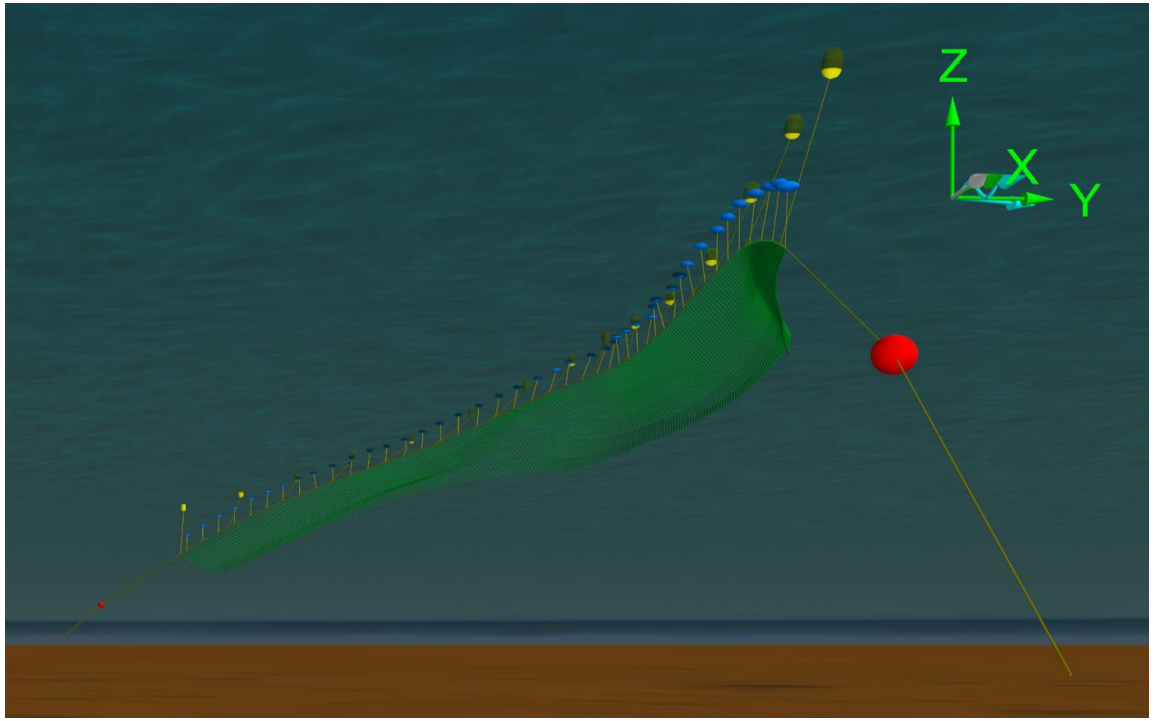


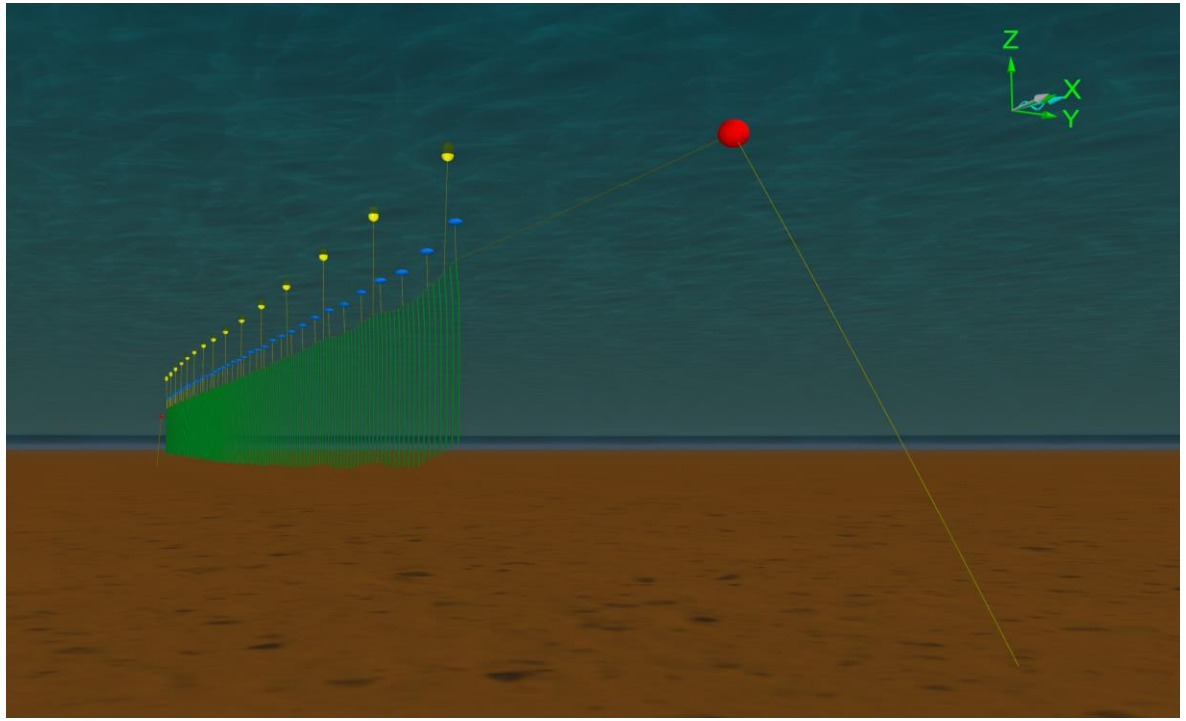
Winch Operation Tension Calculation
3m Lift

*** See "Additional Slides" for More Information**

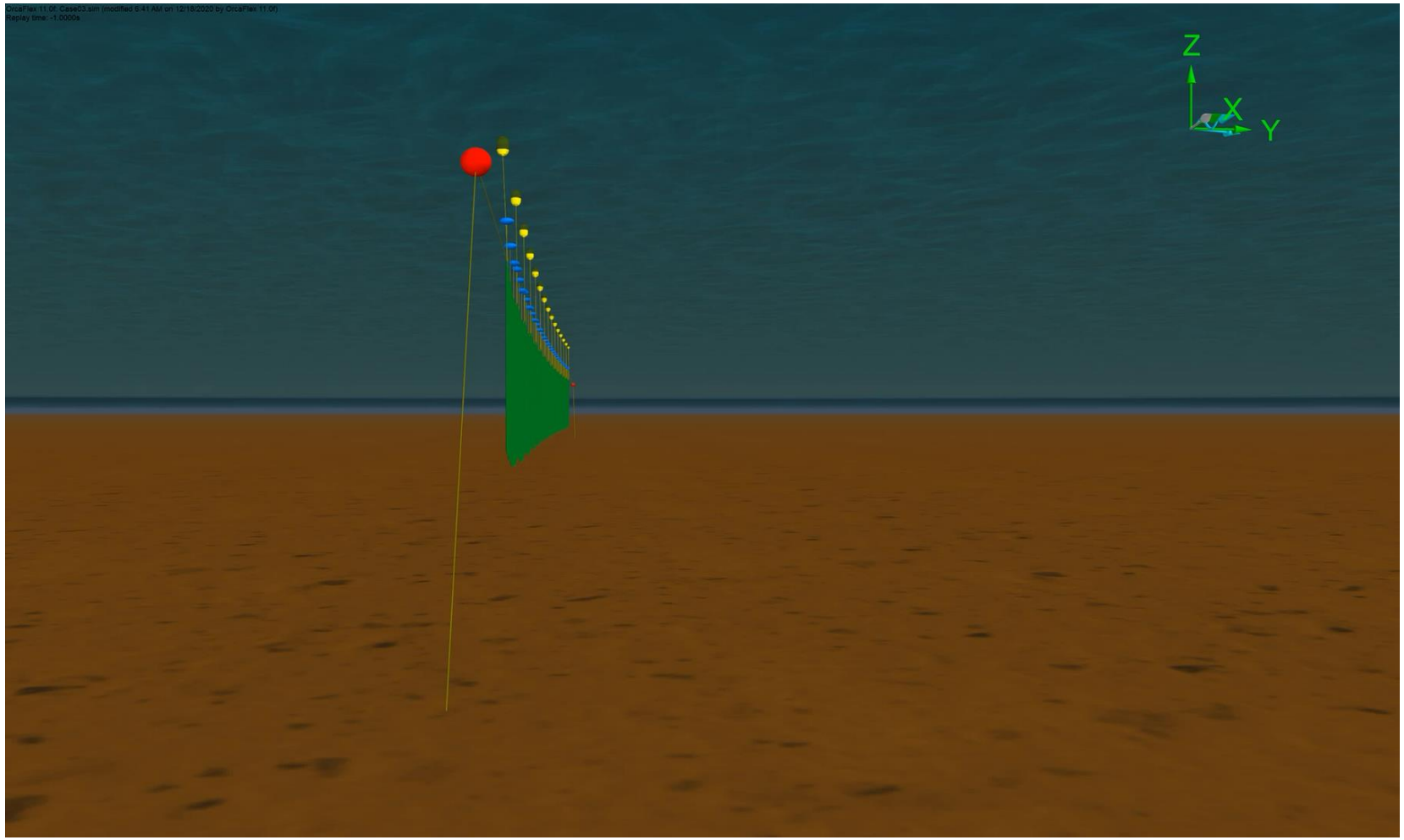
Accurate Physical Modeling and Safety Margin







