



September 27, 2018

Mark Delaplaine
Energy, Ocean Resources, and Federal Consistency
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219

SUBJECT: Coastal Consistency Certification – Ventura Shellfish Enterprise

Dear Mr. Delaplaine,

The Ventura Port District (VPD) is requesting a Coastal Consistency Certification for Ventura Shellfish Enterprise project. The proposed project would establish a commercial offshore bivalve aquaculture operation based from the Ventura Harbor. The project consists of twenty 100-acre plots in federal waters of the Santa Barbara Channel in sandy bottom areas located northwest of Ventura Harbor. The sites would be used for growing the Mediterranean mussel (*Mytilus galloprovincialis*) via submerged long lines. The mussels would be grown and harvested by project growers/producers and landed at Ventura Harbor. The VPD is seeking a permit from the U.S. Army Corps of Engineers pursuant to Section 10 of the Rivers and Harbors Act of 1899 to permit the installation of structures in waters of the United States.

Detailed information regarding the project and its purpose, potential impacts, avoidance and minimization measures, and consistency with the California Coastal Act is provided in the attached documents.

Enclosed with this letter is a Coastal Consistency Certification analysis and associated information including a description of the project and its associated impacts, project figures depicting proposed work in federal waters, and measures to avoid project impacts. The Corps application, a Biological Assessment, and Essential Fish Habitat (EFH) Assessment prepared for the proposed project are also included.

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Thank you in advance for your review of this request for authorization. Please contact me at 805-642-8538 or opena@venturaharbor.com as well as our authorized agent, Melis Okter, at 510-601-2516 or mokter@dudek.com if you have any questions or require additional information.

Sincerely,

A handwritten signature in black ink, appearing to read 'Oscar Peña', with a long horizontal flourish extending to the right.

Oscar Peña
General Manager
Ventura Port District

*Attachments: Consistency Certification Analysis
Figures 1-11
Application to the U.S. Army Corps of Engineers
Biological Assessment, dated September 2018
EFH Assessment, dated September 2018
NOAA Siting Analysis, dated September 2018*

*Cc (sans attachments):
Cassidy Teufel, California Coastal Commission*

Coastal Consistency Certification

1. REQUEST

The applicant, the Ventura Port District (VPD), hereby submits this consistency certification for approval by the California Coastal Commission pursuant to 15 C.F.R. § 930.57, to evaluate the effects of the proposed mussel aquaculture project, to be located in federal waters, consistent with its request for a permit from the U.S. Army Corps of Engineers (USACE), issued pursuant to Section 10 of the Rivers and Harbors Act of 1899.

2. AUTHORITY

This coastal consistency certification is submitted in compliance with Section 930.57 of the National Oceanic and Atmospheric Administration's (NOAA) Federal Consistency Regulations (15 C.F.R. § 930.57), which provides that "all applicants for required federal licenses or permits subject to State agency review shall provide in the application to the federal licensing or permitting agency a certification that the proposed activity complies with and will be conducted in a manner consistent with" the Coastal Zone Management Act (CZMA). General legal authority for CZMA consistency certifications is found at 16 U.S.C. § 1456 and 15 C.F.R. Part 930 Subpart D. The authority of the California Coastal Management Program is defined in the California Coastal Act. As defined in California Coastal Act Section 30103, the coastal zone extends seaward from the shoreline to the State of California's outer limit of jurisdiction (3 nautical miles), including all offshore islands. Federally controlled lands are not part of the coastal zone (15 C.F.R. § 923.33); however, projects must still comply with consistency requirements when federal actions have spillover impacts that may affect land or water use or natural resources within the coastal zone. In addition to this consistency certification and its USACE permit application, the VPD has also prepared a biological assessment (BA) and essential fish habitat (EFH) analysis to determine whether any federally protected species or habitats are likely to be adversely affected by the project. Pursuant to Section 7 of the Endangered Species Act (ESA) and its implementing regulations (16 U.S.C. § 1536; 50 C.F.R. Part 402), the BA and EFH analysis have been prepared to support consultation between the USACE, the U.S. Fish and Wildlife Service and National Marine Fisheries Service. A copy has been included with this consistency certification.

3. CERTIFICATION

As required by 15 C.F.R. 930.57(b), based upon the analysis contained herein, as well as the supplemental analysis provided in the documents submitted with this consistency certification, it has been determined that the project as proposed complies with the California Coastal Act and its enforceable policies (California Public Resources Code 30210 *et seq.*), and will be conducted in a

manner consistent with the program. We request that the California Coastal Commission (CCC) concur with our certification of consistency.

4. PROJECT PURPOSE AND DESCRIPTION

PROJECT OVERVIEW

Through this application, the Ventura Port District (VPD) seeks to permit twenty 100-acre plots of ocean space for aquaculture production of the Mediterranean mussel (*Mytilus galloprovincialis*) via submerged longlines in federal waters within the Santa Barbara Channel, proximate to Ventura Harbor.¹

PROJECT PURPOSE

Objectives of the proposed project are:

1. To increase the supply of safe, sustainably produced, and locally grown shellfish while minimizing potential negative environmental impacts;
2. To enhance and sustain Ventura Harbor as a major west coast fishing port and support the local economy;
3. To provide economies of scale, pre-approved sub-permit area, and technical support to include small local producers who would not otherwise be able to participate in shellfish aquaculture;
4. To provide an entitlement and permitting template for aquaculture projects state-wide;
5. To enhance public knowledge and understanding of sustainable shellfish farming practices and promote community collaboration in achieving VSE objectives;
6. To advance scientific knowledge and state of the art aquaculture practices through research and innovation.

1. To increase the supply of safe, sustainably-produced, and locally-grown shellfish while minimizing potential negative environmental impacts

The proposed project will serve to diversify the catch and stabilize the commercial fishing fleet home-ported at Ventura Harbor. The proposed project also will provide a locally cultivated, sustainably raised food source, and significantly advance state and national goals and objectives for increased domestic aquaculture and a secure food supply. The proposed project is supported, in part,

¹The VPD also acknowledges the critical assistance of its other key participants who have contributed time, resources, and information to assist with this application, including the Cultured Abalone Farm, Coastal Marine Biolabs, and Ashworth Leininger Group, as well as other participants including Scripps Institution of Oceanography, University of California San Diego, National Oceanic and Atmospheric Administration (NOAA) Fisheries West Coast Region, Woods Hole Oceanographic Institution, the California Department of Fish and Wildlife (CDFW), and Marine Science Institute, Bren School of Environmental Science & Management, University of California Santa Barbara.

through the NOAA Sea Grant program, the goal of which is to contribute to “a safe, secure and sustainable supply of seafood to meet public demand.”

Ventura Harbor is home to one of the top fisheries off-loading harbors in the state. One of the core goals of the VSE project is to enhance the Ventura Harbor working waterfront with a sustainable and dependable seafood harvest. The project will help meet state and federal goals for the growth of domestic shellfish aquaculture to better serve the U.S. population demands for new, sustainably grown protein sources. This is consistent with the VPD’s goal of upgrading infrastructure, equipment and facilities for a modernized, efficient and safe working harbor. A 2007 California Sea Grant Extension Program report titled “Commercial Fisheries of the Santa Barbara Channel and Associated Infrastructure Needs” noted that diversification of fishing operations through the development of new fisheries could provide new business opportunities.

The proposed project offers a number of other benefits related to food supply, because at present the mussel market in the United States and locally is dominated by imports from Canada, Chile, New Zealand, and Europe. California is the third-largest consumer of shellfish in the United States, and current state production lags far behind demand. Shortfalls are met by importation, which contributes to the state and national seafood deficit and increases our carbon footprint by the need to transport shellfish into the state from around the world.

This project will supply a locally grown mussel product to an established market with the potential for expansion. Mussels provide a high-protein, low-fat source of human nutrition. Compared with other cultivated protein sources (*e.g.*, beef, pork, chicken), mussels are a more environmentally sustainable food source, require no added feed or water, have significantly lower associated greenhouse gas emissions, and use ocean areas rather than land for production (see Table 1). The proposed project at build out would produce 9,000 to 11,000 tons of mussels for market per year. Further, by serving as a template for additional offshore shellfish-growing projects, this proposed project aims to increase the efficiency of shellfish permitting and thus provide a template to promote additional shellfish growing operations offshore of California.

Table 1
Comparison of Sustainability Indicators among Animal Production Systems

Animal Type	Food Conversion (kg feed/kg edible weight)	Protein Efficiency (%)	Nitrogen Emissions (kg/ton protein produced)	Phosphorous Emissions (kg/ton protein produced)	Land (tons edible product per HA)	Consumptive Freshwater Use (m³/ton)
Beef	31.7	5	1,200	180	0.24–0.37	15,497
Chicken	4.2	25	300	40	1.0–1.20	3,918

Table 1
Comparison of Sustainability Indicators among Animal Production Systems

Animal Type	Food Conversion (kg feed/kg edible weight)	Protein Efficiency (%)	Nitrogen Emissions (kg/ton protein produced)	Phosphorous Emissions (kg/ton protein produced)	Land (tons edible product per HA)	Consumptive Freshwater Use (m³/ton)
Pork	10.7	13	800	120	0.83–1.10	4,856
Finfish (average)	2.3	30	360	48	0.15–3.70	5,000*
Bivalve mollusks	Not fed	Not fed	-27	-29	0.28–20	0

Source: Aquaculture Workshop 2015.

Notes: kg = kilogram; HA = hectare; m³/ton = cubic meters per ton.

* Consumptive water use is difficult to compare across finfish aquaculture production systems because of variability in feed sources and depending on whether the system is freshwater or saltwater.

To minimize conflicts with other ocean uses and ensure location away from pollution sources, the proposed location was selected after multiple stakeholder workshops and consultations, noticed public meetings of the Ventura Port Commission, and utilization of two different marine spatial planning tools. (See “18. Nature of Activity” discussion.)

The proposed project is consistent with California’s Aquaculture Development Act (California Public Resources Code, Sections 826–828), which encourages the practice of aquaculture to augment food supplies, expand employment, promote economic activity and protect and better use the land and water resources of the state, and Assembly Joint Resolution 43 (2014), wherein the State Legislature states its support “to protect existing shellfish beds and access to additional acreage for shellfish farming and restoration.” The proposed project is also consistent with NOAA’s National Shellfish Initiative (NOAA 2013) and National Marine Aquaculture Policy (NOAA 2011), which seek to increase populations of bivalves in coastal waters through commercial aquaculture production and acknowledge the multiple benefits of shellfish aquaculture, including providing new jobs and business opportunities, meeting the growing demand for seafood, and providing habitat for important species. Finally, the proposed project furthers the goals of the National Ocean Policy Implementation Plan (National Ocean Council 2013), one of which is to increase efficiencies in the permitting process and encourage agency coordination to facilitate additional marine aquaculture development.

2. To enhance and sustain Ventura Harbor as a major west coast fishing port and support the local economy

The proposed project is essential to the future of Ventura Harbor. The harbor's status as a robust commercial fishing port is vital to VPD qualifying for USACE harbor dredging funds since the harbor is not a deep water port and does not house a U.S. Coast Guard station. Absent USACE dredging funds the harbor will silt up and close.

Integral to the VPD's mission is to provide a safe and navigable harbor that benefits fisherman. Included amongst the VPD's goals is to maintain and enhance a safe and navigable harbor by:

- Securing federal funding to support the USACE operation and maintenance program at the harbor entrance;
- Dredging the Inner Harbor and preserving infrastructure;
- Providing superior Harbor Patrol, Maintenance, and related Port District services;
- Upgrading infrastructure, equipment and facilities for a modernized, efficient and safe working harbor

To meet its mission and goals the VPD allocates annual revenues to operations, maintenance and capital improvements. In FY18-19 operating revenues were approximately \$10 million and operating expenses were approximately \$8.7 million. However capital improvements totaled \$5.2M, creating a negative cash flow of approximately \$3.9 million. This negative cash flow was funded by use of unrestricted reserves, but is not sustainable at this level annually. This means that some combination of increased revenues or revenue sources and alternative methods to finance some capital infrastructure projects is necessary. Specific to the commercial fishing industry, the VSE project can play a vital role in VPD annual revenue generation that can be leveraged for the financing of commercial fishing infrastructure while creating other positive economic impacts and maintaining dredging priorities as discussed further below.

The VPD, which is an independent special district, receives approximately 88-90% of its revenues from commercial leases, boat slip fees and fish off-loading charges. The remaining funds are local property tax revenues accounting for approximately 10-12% of revenues. These property tax revenues have consistently been allocated to public safety for Harbor Patrol but do not cover these operational costs. Additionally, the VPD is expanding Harbor Patrol operations to "24-7" due to increased demand for services which further increases annual operating expenses for public safety functions.

Dredging

The VPD is completely dependent upon the USACE for the annual federal maintenance of the harbor's entrance system, and the unloading of commercially harvested seafood at the harbor is a primary justification for this federal support. Without diversified fisheries delivering consistent fish offloading

necessary to justify federal funding to USACE for Ventura Harbor dredging, the Harbor risks future entrance closures.

The entrance system includes the following components:

1. A 1,750 foot entrance channel
2. A 600,000 cubic yard sand trap
3. A 1,800 foot offshore breakwater
4. A 1,550 foot north jetty
5. A 250 foot middle jetty
6. A 600 foot south beach groin

The annual maintenance dredging of the entrance channel and sand trap currently require between \$5,000,000 and \$7,000,000 per year. The cost of maintaining the rock structures (i.e. breakwater, jetties and groin), while not occurring on an annual basis, has nonetheless averaged about \$1,280,000 per year over the last 15 years. Were it not for the federal assumption of these maintenance needs, the harbor's entrance channel would simply shoal to closure, and all of the maritime interests in the harbor, both commercial and recreational would lose ocean access.

In order to avoid that possibility, in March 2012, when federal funding was inadequate for the USACE to complete the necessary dredging of the harbor entrance area, the VPD was compelled to utilize \$1,500,000 of its limited reserves to finish the dredging. It was only possible for the VPD to take that action, however, because the USACE had already absorbed the contractor's \$1,000,000 equipment mobilization cost. Even under such limited conditions, it is simply not sustainable for the VPD to financially support the Federal dredging program.

Infrastructure

One of the core goals of the VSE project is to enhance the Ventura Harbor working waterfront with a sustainable and dependable seafood harvest. This is consistent with the VPD's goal of upgrading infrastructure, equipment and facilities for a modernized, efficient and safe working harbor. The existing commercial fishing businesses generate direct revenue to the VPD in the form of commercial boat slips and fish offloading fees. These fees generate approximately \$1.2 million in annual revenue that supports marina operations and some infrastructure needs. The commercial boat slip fees are highly dependent upon a stable commercial fishing fleet, which depends largely upon the ongoing success of the California Market Squid industry along with other smaller fisheries. This industry has proven resilient but unpredictable from year to year due to a variety of impacts from weather, water temperatures, and market forces, including more recently imposed tariffs on international seafood products. For example, the VPD has had years where 60 million pounds or more in squid was offloaded while other years the VPD has had less than 20 million pounds offloaded. The VPD's off-loading fees

are generated largely by the same industry; however, these fees only represent 10% of the total revenue identified above (approximately \$120,000 annually).

The VPD, as part of its annual budget, prepares a 5-year capital improvement plan (CIP) which anticipates large scale projects that are necessary to maintain a modernized, efficient and safe working harbor. These needs are particularly pressing given the harbor's age, with many facilities 35-55 years in age. The scale of these projects necessitates capital financing, since annual revenues are largely utilized for ongoing operations and pay just a portion of capital improvements.

For example, a current project receiving capital financing is the Village Commercial dock replacement. This \$4.6 million project seeks to replace the dilapidated dock system, which is used primarily by 42 purse seiners and related commercial fishing vessels such as 20 light boats for the California Market Squid fleet. The project financing requires that ongoing annual VPD revenues be used to support the debt service.

In the next five to ten years, the VPD will need to finance a substantial amount of new infrastructure construction and likely dredge the inner harbor for commercial fishing boat needs and revetment maintenance, neither of which is a USACE-funded activity because it would be located in the inner harbor. Other projects may include future replacement of an older fisheries building, reconstruction of a fish pier, replacement or addition of fish offloading cranes, modernization of fish handling facilities, worksite improvements, fish equipment storage and fleet parking needs. It is conceivable that the VPD could finance \$20M or more in commercial fishing infrastructure costs to support ongoing operational needs. This is in addition to the \$4.6 million in debt discussed above. For illustrative purposes only, if the VPD were to borrow \$20 million over 30 years at current interest rates, the annual debt service costs to the VPD for this debt would be approximately \$1.2 million.

