BOARD OF PORT COMMISSIONERS
SEPTEMBER26, 2018

STANDARD AGENDA ITEM 1
VENTURA SHELLFISH ENTERPRISE SITE SELECTION

VENTURA PORT DISTRICT **STANDARD AGENDA ITEM 1**

BOARD COMMUNICATION Meeting Date: September 26, 2018

TO:	Board of Port Commissioners
FROM:	Everard Ashworth, Chairman
	Oscar Peña, General Manager
	Brian Pendleton, Deputy General Manager
SUBJECT:	Ventura Shellfish Enterprise Site Selection

RECOMMENDATION:

That the Board of Port Commissioners authorize the General Manager to:

1. Prepare and submit a permit application to the U.S. Army Corps of Engineers (USACE) for use of 2,000 acres of sea water bottom in federal waters near Ventura Harbor in Block 664 and 665, the area generally depicted and described as CASS Report Alternative 1 for the Ventura Shellfish Enterprise (VSE) project: and,
2. Prepare and submit all other applications to local, state and federal agencies as required for the VSE project including the California Coastal Commission; and,
3. Prepare all necessary surveys, studies, reports and federal environmental review documents as directed by local, state and federal agencies as required for the VSE project; and,
4. Return to the Board if there are any material changes to the proposed locations for federal permits for the VSE project resulting from the permitting and/or environmental review processes.

SUMMARY:

The Board of Port Commissioners an informational report on the Ventura Shellfish Enterprise (VSE) site selection process on September 12, 2018 with the anticipation of a final site recommendation with related permit applications, studies and reports on September 26, 2018. As a result of the Board's actions regarding VSE project siting on November 15, 2017, the National Oceanic and Atmospheric Administration's (NOAA) National Ocean Service (NOS) prepared a Coastal Aquaculture Siting and Sustainability (CASS) Technical Report - Ventura Shellfish Enterprise: Aquaculture Siting Analysis Results (Attachment 1). The CASS Report was updated since the September 12, 2018 presentation to provide additional mapping and information regarding collection methodology of commercial fishing data.

As stated in the CASS Report, spatial planning for aquaculture operations, wherein spatial data representing key environmental and use conflicts are synthesized to identify areas with the highest likelihood for compatibility with aquaculture operations, is a critical first step to ensure environmentally and economically sustainable aquaculture development. The CASS Report for the VSE project studied an area of 20,000 acres in federal waters proximate to Ventura Harbor, known as an Area of Interest (AOI).

On June 28, 2018, NOAA and the VSE team co-hosted an Inter-Agency Pre-Application Meeting in Long Beach with federal and state regulatory staff. NOAA presented the preliminary draft CASS Report and the VSE team provided information concerning the status of the project and related studies. On July 9, 2018 and September 10, 2018 VSE team members met with the Commercial Fishermen of Santa Barbara (CFSB) to discuss the project and status of permit applications. The CFSB submitted a letter to the Ventura Port District at the Board meeting of September 12, 2018 expressing concerns about project siting and opportunities for small business participation to which Port District staff has provided a formal response.

As a result of the CASS Technical Report, the VSE team has identified two new alternatives, known as CASS Report Alternative 1 and 2 (Attachment 2-3) and Dudek, the project's environmental consulting firm, has prepared the permit application to the U.S. Army Corps of Engineers (USACE) and an application to the California Coastal Commission (CA Coastal Commission) (Attachment 4). These two new alternatives are consistent with the Board's prior site selection both in terms of size (2,000 acres) and location in federal waters. The exact GPS coordinates of these two alternatives are included in the CASS Technical Report.

BACKGROUND:
On November 15, 2017, the Board of Port Commissioners authorized the General Manager to prepare and submit all applications to local, state and federal agencies as required for the VSE project and prepare all necessary surveys, studies, reports and federal environmental review documents as directed by local, state and federal agencies. NOAA's CASS Technical Report has allowed the VSE team to evaluate the proposed siting and refine these permit locations and configurations in consultation with aquaculture experts prior to submission of the permit applications.

Project Goals and Objectives
Increasing the supply of safe, sustainably produced domestic seafood is a priority of the State Legislature, NOAA and the U.S. Department of Commerce. The VSE project is a multi-party initiative that seeks to permit twenty 100-acre plots for growing the Mediterranean mussel (*Mytilus galloprovincialis*) via submerged long lines within the Santa Barbara Channel near Ventura Harbor. The Ventura Port District received a substantial NOAA Sea Grant sub-award of $300,000 in 2015 for the proposed project in support of these goals. As part of the 2015 grant, the VSE team developed a Strategic Permitting Plan previously provided to the Board and made available to stakeholders and the public. This Strategic Permitting Plan provides a great deal of information about project goals, objectives and regulatory requirements and can be found online at *venturashellfishenterprises.com*. The VSE project objectives include:

- To increase the supply of safe, sustainably produced, and locally-grown shellfish while minimizing potential negative environmental impacts;
- To enhance and sustain Ventura Harbor as a major west coast fishing port and support the local economy;
- 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 provide an entitlement and permitting template for aquaculture projects state-wide;
- To enhance public knowledge and understanding of sustainable shellfish farming practices and promote community collaboration in achieving VSE objectives;
- To advance scientific knowledge and state of the art aquaculture practices through research and innovation.

The proposed project goals and objectives further several of the District's fundamental mission and objectives, as summarized below:

- Maintaining a safe and navigable harbor;
- Diversification of commercial fishing opportunities to benefit the fishing industry and local and regional economies;
- Continued priority (as a commercial fishing harbor) for federal funding appropriations for annual dredging of the federal harbor entrance.

Public Outreach

The VSE team hosted a series of public educational workshops in 2017 regarding the proposed project. In total, there were 10 educational and site selection workshops. Of these, three workshops were held to engage with stakeholders to identify the location of twenty 100 acre parcels within a broader area of interest that was identified through use of a spatial planning tool developed by the Bren School of Environmental Science and Management at UC Santa Barbara (UCSB Bren School). The focused site selection workshops were held at the Four Points Sheraton Hotel in our Harbor on July 11th and 13th and the final workshop was held on August 9th of 2017. While in-person participation was strongly encouraged, individuals who were not able to attend the meetings were provided the opportunity to comment on site selection through SeaSketch linked to *venturashellfishenterprise.com*. Notice of the site selection workshops was mailed out to over 500 commercial fishing vessel owners between Goleta and Port Hueneme; additionally, the VSE team coordinated with NOAA representatives and commercial fishermen to encourage their attendance. The team also contacted all of the individuals that have registered through the VSE website. This marine spatial planning opportunity was available through Wednesday, August 9th 2017, the date of the final site selection meeting. The *venturashellfishenterprise.com* website continues to be used to communicate with interested parties who registered on the website.

During and after the site selection workshops, the Board of Port Commissioners received written and oral reports on the site selection process at four public meetings held in 2017 on July 26th, September 13th and 27th, and October 11th. At a fifth public meeting on November 15, the Board authorized the General Manager to proceed with the preparation of all necessary permit applications, surveys, studies, reports for a site in federal waters known as SeaSketch Alternative 8.

Initial Candidate Area Considerations

The initial candidate area in state waters was selected by the VSE with the assistance of analysis prepared by the UCSB Bren School. The selection of the initial candidate area was detailed in the Strategic Permitting Plan; however some key considerations are summarized here. They included suitability of the candidate growing area for mussels such as 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. Stakeholder considerations are discussed below.

Subsequent to identification of the initial candidate area, the District 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, additional information was provided by aquaculture specialist Scott Lindell, associated with Woods Hole Oceanographic Institution, that the minimum depth to support the mussel growing activities should be adjusted from 60 feet to 80 feet. This minimum depth is consistent with the only permitted mussel farms that can sell Mediterranean Mussels in Southern California, Santa Barbara Mariculture (which is located in 80 feet of water off Hope Ranch), and Catalina Sea Ranch (which is located in depths between 138 and 150 feet, approximately 6.1 miles from the shore off the coast between Long Beach and Huntington Beach). The minimum of 80’ reduces exposure to various predator species (i.e. ducks) and potential storm surge, while the upper-end range of approximately 115’ provides opportunities to scale operations.

2017 Siting Considerations and Expanded Candidate Area

With high levels of stakeholder engagement, ranging from existing users of the candidate area to prospective grower producers and aquaculture industry experts, the VSE team, with Board concurrence, expanded its site search to include areas in federal waters near Ventura Harbor. Specifically, the expanded candidate area comprised 200,000 acres in both state and federal waters in Blocks 651, 652, 664, 665, 666. To understand this scale, the proposed VSE project represents 2,000 acres or 1% of this 5 block area.

Additionally, 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 Board in its decision-making process last November. 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 include:

- 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

Quantification of the eight siting configuration alternatives revealed significant advantages for locating the VSE project in federal waters, and specifically for siting as was depicted and described as SeaSketch Alternative 8 in Block 665. Additionally, the VSE analyzed fish catch data for the 5 block area over a 5-year period. In this 200,000 acre area the data showed that the average annual wholesale value of fish catch from 2012-2016 was approximately $2.96M.

A siting configuration in Federal waters was similar to any alternative in the original identified candidate area in terms of water column depth and bottom substrate. However, SeaSketch Alternative 8 maintained additional advantages over any alternative in CA state waters because of a reduced level of interference with commercial fishermen; potential improved water and product quality; relative proximity to Ventura Harbor; resulting minimal visual impacts to the near shore environment; and potential to realize economies of scale. These factors led to the Board's decision on November 15th of last year.

The VSE team projects that use of 2,000 or 1% of that expanded area for the proposed project at full build out and operation could generate $45M-$55M in annual wholesale value. Many factors will ultimately determine actual revenue including project size, growing conditions, operational interruptions, time period to full build out, market conditions, project and operational costs, etc. In applying a factor of 50% to these preliminary estimates, the project could still potentially generate $22.5M -$27.5M in annual wholesale value.

In identifying the appropriate location in federal waters, the VSE project team also sought to further minimize interaction with existing commercial fisheries. Based upon the workshops and public outreach conducted in 2017, the commercial halibut trawl fishery was identified as the primary commercial fishery potentially affected by the project. Since that time, to determine the

potential impact, the VSE team 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 CASS Report Area of Interest was 1,508 nautical miles.
- The total trawl length within CASS Report Alternative 1 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. It is speculative as to whether this 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.

2018 NOAA CASS Technical Report

As a result of the Board's actions regarding VSE project siting on November 15, 2017, NOAA's NOS prepared a Coastal Aquaculture Siting and Sustainability (CASS) Technical Report - Ventura Shellfish Enterprise: Aquaculture Siting Analysis Results. The report is helpful to District staff in making final recommendations to the Board about project siting, but will also be helpful to inform federal and state regulatory agencies in conducting appropriate environmental review under the National Environmental Policy Act and evaluating permit applications, and other stakeholders and interested parties.

NOS obtained quantitative requirements for the project from the VSE team. These requirements included information regarding preferred project parameters: spatial boundaries of region of interest, preference for state or federal waters, preferred project location coordinates, approximate proposed project size, preferred port, the maximum distance from preferred port, species to be cultivated, acceptable depth range, acceptable seawater temperature range, acceptable current velocity range, maximum allowable wave energy, and additional comments or specifications. These quantitative requirements are contained in the CASS Technical Report and the basis from which a new 20,000 acre Area of Interest (AOI) in federal waters in Blocks 664-665 was developed.

All potential environmental and use factors that could constrain the siting of the VSE project were first plotted and mapped to compare against the identified AOI for the VSE project. These interactions included military, industry, commercial fishing, navigation, and natural resources. NOS determined that oil and gas, commercial fisheries, navigation, and submarine cables and wrecks and obstructions were all uses that intersected with the AOI. This led to a final suitability assessment, where the northern portion of the AOI was determined to have the highest likelihood of compatibility with the proposed project and avoid/minimize interactions with the other user groups. Based on the results of the suitability analysis, NOS identified two alternative site configurations based on VSE parameters that maximize likelihood of compatibility with existing uses in the region. The primary difference between the two CASS Report Alternative sites is the configuration of the individual 100-acre cultivation areas.

Importantly, the two sites overlap with the federal waters alternative site (SeaSketch Alternative 8) identified in the UCSB Bren School spatial planning analysis and previously approved by the Board (Attachment 5), indicating the area has been shown by two independent studies to have the fewest conflicts with other uses and sensitive environmental resources. The permit application to USACE and application to CA Coastal Commission has identified CASS Report Alternative 1 as the preferred project site, given that it has greater operational flexibility, and Alternative 2 as a project alternative.

Seafood Inspection Program (SIP)
At the inception of the VSE project, there was not a clear pathway for compliance with the National Shellfish Sanitation Program (NSSP) guidelines for shellfish grown in federal waters. However, a pathway for NSSP compliance in federal waters has been adopted through an interim program adopted by the Interstate Shellfish Sanitation Conference and the NSSP to enable harvest and sale of safe and healthy shellfish products in interstate commerce. Through a collaborative and coordinated effort with the Food and Drug Administration (FDA) and NOAA's Seafood Inspection Program (SIP) in January 2017, they developed a pathway to implement the interim program for NSSP compliance for molluscan shellfish in federal waters. This pathway for NSSP compliance in federal waters is now being successfully implemented by another offshore mussel aquaculture project in southern California. The compliance pathway covers both pre- and post-harvest elements of the NSSP Model Ordinance and can serve as a template for further adaptation to the VSE project goals and needs. Such adaptations will take into consideration the public-private nature of the VSE enterprise, the participation of multiple grower-producers, its scale and ultimate location, and other factors. VSE team member Coastal Marine Biolabs (CMB) is committed to establishing a centralized, federally approved, Ventura Harbor-based testing facility to meet the testing requirements articulated in the NSSP. This process can be initiated independently of implementing the NSSP compliant interim program for federal waters and concurrently with the permit application process.

FISCAL IMPACT:
Staff has completed the 2015 NOAA Sea Grant and is awaiting formal announcement of two additional grant applications from the Pacific States Marine Fisheries Commission (PSMFC) and 2018 NOAA Sea Grant to help fund the next steps of the entitlement process. Additionally the Board approved $80,000 in FY18/19 for project related professional services. Staff will return to the Board with any announcements regarding grant applications, related agreements and professional services as necessary.

ATTACHMENTS:
Attachment 1 – NOAA Coastal Aquaculture Siting and Sustainability (CASS) Technical Report – Ventura Shellfish Enterprise: Aquaculture Siting Analysis Results (Revised: September 19, 2018)
Attachment 2 – CASS Report Alternative 1
Attachment 3 – CASS Report Alternative 2
Attachment 4 – USACE, CA Coastal Commission Applications
Attachment 5 – SeaSketch Alternative 8
Attachment 6 – Responses to Comments from September 12, 2018

ATTACHMENT 1

CASS Technical Report

Ventura Shellfish Enterprise: Aquaculture Siting Analysis Results

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INTRODUCTION

Spatial planning for aquaculture operations, wherein spatial data representing key environmental and space use conflicts are synthesized to identify areas with the highest likelihood for compatibility with aquaculture operations, is a critical first step to ensure environmentally and economically sustainable aquaculture industry development. Aquaculture siting analyses involve the use of geospatial analytical tools (e.g., GIS – Geographic Information Systems) to integrate pertinent spatial data and generate map-based products that can be used to inform policy and permitting decisions regarding where aquaculture operations can be located.

The Ventura Shellfish Enterprise (hereafter 'VSE') is a multi-party initiative seeking to permit twenty 100-acre plots of ocean space for aquaculture production of the Mediterranean mussel (*Mytilus galloprovincialis*) via submerged long lines in federal waters within the Santa Barbara Channel, proximate to Ventura Harbor, California, USA. The key participants in the VSE, including Coastal Marine Biolabs, The Cultured Abalone Farm, and the Ashworth Leninger Group, have worked with the Ventura Port District to develop a "Strategic Permitting Plan," with a suite of other resources and project related information and tools that can be found on the VSE website: venturashellfishenterprise.com, or by contacting the VSE Co-Project Managers, Everard Ashworth at EAshworth@algcorp.com or Brian Pendleton at BPendleton@venturaharbor.com.

NOAA's Coastal Aquaculture Siting and Sustainability (CASS) Program conducted a comprehensive and objective siting analysis for the proposed VSE project, which is the subject of this technical report. This siting analysis utilized the best available, high-resolution spatial data to represent key potential environmental and space use conflicts that constrain the siting of an aquaculture operation within the Santa Barbara Channel region of interest. This siting analysis was guided by quantitative input provided by VSE regarding specific project requirements and was iteratively developed with input provided by the United States Army Corps of Engineers (USACE) Los Angeles District, NOAA (including the National Marine Fisheries Service and the National Ocean Service), the State of California Aquaculture Coordinator, the California Coastal Commission, and the VSE team.

The **Coastal Aquaculture Siting and Sustainability (CASS)** program supports works to provide science-based decision support tools to local, state, and federal coastal managers supporting sustainable aquaculture development. The CASS program is located within the Marine Spatial Ecology Division of the National Centers for Coastal Ocean Science, National Ocean Service, NOAA.

To learn more about CASS and how we are growing sustainable marine aquaculture practices visit https://coastalscience.noaa.gov/research/marine-spatial-ecology/aquaculture/ or contact Dr. James Morris at James.Morris@noaa.gov.

METHODS

Data Inventory

A comprehensive spatial data inventory was developed for the Santa Barbara Channel region to inform the VSE siting analysis. Specifically, the data inventory included data layers from the following categories: military, industry and recreation, commercial fishing, navigation, natural resources, and oceanographic / biophysical. We conducted an exhaustive search and survey to identify web-based resources and contacts to obtain pertinent data resources. A broad suite of state and federal agencies (e.g., NOAA National Marine Fisheries Service, U.S. Department of Defense, Bureau of Ocean Energy Management, California Department of Fish and Wildlife) and academic institutions (e.g., University of California at Santa Barbara) contributed spatial data. Data was checked for completeness and quality to ensure that the most authoritative source was used. The complete data inventory generated for this siting analysis can be found in Table 1.

Project Requirements

We obtained quantitative requirements for the VSE project directly from the technical coordinator for the VSE team. These requirements included a request for the following items of information regarding preferred project parameters: 1) spatial boundaries of region of interest, 2) preference for state or federal waters, 3) preferred project location coordinates (if available), 4) approximate proposed project size, 5) preferred port, 6) maximum distance from preferred port, 7) species to be cultivated, 8) acceptable depth range, 9) acceptable seawater temperature range, 10) acceptable current velocity range, 11) maximum allowable wave energy, and 12) additional comments or specifications. This information was obtained from the VSE team via a Google Form. All fields were optional.

Spatial Analytical Approach

The spatial analysis for the VSE project was conducted within ArcMap 10.5 (Esri 2016), and is a type of spatial multi-criteria analysis known as suitability analysis. Suitability analyses allow for integration of multiple spatial data layers to identify areas of highest suitability, or areas with the highest likelihood of compatibility. When utilized within an aquaculture spatial planning context, suitability analyses integrate data representing environmental or space-use constraints to identify areas that minimize potential conflicts and have the highest likelihood for compatibility with aquaculture operations. Within a suitability analysis, each individual spatial data layer is re-scaled according to a defined suitability relationship (e.g., locations associated with the highest vessel traffic are assigned a score of ‘0’, locations of lowest vessel traffic are assigned a score of ‘1’). Each re-scaled spatial data layer can be subsequently assigned a weight (all weights must sum to 100%; higher weights = more important conflict considerations), and all data layers can be integrated within the spatial analysis to identify locations with the highest likelihood for compatibility across all factors considered within the analysis. It is important to note that while weights can be assigned to individual spatial data layers, each layer can also be assigned an equivalent weight such that no individual factor has a greater impact on the final scores and output of the spatial analysis.

Based upon the project requirements criteria defined by VSE, we established a boundary for the ‘area of interest’ (hereafter ‘AOI;’ Figure 1). We subsequently established a uniform grid within this boundary with a grid cell size of 10 acres (Figure 2). This grid cell size was selected based on the spatial resolution of the available data and the proposed size of the VSE project. Utilizing the comprehensive data inventory we had previously developed for the Santa Barbara Channel region, we

projected each spatial data layer to visualize and assess which layers were contained within the AOI. Spatial data layers not contained within the AOI were not considered further within the VSE suitability analysis, but were mapped for visualization purposes within this report. Spatial data layers contained within the AOI were subsequently converted onto the previously established grid using a custom Python script. For example, total vessel traffic density was projected onto the established grid wherein each grid cell was assigned a value corresponding to the vessel traffic density for a given cell's location. After projection of each spatial data layer onto the grid, individual grid cell values were re-scaled according to a pre-defined rule (e.g., locations associated with the highest vessel traffic are assigned a score of '0', locations of lowest vessel traffic are assigned a score of '1'). Re-scaling of each spatial data layer was essential to ensure each factor was on a common scale (0 – less compatible, to 1 – more compatible). Within GIS, the overall suitability of each cell (S_j) for siting the VSE aquaculture operation was calculated as:

$$S_j = \sum_{x=1}^{n} (L_{xj} \cdot W_x)$$

where S_j is the cumulative value of cell j calculated as the product of the suitability score L of cell j and the associated weight W for factor x summed across all factors. It is important to note that within this analysis, all factors were considered to have equivalent weighting. After calculation of overall suitability scores using the function described above, a secondary calculation was conducted to remove (i.e., assign a score of '0') grid cells that received a score of '0' for any individual factor. This second-order calculation was necessary to ensure that grid cells associated with locations of known incompatibility were removed from further consideration. On a scale of 0 to 1, grid cell suitability scores for siting the VSE operation were ranked from highest (most suitable) to lowest (least suitable).

Identification of Alternative Sites

Multiple alternative sites for siting of the proposed VSE project were identified within the overall AOI. The final suitability grid that incorporated all identified constraining factors was used to guide the identification and delineation of two specific alternative locations and configurations for the proposed VSE project. Specifically, the highest scoring grid cells (i.e., most compatible locations across all criteria considered) were used to guide delineation of two alternative locations and configurations of the twenty 100-acre parcels associated with the proposed VSE project. In addition to the proposed project's siting criteria (i.e., within federal waters of a suitable depth for mussel long-line gear, see 'Project Requirements' below) the twenty 100-acre parcels were also configured and delineated so that the long-lines (or the side of the parcel facing shore) run parallel to the shoreline to maximize longshore currents.

Additional Considerations

Certain spatial criteria (e.g., cetacean density and distribution along the California coast, fishery landings receipt data by California Department of Fish and Wildlife reporting block), while relevant to understanding the broader regional context and setting of the proposed VSE project, were inappropriate for inclusion within the siting analysis given the coarseness of the resolution of spatial data representing these criteria (e.g., kilometer-scale spatial resolution). Protected cetacean species, for example, are highly mobile and create a complex set of spatial and temporal considerations. Commercial fishery landings by reporting block (10 minute by 10 minute scale, approximately equivalent to 8.25 nm by 10 nm) provide insight into regional trends in fishery landings, however, as

they represent an area in the 10,000s of acres (i.e., approximately 50,000 – 70,000 acres) range and landings are unable to be spatially differentiated within an individual block, these data are inappropriate for inclusion within the siting analysis. Furthermore, other available fishery data and statistics (e.g., total landings by harbor or by species) also provide valuable regional perspective with regards to commercial fisheries, but do not provide information at a sufficient spatial scale or resolution to discern relative compatibility of discrete areas of ocean space (at the scale of 1's or 10's of acres required within a siting analysis) with aquaculture operations or other activities. While we describe these factors and considerations to the greatest extent possible given the best available spatial data to represent them within the 'Discussion' section below, it is important to consult with regional experts regarding these considerations prior to final site selection.

RESULTS

Project Requirements

We received the following project requirements from the VSE team. Note that all fields were optional.

1. *Spatial Boundaries of Region of Interest*:	Santa Barbara Channel
2. *Preference for State or Federal Waters*:	Federal Waters
3. *Preferred Project Location Coordinates:*	*empty*
4. *Approximate Proposed Project Size*:	20 x 100-acre plots (2,000 acres total)
5. *Preferred Port*:	Ventura Harbor
6. *Maximum Distance from Preferred Port*:	9 nautical miles
7. *Species to be Cultivated*:	*Mytilus galloprovincialis*
8. *Acceptable Depth Range*:	25 – 37 m
9. *Acceptable Seawater Temperature Range*:	5 – 30 degC, optimal 20 degC
10. *Acceptable Current Velocity Range*:	0.025 – 0.1 m^{-s}
11. *Maximum Allowable Wave Energy*:	(depth range selected due to wave climate)
12. *Additional Comments or Specifications*:	(communicated through email), longlines are proposed for use for mussel cultivation

Based on the project requirements received from the VSE team, we identified an overall 'area of interest' (AOI) for the VSE project of ~20,000 acres within 9 nm of the Port of Ventura within federal waters between 25 and 37 m depth (Figure 1). A grid containing ~2,000 10-acre grid cells was established within the AOI (Figure 2).

Spatial Analysis Development

All potential environmental and space use factors that could constrain the siting of the VSE project for which an authoritative spatial data source was identified for (Table 1) were first plotted and mapped to compare against the identified AOI for the VSE project.

Military Interactions – No interactions were identified between the AOI and existing military space uses, inclusive of the Point Mugu Sea Range and existing danger zones and restricted areas (Figure 3).

Industry Interactions – An interaction was identified between the AOI and active oil and gas leases, drilling platforms, pipelines, and submarine cables (Figure 4). Active oil and gas leases intersect the central and southern portions of the AOI; oil and gas pipelines and submarine cables intersect the

central and southernmost portion of the AOI; a single drilling platform is located in the southern portion of the AOI. However, no interaction was identified between the AOI and ocean disposal sites.

Commercial Fishing Interactions – Commercial fishing, including trawl and squid fisheries, interactions were identified with the AOI (Figure 5); these interactions were further examined at the regional scale for trawl fisheries (Figure 6) and the squid fishery (Figure 7). Trawl fishery interactions occur throughout the AOI (Figure 6) and were examined in more detail in the subsequent suitability analysis. Squid fishery interactions are more prevalent in the southern and central portions of the AOI, with some identified interactions in the northernmost portion of the AOI (Figure 7).

Navigation Interactions – Navigation space use interactions were identified within the AOI, including vessel traffic and wrecks and obstructions interactions (Figure 8). Aids to navigation, artificial reefs, maintained channels and designated shipping lanes do not intersect the AOI. Vessel traffic (based on total vessel count for 2013, determined to be representative of modern vessel traffic for the region) is most significant in the central and southern portions of the AOI. Wrecks and obstructions are present in the southern portion of the AOI.

Natural Resource Interactions – Multiple levels of natural resource interactions for which authoritative spatial data was available were examined. Cetacean distribution and density data was examined, but the coarse spatial resolution of these data precluded their ability to be incorporated (Figure 9). Hardbottom habitat and deep-sea coral distribution does not interact with the AOI, but does occur within its proximity (Figure 10).

Interactions Incorporated within the Spatial Analysis – Based on examination of the broad suite of potential interactions for which authoritative spatial data were available to represent, we were able to identify which factors do not intersect the AOI and thus were not incorporated within the spatial analysis (Figure 11), and those factors that do intersect the AOI and thus were incorporated (Figure 12). Specific interactions that were subsequently incorporated within the spatial analysis included the following: 1) oil and gas, 2) commercial fisheries, 3) navigation, and 4) submarine cables and wrecks and obstructions.

Spatial Analysis Output and Identification of Alternative Sites

Oil and Gas Suitability – The following rules were applied to develop the oil and gas suitability grid: a score of '0' was assigned to grid cells intersecting oil and gas drilling platforms and pipelines (including areas within a 500-m radius of these features), a score of '0.5' was assigned to grid cells intersecting the active lease area due to the increased coordination required to site and manage the proposed project within the active lease area, and a score of '1' was assigned to grid cells outside of leases and not intersecting oil and gas platforms or pipelines. This restricted the most suitable locations based on oil and gas interactions to the northernmost and central-eastern portions of the AOI (Figure 13).

Commercial Fishing Suitability: Trawl Fishery – Compatibility with trawl fisheries was determined by assigning a relative rank from low-to-high (scores ranging from '0' to '1') to grid cells with low-to-high densities of trawl tracks. Trawl track densities for each grid cell were calculated by summing the total number of trawl track lines that passed through a given grid cell. The highest suitability was identified in western and central portions of the AOI, while lower suitability was identified in the northeastern and southern portions of the AOI where higher levels of interaction with the trawl fishery occur (Figure 14).

Commercial Fishing Suitability: Squid Fishery – Compatibility with the squid fishery was determined by assigning a relative rank from low-to-high ('0' to '1') to grid cells corresponding with low-to-high total squid landings by California Department of Fish and Wildlife reporting microblock. The highest suitability was identified in the western and central portions of the AOI, while lower suitability scores were identified in the southern and northernmost portions of the AOI (Figure 15).

Vessel Traffic Suitability – A relative rank from low-to-high ('0' to '1') was assigned to grid cells based on level (low-to-high) of interaction with vessel traffic (i.e., total vessel density for 2013 based on automatic identification system, 'AIS,' vessel density data for cargo, tanker, fishing, passenger and pleasure/sailing vessels). The highest suitability was identified in the northern portions of the AOI, while lower suitability scores were identified in the central portion of the AOI, and the lowest suitability scores were identified in the central and southernmost portions of the AOI (Figure 16).

Submerged Cables and Wrecks and Obstructions Suitability – The following rule was applied to develop the submerged cables and wrecks and obstructions suitability grid: a score of '0' was assigned to grid cells intersecting submarine cables or wrecks and obstructions and the areas within 500 m of these features, a score of '1' was assigned to all other grid cells outside of these areas. Application of this rule yielded identified areas of incompatibility in the central and southern portions of the AOI.

Final Suitability Results – The final suitability grid incorporated all major identified interactions to identify locations (grid cells) with the highest likelihood of compatibility. All identified interactions were considered with equal weighting within the analysis. Specifically, the following weights were assigned to individual suitability grids to calculate the final suitability grid: 1) oil and gas suitability – 33%, 2) commercial fishing suitability – 33% (16.5% for trawl fishery and squid fishery, each), 3) vessel traffic suitability – 33%. As the submerged cables and wrecks and obstructions grid included scores of only '0' and '1,' this grid was not weighted, but was included in the analysis as a binary factor. As described within the 'Methods' section above, if a given grid cell was assigned a score of '0' for any individual factor, it was assigned a score of '0' in the overall final suitability grid.

Based on the outcome of the final suitability calculation, the areas of highest identified suitability occur in the northern portion of the AOI (i.e., scores > 0.66; Figure 18). Areas in the southern and central portion of the AOI were generally identified as less suitable. The maximum observed suitability score for any given grid cell within the AOI was 0.90, meaning that all grid cells interacted with one or more factors within the suitability analysis.

Identified Alternative Sites – The proposed alternative site configurations for the twenty 100 acre plots (2000 acres total) were developed based on two farm configurations proposed by VSE, and were located within the areas corresponding with the highest observed suitability. Importantly, these alternative configurations do not change the amount of total area, gear, or the number of mussel long-lines included within each of the proposed farm parcels, but rather dictate how the long-lines would be arranged into rows within the parcels.

The first configuration considered (Alternative #1, Figure 19) was based on the initial configuration proposed by the VSE project team. This configuration includes 20 farm parcels of a 1,900' by 2,300' size that are configured and clustered based on optimized suitability scores from this analysis. The 20 parcels are divided across 2 blocks of 10 parcels each with a 600-ft wide navigational corridor between the blocks of parcels. This configuration allows for two long lines across each row and 12

rows (24 long lines total) per parcel, with 150' spacing between each row. The average suitability score within the 2,000 acres that this configuration covers was 0.813.

The second configuration considered (Alternative #2, Figure 20) was based on the alternative configuration proposed by the VSE project team. This configuration includes 20 farm parcels of a 1,175' by 3,707' size that are configured and clustered based on optimized suitability scores from this analysis. The 20 parcels are condensed within a single block with no navigational corridor needed. No navigational corridor is needed because this configuration allows for only two rows of parcels, where every parcel has vessel access along the perimeter of the site. This configuration allows for one longline across each row, with 24 rows per farm parcel (24 long lines total) and 150' spacing between each row. The average suitability score within the 2,000 acres that this configuration covers was 0.809.

The corner coordinates associated with each alternative are depicted in map and table form in Appendices 1-4.

Caveats – The suitability analysis described here for the proposed VSE project incorporated the best available, authoritative spatial data as of August 2018 to represent major potential interactions based on a thorough review of available resources (Table 1). While all efforts were made to incorporate the best available data, it is important to recognize that for some interactions (e.g., protected species), spatial data is unavailable or exists at an inappropriate scale for consideration within this analysis.

DISCUSSION

The siting analysis described here represents an objective, data-driven approach to identify the locations with the highest likelihood for compatibility with the proposed Ventura Shellfish Enterprise (VSE) project. Through mapping available modern, authoritative spatial data associated with major identified environmental and space use interactions, this siting analysis provides essential information needed to inform the permitting decision-making process for the proposed VSE project. The results of this siting analysis indicate that the northern portion of the area of interest (AOI) has the highest likelihood of compatibility given equal consideration of existing space use conflicts (Figures 18-20). We identify and describe two alternative configurations within the northern portion of the area of interest with the highest likelihood for compatibility given the various interactions considered within this analysis.

Across all identified space use conflicts that were incorporated within the siting analysis, the northern portion of the AOI has the highest likelihood of compatibility with the proposed project (Figures 18-20). Oil and gas, vessel traffic, and submarine cables and wrecks and obstructions interactions are minimized or non-existent within the northern portion of the AOI (Figures 13, 16, and 17). Commercial fishing interactions are present within the northern portion of the AOI, with increased trawl fishing interactions in the northwestern portion of the AOI in the areas nearest to the state-federal waters boundary (Figure 14) and some interactions with the squid fishery in the northernmost portion of the AOI (Figure 15). Importantly, as evident in the final suitability grid, the location (grid cells) with the highest likelihood for compatibility that minimize these interactions are located in the northwestern portion of the AOI (Figure 18). Despite minimization of potential interactions, the highest possible score in the final suitability grid was 0.90, indicating that even the grid cell locations with the highest likelihood for compatibility had some level of interaction with at least one factor.

Locations within the central portion of the AOI have more substantial interactions with oil and gas (Figure 13), vessel traffic (Figure 16) and submerged cables and wrecks and obstructions (Figure 17).

Within the southern portion of the AOI, interactions exist with oil and gas, vessel traffic, submerged cables and wrecks and obstructions, and both the trawl and squid fisheries (Figures 14 and 15). Importantly also, the southern portion of the AOI also borders closely to the designated shipping lane and known areas of hardbottom habitat and deep-sea corals (Figure 11).

As shown in Figure 6, the northern portion of the AOI does interact with areas of known trawl fishery activity. Importantly, the known area of highest trawl fishery intensity occurs in the portion of the Santa Barbara Channel to the northwest of the AOI. For the squid fishery, the southern portion of the AOI, and areas further south of the AOI, represent the most substantial intensity and volume of landings. It is important to note that while these data represent the best available, authoritative data to represent these fisheries, there remains a need for discussion with commercial fishery stakeholders regarding spatial compatibility.

Based on the results of the suitability analysis, we identified two alternative configurations for the proposed VSE project that maximize likelihood of compatibility with existing space uses in the region. The first alternative (Figure 19) and second alternative (Figure 20) do not differ substantively in average suitability score (0.813 and 0.809, respectively). Within the first alternative, the configuration of the farm parcels requires a navigational corridor (600 feet) to allow access to the center farm parcels. The configuration of the farm parcels within the second alternative is such that a navigational corridor is not required to access the individual parcels. In developing the alternative sites, contiguous sites and those with a more uniform shape were preferred over other dispersed alternatives. During the process of obtaining criteria from the VSE project team, it was expressed that in previous stakeholder engagements, a preference was indicated by local fishermen and other ocean users for a design that was clustered to minimize navigational challenges.

Additional Considerations

This siting analysis serves as an authoritative resource to inform the permitting decision-making process regarding where the proposed VSE project is most likely to be compatible from an environmental and space-use perspective. However, additional factors should be the subject of consideration during the permitting decision-making process that are beyond the scope of this siting analysis, including consideration of potential protected species entanglement risks, carrying capacity limitations, and farm design specifications. Below, we provide additional detail regarding engagements with state and federal government agencies to obtain the best available data for protected species for this siting analysis.