Stress Analysis in Worst-Case Storm Environment



60-second video: 100-year waves from 273 degrees and 10-year current from 180 degrees (SBSR longlines will lay 286/106 degrees)

* See “Additional Slides” for More Information

Determination of Line Strength Requirements

Maximum Line Loads (N)

Load Case	Wave Direction (degrees)	Wave Return (years)	Current Direction (degrees)	Current Return (years)	Wind Direction (degrees)	Wind Return (years)	Anchor Line 1 (anchor end)	Anchor Line 1 (top end)	Backbone 1	Backbone 2	Anchor Line 2 (top end)	Anchor Line 2 (anchor end)
1	273	100	273	10	315	10	52,726	54,634	52,932	16,966	15,381	16,895
2	273	10	273	100	315	10	50,764	52,081	50,915	13,389	9,375	12,977
3	273	100	180	10	315	10	67,825	67,838	67,997	53,625	53,503	56,406
4	273	10	180	100	315	10	57,401	58,597	57,574	48,574	48,386	49,955
5	273	1	273	1	315	10	45,555	47,634	45,715	8,103	5,744	9,568
6	273	1	180	1	315	10	56,597	57,880	56,762	42,604	42,429	44,716
7	273	100	225	10	315	10	80,249	80,406	80,394	42,455	42,295	44,725
8	273	10	225	100	315	10	72,022	73,335	72,157	41,359	41,177	43,307
9	303	100	273	10	315	10	49,935	52,477	50,066	15,023	12,802	13,549
10	303	10	273	100	315	10	51,101	52,440	51,249	9,018	7,289	9,500
11	303	100	180	10	315	10	45,624	46,872	45,841	55,613	55,454	57,382
12	303	10	180	100	315	10	39,581	41,197	39,811	51,023	50,852	52,491
13	303	1	273	1	315	10	44,425	46,698	44,583	5,991	4,491	7,408
14	303	1	180	1	315	10	37,582	39,219	37,804	55,086	54,932	56,791
15	303	100	225	10	315	10	58,873	60,422	59,024	41,667	41,464	43,409
16	303	10	225	100	315	10	54,954	57,192	55,090	38,762	38,428	40,248
17	243	100	273	10	315	10	72,591	74,234	72,726	19,845	18,813	20,892
18	243	10	273	100	315	10	58,268	60,123	58,415	13,842	12,592	14,555
19	243	100	180	10	315	10	127,612	128,448	127,692	103,938	103,846	105,841
20	243	10	180	100	315	10	99,894	101,194	99,999	81,263	81,150	82,814
21	243	1	273	1	315	10	47,677	49,466	47,855	8,322	7,141	9,818
22	243	1	180	1	315	10	67,968	69,188	68,100	63,011	62,867	64,444
23	243	100	225	10	315	10	118,316	118,830	118,406	80,939	80,821	82,262
24	243	10	225	100	315	10	102,369	103,575	102,462	72,136	71,983	73,356

TEAM

President and Founder – Capt. David Willett

- 20+ years of senior-level experience in ocean engineering, manufacturing, supply chain management, quality assurance, and business development.
- BSEE, MSEE, MBA.
- USCG Licensed Master

Partner and Commercial Fisherman - Steve Escobar

- Commercial fisherman since 1991
- Worked out of Santa Barbara Harbor since 2001
- Board member: Commercial Fishermen of Santa Barbara
- Owns and operates a 44’ Stanley Lobster Boat – the “Ocean Pearl”

ADVISORY BOARD

Carolynn (Carrie) S. Culver, Ph.D.

- Aquatic Resources Specialist/Research Scientist
  - California Sea Grant
  - Scripps Institution of Oceanography, UC San Diego
  - Marine Science Institute, UC Santa Barbara

Michael D. Chambers, Ph.D.

- Marine Aquaculture Specialist
  - UNH Associate Professor, School of Marine Science and Ocean Engineering
  - New Hampshire Sea Grant and Cooperative Extension University of New Hampshire

Jason Diamond

- Owner - Stardust Sportfishing - https://www.stardustsportfishing.com/

Vanessa Willett (Sales and Marketing)

- VP Partnerships and Ecosystems at Demandbase, Inc.
- Responsible for over $200M in B2B ads and SAAS revenue

Current Project Status

- On the suggestion of FGC and California Coastal Commission Staff, SBSR drafted an Initial Study/Mitigated Negative Declaration.
- CDFW and CCC reviewed the IS/MND draft and CDFW concluded that a full EIR should be conducted.
- SBSR engaged ECORP (https://www.ecorpconsulting.com/) and they have provided a suggested plan of action for completion of the EIR which has been reviewed by CDFW and CCC and iterated on multiple times.
- **At this point, nearly SEVEN years since we started, we hope to get everyone on the same page, gather everyone's input and guidance, and be positioned to efficiently move forward with minimal duplication of effort and unnecessary cost or delay.**

Conclusion and Call for Support

- Santa Barbara Sea Ranch is committed to responsible aquaculture.
- Mitigation measures will be put in place to minimize environmental impact.
- We value ongoing engagement with all NGOs & stakeholders.
- Seeking support for approval & implementation.

SUSTAINABLE AQUACULTURE IS KEY

TO A RESILIENT SEAFOOD FUTURE!

Thank you!

Additional Slides

Advisory Board

Carolynn (Carrie) S. Culver, Ph.D.

- Aquatic Resources Specialist/Research Scientist
  California Sea Grant
  Scripps Institution of Oceanography, UC San Diego and
  Marine Science Institute, UC Santa Barbara
- Dr. Culver runs her program from the Santa Barbara Channel region of south-central California. Her program addresses the general vision of California Sea Grant: to promote the sustainable use of marine and coastal resources in support of thriving human and natural communities. She supports this vision by facilitating and conducting research and extending research-based information to help California communities solve coastal and marine issues, especially those related to aquatic invasive species, marine invertebrate fisheries, and shellfish mariculture.
- Culver's research interests include understanding life history characteristics and population dynamics of aquatic organisms and applying this information to improve the management of non-native invasive species and fisheries resources, and to enhance culture technologies of marine species. She was a lead researcher on the successful eradication of a marine pest, and she remains actively engaged in the management of invasive species. She is currently working collaboratively with many groups to minimize the impacts of non-native species, including quagga and zebra mussels and several marine organisms that are transported via boat hulls. Culver also is evaluating ways to assist the state with the management of fisheries resources, through collaborative fisheries research to collect field data and promote its integration into the management process. She continues to gather essential fisheries information on marine resources and those who depend on them to enhance the management of California's fisheries. **Her work in mariculture currently assists those interested in culturing rock scallops and other marine shellfish.** Culver is a UC certified research diver, and SCUBA diving is often a part of her research program.

Advisory Board

Michael D. Chambers, Ph.D.

- Marine Aquaculture Specialist, Associate Professor, School of Marine Science and Ocean Engineering, New Hampshire Sea Grant and Cooperative Extension, University of New Hampshire
- Michael has been advancing open ocean farming technologies for over 25 years in the US and abroad. In the US, he has managed submerged cage culture projects in the Gulf of Mexico, Hawaii, and the North Atlantic. In 2000, he took the role of Project Manager at the University of New Hampshire's (UNH) Open Ocean Aquaculture Project and the Atlantic Marine Aquaculture Center. This project was at the forefront of developing biological, engineering, and environmental technologies for the commercialization of offshore aquaculture in the US. Novel culture systems were evaluated, and numerous species were successfully grown at the farm located 13 km offshore in 52m water depth. In addition, Michael and UNH engineers have developed a floating integrated multi-trophic aquaculture platform to grow steelhead trout, blue mussels, and sugar kelp. The nearshore system is used to train and educate fishermen and students on responsible aquaculture methods. On a national level and funded by the Department of Energy, Michael has been involved with multiple US institutions to develop offshore macroalgae farms for biofuel production. Internationally, he has been engaged with aquaculture projects in the Black Sea (US AID), in Norway (SINTEF Fisheries and Aquaculture), in the Mediterranean (University and private), and Cuba (non-profit). Michael received a BS (Biology) from the University of Wisconsin, an MS (Mariculture) from Texas A& M and a Ph.D. (Zoology) from the University of New Hampshire. Lastly, he maintains a Master Captain's license (100 ton) and has over 5500 hours logged diving in the Pacific, Atlantic, Gulf of Mexico and Caribbean oceans.