The VPD is subject to significant due diligence and financial "tests" in order to borrow and support capital project funds. While the VPD continues to meet these borrowing requirements, and maintains a strong financial position, it is clear that the VPD must seek to diversify its fisheries to support commercial fishing operational and infrastructure costs. Annual boat slip and offloading fees are used to fund ongoing fisheries and marina operations but do not provide the necessary funding to complete large-scale capital projects. Thus, the implementation of new fisheries and resulting revenues is of major importance to the VPD.

The VSE project anticipates wholesale market values of \$2.76 million per 100-acre parcel or \$55.2 million at full build-out of 20, 100-acre parcels. Many factors will ultimately determine actual revenue, with the most critical factor being the size of the approved project, as well as growing conditions, operational interruptions, time period to full build out, market conditions, project and operational costs, etc. However, in utilizing these initial projections the VPD is evaluating potential revenue sharing models as discussed below.

The VPD is evaluating a new revenue approach with the VSE project. The VPD will be the project permittee. As such, the VPD may consider implementing a participation fee (e.g. 3-5% of gross wholesale value) for future private grower producers, rather than rely on fish offloading fees to help fund infrastructure needs. For example, an operating fee of 3% of the gross wholesale value at full build-out as described above could generate annual revenues to the VPD of approximately \$1.65 million. These funds generated will be used to support the VPD's project administration costs and could help support future debt issued for commercial fishing infrastructure (e.g. \$1.2 million annual debt service as described above). A project of a lesser scale would directly impact future VPD annual revenues that can be used in part to support the financing of ongoing commercial fishing infrastructure and harbor needs.

3. To provide economies of scale, pre-approved sub-permit area, and technical support to include small producers who would not otherwise be able to participate in shellfish aquaculture

Designed economies of scale will maximize the previously described direct and indirect secondary benefits of the proposed project. Significant expenses are associated with permitting, environmental review, compliance with shellfish health regulations, and environmental monitoring; therefore, leasing and permitting the proposed project as one will provide economies of scale and eliminate a significant impediment to market diversification and participation by small shellfish companies or new investors. By permitting all the growing areas as a single proposed project, individual grower/producers benefit from the collective upfront permitting efforts of VPD.

As a specific example of a regulatory economy of scale, monitoring requirements such as implementation of a sediment quality monitoring plan are more efficiently handled at the VPD project scale as opposed to separate efforts by individual grower/producers. VPD, acting as the responsible party for BMP compliance, can use collective funds to monitor sediment conditions within the larger project area, offering technical sampling and reporting consistency, along with facilitating collection of a larger data set, which will offer greater opportunities to track overall project impacts. Collective sampling and reporting will also yield efficiencies in compliance review for the agencies, as VPD can act as a clearinghouse for information, handling the initial screening and vetting of information before it is transmitted to the appropriate regulatory agencies.

Project grower/producers will have access to a pooled, centralized and comprehensive monitoring and reporting program for all the growing plots. All necessary permits and entitlements will already have been obtained by VPD, making participation by the grower/producer "turn-key." The costs to the grower/producer associated with ongoing water quality sampling and monitoring will be reduced by the efficiency of a centralized pooled program, which will in turn reduce operating costs and increase the direct benefit to the grower/producer.

Further, grower/producers will also have access to technical expertise and the accepted BMPs developed through the permitting process and described below. Similarly, grower/producers will enjoy access to centralized marketing and branding of a Ventura-specific premium seafood product grown and harvested in the proposed area.

Each of these elements of the project design contributes cumulatively to a total package, which in turn contributes positively, and materially to the ongoing operational health and vitality of the Ventura Harbor community. The costs associated with the proposed project (i.e. permitting and monitoring) would be too high for a small operation. In order for the sub-permits to be affordable for individual grower/producers, the proposed project must be a large scale project.

4. To provide an entitlement and permitting template for aquaculture projects state-wide

A major goal of the proposed project is delineation of a streamlined strategic permitting pathway that will not only facilitate the establishment of a Ventura Harbor-based shellfish operation promoting sustainable economic development, but that will more generally serve as a model to help other entities address regulatory barriers and planning challenges that currently create impediments to the expansion of the shellfish aquaculture industry in California.

The proposed project is a unique approach to developing environmentally and economically sustainable shellfish commerce with product landed at the Ventura Harbor. This initiative is novel in several ways.

- The project proposes to produce bivalve shellfish in the offshore marine environment using cultivation practices that, although well-established worldwide, are in their infancy in the United States, particularly on the West Coast.
- The proposed project is a cooperative and collaborative effort taking place in an open-source format with state and federal regulators to establish a template for additional future shellfish growing operations in California.
- The proposal to permit a group of twenty 100-acre growing plots allows for participation by potential grower/producers who might otherwise be precluded from participation in aquaculture because of the significant regulatory burden of obtaining the required government approvals.
- The scale of the proposed project allows the individual grower/producers to benefit from centralized environmental monitoring, product safety testing, and product marketing.
- This proposed project as it is scaled will bolster the working waterfront in Ventura Harbor, providing economic benefits to VPD, its tenants, and the community.

The proposed project seeks to significantly improve the interagency review and permitting process for offshore shellfish aquaculture and create a comprehensive and efficient permitting process that is cost effective for both review agencies and applicant alike. In doing so, the overarching objective is to establish a viable and replicable permitting pathway model that satisfies the requirements of the review and permitting agencies and may be used by any prospective shellfish grower/producers to facilitate project design and aid in the evaluation of future offshore aquaculture proposals.

5. To enhance public knowledge and understanding of sustainable shellfish farming practices and promote community collaboration in achieving VSE objectives

Realizing the vision of an improved permitting process requires coordinated planning among all stakeholders to attain the full environmental and economic benefits. VPD and other VSE partners are committed to transparency, open communication, and comprehensive public education and outreach efforts. To this end, VPD and other VSE partners hosted an ongoing series of informational public meetings to discuss the social, economic, environmental, scientific, and technological variables encompassed by the proposed project. These interactive, workshop-style meetings provided a forum for open dialog among all interested members of the general public, state and federal agency representatives, shellfish industry leaders, and environmental and scientific leaders to discuss the policy, planning, and scientific issues surrounding the establishment of a Ventura Harbor-based offshore shellfish aquaculture operation. This was a critical first step toward productive collaboration and ultimately, overall project success.

6. To advance scientific knowledge and state of the art aquaculture practices through research and innovation

The project is envisioned to include both research and education components. The project includes as partners researchers and educators with the following institutions:

- UCSB Bren School
- University of California, San Diego, Scripps Institution of Oceanography
- Woods Hole Oceanographic Institute
- NOAA Fisheries West Coast Region

The project will serve an in situ working laboratory for improving shellfish aquaculture techniques and will be used as an open-water classroom. Qualified researchers affiliated with universities (i.e., UCSB Bren School, or University of Southern California, etc.), or qualified marine research institutes (i.e., Woods Hole Oceanographic Institute, Scripps Institution of Oceanography, etc.) will have access to aquaculture plots to conduct research and monitoring approved by the VPD; however, access may be limited in certain circumstances to respect grower/producer proprietary data or technology or to accommodate a grower/producer's operational and logistical needs in operating the farm. VPD will review and approve research projects in consultation with USACE,

NMFS, NOAA, and any affected grower/producers. Grower/producers will be fairly compensated for the use of their vessels, equipment, and fair market value of any mussels produced or generated as part of approved research projects.

PROJECT DESCRIPTION

The project consists of twenty 100-acre plots (total of 2,000 acres) located in open federal waters of the Santa Barbara Channel (Channel) in the Southern California Bight (SCB), northwest of Ventura Harbor, with approximate depths at the project site ranging from 80 to 114 feet below sea level, with an average depth of 98 feet. The plot locations are shown in Figure 1, with latitude and longitude coordinates for the outer corners indicated. Each of the 20 plots are 2,299.5 feet by 1,899.5 feet, for an average plot size of 100.27 acres. Each plot will contain up to 24 lines (12 end-to-end pairs), with each line consisting of 575 feet of backbone length and 250 feet of horizontal scope on each end. There will be a 50 foot setback on each end of the pairs (for a total of 100 feet of spacing between lines of adjacent parcels) and 50 foot spacing between the two center pins. Parallel lines will be spaced 150 feet apart, with a 125 foot setback at each of the long sides (for a total of 250 feet of spacing between lines of adjacent parcels).

The sites will be used for growing the Mediterranean mussel (*Mytilus galloprovincialis*) via submerged long lines (*see* Figure 2). The mussels will be grown and harvested by grower/producers who would sub-permit the plots from Ventura Port District, and the mussel product will be landed at Ventura Harbor.

SITE LOCATION

The project's twenty 100-acre plots are approximately 3.53 miles from the shore. The closest distance from the plots to the 3-mile nautical line is a minimum of 2,900 feet, with an average closest distance of over 3,000 feet. The closest distance from the growing area to the City of Ventura city limit is 4.5 miles. Ventura Harbor is 4.1 miles from the closest plot (8 miles from the most distant plot). The sub-permit sites are located on sandy bottom habitat outside of any rocky reef habitat, as evaluated in Gentry et al. 2017 and illustrated by NOAA United States West Coast nautical charts (NOAA 2017a).

SITE SELECTION

The project was initially proposed to be located in waters of the State of California, i.e., within the 3-mile limit. The VPD, in collaboration with its partners (collectively the "VSE") undertook extensive site selection public outreach that culminated in the decision to instead locate the project in federal waters so as to minimize conflicts with commercial halibut trawlers based in Ventura and Santa Barbara Harbors.

SITE SELECTION PROCESS SUMMARY

The VSE team hosted a series of seven public educational workshops regarding the proposed project. (See <http://venturashellfishenterprise.com/index.html> - About VSE, scroll down to “Get Involved” and click on “Workshop Archive.”)

After these introductory workshops, VSE hosted three site selection workshops to engage with stakeholders to identify the location of the twenty 100-acre parcels within a broader area of interest identified through use of a spatial planning tool developed by researchers at University of California, Santa Barbara, Bren School of Environmental Science and Management (UCSB Bren School). While in-person workshop participation was strongly encouraged, individuals who were not able to attend the meetings were provided the opportunity to comment on site selection through a UCSB Bren School SeaSketch digital mapping and communication portal linked to the VSE website. Notice of the site selection workshops was mailed out to a list of over 500 commercial fishing vessel owners between Goleta and Port Hueneme identified by the California Department of Fish and Wildlife (CDFW); additionally, VSE coordinated with NOAA representatives and commercial fishermen to encourage their attendance. VSE also contacted all of the individuals who registered interest in the proposed project through the VSE website. During and after the site selection workshops the VPD Board of Port Commissioners received written and oral reports on the site selection process at four public meetings held in summer and fall of 2017.

The initial candidate area in state waters was selected by VSE based on marine spatial planning analysis prepared by the UCSB Bren School (Gentry et al., 2017). The site selection analysis included numerous factors related to the suitability of the candidate growing area for mussels; location in State waters near Ventura Harbor for product landing; avoidance of potential pollution sources; and avoidance of conflicts with existing subsurface leases for oil and gas pipelines, etc.

Through the stakeholder engagement process and consultation with its aquaculture specialist, Scott Lindell of Woods Hole Oceanographic Institution, it became clear that location of the project in State waters posed certain issues. Most importantly, VPD received information from local halibut trawlers that the proposed State waters candidate area was located in one of two areas statewide designated by CDFW as halibut trawl grounds. Further, Mr. Lindell advised that a minimum 80’ bottom depth (versus the initial criterion of 60’ bottom depth) would reduce exposure to various mussel predator species (*e.g.*, diving ducks) and potential storm surge. Following a November 2017 public hearing, the VPD Board of Commissioners selected a federal waters alternative location, which was identified based on further refinement of the spatial planning analysis by the UCSB Bren School.

Subsequently, NOAA Fisheries Southwest District Aquaculture Coordinator, Diane Windham, connected VSE with NOAA’s National Ocean Service staff, which undertook a second siting study focused on federal waters proximate to Ventura Harbor. (See “Coastal Aquaculture Siting and Sustainability Technical Report, Ventura Shellfish Enterprise: Aquaculture Siting Analysis Results” prepared by Coastal Aquaculture Siting and Sustainability Program, within the Marine Spatial Ecology Division of the National Centers for Coastal and Ocean Science, National Ocean Service, NOAA, dated September 2018, copy attached.) The siting analysis represents an

objective, data-driven approach to identify the locations within federal waters with the highest compatibility with the proposed project. The results of this siting analysis identify two alternative sites (CASS Report Alternatives 1 and 2) proximate to Ventura Harbor given equal consideration of existing use conflicts, including:

- Existing vessel traffic corridors,
- Oil and gas production,
- Commercial fishing (specifically trawl and squid fisheries), and
- Obstructions, including submerged cables and wrecks.

The two CASS Report Alternatives are both situated in the northern portion of the siting analysis study area, which was determined to have the smallest potential overlap with conflicting uses. The primary difference between the two CASS Report Alternative sites is the configuration of sub-permit areas (Figures 3 and 4). Importantly, the two sites overlap with the federal waters alternative site identified in the UCSB Bren School spatial planning analysis, indicating the area has been shown by two independent studies to have the fewest conflicts with other uses and sensitive environmental resources (Figure 5). Following a public hearing in September 2018, it is anticipated the VPD Board of Commissioners approved CASS Report Alternative 1) (also shown in Figure 1) as the preferred project site. CASS Report Alternative 2 (shown in Figure 4) is shown as an alternate site location.

PROJECT CONSTRUCTION

Installation of anchors, longlines, and buoys will be performed by grower/producers in compliance with all permit requirements and VPD sub-permit conditions which will incorporate approved best management practices (BMPs). Submerged longlines consist of a horizontal structural header line, or “backbone,” that is attached to the seafloor by helical screw anchors drilled into the sandy bottom at each end and is marked and supported by a series of buoys along the central horizontal section, as shown in Figure 2. Helical screw anchors have been shown to exhibit superior holding power as compared to other anchoring systems and can be removed or cut below the surface at project decommissioning. Helical screw anchors for mussel farms in open ocean habitats have been installed all over the world, including offshore of Catalina Island, California. Helical screw anchors will be installed by a hydraulic drill with a drill head that operates from a rig lowered to the ocean floor. The helical screw anchors will be screwed approximately 10 to 20 feet deep into the sandy bottom ocean floor. Each 100-acre plot will contain up to 48 anchors for a total of 960 anchors at full project build out.

It is anticipated that the potential noise impacts from the installation of the sand screw anchors using a hydraulic drill will be minimal. The screw anchors are drilled into the seabed using a hydraulic auger controlled at the surface. The drill is submersible and is lowered with the anchor. Noise levels are very low in the water, with a relatively small (50 hp) hydraulic power pack on the

installation vessel (Fielder Marine Services, New Zealand, pers.comm.). Rotation speeds are very low, which minimizes entanglement of marine species. The anchor installation disturbs less than 1 square meter of seabed on installation and once installed no rope or chain touches the sea floor, which also minimizes seabed disturbance (Fielder Marine Services, New Zealand, pers.comm.). Marine wildlife, especially cetaceans, is known to be sensitive to noise effects (e.g., NMFS 2007a). However, construction noise levels will be well within acceptable thresholds for both marine mammals and fish (ICF Jones & Stokes and Illingworth and Rodkin, Inc. 2009; NMFS 2007a). Due to the minimal noise level and area of disturbance on the sea floor, an action area of 100 feet is sufficient.

Buoys marking the corners of each parcel will identify the cultivation area for navigational safety and will comply with all regulations for height, illumination, and visibility, including radar reflection. As shown in Figure 2, permanent surface buoys for each longline will consist of two 16-inch surface corner buoys (one corner buoy supporting and marking either end of the backbone), as well as one 16-inch buoy supporting and marking the center pickup line, for a total of three surface buoys per longline. Simulated views of parcel arrays at the surface and underwater are provided in Figures 6 through 9. All surface buoys will be marked with the grower/producer name and phone number. Buoys attached to the central horizontal portion of the backbone line support the line, provide a means of lifting the backbone line to access the cultivation ropes, and determine the depth of the submerged backbone, which will vary seasonally from 15 to 45 feet below the surface. Additionally, a combination of surface and submerged buoys attached to the backbone line will be used during the mussel production cycle to maintain tension on the structural backbone line as the weight of the mussel crop increases. These will consist of 24-inch (or equivalent, with greater than 200 L buoyancy) buoys attached at required intervals along the surface and connecting to the backbone line, in combination with smaller submerged buoys affixed directly to the backbone line. The combination of surface and submerged buoyancy is designed to create a tensioned but flexible structure that is capable of responding dynamically to surface waves and storms.