Regarding carrying capacity limitations, the environmental conditions corresponding with the proposed VSE project's AOI generally appear favorable for the species and gear combination proposed. The annual average surface current velocity in relation to the AOI is generally within the optimal range for blue mussels of 0.025 and 0.10 m/s (Appendix 1)[1]. Sufficient current velocity is essential to ensure adequate food (i.e., naturally occurring phytoplankton) delivery to the cultivated species (i.e., Mediterranean mussels), and also to ensure adequate dispersal of waste products. With regards to chlorophyll *a*, which is a proxy for the availability of naturally occurring phytoplankton, the optimal range for chlorophyll *a* for blue mussels of 0.5 – 40 µg/l corresponds with the annual average

[1] Longdill, P.C., Healy, T.R., and Black, K.P. 2008. An integrated GIS approach for sustainable aquaculture management area site selection. *Ocean and Coastal Management* 51, 612-624.

chlorophyll *a* concentration for the AOI (Appendix 2)[2]. The mean water temperature in the area immediately adjacent to the proposed project AOI is within the acceptable water temperature range of 3 – 29 degrees Celsius, and remains near the optimal water temperature of 20 degrees Celsius for nearly half of the year (Appendix 3)[3,4,5]. Carrying capacity considerations are likely to be most dependent upon the final farm design selected rather than environmental limitations. Furthermore, farm design considerations are critical to minimize entanglement risks to cetaceans and sea turtles. A recent review of documented cases of marine animal entanglements in mussel aquaculture gear identified mussel spat collection ropes as yielding the greatest risk of entanglement.[6] Careful attention must be paid to ensure the farm design, gear, and associated activities minimize the risk of protected species entanglement.

The best available data to represent potential protected species interactions with the proposed VSE project were obtained from state and federal government agencies. Regarding pinniped species, spatial data from the NOAA Southwest Fisheries Science Center (Mark Lowry) were unavailable to represent California sea lions and Pacific harbor seals as ongoing observation efforts are land-based. Loggerhead sea turtle aerial survey and satellite telemetry data were cross-referenced with the proposed project's AOI, and no sightings or tracks as recorded by NOAA's National Marine Fisheries Service (Jeffrey Seminoff and Tomo Eguchi) intersected the area. In both cases, with regards to pinnipeds and sea turtles (including monitored loggerhead, as well as green turtles and leatherbacks that are not monitored), it was acknowledged that the lack of data representing interactions does not preclude the potential for the proposed project's AOI to interact with these protected species.

Habitat-based predicted density and distribution models for multiple cetacean species for the California coast, including: beaked whales (multiple species), blue whales, dolphins (multiple species), Dall's porpoise, fin whales, humpback whales, and sperm whales was obtained from NOAA National Marine Fisheries Service (Pers. Comm., Karin Forney and Elizabeth Becker). Cetacean species with the highest likelihood for potential interaction with the proposed VSE project based on this data include: blue whales and bottlenose dolphins (Appendix 8), long-beaked common dolphins (Appendix 9), and Rissos and short-beaked common dolphins (Appendix 10). There is a lower likelihood for potential interaction with Baird's beaked whales and beaked whales (Appendix 8), Dall's porpoises and humpback whales (Appendix 9), northern right whale dolphins and Pacific white sided dolphins (Appendix 10), and sperm whales and striped dolphins (Appendix 11). It is important to note that these data represent predicted distribution of these species and do not preclude the potential for interaction with any species.

As described within 'Methods: Additional Considerations' above, additional commercial fishery data beyond the trawl fishery track lines and squid landings by microblock data provided by the California Department of Fish and Wildlife were considered for inclusion within the siting analysis, but were determined to be incompatible for use within the analysis due to a lack of sufficient spatial resolution to differentiate the relative compatibility of discrete areas of ocean space (at the scale of 1's or 10's of

[2] Sara, G., Manganaro, A., Cortese, G., Pusceddu, A., and Mazzola, A. 1998. The relationship between food availability and growth in *Mytilus galloprovincialis* in the open sea (southern Mediterranean). *Aquaculture* 167, 1-15.
[3] Widdows, J. 2009. Combined effects of body size, food concentration and season on the physiology of *Mytilus edulis*. *Journal of the Marine Biological Association of the United Kingdom* 58, 109-124.
[4] Newell, R.I.E. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North-Mid Atlantic): Blue Mussel. *U.S. Army Corps of Engineers report TR EI-82-4.*
[5] Almada-Villela, P.C., Davenport, J., and Gruffydd, L.D. 1982. The effects of temperature on the shell growth of young *Mytilus edulis*. *Journal of Experimental Marine Biology and Ecology* 59, 275-288.
[6] Young, M.O. 2015. Marine animal entanglements in mussel aquaculture gear: Documented cases from mussel farming regions of the world including first-hand accounts from Iceland. *M.S. Thesis, University of Akureyri*.

acres required within a siting analysis) for aquaculture operations or other activities. The best available spatial data to represent commercial fisheries within the region included those provided by the California Department of Fish and Wildlife, including: trawl fishery track lines, squid landings by microblock, and the fishery landings receipt data by block (Appendix 12). Trawl fishery track lines and squid landings by microblock data were incorporated within the siting analysis. However, the fishery landings receipt data by block (represented by average total landings across all reported species for the period of 2012-2017) is of insufficient spatial resolution for incorporation within the siting analysis. As depicted in Appendix 12, the 1,953 grid cells that represent the 'area of interest' for the siting analysis correspond with 4 reporting blocks. Other data, such as commercial fishery landings by species for the region or by harbor provide regional perspective with regards to commercial fisheries, but at an insufficient spatial scale for use within a siting analysis. The available data indicates that the proposed VSE project would intersect California Department of Fish and Wildlife reporting block #665, which is a block associated with a moderate quantity of average total landings for the period of 2012-2017 relative to the 9 adjacent blocks for which data is available. The average total landings for block #665 for the period of 2012-2017 was 872,164 lbs, relative to the adjacent block with the lowest total landings (block #652, furthest northwest, 155,237 lbs) and the block with the highest total landings (block #683, furthest southeast, 5,375,358 lbs).

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TABLES

Table 1. Data layers integrated within the comprehensive data inventory developed for the Santa Barbara Channel region to inform the siting analysis for the proposed Ventura Shellfish Enterprise (VSE) project.

Data Layer:	**Description:**	**Source:**
Military		
Danger Zones and Restricted Areas	These data represent the location of Danger Zones and Restricted Areas within coastal and marine waters, as outlined by the Code of Federal Regulations (CFR) and the Raster Navigational Charts (RNC). The CFR defines a Danger Zone as: "A defined water area (or areas) used for target practice, bombing, rocket firing or other especially hazardous operations, normally for the armed forces. The danger zones may be closed to the public on a full-time or intermittent basis, as stated in the regulations."	Code of Federal Regulations (CFR) and the Raster Navigational Charts (RNC)
Unexploded Ordnances	Unexploded ordnances are explosive weapons (bombs, bullets, shells, grenades, mines, etc.) that did not explode when they were employed and still pose a risk of detonation, potentially many decades after they were used or discarded. Sea disposal of munitions was an accepted international practice until 1970, when the Department of Defense prohibited the practice, and Congress followed up by passing the Marine Protection, Research, and Sanctuaries Act in 1972, generally banning sea disposal.	NOAA Office of Coast Survey (OCS)
Point Mugu Sea Range	Point Mugu Sea Range is the world's largest instrumented over-water range encompassing up to 220,000 square miles of ocean space. It provides extensive test and training capabilities for the U.S. Navy and allied forces and is located adjacent to the Santa Barbara Channel.	U.S. Navy
San Pedro Channel Operating Area	Offshore military operating area within the San Pedro Channel for the U.S. Navy and allied forces.	U.S. Navy
Industry and Recreation		
Oil and Gas Drilling Platforms, Pipelines and Active Leases	Infrastructure for oil and gas offshore activities including drilling platforms for extracting minerals, particularly oil and gas, pipelines for transporting to onshore facilities, and the active leases, which include a portion of the Outer Continental Shelf (OCS) Lease Blocks that are currently leased to private entities for oil and/or gas mining rights. Importantly, active leases include those that are exploratory, non-producing, and producing.	Bureau of Ocean Energy Management (BOEM)
NOAA Charted Submarine Cables	These data depict the occurrence of submarine cables in and around U.S. navigable waters.	NOAA Office of Coast Survey (OCS)

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Data Layer:	**Description:**	**Source:**
Ocean Disposal Sites	Ocean disposal sites, including both active and discontinued or historical sites. Nearly all material ocean dumped today is dredged material (sediments) removed from the bottom of waterbodies in order to maintain navigation channels and berthing areas.	NOAA Office of Coast Survey (OCS)
Wind and Marine Hydrokinetic Planning Areas	Planning areas for renewable energy, such as wind and marine hydrokinetic (MHK) development, as defined by the U.S. Bureau of Ocean Energy Management (BOEM).	Bureau of Ocean Energy Management (BOEM)
Marine Minerals and Sand Resource Blocks	This layer contains Outer Continental Shelf (OCS) block outlines and delineated polygons containing sediment resources and areas of disposal.	Bureau of Ocean Energy Management (BOEM)
Administrative Kelp Beds	Kelp beds open to state-managed commercial harvest within the state waters of California.	California Department of Fish and Wildlife
Existing Aquaculture Areas	The presence and location of aquaculture sites were derived from multiple state websites and include only those in coastal and marine saltwater areas. The following states are included in this layer: Alaska, California, Connecticut, Florida, Louisiana, Maine, New York, North Carolina, Rhode Island, and Virginia.	NOAA Office for Coastal Management (OCM) & other state and federal agencies
Commercial Fishing		
Trawl Fishery Track Lines	Logbook-derived state-managed trawl fishery track lines; inclusive of all state-managed trawl fisheries between 2010 and 2016 (connected line between start and stop location for trawls).	California Department of Fish and Wildlife
Squid Landings by Micro-Block	Total squid landings (in short tonnes) by microblock (~700 acres) for the period of 2012-2017.	California Department of Fish and Wildlife
Fishery Landings Receipt Data by Block	Total landings by fishery landings block for the period of 2012-2017, inclusive of multiple (20+) commercial fisheries species (e.g., halibut, spiny lobster, squid, etc.).	California Department of Fish and Wildlife
Navigation		
Principal Ports	Principal Ports are defined by port limits or US Army Corps of Engineers (USACE) projects, these exclude non-USACE projects not authorized for publication. The determination for the published Principal Ports is based upon the total tonnage for the port for the particular year; therefore the top 150 list can vary from year to year.	U.S. Army Corps of Engineers (USACE)
Shallow Draft Ports	National database of shallow draft ports, or ports accessible by small commercial and/or recreational vessels.	U.S. Army Corps of Engineers (USACE)
Aids to Navigation	Structures intended to assist a navigator to determine position or safe course, or to warn of dangers or obstructions to navigation. This dataset includes lights, signals, buoys, day beacons, and other aids to navigation.	U.S. Coast Guard
Environmental Sensors and Buoys	Buoys or structures, often near the surface of the water column, intended to collect water quality or other environmental data.	NOAA National Data Buoy Center

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Data Layer:	**Description:**	**Source:**
Artificial Reefs	An artificial reef is a human-made underwater structure, typically built to promote marine life in areas with a generally featureless bottom.	NOAA Office for Coastal Management (OCM) & other state and federal agencies
Wrecks and Obstructions	In 1981, NOAA's National Ocean Service (NOS) implemented the Automated Wreck and Obstruction Information System (AWOIS) to assist in planning hydrographic survey operations and to catalog and store a substantial volume of reported wrecks and obstructions that are considered navigational hazards within U.S. coastal waters. AWOIS is not a comprehensive record of wrecks in any particular area.	NOAA Office of Coast Survey (OCS)
Maintained Channels	This layer shows coastal channels and waterways that are maintained and surveyed by the U.S. Army Corps of Engineers (USACE).	U.S. Army Corps of Engineers (USACE)
Shipping Lanes	Shipping zones delineate activities and regulations for marine vessel traffic. Traffic lanes define specific traffic flow, while traffic separation zones assist opposing streams of marine traffic.	NOAA Office of Coast Survey (OCS)
AIS Vessel Count (including total count and by vessel type)	Automatic Identification Systems (AIS) are a navigation safety device that transmits and monitors the location and characteristics of many vessels in U.S. and international waters in real-time. This dataset represents vessel counts by vessel type for 2013. Vessel count raster data layers were created by CASS Spatial team and are derived from vessel density raster data layers generated from raw AIS data.	Bureau of Ocean Energy Management (BOEM)
Anchorage Areas	An anchorage area is a place where boats and ships can safely drop anchor.	NOAA Office of Coast Survey (OCS)
Natural Resources		
Deep-Sea Corals	The National Oceanic and Atmospheric Administration (NOAA) Deep Sea Coral Research and Technology Program (DSCRTP) have developed a National Database for Deep-Sea Corals and Sponges (database).	NOAA National Centers for Coastal Ocean Science (NCCOS)
Hardbottom Habitat	Distribution of known hardbottom habitat within the Santa Barbara Channel region. Hardbottom habitat generally occurs in the ocean where rocks or other hard surfaces are exposed from bottom sand or mud; this structure can serve as habitat for fish and invertebrate species.	California Geological Survey and Moss Landing Marine Lab / UC Santa Barbara
Cetacean Predicted Density and Distribution	Habitat-based predicted density and distribution models for multiple cetacean species, including: beaked whales (multiple species), blue whales, dolphins (multiple species), Dall's porpoise, fin whales, humpback whales, and sperm whales.	NOAA National Marine Fisheries Service

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Data Layer:	Description:	Source:
Seagrass	Aquatic vascular vegetation beds dominated by submerged, rooted, vascular species or submerged or rooted floating freshwater tidal vascular vegetation. This is not a complete collection of seagrasses on the seafloor, nor are the locations to be considered exact.	NOAA Office for Coastal Management (OCM) & other state and federal agencies
Essential Fish Habitat / Habitat Areas of Particular Concern	Essential Fish Habitat (EFH) represent important habitat areas for every life stage of federally managed species. Habitat Areas of Particular Concern (HAPC) are discrete subsets of Essential Fish Habitat (EFH) that provide extremely important ecological functions or are especially vulnerable to degradation.	NOAA National Marine Fisheries Service (NMFS)
Marine Protected Areas	The MPA Inventory is a comprehensive catalog that provides detailed information for existing marine protected areas in the United States.	NOAA National MPA Center
Oceanographic and Biophysical		
Bathymetry (water depth)	High-resolution bathymetry data was obtained from NOAA's National Geophysical Data Center (NGDC). This bathymetric data is a composite of various sources, including NGDC, U.S. National Ocean Service (NOS), U.S. Geological Survey (USGS), the Federal Emergency Management Agency (FEMA), and other federal, state, and local government agencies, academic institutions, and private companies. DEMs are referenced to the vertical tidal datum of Mean High Water (MHW) and horizontal datum of World Geodetic System 1984 (WGS84).	NOAA National Geophysical Data Center (NGDC)
Water Temperature	MODIS Global Level 3 Mapped SST (via MGET) mean/min/max climatologies for 20 year period 1997 – 2016.	NASA MODIS Aqua
Current Velocity and Direction	Surface current velocity and direction data from HYCOM + NCODA Global 1/12 Degree Reanalysis, experiments 19.1 (1995-2012). Directional data are represented by U and V vector data.	HYCOM
Salinity	Salinity data from HYCOM + NCODA Global 1/12 Degree Reanalysis, experiments 19.1 (1995-2012).	HYCOM
Significant Wave Height	Significant wave height (SWH or H_s) is defined traditionally as the mean wave height (trough to crest) of the highest third of waves ($H_{1/3}$).	AVISO
Chlorophyll *a*	NASA GSFC OceanColor L3 SMI (via MGET) mean/std dev climatologies for 10 yr period 2007 – 2016.	NASA OceanColor
Administrative Boundaries		
Federal / State Waters Boundary	The Submerged Lands Act (SLA) boundary line (also known as State Seaward Boundary or Fed State Boundary) defines the seaward limit of a state's submerged lands and the landward boundary of federally managed OCS lands.	Bureau of Ocean Energy Management (BOEM)

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Data Layer:	**Description:**	**Source:**
Channel Islands National Marine Sanctuary Boundary	Boundary for the Channel Islands National Marine Sanctuary.	NOAA Office of National Marine Sanctuaries (NMS)

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FIGURES

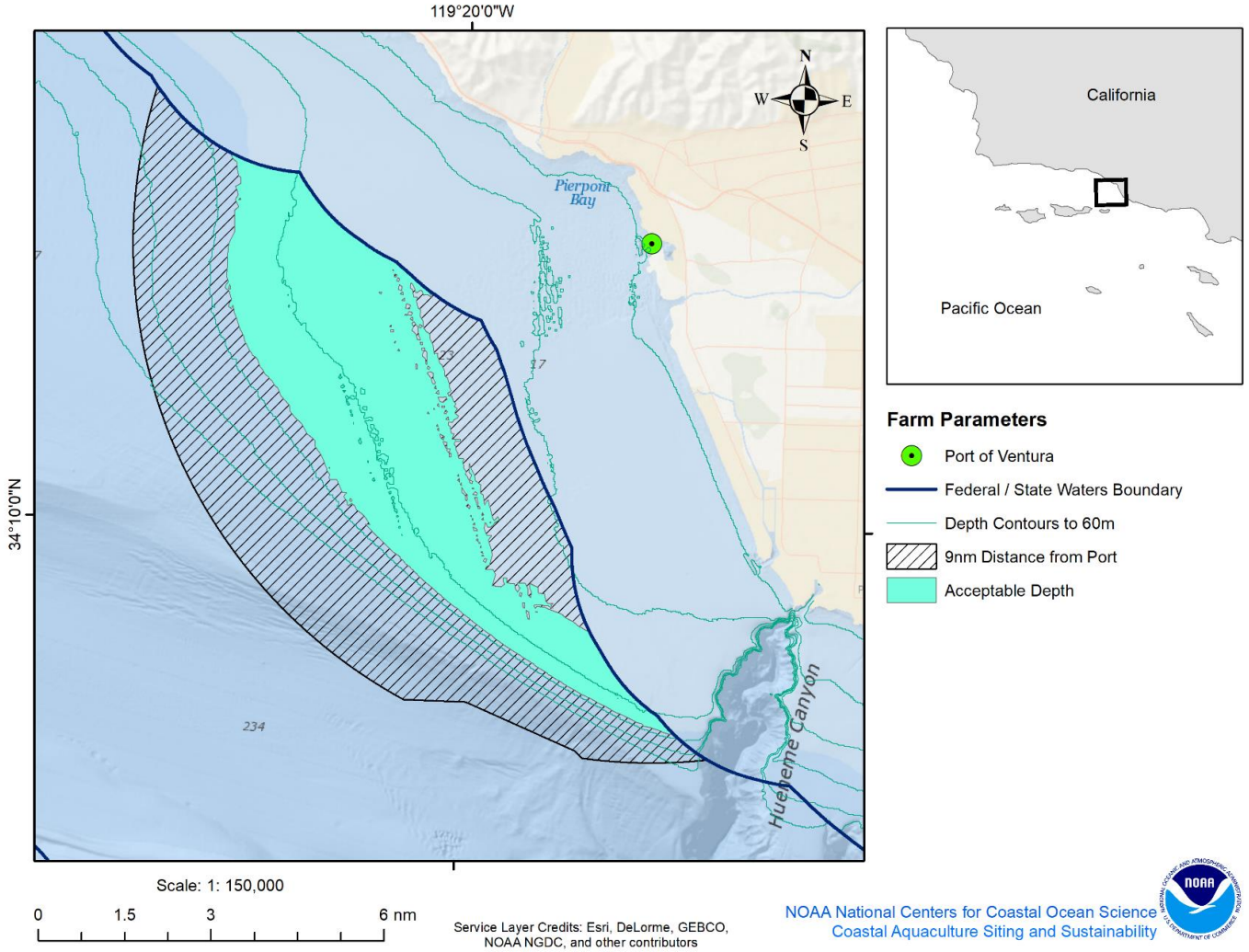

Figure 1. Map of the 'area of interest' for the proposed Ventura Shellfish Enterprise (VSE) project based on project requirements provided by VSE. The primary constraining criteria defined by VSE included: 1) federal waters only, 2) maximum 9 nautical mile distance from the Port of Ventura, and 3) a required depth range of 25 – 37 meters for the proposed Mediterranean mussel (*Mytilus galloprovincialis*) cultivation gear. The defined 'area of interest' is represented by the light green polygon denoted as 'Acceptable Depth' in the map legend. Note that the VSE project is seeking 2,000 acres within the ~20,000 acres within the overall 'area of interest'.

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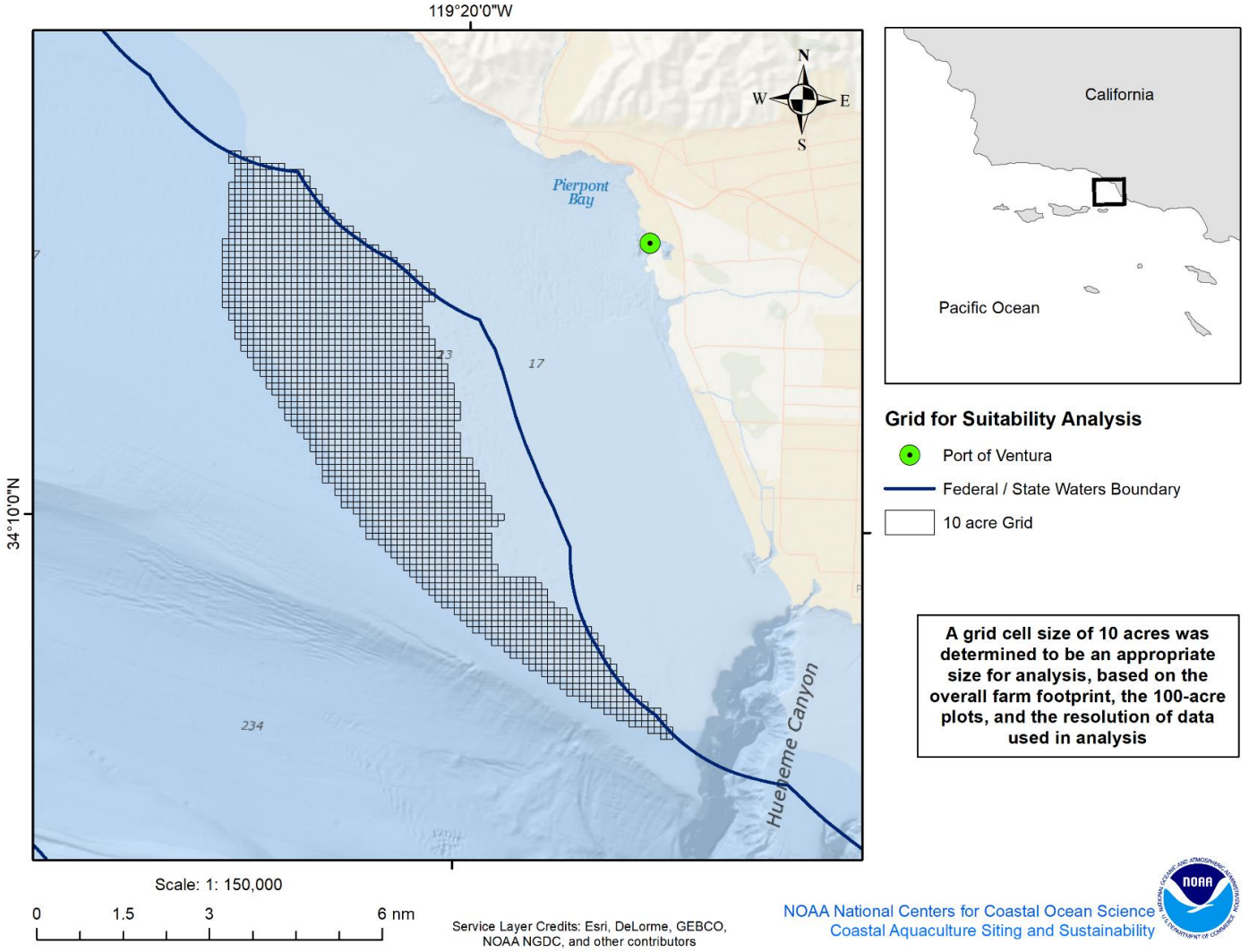

Figure 2. Grid established within the proposed Ventura Shellfish Enterprise (VSE) 'area of interest' for use in the siting analysis. A grid cell size of 10 acres was determined to be appropriate for use in the spatial analysis. The grid contains 1,953 grid cells, equivalent to 19,530 acres total. Note that the VSE project is seeking 2,000 acres within the ~20,000 acres within the overall 'area of interest' described by the grid.

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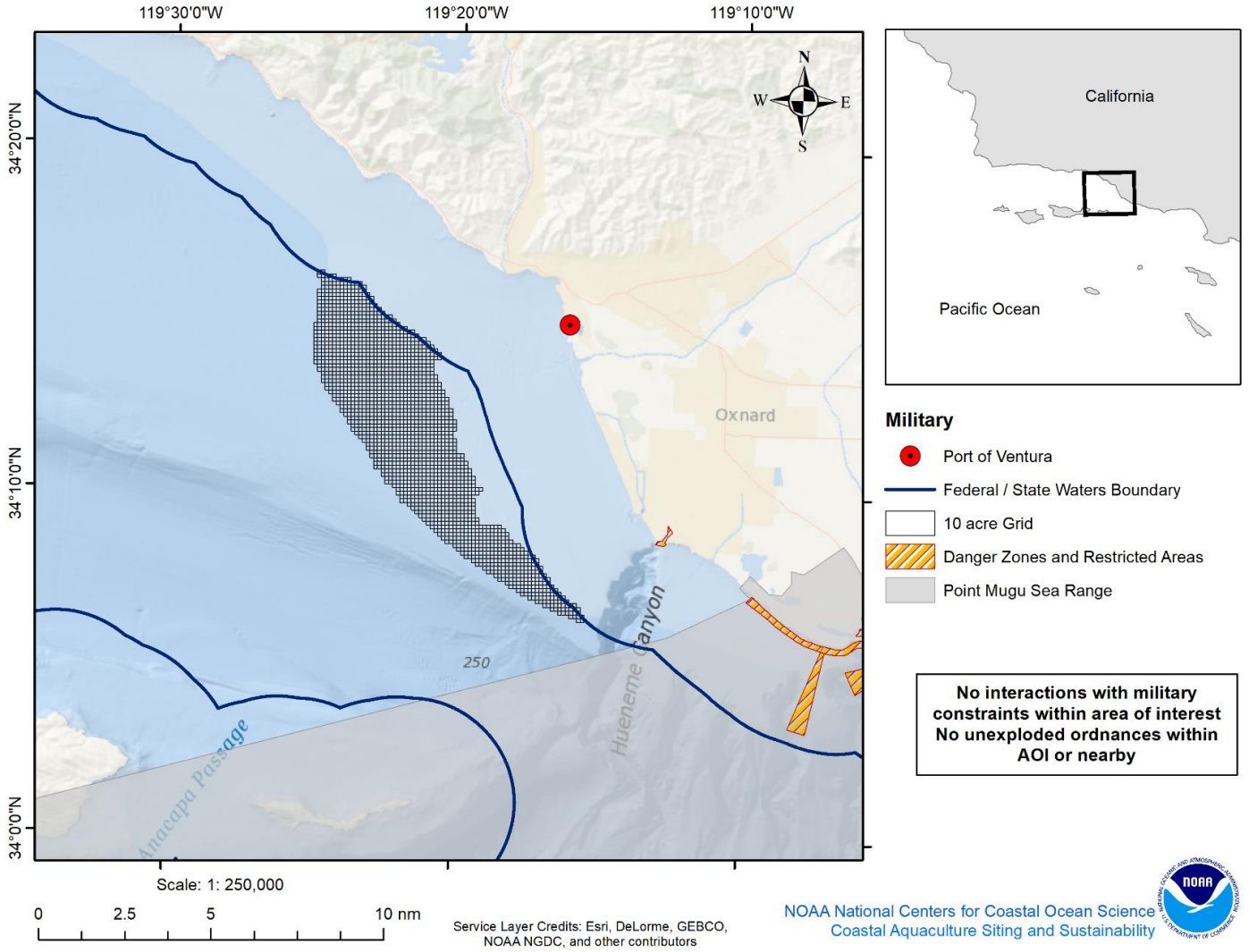

Figure 3. Military space use within the Santa Barbara Channel region in relation to the Ventura Shellfish Enterprise (VSE) 'area of interest'. No military interactions occur within the 'area of interest'.

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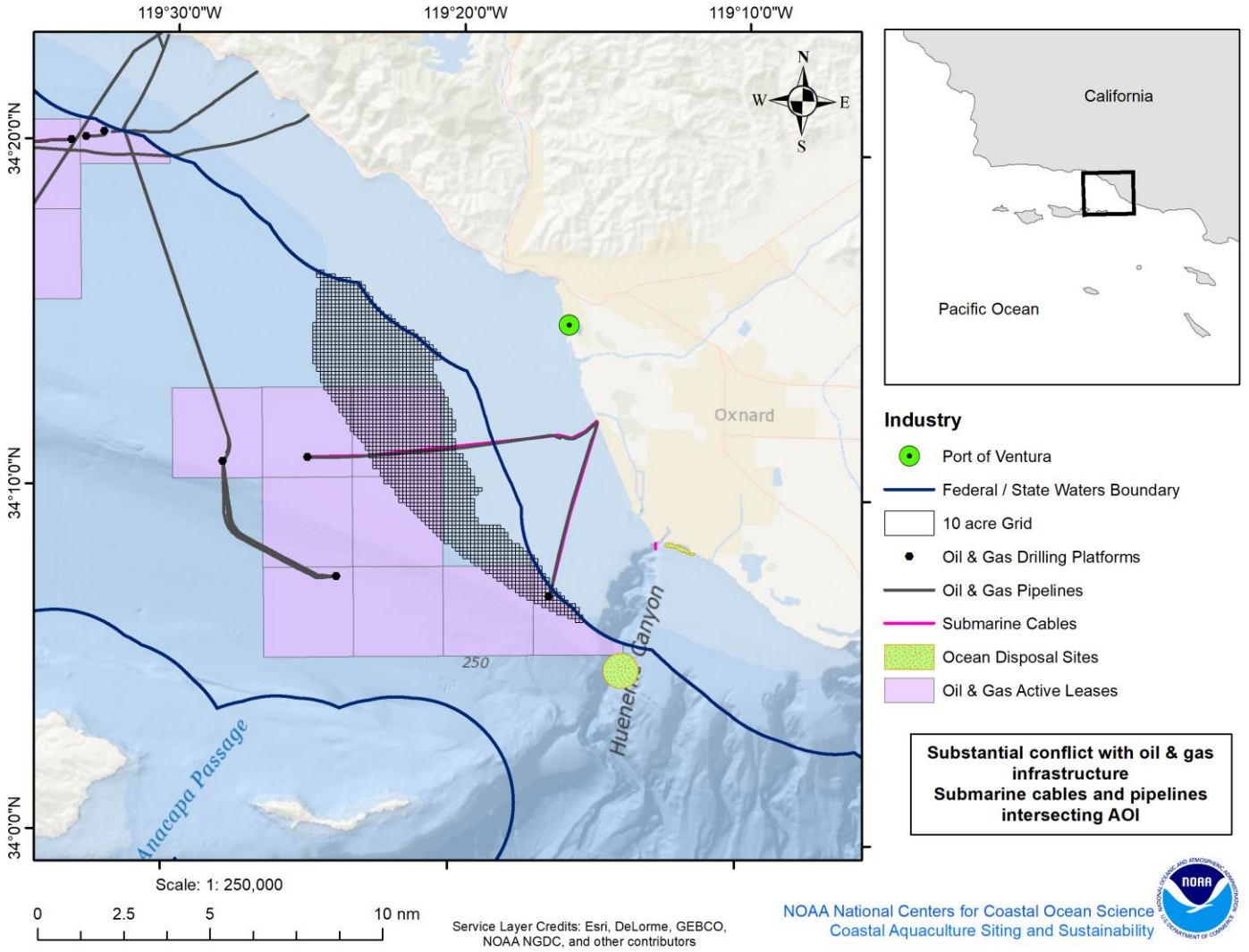

Figure 4. Industry space use within the Santa Barbara Channel region in relation to the Ventura Shellfish Enterprise (VSE) 'area of interest'. Oil and gas infrastructure (active leases, drilling platforms, and pipelines) and submarine cables interactions occur within the 'area of interest'.

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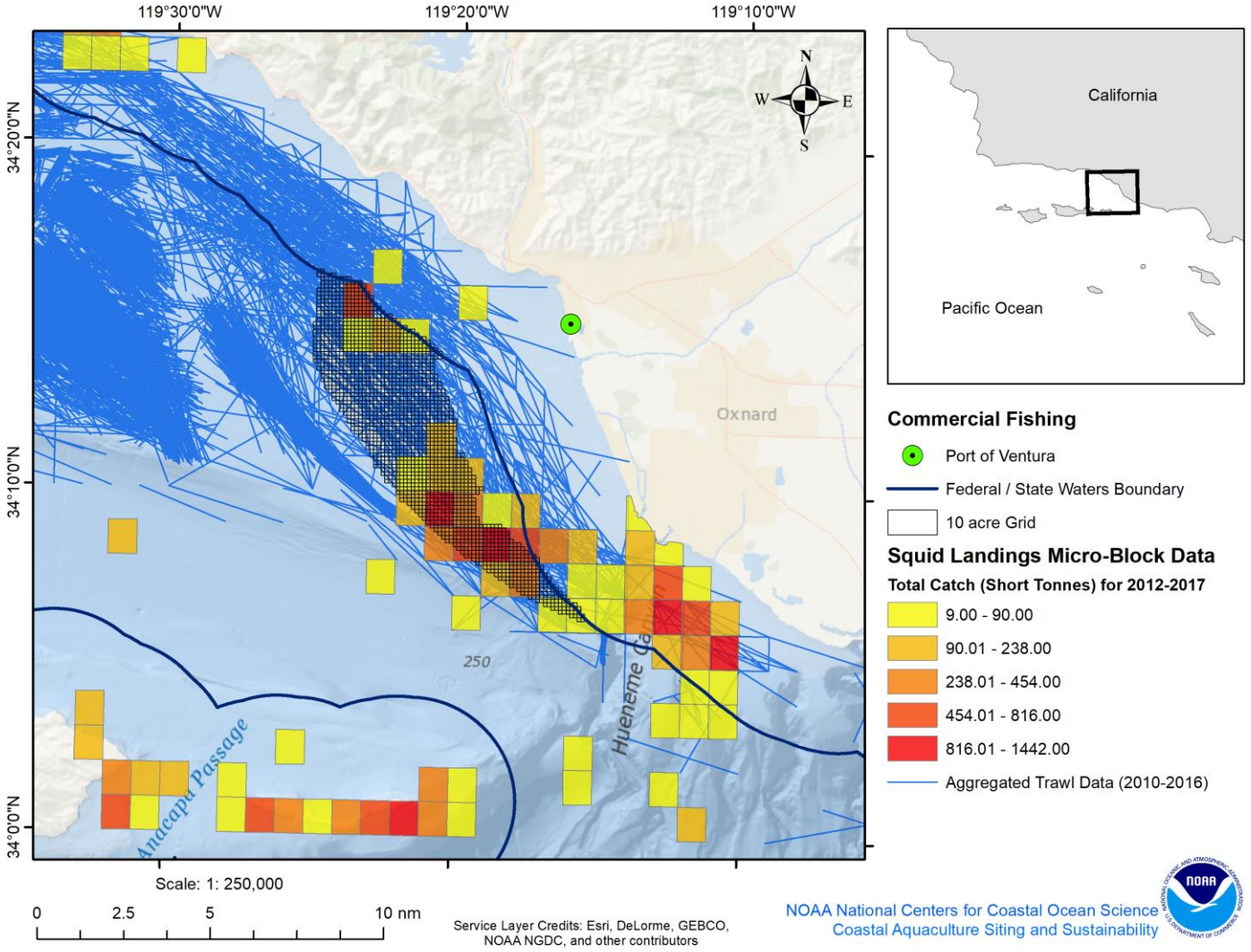

Figure 5. Commercial fishery space use within the Santa Barbara Channel region in relation to the Ventura Shellfish Enterprise (VSE) 'area of interest'. Commercial trawl and squid fishery interactions occur within the 'area of interest'.