Advisory Board

Jason Diamond

- Owner - Stardust Sportfishing
- https://www.stardustsportfishing.com/

Vanessa Willett (Sales and Marketing)

- Vanessa Willett has over 15 years of experience in sales and marketing, with an emphasis in B2B where she has helped some of the world's biggest brands drive revenue. Today, as Vice President of Partnerships and Ecosystems at Demandbase, Inc., she and her team are responsible for over $200M in revenue.

Team

Partner and Commercial Fisherman: Steve Escobar

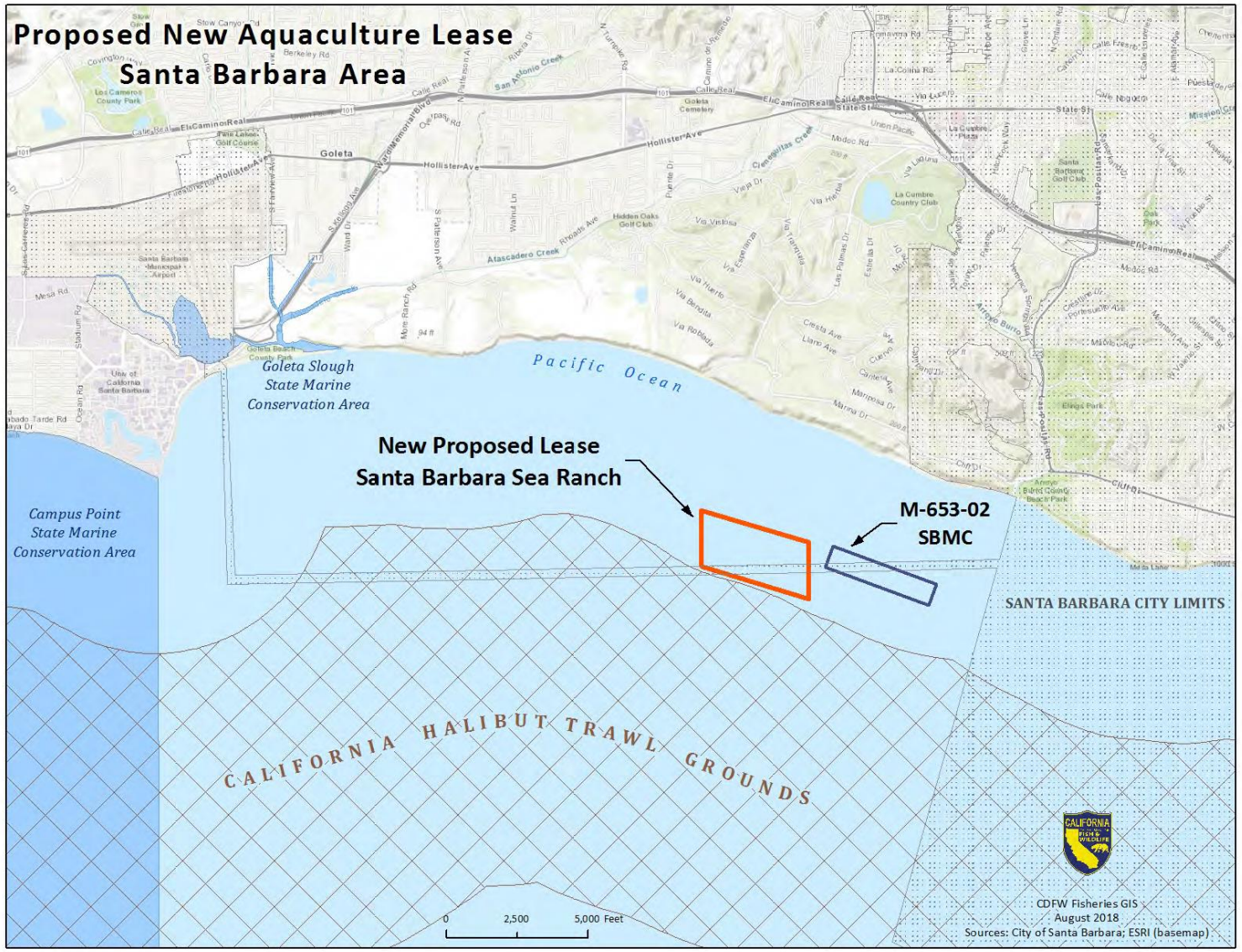
A board member of Commercial Fishermen of Santa Barbara, Steve has been a commercial fisherman since 1991, working out of the port of Santa Barbara since 2001. While Steve's catch-of-the-day is primarily Rock Crab, he also provides Urchin, Spider Crab, Sea Snails (Whelk) and Lobster direct to the public every Saturday at the Newport Beach 'Dory Fleet' Fisherman's Market. Steve fishes off his 44' Stanley Lobster boat, the Ocean Pearl, which you may see docked in Santa Barbara just down from Brophy's Restaurant on the breakwater.

Team

President and Founder: Capt. David Willett

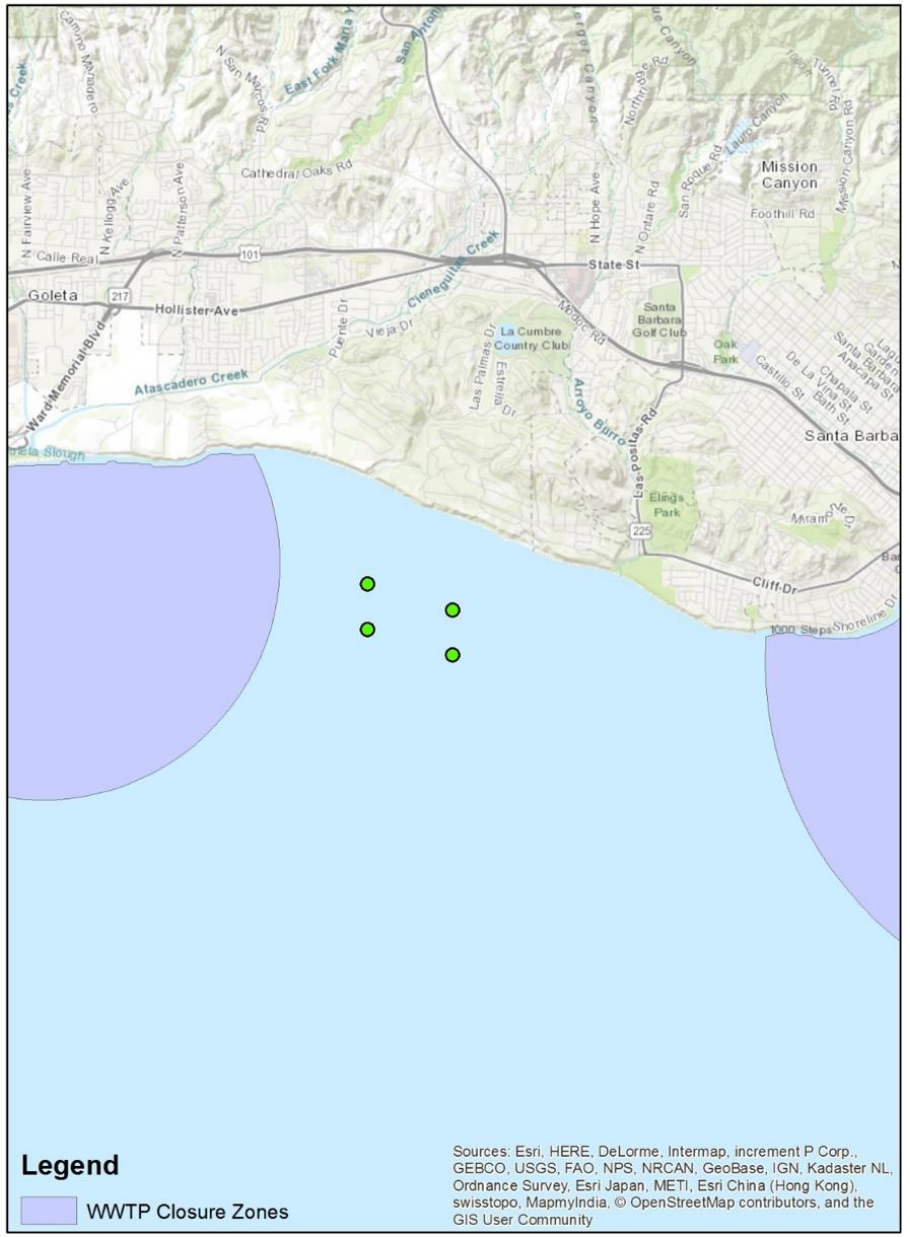
- 20+ years of experience in manufacturing, ocean engineering, supply chain, and quality systems leadership positions
- MBA and Master of Science, Electrical Engineering
- USCG 25-ton Merchant Mariner Credential
- Exceptional problem-solving skills
- Proven ability to take on difficult and unfamiliar challenges and deliver exceptional results.
- Pragmatic, logical, driven, and tenacious.
- linkedin.com/in/dwillett

Proposed Lease Area



Google Earth:
https://earth.google.com/web/@34.40051407,-119.78324028,-3.00654376a,27564.13618836d,35y,0.00000121h,0t,0r/data=CgRCAggBOgMKATBCAggASggl8c-p4QEQAA

Project Location and Wastewater Treatment Plant Closure Zones



Map provided by the California Department of Public Health

Fish and Game Commission Public Interest and Lease Availability Determination (August 22-23, 2018)

STATE OF CALIFORNIA
Edmund G. Brown Jr., Governor

Fish and Game Commission

Wildlife Heritage and Conservation
Since 1870

Valerie Termini, Executive Director
P.O. Box 944209
Sacramento, CA 94244-2090
(916) 653-4899
fgc@fgc.ca.gov
www.fgc.ca.gov

September 10, 2018

David Willett, President and Chief Executive Officer
Santa Barbara Sea Ranch, Inc.
1829 Loma Street
Santa Barbara, CA 93103

Sent via email to dwillett@santabarbarasearanch.com

Dear Mr. Willett:

At its August 22-23, 2018 meeting in Fortuna, the California Fish and Game Commission (Commission) made a determination that the 176 acres of state water bottoms applied for leasing by Santa Barbara Sea Ranch, Inc. is available for lease and that the lease would be in the public interest.