The longlines that will be utilized are thick (1-inch diameter), tensioned (to approximately 800 pounds) rope that is not conducive to wrapping around or entangling protected species. The longline configuration produces a fairly rigid tensioned structure from which the cultivation ropes, or “fuzzy ropes” are attached. Fuzzy ropes are characterized by extra filaments that provide settlement substrate for mussels to attach. Fuzzy ropes may be attached to and suspended from the backbone rope either as individual lengths or as a continuous looping single length that drapes up and down over the backbone. The length of each section or loop of fuzzy rope will be approximately 20 feet but the actual length depends on the lifting capacity of the servicing vessel. The length of the central horizontal section of backbone line will be approximately 575 feet, which will support approximately 8,000 feet of fuzzy cultivation line.

The shape of each 100-acre cultivation parcel will be a function of the geometry of the submerged backbone lines and anchoring system. Each horizontal section of the longline will be approximately 575 feet and will require an anchor scope of approximately 2.5 times depth. Therefore, in 100 feet of water depth, scope from the horizontal section of backbone to the helical screw anchor will require 250 feet on each end of the line, making a total length of 1,075 feet from anchor screw to anchor screw. A 100-acre parcel with rectangular dimensions of 1,899.5 feet by 2,299.5 feet will therefore accommodate up to 24 individual longlines (Figures 10 and 11). The submerged longline growing gear configuration will be specifically engineered for open ocean conditions with respect to size and strength of all lines, anchoring, hardware, and buoyancy.

Construction in each individual growing plot will take place only after VPD approval of a sub-permits (or other form of agreement) with the individual grower/producer. While project development is dependent on market demand, VPD estimates that full build out would occur within three to five years after project approval.

PROJECT OPERATION/CULTIVATION METHODS

The mussels will be grown and harvested by grower/producers under individual sub-permits (or other form of agreement) with VPD that incorporate all project permit conditions and BMPs. All grower/producers will be required to land their mussels at Ventura Harbor. Spat will be purchased from onshore hatcheries certified by CDFW. At the hatcheries, spat are settled on the fuzzy ropes, which is rope woven with additional loops of fiber to create additional settlement substrate and is standard industry practice. When the spat are firmly settled to the ropes, the ropes are covered with cotton socking material to protect them from shaking off the ropes during transport to the offshore growing site and deployment. The socks hold the spat next to the rope while the mussels naturally attach with their byssal threads, by which time the cotton material naturally degrades. These ropes are then attached to the longlines and buoys, either as single sections of line or as a continuous looping strand attached in intervals.

The mussel grow-out ropes will grow to be stiff with attached mussels encasing the rope core, thus making them very unlikely sources of entanglement. As an additional precaution against entanglement, grow ropes will be attached to the head rope with a low-breaking-strength line, which will facilitate rapid detachment in the unlikely event of any interaction with the longline. To further minimize entanglement potential, a breakaway link will be installed between the surface buoys and vertical lines, similar to strategies used to mitigate potential entanglement in trap fisheries in the northeastern United States (NOAA 2008). Buoy lines between the surface and head rope are generally under tension partially equivalent to their full buoyancy and breakaway link ratings will be specific to buoy size.

Cultivated mussels grow by filtering naturally occurring phytoplankton from the ocean. Juvenile mussels will grow on lines until an intermediate size where the density of mussels on the fuzzy rope becomes limiting to further growth. At this point, a servicing vessel will lift the backbone line in order to access the fuzzy rope stocked with juvenile mussels and pull the fuzzy rope through vessel-based equipment designed to strip the mussels from the fuzzy rope, and then clean, separate, and grade the juvenile mussels by size. Juvenile mussels then will be restocked to clean fuzzy rope and covered with naturally-dissolving cotton socking at a reduced density for their second stage of grow out to market size. All these intermediate mussel-tending steps take place on the servicing vessel.

Maintenance and inspection of the longlines will be carried out at least on a monthly basis and consist of lifting the longlines out of the water and adding additional buoys as necessary to account for increased mussel weight. Inspections of the anchor ropes, anchors, and connecting ropes will be carried out monthly for the first two years following deployment, and in the event there are no marine wildlife entanglements within the first two years, may be reduced to quarterly inspections thereafter. Inspections can include a variety of techniques: recordings by depth/fish finder; ROV surveys of lines; and/or monitoring performed by SCUBA divers.

Gear and planted ropes will be inspected regularly as part of a comprehensive monitoring plan, but generally the planted ropes will only be manipulated during initial stocking, intermediate harvest and restocking, and final harvest. Inspection will involve monitoring the all hardware and rigging and surface buoys and their tension, and checking for escaped gear and potential entanglements. Examples of possible observations that would trigger concern and further investigation are (1) gaps or tangling of dropper ropes detected on depth finder or other structural anomalies, (2) fouling by objects or other marine debris detected in support buoys or buoy deployment lines, and (3) loss of function or damage to devices related to navigational safety.

Harvesting involves separating the mussels from the ropes, followed by cleaning, sorting, and bagging. When the mussels reach market size, which is expected to occur after about one year of total production time, the submerged backbone lines again will be lifted in order to access the fuzzy cultivation ropes, and mussels again will be stripped from the line, cleaned, and separated, and this time size-graded and bagged for landing at the Ventura Harbor as market-ready product. The bagged mussels will be transported to Ventura Harbor for offloading, sale, and distribution. All husbandry activities related to harvesting, grading, and restocking of mussels to cultivation lines will occur onboard the servicing vessel using specialized equipment for that purpose.

Watercraft used for planting, inspections, and harvesting will be home ported at Ventura Harbor. At full project build out 20 to 40 vessels will be traveling to the specific sub-permit sites to conduct these activities. The maximum distance traveled between the harbor and the farthest potential sub-

permit area will be approximately 8 miles. Once constructed, it is projected that each sub-permit site will generate an estimated 150 trips per year to accomplish the tasks outlined above.

Landed product will comply with all testing and labeling regulations as part of the California Department of Public Health (CDPH) Shellfish Sanitation Plan and the National Shellfish Sanitation Program (NSSP) guidelines for shellfish grown in federal waters. NOAA-Seafood Inspection Program (NOAA-SIP), in collaboration with the U.S. Food and Drug Administration (FDA), recently began the process of developing NSSP-compliant sanitation protocols for bivalve shellfish cultivated in federal waters.

ORGANIZATION AND GOVERNANCE

VPD proposes to make mussel growing area sub-permits available to a variety of grower/producers, anticipated to include existing commercial fishermen, existing commercial shellfish businesses, and startups that otherwise would be disinclined to embark on the lengthy and expensive mandatory regulatory pathway. As a requirement of their participation, grower/producers will be obligated to operate under robust environmental monitoring guidelines and BMPs incorporated into the proposed project's entitlements. While all grower/producers will be held accountable for compliance with these requirements, VPD is ultimately responsible for compliance with all permit conditions and required BMPs. All grower/producer responsibilities would be spelled out as conditions in grower/producer sub-permits with VPD, thus establishing VPD enforcement authority for those conditions. VPD anticipates further discussions with the U.S. Army Corps of Engineers (USACE) concerning the proposed sub-permitting process once the USACE has had an opportunity to review the application.

PROJECT DECOMMISSIONING

The project will include a decommissioning plan, which will provide for the removal of all equipment and structures in each sub-permit area associated with project activities when activities in that sub-permit are terminated. The decommissioning plan will be a requirement of each sub-permit. Financial assurances to guarantee implementation of the decommissioning plan will be required of each grower/producer and reviewed periodically.

BEST MANAGEMENT PRACTICES

In addition to the design features associated with minimizing impacts, the proposed project will incorporate a number of other resource protection measures that avoid and minimize impacts on the aquatic environment. These resource protection measures will include BMPs listed below. As further described in the BA, proposed project actions have the potential to adversely impact resources as well as potentially cause navigational concerns. Absent mitigation and BMPs, project activities may have an adverse effect on the surrounding area. However, with the incorporation of

BMPs, these effects would be reduced to insignificant levels. Table 2 details the proposed BMPs as well as the responsible party and enforcing agency of each measure.

**Table 2: Ventura Shellfish Enterprise
Proposed Best Management Practices to Mitigate Potential Adverse Project Impacts**

Measure	Description of Measure	Responsible Party	Enforcing Agency
Seed supply – 1	Cultivation of Spat Offsite. Only hatchery-reared mussel spat grown at a facility certified by CDFW will be used in order to ensure that spat are free of introduced invasive species, parasites, and pathogens; however, natural mussel spat collected on farm grow-out lines and buoys may also be harvested and cultivated.	Grower/Producer ²	Ventura Port District (VPD) and CDFW
Sediment quality – 1	Sediment Quality Monitoring Plan. A Sediment Quality Monitoring Plan shall be developed requiring monitoring of sediment conditions within the project area, including monitoring the quantity, type, and distribution of biological materials (such as shellfish, shell material, and fouling organisms) that accumulate on the seafloor. Monitoring will also include an evaluation of any changes oxygen demand of benthic infaunal and epifaunal communities, and changes to the chemical and biochemical conditions of seafloor sediments along with a description of performance standards to meet. If performance standards are not met, corrective actions will be outlined. The Plan will include reporting requirements, including annual report submittals to NOAA and NMFS for review. If performance standards are met for a period of time, the plan will provide for appropriately scaling down monitoring and intervals over time.	VPD to prepare plan Third-party consultant hired by VPD to conduct monitoring	NOAA and NMFS
Wildlife – 1	Marine Wildlife Entanglement Plan. No less than once per month, each grower/producer operating on a VPD lease shall visually inspect all ropes, cables, and equipment via depth/fish finders to determine if any entanglement of a marine mammal has occurred and to ensure that (a) no lines have been broken, lost or removed; (b) all longlines, anchor lines, and buoy lines remain taught and in good working condition; and (c) any derelict fishing gear or marine debris that collects in the growing gear is removed and disposed of at an identified onshore facility. All equipment and materials accidentally released or found to be missing from the facility during monthly inspections, including buoys, floats, lines, ropes, chains, cultivation trays, wires, fasteners, and clasps, shall	Grower/Producer to inspect and respond VPD to identify disposal facility	VPD and NOAA Fisheries

² Note that all Grower/Producer responsibilities will be spelled out as conditions in grower/producer sub-permits with VPD, thus establishing VPD enforcement authority for those conditions.

	<p>be searched for, collected, properly disposed of onshore, and documented in the annual inspection report. Monitoring shall occur monthly for the first two years following deployment and, in the event that there are no marine wildlife entanglements within the first two years, may be reduced to quarterly inspections thereafter.</p> <p>Inspections shall include recordings by depth/fish finder or ROV surveys of lines and/or monitoring performed by SCUBA divers. Recorded video shall be provided along with the annual report described above. Any maintenance issues including wear, loosening, or fatigue of materials shall be remedied as soon as possible. All incidents of observed whale entanglement shall be immediately reported to SOS WHALe. Any other marine wildlife (i.e., other marine mammals, turtles) observed to be entangled will be immediately reported to NOAA Fisheries Marine Mammal Stranding Network Coordinator, West Coast Region, Long Beach Office. Only personnel who have been authorized by NOAA Fisheries and who have training, experience, equipment, and support will attempt to disentangle marine wildlife. If possible, the grower/producer shall document and photograph entangled wildlife and the entangling gear material.</p>		
Wildlife – 2	<p>Predator Control. Potential predator species will be identified. Specified humane methods of predator deterrence will be utilized, favoring non-lethal methods. No controls, other than non-lethal exclusion, shall be applied to species that are listed as threatened or endangered.</p>	<p>VPD to identify potential predator species and deterrence methods Grower/Producer to implement identified methods as necessary</p>	<p>Any methods of predator control are subject to prior approval of VPD, U.S. Fish and Wildlife Service, and NOAA Fisheries</p>
Wildlife – 3	<p>Marine Wildlife Observer. A Marine Wildlife Observer shall be present on each project construction vessel during all construction activities, including the installation of long lines and anchoring systems. The observer shall monitor and record the presence of all marine wildlife (marine mammals and sea turtles) within 100 yards of the work area. The observer shall have the authority to halt operations if marine wildlife are observed or anticipated to be near a work area and construction activities have the potential to result in injury or entanglement of marine wildlife. In addition, all work (including vessel motors) will be halted if a cetacean is observed within the monitoring area or if a pinniped or sea turtle is observed within 50 yards of the work area. Work may commence after the observed individuals have moved out of the monitoring area.</p> <p>Observers' reports on marine mammal monitoring during construction activities shall be prepared and submitted to NOAA Fisheries on a monthly basis. Reports shall include such information as the (1) number, type, and location of marine mammals observed; (2) the behavior of marine</p>	<p>VPD to identify qualified Marine Wildlife Observers and submit monthly observers' reports Growers/Producers to assure a qualified observer is present during construction activities and that observers' directives are heeded</p>	<p>VPD and NOAA Fisheries</p>

	<p>mammals in the area of potential sound effects during construction; (3) dates and times when observations and in-water project construction activities were conducted; and (4) dates and times when in-water construction activities were suspended because of marine mammals.</p> <p>VPD shall prepare a list of qualified marine wildlife observers who meet the following minimum qualifications: visual acuity in both eyes (correction is permissible) sufficient to discern moving targets at the water's surface with ability to estimate target size and distance; (2) use of binoculars or spotting scope may be necessary to correctly identify the target; (3) advanced education in biological science, wildlife management, mammalogy, or related fields (bachelor's degree or higher is preferred); (4) experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience); (5) experience or training in the field identification of marine mammals (cetaceans and pinnipeds) and sea turtles; and (6) ability to communicate orally, by radio or in person, with project personnel to provide real time information on marine wildlife observed in the area, as needed.</p>		
Wildlife – 4	<p>Entanglement Prevention. Grow-ropes will be attached to the head rope with a low-breaking-strength twine (4-millimeter (0.16-inch) diameter; <1,000 pounds), which will facilitate rapid detachment in the unlikely event of any interaction with the longline. A 1,100-pound breakaway link will be installed between surface marking buoys and the vertical lines.</p>	Grower/Producer	VPD
Wildlife – 5	<p>Marine Wildlife Education. Each grower/producer will be required to provide bi-annual (twice per year) marine wildlife education to its employees regarding proper procedures relating to marine wildlife. The training curriculum will include identifying the presence of specified marine wildlife and procedures for avoiding impacts to marine wildlife during operations. These procedures will include (1) reducing speed and observing the distances from marine life specified in Wildlife-7; (2) providing a safe path of travel for marine mammals that avoids encirclement or entrapment of the animal(s) between the vessel and growing apparatus; (3) if approached by a marine mammal, reducing speed, placing the vessel in neutral and waiting until the animal is observed clear of the vessel before making way; (4) avoiding sudden direction or speed changes when near marine mammals; (5) refraining from approaching, touching or feeding a marine mammal; and (6) immediately contacting their supervisor and other identified parties/agencies identified in Wildlife-1 should an employee observe an injured marine mammal.</p>	<p>VPD to prepare training curriculum Grower/Producer to provide training</p>	VPD and NOAA Fisheries

Wildlife – 6	Lighting. All growing area operations shall be completed during daylight hours. No growing area operations will be conducted at night and no permanent artificial lighting of the shellfish cultivation facility shall occur, except for that associated with the use of navigational safety buoys required by the U.S. Coast Guard.	Grower/Producer	VPD and U.S. Coast Guard
Wildlife – 7	Vessel Management. Vessels in transit to and from the growing area shall maintain a distance of 100 yards from any observed cetacean and 50 yards between any observed pinniped or sea turtle. If cetaceans are observed within 100 yards or pinnipeds or sea turtles observed within 50 yards, the vessel shall reduce speeds to 12 knots or less until it is the appropriate distance (as required by this condition) from the particular marine life. If a cetacean is heading into the direct path of the vessel (i.e., approaching a moving vessel directly into the bow), the vessel shall shut off the engine until the cetacean is no longer approaching the bow and until a greater separation distance is observed. If small cetaceans are observed bow-riding, and the vessel is operating at speeds of 12 knots or less, the vessel shall remain parallel to the animal's course and avoid abrupt changes in direction until the cetaceans have left the area. Each sighting of a federally listed threatened or endangered whale or turtle shall be recorded and the following information shall be provided: <ul style="list-style-type: none"> a. Date, time, coordinates of vessel b. Visibility, weather, sea state c. Vector of sighting (distance, bearing) d. Duration of sighting e. Species and number of animals f. Observed behaviors (feeding, diving, breaching, etc.) g. Description of interaction with aquaculture facility 	Grower/Producer	U.S. Coast Guard
Wildlife – 8	Invasive Species. Grower/producers operating in the project area shall be required to receive training from NMFS to identify potential invasive species and how to properly dispose of such invasive species if discovered.	Grower/Producer	NMFS or entity delegated by NMFS to conduct training