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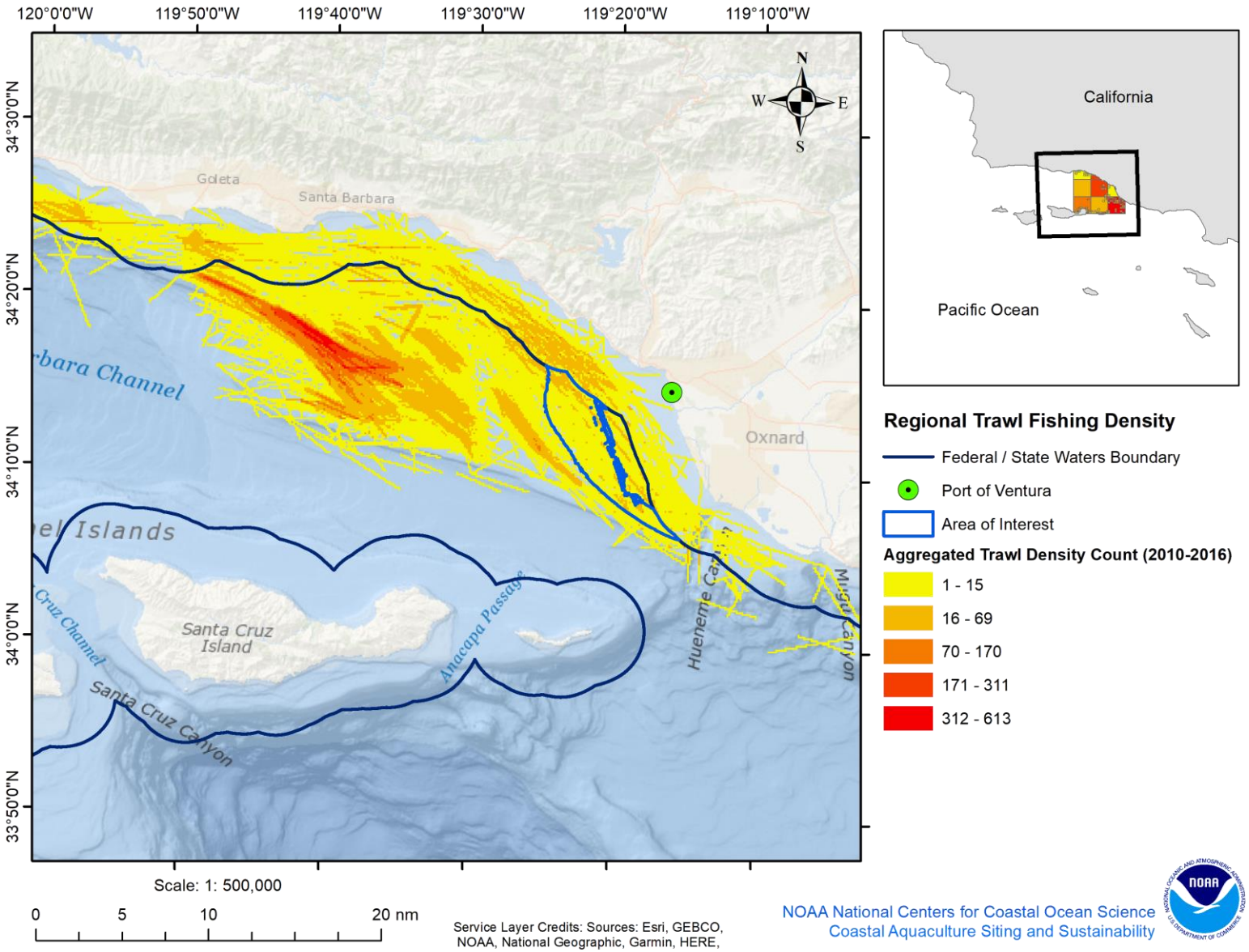

Figure 6. Regional perspective of commercial trawl fisheries within the Santa Barbara Channel region. Note that trawl fishery interactions occur within the 'area of interest,' however, the highest density of trawl fishery activity occurs northwest of the 'area of interest'.

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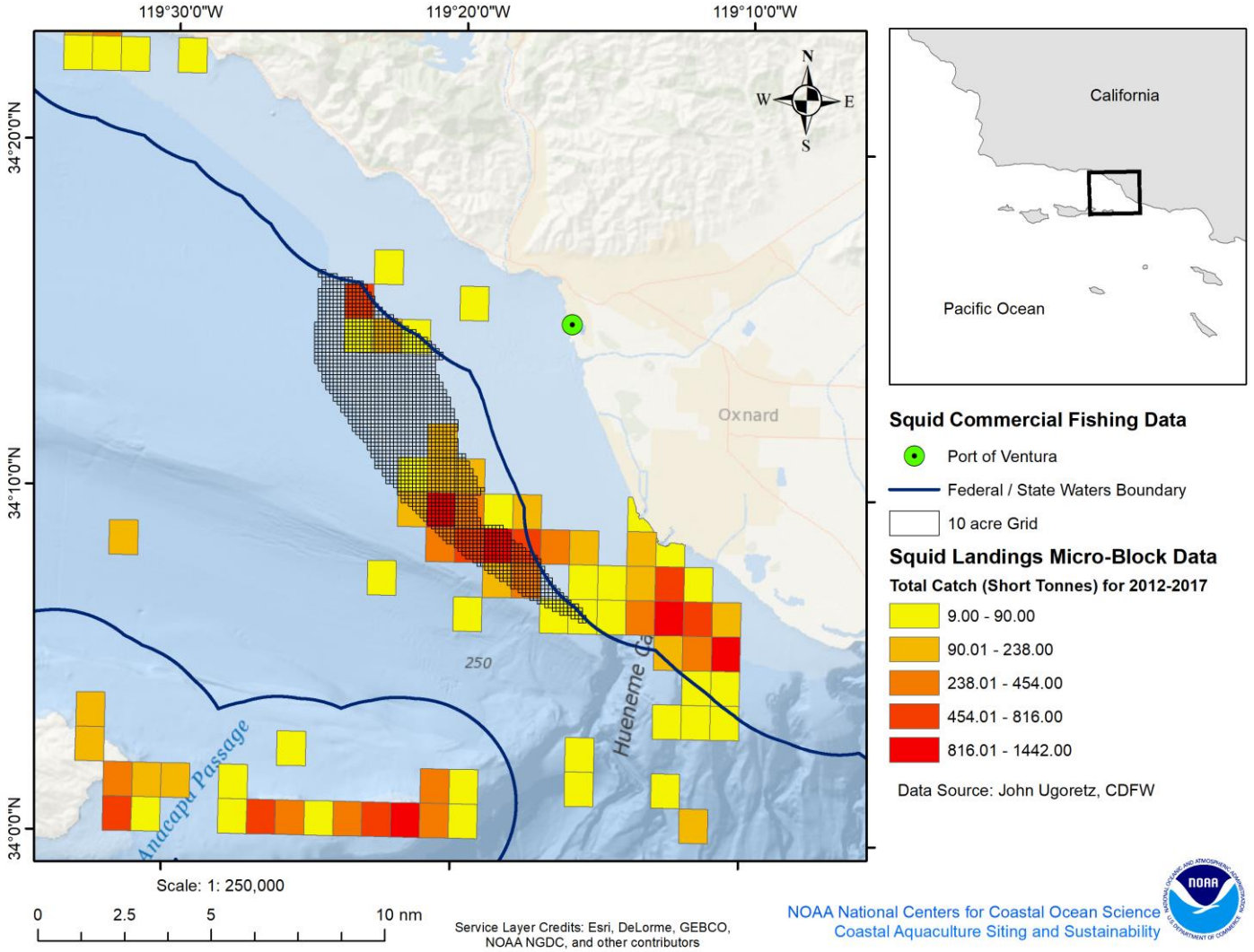


Figure 7. Regional perspective of the commercial squid fishery within the Santa Barbara Channel region. Note that trawl fishery interactions occur within the 'area of interest,' however, the highest density of trawl fishery activity occurs northwest of the 'area of interest'.

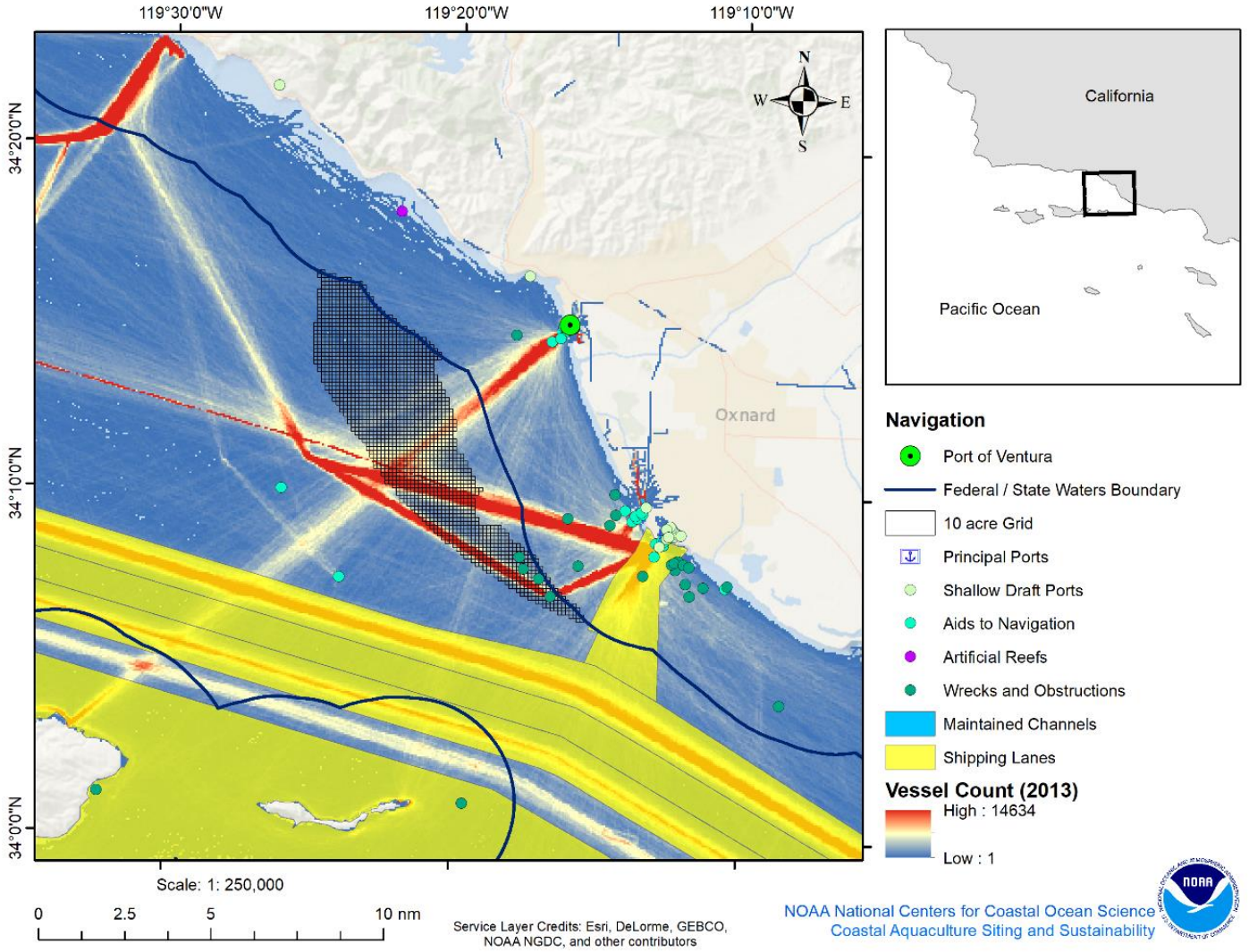


Figure 8. Navigation space use within the Santa Barbara Channel region in relation to the Ventura Shellfish Enterprise (VSE) 'area of interest'. Vessel traffic and wrecks and obstructions interactions occur within the 'area of interest'.

ATTACHMENT 1

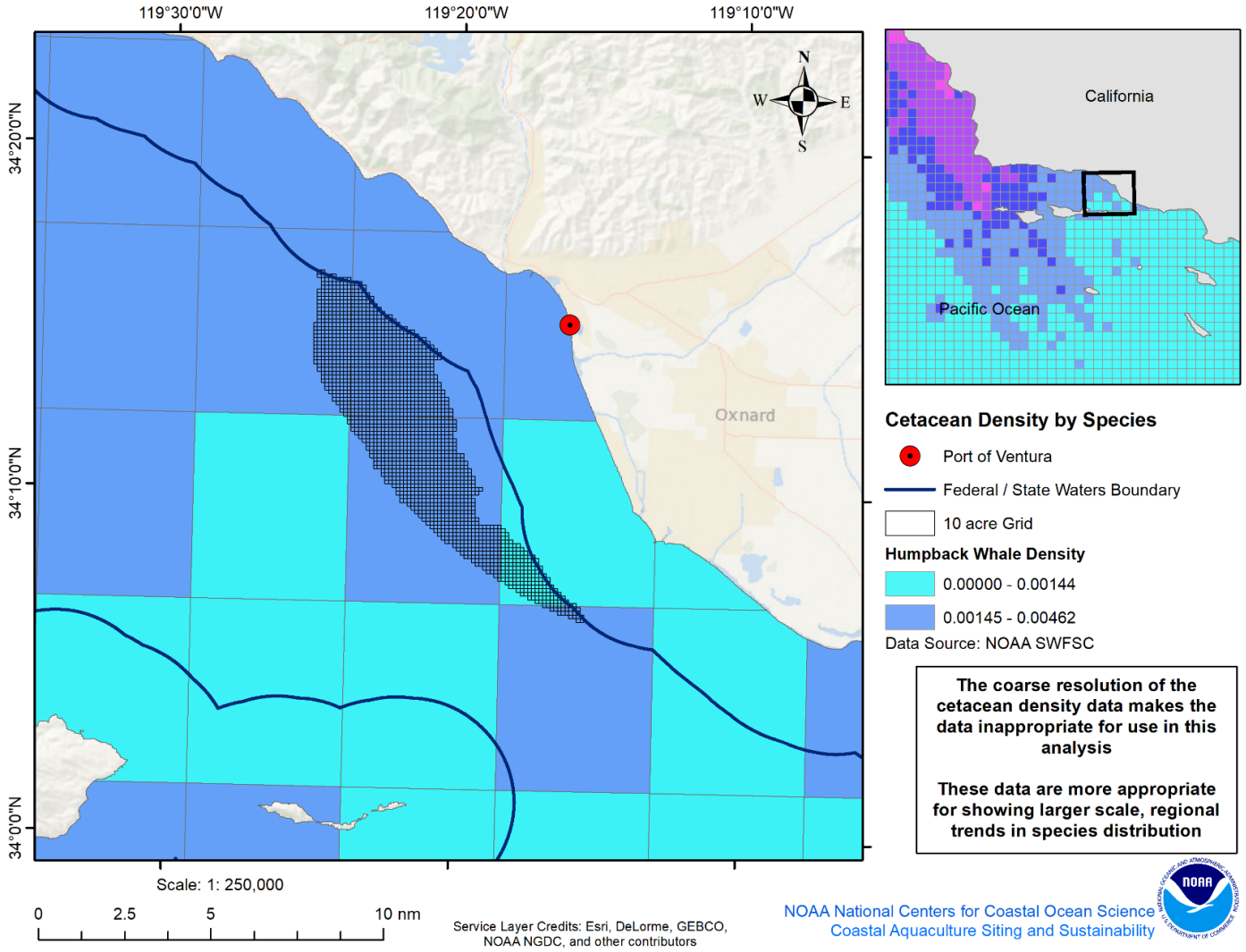


Figure 9. Cetacean (i.e., humpback whale) predicted density in relation to the VSE 'area of interest. Note that due to the coarse spatial resolution of this data, it was inappropriate for use within the VSE suitability analysis. The inset map (upper right) shows the large-scale, regional trends of cetacean (i.e., humpback whale) distribution.

ATTACHMENT 1

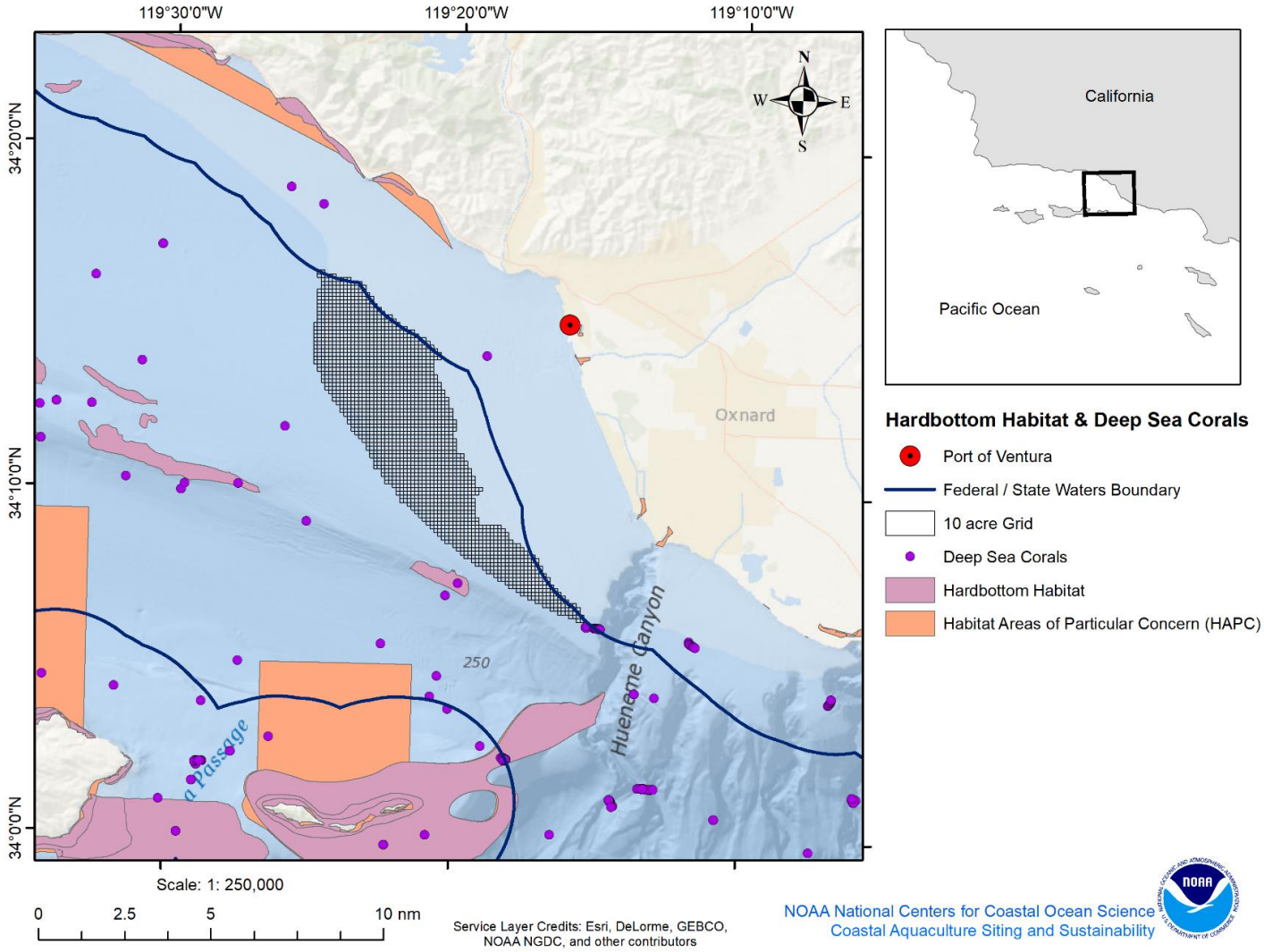


Figure 10. Distribution of hardbottom habitat and deep-sea corals in relation to the VSE 'area of interest'. Note that records of deep-sea corals and hardbottom habitat occur within proximity of the VSE 'area of interest,' but not within it.

ATTACHMENT 1

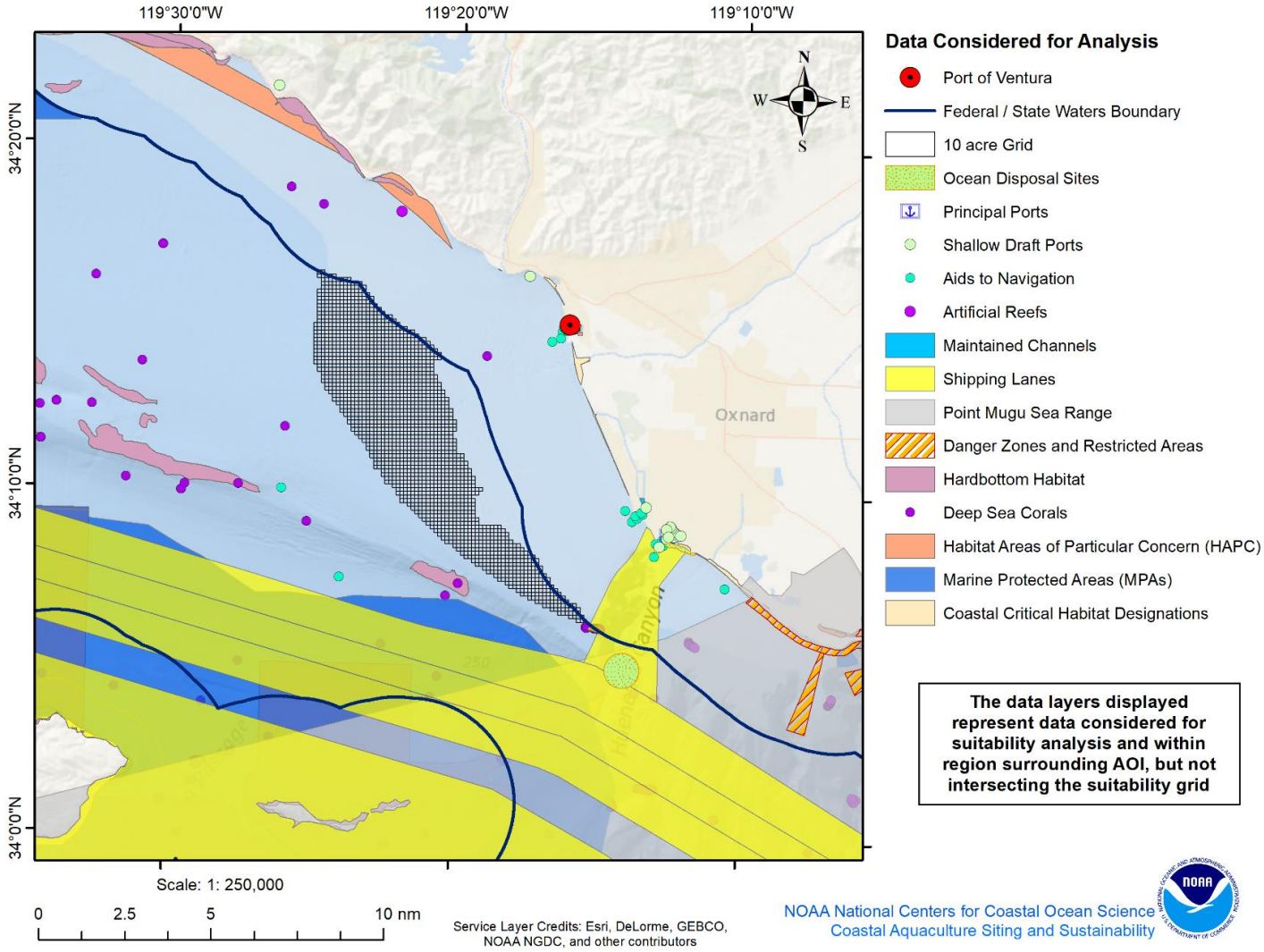


Figure 11. Distribution of all major spatial data layers representing potential space-use conflicts (e.g., military, navigation, natural resources) that were considered, but do not intersect the VSE 'area of interest' and were thus not incorporated within the suitability analysis.

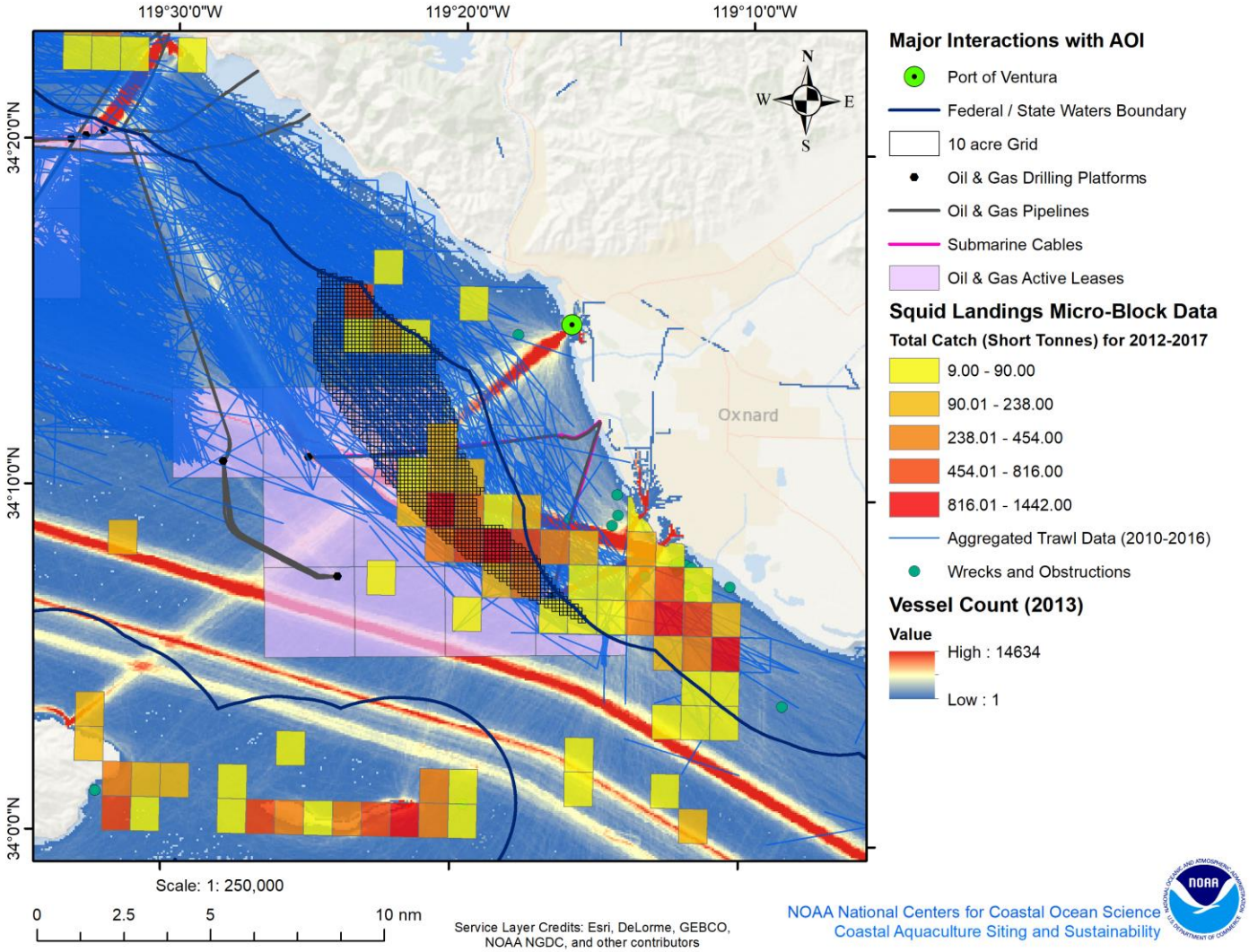


Figure 12. Distribution of all major spatial data layers representing potential space-use conflicts that intersect the VSE 'area of interest' and were incorporated within the suitability analysis. These include: (1) oil and gas leases, drilling platforms, and pipelines, (2) submarine cables, (3) commercial trawl and squid fisheries, (4) wrecks and obstructions, and (5) vessel traffic.

ATTACHMENT 1

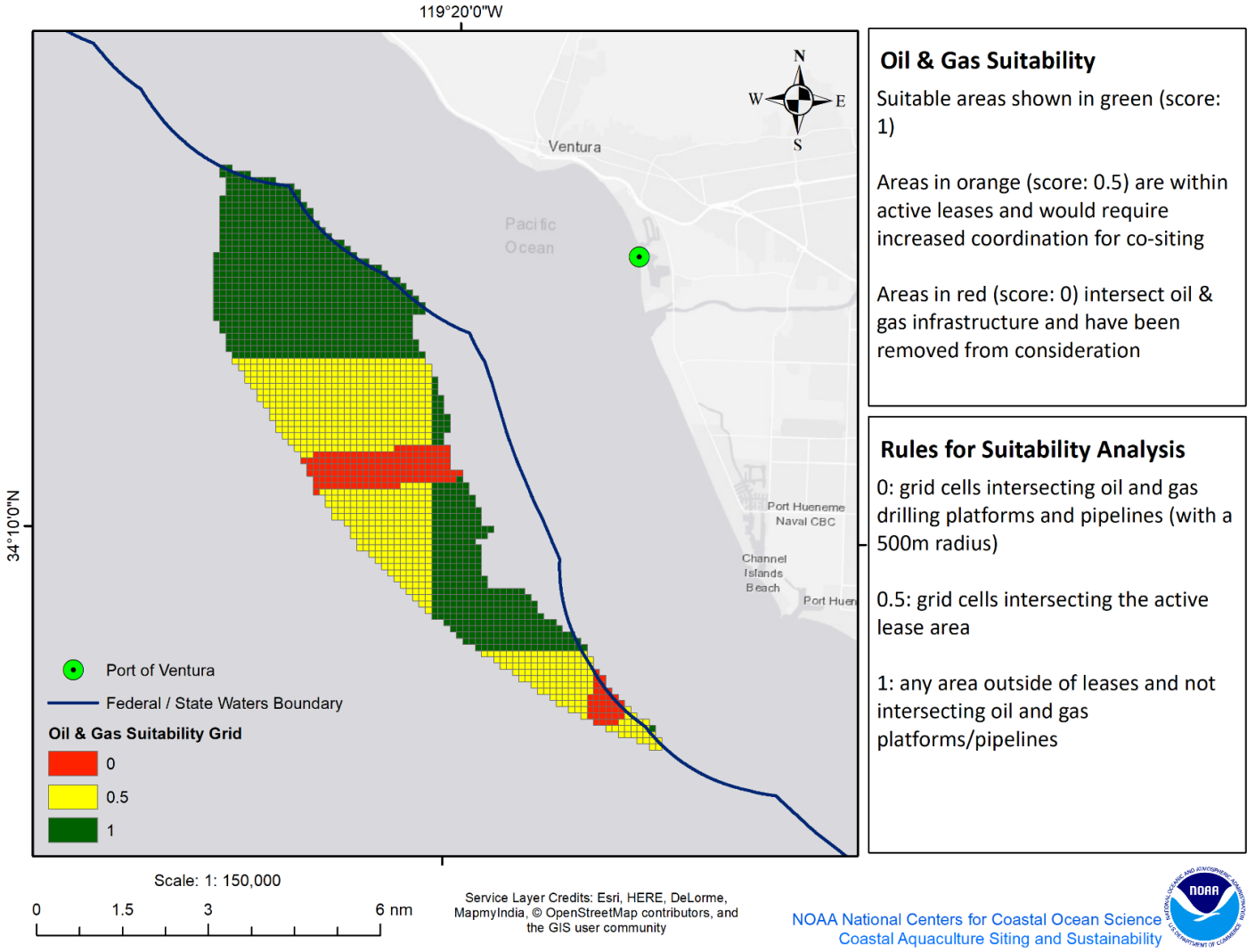


Figure 13. Oil and gas suitability layer incorporated within the overall VSE suitability analysis. Areas within a 500 meter radius of active oil and gas pipelines and drilling platforms were assigned a score of '0' (least compatible), areas within an active oil and gas lease were assigned a score of '0.5' (moderately compatible), and those outside of active oil and gas interests were assigned a score of '1' (most compatible).

ATTACHMENT 1

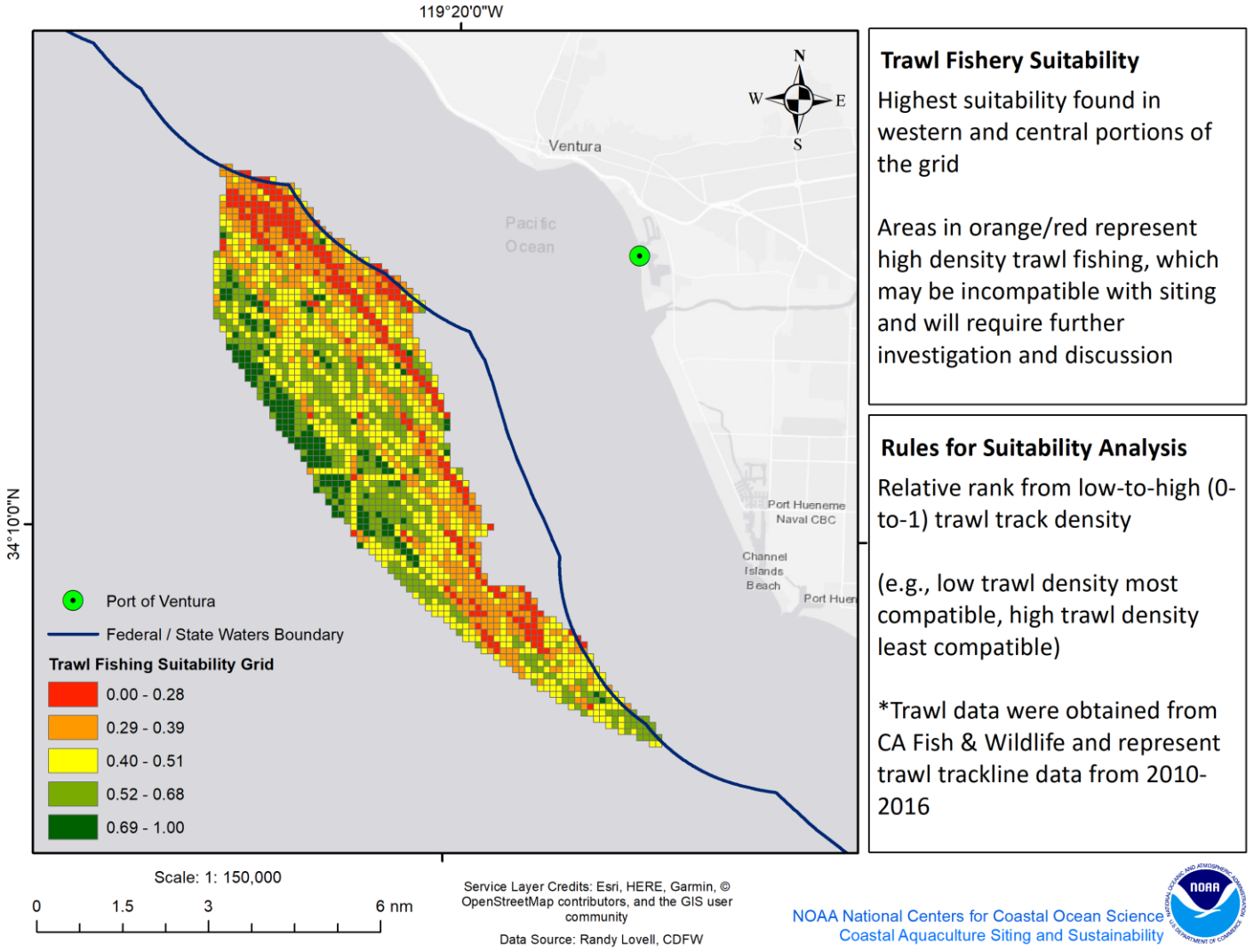


Figure 14. Commercial trawl fishery suitability layer incorporated within the overall VSE suitability analysis. Areas corresponding to the highest density of trawl track line intersections were assigned a score of '0' (least compatible) and areas of lowest density of trawl track line intersections were assigned a score of '1' (most compatible). Continuous scores between '0' and '1' were assigned for all other grid cells across the low-to-high density gradient.

ATTACHMENT 1

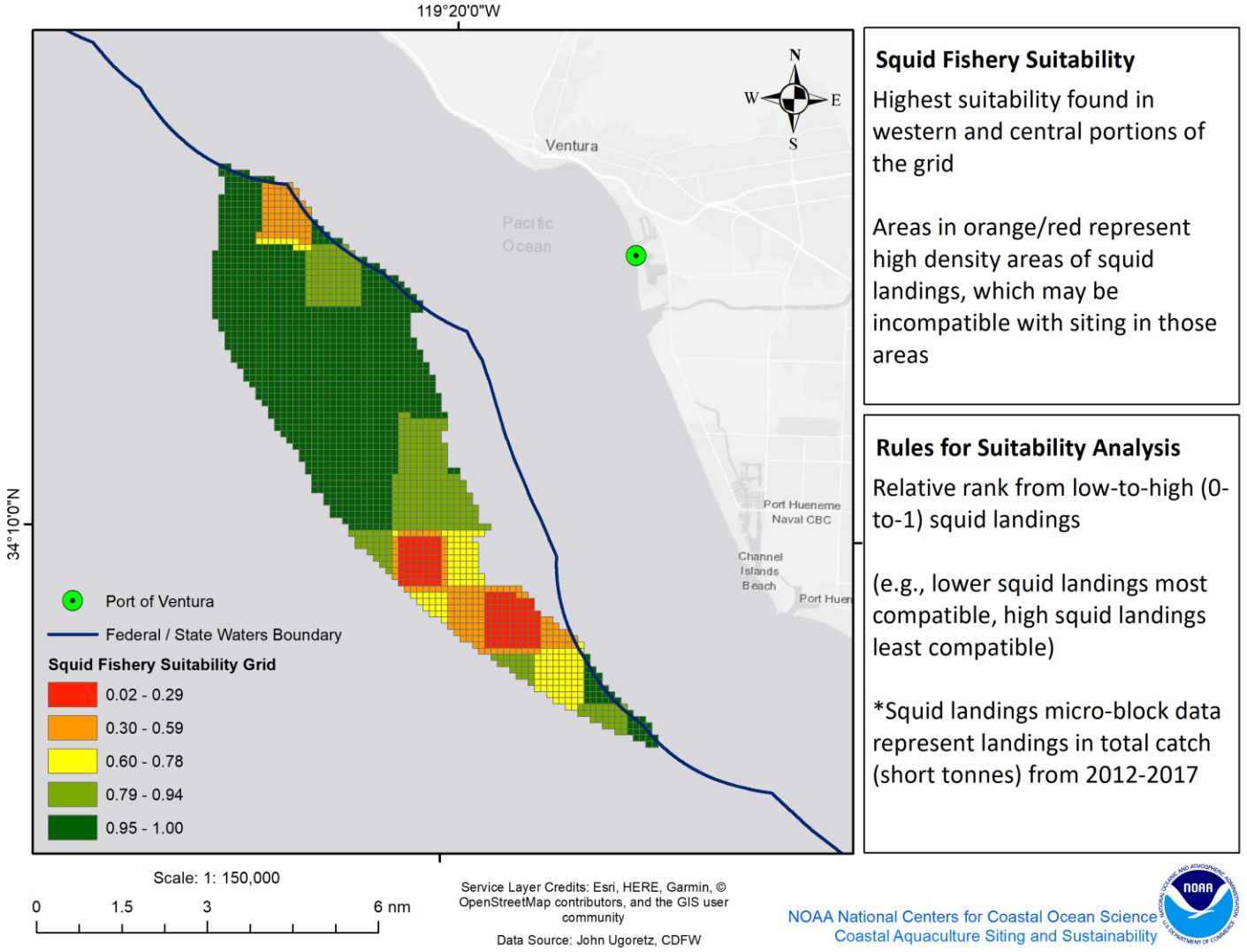


Figure 15. Commercial squid fishery suitability layer incorporated within the overall VSE suitability analysis. Areas corresponding to the highest total squid landings by microblock were assigned a score of '0' (least compatible) and areas of lowest total squid landings by microblock were assigned a score of '1' (most compatible). Continuous scores between '0' and '1' were assigned for all other grid cells across the low-to-high total squid landings by microblock gradient.