Following its determination, the Commission directed staff to publish public notice that the area is being considered by the Commission for leasing, pursuant to Fish and Game Code Section 15404. The attached public notice will be printed in the Santa Barbara News-Press on September 14 and 21.

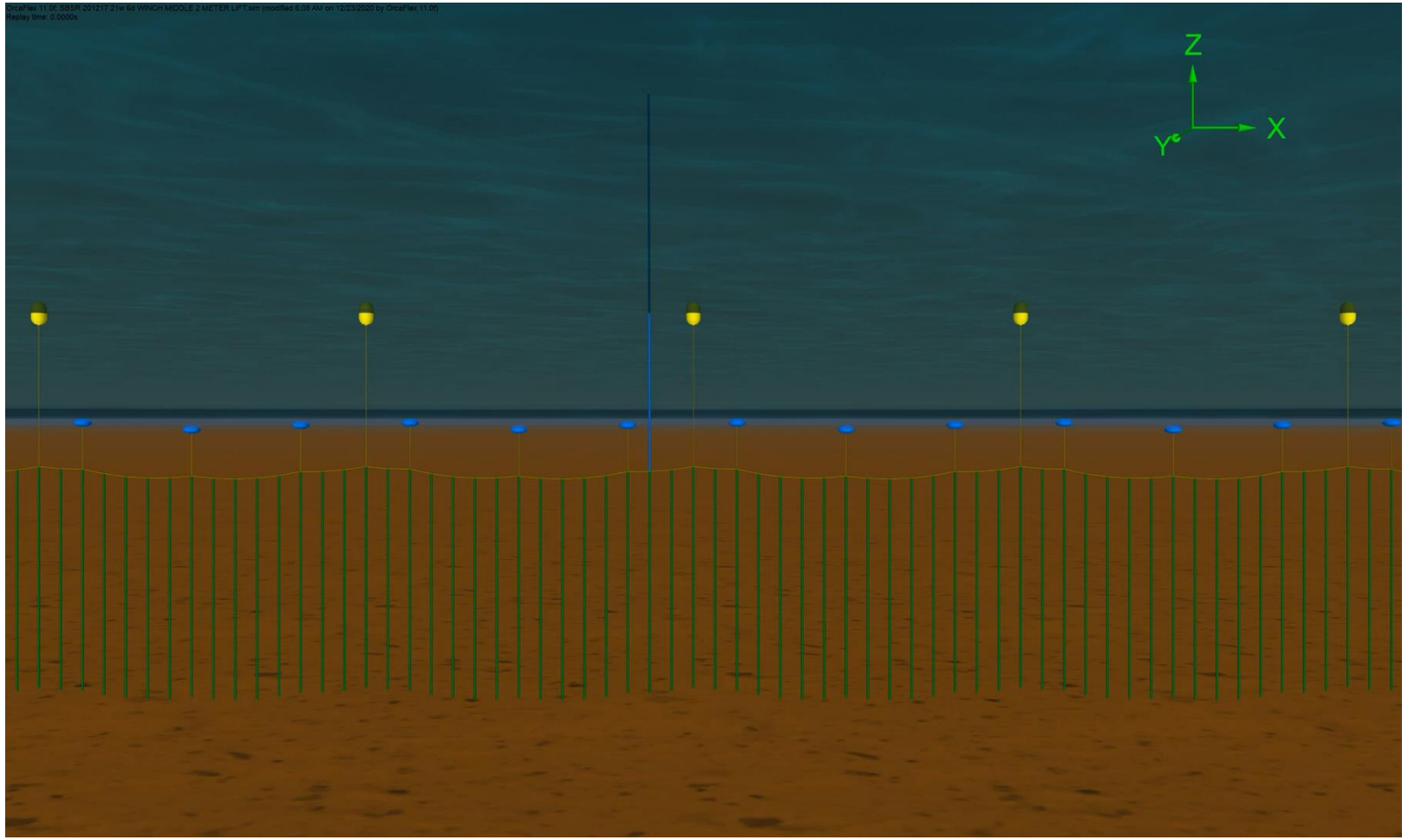
Further, the Commission directed staff to schedule the lease application for consideration after completion of California Department of Fish and Wildlife (Department) and interagency review; tribal notification; and environmental review conducted by Santa Barbara Sea Ranch, Inc. pursuant to the California Environmental Quality Act. Final Commission consideration will be scheduled following the required steps. Randy Lovell, statewide aquaculture coordinator with the Department, and Susan Ashcraft, marine advisor to the Commission, will be contacting you to discuss how to accomplish the necessary project submissions.

If you have any questions or concerns about your petition, please feel free to contact Susan Ashcraft directly at (916) 653-1803 or fgc@fgc.ca.gov.

Sincerely,

Valerie Termini
Executive Director

Longline Lifting Force Analysis



25-second video: Simulated longline lift to 2m above the surface for determination of lifting requirements along the longline

SBSR Website:

David Willett's vCard:


SANTA BARBARA
SEA RANCH
EST.
2018

From: [redacted]
Sent: Friday, February 28, 2025 04:58 PM
To: FGC <FGC@fgc.ca.gov>
Subject: comments for agenda item 3

Hello FGC

I write these comments in the last hour befor the deadline for you to review before the meeting. I am attaching two previous submissions from previous years for your review. I will try to be at this meeting in person for further comment as this topic is my life's work and has the most profound effect on the future of my family.

I have been a shellfish farmer in the Santa Barbara Channel for the past 27 years. This is the only income that I have generated for my family. This income sustains us as a family and keeps us housed and fed. I have a shellfish farm one mile off the coast of Santa Barbara which is solely owned by myself and I have tied my families health and safety to the productivity of this farm.

One overarching theme is that farming shellfish in the ocean is an extemely difficult undertaking. Farming shellfish in the ocean is very different than farming shellfish in a bay. Do not confuse the two. Over the years I've had to overcome many unknown obstacles and there is still much to be learned to be a successful ocean farmer. I have always farmed methodically and conservatively because the priority is staying in business so I can provide for my family.

It takes alot of time and experience to learn how to farm shellfish or algae in the ocean. I would say I'm still a novice after all these years because changing ocean conditions make productivity extremely unpredictable. The challenge has always been staying financially viable that is why I am asking for help in getting native mussels and algae added to the lease. I would have attached comments I sent in last month, but I can't find them right now. Hopefully FGC staff can provide them.

I don't have too many details of the farm that is being proposed next to my farm also being discussed on this agenda, but I do know that it is too close, too big, and the applicant does not have any experience in operating a shellfish farm. I would recommend a much smaller size and further away, and a shorter duration lease. Because of numerous sewage outfalls in the area and traditional trawl grounds, there is not much room for future shellfish leases in the area. The establishment of the proposed lease my prohibit future development of the area.

I have spent my life's work farming shellfish in this area and FGC needs to carefully consider the applicant and application to make sure its a good fit for Santa Barbara. I

would recommend engaging our local fishing community for further vetting of the application and applicant. I would also recommend an overarching aquaculture development plan for the area. We have many talented people knowledgable about this subject that need to be engaged.

I feel that this application was opportunistic as it was only 5 months after my CEQA document was publish and not properly vetted by the aquaculture coordinator. The mehanisms that the department has in place today do not bode well for the future of aquaculture development. Right now it is first come first served and whoever has the most financial resources to stomach the permit guantlet will win. This is not a desirable outcome for sustainable aquaculture. the more expensive you make the permit, the more intensely one has to farm inorder to make a return on investment. The harder the intensity of farming the more likely the environment will be harmed.

To be like me is to be sustainable. I farm lightly and economically with maximum return to my family and community. I am out of time its almost 5 pm. More to be discussed....

Bernard Friedman

Santa Barbara Mariculture

Santa Barbara Mariculture Co.