Storage and disposal of supplies – 1	<p>Spill Prevention and Response. Discharges of feed, pesticides, or chemicals (including antibiotics and hormones) in ocean waters are prohibited. Fuel, lubricants and chemicals must be labeled, stored and disposed of in a safe and responsible manner, and marked with warning signs. Precautions shall be taken to prevent spills, fires and explosions, and procedures and supplies shall be readily available to manage chemical and fuel spills or leaks. Each grower/producer shall comply with the Spill Prevention and Response Plan (SPRP) for vessels and work barges that will be used during project construction and operations. Each grower/producer operating in the project area shall be trained in, and adhere to, the emergency procedures and spill prevention and response measures specified in the SPRP during all project operations. The SPRP shall provide for emergency response and spill control procedures to be taken to stop or control the source of the spill and to contain and clean up the spill. The SPRP shall include, at a minimum: (a) identification of potential spill sources and quantity estimates of a project specific reasonable worst case spill; (b) identification of prevention and response equipment and measures/procedures that will be taken to prevent potential spills and to protect marine and shoreline resources in the event of a spill. Spill prevention and response equipment shall be kept onboard project vessels at all times; (c) a prohibition on at-sea vessel or equipment fueling/refueling activities; and (d) emergency response and notification procedures, including a list of contacts to call in the event of a spill; (e) assurance that all hydraulic fluid to be used for installation, maintenance, planting, and harvesting activities shall be vegetable based.</p>	VPD to prepare SPRP and provide training to growers/producers Growers/Producers to implement VPD-prepared SPRP	U.S. Army Corps of Engineers, U.S. Coast Guard, California Office of Emergency Services
Storage and disposal of supplies – 2	<p>Aquaculture Gear Monitoring and Escapement Plan. Include in overall management plan an aquaculture gear monitoring and escapement plan. Any farm gear that has broken loose from the farm location shall be retrieved. The farm site shall be visited at minimum twice per month to examine the aquaculture gear for potential loss or non-compliant deployment, including inspections for fouling organisms. Any organisms that have a potential to cover the sea floor will be removed and disposed of at an identified upland facility. A Marine Debris Management Plan shall also be prepared that includes (a) a plan for permanently marking all lines, ropes, buoys, and other facility infrastructure and floating equipment with the name and contact information of the grower/producer; (b) a description of the extent and frequency of maintenance operations necessary to minimize the loss of materials and equipment to the marine environment resulting from breakages and structural failures; and (c) a description of the search and cleanup measures that would be implemented if loss of shellfish cultivation facility materials, equipment, and/or infrastructure occurs.</p>	VPD to prepare plan Growers/Producers to implement plan	VPD and U.S. Army Corps of Engineers

Storage and disposal of supplies -3	Decommissioning Plan. A decommissioning plan for the timely removal of all shellfish, structures, anchoring devices, equipment, and materials associated with the shellfish cultivation facility and documentation completion of removal activities will be a requirement of each permit or sub-permit. Financial assurances to guarantee implementation of the plan will be in place and reviewed periodically.	Grower/Producer to prepare and implement approved plan VPD to approve plan	U.S. Army Corps of Engineers
Navigation - 1	Update NOAA Charts. VPD to submit to the NOAA Office of Coast Survey: (a) the geographical coordinates of the facility boundaries obtained using a different geographic position unit or comparable navigational equipment; (b) as-built plans of the facility and associated buoys and anchors; (c) each grower/producer's point of contact and telephone number; and (d) any other information required by the NOAA Office of Coast Survey to accurately portray the location of the shellfish cultivation facility on navigational charts.	VPD	NOAA
Navigation - 2	Notice to Mariners. No less than 15-days prior to the start of in-water activities associated with the installation phase of the project, VPD shall submit to (a) the U.S. Coast Guard (for publication in a Notice to Mariners); and (b) the harbor masters (for posting in their offices of public noticeboards), notices containing the anticipated start date of installation, the anticipated installation schedule, and the coordinates of the installation sites. During installation, VPD shall also make radio broadcast announcements to the local fishers' emergency radio frequency that provide the current installation location and a phone number that can be called for additional information.	VPD	U.S. Coast Guard

Conditions within the project area will be monitored throughout the proposed project's implementation to ensure compliance with all permit requirements and to evaluate all effects, including beneficial effects, of the growing areas. Monitoring will be conducted according to a robust monitoring programs designed to evaluate the proposed project's potential effects on the following factors:

- The seafloor and benthic environment beneath and in the vicinity of the facilities, including biological, physical, and chemical conditions
- Wildlife interactions including marine mammals, sea turtles, fish, and seabirds
- Marine debris, including lost and broken gear

As noted in Table 2, a sediment quality monitoring plan, aquaculture gear monitoring and escapement plan, and a decommissioning plan will be developed in conjunction with the permit review process. These plans will be developed through iterative review with the appropriate regulatory agencies.

5. ALTERNATIVES ANALYSIS

Avoidance of user conflicts

As described previously, the size of the proposed project was determined based on needing to meet the project objectives, primarily Objectives 2 and 3:

2. To enhance and sustain Ventura Harbor as a major west coast fishing port and support the local economy;
3. To provide economies of scale, pre-approved sub-permit area, and technical support to include small local producers who would not otherwise be able to participate in shellfish aquaculture.

To meet its mission and goals the VPD allocates annual revenues to operations, maintenance and capital improvements. As stated in Section 19, Project Purpose, the VPD had a negative cash flow of approximately \$3.9 million in FY18-19, which was funded by use of unrestricted reserves, but is not sustainable at this level annually. As such, a combination of increased revenues or revenue sources and alternative methods to finance some capital infrastructure projects is necessary. Specific to the commercial fishing industry, the VSE project can play a vital role in VPD's annual revenue generation that can be leveraged for the financing of commercial fishing infrastructure while creating other positive economic impacts and maintaining dredging priorities. *See* Section 19 for further discussion of these issues.

There is a strong nexus between the continued receipt of federal support and the vitality of the harbor's commercial fishing operations and landings. In order to ensure that dredging continues, the harbor needs to increase the tonnage landed at Ventura Harbor in a sustainable manner. As other forms of commercial fishing are not currently a viable or sustainable option, the proposed project will significantly increase and diversify the catch landed at Ventura Harbor. A smaller scale fishery is unlikely to provide enough tonnage to ensure dredging continues.

Similarly, it is not feasible to provide economies of scale to small, local producers without a large scale operation. The operation costs, such as monitoring, permitting, and technical support, would be far too high with a smaller size. In order to have a sustainable fishing operation with a recognizable product, the proposed project needs to be a larger operation.

Siting Analysis

Once the size of the proposed project was determined, spatial planning guided the VPD in determining which area was most suitable for longline mussel cultivation with the lowest impact on existing marine uses. The initial candidate area in state waters was selected by VSE with the assistance of analysis prepared by the UCSB Bren School (using SeaSketch software), and focused

on the Southern California Bight. The factors evaluated in the analysis included suitability of the candidate growing area for mussels considering water depth and ocean bottom; location in State waters near Ventura Harbor for product landing; avoidance of potential pollution sources; and avoidance of conflicts with existing subsurface leases for oil and gas pipelines, etc. The report identified areas where conflicts with or impacts by aquaculture development had to potential to affect stakeholders, the environmental health of the marine benthos, quality of ocean views, and the risk of disease spread among fish farms. Thousands of spatial plans were considered. The spatial plans indicated that for various locations within the Southern California Bight, mussel aquaculture can achieve considerable value while minimizing impacts to the existing sectors (0-5% impact). As a result of the UCSB Bren School spatial planning analysis, eight SeaSketch alternatives were identified, including an alternative in federal waters.

- SeaSketch Alternative 1 – 20 lease sites located along the 80’ contour at 45-degree angle
- SeaSketch Alternative 2 – 20 lease sites along 80’ contour with contiguous straight-line outer edge
- SeaSketch Alternative 3 – 20 lease sites along 80’ contour with 2X2 configuration extending toward the middle of candidate area
- SeaSketch Alternative 4 – 20 lease sites along 3nm State waters line, six sites south of Pitas Pt. extended towards the middle of the candidate area
- SeaSketch Alternative 5 – 20 lease sites that follows 3 nm line intuitively
- SeaSketch Alternative 6 – 20 lease sites at 3nm line arranged in a 2X2 configuration
- SeaSketch Alternative 7 – 20 lease sites intuitively following the 3nm State waters line in a 2X2 configuration
- SeaSketch Alternative 8 – 20 lease sites outside of the 3nm State waters line, in Federal waters, arranged in two, ten parcel 2X2 configurations slightly offset.

The VSE team established criteria on which to evaluate and prioritize each siting alternative. As a result, the VSE team constructed a siting decision matrix to quantify the benefits of each potential siting configuration, and assist the VPD Board of Commissioners in its decision-making process. The stakeholder engagement process supported the identification of key factors upon which to assist siting configuration decision-making. Each of the criteria was assigned a weight based on perceived relative importance to achieving optimal operational capacity and minimizing potential user conflicts and environmental impacts. Siting alternatives were then scored using a rating system that corresponds to preferences identified by the VSE team. These criteria included:

- Approximate water depth
- Potential adverse water pollution sources
- Potential visual effects from shore
- Potential interaction with commercial and recreational fishing interests
- Subleasing or sub-permitting complexities
- Potential overlap with subsurface leases
- Environmental review complexity
- Contiguous siting

- Distance from Harbor

Through the stakeholder engagement process and consultation with its aquaculture specialist, Scott Lindell of Woods Hole Oceanographic Institution, it became clear that location of the project in State waters posed certain issues. Most importantly, VSE received information from local halibut trawlers that the proposed State waters candidate area was located in one of two areas statewide designated by CDFW as halibut trawl grounds. Further, Mr. Lindell advised that a minimum 80' bottom depth (versus the initial criterion of 60' bottom depth) would reduce exposure to various mussel predator species (*e.g.*, diving ducks) and potential storm surge. Following a November 2017 public hearing, the VPD Board of Commissioners selected a federal waters alternative (SeaSketch Alternative 8) location.

Subsequently, NOAA Fisheries Southwest District Aquaculture Coordinator, Diane Windham, connected VSE with NOAA's National Ocean Service staff, which undertook a second siting study focused on federal waters proximate to Ventura Harbor. (*See* "Coastal Aquaculture Siting and Sustainability Technical Report, Ventura Shellfish Enterprise: Aquaculture Siting Analysis Results" prepared by Coastal Aquaculture Siting and Sustainability Program, within the Marine Spatial Ecology Division of the National Centers for Coastal and Ocean Science, National Ocean Service, NOAA, dated September 6, 2018, copy attached.) The siting analysis represents an objective, data-driven approach to identify the locations within federal waters with the highest compatibility with the proposed project. The results of this siting analysis identify two alternative sites proximate to Ventura Harbor given equal consideration of existing use conflicts, including:

- Designated shipping fairways,
- Areas of high vessel density and wrecks and obstructions,
- Sensitive habitats,
- Military uses,
- Existing vessel traffic corridors,
- Oil and gas production,
- Commercial fishing (specifically trawl and squid fisheries), and
- Obstructions, including submerged cables and wrecks.

Other important considerations were the distance from Ventura Harbor and depth (25-37m). Slightly less influential parameters included wind speed and direction, wave height, surface current, and chlorophyll *a*.

The two CASS Report Alternatives are both situated in the northern portion of the siting analysis study area, which was determined to have the smallest potential overlap with conflicting uses. The primary difference between the two sites is the configuration of sub-permit areas (Figures 3 and 4). In CASS Report Alternative 1, each sub-permit area has two shorter lines in parallel, and is represented in Figure 3. CASS Report Alternative 2, shown in Figure 4, was designed as a longer "stack" of single lines within each sub-permit area, which was found to be less flexible. Since varying oceanic patterns may necessitate more design flexibility, CASS Report Alternative 1 was

determined to be the most compatible configuration. CASS Report Alternative 1 will have 20 plots, each with a dimension of 2,299.5 feet by 1,899.5 feet, and an average water depth of 98 feet.

Importantly, the two CASS Report Alternative sites overlap with the federal waters alternative site (SeaSketch Alternative 8) identified in the UCSB Bren School spatial planning analysis, indicating the area has been shown by two independent studies to have the fewest conflicts with other uses and sensitive environmental resources (Figure 5). Following a public hearing in September 2018, it is anticipated the VPD Board of Commissioners approved CASS Report Alternative 1)(also shown in Figure 1) as the preferred project site. CASS Report Alternative 2 (shown in Figure 4) is shown as an alternate site location.

6. CONSISTENCY WITH PROVISIONS OF THE CALIFORNIA COASTAL ACT

The project is reviewed to determine compliance with the California Coastal Act's enforceable policies, stated in Sections 32000 through 30265.5. The policies that are not applicable to the project are identified and discussed in Table 3. The project is then analyzed for consistency with applicable Coastal Act policies.

Table 3
Enforceable Policies of the California Coastal Act That Are Not Applicable to the Project

Article	Section	State Enforceable Policy	Explanation
Article 2: Public Access	30211	Development shall not interfere with access	The project does not include any development within the coastal zone
	30212	Access from new projects	The project does not include any development within the coastal zone
	30212.5	Distribution of public facilities	The project does not include public facilities or impact the public's use of existing facilities
	30213	Encouragement of lower cost visitor and recreational facilities	The project does not include any visitor or recreational facilities or impact any existing facilities
	30214	Implementation of public access	The project does not include any development within the coastal zone
Article 3: Recreation	30221	Protection for recreational use and development of oceanfront land	The project does not include the development of oceanfront land that would reduce available areas for public recreational use
	30222	Priority of development purposes of private lands	The project does not include any development of private lands within the coastal zone
	30222.5	Priority of oceanfront lands suitable for aquaculture	While the project supports this policy by significantly expanding aquaculture opportunities in California, it does not include the development of oceanfront lands within the coastal zone
	30223	Reservation of upland areas	The project does not include any development of upland areas within the coastal zone
Article 4: Marine Environment	30225	Revetments, breakwaters, etc.	The project does not propose any construction associated with structures that would alter the natural shoreline
	30236	Waterway modification	The project does not alter any rivers or streams

Article	Section	State Enforceable Policy	Explanation
Article 5: Land Resources	30240	Protection of environmentally sensitive areas	The project does not include development within any environmentally sensitive areas within the coastal zone
	30241	Maintenance of prime agricultural land	The project area does not include any prime agricultural lands
	30241.5	Agricultural land uses	The project area does not include any agricultural lands
	30242	Conversion of lands suitable for agricultural use	The project does not convert any agricultural lands
	30243	Protection of the long-term productivity of soils and timberlands	The project area does not include any timberlands
	30244	Archaeological or paleontological resources	The project does not include any development in areas of significant archaeological or paleontological resources within the coastal zone
Article 6: Development	30250	Location	The project does not include any development within the coastal zone
	30251	Scenic and visual qualities of coastal areas	The project site is located over 3 miles from the shoreline, will not be visible from the shore, and will not impact visual qualities within the coastal zone
	30252	Enhancement and maintenance of public coastal access	The project does not include any development within the coastal zone
	30253	Safety, stability, pollution, energy conservation, visitors	The project does not include any development within the coastal zone
	30254	Public works facilities	The project does not propose any public works facilities
	30254.5	Sewage treatment plant development	The project does not propose a sewage treatment plant
	30255	Coastal-dependent developments	The project does not include any development within the coastal zone
Article 7: Industrial Development	30260	Location or expansion	The project does not include any industrial development
	30261	Use of tanker facilities	The project does not use any tanker facilities
	30262	Development of gas and oil	The project does not include any oil and gas development
	30263	Petrochemical facilities or refineries	The project does not include any petrochemical facilities or refineries
	30264	Thermal electric generating plants	The project does not include any thermal electric generating plants
	30265	Offshore oil transportation	The project does not involve any offshore oil transportation

Article	Section	State Enforceable Policy	Explanation
	30265.5	Coordination of activities concerning the transport and refining of offshore oil	The project does not involve oil transportation or refining

ENFORCEABLE POLICIES OF THE CALIFORNIA COASTAL ACT APPLICABLE TO THE PROJECT

1. Article 3, Sections 30220 and Section 30224: Recreational Opportunities

Policies:

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

Section 30224 Recreational boating use; encouragement; facilities. Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, by developing dry storage areas, increasing public launching facilities, providing additional berthing space in existing harbors, limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, providing harbors of refuge, and by providing for new boating facilities in natural harbors, new protected water areas, and in areas dredged from dry land.