ATTACHMENT 1

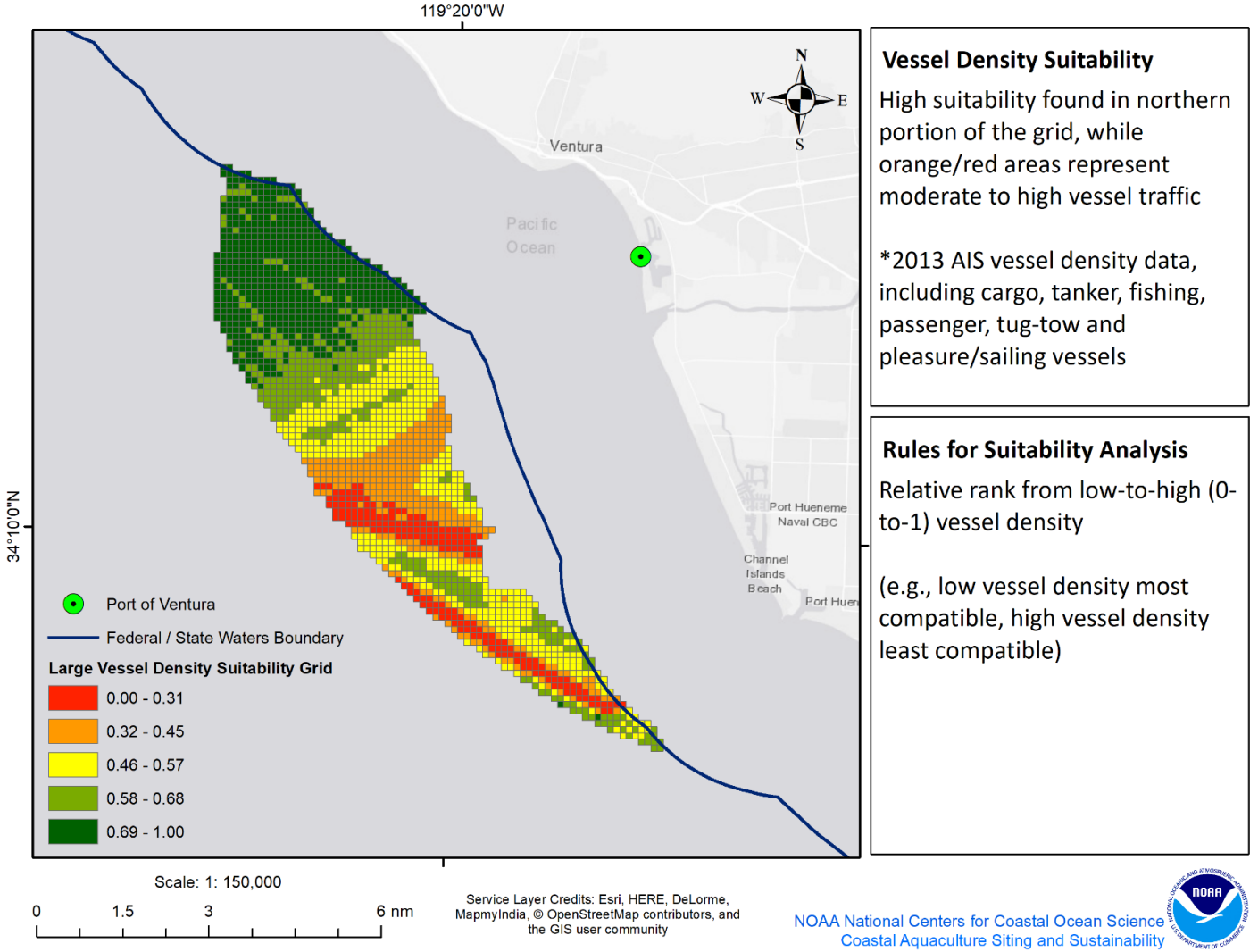


Figure 16. Vessel density suitability layer incorporated within the overall VSE suitability analysis. Areas corresponding to the highest total vessel density were assigned a score of '0' (least compatible) and areas of lowest total vessel density were assigned a score of '1' (most compatible). Continuous scores between '0' and '1' were assigned for all other grid cells across the low-to-high density gradient.

ATTACHMENT 1

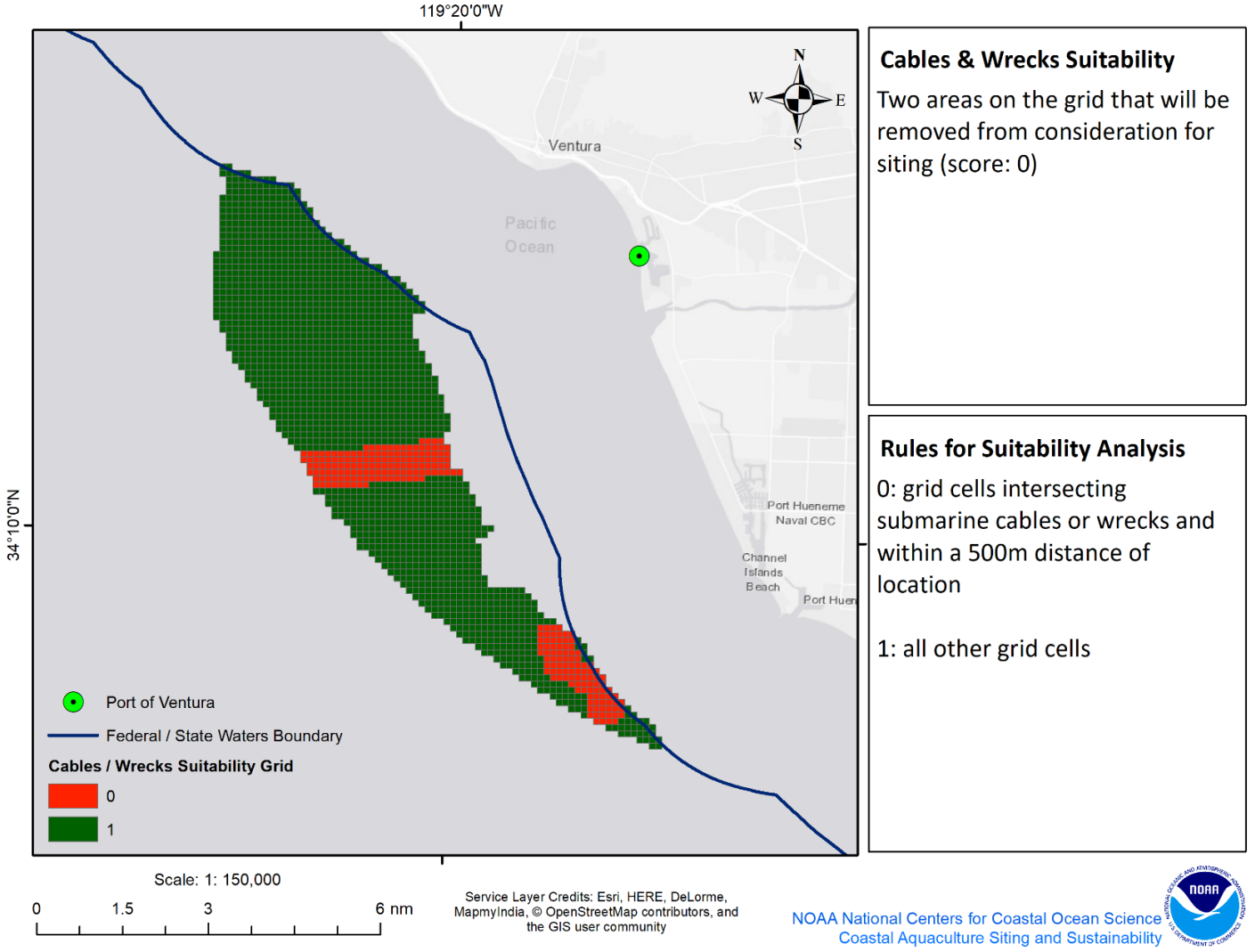


Figure 17. Submerged cables and wrecks and obstructions suitability layer incorporated within the overall VSE suitability analysis. Areas within a 500-meter radius of submerged cables and wrecks and obstructions were assigned a score of '0' (least compatible) while areas outside of a 500-meter radius of submerged cables and wrecks and obstructions were assigned a score of '1' (most compatible).

ATTACHMENT 1

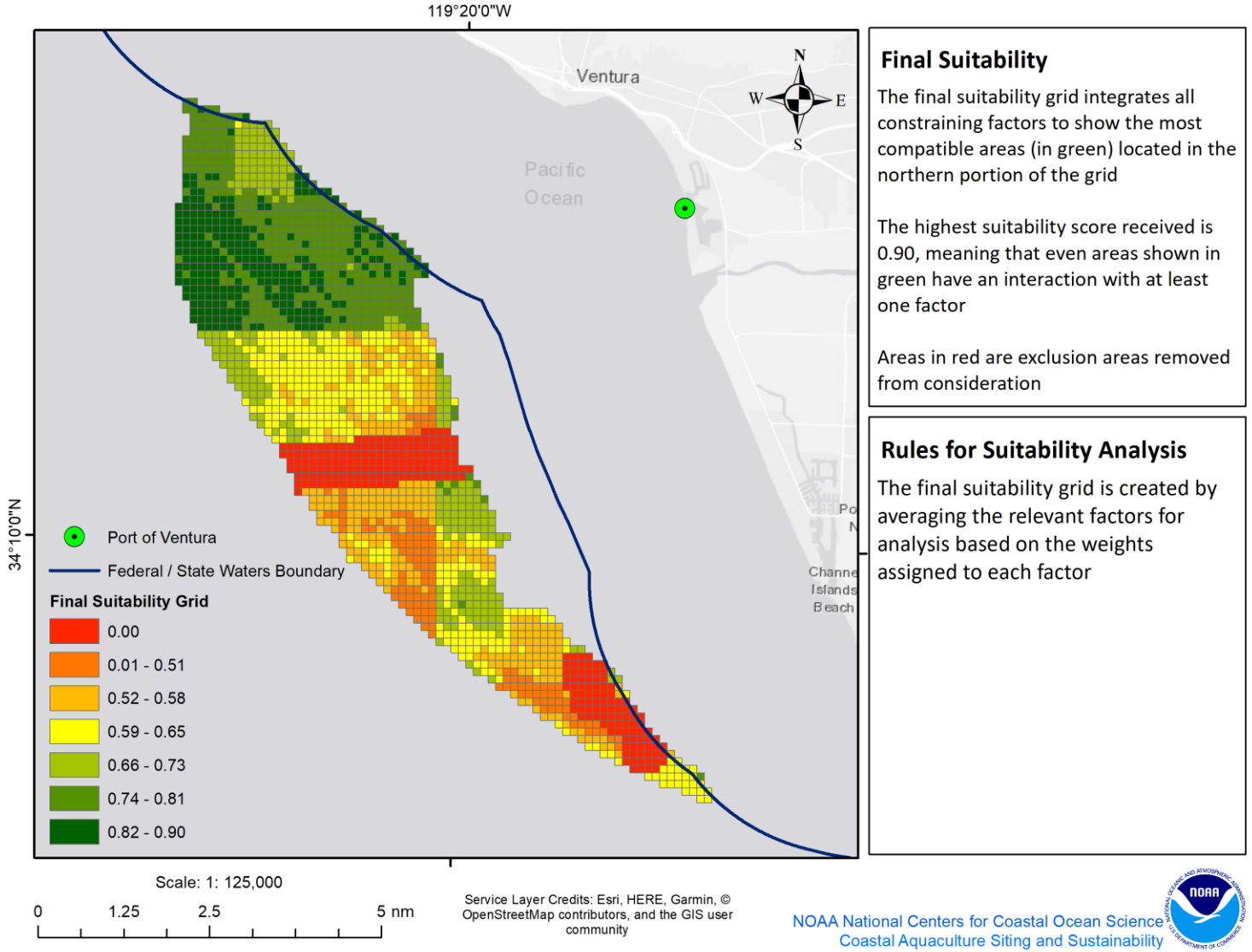


Figure 18. Final suitability grid generated through integration of all individual suitability layers (i.e., oil and gas, commercial trawl fishery, commercial squid fishery, vessel traffic, and submerged cables and wrecks and obstructions). Note that all layers were assigned equal weights within the analysis.

ATTACHMENT 1

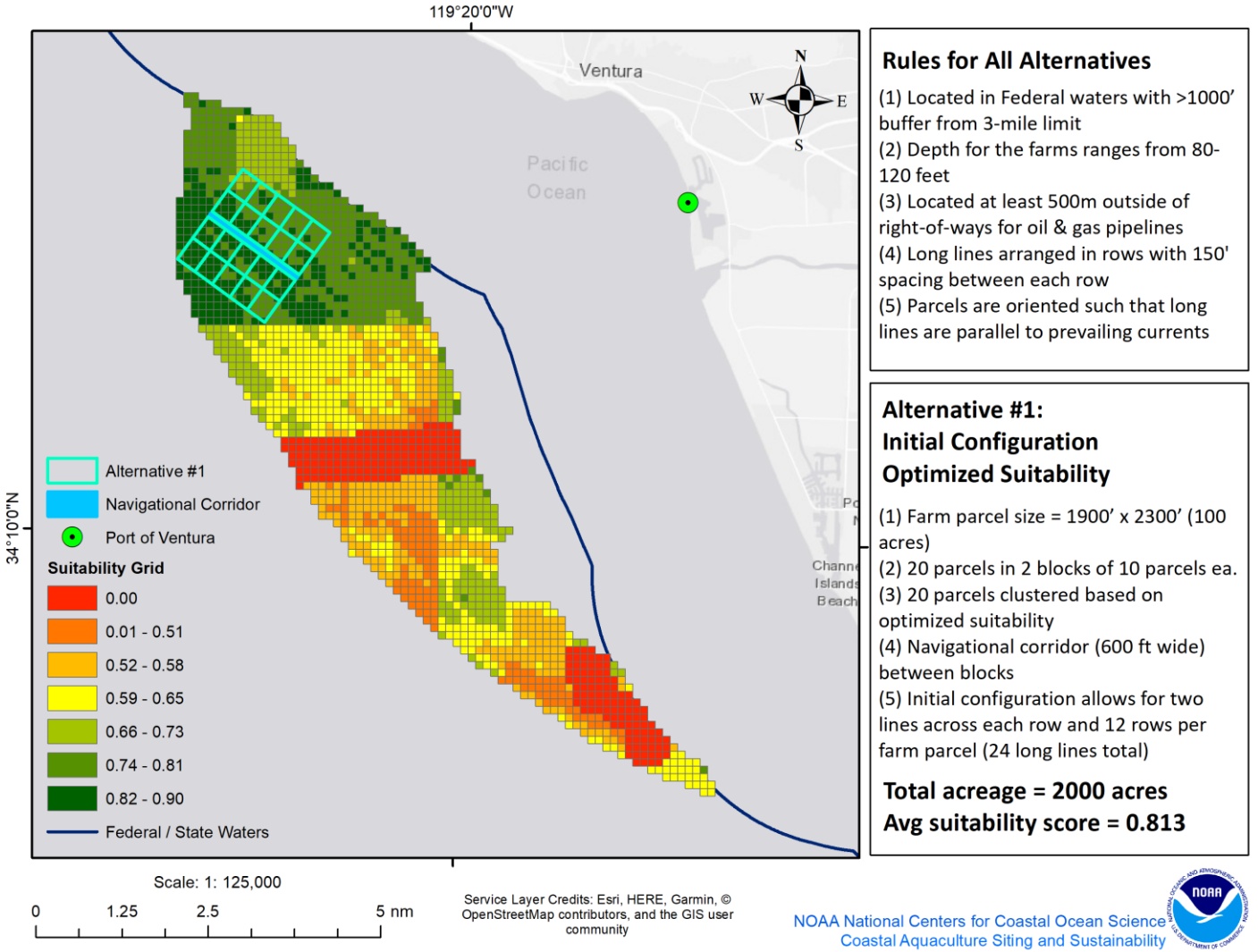


Figure 19. Alternative 1. The first alternative site for VSE was created using their initial configuration, in which the farm parcel design is a 1,900' by 2,300' plot. The alternative site contains 20 parcels, clustered into two blocks, with a 600' navigational corridor between the two blocks. The alternative site was positioned within the 'area of interest' based on optimizing suitability.

ATTACHMENT 1

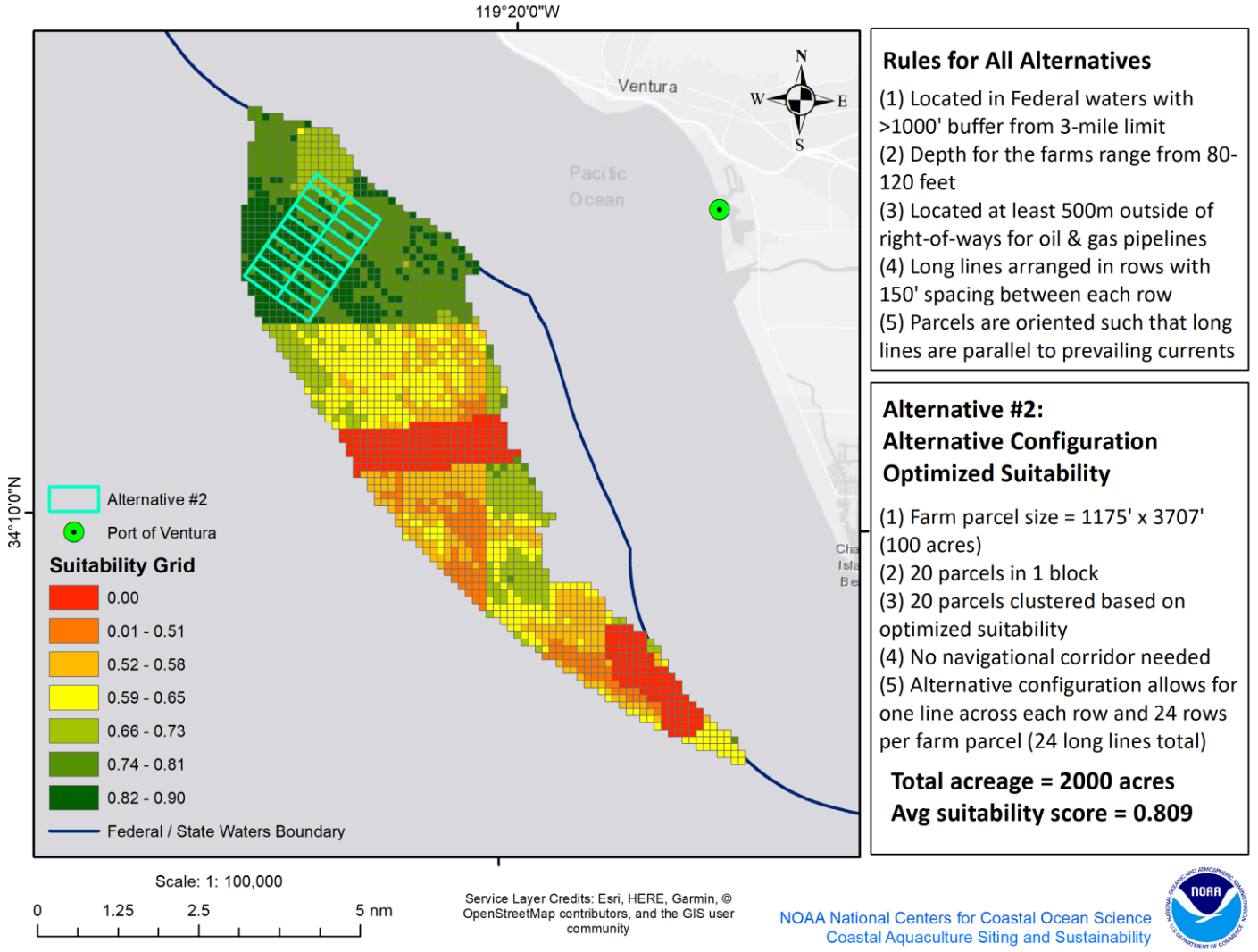
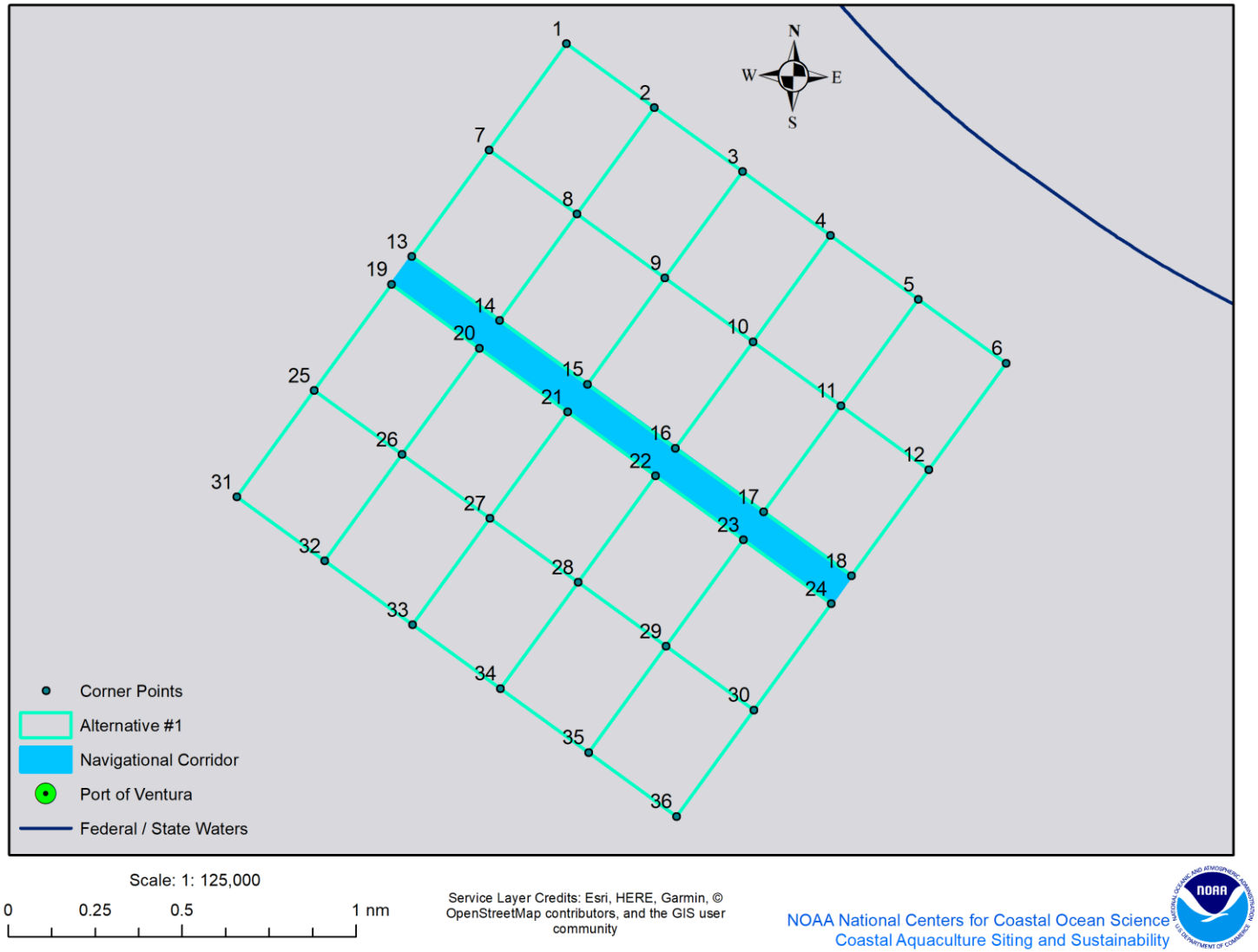


Figure 20. Alternative 2. The second alternative site for VSE was created using their alternative configuration, in which the farm parcel design is a 1,175’ by 3,707’ plot. The alternative site contains 20 parcels, clustered in one contiguous block. A navigational corridor was not needed since all parcels can be reached on the perimeter of the site. The alternative site was positioned within the ‘area of interest’ based on optimizing suitability.

APPENDIX



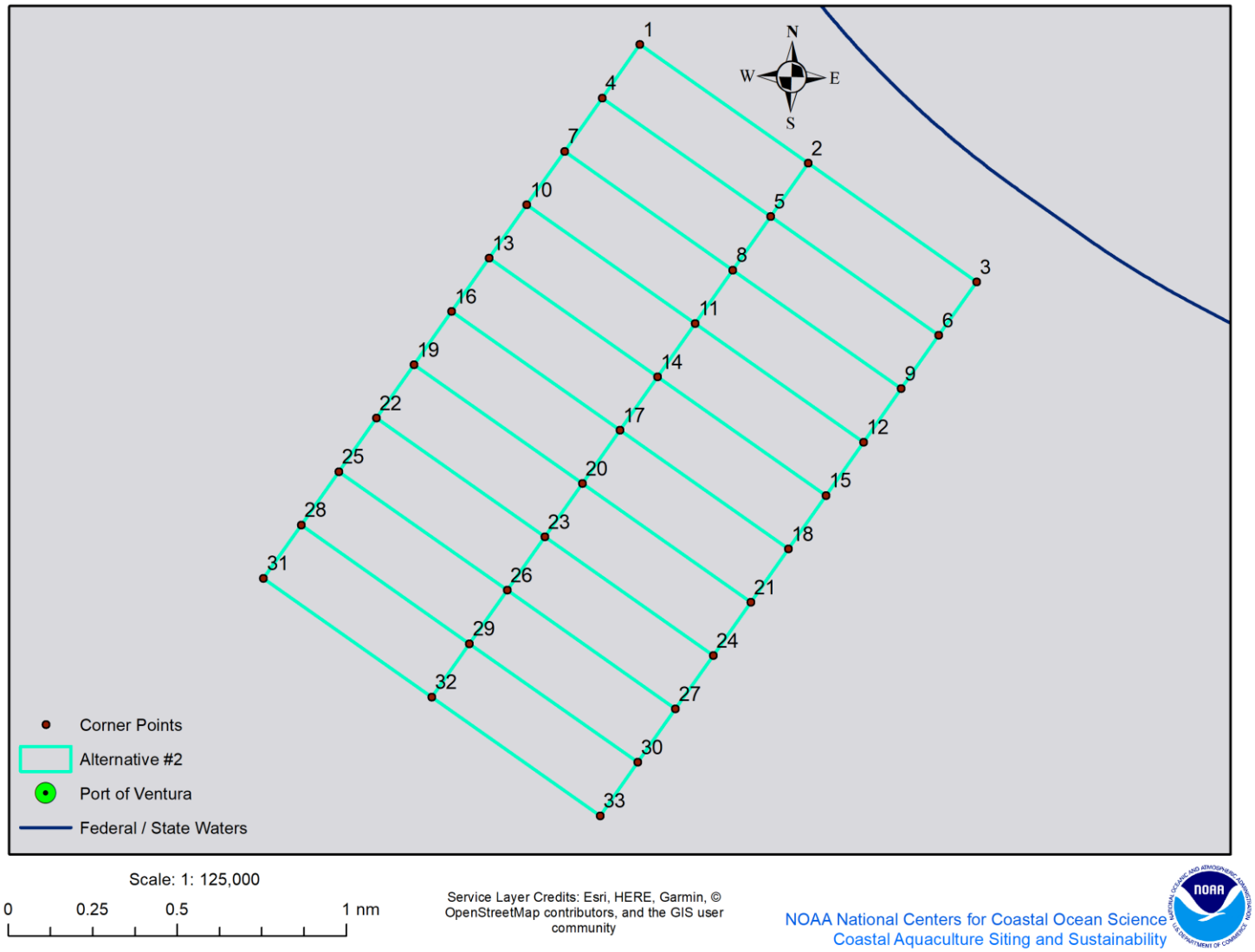
Appendix 1. Corner points associated with Alternative #1 for the proposed VSE project. Note that the labelled points correspond with the latitude and longitude coordinates described in Appendix 2.

ATTACHMENT 1

Appendix 2. Corner points and associated latitudes and longitudes for Alternative #1 for the proposed VSE project.

Corner ID	Latitude	Longitude
1	34° 15' 17.528" N	119° 23' 56.582" W
2	34° 15' 6.837" N	119° 23' 37.972" W
3	34° 14' 56.145" N	119° 23' 19.363" W
4	34° 14' 45.452" N	119° 23' 0.755" W
5	34° 14' 34.759" N	119° 22' 42.149" W
6	34° 14' 24.064" N	119° 22' 23.544" W
7	34° 14' 58.821" N	119° 24' 12.166" W
8	34° 14' 48.130" N	119° 23' 53.557" W
9	34° 14' 37.439" N	119° 23' 34.949" W
10	34° 14' 26.747" N	119° 23' 16.342" W
11	34° 14' 16.054" N	119° 22' 57.736" W
12	34° 14' 5.361" N	119° 22' 39.132" W
13	34° 14' 40.113" N	119° 24' 27.749" W
14	34° 14' 29.423" N	119° 24' 9.140" W
15	34° 14' 18.733" N	119° 23' 50.532" W
16	34° 14' 8.041" N	119° 23' 31.926" W
17	34° 13' 57.349" N	119° 23' 13.321" W
18	34° 13' 46.656" N	119° 22' 54.718" W
19	34° 14' 35.223" N	119° 24' 31.808" W
20	34° 14' 24.533" N	119° 24' 13.199" W
21	34° 14' 13.843" N	119° 23' 54.592" W
22	34° 14' 3.151" N	119° 23' 35.986" W
23	34° 13' 52.459" N	119° 23' 17.381" W
24	34° 13' 41.766" N	119° 22' 58.777" W
25	34° 14' 16.514" N	119° 24' 47.388" W
26	34° 14' 5.826" N	119° 24' 28.780" W
27	34° 13' 55.136" N	119° 24' 10.173" W
28	34° 13' 44.445" N	119° 23' 51.568" W
29	34° 13' 33.754" N	119° 23' 32.964" W
30	34° 13' 23.061" N	119° 23' 14.361" W
31	34° 13' 57.806" N	119° 25' 2.966" W
32	34° 13' 47.118" N	119° 24' 44.359" W
33	34° 13' 36.428" N	119° 24' 25.753" W
34	34° 13' 25.738" N	119° 24' 7.148" W
35	34° 13' 15.048" N	119° 23' 48.544" W
36	34° 13' 4.356" N	119° 23' 29.942" W

ATTACHMENT 1



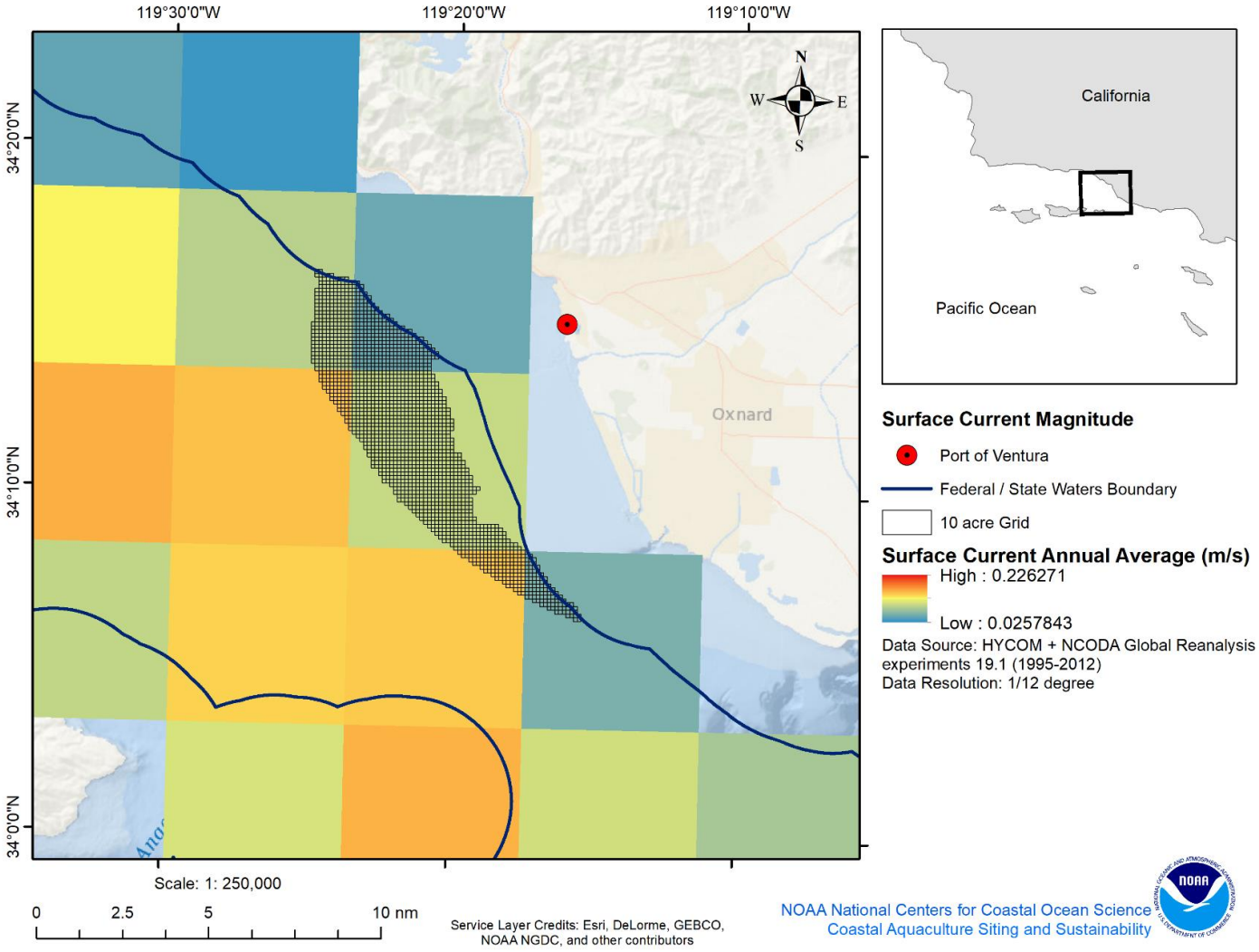
Appendix 3. Corner points associated with Alternative #2 for the proposed VSE project. Note that the labelled points correspond with the latitude and longitude coordinates described in Appendix 4.

ATTACHMENT 1

Appendix 4. Corner points and associated latitudes and longitudes for Alternative #2 for the proposed VSE project.