Bernard Friedman

Bernard Friedman
Santa Barbara Mariculture Co.
[redacted]
[redacted]

July 12, 2020

Dear Fish and Game Commission,

After watching the June 24, 2020 Fish and Game Commission meeting, it has become clear that the Aquaculture information report did not provide enough relevant information. The Aquaculture Coordinator and a Commissioner or two mention at the meeting that no new leases had been approved for over 20 years. I believe this not to be true. As one of your state water bottom lease holders, I feel that I must speak on subjects not being covered. I write this letter to represent myself and my shellfish lease for the State of Callifornia. The following is my own informational report to talk about subjects not covered in the AIR.

I did send comments in during the MRC meeting and they were echoed by Dr. Shuman but they were not addressed in the AIR report. I was hoping for a more programmatic vision of the future with a clear plan for how future aquaculture was going to be implemented in the State. What was made clear to me was that the Commission and the Department are going to go ahead with the first 3 application submissions before addressing the larger context. I believe this to be a mistake.

I will be submitting this letter as public comment at future Commission meetings on Aquaculture. I will also be submitting this letter to all the other regulatory agencies that have discretion over my lease. I am my own administrator when it comes to securing regulatory approval and therefore, I am also the coordinator of information for the agencies about anything related to my lease. I feel like I do not have any representation and so I must again do this for myself.

This whole letter will underscore that fact, and it's quite lengthy but hopefully just as enlightening as the AIR. As a major stakeholder in the aquaculture program, I have a lot of relevant information to convey and an interesting story to tell.

Let me refresh your memories and take you back to a letter I wrote to the Fish and Game Commission on November 30, 2017 (See Exhibit A). At that time, I had spent the last 6 years getting the old lease updated and modernized into a new lease. I had written a CEQA document and submitted it for approval in 2014. I had spent a decade working with the Department to modernize my lease and in 2017 I had become completely disenfranchised by the process. I pulled my two children out of school

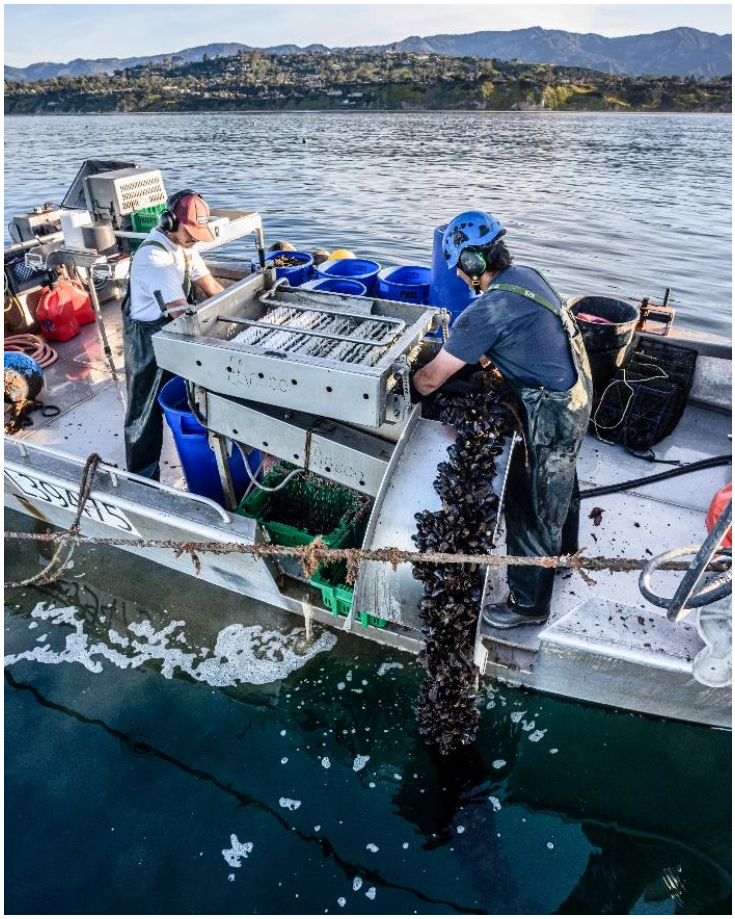
and drove down through the burning fires to your commission meeting on December 7, 2017 to demand action.

At that Commission meeting I received a heartfelt apology from the Department's Deputy Director. His public apology felt personal and made my family feel relevant and appreciated. After years of my CEQA document being sidelined the document was finalized that same day and ready to be submitted for public comment at your February 2018 commission meeting.

Action by the Department and the Commission should not have had to involve pulling my kids out of school and getting really upset with your program to get respect and action. But it was precisely that action that spurred on the department to finish processing my multiple and repeated requests for due process throughout those years. It was a very pivotal and memorable moment in my career.

On May 19, 2018 I was granted a 15-year state water bottom lease. This very monumental and significant moment should not be omitted from the Department's nor the Commission's records.

This is the only state water bottom lease that successfully grows shellfish in the offshore waters of California. This is the most successful offshore shellfish farm to have ever existed in our history in the United States of America. Your own staff have currently accepted applications which are trying to copy the success of this lease. The future of aquaculture lies off our shores and this farm has broken barriers and shown a light on that future.



This lease is also your first ever state water bottom lease to receive approval from all of California's regulatory agencies to farm shellfish in this new modern-day regulatory era. I have the full approval of every regulatory agency in California to farm shellfish in California. Very few people can say that. This is also information the AIR fails to mention and is valid and important information when discussing aquaculture permitting in California.

The AIR report also fails to mention that the farm grew over 2,500 giant kelp plants in 2019 for a Department of Energy grant funding research for renewable energy. This is monumental achievement for the United States of America. Pease validate my achievements. I have worked long and hard to get to where I am today. I am a very unique person with a very unique skill set and a very unique farm.

One of the Commissioner's expressed dismay that a new lease applicant has been waiting 2 years get started on a lease. I have waited too long to address this issue. I was waiting for an appropriate time to do it. I feel that I have no outlet or place to express my concerns and be heard. I realize I may have now missed my chance, but this issue is very important to me and it's time I get this conversation started.

I would like to address the subject of the proposed mussel farm, Santa Barbara Sea Ranch, that was approved to move forward by the Fish and Game Commission back in August 22, 2018. I write to express my concerns with this lease application. My concerns also carry over to the other new lease proposal off of Malibu. Both of these lease applications mimic parts of my lease and mention it in their applications, but I fear the applicants do not have the proper skills to execute such a farm. More on that later.

My first objection is the speed and process that this applicant was selected to be approved in the interest of the public. I should have made my complaints known at that time. To refresh your memory my lease had just been approved by the Fish and Game Commission in April 2018. My lease was then approved at the Coastal Commission in July of 2018. My lease had not yet gotten approval from the US Army Corps of Engineers or the Central Coast California Regional Water Quality Control Board.

At the time, I was still in lease legal limbo. I was also moving my family and getting ready for the new school year in August at the same time this proposal was before the Commission. I was not given any notification that this proposal was on the Commission agenda. Even had I known about it, voicing my concerns at that time may have jeopardized my own chances of getting approved. It was inappropriate for me at the time and possibly harmful for my own chances to get full approval of my own lease.

I do not think you followed procedure as described in the AIR. I didn't feel sufficiently notified about what is going on nor did I know about the second lease application as well. I had to find them by searching your past meetings on the web.

I am really shocked and outraged that after 10 years of working with the Department of Fish and Wildlife and the Commission to keep extending my old lease and getting a new and updated lease that the Department of Fish and Wildlife would accept the first person to copy my farming model with $500 to apply for a space right next to my farm. Mr. Willet has no mussel farming experience. He has never even been to my farm. The only way he was able to get the information was that he was able to study my CEQA document that was made public in January 2018. Without that document being published on the internet he would not have known what to write because he has not had any mussel farming experience.

The last thing I need after struggling to get my farm permitted for decades is an even bigger mussel farm right next to mine. I have struggled for 18 years to build my business and my brand so that I can make a living and gain acceptance in the Santa Barbara community. My brand of Hope Ranch mussels has taken decades to build and market. Putting another mussel farm right next to mine will undermine my brand and will compete in my markets that I have painstakingly built.

I'm appalled that you would even consider giving a novice farmer 100 acres right next to my 72 acre farm. I have worked extremely hard to get to where I am today, and you just give the first person to apply a larger space right next to mine in the blink of an eye.

People in California will not differentiate between the two farms. All my decades of hard work will immediately be jeopardized by the mistakes of a novice farmer. My farm has large closure periods due to domoic acid and paralytic shellfish poisoning. I get a lot of Scoter duck predation. I have large winter storms and strong currents that I have to constantly manage. Why would you put an inexperienced farmer next to me? All his mistakes will become my problems. I feel that this would majorly burden my livelihood.

The environmental conditions have changed over the past few years. Global warming and ocean acidification are noticeable. My shellfish growth has slowed down considerably and I'm getting a lot of die off. I successfully applied and received two grants to work on mussel breeding to adapt my mussels to these concerning conditions. I have no expansion plans within my own farm until more resilient mussels are produced with the research currently being conducted.