Consistency Analysis:

The proposed facility would have a surface footprint that has the potential to have a small impact on water-oriented or ocean-based recreational activities such as boating and fishing. The proposed project has the potential to adversely affect recreation by restricting water-oriented recreational activities from occurring within the footprint of the facility due to the presence of surface and submerged gear and the risk of possible collision or entanglement. However, given that the project is not located within the coastal zone, any potential impacts associated with recreational uses would likely occur outside of the coastal zone. Further, the longlines would be submerged 15-45 feet below the surface, which will not restrict the passage of most recreational vessels through the project site and recreational vessels would be able to pass freely about the proposed structure with little risk of collision or entanglement. Safe passage of all but the largest deep-draft commercial vessels would be accommodated by the project design. The project will also incorporate navigational buoys that comply with U.S. Coast Guard requirements to properly mark the project site to avoid potential collisions. While the facility may redirect some boaters and traffic, the proposed offshore location and size, when compared to the abundance of open water in the project area, would limit any adverse impacts on recreational boating. In order to help ensure that those

who may wish to avoid the area due to a desire for extra precaution, BMPs Navigation-1 and Navigation-2 are proposed for the final location and configuration of the facilities to be marked on navigational charts. As such, the project as proposed and with the proposed BMPs is consistent with the Coastal Act policies 30220 and 30224.

2. Article 3, Section 30230: Marine Resources

Policy:

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

Consistency Analysis:

The project includes activities that may affect marine resources and have the potential to affect marine organisms. While the project site does not contain any designated critical habitat for marine species, the placement and operation of the proposed project has the potential to affect marine species, habitats, and biological productivity through disturbance, loss, and alteration of benthic habitat; interference with migration and feeding routes; construction noise; colonization by fouling organisms; deposition of organic materials; disturbance and entanglement of marine wildlife; release of marine debris; invasive species; and collision of vessels with marine mammals or sea turtles.

These actions could adversely affect commercial and recreational fish stocks and protected marine species, including whales, sea turtles, dolphins, and pinnipeds that may frequent the project area. Specifically, protected species that are anticipated to occur in the area include gray whales (*Eschrichtius robustus*), humpback whales (*Megaptera noaengliaea*), fin whales (*Balaenoptera physalus physalus*), loggerhead sea turtles (*Caretta caretta*), green sea turtles (*Chelonia mydas*), common minke whales (*Balarnoptera acutorostrata*), common bottlenose dolphin (*Tursiops truncatus*), long-beaked common dolphin (*Delphinus capensis capensis*), short-beaked common dolphin (*Delphinus delphis delphis*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), California sea lion (*Zalophus californianus*), and Pacific harbor seal (*Phoca vitulina*).

Marine Wildlife Entanglement in Aquaculture Gear

The project may result in marine mammal entanglement. Mussel aquaculture utilizes various ropes in the water column that may pose an entanglement risk to cetaceans and sea turtles. In contrast to fishing gear, however, there are far fewer documented entanglement cases in mussel aquaculture

gear. Interactions and entanglements with longline aquaculture gear worldwide are rare, and close approaches by protected species are seldom documented (Price et al. 2016). West coast entanglement summaries for 2015 and 2016 report no entanglements from mussel aquaculture fisheries (NOAA 2017c). There have been no reported marine mammal entanglements associated with Santa Barbara Mariculture, which has operated a 25-acre mussel aquaculture farm in the Santa Barbara Channel, using similar cultivation techniques, for over a decade (CDFG 2018).

Reported entanglements are predominantly from crab, gillnet and spiny lobster fisheries. Fixed fisheries gear (e.g., pot and trap gear) is the most commonly recognized and reported gear type causing entanglements since 2000. Documented entangled animals and disentanglement efforts in the Pacific Northwest have mostly involved gray whales and humpback whales and have involved both gill nets and crab gear. While not as common, both fin and blue whales are sometimes entangled in gill nets and crab gear based on a few stranded animals and scarring on live animals (NOAA 2014). More recently, from 2014 to 2017, the majority of the whale entanglements involved humpback whales and most of the entanglements were from commercial Californian and Washington Dungeness crab traps, and gillnet fisheries (NOAA 2017c). Large whale species appear to be more vulnerable to entanglement than smaller cetacean species, such as dolphins and porpoises, which are more prone to be caught as bycatch in nets due to their smaller size (Benjamins et al. 2014). Furthermore, juveniles are more likely to be entangled due to their inquisitive nature and inexperience. The proposed mussel culture techniques have some significant differences as compared to crab and fishing gear that reduce the potential for marine mammal entanglement. As opposed to fishery gear, the mussel aquaculture gear is stationary, the lines are larger, and the gear is not designed to catch or ensnare fish. Further, as described below, the lines will be highly tensioned, which reduces the risk of marine mammals being caught in slack lines. Therefore, the project design is expected to pose a much smaller risk to marine mammal entanglement compared to longline fishing methods.

Cetaceans also have different ways in which they can perceive mussel farm lines and navigate around them. For example, odontocetes, such as harbor porpoises, are able to use echolocation to detect the lines (Lloyd 2003; Nielson et al. 2012), and minke whales are able to detect and avoid ropes that are white or black (Kot et al. 2012). No entanglements have been reported for pinnipeds with this method of mussel aquaculture (Lloyd 2003, Clement 2013).

Entanglements involving sea turtles and cetaceans have occurred in mussel aquaculture operations in Australia, New Zealand, Iceland, South Korea and Canada (Young et al. 2015). Entanglement risk is highest at mussel farms that employ mussel spat collecting ropes, as these ropes are thinner and more flexible making them more conducive to entanglement (Keeley et al. 2009). The majority of entanglements have involved these thinner mussel spat collector ropes or buoy lines connected to them. To avoid this concern, BMP Seed Supply-1 requires all mussel spat to be provided by

land-based hatcheries certified by the California Department of Fish and Wildlife (or collected from grow-out lines) and will prohibit spat collector ropes. The project will only utilize grow-out ropes, which are thicker and more tightly anchored and tensioned (Lindell 2014; Moore & Wieting, 1999; Price et al. 2017).

Lines with spat or mature muscles will be freely hanging (not looping ropes), thereby allowing wildlife to traverse through the area. These lines will likely be heavy enough and under sufficient tension to prevent loose lines from becoming entangled and forming loops or knots along the longline. In addition, it is anticipated that when muscles are harvested, the lines will immediately be re-seeded with spat. Project design specifications are also proposed to minimize protected marine mammal and sea turtle entanglement. The longlines that will be used are a thick (1-inch-diameter) tensioned (to approximately 800 pounds) rope that is not conducive to wrapping around or entangling protected species. The mussel grow-out ropes themselves are typically planted with seed 3 inches thick and may grow to be stiff with byssus at diameters of 10 inches or more at harvest, thus making them very unlikely sources of entanglement. As an additional precaution, grow-ropes will be attached to the headrope with a low-breaking-strength twine (4-millimeter (0.16-inch) diameter; <1,000 pounds), which will facilitate rapid detachment in the unlikely event of any marine mammal interaction with the longline (see BMP Wildlife-4).

Other potential entanglement points include (1) two vertical lines to the surface buoys marking each end of the headrope and (2) one pull-up buoy line for servicing at the midpoint. To minimize these potential entanglements, a 1,100-pound breakaway link will be installed between these buoys and the vertical lines, similar to strategies used to mitigate potential entanglement in trap fisheries in the northeastern United States (NOAA 2008). Buoy lines between the surface and headrope are generally under tension partially equivalent (0 to 10 kilograms (0 to 22 pounds)) to their full buoyancy (42 kilograms (93 pounds)). Overall, the longline configuration produces a fairly rigid structure under tension, with stout lines and little slack.

Other mitigation measures have been incorporated into the project to further minimize the potential for marine mammal entanglement. The project will incorporate a marine wildlife entanglement plan to regularly check equipment for evidence of marine mammal entanglement (BMP Wildlife-1) and require a qualified marine wildlife observer to be present during construction activities that can halt activities if marine mammals are observed (BMP Wildlife-3). Further details regarding these measures are found in the BMPs provided in Section 4. After the incorporation of these BMPs and given the lack of documented marine mammal entanglement incidents associated with the proposed aquaculture cultivation method, impacts associated with marine mammal entanglement are considered insignificant.

Ship Strikes

Vessel strikes are known to be a hazard to a number of marine species, particularly whales. The project may result in an additional 20 to 40 small boats traveling to lease sites on an average of 3 times per week to daily and would therefore contribute to increased boat traffic in the area during both construction and regular operations. Between 1988 and 2012, there were 100 documented large whale ship strikes along the California coast (NOAA 2017b). Large whale species are vulnerable to collisions with all vessel types, classes and sizes (NOAA 2017b); however, most collisions are associated with large container and freight ships due to their mass and the speed at which they transit the shipping lanes (Silber et al. 2010). When large vessels such as container ships are involved, the crew may be unaware a strike has occurred. As such, the number of ship strikes to whales is likely under reported. Most cases where whales were known to be severely hurt or killed occurred at vessel speeds of 14 knots or more and were caused by large ships of 80 meters or more in length (Laist et al., 2001). However, collisions with smaller boats, such as those that would be used for the aquaculture operations, do have the potential to injure or kill marine wildlife, especially when travelling at high speeds (Ritter 2012). Large container or freight ships will not be used during construction of the mussel farm nor during regular maintenance. To address this concern, the project will require continuous education regarding how to properly interact with marine mammals if encountered during operations (BMP Wildlife-5) and include vessel management requirements if vessels observe marine mammals in close proximity to the vessel (BMP Wildlife-7). After incorporation of these BMPs, impacts associated with ship strikes are considered insignificant.

Interference with Migration or Feeding Routes

The project will result in increased human activity and the establishment of aquaculture facilities across 2,000 acres. Available habitat within Southern California Bight includes 400 miles of recessed coastline from Point Conception, Santa Barbara County to Cabo Colnet, Mexico, (SCCWRP 2016) and comprises over 6 million acres. Increased human activity and facilities during construction and operation may deter marine wildlife from using previously open and unoccupied areas for feeding or migration in different spatial and temporal ways. As a result, marine wildlife may be forced to seek feeding or open migration routes outside of the project area, thereby causing wildlife to expend time and energy seeking these resources. The project site is within the northward migration route for gray whales but it is largely unknown how many marine species perceive and respond to man-made structures in the ocean (Price et al. 2017). Habitat exclusion can range from low to high risk depending upon the location and density of mussel farms. Existing studies have demonstrated the potential for species to be excluded from foraging habitats. Lloyd (2003) describes how curtains of mussel growing lines may act as barriers and impede hunting behavior in dolphins (dusky, common, and Hector's dolphins) by interfering with sonar signals for finding prey and communicating with other members of the pod. Dusky dolphins rarely enter mussel farms (Markowitz et al. 2004). Whales and some dolphins tend to be more

sensitive, while pinnipeds and both common and bottlenose dolphins seem attracted to the underwater arrays (Clement 2013). Dusky dolphins were observed foraging adjacent to mussel farms pointing to the suggestion that fish may be attracted to the structure (Price et al. 2017). Most studies were conducted in nearshore waters and it is uncertain how, or even if, these results pertain to offshore longline mussel farms in deep open ocean locations. However, this effect would be minimal due to the expansive open ranges that are open for marine wildlife in the greater region, and the project site is not located within critical habitat.

Noise Associated with Construction Activities

Disturbance to marine wildlife such as construction-related noise could occur from anchor installation and array set up. Noise effects may have a variety of indirect effects on marine wildlife species, including increased stress, weakened immune systems, altered feeding behavior, altered mother-infant relationships, displacement due to startle, degraded communication with conspecifics (e.g., masking), damaged hearing from extremely loud noises, and increased vulnerability to predators (MMC 2007; NMFS 2016c; Thomsen 2009). Another potential effect is abandonment of an area due to human disturbance which has been shown in several species (Lloyd 2003). The NOAA Fisheries criteria distinguishes between impulse sound, such as that from impact pile driving, and continuous sounds, such as that from vibratory pile driving. The Level A (injury) and Level B (disturbance) threshold levels used by NOAA Fisheries are summarized in Table 2 for cetaceans (whales, dolphins, and porpoises) and pinnipeds (seals and sea lions). NOAA is developing comprehensive guidance on sound characteristics likely to cause injury and behavioral disruption in the context of the Marine Mammal Protection Act (MMPA), ESA and other statutes. Until formal guidance is available, NOAA Fisheries uses conservative thresholds of received sound pressure levels from broad band sounds that may cause behavioral disturbance and injury, and the criterion levels specified in Table 4 are specific to the levels of harassment permitted under the MMPA (NMFS 2018e). The project will temporarily disturb and alter the seafloor habitat from the placement of screw anchors used to hold the lines, ropes, floats, and buoys. Construction-related noise with the installation of sand screw anchors is very low in the water, with only a 50-horsepower hydraulic power pack on the boat, stipulating that noise will not approach NOAA thresholds. Furthermore, rotation speeds are also very low, which minimizes entanglement of marine species. The anchor installation disturbs less than 1 square meter of sea bed on installation and once installed no rope or chain touches the sea floor which also minimizes seabed disturbance (Fielder Marine Services, New Zealand, Pers.comm). Marine species that are the focus of this assessment are highly mobile and have the ability to temporarily avoid the project site during construction activities. Therefore, noise impacts associated with installation of equipment are considered insignificant.

Table 4
NOAA Fisheries Acoustic Thresholds

Criterion	Criterion Definition	Threshold
<i>In-Water (Excluding Tactical Sonar and Explosives)</i>		
Level A	PTS (injury) conservatively based on TTS	190 dB _{rms} ³ for pinnipeds 180 dB _{rms} for cetaceans
Level B	Behavioral disruption for impulsive noise (e.g. impact pile driving)	160 dB _{rms}
Level B	Behavioral disruption for non-pulse noise (e.g. vibratory pile driving, drilling)	120 dB _{rms}
<i>In-Air</i>		
Level A	PTS (injury) conservatively based on TTS	None established
Level B	Behavioral disruption for harbor seals	90 dB _{rms}
Level B	Behavioral disruption for non-harbor seal pinnipeds	100 dB _{rms}

Marine Debris

The project has the potential to create marine debris if aquaculture gear breaks free through poor maintenance or damage from storm or wave activity. Entanglement may occur if aquaculture gear comes loose, washes away, or otherwise escapes into the environment as a result of tide, wind, or wave action. Additional risk may occur if derelict fishing gear, lines, and other materials become entangled in the longline arrays of this project, which could compromise structural integrity and/or exacerbate the risk of marine wildlife entanglements. There is also a risk that marine debris could be ingested by gray whales and sea turtles. To address this concern, BMP Storage and Disposal of Supplies-1 incorporates an aquaculture gear monitoring and escapement plan to routinely check and maintain aquaculture gear to prevent breakage and quickly retrieve any gear that breaks free. Further, BMP Storage and Disposal of Supplies-3 incorporates a decommissioning plan to require timely removal of aquaculture gear once shellfish operations cease on a parcel. Upon incorporation of the proposed BMPs, impacts associated with marine debris are considered insignificant.

Invasive Species, Parasites, and Pathogens from Seed Stock

Mussel aquaculture practices have the potential to introduce invasive species, parasites, and pathogens into the environment via contaminated seed stock, which could have detrimental effects on the California marine ecosystem. However, this project will use spat from hatcheries certified by CDFW to not contain invasive species, parasites or pathogens of concern or will be collected directly from grow-out lines. Seed stock, other than those obtained from grow lines, must be

³ RMS refers to the sound pressure level that is square root of the sum of the squares of the pressure contained within a defined period from the initial time to the final time. For marine mammals, the RMS pressure historically has been calculated over the period of the pulse that contains 90% of the acoustical energy.

inspected and certified before planting in compliance with Sections 15201 and 15600 of the Fish and Game Code. Mediterranean mussels are a non-native, but naturalized species. In fact, this mussel is now one of the most abundant mussel species between Marin County and San Diego (Suchanek et al. 1997). Given the widespread nature of this species, the proposed mussel farm would have a negligible effect on the surrounding environment. Furthermore, benthic characteristics of the project site demonstrate a lack of available suitable substrate for any further establishment of mussels beyond the project site, as the closest substrate where mussels could establish beyond the project site is several miles away.