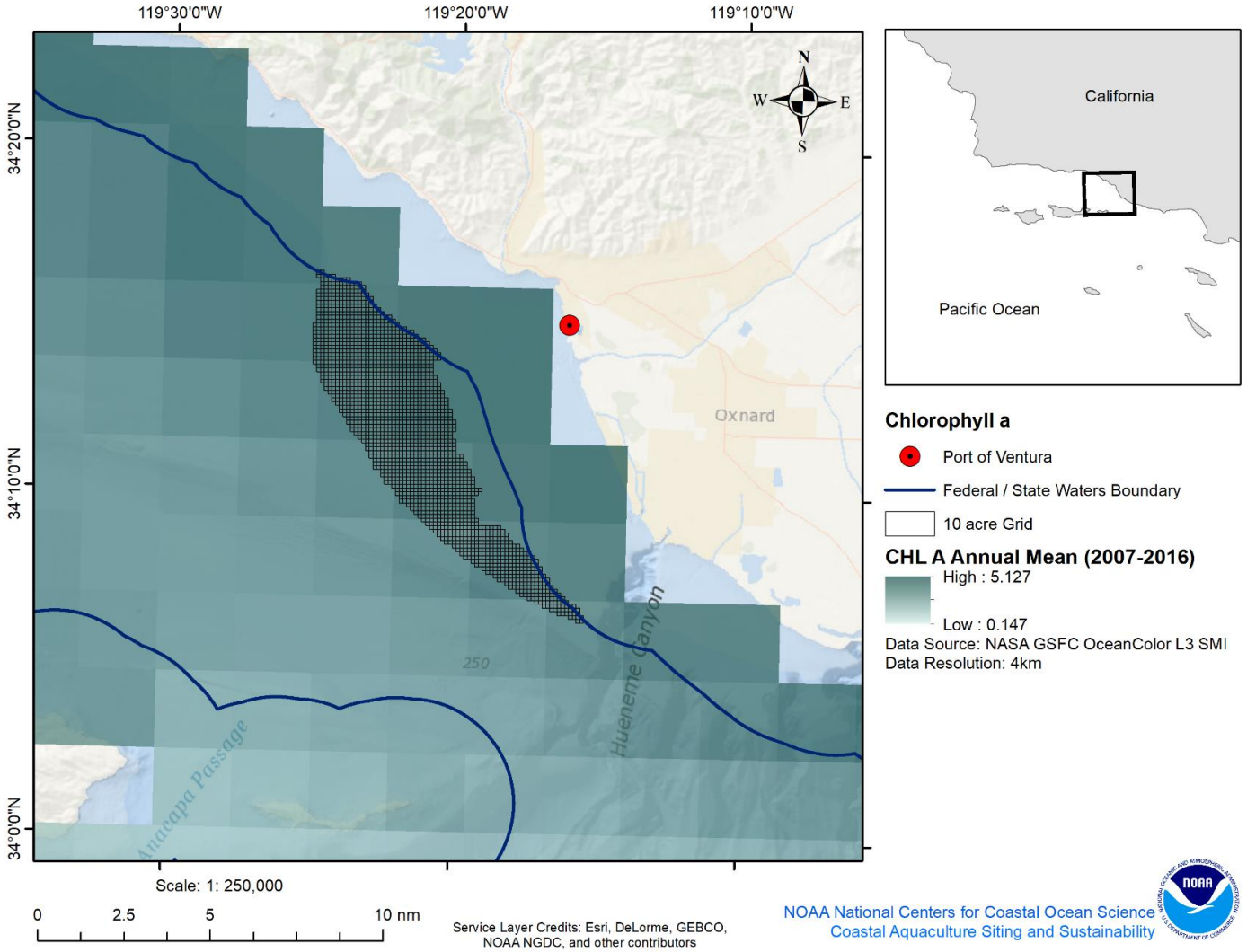
Corner ID	Latitude	Longitude
1	34° 15' 21.520" N	119° 23' 42.518" W
2	34° 15' 1.105" N	119° 23' 5.841" W
3	34° 14' 40.687" N	119° 22' 29.169" W
4	34° 15' 11.867" N	119° 23' 50.309" W
5	34° 14' 51.453" N	119° 23' 13.633" W
6	34° 14' 31.035" N	119° 22' 36.962" W
7	34° 15' 2.214" N	119° 23' 58.101" W
8	34° 14' 41.801" N	119° 23' 21.425" W
9	34° 14' 21.384" N	119° 22' 44.755" W
10	34° 14' 52.561" N	119° 24' 5.891" W
11	34° 14' 32.148" N	119° 23' 29.217" W
12	34° 14' 11.731" N	119° 22' 52.547" W
13	34° 14' 42.908" N	119° 24' 13.682" W
14	34° 14' 22.495" N	119° 23' 37.008" W
15	34° 14' 2.079" N	119° 23' 0.339" W
16	34° 14' 33.254" N	119° 24' 21.471" W
17	34° 14' 12.842" N	119° 23' 44.798" W
18	34° 13' 52.427" N	119° 23' 8.130" W
19	34° 14' 23.601" N	119° 24' 29.261" W
20	34° 14' 3.189" N	119° 23' 52.588" W
21	34° 13' 42.775" N	119° 23' 15.921" W
22	34° 14' 13.947" N	119° 24' 37.050" W
23	34° 13' 53.536" N	119° 24' 0.378" W
24	34° 13' 33.122" N	119° 23' 23.711" W
25	34° 14' 4.293" N	119° 24' 44.838" W
26	34° 13' 43.883" N	119° 24' 8.167" W
27	34° 13' 23.470" N	119° 23' 31.501" W
28	34° 13' 54.639" N	119° 24' 52.626" W
29	34° 13' 34.230" N	119° 24' 15.956" W
30	34° 13' 13.817" N	119° 23' 39.290" W
31	34° 13' 44.985" N	119° 25' 0.413" W
32	34° 13' 24.576" N	119° 24' 23.744" W
33	34° 13' 4.164" N	119° 23' 47.079" W

ATTACHMENT 1



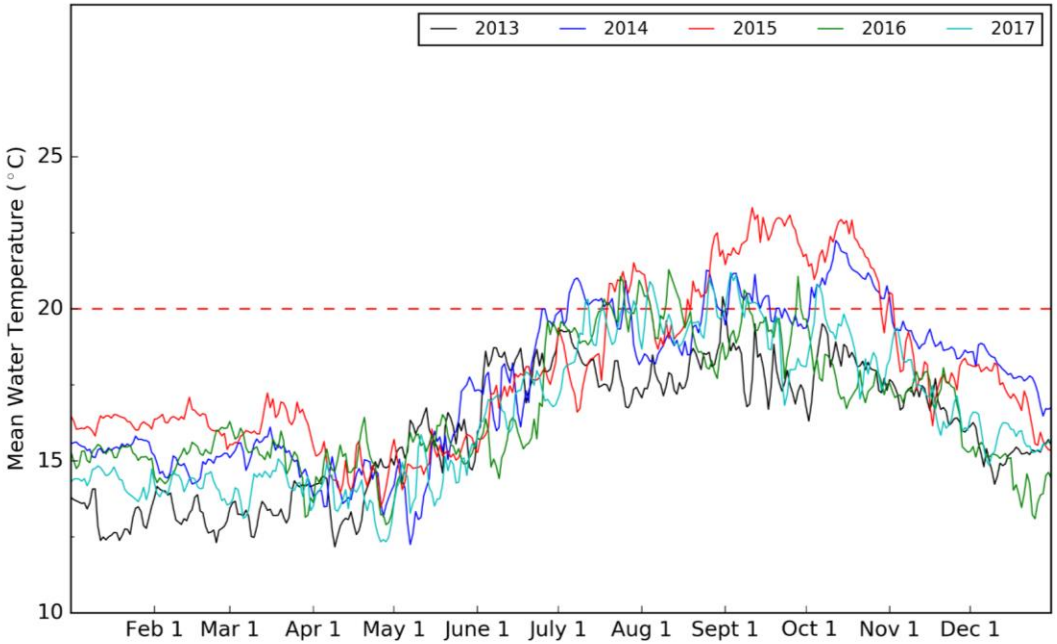
Appendix 5. Annual average surface current velocity (m/s) in relation to the area of interest for the proposed VSE project. The optimal current velocity range for blue mussel (*Mytilus galloprovincialis*) longlines is between 0.025 and 0.10 m/s (Longdill et al., 2008), which generally corresponds with annual average current velocity for the area of interest.

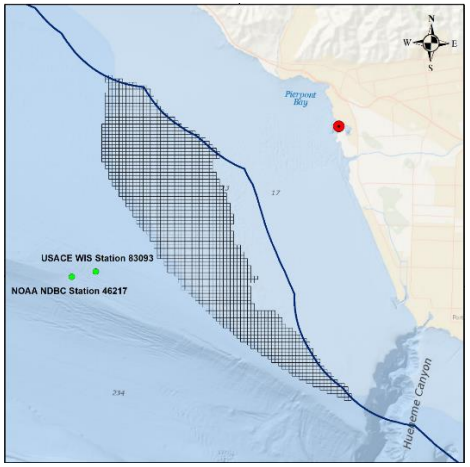
ATTACHMENT 1



Appendix 6. Annual average chlorophyll *a* concentration (in micrograms per liter) in relation to the proposed VSE project. The optimal chlorophyll *a* range for blue mussels (*Mytlius galloprovincialis*) is between 0.5 and 55 µg/l (Sara et al., 1998), which corresponds with the annual average chlorophyll *a* concentration for the area of interest.

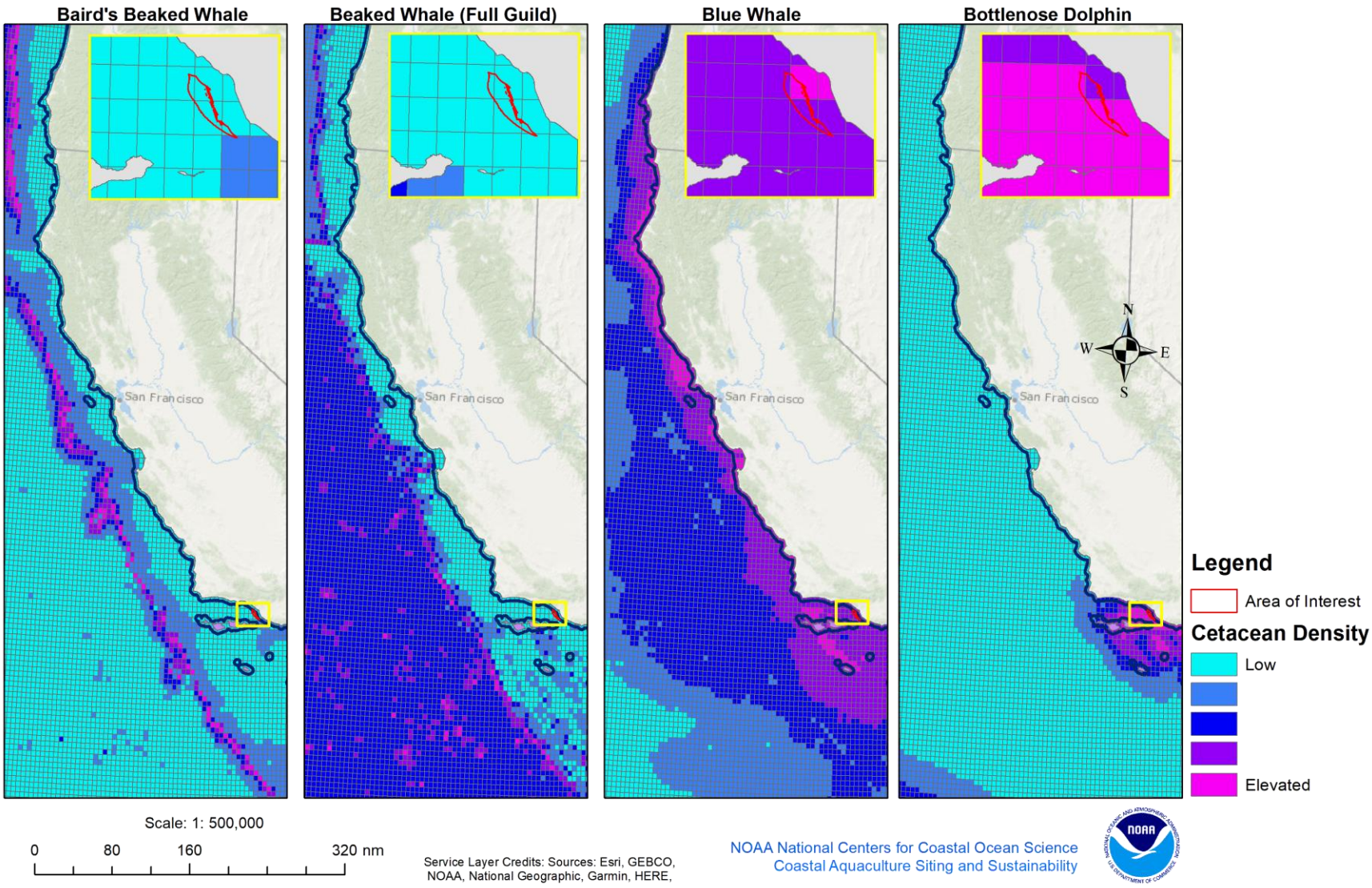
ATTACHMENT 1





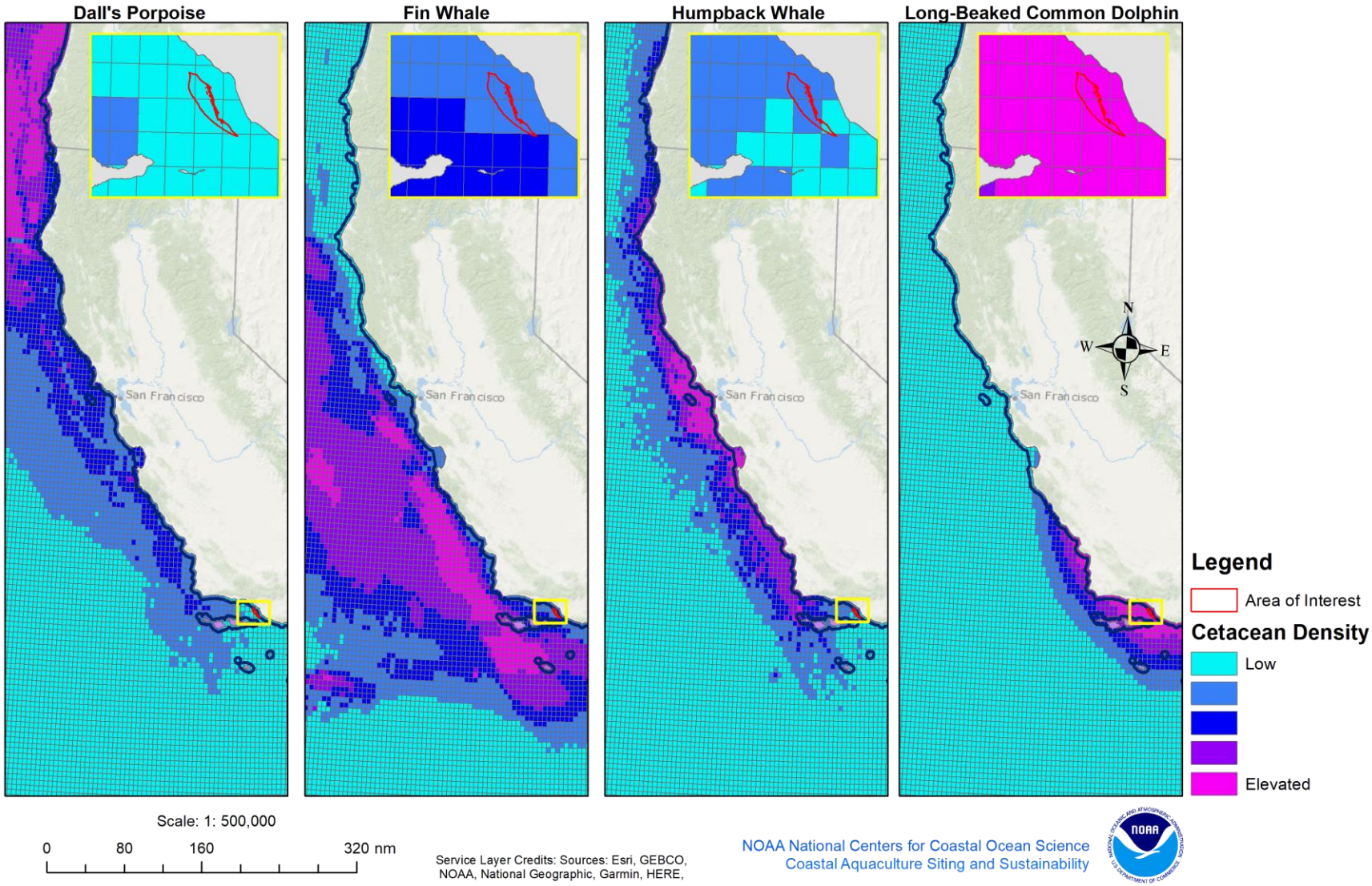
Appendix 7. Mean water temperature over a 5-year period as measured by the NOAA data buoy adjacent to the proposed VSE project area of interest. The acceptable water temperature range for blue mussels (*Mytlius galloprovincialis*) is between 3 and 29 degrees Celsius, with an optimal temperature of 20 degrees Celsius (denoted by the dashed red line in the figure above; Widdows 1978, Newell 1989, and Almada-Villela et al. 1982).

ATTACHMENT 1



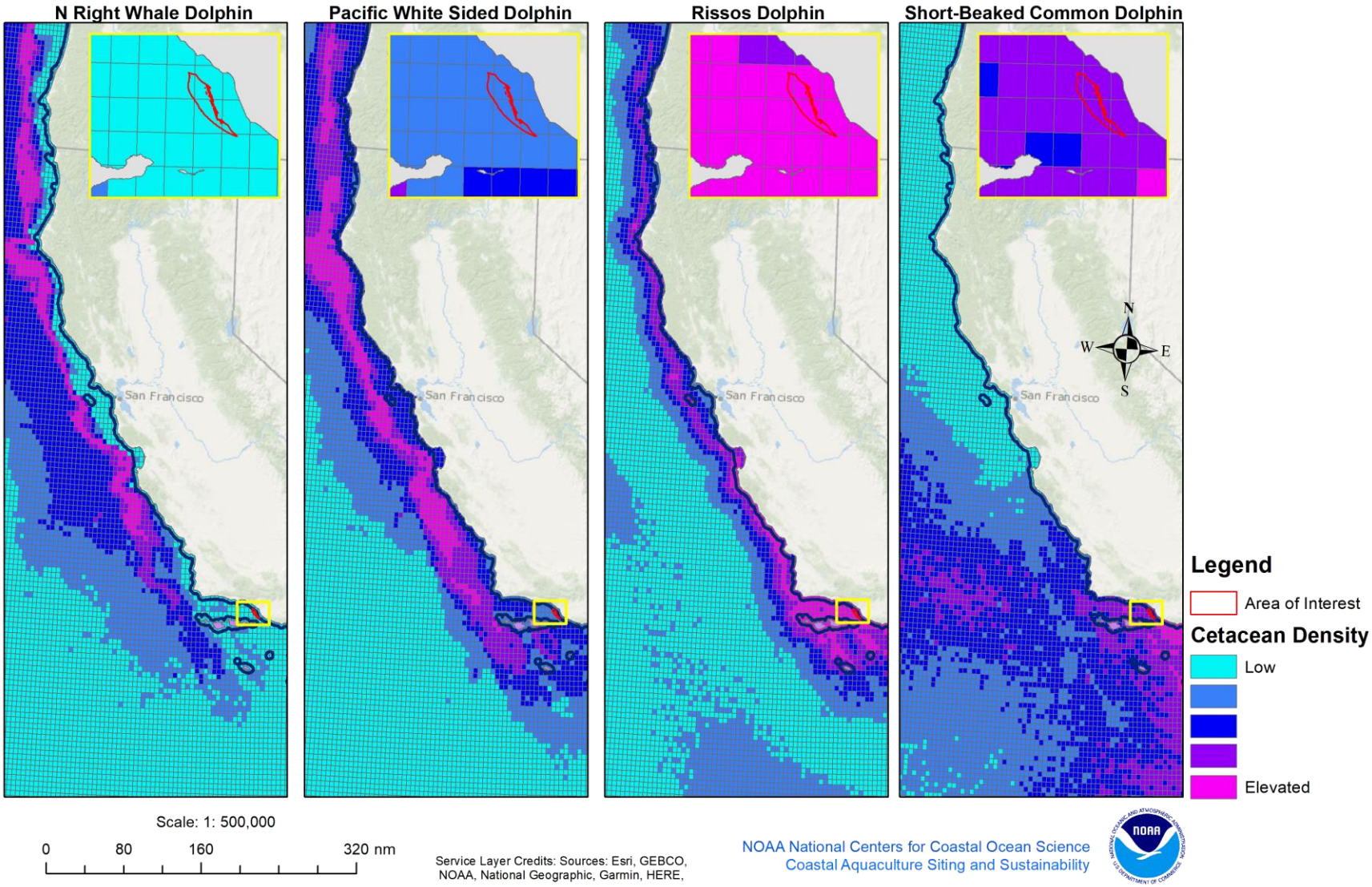
Appendix 8. Predicted habitat-based density and distribution models for multiple cetacean species, derived from NOAA National Marine Fisheries Service's CetSound database. Light blue colors indicate low predicted densities whereas purple colors indicate elevated predicted densities. Note that these maps represent predicted density, but do not necessarily correspond with actual distribution or definitive probability of encountering these species.

ATTACHMENT 1



Appendix 9. Predicted habitat-based density and distribution models for multiple cetacean species, derived from NOAA National Marine Fisheries Service's CetSound database. Light blue colors indicate low predicted densities whereas purple colors indicate elevated predicted densities. Note that these maps represent predicted density, but do not necessarily correspond with actual distribution or definitive probability of encountering these species.

ATTACHMENT 1



Appendix 10. Predicted habitat-based density and distribution models for multiple cetacean species, derived from NOAA National Marine Fisheries Service's CetSound database. Light blue colors indicate low predicted densities whereas purple colors indicate elevated predicted densities. Note that these maps represent predicted density, but do not necessarily correspond with actual distribution or definitive probability of encountering these species.

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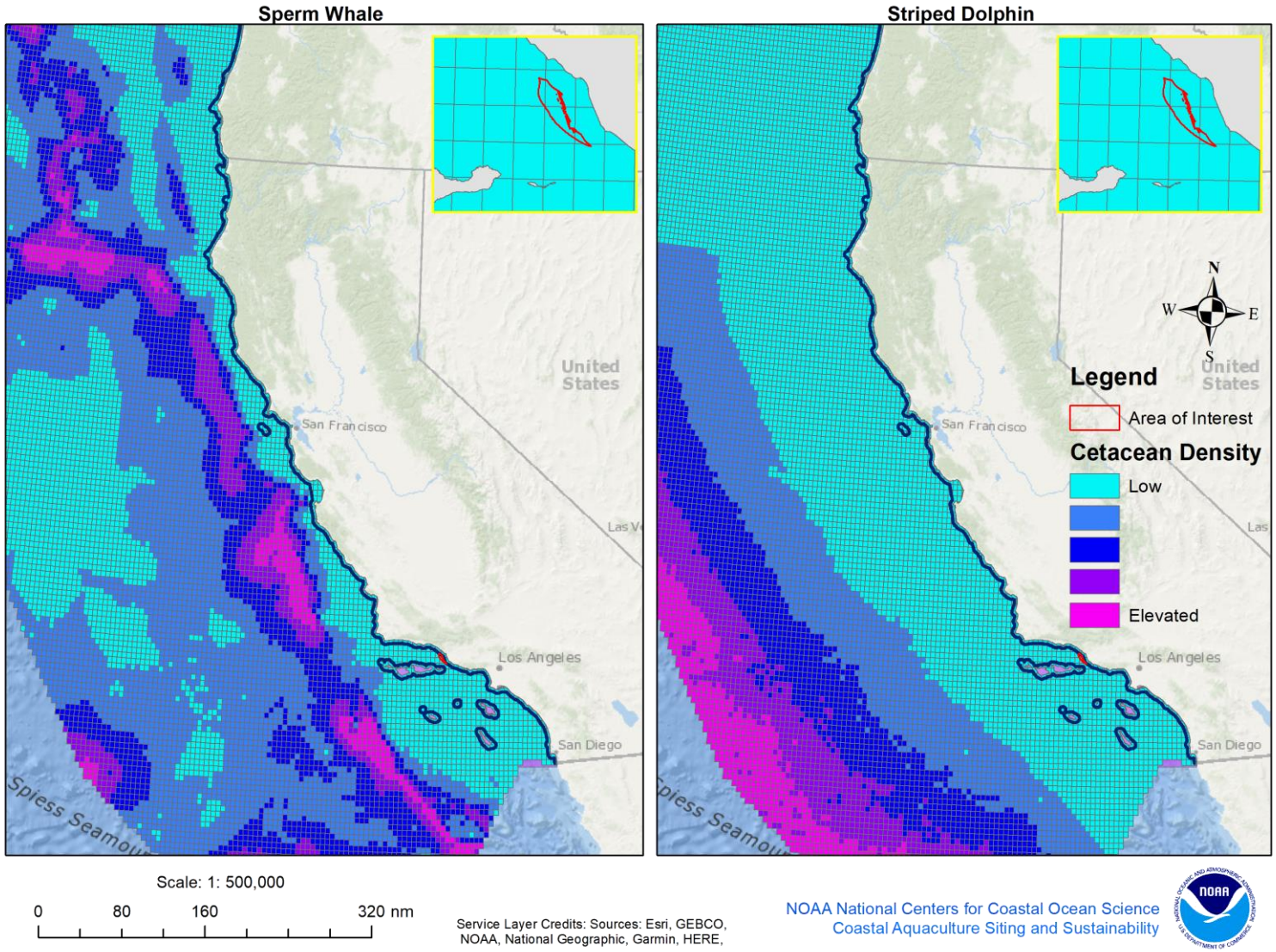

Appendix 11. Predicted habitat-based density and distribution models for multiple cetacean species, derived from NOAA National Marine Fisheries Service's CetSound database. Light blue colors indicate low predicted densities whereas purple colors indicate elevated predicted densities. Note that these maps represent predicted density, but do not necessarily correspond with actual distribution or definitive probability of encountering these species.

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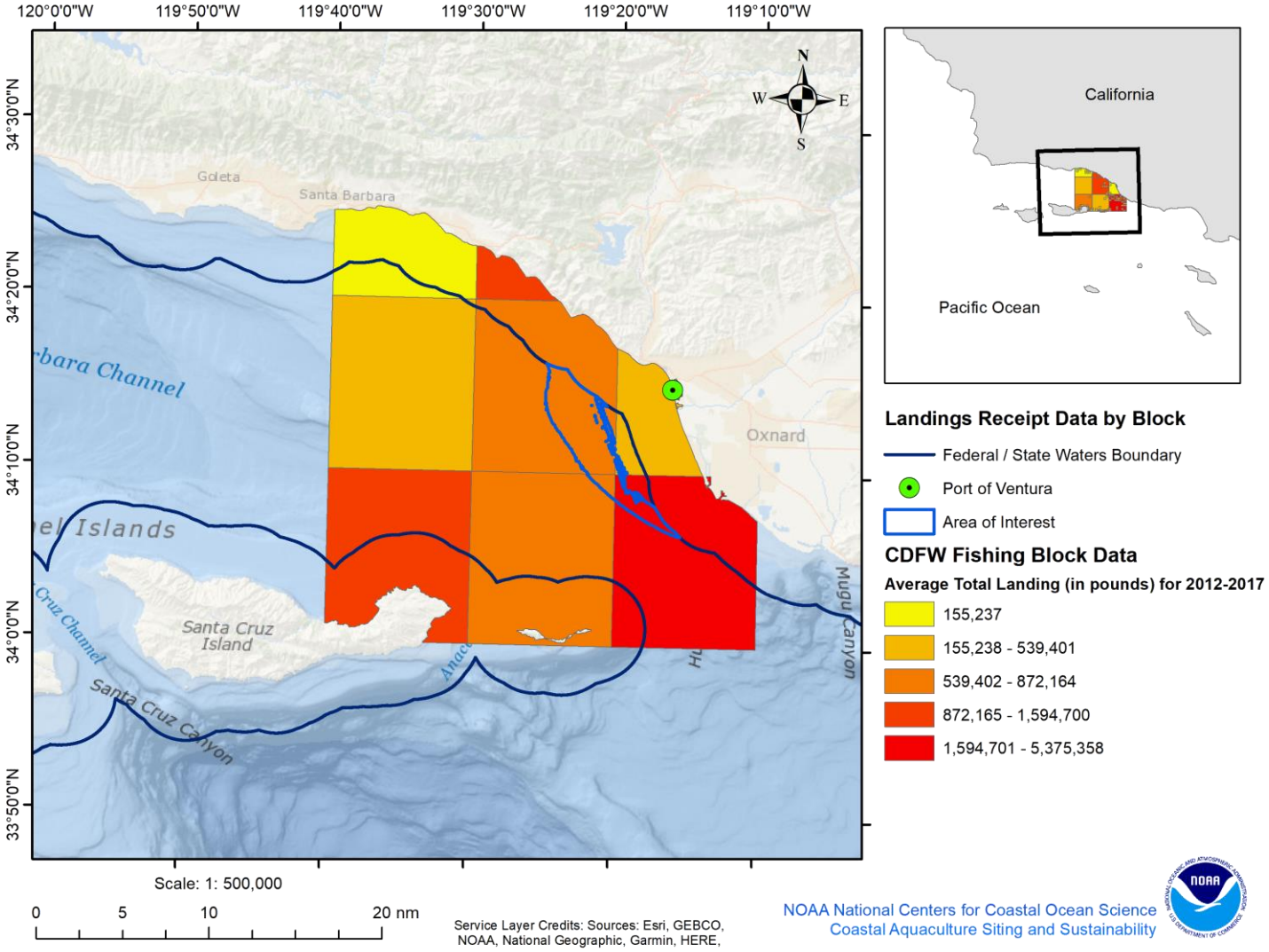


Appendix 12. Broader perspective of commercial fishery landings by California Department of Fish and Wildlife reporting block in relation to the VSE project 'area of interest.' Fishery landings represent average total landings (across all species requiring reporting by block) for the period of 2012-2017. Note that the entirety of the 'area of interest' (represented by the blue outline in the map) which was further subdivided into 1,953 grid cells within the siting analysis, overlaps with four reporting blocks rendering this data incompatible for incorporation within the siting analysis.

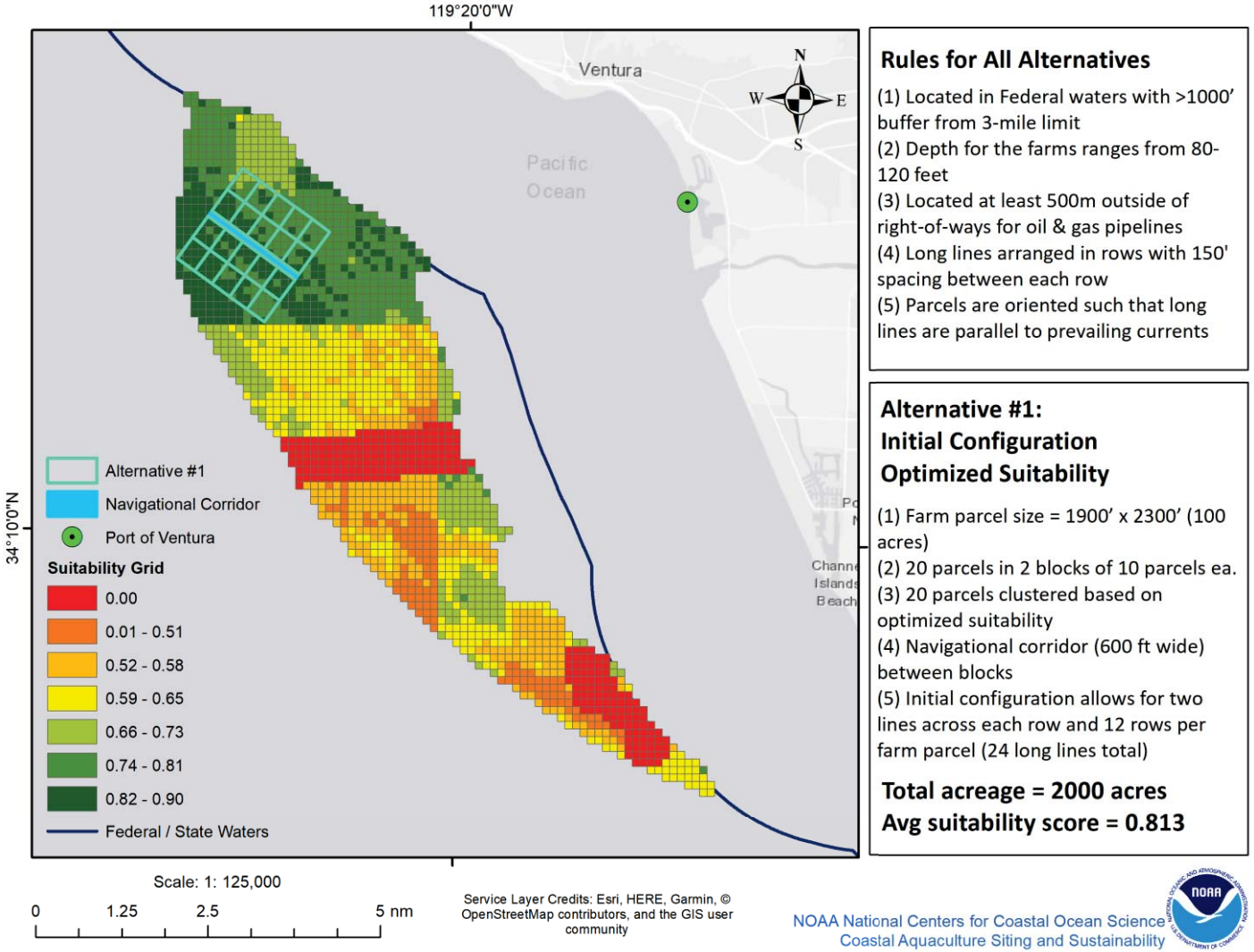


Figure 19. Alternative 1. The first alternative site for VSE was created using their initial configuration, in which the farm parcel design is a 1,900' by 2,300' plot. The alternative site contains 20 parcels, clustered into two blocks, with a 600' navigational corridor between the two blocks. The alternative site was positioned within the 'area of interest' based on optimizing suitability.

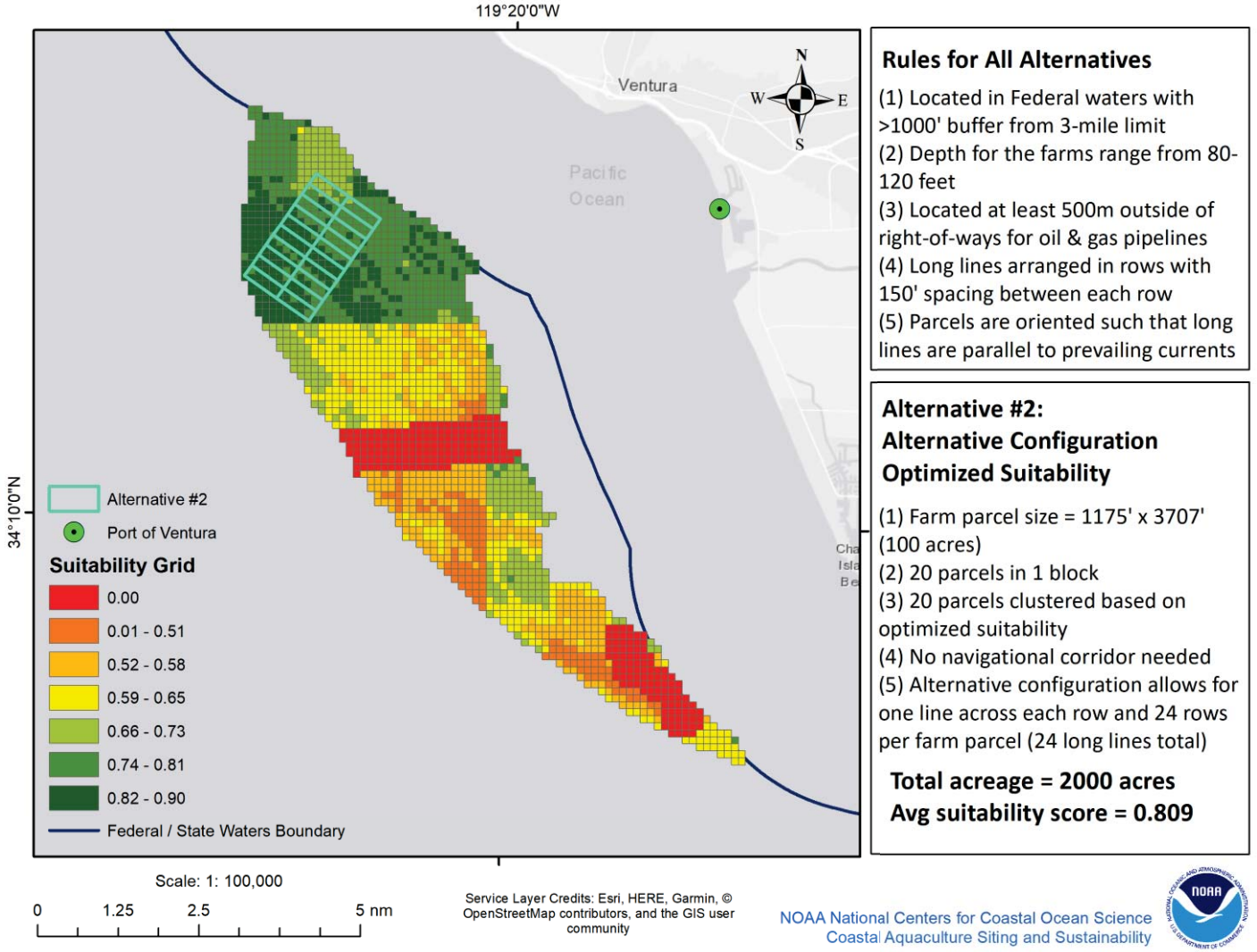


Figure 20. Alternative 2. The second alternative site for VSE was created using their alternative configuration, in which the farm parcel design is a 1,175’ by 3,707’ plot. The alternative site contains 20 parcels, clustered in one contiguous block. A navigational corridor was not needed since all parcels can be reached on the perimeter of the site. The alternative site was positioned within the ‘area of interest’ based on optimizing suitability.