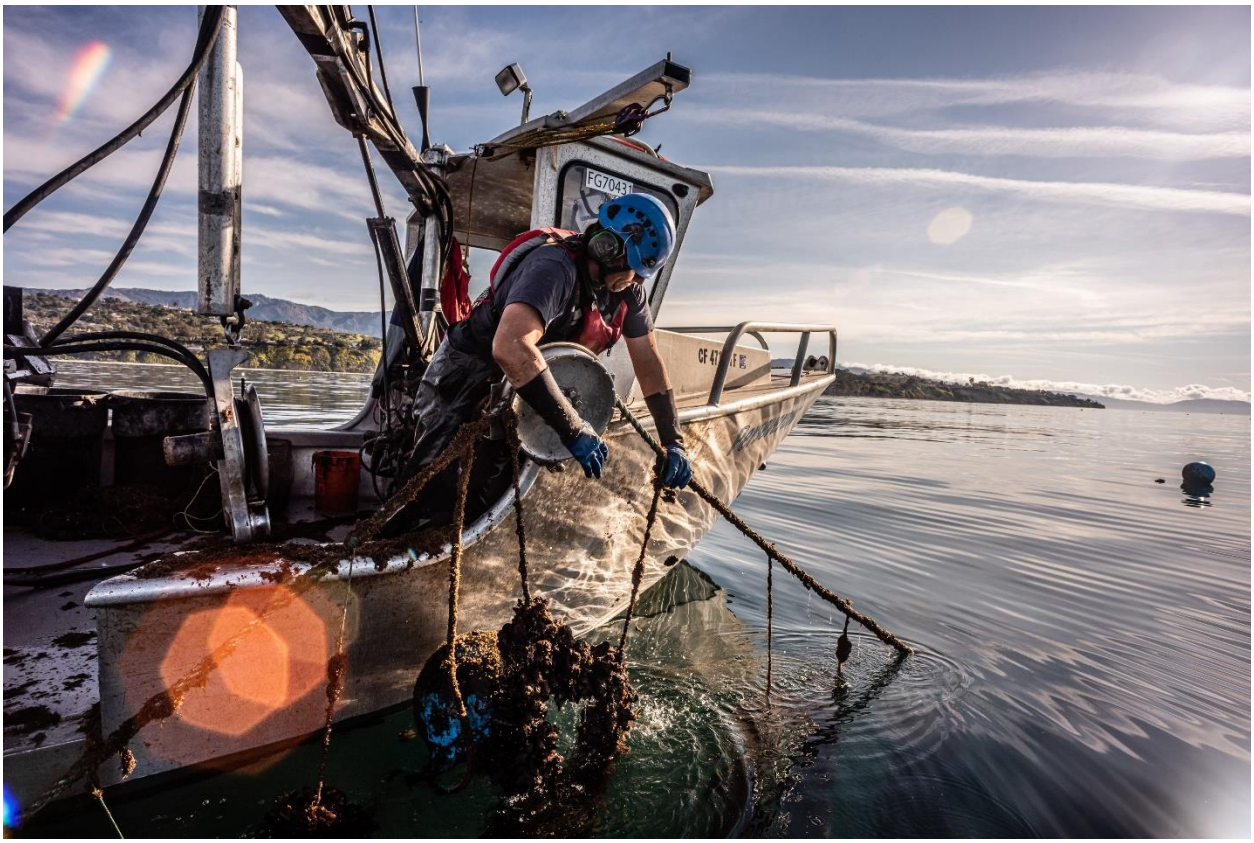
This offshore shellfish farming business is incredibly hard and dangerous. Many people considering entering the profession of offshore farmer do not appreciate this aspect of my business. People are really unaware of the skill sets I have learned and earned throughout my life to be able to do this. Catalina Sea Ranch tried to imitate me and failed miserably.

Catalina Sea Ranch was a very costly lesson for me. When they started selling mussels into the marketplace, they immediately moved into my markets and drove the price down by almost half. Catalina Sea Ranch was operated by a novice farmer that blew through 5 million dollars of investment and went bankrupt with over a million dollars of debt. They were also not in compliance with the regulatory authorities.

The Coastal Commission and the US Army Corps of Engineers should have given a much smaller lease space to a novice farmer. The rules are only as good as they can be followed. It's easy to tell someone not to do something, but much harder to teach them how to do something correctly. Catalina Sea Ranch had no idea how to follow the rules and there was a major tragedy associated with the inexperience of that operation. Guess who gets to pay again for the increase in regulatory oversight due to the completely insufficient permitting vetting? I do. The rules just got tougher to comply with.

The greater tragedy is no one is taking responsibility for all the seafood consumption that goes on in California. Why must foreign environments and foreign governments pay for our seafood consumption. The real cost of producing seafood for American's to eat is entirely unaccounted. Can you imagine how much it would cost if we regulated all the seafood we consumed?

I am the best offshore mussel farmer because of my training and education, and it is not because of my ability to navigate the regulatory authority**.** I have attached my resume so that you can see what a qualified individual might look like when applying for an offshore lease (Exhibit B). The following is a description of all my accomplishments leading up to becoming a shellfish farmer. It is really a life-long journey.



I would like to tell you a little about myself so you get a sense of who I am and how I came to become an offshore mussel farmer. My hope is that California promotes similar dedicated and experienced people to the future of offshore farming.

My love of farming first expressed itself in my agriculture classes in high school. I joined the Future Farmer's of America. This national organization promotes and supports agriculture education, and I was the president of my high school chapter in my senior year with many awards (see exhibit C). I earned a Biology Degree from UC Santa Cruz. I was taught by some of California's most famous marine ecologists such as John Pearse and James Estes to name a few. Dr. Pearse taught my kelp forest ecology class and Dr. Estes was my adviser for my senior project studying urchins and kelp on a remote Aleutian Island in Alaska.

My scientific diver and dive master training was taught by the legendary and late Don Canestro. He was the diving safety officer at UCSC at the time. I worked as a scientific diver for Dr. Mark Carr, Dr. Steve Gaines, Dr. Pete Ramondi, and Dr. Dan Reed to name a few. These are all some of California's most venerated marine ecologists.

My training and education for working in the marine environment continues when I completed my A.S. in Marine Diving Technologies at the Santa Barbara City College. I learned from Don Bartholomew and Jerry Clauser who are legends in their fields of commercial ROV work and commercial diving respectively. I received my Commercial Diving certificate from that program and went to work for Ecomar Inc. harvesting mussels off of 8 oil platforms in Southern California.

Dr. Bob Meek, the founder and owner of Ecomar is also a legend that should not be forgotten. He is the only person in America or anywhere in the world to successfully harvest edible mussels off of oil platforms, and he did it for decades. We sold mussels all over the United States and people loved them. I joined Ecomar in 1998, and I loved it, and Dr. Meek opened up a whole new world for me and he became a role model. He taught me the nuts and bolts of managing a business on the ocean. I worked for him for a total of 4 years.

I continued my education of the marine environment even further. I went to the University of Ireland and did all my course work for my Master's degree in Fisheries Management, Development, and Conservation. That program was Ireland's answer for being tasked with complying with the European Common Fisheries Policy while trying to keep their local fisherman employed.

After the 10 months of classes, I went back to work for Dr. Meek at Ecomar. He wanted to start growing oysters off one of the oil platforms and we struck a deal that while I was growing the oysters for him, I would also be able to design a Master's thesis with the University of Ireland that would satisfy their requirements to complete my degree. My master's thesis "Developing Oyster Culture in The Santa Barbara Channel" was submitted and accepted a few years later.

All this happened before I started working on my state water bottom lease back in September of 2002. I have worked hard and diligently as a shellfish farmer for the last 18 years supporting myself and now my family with that lease. My family is dependent on this lease for income, it would be disastrous if the lease were taken away. It's not like I can get a job as an offshore shellfish farmer somewhere else.

I hope by now you see why I am so infuriated with how easily and quickly Mr. Willet was able to apply for a lease right next to me. Although I feel honored that he wants to copy me. He even has his yacht parked on the same finger as mine in the Santa Barbara Harbor. I feel Mr. Willets does not even come close to having my training and experience. I have acquired decades of training and education in building up experience and talent so that I can gain the public's trust in allowing me to farm off the coast of Santa Barbara. If you let an inexperience operator start up next to me, and that person messes up, it will jeopardize and possible erase decades of my work.

My next point I would like to make is the insanity of taking the first 4 applicants for a state water bottom lease and then closing the process to any new applicants. That's crazy, no organization takes the first 4 applicants that show up for the job. By taking the first 4 applicants, you are now excluding more qualified candidates. You shouldn't take the first person with $500 and then spend all your time vetting that one application. You should pull from a pool of the most talented people you can find if you want aquaculture to succeed in California**.** The Commission should change from an open access policy to a more discerning one.