Disturbance or Displacement of Benthic Habitat

Effects on sediment quality underneath shellfish aquaculture gear could be impacted from biodeposits and changes to the benthic invertebrate species composition. The project has the potential to disturb or alter the seafloor habitat by the deposition of biological materials resulting from dislodged or discharged shells, shell fragments, and deposits from the growing operation accumulating on the seafloor beneath the aquaculture structures. Such material typically includes feces and pseudofeces from the cultivated shellfish, as well as fouling organisms such as algae, barnacles, sponges, and other invertebrates that accumulate on the project equipment and subsequently become dislodged by natural processes, or due to harvesting or cleaning operations. Cultivated shellfish or shells from can also be dislodged from the structure during growth, storm events, predation by marine wildlife, and cleaning and harvesting activities. The accumulation of material including shell fragments, intact shells, fouling organisms, and feces can alter the physical and chemical characteristics of the bottom substrate, and can affect the benthic community and sediment-dwelling organisms that may be sensitive to conditions such as substrate composition and chemistry. Accumulation of material could also attract organisms that would change the composition of the benthic community. Other potential benthic impacts can include increased loads on sediment dissolved oxygen and redox conditions, and changes to nutrient cycling resulting in a decrease in benthic species abundance and sediment porosity (Pearson and Rosenberg 1978; Wilding and Nickell 2013; Wilding 2012). The effect on benthic nitrogen cycling is determined by biogeochemical and physical variables, such as water depth, current velocities, and bottom type and composition (CFGC 2018). Shellfish are able to alter the biogeochemical process in the water column by stimulating nitrification (Souchu et al. 2001). Mussel farms that are located in areas with greater water depths and current speeds spread bio-deposits over a larger area without posing the risk of enhanced sediment nutrient release (Stadmark & Conley 2011). A local mussel farm, the Santa Barbara Mariculture Company, with thirteen years in operation, conducted benthic analysis testing. This sediment analysis testing examined grain size, and levels of benthic epifaunal and infaunal biodiversity both within the farm and outside of the farm, and found no significant benthic impact (CFGC 2018). Given the conditions at the Ventura Shellfish Enterprise project site, with the significant depth, wave action and mixing, this potential impact is

unlikely to be significant and bioaccumulation is expected to be dispersed over a larger area. To confirm this conclusion, SMP Sediment Quality-1 has been incorporated, which requires monitoring of sediment quality and composition to evaluate any benthic impacts associated with the project.

Installation of the anchors proposed with the project also has the potential to displace benthic invertebrates. However, the adverse impacts to epifauna and infauna would be minimal. Each anchor would only have a footprint of less than one square meter. The total habitat area that would be disturbed by the proposed project would be small and regionally insignificant when compared to the overall amount of habitat available in the area. Further, many benthic invertebrates are mobile and would quickly recolonize the area after installation of the anchors. Therefore, impacts associated with benthic disturbance are considered insignificant.

Fouling Organisms and Nonnative Species

The project's submerged structures can provide hard substrate habitat for invasive "fouling organisms." Fouling organisms, such as invasive algae, sea squirts, and mussels, can pose economic and ecological risks to the marine environment. For example, the invasive carpet sea squirt (*Didemnum vexillum*) reproduces rapidly and fouls marine habitats (including shellfish aquaculture operations and fishing grounds), ship's hulls, and maritime structures. Like other fouling organisms, they are found on hard substrates that include floats, moorings and ropes, steel chain and ship hulls. They overgrow other marine organisms such as tunicates, sponges, macro algae, hydroids, anemones, bryozoans, scallops, mussels, and oysters. Where these colonies occur on the seabed, they likely cover the siphons of infaunal bivalves and serve as a barrier between demersal fish (or benthic feeding grey whales) and their prey. However, the invasive carpet sea squirt is not present in the Channel Islands area. The nearest known occurrences are in Monterey Bay and Mission Bay in San Diego (Woods Hole Science Center 2007). Further, there is a lack of available substrate within or near the project site suitable for colonization by fouling organisms, as these invasive species cannot attach themselves to the sandy bottom substrate at the project site.

Essential Fish Habitat

Essential Fish Habitat (EFH) is regulated under the Magnuson-Stevens Fishery Conservation and Management Act of 1976, 16 U.S.C. 1801 *et seq.* (MSFCMA) protecting waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. An EFH Assessment (Attachment 3) has been prepared to assess the effects of the proposed project actions on managed fisheries in accordance with legal requirements set forth in the MSFCMA. Implementation of the project could result in temporary impacts associated with construction activities and impacts from project operations associated with entanglement, changes in sediment composition, and potential oil spills. However, implementation of the Project's proposed mitigation measures are expected to

fully compensate for project impacts and reduce potential impacts on EFH species to negligible levels. The Project as proposed may affect, but is not likely to adversely affect EFH and will not reduce the overall value of the EFH of managed groundfish, coastal pelagic, or highly migratory species.

Through project design features and the use of BMPs including the ones discussed above, the proposed project is consistent with Section 30230 of the Coastal Act.

3. Article 3, Section 30231: Biological Productivity and Water Quality

Policy:

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

Consistency Analysis:

Mussels feed primarily on phytoplankton filtered from the water column. Each individual is capable of filtering over 20-gallons of seawater per day (Okumus et al 2002). Hence, in some circumstances, large concentrations of mussels found in mussel farms can remove a significant proportion of available phytoplankton from the water column in an area, causing localized phytoplankton depletion (Okumus et al 2002). Other studies suggest that nutrient regeneration in the water column within mussel farms is high, as phytoplankton consumed by the mussels results in released nutrients supporting new phytoplankton production (CFGC 2018). The project has adopted the methodology utilized by CDFW to evaluate carrying capacity impacts associated with Santa Barbara Mariculture Company's mussel aquaculture farm, whereby the standing stock of phytoplankton biomass outside the facility is determined and compared with the filtration/consumption rate of mussels within the farm. The results of the Santa Barbara Mariculture Company study indicated that total production of the fully built-out farm would not have an adverse impact on phytoplankton in the Santa Barbara Channel (CFGC 2018). Similarly, calculations for the Ventura Shellfish Enterprise mussel farm indicate that no adverse impact on phytoplankton in the Santa Barbara Channel would occur. These calculations are provided in Appendix C to the Biological Assessment. Further, any impact is likely to be localized to the project area and not affect marine resources within the coastal zone. Because mussels are filter feeders, it is anticipated that the project will provide a minor positive impact on water quality, as

mussels can remove pollutants and any excess nutrients from the water column. The project is therefore consistent with Section 30231 of the Coastal Act.

4. Article 3, Section 30232: Oil and Hazardous Substance Spills

Policy:

Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.

Consistency Analysis:

Construction and harvesting operations (and the use of any heavy equipment) could result in water-quality effects due to chemical-compound pollution (fuel, oil, lubricants, inadvertent spills, and other materials) in the event of an oil spill. As with any mechanized machinery, there is a small risk of accidental discharge of fuel, lubricants, or hydraulic fluids, which could affect marine wildlife in the area and result in injury and/or mortality to wildlife in the area of the contaminant through ingestion, physical contact that reduces survival functions (e.g., oiled wildlife), or a reduction in suitable feeding habitat. Although spills of this nature are detrimental to aquatic organisms, it is expected that the impacts would be negligible because of the limited occurrence of spills and corrective actions. BMP Storage and Disposal-1 has been incorporated to further address this concern through adopting a spill prevention and response plan. Upon incorporation of this BMP, the project is consistent with Section 30232 of the Coastal Act.

5. Article 3, Section 30233: Diking, Filing, or Dredging Impacts

Policy:

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

(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.

(2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.

(3) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.

(4) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.

(5) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.

(6) Restoration purposes.

(7) Nature study, aquaculture, or similar resource dependent activities.

(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for these purposes to appropriate beaches or into suitable longshore current systems.

(c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary. Any alteration of coastal wetlands identified by the Department of Fish and Game, including, but not limited to, the 19 coastal wetlands identified in its report entitled, "Acquisition Priorities for the Coastal Wetlands of California", shall be limited to very minor incidental public facilities, restorative measures, nature study, commercial fishing facilities in Bodega Bay, and development in already developed parts of south San Diego Bay, if otherwise in accordance with this division.

For the purposes of this section, "commercial fishing facilities in Bodega Bay" means that not less than 80 percent of all boating facilities proposed to be developed or improved, where such improvement would create additional berths in Bodega Bay, shall be designed and used for commercial fishing activities.

(d) Erosion control and flood control facilities constructed on watercourses can impede the movement of sediment and nutrients that would otherwise be carried by storm runoff into coastal waters. To facilitate the continued delivery of these sediments to the littoral zone, whenever feasible, the material removed from these facilities may be placed at appropriate points on the shoreline in accordance with other applicable provisions of this division, where feasible mitigation measures have been provided to minimize adverse environmental effects. Aspects that shall be considered before issuing a coastal development permit for these purposes are the method of placement, time of year of placement, and sensitivity of the placement area.

Consistency Analysis:

The project proposed placing the installation of 48 sand screw anchors per each 100 acre plot, for a total of 960 sand screw anchors upon full project build out. The anchors are considered “fill” under the Coastal Act; however, all fill will be installed outside of the coastal zone. Each anchor would occupy approximately one square meter of area; therefore, upon project buildout, the anchors would occupy approximately 10,300 square feet of area. One of the seven allowable uses of fill under section 30233(a) of the Coastal Act is aquaculture. Because the proposed anchoring devices would support a shellfish aquaculture facility, this placement of fill is consistent with the Coastal Act. No known project alternatives would meet the objective of the proposed project – to install and operate an open ocean shellfish aquaculture facility- without the placement of at least some fill material in open coastal waters. The anchors are necessary to ensure that the project structures are stable and durable and not susceptible to displacement during wave and storm activity. The anchoring devices are a minimal amount of fill and, as described above, will have little to no impact on the ocean floor. Mitigation measures, such as BMP Storage and Disposal of Supplies-1, have also been taken to minimize the adverse environmental effects associated with the placement of fill. As such, the proposed project is consistent with Coastal Act Section 30233(a).

6. Article 3, Section 30234 and Section 30234.5: Commercial Fishing and Recreational Boating Facilities

Policies:

Section 30234 Commercial fishing and recreational boating facilities. Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.

Section 30234.5 Economic, commercial, and recreational importance of fishing. The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.

Consistency Analysis:

As described above in Sections 4 and 5, the VPD engaged in significant outreach to the commercial fishing industry for more than a year to determine potential impacts to commercial and recreational fishing interests and attempt to avoid or minimize such impacts. These efforts included three site selection workshops where notice of the workshops was mailed out to a list of over 500 commercial fishing vessel owners between Goleta and Port Hueneme identified by CDFW and NOAA; use of a spatial planning tool developed by the University of California, Santa Barbara, Bren School of Environmental Science and Management to identify and evaluate potential use conflicts; and a site

selection analysis prepared by NOAA's National Ocean Service (NOS) to evaluate potential use conflicts and identify the project area that minimizes such conflicts to the greatest extent possible. The location recommended by NOAA that would reduce these conflicts, including conflicts with commercial fisheries, to the greatest extent possible was adopted by the VPD as the proposed site location.

Through the initial stakeholder outreach process, the VPD received feedback from local halibut trawlers that the initial site location proposed in State waters was located in one of two areas statewide designated by CDFW as halibut trawl grounds and there were significant concerns voiced by the trawlers that the project would significantly impact their ability to fish in the area. This was one of the primary reasons that VPD decided to relocate the proposed project site to federal waters beyond the coastal zone. Therefore, the project is not anticipated to directly impact fishing opportunities within the coastal zone.

The project is also likely to have a negligible impact on commercial fishing in federal waters. Based upon the workshops and public outreach conducted in 2017, the commercial halibut fishery was identified as the primary commercial fishery potentially affected by the project. To determine the potential impact, the VPD and NOAA reviewed actual CDFW trawl data from 2010 through 2016, which provided the location (i.e. latitude and longitude) of where each trawl started and stopped.

- The total trawl length within the Santa Barbara Channel during that time period was 40,480 nautical miles.
- The total trawl length within the area of interest evaluated by NOS was 1,508 nautical miles.
- The total trawl length within the proposed project area was 145 nautical miles.

Therefore, based upon CDFW trawl data, the project will require the existing commercial trawling fishery to relocate approximately 0.4% of their total trawls within the Santa Barbara Channel. The analysis conducted by NOS confirms that, while the proposed site location does overlap with some known halibut trawl fishery activity, it avoids the known area of highest trawl fishing activity, which is located in a portion of the Santa Barbara Channel northwest of the project site. It is speculative as to whether trawl relocation will have a negative or positive impact on the overall catch for the halibut fishery but, given the small amount of existing usage, the impact is considered to be likely negligible. For the squid fishery, the proposed site avoids the areas of significant fishing intensity and landings, which occur significantly south of the project site.

Regarding recreational fishing, the longlines would be spaced 150 feet apart, which would allow recreational fishing vessels to navigate between the lines and fish within the project area if so desired. In fact, it has been noted that both commercial and recreational fishing activities utilize a

similar mussel longline aquaculture operation managed by Santa Barbara Mariculture. Given that the longlines will be submerged in 15-45 feet of water, all but the largest recreational and commercial fishing boats will be able to navigate over the longlines. To reduce the potential for accidental loss or entanglement of fishing gear with aquaculture gear, BMP Storage and Disposal of Supplies-2 has been incorporated to ensure that the project site is well maintained and that any aquaculture gear that becomes dislodged is quickly recovered. While the facility may redirect some small amount of commercial and recreational fishing interests, the proposed offshore location and size, when compared to the abundance of open water in the project area, would limit any adverse impacts on commercial and recreational fishing.

Additionally, as mentioned in the project purposes stated in Section 4, a critical purpose of the project is to expand commercial fishing landings so that the VPD can ensure continued dredging of the harbor by the USACE. Dredging of the federal harbor entrance is critical to maintaining commercial fishing in the area. Further, the VPD plans to utilize some of the revenue it obtains from the project to finance future capital improvements, including many that would be of assistance to the existing commercial fishing fleet, including potentially replacing an older fisheries building, reconstruction of a fish pier, and/or adding fish offloading cranes. As such, the proposed project is consistent with Sections 30234 and 30234.5 of the California Coastal Act.

7. FIGURES AND ATTACHMENTS

Figure 1- Project Location

Figure 2- Detailed Plan for Shellfish Longlines

Figure 3- CASS Report Alternative 1

Figure 4- CASS Report Alternative 2

Figure 5- CASS Report Alternative 1 Overlaid with SeaSketch Alternative 8

Figure 6- Simulated View of Parcel Array at the Surface: 100-Acre Plot

Figure 7- Simulated View of Parcel Array at the Surface

Figure 8- Simulated View of the Parcel Array Underwater

Figure 9- Simulated View of Parcel Array Underwater with Anchor Line

Figure 10- Parcel Array Overview

Figure 11- Parcel Array Overview Backbone Details

Attachment 1- Application to the U.S. Army Corps of Engineers

Attachment 2- Biological Assessment

Attachment 3- Essential Fish Habitat

Attachment 4- NOAA CASS Study

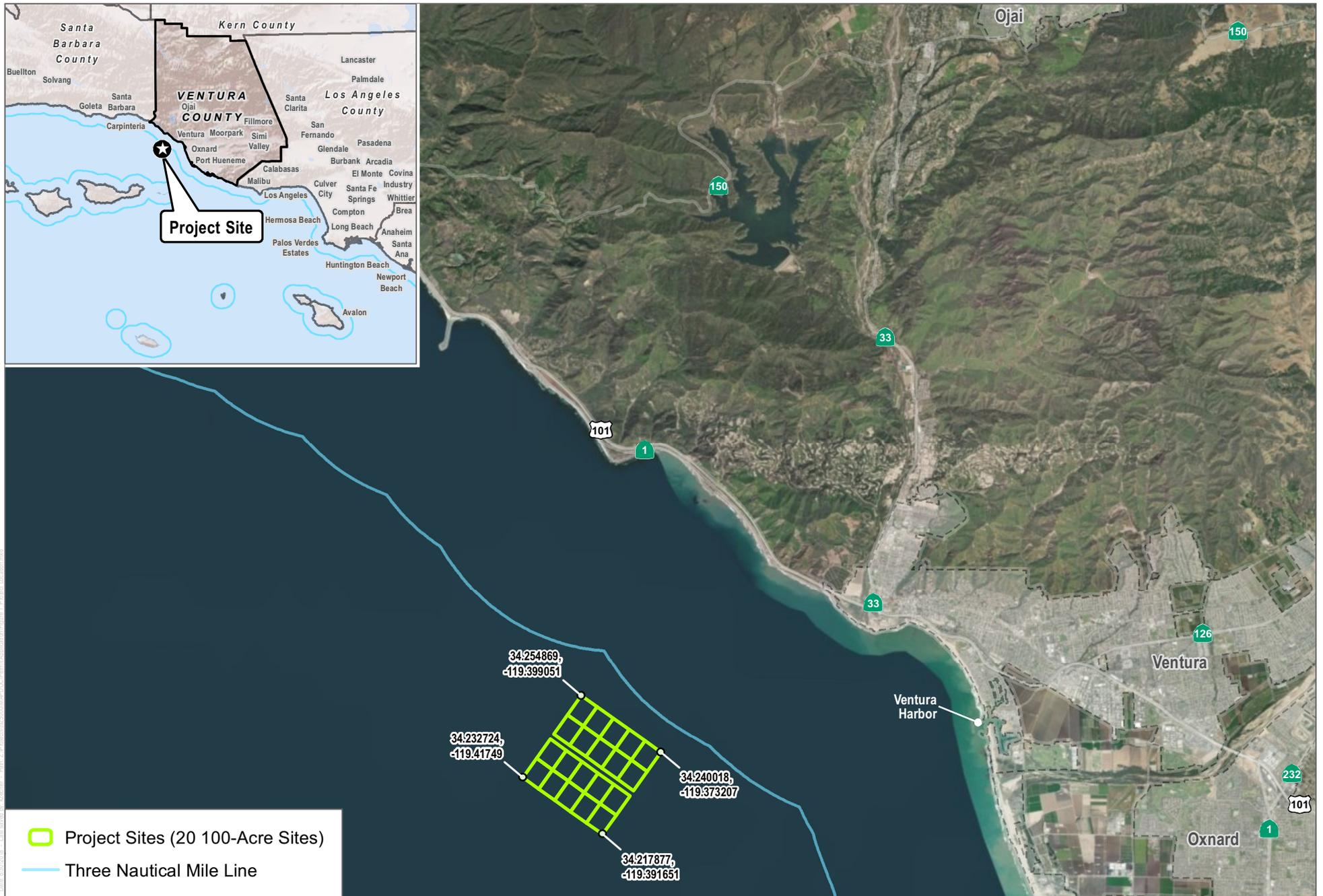
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Dudek. 2017c. Ventura Shellfish Enterprise: Strategic Permitting Initiative to Substantially Increase Shellfish farming in Southern California. 2017 NOAA Sea Grant Aquaculture Extension and Technology Transfer. Task 1 Deliverable: Strategic Permitting Plan. Prepared by Dudek. May 26.