U.S. Army Corps of Engineers (USACE)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 01-08-2018

The public reporting burden for this collection of information, OMB Control Number 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned. System of Record Notice (SORN). The information received is entered into our permit tracking database and a SORN has been completed (SORN #A1145b) and may be accessed at the following website: http://dpcld.defense.gov/Privacy/SORNsIndex/DOD-wide-SORN-Article-View/Article/570115/a1145b-ce.aspx

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Oscar Middle - F. Last - Peña	First - Laurie Middle - Last - Monarres
Company - Ventura Port District	Company - Dudek
E-mail Address - opena@venturaharbor.com	E-mail Address - lmonarres@dudek.com
6. APPLICANT'S ADDRESS:	9. AGENT'S ADDRESS:
Address- 1603 Anchors Way Drive	Address- 1630 San Pablo Ave, Suite 300
City - Ventura State - CA Zip - 93001 Country - USA	City - Oakland State - CA Zip - Country - USA
7. APPLICANT'S PHONE NOs. w/AREA CODE	10. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business 805-642-8538 c. Fax	a. Residence b. Business 510-601-2515 c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Laurie Monarres to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Ventura Shellfish Enterprise

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
Santa Barbara Channel	Address
15. LOCATION OF PROJECT	City - State- Zip-
Latitude: °N See Attach. 2, Figures Longitude: °W	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID Municipality

Section - Township - Range -

ATTACHMENT 4

17. DIRECTIONS TO THE SITE

The project will consist 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 ranging from between 80 to 114 feet below sea level. The plots are approximately 3.53 miles from the shore. The closest distance to the 3-mile nautical line is a minimum of 2,900 feet from the plots, with an average closest distance of over 3,000 feet. The closest distance to the City of Ventura limit is 4.5 miles. Ventura Harbor is 4.1 miles from the closest plot (8 miles in distance to the most distant plot).The lease 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).

18. Nature of Activity (Description of project, include all features)

The proposed project will establish a commercial offshore bivalve aquaculture operation based from the Ventura Harbor in Ventura, California, focused on the cultivation of Mediterranean mussels (Mytilus galloprovincialis).

See Supplemental Information Attachment Pages 1-8

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

The proposed project is intended to create economic opportunities for community and marine stakeholders, produce a high value and sustainable seafood product, and provide additional economic revenue sources and commercial activity to maintain the Port of Ventura.

See supplemental Information Attachment Pages 9-17

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Not Applicable

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres

or

Linear Feet

23. Description of Avoidance, Minimization, and Compensation (see instructions)

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. The proposed projects actions have the potential to degrade the biological quality (i.e. water quality, invasive species), as well as potentially cause navigational concerns. Absent mitigation and best management practices, project activities may have an adverse effect on the surrounding area. However, with the incorporation of the following BMPs, the effects would be mitigated to insignificant levels.
See supplemental Information Attachment Pages 18-32

ATTACHMENT 4

24. Is Any Portion of the Work Already Complete? ☐ Yes ☒ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- N/A

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
CCC	Consistency Certificat	In Progress			

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

ATTACHMENT 4

18. Nature of Activity

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 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

[1] The 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.

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 key participants (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 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 (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; remotely operated vehicle (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.

19. 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, 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 (m^3/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
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 very important 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 federal 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, causing the VPD to utilize approximately $3.9 million in unrestricted reserve funds. Due to VPD reserve fund policies, this 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 maintenance of the harbor's federal 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 federal 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 $1.2M 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 at the Harbor while other years the VPD has had less than 20 million pounds offloaded at the Harbor. The VPD's off-loading fees are generated largely by the squid industry; however, these fees only represent 10% of the $1.2M in 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 is not part of the Harbor's federal entrance. 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 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 $2.76M per 100-acre parcel or $55.2M 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 just rely on fish offloading and slip 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 $1.65M. 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. $1.2M 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 key VSE participants are committed to transparency, open communication, and comprehensive public education and outreach efforts. To this end, VPD and key VSE participants 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 additional participants, 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.

23. Description of Avoidance, Minimization, and Compensation

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 19, 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.

Measures to minimize impacts to the waters of the U.S.

The proposed project has been designed to minimize direct and indirect impacts to waters of the U.S. to the maximum extent practicable through implementation of the following measures. Please see Table 2 for details of the BMPs, the responsible party, and the enforcing agency of each measure.

Measures to minimize debris and impacts to water 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 to 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.

2. 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.

3. 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.

4. 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 of 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.

Measures to prevent spread of invasive species

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 grown-out lines and buoys may also be harvested and cultivated.

2. 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.

Measures to prevent navigational impacts

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.

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 harbormasters (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.

Measures to prevent impacts to threatened or endangered species

The enclosed Biological Assessment evaluates the potential effects of the VSE project on federally protected species. In addition to the BMPs identified below, the Biological Assessment identifies certain design features that minimize potential impacts, including marine mammal entanglement. With the incorporation of appropriate avoidance and minimization measures, a preliminary determination has been made that the project may affect, but is not likely to adversely affect any federally-listed threatened or endangered species, or cause adverse modification to federally designated critical habitat.

1. Marine Wildlife Entanglement Plan. No less than once per month, each grower/producer operating on a VPD lease shall visually inspect all ropes, 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 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.

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.

2. 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.

3. 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.

   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 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.

   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.

4. 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 the surface marking buoys and the vertical lines.

5. 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.

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.

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:

   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

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	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.

	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 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. 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.		
Wildlife – 2	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.	VPD to identify potential predator species and deterrence methods Grower/Producer to implement identified methods as necessary	Any methods of predator control are subject to prior approval of VPD, U.S. Fish and Wildlife Service, and NOAA Fisheries
Wildlife – 3	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.	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	VPD and NOAA Fisheries

	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 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. 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.		
Wildlife – 4	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.	Grower/Producer	VPD
Wildlife – 5	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	VPD to prepare training curriculum Grower/Producer to provide training	VPD and NOAA Fisheries

	mammal; and (6) immediately contacting their supervisor and other identified parties/agencies identified in Wildlife-1 should an employee observe an injured marine mammal.		
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: 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	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.	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	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.	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 harbormasters (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

Monitoring Plans

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.

Figures

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

Attachments

Biological Assessment

Essential Fish Habitat Assessment

NOAA CASS Study

References

Dudek. 2017a. Draft Initial Study Checklist for the Ventura Shellfish Enterprise Project. Prepared by Dudek. Prepared for Ventura Port District. September

Dudek. 2017b. Draft Ventura Shellfish Enterprise Environmental Impact Report. Prepared by Dudek. Prepared for Ventura Port District. May.

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.

Dudek. 2018a. Biological Assessment Report for the Ventura Shellfish Enterprise. Prepared by Dudek. Prepared for Ventura Port District.

Dudek. 2018b. Essential Fish Habitat Assessment Report for the Ventura Shellfish Enterprise. Prepared by Dudek. Prepared for Ventura Port District

Gentry R.R., H.E. Froehlich, D. Grimm, P. Kareiva, M. Parke, M. Rust, S.D. Gaines, and B.S. Halpern. 2017. "Mapping the Global Potential for Marine Aquaculture." *Nature Ecology & Evolution.* 1:1317-1324. https://doni.org/10.1038/s41559-017-0257-9

NOAA. 2011. National Oceanic and Atmospheric Administration Marine Aquaculture Policy. https://www.fisheries.noaa.gov/noaa-aquaculture-policies

NOAA. 2013. National Shellfish Initiative. https://www.fisheries.noaa.gov/content/national-shellfish-initiative

NOAA. 2018. "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. September 19.

ATTACHMENT 4

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

DUDEK

0 6,250 12,500 Feet

FIGURE 1

Project Location

Ventura Shellfish Enterprise Project

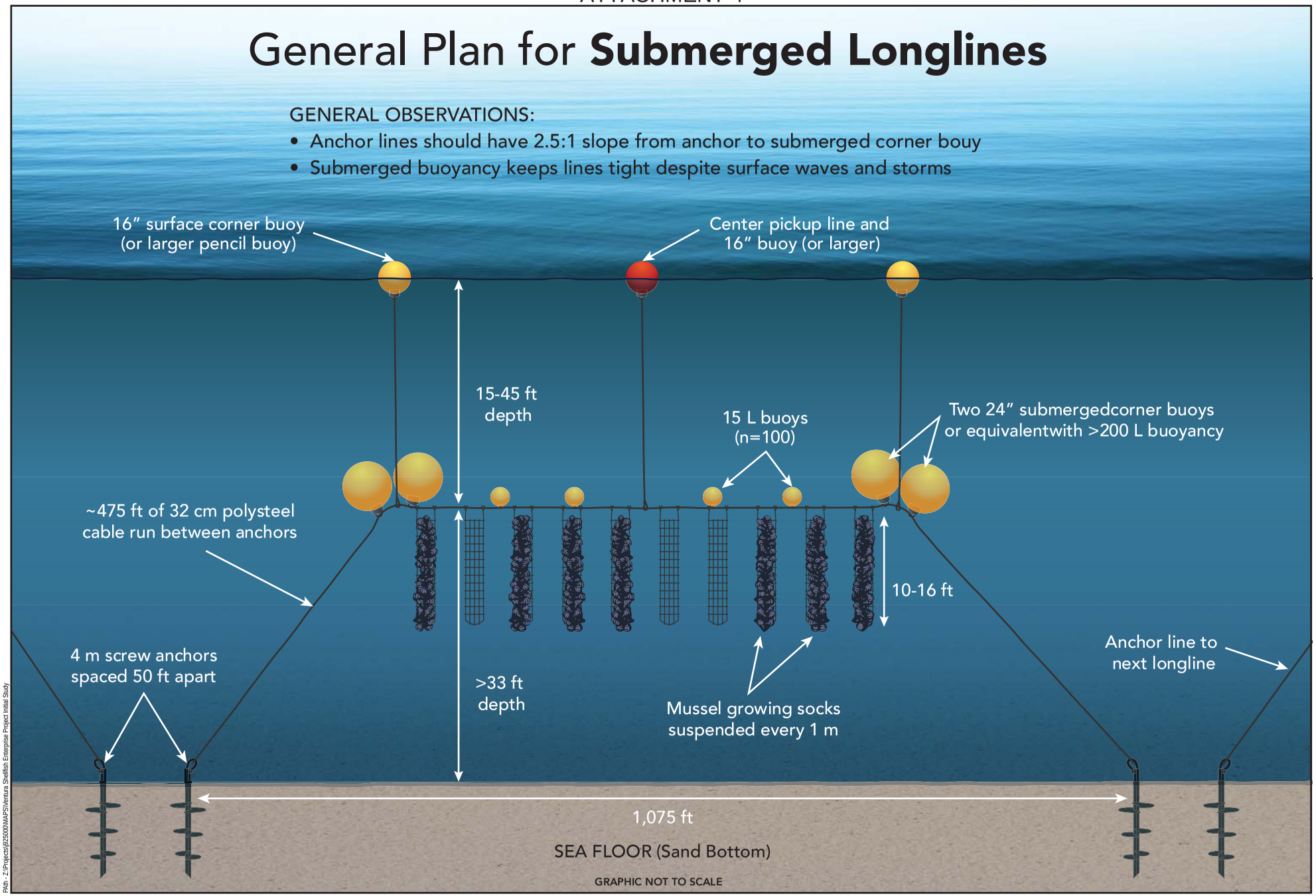
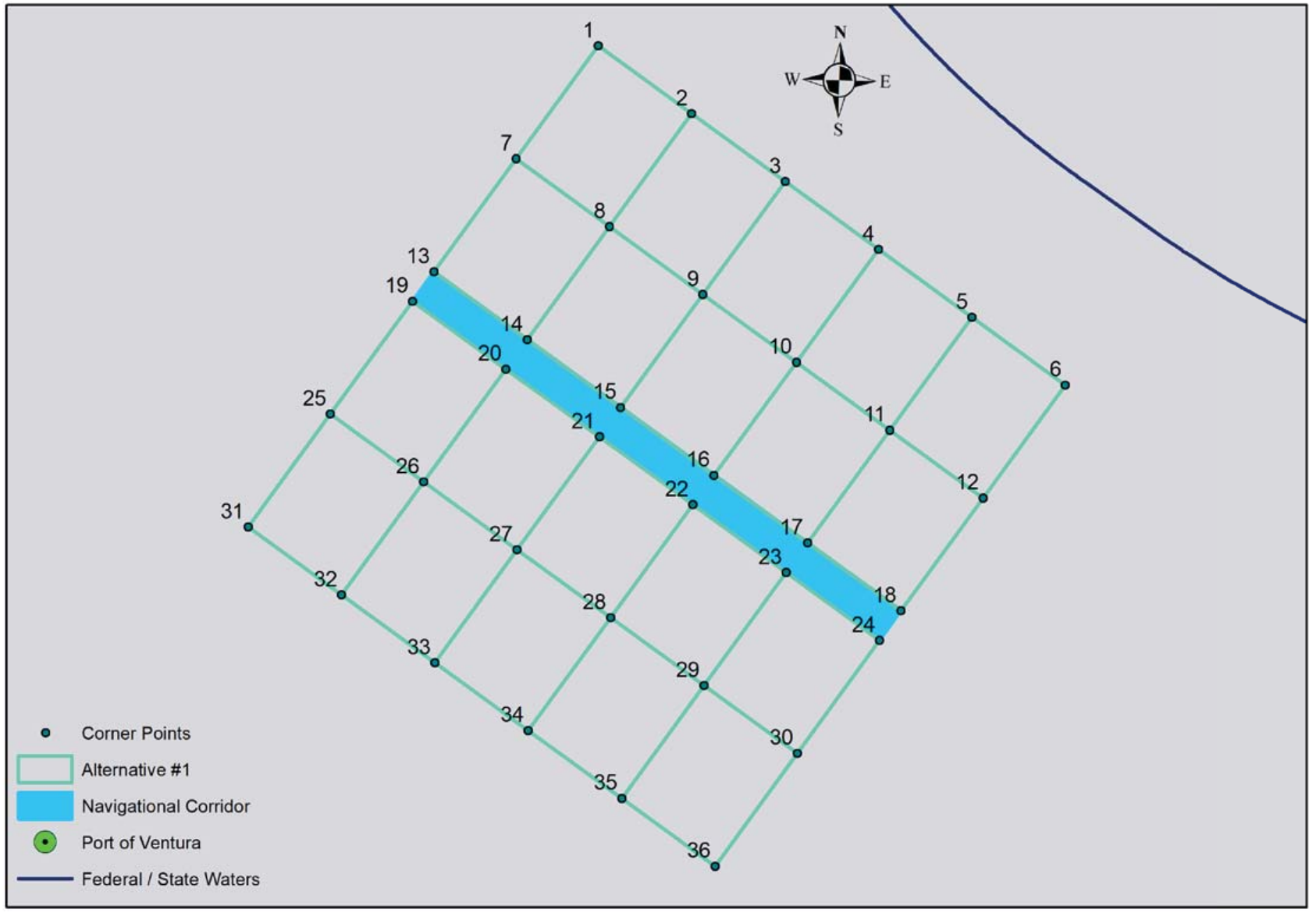


FIGURE 2

Detailed Plan for Shellfish Longlines

Ventura Shellfish Enterprise Project

DUDEK



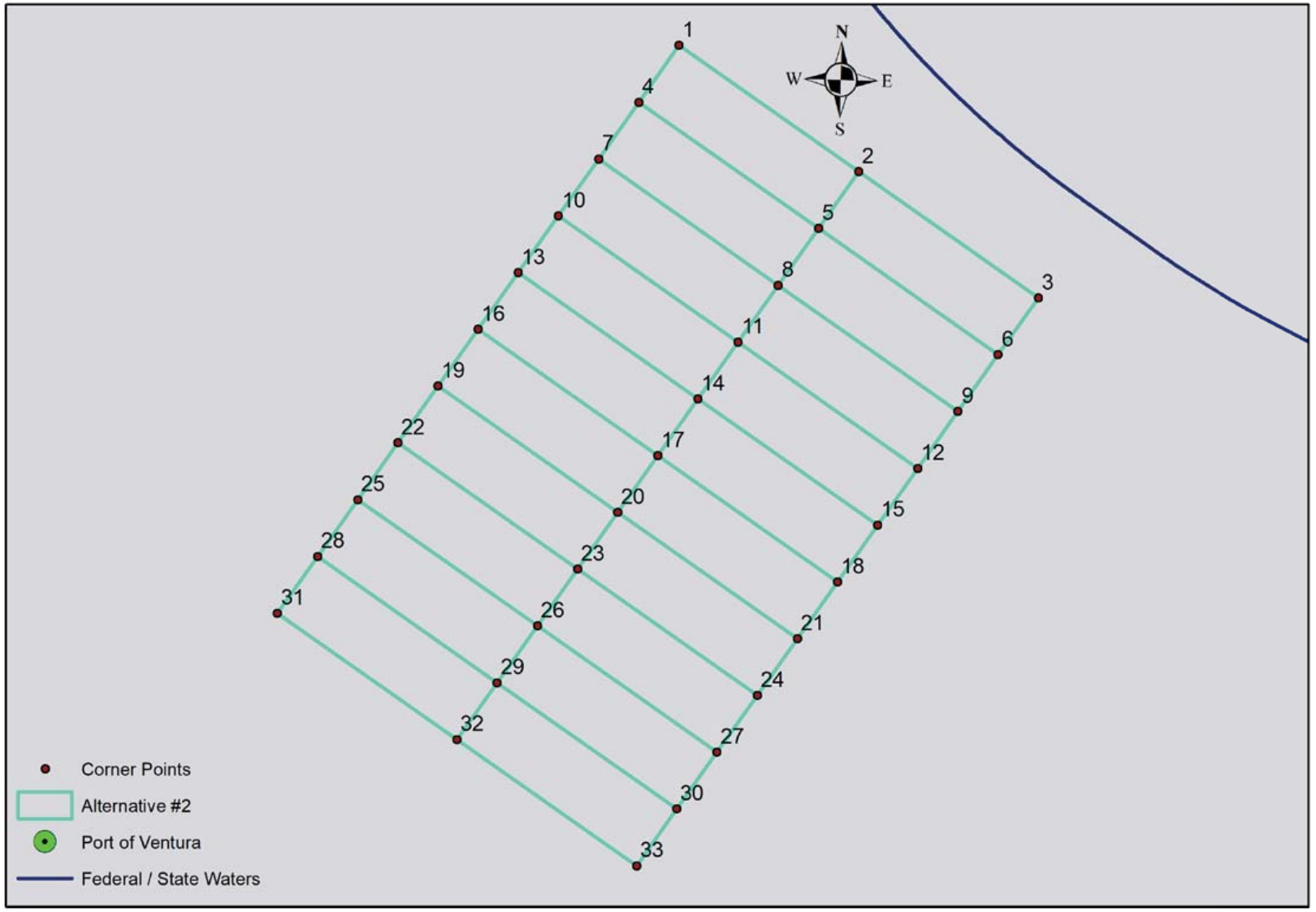
SOURCE: NOAA 2018

FIGURE 3

Proposed Project (CASS Report Alternative 1)

Ventura Shellfish Enterprise Project

DUDEK



SOURCE: NOAA 2018

FIGURE 4

Proposed Alternative (CASS Report Alternative 2)

Ventura Shellfish Enterprise Project

DUDEK

SOURCE: NAIP 2016

DUDEK

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 7

Simulated View of Parcel Array at the Surface

Ventura Shellfish Enterprise Project

DUDEK

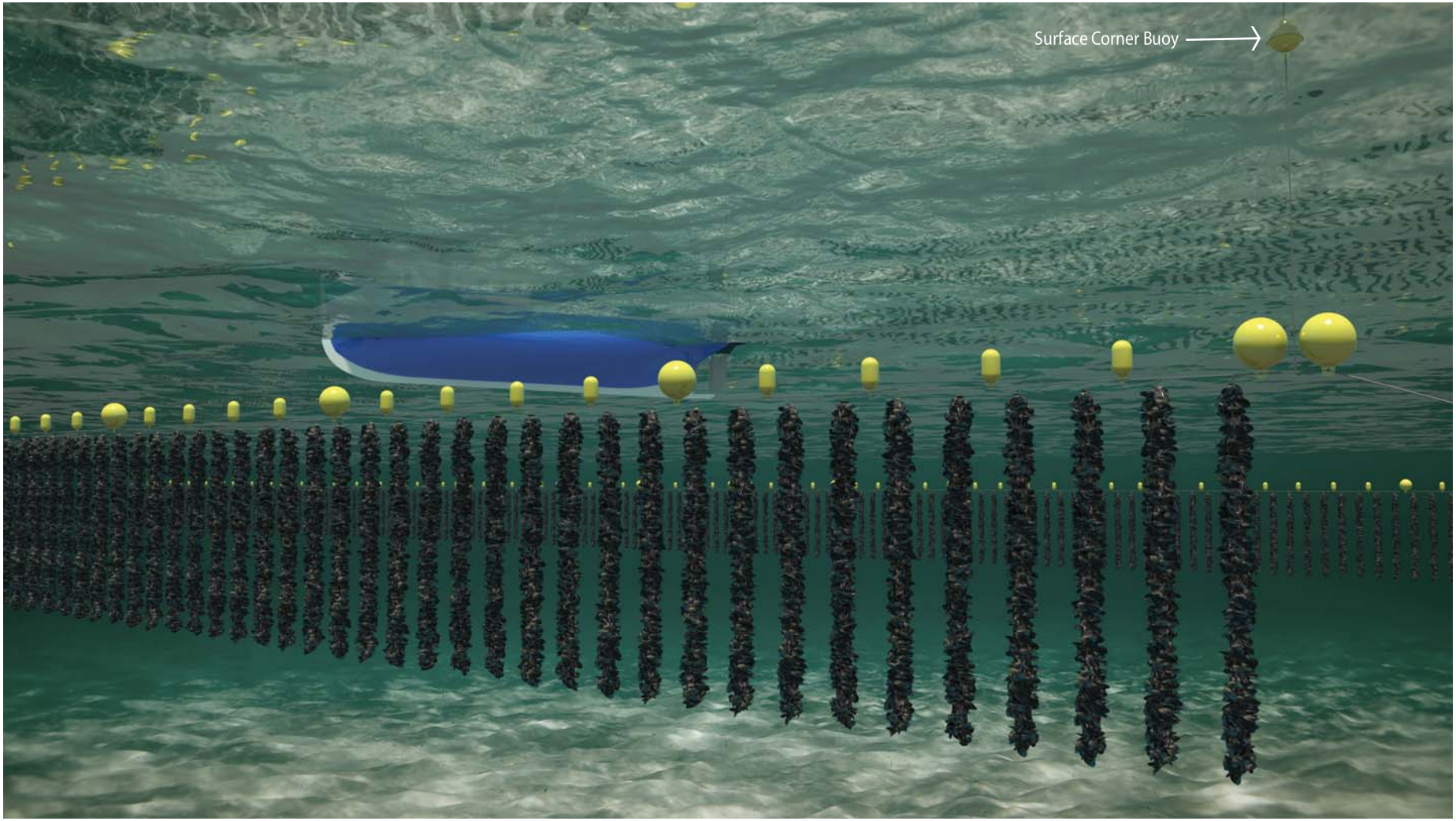


FIGURE 8

Simulated View of Parcel Array Underwater

Ventura Shellfish Enterprise Project

DUDEK

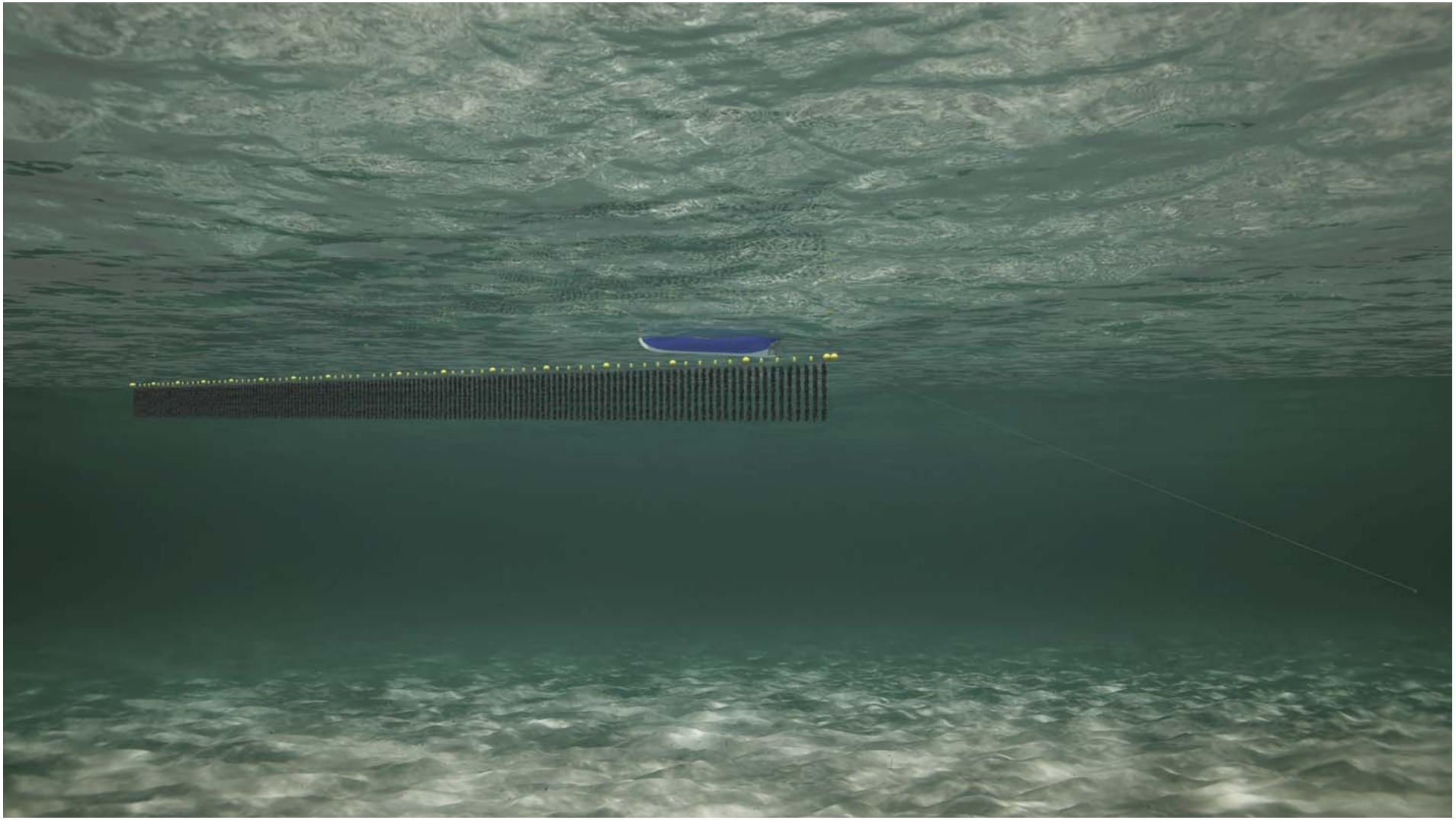
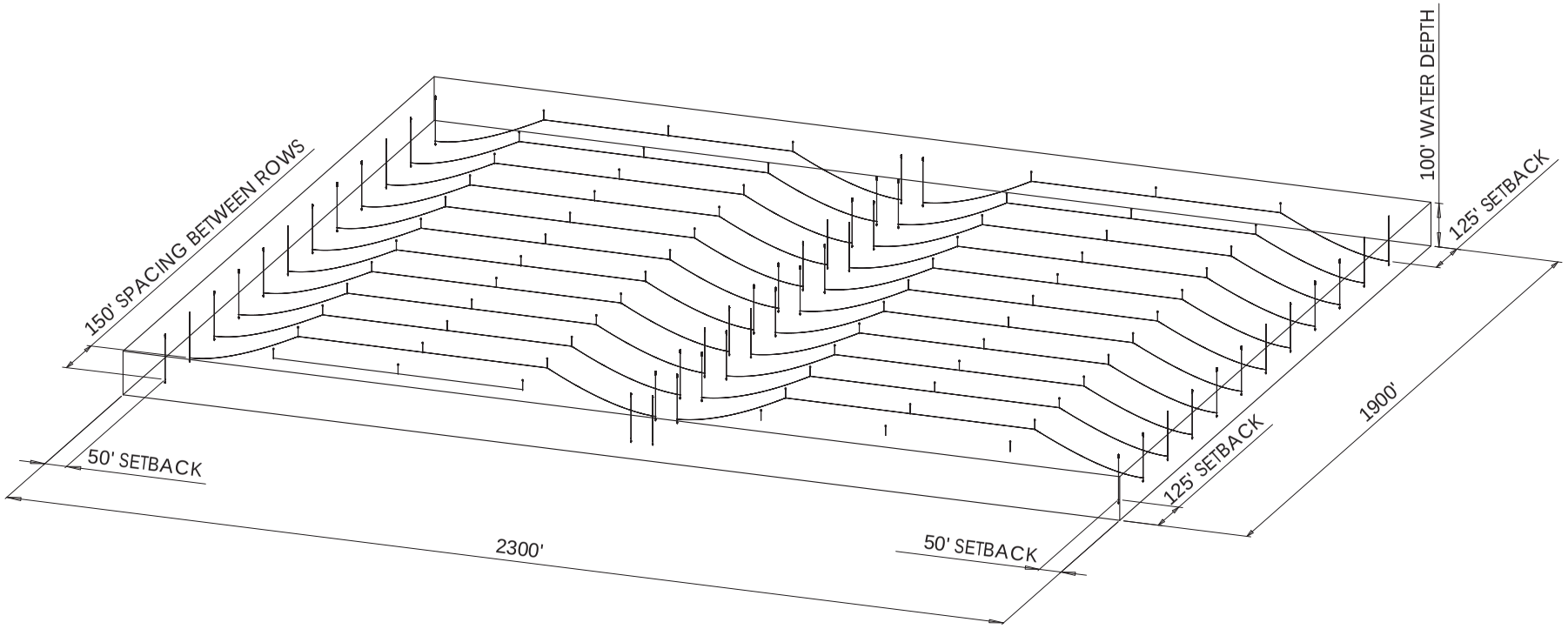


FIGURE **9**

Simulated View of Parcel Array Underwater with Anchor Line

Ventura Shellfish Enterprise Project

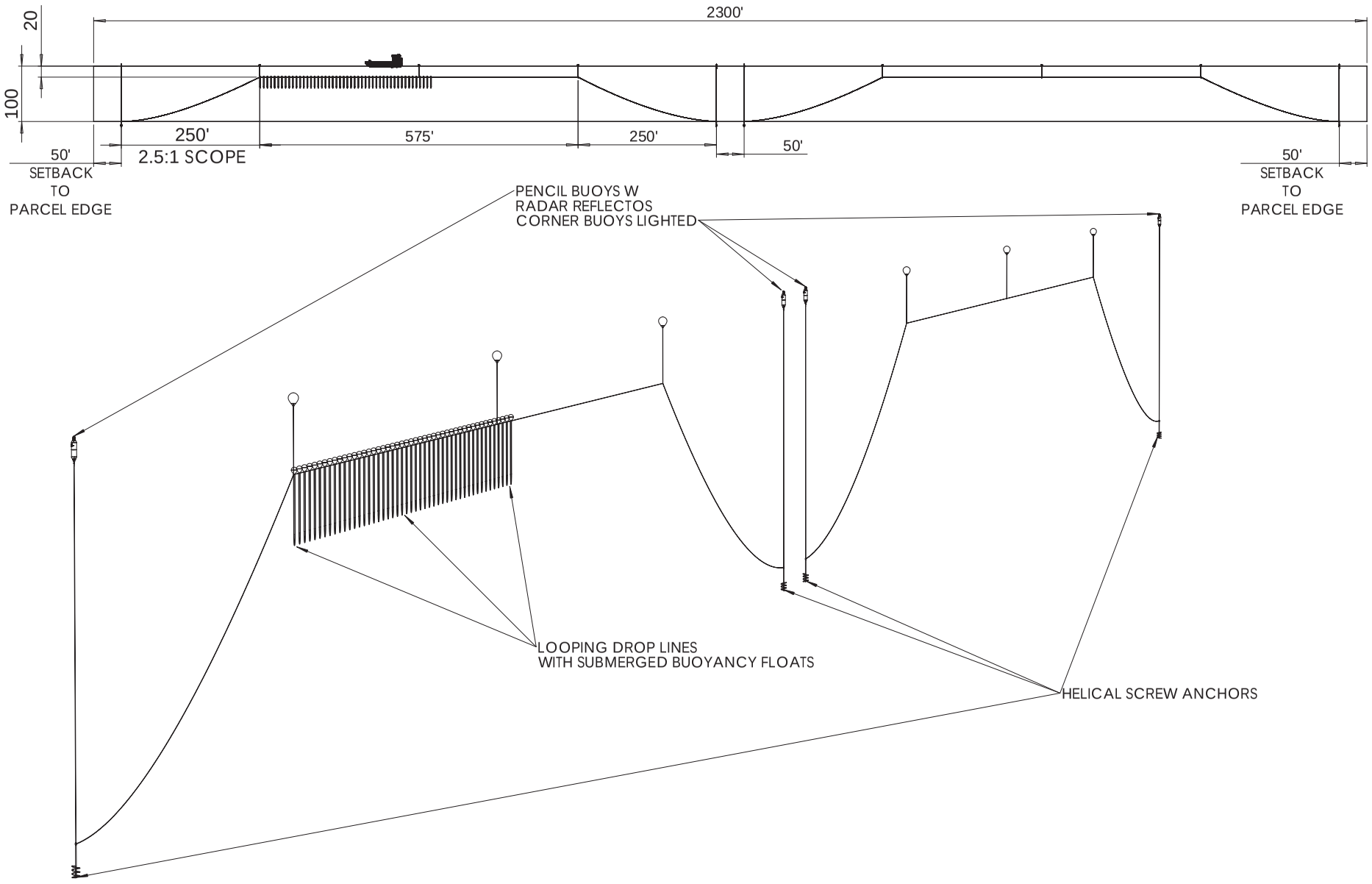


Z:\Projects\025000\MAPS\Permit Application

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

DUDEK

FIGURE 10
Parcel Array Overview
Ventura Shellfish Enterprise Project



SOURCE: VSE 2018

FIGURE 11

Backbone Details

Ventura Shellfish Enterprise Project

DUDEK

DUDEK

1630 SAN PABLO AVENUE, SUITE 300
OAKLAND, CALIFORNIA 94612
T 510.601.2500 F 510.601.2501

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.

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,

Oscar Peña, 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: *Mr. Brian Pendleton, Ventura Port District*
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,

[1]The 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 (m^3/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 (m^3/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.

<u>Dredging</u>

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.