The future ocean farmers that are going to manage these offshore leases need experience in the offshore environments so they can make appropriate decisions. The reality is that there is a very limited number of leases that can be created in State waters. Make sure you have the very best. The people at the top, signing their name on the dotted line need to know how to run offshore farms. The ocean will sort them out for you, so why spend all your time getting weak applicants through the process.

The department's permit counter and the California Shellfish Initiative have not been helpful. I just want to let you know that there has not been any coordinating with other regulatory agencies in regards to my lease. I am responsible for complying with all the rules and coordinating with all the agencies. In effect, I feel aquaculture is not a program of any kind here in California. It is a group of individuals who have some how managed to find a way to farm in California's State waters. I think it is less than 20 individuals. I would not call this an industry. I don't feel I have any representation. There seems to be no coordination going on. You can clearly see from this letter that I must be my own advocate.

I have been advocating for offshore aquaculture for some time now. I feel I am clearly ahead of my time. I have shown this State it is possible to get an offshore farm permitted in California and that one can be managed and accepted by the local community for 18 years. I really want the best for the future of aquaculture.

Aquaculture does not have to be a race to the bottom like many industries in the world where we suck up the resource faster than the competitor can. The State has invested too little in the future of aquaculture. The State regulatory agencies have made it very clear on what not to do, but I feel that there is no advice on how to farm offshore properly. If you feel aquaculture is in your future, invest in training your future farmers and give them the necessary resources to be successful.

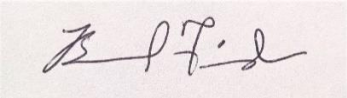
I would like to see aquaculture administered at a more local level. Please welcome any port district involvement. I feel that the ports have more resources for solving local problems and have the knowledge and experience to administer aquaculture in their local district. They will also be invested in marketing aquaculture products so that their constituents are working together to build markets and

not competing against each other for the same market. This is very important to create a thriving industry. California aquaculture needs to be marketed to be competitive with imports.

Please also welcome the Ventura Shellfish Enterprise back into State waters. I think they made a mistake by moving to Federal waters. I'm very certain that the VSE has a much better chance to be successful in State waters.

I feel very deeply about the future of aquaculture here in California. I have put it all on the line. My family's health and upward mobility are directly tied to the success of my State Water Bottom Lease. I am very aware that I operate on public resources and I would like to contribute to keeping those resources available for future generations. For me, farming is all about discovering these deep new relationships. Aquaculture can be a tool to lower our impact on the Earth's resources if put in capable hands. I feel like we are just at the beginning at discovering our relationship with offshore aquaculture.

Yours Truly,



Bernard Friedman

EXHIBIT A

11/30/2017

bernard friedman
[redacted]

Californian Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

Dear Commissioners,

Regarding AGENDA ITEM 25 for the Commission meeting on December 7, 2017

I will be attending this meeting with my family. I would like to request 5 minutes of speaking time regarding this agenda.

Santa Barbara Mariculture is owned 100 percent by myself. Lease M-653-02 being considered for extension on this agenda provides 90 percent of my family's income. The other 10 percent comes from commercial lobster fishing. We are a fishing family dependent on California's marine resources for our wellbeing.

The process of seeking a lease extension for the past 6 years has eroded my family's upward mobility. I feel that this ultraslow progression has harmed my family's future and retarded any potential growth as I am being required to stagnate in a process with no means of escape except to quit.

My kids are growing up. I'm getting older. Progress is happening all around me except my means to make a living is stuck in an endless permitting cycle. The cost, time, and anxiety created by this dysfunctional bureaucratic procedure has eroded my family's future prosperity as a fishing family.

In 2012, I was informed by the Coastal Commission that this lease was permitted for only one acre in 1985. This notice sparked a cascade of events which mandated that basically all of lease M-653-02 be updated to present day standards.

I have spent hundreds of hours working with the department of fish and wildlife. I have spent $25,000 getting the farm surveyed and a CEQA document prepared by a third party. I have spent 6 years coming to fish and game commission meetings asking for a lease renewal every year. I have spent thousands of hours worrying about my future and how and if I am going to get through this process and be a fully legitimate and permitted shellfish farmer in California.

After all this time and energy, I have yet to begin the permitting process. The department is again asking for a lease extension, and again, they promise this will be the last extension. During the last commission meeting in which the lease was on the agenda, Director Bonham stated the department was going to "either do this or not". It's now 6 months later, and as you know, the department did not. I am exhausted, angry, and completely disenfranchised with this process.

This lease still has to go through public comment. It still has to go through the Coastal commission process, and then through the army corps of engineer process. This is just what I know. Many unknowns could surface. At this rate, it is quite possible I will retire before this lease is fully permitted.

Not being able to grow my business as it naturally would has impacted me in many ways. No permanent employees. No investment or upgrades in infrastructure. Wasted mussel seed and opportunities because the farm doesn't have enough room to do its business as it was planned and designed many years ago.

I am extremely concerned for my family's future and welfare. I am bringing them to this Commission meeting so that we can hear accountability, get some recourse for the harm that's been done, and find a vision for moving forward so that my family can get back on track with our future.

Earning a living as a fisherman and a farmer is one of the toughest jobs on this planet. The permitting process does not take the difficulties of this job into consideration. There is no empathy displayed for my family. The process is making it really hard and expensive for me to compete with foreign mussels imported into California. Why is it okay to grow mussels in New Zealand and Canada for consumption in the California, but not in California?

There are only 3 mussel farmers in California growing less than 1% of the mussels consumed in California. There are only 14 shellfish farmers in the State. California only has 60 aquaculture registrations making over $25,000. Registrations are projected to decline. This is the wrong direction for the aquaculture department to be heading. Sixty people in the entire state is not an industry.

Five years ago, Assembly Bill 1886 (Chesbro, 2012) was created and supported by the aquaculture "industry" to add program capacity. The bill increased registration fees by 20%. As a result there are now 14% less registrations. The aquaculture program is estimated to run a deficit in 2017 with future increasing deficits. The aquaculture program is slowly going broke.

Where is my family's future when the department cannot responsibly manage the aquaculture program? Where is the vision for the future? Are we always going to be dependent on foreign countries exporting their seafood to California? Who is going to take responsibility for California's seafood consumption?

How does this Commission envision the future of aquaculture for California? This family wants to know, and would like to hear from you at the commission meeting. I'm taking my kids out of school because it is important for them to hear their future and understand how it is affecting their lives. Please make it a learning experience. We want to hear your thoughts, opinions, and ideas on our future as part of this process. We want to be engaged with respect and dignity that we feel we deserve.

Please hold people accountable and responsible for not moving this process along. Instill some justice. Start the healing so that this family can believe and have faith in this process. We need your help.

Sincerely,

bernard friedman

EXHIBIT B

PERSONAL QUALIFICATION SUMMARY: **Bernard Friedman**

Contact Information

Santa Barbara Mariculture Company

1. Education and Training

MSc. Fisheries Management, Development, and Conservation from the University of Ireland, June 2002
B.A. Biology from the University of California, Santa Cruz, June 1995
A.S. Marine Diving Technologies, Santa Barbara City College, June 1998
Shellfish Handling and Marketing Certificate from F.D.A. California (Current)
CA Dept. of Public Health Growing Area Certificate M-653-02 (Current)
ServSafe Food Protection Certification (Exp. 2021)
FDA certified offshore wet storage facility (current)
Certificate of Training for Commercial Diving, Santa Barbara City College (1998)
Certificate of Training for Research Diving, UC Santa Cruz (1994)
Certificate of HAACP Course Completion (2003)
Basic Sea Survival Course Training, Ireland (1999)
Emergency Medical Technician Certificate, Santa Barbara City College (1998)
Master of Dendrology Honorary Award, Palm Beach Gardens High School, Florida (1991)
Agricultural Achievement Award, Palm Beach Gardens High School, Florida (1991)
National Outdoor Leadership School Certificate, Wind River Range, Wyoming (1988)

2. Employment history

2002-present: President of Santa Barbara Mariculture Company, Santa Barbara, CA.
2010-2018: Commercial Lobster Fisherman, Santa Barbara, CA.
2009-present: Offshore Shellfish farming Consultant, North America and Central America.
2003-2004: Commercial Fishing Deckhand for Lobster and Sea Urchin, Santa Barbara, CA.
1998-2003: Commercial Diver, Ecomar Inc., Goleta, CA.
1996-1997: Lab Technician and Scientific Diver for Marine Science Institute, UC Santa Santa Barbara, CA.
1996: Scientific Diver, National Biological Services, Shemya Island, Alaska.

3. Publications

Cheney, D., Langan, R., Heasman, K., Friedman, B. and J. Davis. 2010. Shellfish Culture in the Open Ocean: Lessons Learned for Offshore Expansion. Marine Technology Society Journal 44 n.3: 55-67.

Friedman, B. Developing Offshore Oyster Culture in the Santa Barbara Channel. 2002. Dept. of Zoology. National University of Ireland, Cork.