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SOURCE: NAIP 2016
 DATE OF PREPARATION: 8/30/2018



FIGURE 1
Project Location
 Ventura Shellfish Enterprise Project

General Plan for Submerged Longlines

GENERAL OBSERVATIONS:

- Anchor lines should have 2.5:1 slope from anchor to submerged corner buoy
- Submerged buoyancy keeps lines tight despite surface waves and storms

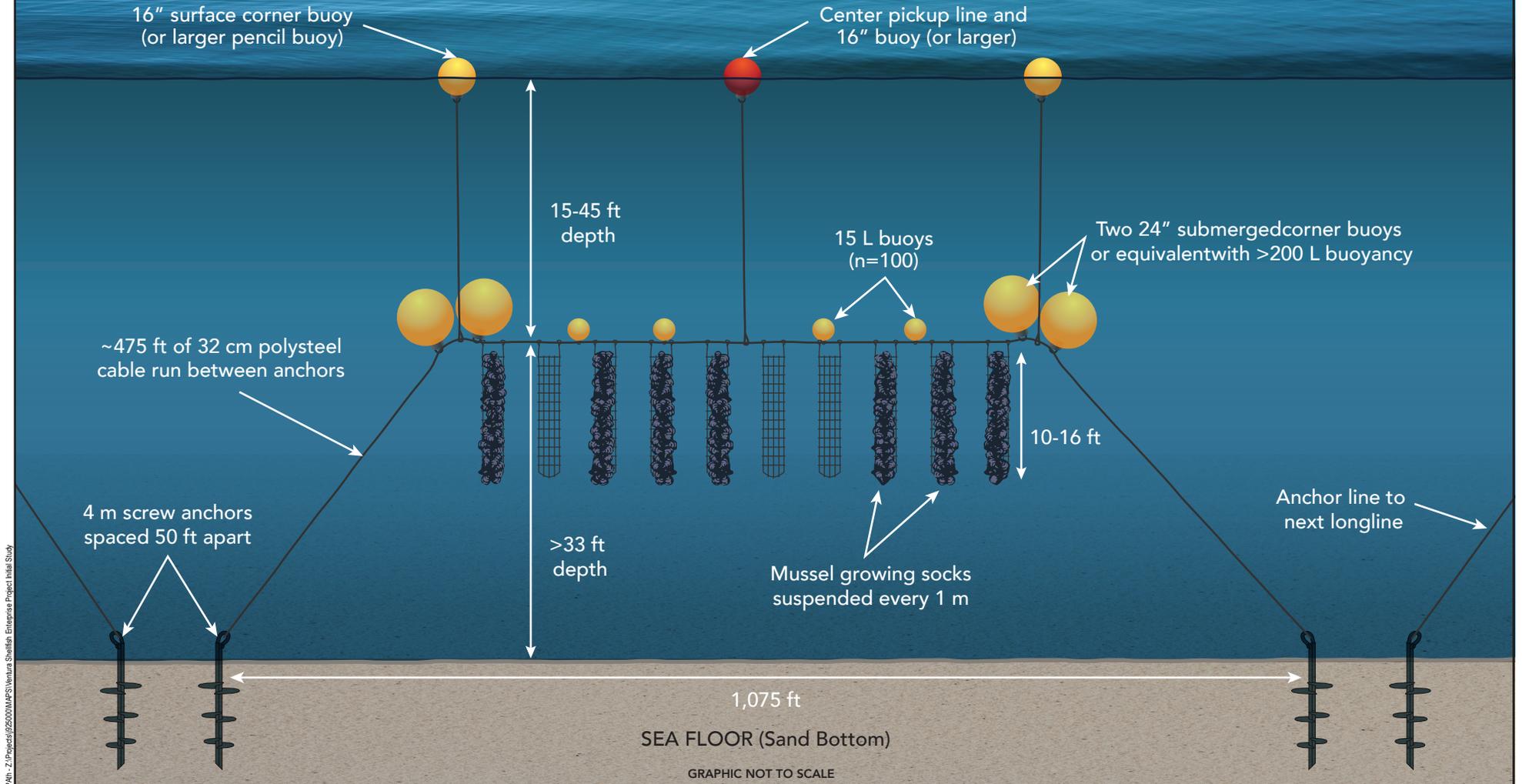
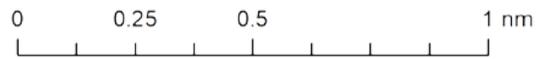
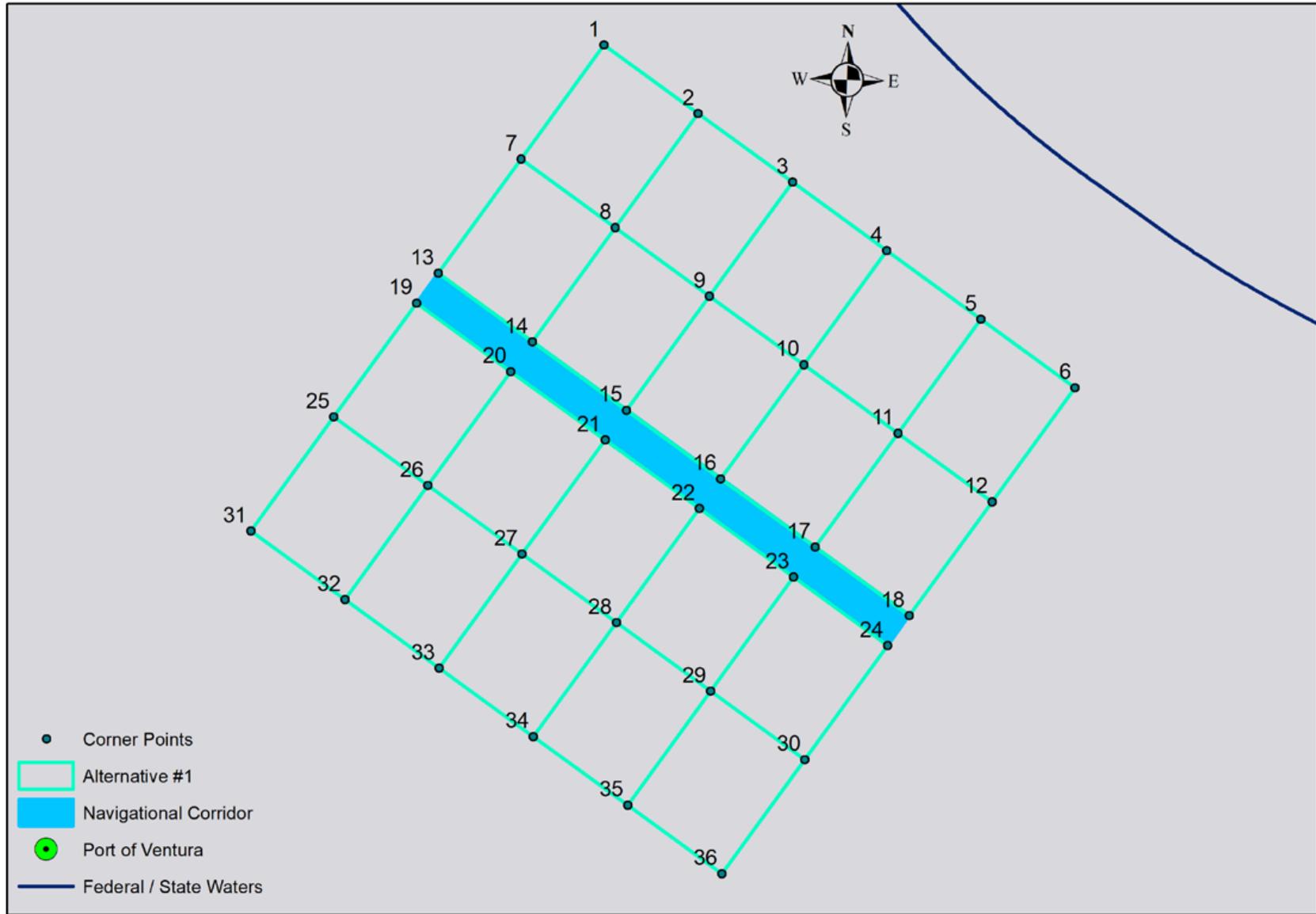


FIGURE 2

Detailed Plan for Shellfish Longlines



NOAA National Centers for Coastal Ocean Science
Coastal Aquaculture Siting and Sustainability



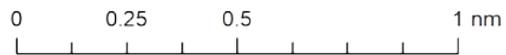
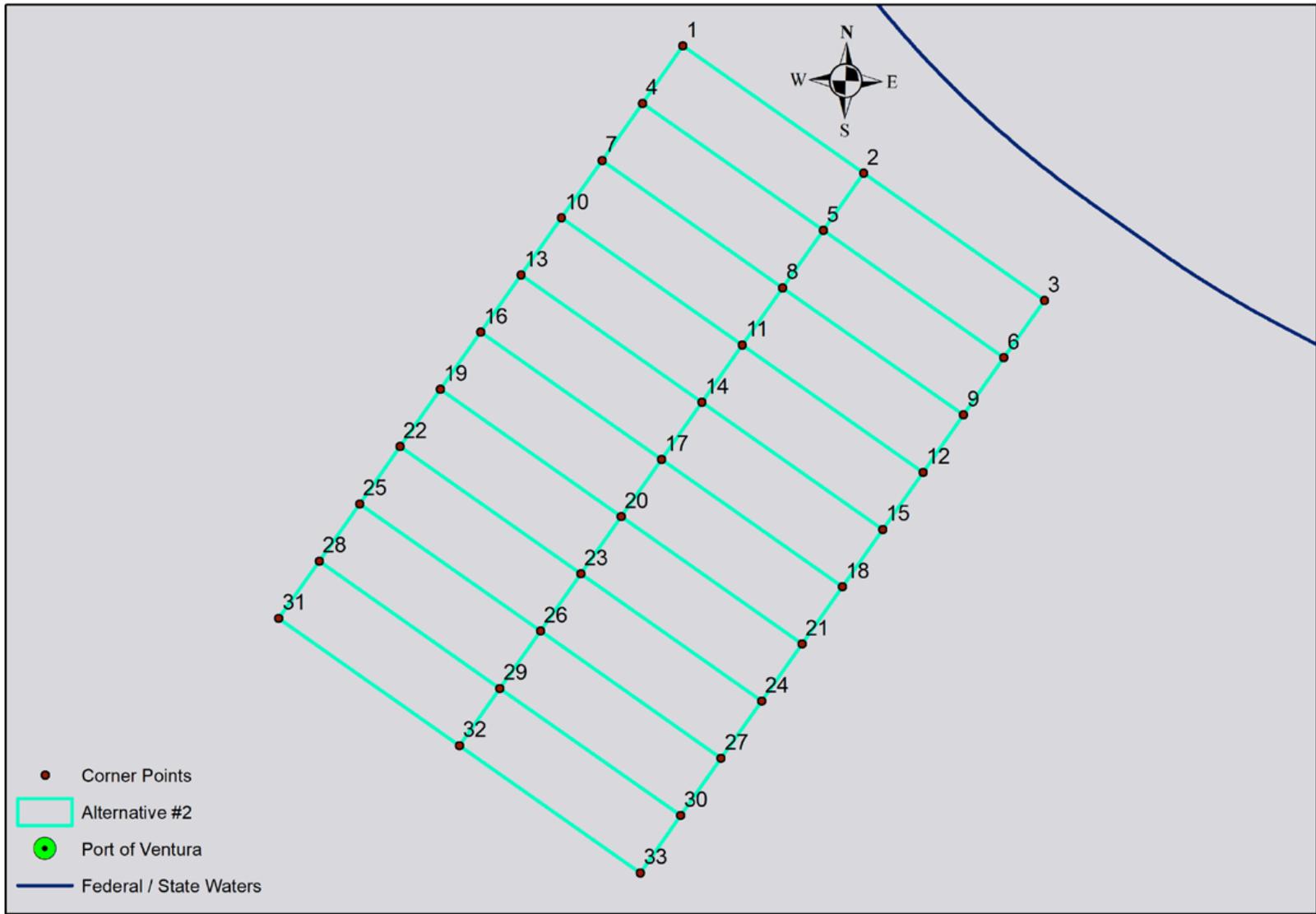
SOURCE: NOAA 2018

DUDEK

FIGURE 3

Proposed Project (CASS Report Alternative 1)

Ventura Shellfish Enterprise Project



NOAA National Centers for Coastal Ocean Science
Coastal Aquaculture Siting and Sustainability

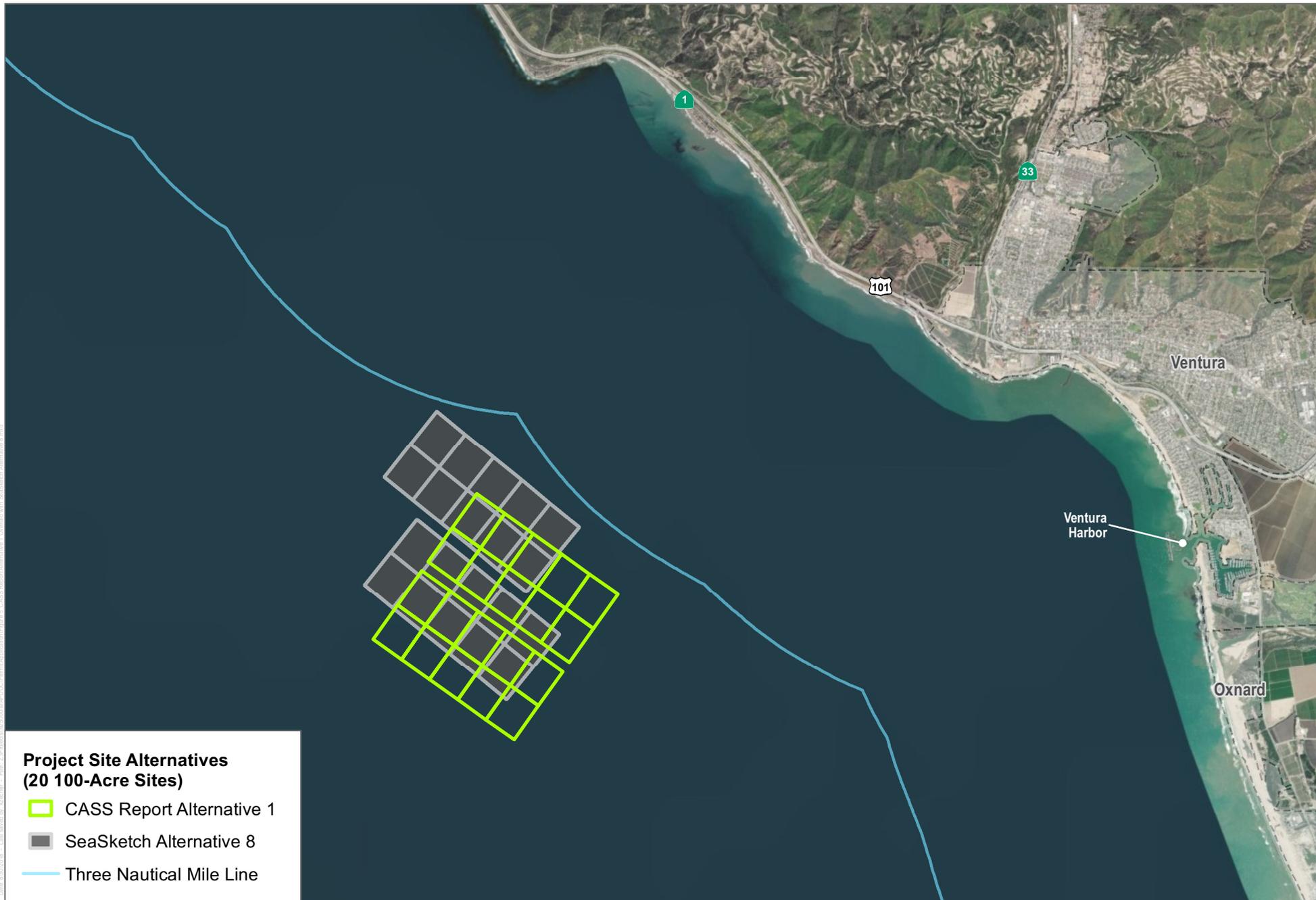


SOURCE: NOAA 2018

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FIGURE 4
Proposed Alternative (CASS Report Alternative 2)