	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. 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.		
Wildlife – 2	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.	VPD to identify potential predator species and deterrence methods Grower/Producer to implement identified methods as necessary	Any methods of predator control are subject to prior approval of VPD, U.S. Fish and Wildlife Service, and NOAA Fisheries
Wildlife – 3	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. 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	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	VPD and NOAA Fisheries

	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. 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.		
Wildlife – 4	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.	Grower/Producer	VPD
Wildlife – 5	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.	VPD to prepare training curriculum Grower/Producer to provide training	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: 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	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.	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	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.	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 harbormasters (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 ANALAYSIS

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 (Markowtiz 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
In-Water (Excluding Tactical Sonar and Explosives)		
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 $_{rms}$
In-Air		
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 and 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:

> *(l) 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 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

8. REFERENCES

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ATTACHMENT 4

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

DUDEK

0 6,250 12,500 Feet

FIGURE 1

Project Location

Ventura Shellfish Enterprise Project

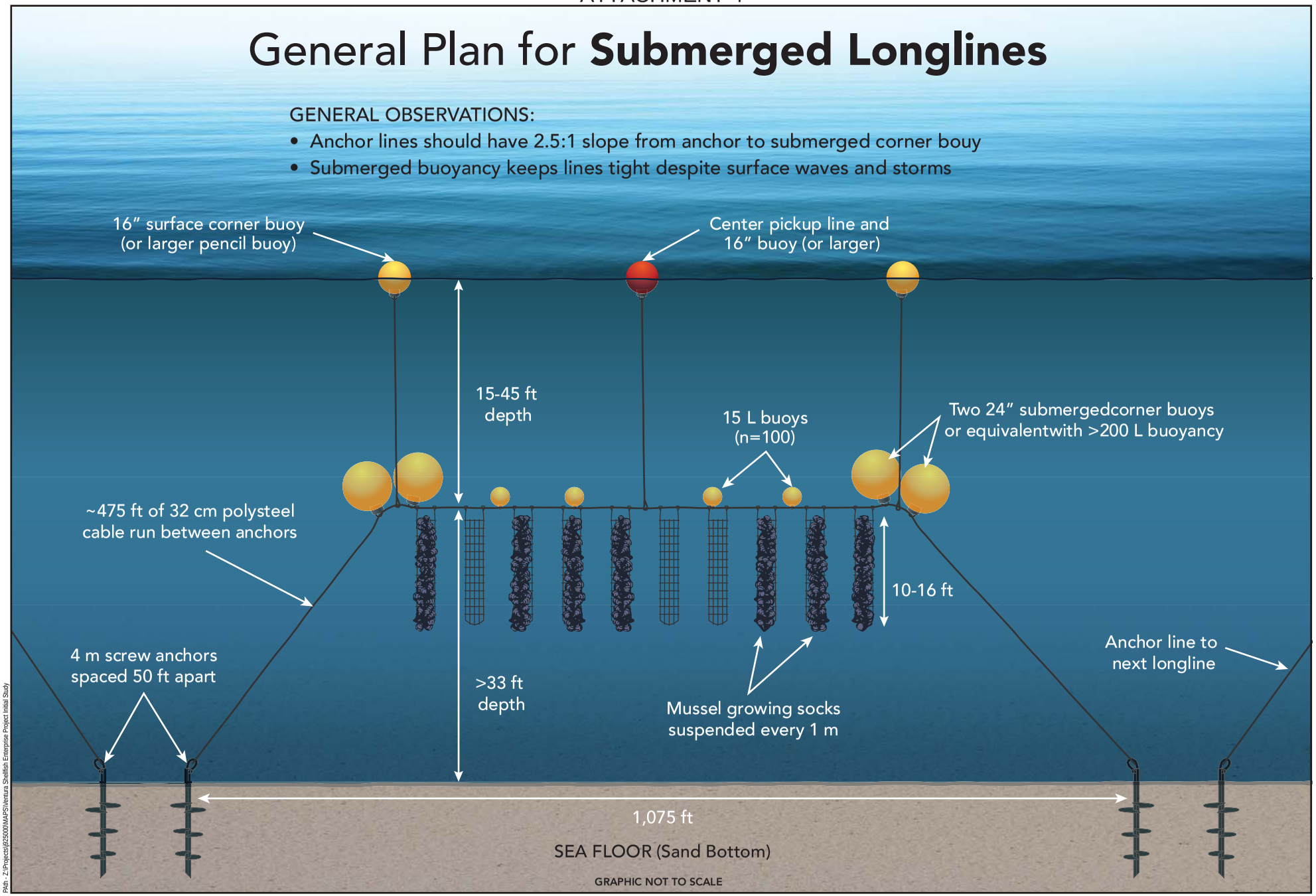
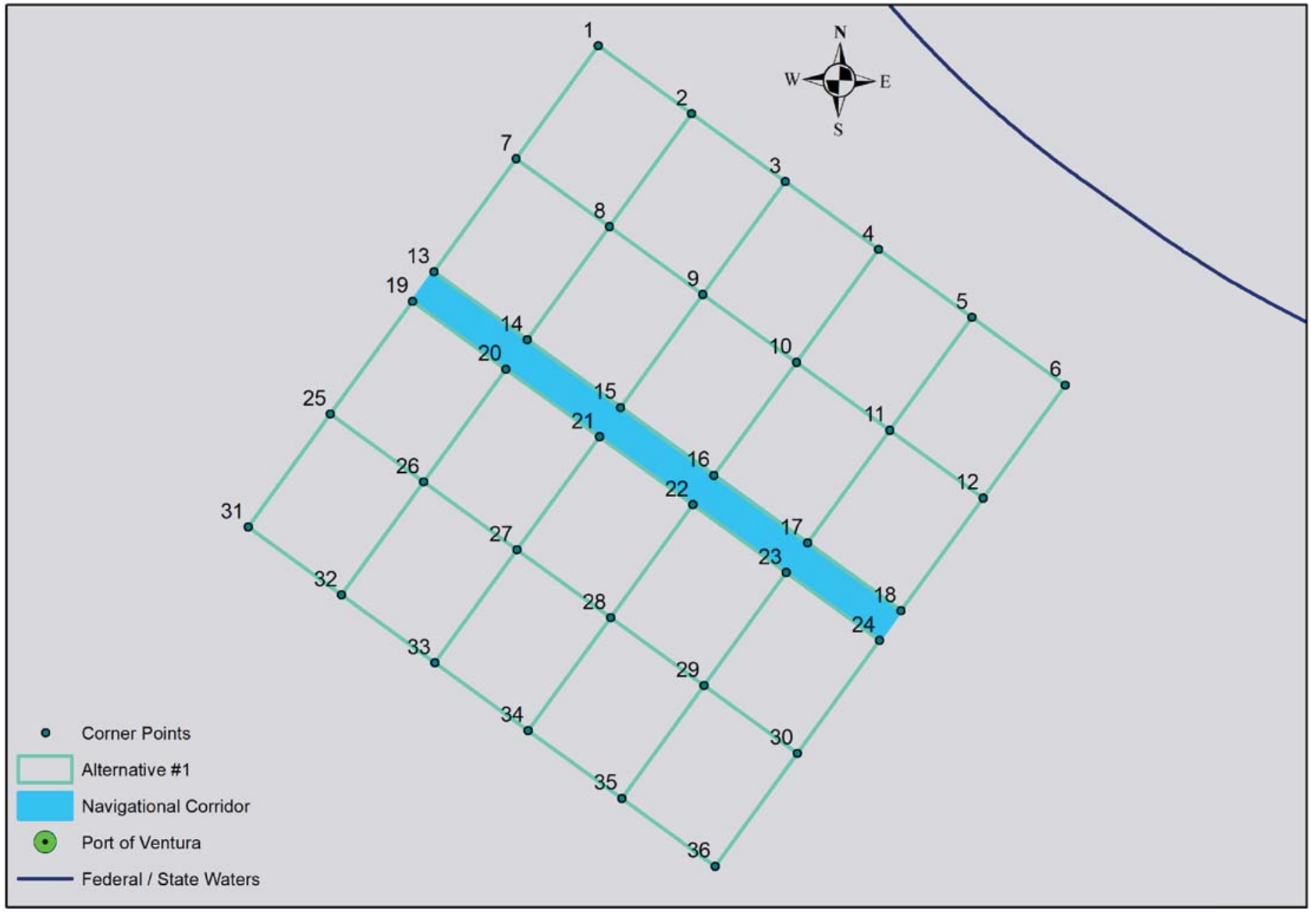


FIGURE 2

Detailed Plan for Shellfish Longlines

Ventura Shellfish Enterprise Project

DUDEK



SOURCE: NOAA 2018

FIGURE 3

Proposed Project (CASS Report Alternative 1)

Ventura Shellfish Enterprise Project

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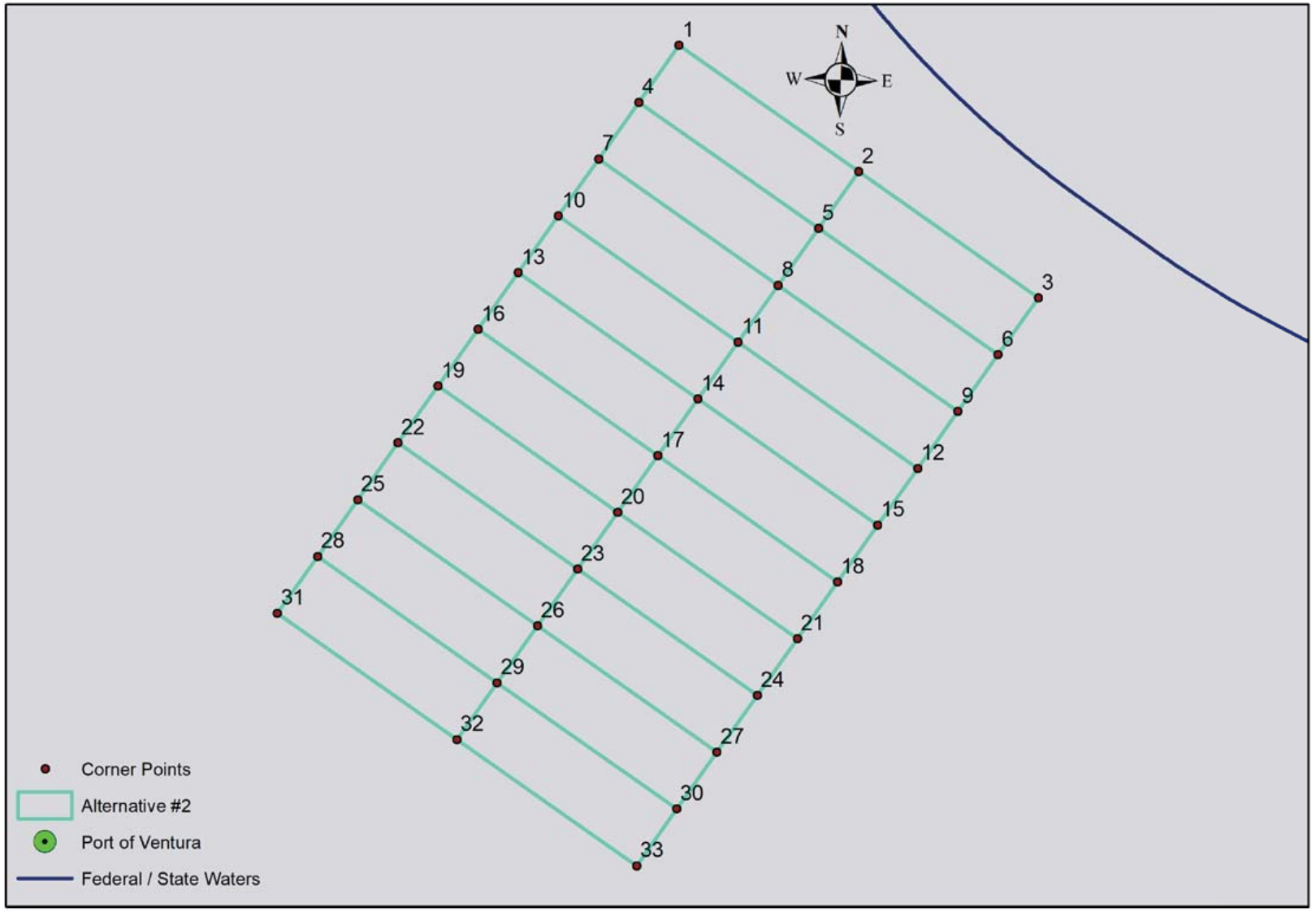

SOURCE: NOAA 2018

FIGURE 4

Proposed Alternative (CASS Report Alternative 2)

Ventura Shellfish Enterprise Project

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SOURCE: NAIP 2016

DUDEK

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 7

Simulated View of Parcel Array at the Surface

Ventura Shellfish Enterprise Project

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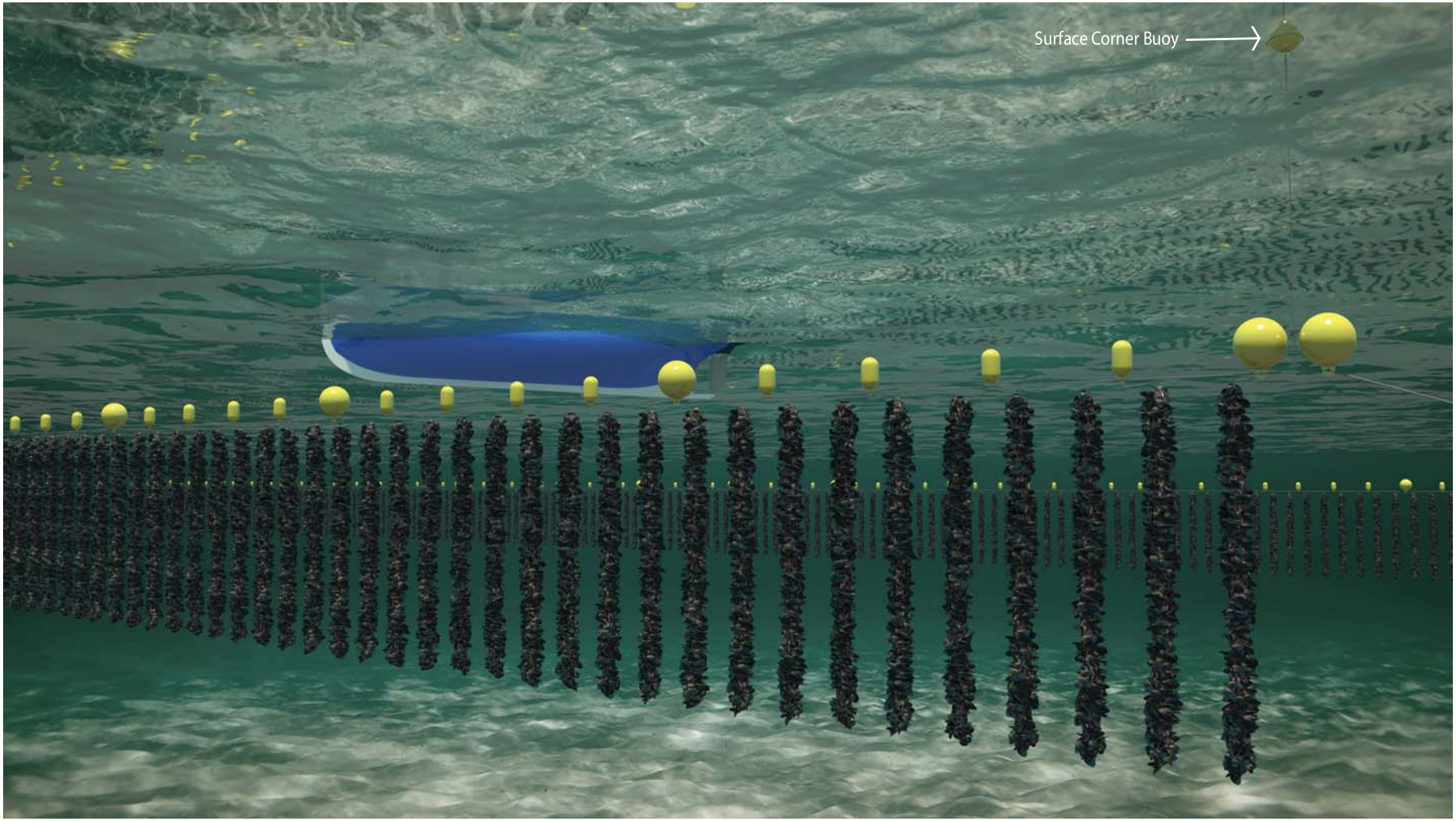

FIGURE 8

Simulated View of Parcel Array Underwater

Ventura Shellfish Enterprise Project

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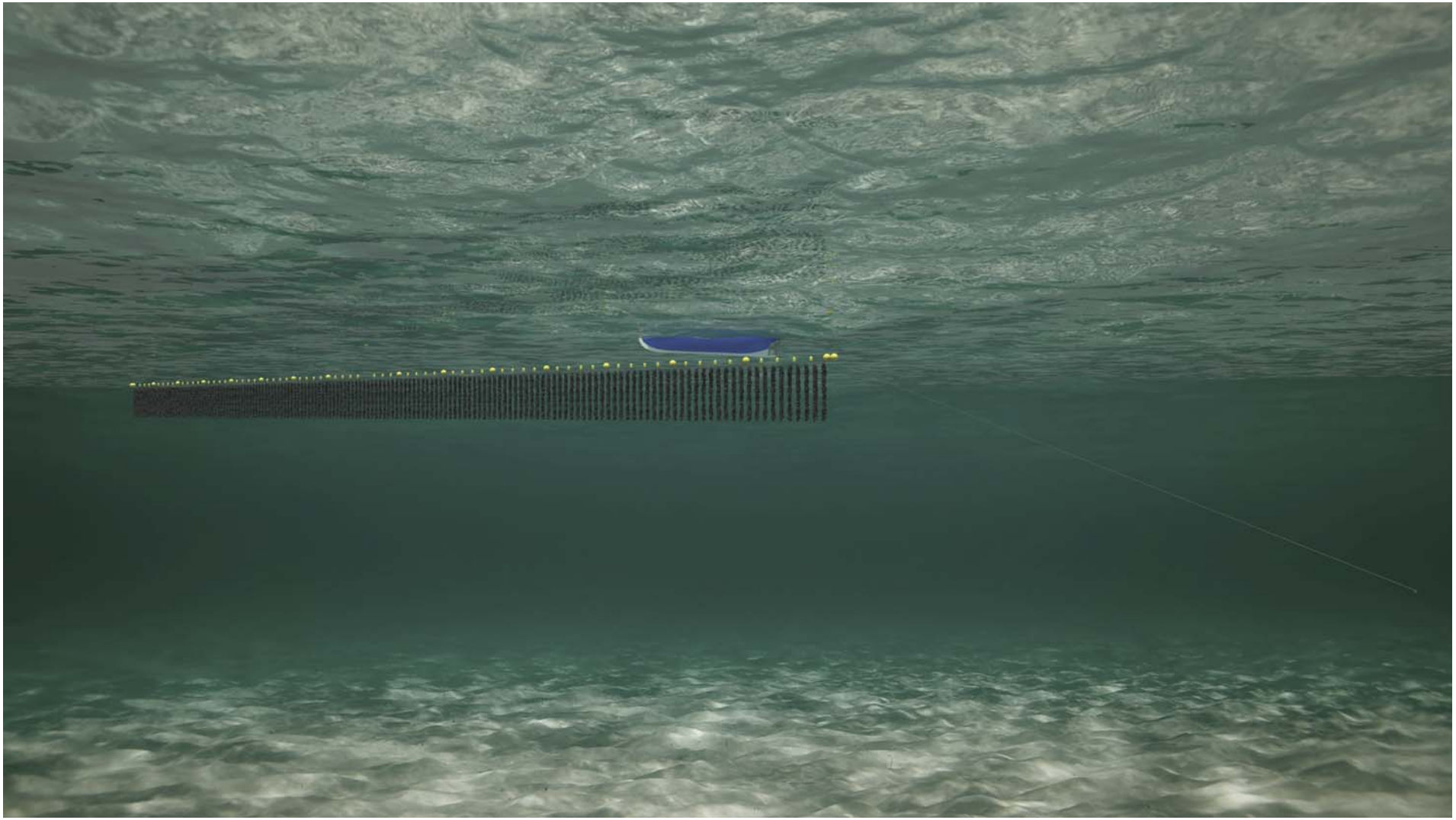
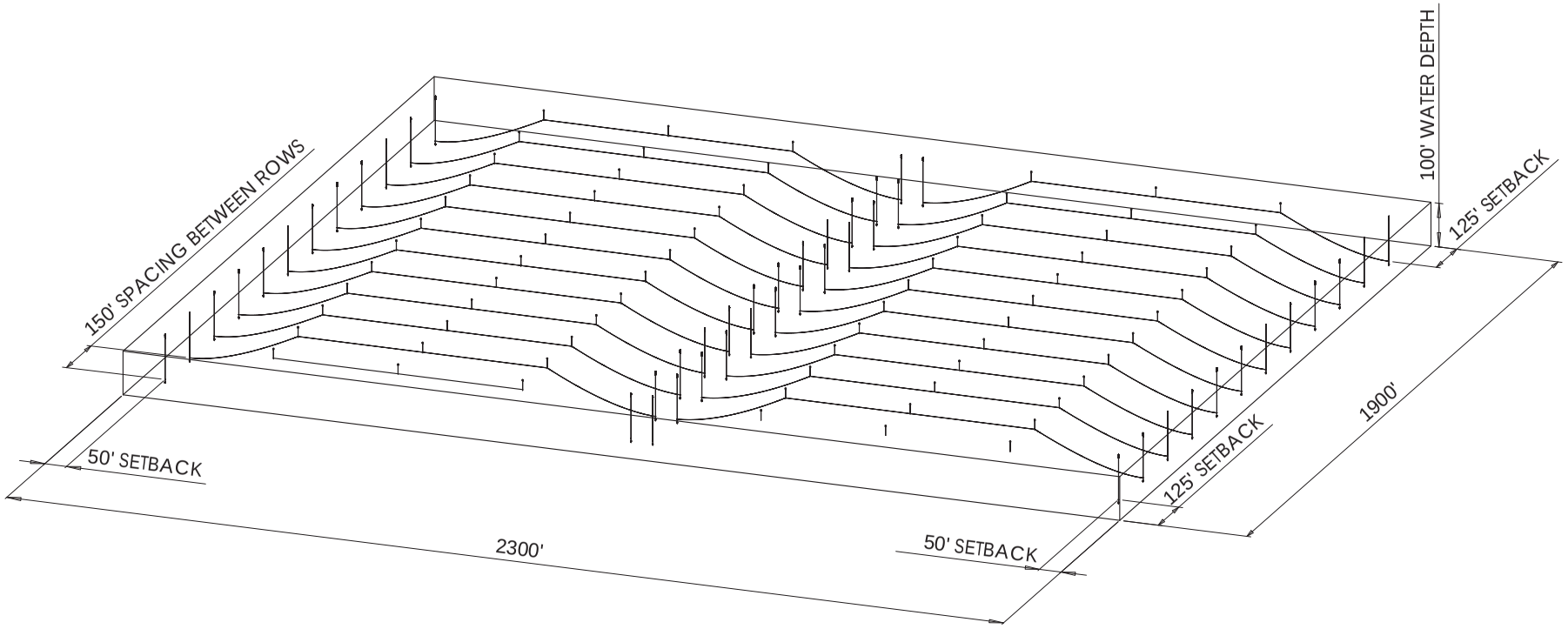


FIGURE **9**

Simulated View of Parcel Array Underwater with Anchor Line

Ventura Shellfish Enterprise Project



Z:\Projects\025000\MAPS\Permit Application

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

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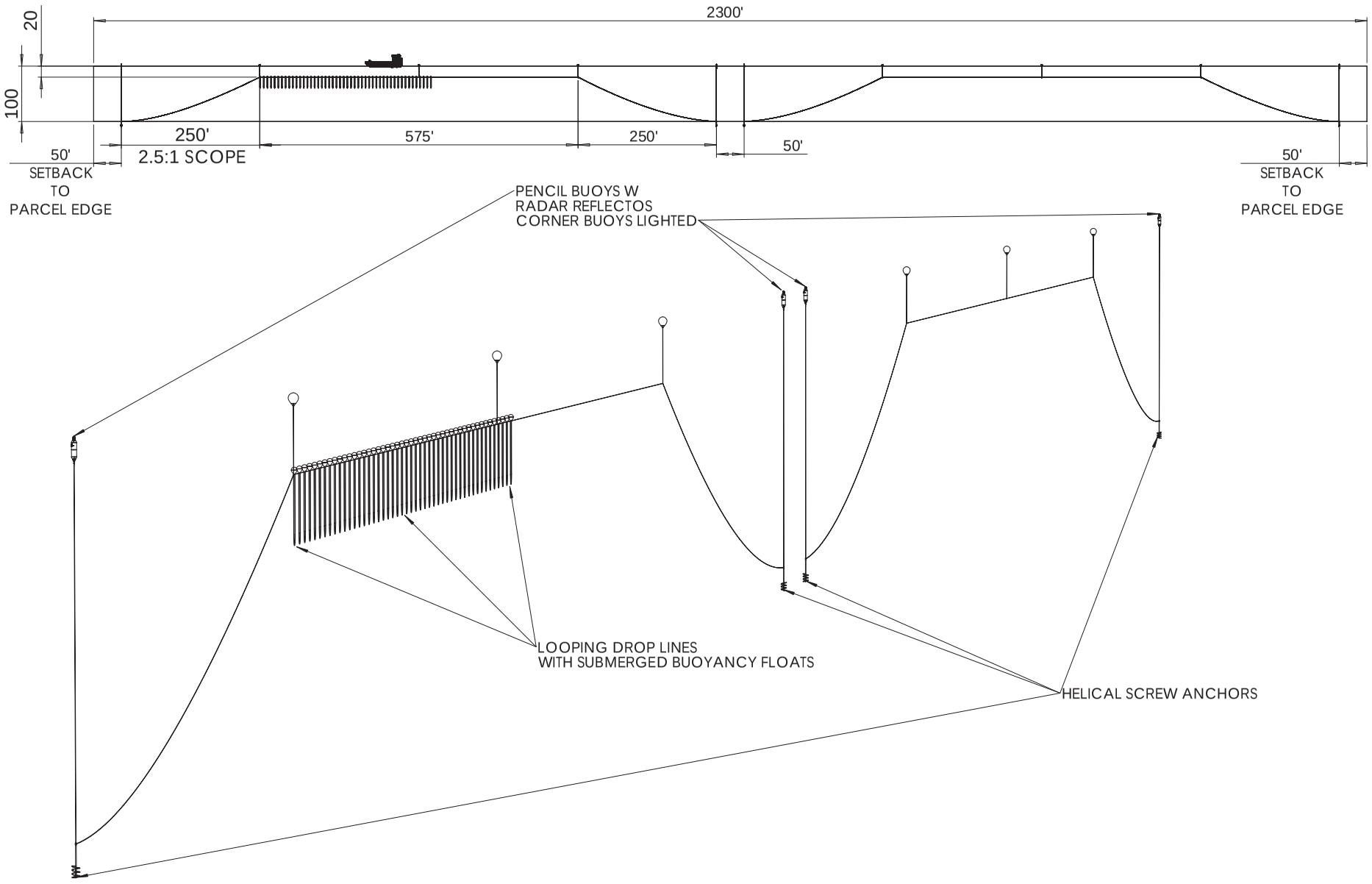
FIGURE 10
Parcel Array Overview
Ventura Shellfish Enterprise Project



SOURCE: VSE 2018

FIGURE 11

Backbone Details

Ventura Shellfish Enterprise Project

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ATTACHMENT 4

BIOLOGICAL ASSESSMENT

FOR THE VENTURA SHELLFISH ENTERPRISE PROJECT

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SEPTEMBER 2018

ATTACHMENT 4

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1.0 INTRODUCTION

This Biological Assessment (BA) has been prepared for the Ventura Port District (VPD, project applicant) to evaluate the effects of the Ventura Shellfish Enterprise (VSE) Project (project) on federally protected species along with federally designated critical habitat. The project, supported in part through the NOAA 2015 Sea Grant Aquaculture Extension and Technology Transfer to California Sea Grant (NOAA Sea Grant Program), will establish a commercial offshore bivalve aquaculture operation. VPD is applying for a U.S. Army Corps of Engineers (Corps) authorization under Section 10 of the Rivers and Harbors Act. The Corps will act as the federal lead agency on the project. The BA will 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 (50 CFR § 402.01 et seq.), this BA has been prepared to support consultation between the Corps, the U.S. Fish and Wildlife Service (USFWS), and National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS). Section 7 of the ESA insures that through consultation federal actions are not likely to jeopardize the continued existence of any federally protected species or result in the destruction or adverse modification of critical habitat. This BA is also intended to support of the National Environmental Quality Act (NEPA) planning process as well as the resource agency permitting of the project. An Essential Fish Habitat (EFH) assessment has also been prepared, which analyzes how the project would affect EFH for species regulated under a Fisheries Management Plan, pursuant to the requirements of the Magnuson-Stevens Fishery Conservation and Management Act, which requires consultation with NMFS on all actions or proposed actions that may adversely affect EFH (Appendix A).

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2.0 DESCRIPTION OF PROJECT ACTION

The project will establish a commercial offshore bivalve aquaculture operation based from the Ventura Harbor in Ventura, California, focused on the cultivation of Mediterranean mussels (*Mytilus galloprovincialis*).

2.1 Project Location

The project will consist 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 (Figure 1), with approximate depths ranging from 78 to 114 feet below sea level (13 – 19 fathoms) and an average depth of 98 feet. The plots are 3.53 miles from the shore. 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 closest distance to the 3-mile nautical line is 2,900 feet from the plots, with an average closest distance of over 3,000 feet. The closest distance to the City of Ventura limit is 4.5 miles. Ventura harbor is 4.1 miles from the closest plot (8 miles in distance to the most distant plot). The lease 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).

The project site is characterized by a gradually sloping sandy/soft bottom. The SCB is located along the curved coastline of Southern California from Point Conception south to Cape Colnett in Baja California and includes the Channel Islands and the Pacific Ocean. The habitats and biological communities of the SCB are influenced by dynamic relationships among climate, ecology, and oceanography (e.g., currents) (Leet et al. 2001). The SCB provides essential nutrients and marine habitats for a range of species and organisms. Submarine canyons, ridges, basins, and seamounts provide unique deep water habitats within the region. The basins provide habitats for a significant number of mid-water and benthic deep-sea fish near the Channel Islands, whereas nearshore areas provide habitats for kelp and seagrass communities. Nearshore geology includes a variety of bottom types, including soft sediments and rocky bottoms. Hard-substrates environments, such as the rocky intertidal, shallow subtidal reefs, and deep rocky reefs, are a key component of the high productivity found near the project area. Due to linkages among ecosystems, the impacts of ecosystem dynamics contained within the project area extend to interactions with species in the greater Eastern Pacific Ocean. The Santa Barbara Channel is located within the SCB and extends from Point Conception to Point Mugu.

The waters of the Santa Barbara Channel form one of the most biologically productive ecosystems found on Earth. Unlike most of coastal California, which faces due west and the open ocean, the coastal waters of the Santa Barbara Channel are on a south-facing coast and situated between two land masses, the South Coast and the Northern Channel Islands. The project site is 9.1 miles from the Channel Islands National Marine Sanctuary, a Federal Marine Protected Area, and 13.5 miles from the Channel Islands National Park boundary. The western section of the Santa Barbara Channel is a meeting place of the cool Northern California Current and warm Southern California Countercurrent. This type of ecosystem is called a

"transition zone." Transition zones are known to promote large concentrations of both biomass and species diversity, as they are the confluence between two or more ecologically distinct systems. In addition, upwelling provides unusually high concentrations of nutrients, especially macrozooplankton, which are one of the primary driving forces behind the Santa Barbara Channel's biological productivity and diversity. Wind patterns around Point Conception and in the Santa Barbara Channel create frequent seasonal upwelling, which force deep nutrient-laden ocean waters to rise up the water column into the biologically rich euphotic zone (Santa Barbara Channelkeeper 2017). Data from last year, for the closest oceanographic buoy to the project site (Station 46217 Anacapa Passage), shows the following average wave action conditions for the project area: an average wave height of 1.04 feet, with a dominant wave period of 10.1 seconds, and an average wave period of 6.49 seconds, with surface currents generally moving in a SW (249 degrees) direction and an average temperature of 16 °C (National Data Buoy Center 2017). The Ventura area is known to be an area of high swell height, particularly in the winter (Guza and O'Reilly 2001). Wave action is focused by the large fan of sediment deposited on the shelf from the Ventura and Santa Clara rivers. When deep water swell comes in from a WSW direction, these bathymetric features can focus the wave energy northward into the Ventura area. Wave action is slightly less in the summer months when the Channel Islands block southward swells (Guza and O'Reilly 2001).

2.2 Project Actions

2.2.1 PROJECT CONSTRUCTION

The proposed plots will be used for growing Mediterranean mussels via submerged longlines (Figures 2 and 3).

Installation of anchors, longlines, and other facilities will be performed by permitted shellfish companies, in compliance with all permit requirements. Submerged longlines consist of a horizontal structural header line, or "backbone," that is attached to the seafloor by sand screw anchors at each end and is marked and supported by a series of buoys along the central horizontal section. Sand screw anchors have been shown to exhibit superior holding power as compared to other anchoring systems and are removable. Sand screw anchors will be installed by a hydraulic drill with a drill head that operates from a rig lowered to the ocean floor. The sand screw anchors would be screwed into the sandy bottom ocean floor approximately 10 to 20 feet (3 to 6 meters) deep. Each 100-acre plot will contain up to 48 anchors for a total of 960 anchors at full project build out.

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 and Figure 3, surface buoys for each longline would 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 4 through 7. All surface buoys would be uniquely colored for each operator and 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 would be approximately 20 feet but would depend on the lifting capacity of the servicing vessel. The length of the central horizontal section of backbone line would be 575 feet, which would support approximately 8,000 feet of fuzzy cultivation line.

The shape of each of the 100-acre cultivation parcels would be a function of the geometry of the submerged backbone line and anchoring. 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. The submerged longline growing gear configuration would 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 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.

2.2.2 PROJECT OPERATION

The mussels will be grown and harvested by permitted growers/producers and landed at Ventura Harbor. Initial plantings of juvenile seed mussels, commonly referred to as spat, will be purchased from onshore hatcheries certified by the CDFW. At the hatcheries, mussels adhere directly to special textured ropes that promote mussel attachment and growth. When the seed are firmly settled to 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 until the mussels naturally attach with their byssal threads, after which the cotton material naturally degrades. These ropes are then attached to the longlines and buoys, as described above.

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), which will facilitate rapid detachment in the unlikely event of any interaction with the longline. To further minimize entanglement potential, a 1,100 pound 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 headrope are generally under tension partially equivalent (0 to 10 kilograms (0 to 22 pounds)) to their full buoyancy (42 kilograms (93 pounds)).

Cultivated mussels grow by filtering naturally occurring phytoplankton from the ocean. Harvesting involves separating the mussels from the ropes, followed by cleaning, sorting, and bagging. All of these activities will take place aboard the harvesting vessel. Juvenile mussels will grow on lines until an intermediate size where the density of mussels on the fuzzy rope becomes limiting. 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 at a reduced density for their second stage of grow out to market size. Maintenance and inspection of the longlines is proposed to be carried out on a monthly basis, which consists 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 shall take place at a minimum of twice per month. Inspections shall include recordings by depth/fish finder or ROV surveys of lines and/or monitoring performed by SCUBA divers.

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 would be home ported at Ventura Harbor. On average, between 20 to 40 boats would be traveling to the specific lease sites to conduct these activities on a three times per week to daily basis. The maximum distance traveled would be between the harbor and the farthest potential lease area, which could be up to approximately 8.7 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 Food and Drug Administration (FDA), recently began the process of developing NSSP-compliant sanitation protocols for bivalve shellfish cultivated in Federal waters.

Qualified researchers affiliated with universities (i.e., U.C. Santa Barbara - 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

Ventura Port District; 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. The Ventura Port District 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.

2.2.3 PROJECT DECOMISSIONING

The project will include a decommissioning plan when activities in that lease are terminated. The decommissioning plan for the timely removal of all shellfish, structures, anchoring devices, equipment, and materials associated with the shellfish cultivation facility and documentation of 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.

2.2.4 PROJECT OBJECTIVES

Objectives of the proposed project are as follows:

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.

2.3 Project Action Area

The Action Area for this project includes the project site (twenty 100-acre growing sites occupying a total project area of 2,000 acres) and all areas within 100 feet of the Project Actions (Figure 8). This Action Area was defined based upon several factors, including the project location and components, the potential noise impacts and disturbance areas for project components, and the properties of underwater acoustics. It is anticipated that the potential noise impacts from the initial installation of the sand screw anchors using a hydraulic drill will be minimal. Helical anchors for mussel farms in open ocean habitats have been installed all over the world, including at Catalina Island. They 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 50 horsepower hydraulic power pack on the boat (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 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 wildlife, especially cetaceans, are known to be sensitive to noise effects (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, we believe an action area of 100 feet is sufficient.

Figure 1 Project Location

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Figure 2 Detailed Plan for Shellfish Longlines

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Figure 3A Parcel Array Overview

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Figure 3B Backbone Details

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Figure 4 Simulated View of Parcel Array at the Surface: 100 Acre Plot

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Figure 5 Simulated View of Parcel Array at the Surface

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Figure 6 Simulated View of Parcel Array Underwater

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Figure 7 Simulated View of Parcel Array Underwater with Anchor Line

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Figure 8 Ventura Shellfish Enterprise Action Area

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3.0 REGULATORY SETTING

3.1 Federal Endangered Species Act (1973)

The federal Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), as amended, is administered by the USFWS and NMFS. This legislation is intended to provide a means to conserve the ecosystems upon which endangered and threatened species depend and provide programs for the conservation of those species, thus preventing extinction of plants and wildlife. The ESA defines an endangered species as "any species that is in danger of extinction throughout all or a significant portion of its range." A threatened species is defined as "any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Under the provisions of Section 9(a)(1)(B) of the ESA (16 U.S.C. 1531 et seq.), it is unlawful to "take" any listed species. Take is defined in Section 3(19) of the ESA as, "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." A Final Rule published in the Federal Register on November 8, 1999 (64 FR 60727–60731), further defines "harm" as any act that kills or injures fish or wildlife, and emphasizes that such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns (e.g., nesting or reproduction) of fish or wildlife. Further, the USFWS, through regulation, has interpreted the terms "harm" and "harass" to include certain types of habitat modification that result in injury to or death of species, which therefore are defined as forms of take. These interpretations, however, are generally considered and applied on a case-by-case basis and often vary from species to species.