4. Synergistic activities

5. Collaborators and other affiliations

Commercial Fisherman of Santa Barbara, Board Member.
Paso Pacifico Nicaragua, Development and Education Advisor.
Ventura Shellfish Enterprise, Development and Education Advisor.
NASA Ocean Research from Space, Business Amplifier panelist.
Master's Student Advisor at The Bren School of Environmental Science, UCSB.
California Aquaculture Association, Member.

Filmography

"The Salty Generations" Independent Film. Shawn Wolf Productions. June 2018.
"Are you Committed?" Billion Dollar Buyer. Season 2, Episode 2. CNBC. November 2016.
"Mussel Man" Documentary Santa Barbara Film Festival. Barefoot Productions. February 2015.
"Oysters on the Half Plate" Storage Wars. Season 4, Episode 7. A&E. May 2013.

Featured Publications about Santa Barbara Mariculture

Purveyor of the year (Award). Santa Barbara Independent. August 2019.
State of California Natural Resources Agency, Fish and Game Commission Mitigated Negative Declaration for Santa Barbara Mariculture Company Continued Shellfish Aquaculture Operations On State Water Bottom Lease Offshore Santa Barbara, California. Prepared by: California Fish and Game Commission Staff. January 2018
Using Scientific Muscle to Grow Safer Mussels. NASA Earth Observatory. Editorial. January 2018.
Flexing Mussels Over Mussels. California's Only Open-Ocean Shellfish Farmer Struggle's to Grow His Santa Barbara Operation. By Matt Kettmann. Santa Barbara Independent. April 2015.
Hope Ranch Mussels with Sweet Corn and Chile Vinaigrette from Downey's. Cover photo by Shelly Vinson. Food and Home Santa Barbara Magazine. Spring 2016.
Mussel Madness. Dinners on the Central Coast are in Love with this Brilliant Bivalve. By Jenn Kennedy. Cover Photo by Bernd Zeugswetter. Food and Home Santa Barbara Magazine. Fall 2014.
Hooked on Local Catch. By Shannon Turner Brooks. Santa Barbara Season's Magazine. Summer 2011.
The Last Bite. Bernard Friedman, Santa Barbara Mariculture. By Laura Sanchez. Edible Santa Barbara Magazine. Winter 2010.
Mussel Boat. Cover Photo and editorial. Fisherman's News. February 2007.
California Gets Canadian Mussel Rig. Editorial. National Fisherman. March 2007.
Built to Order Boats Delivered to Two Shellfish Companies. Editorial. Longlines. May 2007.
Champagne and Shellfish Get Together at The Hotel Del. By Nina Mcdonald. Coronado Eagle and Journal. March 2007.
Santa Barbara Mariculture Plying New Waters. Editorial. Longlines. July 2004.
A Pearl of a Find. Farmer's Market Report. By Diane Rodgers. April 2004
Up from the Deep. Cover photo by Mehosh Dziadzio. Food and Home Santa Barbara Magazine. Winter 2003.
Picks of the Week. Pacifc oysters. Editorial. Santa Barbara News Press. October 2003.
Food for Thought: Fresh Fish for the Eating. By Sally Scappon. The Beacon. September 2003.

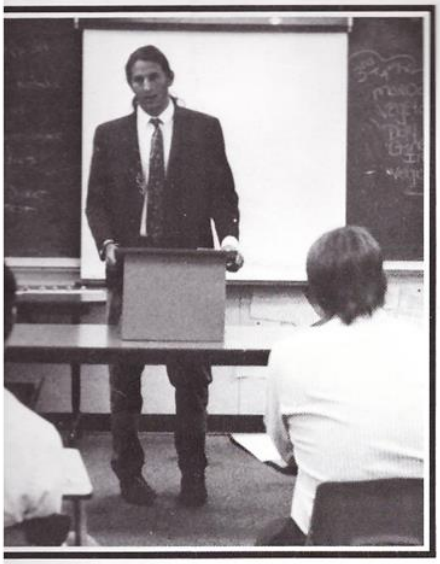
Grant research on the farm

USDA SBIR. Investigating the California Mussel as a new species for aquaculture production. May 2019,

Pacific States Marine Fisheries Commission. Developing Locally Adapted mussel varieties for aquaculture production the Southern California Bight. July 2019.

ARPA-E Mariner program. Genome-Wide Association of Studoes for Breeding M. Pyrifera. March 2018,

EXIBIT C



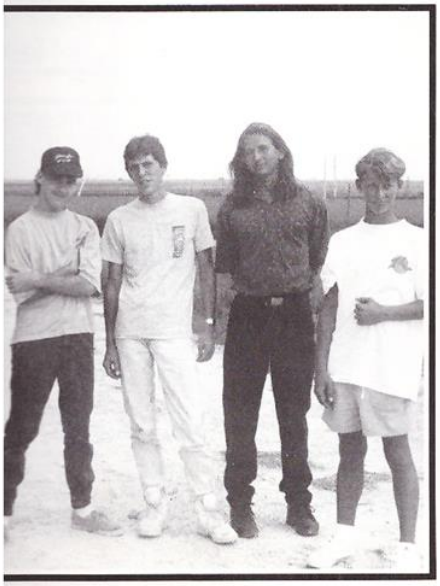
The club with a

Green Thumb

The Future Farmers of America originated from the Horticulture class. The organization was for people who were interested in the Agriculture field and may possibly be seeking a job in the future in this area. FFA participated in many different contests throughout the year such as plant and vegetable identification- both held at the South Florida Fair, Forestry Field Day, and numerous others. The main purpose why many joined this club was to develop and learn more about plants, the environment in which they grow, and learning skills which will help them in future Agricultural career choices.

-Jennifer Hanson

Front row: Jason Schmidt-Secretary, Joy Gray-Vice President, Mr. Culbert-Sponsor, Susie Hahn, Aaron Rhodes-Sentinel. Back row: Mike Doran, Evan Weilage-Treasurer, Rick Embray, Bernie Friedman-President, Tim Wallace-Reporter, Kris Franzen. Not Pictured George May and Calvin Wright-Parliamentarian. ***Photo by: Bryn Alan***



President, Bernie Friedman gives his speech to the judges in an extemporaneous speaking competition. ***Photo by: Susie Hahn***

Tim Wallace, George May, Rick Embray, Bernie Friedman, and Kris Franzen pose while attending an Agriculturaral leadership school. ***Photo by: Susie Hahn***

rom: "[redacted]
Sent: Tuesday, October 27, 2020 8:56 PM
To: FGC@fgc.ca.gov
Subject: FGC MRC Meeting Nov. 10, 2020 Agenda Item 5. New Marine Aquaculture Leases in California

FGC MRC Meeting Nov. 10, 2020

Agenda Item 5. New Marine Aquaculture Leases in California

I am a major proponent for offshore aquaculture. I have made it my life's work to develop and promote it. Please, for the future of aquaculture, **do not create any new leases** until you have created a vision and a comprehensive management program for implementation of new state water bottom leases.

Please direct all new applicants (including the ones that are already in the queue) to port districts that are willing to do the heavy lifting for training and vetting of new offshore leases. I am lobbying the Ventura Shellfish Enterprise to head back into State waters. They will be able to have more success as offshore mussel farmers in more protected waters. I will be applying for one of those leases when their operations plan is more comprehensive and realistic.

Your permit counter does not work. How can you accept any applicants when it does not work for your current State water bottom lessees.

Right now, applicants will still be going through the permit process sequentially for each agency**. I will be voicing my opposition of your first applicant throughout this process**. My reasons have been detailed in a letter I sent to the department and the commission dated July 2, 2020.

The last offshore mussel farm to copy my farm was a complete disaster. Catalina Sea Ranch was non-compliant to the permit conditions of their lease and ended up in bankruptcy with major liabilities. It still hasn't been made clear to why a non-compliant and bankrupt company can be bought at a private auction for $1.75 million so the next unqualified lease holder can get another chance. That lease should be going back into the public trust. What message does this send to the people of California?

This state is not ready to manage individual leases at the State level. The last 20 years should be proof of that. The Fish and Wildlife department has accepted an application for 100 acres right next to my farm by an unqualified candidate. **This minimizes my life's work and is completely disrespectful to all my success which I have worked so hard for**.

There is only enough room for about 3 shellfish farms off the coast of Santa Barbara in State Waters. I would love an experienced and capable neighbor to contribute to what I have already built to make a stronger group of shellfish farmers. Seaweed and scallop farming would be very good compliments. This applicant that has applied to be next to me will only compete with what I have already created. The applicant adds nothing to the future of aquaculture. It is such a slap in the face for the Department to allow for someone to completely rip me off.

By giving a lease to an unqualified farmer, you are sacrificing future opportunities for more qualified applicants. Applicants that will contribute significant contributions to offshore aquaculture. **Please do not sacrifice what little that is available to such a weak applicant.**

Bernard Friedman
Santa Barbara Mariculture Company