Ventura Shellfish Enterprise Project



SOURCE: NAIP 2016

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0 3,600 7,200 Feet

FIGURE 5
CASS Report Alternative 1 Overlaid with SeaSketch Alternative 8

Ventura Shellfish Enterprise Project

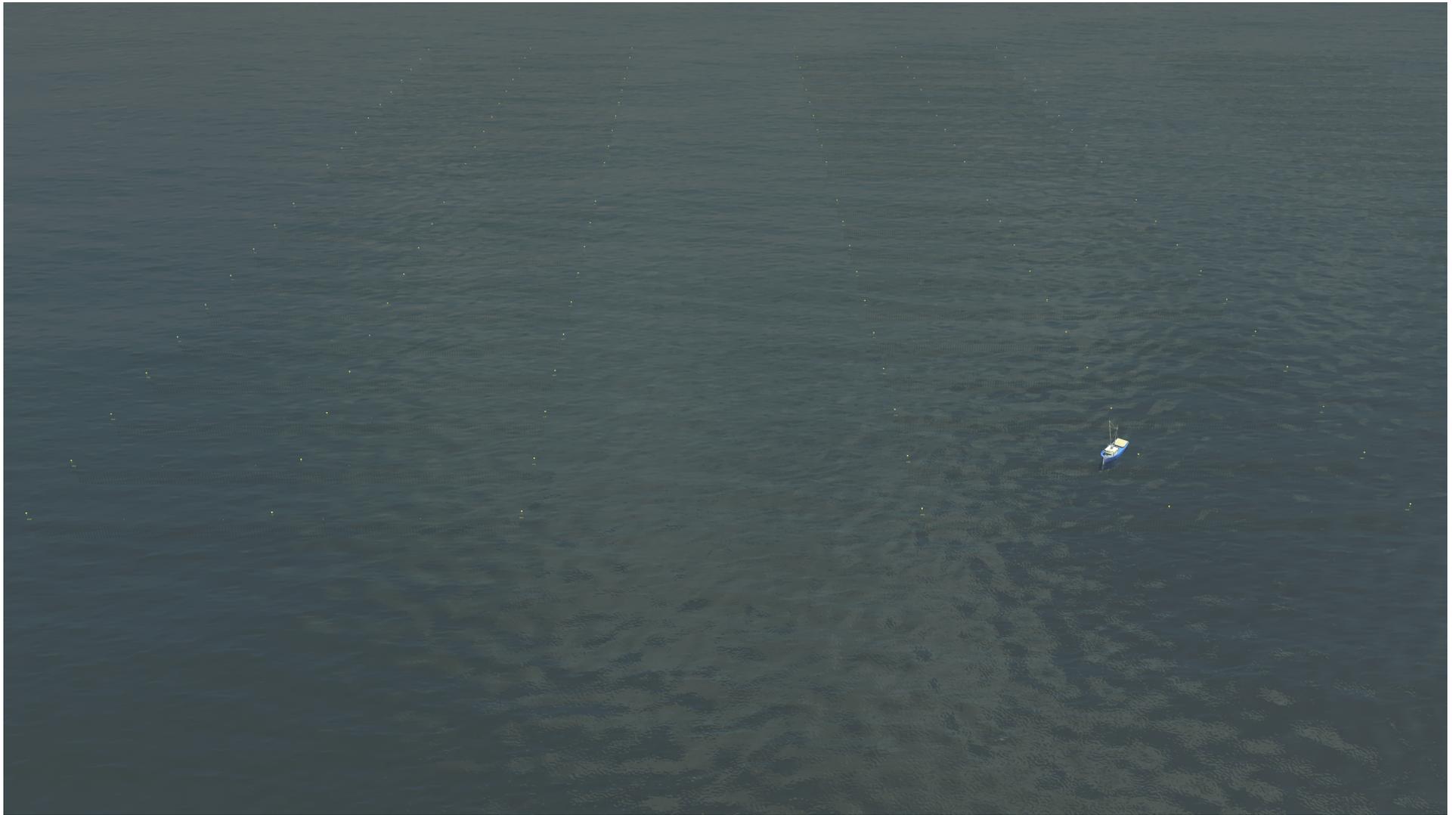


FIGURE 6

Simulated View of Parcel Array at the Surface: 100 Acre Plot

Ventura Shellfish Enterprise Project

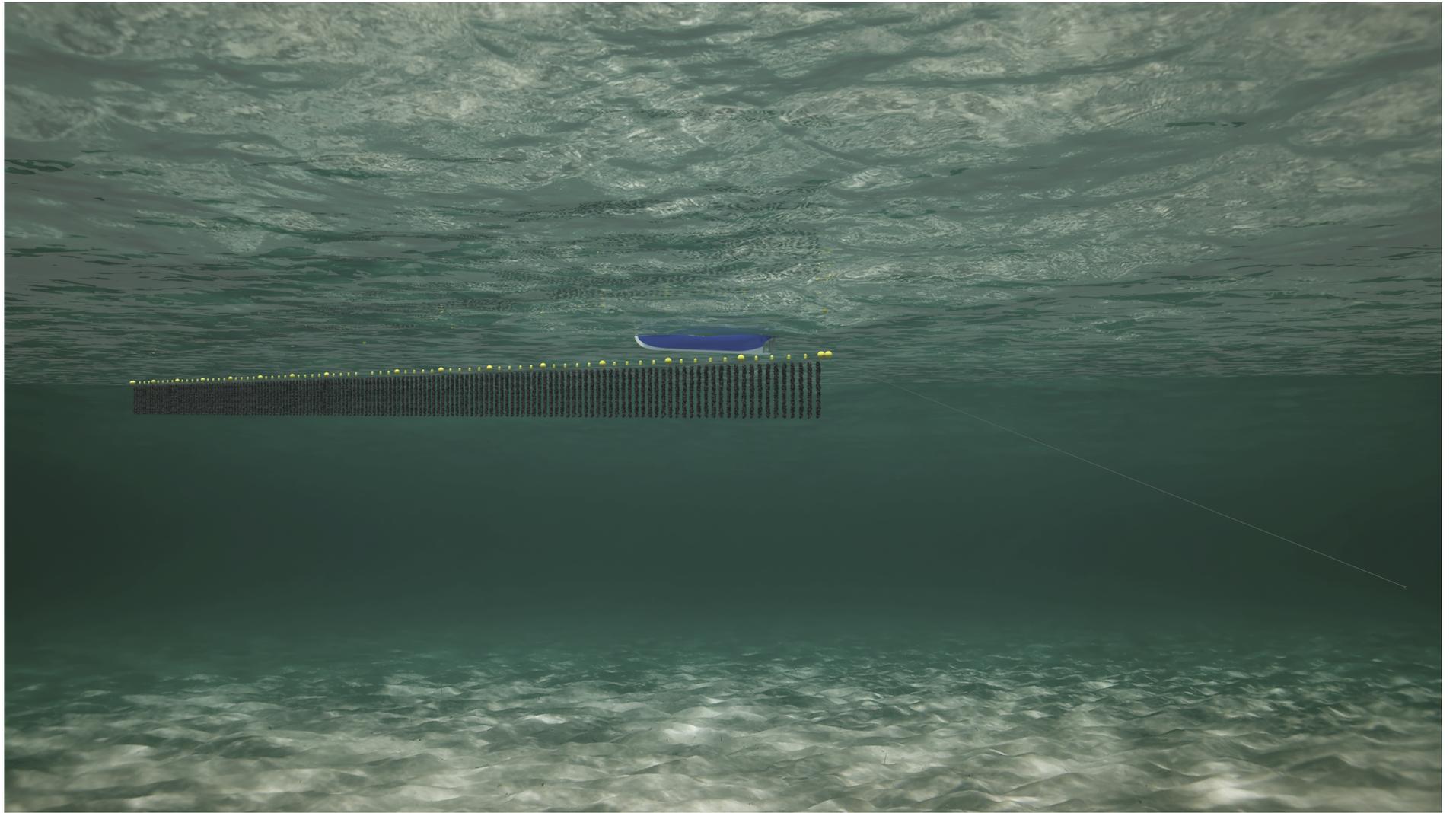
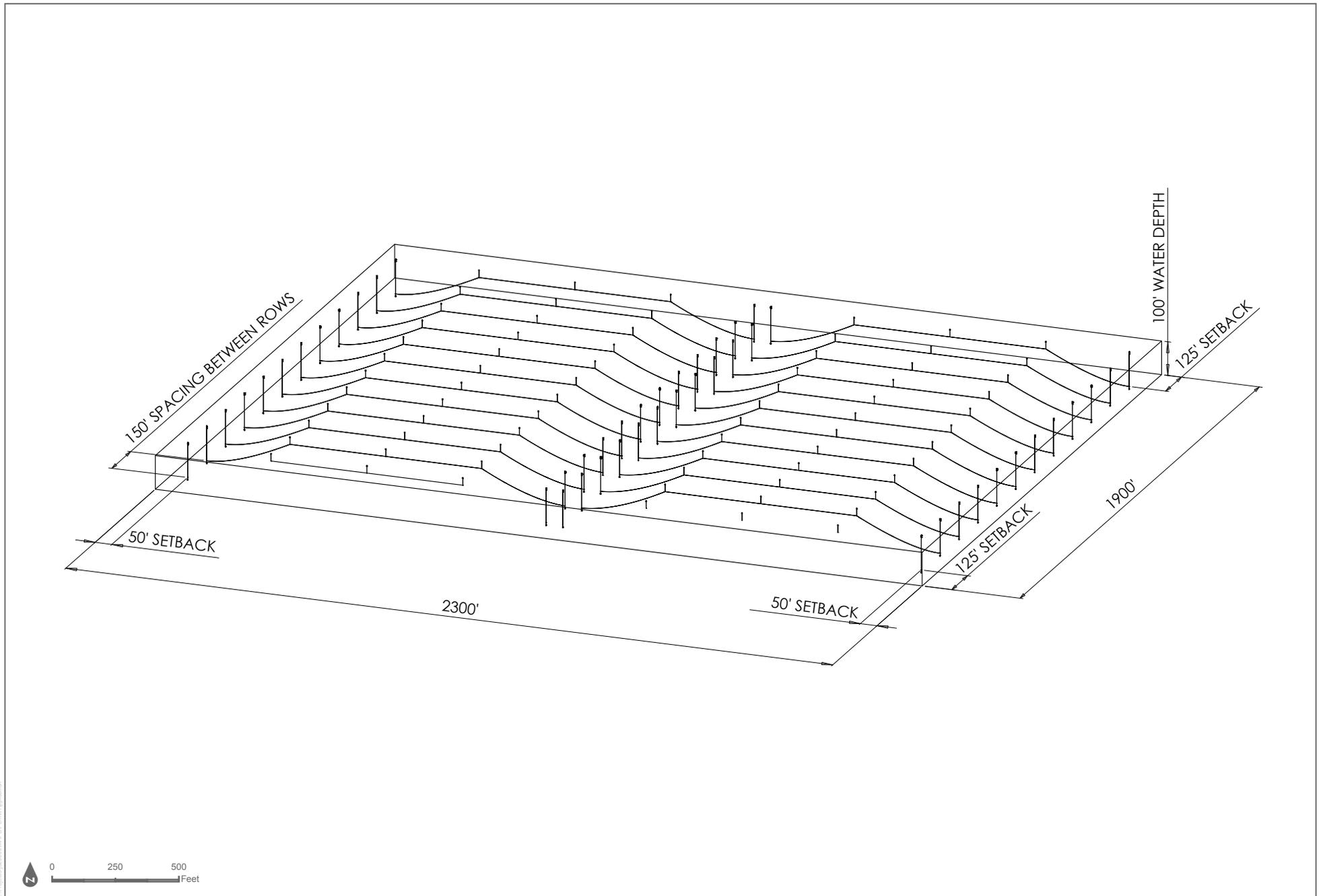


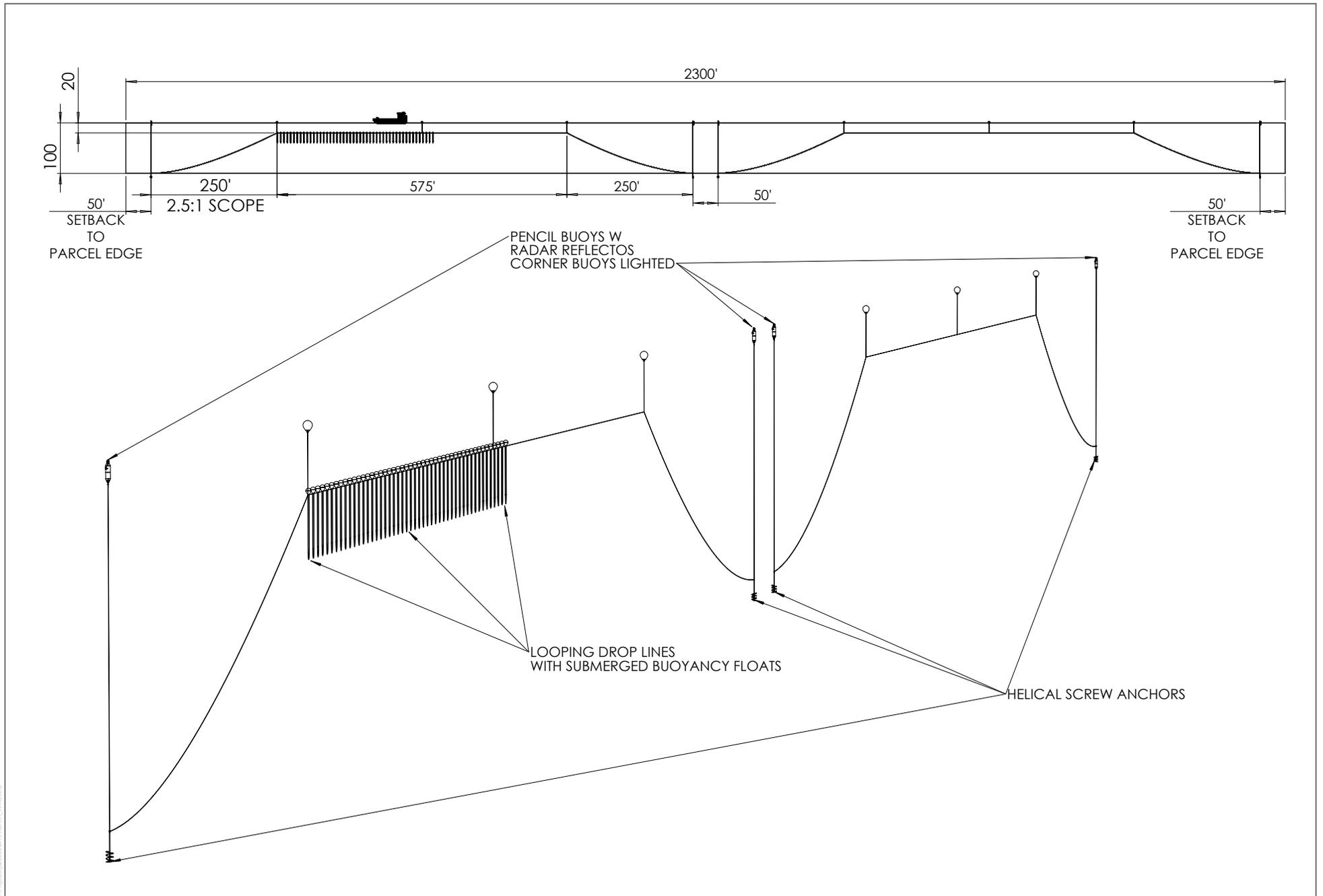
FIGURE 9

Simulated View of Parcel Array Underwater with Anchor Line

Ventura Shellfish Enterprise Project



SOURCE: VSE 2018
 DATE OF PREPARATION: 9/19/18



SOURCE: VSE 2018