In a case where a property owner seeks permission from a federal agency for an action that could affect a federally listed plant or wildlife species, the property owner and agency are required to consult with USFWS. Take prohibitions in Section 9 of the ESA (16 U.S.C. 1531 et seq.) do not expressly encompass all plants. Property owners may take listed plant species without violating the take prohibition if:

- The proposed development is private and does not require federal authorization or permit.
- There are no special federal regulations under Section 4(d) that prohibit take of the plant species.
- There are no state laws prohibiting take of the plant species.

Section 9(a)(2) of the ESA (16 U.S.C. 1531 et seq.) addresses the protections afforded to listed plants. In addition, the ESA provides protection to invertebrate species by listing them as threatened or endangered.

3.2 Marine Mammal Protection Act (1972)

The Marine Mammal Protection Act of 1972 (MMPA), as amended, establishes a federal responsibility for the protection and conservation of marine mammal species by prohibiting the "take" of any marine mammal. The MMPA defines "take" as the act of hunting, killing, capture, and/or harassment of any marine mammal, or the attempt at such. The MMPA also imposes a moratorium on the import, export, or sale of any marine mammals, parts, or products within the U.S. The USFWS and NMFS are jointly responsible for implementation of the MMPA; USFWS is responsible for the protection of sea otters, and NMFS is responsible for protecting pinnipeds (seals and sea lions) and cetaceans (whales and dolphins).

Under Section 101(a)(5)(D) of the MMPA, an incidental harassment permit may be issued for activities other than commercial fishing that may impact small numbers of marine mammals. An incidental harassment permit covers activities that extend for periods of not more than 1 year, and that will have a negligible impact on the impacted species. Amendments to the MMPA in 1994 statutorily defined two levels of harassment. Level A harassment is defined as any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal in the wild. Level B harassment is defined as harassment having potential to disturb marine mammals by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

3.3 Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. Sections 1801−1884) of 1976, as amended in 1996 and reauthorized in 2007, is intended to protect fisheries resources and fishing activities within 200 miles of shore. The amended law, also known as the Sustainable Fisheries Act (Public Law 104-297), requires all federal agencies to consult with the Secretary of Commerce on proposed projects authorized, funded, or undertaken by that agency that may adversely affect Essential Fish Habitat (EFH). The main purpose of the EFH provisions is to avoid loss of fisheries due to disturbance and degradation of the fisheries habitat. Managed fisheries found in the project vicinity include, but are not limited to California halibut, ridgeback prawn, sea cucumber trawl, and rock crab trawl fisheries, and set gill net for California halibut and white sea bass

Essential Fish Habitat is addressed in the Essential Fish Habitat Assessment Report for the Ventura Shellfish Enterprise.

4.0 FEDERALLY PROTECTED SPECIES AND CRITICAL HABITAT

4.1 Federally Protected Species

The following resources were used to determine which federally listed, proposed, or federally recognized (i.e., NMFS Species of Concern) species had a potential to occur in the Action Area: NOAA California Species List Tools (NOAA 2018a), NOAA Find a Species Website (NMFS 2018a, filtered for West Coast Region), Channel Islands Bird Checklist (Collins 2011), USFWS Information for Planning and Consulting (USFWS 2018a), USFWS Environmental Conservation Online System (USFWS 2018b), the NOAA Section 6 Program Website (NOAA 2018b), NMFS Species of Concern (NMFS 2018), Environmental Sensitivity Index (ESI 2010), and California Natural Diversity Database (CNDDB; CDFW 2018). The NOAA Species List Tools (NOAA 2018a) and CNDDB (CDFW 2018) were queried for the 7.5-minute U.S. Geological Survey quadrangle that bordered the Pacific Ocean from the Ventura County line south to Port Hueneme, which included Pitas Point, White Ledge Peak, Ventura, Oxnard, and Oxnard OE W.

Information on species distribution, behavior, and habitat preferences was obtained from sources such as NOAA Find a Species Website (NMFS 2018a), Marine Mammal Stock Assessment Reports (e.g., Allen and Angliss. 2014), Marine Mammals of the World: A Comprehensive Guide to Their Identification (Jefferson et al. 2008), Point Blue Conservation Science Whale Alert Map (PBCS 2018), Large Cetacean Analysis for the Santa Barbara Channel Region (Cascadia 2011), Marine Mammal Commission (MMC 2007, 2018), Marine Mammal Haulouts and Rookeries (CDFW 2009), California Bird Records Committee (CBRC 2018), USFWS Recovery Plans, USFWS 5-Year Reviews and/or Federal Registers. Additional resources are reported within the species account information.

The database searches returned a total of 68 species. Of these species, 8 cetaceans, 1 mustelid, 2 pinnipeds, 3 birds, 5 sea turtles, 2 sharks, 8 fish, and 2 invertebrates have a federal status of Endangered or Threatened. Other species that are covered only under the MMPA (no other federal designation) include 21 cetaceans and 4 pinnipeds. Species that are only covered under NMFS Species of Special Concern include 1 shark, 8 fish and 3 invertebrates. Although NMFS Species of Concern designation is not protected under the ESA, this BA includes these species for a complete analysis of species with a recognition from a federal agency.

Based on Dudek's habitat suitability analysis, 13 species have a moderate to high potential to occur in the Action Area. Appendix B provides Dudek's habitat suitability analysis and an assessment of the species potential to occur in the Action Area, including species not expected to occur or a low potential to occur. Section 4.2, below, provides species descriptions and assessments for those species with a moderate to high potential to occur.

4.2 Status of the Species and their Habitat in the Action Area

This section describes the status, basic life history, and potential for occurrence for federally-listed, proposed, or federally recognized species that are identified as potentially affected by the Project Actions as described above.

4.2.1 Federally-Listed Species

4.2.1.1 Cetaceans

Gray Whale

Gray whales (*Eschrichtius robustus*) of the Eastern North Pacific Stock were delisted from the ESA in 1994 (59 FR 31094-31095) but are protected by the MMPA. This species occurs in coastal waters along the west coast of North America from Mexico to Alaska, and in eastern Siberia. Gray whales usually feed along the Bering, Chukchi, and Beaufort seas during the summer, and winter along breeding and calving areas off the coast of Baja California. Calves are born from January to February (NMFS 2018a). During their northward migration from Baja to Alaska, cow-calf pairs stay particularly close to shore to avoid predation by orcas (*Orcinus orca*) (NMFS 2014). Gray whales are bottom feeders that consume benthic amphipods (epibenthic fauna such as mysids, amphipods, polychaete tubeworms). Since this species is a bottom feeder, gray whales are restricted to shallow continental shelf waters (Jefferson et al. 2008). Juvenile gray whales often are found in Santa Barbara Harbor and along the coastline and have been observed in the surf at Ventura Point (J. Davis IV, pers. obs). In Santa Barbara, gray whales are seen during their northward migration within 3 nautical miles from shore, frequently travelling along the kelp line within close proximity to Coal Oil Point where surveys take place for four months beginning in February (Gray Whales Count 2018). Data shows an upward trend for gray whales over the last five years from 736 whales in 2013 to 1,052 whales in 2017. More whales means an increase in the chance for interaction between ships and fishing gear. Ship strikes, entanglement, habitat degradation, whale watching harassment, low-frequency noise disturbance and impacts from commercial/industrial development are the largest threats to gray whales (NMFS 2018c). In California, ship strikes of gray whales are the most commonly reported followed by fin, blue, humpback, and sperm whales (NOAA 2017b).

Potential for Occurrence. High potential to occur. This species is a frequent visitor to the Ventura coastline and the Santa Barbara Channel and is commonly observed during migration, especially during the northward migration from Baja to Alaska. Gray whales are often observed close to shore, and there have been many regular occurrences in the Action Area on a yearly basis (PBCS 2018). The local whale watching boat, The Condor Express, has sighted 12 gray whales within 5 miles of the project area since the start of the 2018 gray whale season in the Santa Barbara Channel (Condor Express 2018, PBCS 2018). Whales are traveling northward at about 2.5 miles from shore as seen for example on the local whale watching trip in Santa Barbara Channel on March 15, 2018 (Condor Express 2018). Gray whale migration routes overlap with the Action Area and encompass the entire Santa Barbara Channel (Calambokidis et al. 2015; NOAA 2012; NOAA 2018e).

Humpback Whale

The humpback whale (*Megaptera noaengliaea*) is a federally-listed endangered species and is protected by the MMPA. Humpback whales occur throughout the North Pacific. North Pacific breeding areas fall broadly into three regions: 1) western Pacific (Japan and Philippines); 2) central Pacific (Hawaiian Islands); and 3) eastern Pacific (Central America and Mexico). Along the U.S. west coast, one stock is currently recognized that includes individuals that appear to be part of two separate feeding groups, a California and Oregon feeding group and a northern Washington and southern

British Columbia feeding group. Humpbacks from both groups have been matched to breeding areas off Central America, mainland Mexico, and Baja California. The population is estimated at approximately 1,918 animals for the California/Oregon/Washington stock (NOAA 2015). Migrating individuals from the Central America Distinct Population Segment (DPS) may migrate through the Action Area on their way to feeding grounds located off the Pacific Northwest (NMFS 2018a). This species stays near the surface of the ocean when migrating and prefers shallow waters when feeding and calving. This species can be seen close to shore when conditions allow for prey switching from krill to small schooling fish, which inhabit nearshore areas. Humpbacks are commonly found feeding in the Santa Barbara Channel during summer and fall, with some observations closer to shore in the Ventura Area. Typically, humpback whales utilize predictable habitats offshore along the continental shelf break and slope where upwelling occurs where they feed on krill (Yen et al. 2004). However, when conditions change and krill is not available, humpback whales are known to prey switch and feed on small schooling fish, which occur in nearshore waters (Fleming et al. 2016). In July 2017, a humpback found its way into Ventura Harbor (VC Star 2017). In addition, this species is strongly associated with the 200 meter isobath (Cascadia 2011). Threats to humpback whales include ship strikes, entanglement in fishing gear, whale watch harassment, and habitat impacts (NMFS 2018c). On the west coast of the United States, ship strikes are an important cause of mortality for baleen whales, including humpback, blue, fin and gray whales (Berman-Kowalewski et al. 2010).

Potential for Occurrence. Moderate to high potential to occur. Foraging and migration habitat is present in the Action Area. Numerous observations of this species have been documented within the Santa Barbara Channel both close to shore and near the Channel Islands (PBCS 2018). NOAA's cetacean mapping tool indicates humpback whale feeding habitat is close to the Action Area and is prevalent in the Santa Barbara Channel (NOAA 2018e). The project area is situated near feeding Biologically Important Areas (BIAs) and encompasses moderate humpback whale predicted densities for the Santa Barbara Channel (Calambokidis et al. 2015). Habitat-based density models show high predicted density in the action area (Becker et al. 2016), and Becker et al. (2017) show a marked seasonal difference in the area, with the highest predictions for this species in winter and spring for the Santa Barbara Channel.

Fin Whale

The fin whale (*Balaenoptera physalus physalus*) is a federally-listed endangered species and also is protected by the MMPA. Fin whales occur worldwide, primarily in temperate to polar latitudes and are less common in the tropics. They are one of the more commonly seen whales in the Northern Hemisphere. Its distribution is not well known, but it generally migrates poleward to feed in the summer and to the subtropics to breed in the winter (Jefferson et al. 2008). The location of the winter breeding grounds is unknown. Fin whales feed on krill, small schooling fish, copepods and squid (NOAA 2018a). They are usually solitary or travel in pairs, but on feeding grounds there can be groups of up to 20, with 100 or more whales loosely grouped (Carwardine et al. 1998). The California/Oregon/Washington stock has approximately 3,200 fin whales. Fin whales prefer deeper, offshore waters and are a fast swimming species. This species is more commonly associated with the 200 meter isobath, which is approximately 7.4 miles from the Action Area (Cascadia 2011). Threats to this species include ship strikes, entanglement and ocean noise pollution (NOAA 2018a). On the west coast of the United States, ship strikes are an important cause of mortality for baleen whales, including humpback, blue, fin and gray whales (Berman-Kowalewski et al. 2010).

Potential for Occurrence. Moderate potential to occur. This species has been observed migrating and feeding through the Santa Barbara Channel on many occasions with one occurrence (12 individuals) noted within 1 mile of the Action Area in 2011 (PBCS 2018; Cascadia 2011). Resources (krill, small schooling fish and squid) are likely present in the Action Area. The project area is situated within moderate fin whale predicted densities within the Santa Barbara Channel (Becker et al. 2016; Calambokidis et al. 2015).

4.2.1.2 SEA TURTLES

Loggerhead Sea Turtle

The loggerhead sea turtle (*Caretta caretta*) is a federally-listed endangered species, and also is protected by the MMPA. The North Pacific Ocean DPS occurs in tropical to temperate waters in the Pacific Ocean. Loggerhead sea turtles migrate from nesting grounds in Japan and Australia to feeding grounds located along the west coast from central to North America. Nesting occurs mainly on open beaches or along narrow bays having suitable sand, and often in association with other species of sea turtles. They choose ocean beaches with high wave energy, narrow, steep slopes, and coarse-grain sand for their nests. There are no known nesting locations that occur along the western seaboard of the U.S. or Hawaii (NMFS and USFWS 1998a). The closest known loggerhead nesting beaches in the North Pacific Ocean are located in Japan (NMFS and USFWS 2007). Baja California has the largest known aggregations of loggerhead sea turtles. Migration occurs along nearshore coastal waters (neritic zone). Loggerhead sea turtles typically feed on benthic invertebrates in hard bottom habitats, although fish and plants are occasionally consumed (NMFS and USFWS 1998a). During ideal conditions (water temperature/break), this species is known to migrate along the coast of California, including the Santa Barbara Channel. Sightings of this species along the U.S. west coast typically are of juveniles measuring 20-60 centimeter shell length (NMFS and USFWS 1998a). Loggerhead sea turtles are subject to several threats including loss of nesting habitat; disorientation of hatchlings by beachfront lighting; degradation of foraging habitat; marine pollution and debris; ship strikes; disease; and incidental take from commercial trawling, longline, and gill net fisheries (NMFS and USFWS 1998a).

Potential for Occurrence. High potential to migrate. Although there is no suitable feeding habitat (hard bottoms, benthic invertebrates) within the Action Area, during migration they may enter the Action Area. This species has been observed at San Clemente Island (NMFS and USFWS 2007). This species has stranded on Ventura beaches in 2014 and 2017 (Dan Lawson, NMFS Protected Resources Division, 2018, pers. comm.). Loggerhead sea turtles are not expected to nest in the Action Area. No beach habitat is present in the Action Area and the Santa Barbara Channel area is outside of nesting range.

Green Sea Turtle

The green sea turtle (*Chelonia mydas*) is a federally-listed threatened species, and also is protected by the MMPA. The Eastern Pacific DPS ranges from Baja California to southern Alaska. However, the green sea turtle is more common from San Diego southward. This species forages in the open ocean when migrating as well as shallow waters of lagoons, bays, estuaries, mangroves, eelgrass, and seaweed beds. They are herbivorous and feed primarily on seagrasses and algae. Green sea turtles are generally found in shallow waters except when migrating. It is a regular visitor in the waters off the

southwest coast of the United States. Residents occur in the San Gabriel River, Long Beach (NMFS and USFWS 1998b). The closest known nesting occurrences are in Mexico (NMFS and USFWS 1998b). This species requires open beaches with a sloping platform and minimal disturbance for nesting. Green sea turtles have strong nesting site fidelity and often make long distance migrations between feeding grounds and nesting beaches. Threats to the green sea turtle include commercial harvesting, loss of nesting habitat; disorientation of hatchlings by beachfront lighting; nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; ship strikes; and incidental take from commercial fishing operations (NMFS and USFWS 1998b).

Potential for Occurrence. High potential to occur. They have been captured at Sterns Wharf in Santa Barbara harbor and at the Channel Islands. This species has stranded on Santa Barbara and Ventura beaches in 2014, 2015 and 2017 (Dan Lawson, NMFS Protected Resources Division, 2018, pers. comm.). This species may migrate and/or forage in the Action Area. Green sea turtles are not expected to nest in the Action Area.

Olive Ridley Sea Turtle

The olive ridley sea turtle (*Lepidochelys olivacea*) is a federally-listed threatened species, and also is protected by the MMPA. Olive ridley sea turtles occur worldwide in tropical and warm temperate ocean waters. In the eastern Pacific, this species distribution ranges from Southern California to Northern Chile. Olive Ridley sea turtles are mostly pelagic but will also inhabit coastal areas. This species feeds on algae, lobster, crabs, tunicates, mollusks, shrimp, and fish. The olive ridley sea turtle gets its name from the olive coloration of its heart-shaped carapace. Their nesting behavior is called "arribada" nesting, whereby large groups gather and come ashore and nest all at once. This nesting behavior makes the olive ridley sea turtle vulnerable to harvest of eggs and even adult turtles. The breeding populations on the Pacific Coast of Mexico are listed as endangered and all other populations are listed as threatened under the ESA (NOAA 2018f). Their Pacific nesting grounds include the Pacific coasts of Mexico and Central America. As a highly migratory species, they are encountered in U.S. waters as they travel between nesting and foraging habitats (NOAA 2018f).

Potential for Occurrence. Moderate potential to occur. They have been captured at Sterns Wharf in Santa Barbara harbor and at the Channel Islands. This species may migrate and/or forage in the Action Area. Olive ridley sea turtles are not expected to nest in the Action Area. This species has been observed in the Los Angeles Harbor (NMFS and USFWS 1998e). This species has stranded on Santa Barbara County beaches in 2014 and 2015 (Dan Lawson, NMFS Protected Resources Division, 2018, pers. comm.).

4.2.2 OTHER NON-LISTED SPECIES PROTECTED UNDER THE MMPA

4.2.2.1 Cetaceans

Common Minke Whale

The common minke whale (*Balarnoptera acutorostrata*) is protected by the MMPA. Minke whales are found throughout the world in polar, temperate, and tropical waters in both coastal and offshore habitats (NMFS 2018a). They are the smallest baleen whale in North American waters. It migrates seasonally and travels great distances. Common minke whales are the smallest baleen whale in North American waters. Some individual minke whales are residents in California waters. They are often solitary but sometimes travel in groups of 2-3 individuals (NMFS 2018a). This species feeds on copepods, krill, and small schooling fish. Minke whales are a normally cryptic species but are sometimes curious and will approach vessels (especially stationary vessels). Minke whales are subject to the following threats including entanglement (gill nets, seine nets, herring weirs, lobster traps, driftnets, longlines, and trawls), habitat disturbance, human interactions, noise pollution, and ship strikes (NMFS 2018a).

Potential for Occurrence. Moderate potential to occur. Foraging and migration habitat is present in the Action Area. Minke whales feed on euphausiids, copepods and small schooling fish, which are present in the Channel. In addition, this species has been recorded since 1988 in the Santa Barbara Channel and within 1 mile of the Action Area, although this species is usually in slightly deeper waters (PBCS 2018). Stock reports for the California/Oregon/Washington Stock show minke whales in close proximity to the northern Channel Islands, within the Santa Barbara Channel (NMFS 2016c).

Common Bottlenose Dolphin

The common bottlenose dolphin (*Tursiops truncatus*) is protected by the MMPA. Bottlenose dolphins have a worldwide distribution ranging from 45°N to 45°S latitude and are found in temperate and tropical waters. Coastal populations often migrate into bays, estuaries, and river mouths. Offshore populations inhabit pelagic waters along the continental shelf. The common bottlenose dolphin, as its name suggests, is a common coastal species, and a generalist feeder (squid, fish and crustaceans) (Jefferson et al. 2008). Common bottlenose dolphins are comprised of two sub-populations: coastal bottlenose dolphins and offshore bottlenose dolphins. Coastal bottlenose dolphins are known to regularly occur within 1 kilometer of shore (Carretta et al. 1998). In southern California, they are found within 500 m of the shoreline 99% of the time and within 250 m 90% of the time (NMFS 2017g). On the other hand, offshore bottlenose dolphins inhabit areas at distances greater than a few kilometers from the mainland (NMFS 2011a). They may travel alone or in groups and commonly work together to herd prey. They are active at the surface and will approach ships and even other whales to bow ride as an energy efficient mode of transportation (NMFS 2018a). They interact with fisheries and are often seen following shrimp trawlers (Jefferson et al. 2008). Common bottlenose dolphins are subject to the following threats including entanglement (gill nets, driftnets, longlines, and trawls), habitat degradation, noise pollution, pollution from oil spills and chemicals, and ship strikes.

Potential for Occurrence. High potential to occur; specifically for offshore bottlenose dolphin populations. This species has many occurrences throughout the Santa Barbara Channel and within or directly adjacent to the Action Area (PBCS 2018). Habitat-based density models show high predicted density for this species in the action area (Becker et al. 2016).

Long-beaked Common Dolphin

The long-beaked common dolphin (*Delphinus capensis capensis*) is protected by the MMPA. Long-beaked common dolphins are commonly found along the U.S. west coast, from Baja California (including the Gulf of California) northward to about central California. Long-beaked and short-beaked common dolphins are similar species but have different habitat preferences. Long-beaked common dolphins prefer coastal waters. Long-beaked common dolphins are not as abundant as short-beaked common dolphins. They select shallower areas in tropical, subtropical, and warmer temperate to cool waters closer to the coast (within 50-100 nautical miles (90-180 km)) and the continental shelf (NMFS 2018a). This species will sometimes come close to shore within waters that are only a few meters deep (Jefferson et al. 2008). Long-beaked common dolphins usually travel in pods of 100-500 individuals, but have been seen numbering in the thousands. They are active at the surface and will approach ships to bow ride as an energy efficient mode of transportation (NMFS 2018a). Long-beaked common dolphins are subject to the following threats: entanglement (gill nets, driftnets, longlines, and trawls).

Potential for Occurrence. High potential to occur. Foraging resources (small schooling fish and squid) are likely present in the Action Area. This species has been recorded multiple times and in great numbers (e.g., occurrences with 1,500 individuals) in the Santa Barbara Channel, including the Action Area (PBCS 2018). Habitat-based density models show high predicted density for this species in the action area (Becker et al. 2016; Douglass et al. 2014).

Short-beaked Common Dolphin

The short-beaked common dolphin (*Delphinus delphis delphis*) is protected by the MMPA. Short-beaked common dolphins inhabit warm tropical to cool temperate waters that are primarily oceanic and offshore. Off the U.S. west coast, the majority of the populations are found off California, especially during the warm-water months. This species occurs along the continental slope in waters 650-6,500 feet (200-2,000 m) deep (NMFS 2018a). This species is often associated with areas of upwelling and areas of steep sea-bottom, and as an offshore species they are commonly associated with pilot whales (Jefferson et al. 2008). Short-beaked common dolphins prefer deeper, offshore habitat. Short-beaked common dolphins travel in pods of hundreds to thousands of individuals. They are active at the surface and will approach ships and even other whales to bow ride as an energy efficient mode of transportation (NMFS 2018a). Short-beaked common dolphins are subject to the following threats: entanglement (gill nets, driftnets, longlines, and trawls).

Potential for Occurrence. Moderate to high potential to occur. Foraging resources (small schooling fish and squid) are likely present in the Action Area. This species has been recorded multiple times and in great numbers (e.g., occurrences with 1,500 individuals) in Santa Barbara Channel and adjacent to the Action Area (PBCS 2018). Habitat-based density models show high predicted density in the action area (Becker et al. 2016; Douglass et al. 2014), and

indicated a marked seasonal difference in the area, with the highest predictions for this species in summer and fall for the Santa Barbara Channel (Becker et al. 2017; Campbell et al. 2014).

Pacific White-sided Dolphin

The Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) is protected by the MMPA. Pacific white-sided dolphins are found in temperate waters in the North Pacific and they utilize waters over the continental shelf to the deep open ocean (NMFS 2018a). In North America, in the Pacific they range from the Gulf of Alaska to the Gulf of California. Pacific white-sided dolphins exhibit seasonal inshore/offshore and north/south movements, but are generally non-migratory. This species feeds mostly on cephalopods and small schooling fish in deep offshore waters but also on the continental shelf (Jefferson et al. 2008). They are often observed working together in pod sizes of 10-100 individuals working together to herd schools of fish. Pacific white-sided dolphins are subject to several threats: entanglement in fishing gear (gillnets, longline), pollution, noise (will react to pingers), and ship strikes (NMFS 2018a). They will often bow ride with vessels as a method of energetically efficient transportation.

Potential for Occurrence. Moderate potential to occur. Foraging habitat is present in the Action Area. In addition, this species has numerous occurrences within the Santa Barbara Channel (mostly offshore, this species is commonly associated with other deep-water cetaceans such as Risso's dolphins and Northern right whale dolphins (NMFS 2018a)) and a few occurrences in the Action Area (PBCS 2018). Habitat-based density models show high predicted density for this species in the action area (Becker et al. 2016), particularly in the fall (Campbell et al. 2014; Douglass et al. 2014).

4.2.2.2 Pinnipeds

California Sea Lion

The California sea lion (*Zalophus californianus*) is protected by the MMPA. It inhabits the eastern North Pacific Ocean from central Mexico to Canada. This species is present along the west coast from the Tres Marias Islands off Puerto Vallarta, throughout the Gulf of California and the Baja peninsula, north to Alaska. Males (adults, subadults, and juveniles) undertake a northward migration to Central California and Washington after the breeding season in southern rookeries. They are generalist opportunistic feeders (squid and fishes in areas of upwelling) and utilize the continental shelf and slope, but have also been observed in deeper oceanic waters (Jefferson et al. 2008). California sea lions prefer shallow coastal and estuarine waters and sandy beaches for haul out sites but will also haul out on marina docks, jetties, and buoys (NMFS 2018a). On land, they are wary of humans, but in the water they are curious, bold and will approach boats looking for fish. They will take fish from commercial fishing gear, sport fishing lines, and fish passage facilities at dams and rivers. They are less wary of people because they associate people with an easy meal. They may also be curious about construction activities. California sea lions are subject to several threats: entanglement in fishing gear (gillnets, longline), pollution, ship strikes and human caused injuries.

Potential for Occurrence. High potential to occur. This species has known haulouts along all of the Channel Islands and rookeries at San Nicholas Island (CDFW 2009, NMFS 2018a).The project site is within their distribution range (Lowry and Carretta 1999; NOAA 2018a). California sea lions mostly forage near mainland coastlines, the continental

shelf, and seamounts. Adult females feed between 10–100 km from shore (Lowry and Carretta 1999) while adult males may forage up to 450 km from shore (Weise et al. 2006).

Pacific Harbor Seal

The Pacific harbor seal (*Phoca vitulina*) is protected by the MMPA. It is widespread in coastal areas of the Northern Hemisphere, in temperate and polar habitats. It is generally non-migratory and inhabits areas from the coast to the continental slope (Jefferson et al. 2008). On the U.S. west coast, this species is found in coastal and estuarine waters from Canada to Baja California, Mexico. Harbor seals inhabit temperate coastal habitats and use rocks, reefs, beaches, and drifting glacial ice for hauling out and pupping sites (NMFS 2018a). Diving averages less than 35 meters and they are generalist feeders (a variety of fish, cephalopods and crustaceans) (Jefferson et al. 2008). On land, harbor seals are very wary and shy, and will stampede into the water when disturbed. In the water, they are curious but cautious and will peer at people/boats. Harbor seals are subject to several threats: incidental capture in fishing gear (gillnets, trawls, purse seines, weirs), ship strikes, pollution, power plant entrainment, and harassment by humans when on land.

Potential for Occurrence. High potential to occur. Harbor seals have known haulouts and rookeries at Carpinteria Bluffs (Santa Barbara County) and Point Mugu (Ventura County); and haulouts from Point Conception to Santa Barbara and along all of the Channel Islands (CDFW 2009).

4.3 Critical Habitat

No designated critical habitat for federally-listed threatened and endangered species occurs within the Action Area (USFWS Environmental Online System (USFWS 2018b), NOAA Critical Habitat Maps (NOAA 2018c)).

5.0 EFFECTS OF THE ACTION

5.1 Effects of the Project Actions

This section analyzes all of the potential effects to listed species from Project Actions. As described in NMFS (2009) and 50 CFR 402.02, **direct effects** are those that have direct or immediate effects on the species or its habitat during construction. These effects include temporary changes in marine wildlife behavior from construction noise; and temporary construction disturbance to feeding habitat. **Indirect effects** are those that are caused by or will result from the Project Action later in time, after completion of initial construction, but still reasonably certain to occur. These effects include marine mammal disturbance due to inadvertent spills or introduction of chemical pollutants; release of invasive species, parasites, and pathogens from seed stock; effects on sediment quality due to biodeposits and changes in benthic invertebrate species; phytoplankton consumption, and fouling organisms and non-native species. Effects that may occur **both** during construction (direct effects) and later in time (indirect effect) include entanglement in aquaculture gear; vessel strikes; noise disturbance from vessels, and interference with migration or feeding routes. Each of these effects is discussed more in detail below. In addition, further assessments and mitigation measures aimed at avoiding, reducing, or remedying the effect of Project Actions are recommended below.

Direct and Indirect Effects (Occurring During and After Construction)

- **Potential for Marine Wildlife Entanglement in Aquaculture Gear**. The Project Actions 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, Mitigation Measure BIO-4 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 Mitigation Measure BIO-2).

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 (MM BIO-1) and require a qualified marine wildlife observer to be present during construction activities that can halt activities if marine mammals are observed (MM BIO-3). Further details regarding these measures are found in the mitigation measures provided in Section 5. After the incorporation of these mitigation measures 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 Due to Increased Activity**. Vessel strikes are known to be a hazard to a number of marine species, particularly whales. Project Actions 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 (MM BIO-5) and include vessel management requirements if vessels observe marine mammals in close proximity to the vessel (MM BIO-6). After incorporation of these mitigation measures, impacts associated with ship strikes are considered insignificant.
- **Interference with Migration or Feeding Routes.** The Project Actions 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 Action 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 (Markowtiz 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.

Direct Effects (Construction-Related Effects)

- **Changes in Marine Wildlife Behavior from Construction**. 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), Endangered Species Act (FESA) 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 1 are specific to the levels of harassment permitted under the MMPA (NMFS 2018e). Project Activities 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 1
NOAA Fisheries Acoustic Thresholds

Criterion	Criterion Definition	Threshold
In-Water (Excluding Tactical Sonar and Explosives)		
Level A	PTS (injury) conservatively based on TTS	190 dB $_{rms}$[1] 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 $_{rms}$
In-Air		
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 $_{rms}$

Indirect Effects (After Completion of Initial Construction)

- **Oil Spills.** 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.
- **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, Mitigation Measure BIO-10 incorporates and 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, Mitigation Measure BIO-11 incorporates a decommissioning plan to require timely removal of aquaculture gear once shellfish operations cease on a parcel. Upon incorporation of the proposed mitigation, impacts associated with marine debris are considered insignificant.

[1] 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.

- **Release of Potentially 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 State waters, must be 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/ Displacement of the Benthic Environment.** Effects on sediment quality underneath shellfish aquaculture gear could be impacted from biodeposits and changes to the benthic invertebrate species composition. The Project Actions have 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, Mitigation

Measure BIO-9 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 submerged structures of the Project Actions 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.
- **Carrying Capacity** (Phytoplankton Consumption). 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). Ventura Shellfish Enterprise 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 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 (Appendix C).

5.1.1 FEDERALLY-LISTED SPECIES

5.1.1.1 Cetaceans

Gray Whale

Direct Effects

As described in Section 4.0, gray whales and their calves forage and travel in close proximity to shore during their northward migration. Due to their size, behavior, and occurrence close to shore, gray whales are likely to be affected by the Project Actions. The gray whale is a frequent visitor to the Santa Barbara Channel and may migrate directly along the path of the project site. As a result, gray whales may experience both direct and indirect effects from the Project Actions. If Project Actions will occur during the migration period, adults (and particularly calves) have the potential for entanglement in aquaculture gear. However, gray whales routinely swim through kelp and are adept at navigating obstacles, given they are accustomed to coastal areas. Absent mitigation, entanglement could adversely affect this species. However, with incorporation of **MM BIO-1 through BIO-5**, the effect would be reduced.

As described in Section 4.0, one of the main threats to gray whales is from ship strikes. Project Actions will involve an increase in boat traffic both within the Project Action Area and routes to and from the Ventura Harbor. Ship strike risk may also increase at nighttime when whales are resting, unaware of ship presence, and are less visible to staff onboard. Absent mitigation, the Project Actions have the potential to result in injury and/or mortality to gray whales from ship strikes, which would adversely affect this species. However, with incorporation of **MM BIO-6**, the effect would be reduced.

Project Actions have the potential to interfere with gray whale migration and feeding routes. However, the Santa Barbara Channel measures over 20 miles wide and the Project Action Area would be under 2 miles wide. Due to the expansive open ranges that are available for grey whales in the greater region, the Project Actions interference with migration and feeding routes would not adversely affect this species.

Project Actions have the potential to result in changes of gray whale migration or feeding behavior during construction from noise or disturbance to benthic feeding areas. Although noise effects will be very low, gray whales may temporarily avoid construction areas. Absent mitigation, construction activities may adversely affect this species. However, with incorporation of **MM BIO-3, MM BIO-5 and MM BIO-6**, the effect would be reduced.

Indirect Effects

Project Actions have the potential to result in inadvertent oil spills. Any grey whales traversing through areas that enter areas containing material from oil spills or other pollutants may experience immediate health effects. Absent mitigation, Project Activities may adversely affect this species. However, with incorporation of **MM BIO-7**, the effect would be reduced.

Project Actions have the potential to result in the release of invasive species, parasites, and pathogens. Absent mitigation, Project Activities may adversely affect this species through reducing its access to prey within the Project Area. However, with incorporation of **MM BIO-4**, **MM BIO-8**, and **MM BIO-10** the effect would be reduced.

Determination of Effects

Project Actions have the potential to result in direct and indirect effects to grey whale individuals and/or their migration and feeding habitats. The highest risk to this species includes entanglement in gear and vessel strikes. Construction activities are anticipated to be relatively brief (several weeks) within each plot which would cause temporary changes to grey whale feeding and migrating behavior. In addition, due to the availability of feeding habitat in the Santa Barbara Channel, Project Actions are not anticipated to interfere with gray whale migration and feeding routes. Additional Project effects to this species include the potential effects on sediment quality from aquaculture farms or fouling organisms. Measures to avoid and minimize any potential adverse effects to grey whale are discussed above and include **MM BIO-1 through BIO-11**. With implementation of these measures, the effects of the Project Actions would not jeopardize the continued existence of this species. As such, the Project Actions **may affect, but is not likely to adversely affect** the grey whale.

Humpback Whale and Fin Whale

Humpback and fin whales are anticipated to experience similar effects as those described for grey whales, with the exception of effects to sediment quality and the fouling of organisms. As described below, these species are expected to be directly and indirectly effected by the Project Actions from entanglement, ship strikes, interference with migration or feeding routes, changes in behavior from construction activities, oil spills, and release of invasive species. Given recent reports, humpback whales may in fact be more susceptible to entanglements, given their size, large appendages relative to body size ratio, and propensity to roll when entangled (NOAA 2018f).

Direct Effects

Humpback and fin whales may transit directly along the path of the project site. If Project Actions occur during the migration period, individuals have the potential for entanglement in aquaculture gear. Absent mitigation, entanglement would adversely affect this species. However, with incorporation of **MM BIO-1 through BIO-5**, the effect would be reduced.

Project Actions will involve an increase in boat traffic both within the Project Action Area and routes to and from the Ventura Harbor. Ship strike risk may also increase at nighttime when whales are resting, unaware of ship presence, and are less visible to staff onboard. Absent mitigation, the Project Actions have the potential to result in injury and/or mortality to humpback and fin from ship strikes, which would adversely affect these species. However, with incorporation of **MM BIO-6**, the effect would be reduced.

Project Actions have the potential to interfere with humpback and fin whale migration and feeding routes. However, the Santa Barbara Channel measures over 20 miles wide and the Project Action Area would be under 2 miles wide. Due to the expansive open ranges that are available for these in the greater region, the Project Actions interference with migration and feeding routes would not adversely affect these species.

Project Actions have the potential to result in changes of humpback and fin whale migration or feeding behavior during construction from noise or avoidance of suitable feeding areas. Although, noise effects will be very low, these

species may temporarily avoid construction areas. Absent mitigation, construction activities may adversely affect this species. However, with incorporation of **MM BIO-3, MM BIO-5 and MM BIO-6**, the effect would be reduced.

Indirect Effects

Project Actions have the potential to result in inadvertent oil spills. Any humpback or fin whales traversing through areas that enter areas containing material from oil spills or other pollutants may experience immediate health effects. Absent mitigation, Project Activities may adversely affect these species. However, with incorporation of **MM BIO-7**, the effect would be reduced.

Determination of Effects

Project Actions have the potential to result in direct and indirect effects to humpback and fin whale individuals and/or their migration and feeding behaviors. The highest risk to these species includes entanglement in gear and vessel strikes. Construction activities are anticipated to be relatively brief (several weeks) within each plot which would cause temporary changes to humpback and fin whale feeding and migrating behavior. In addition, due to the availability of feeding habitat in the Santa Barbara Channel, Project Actions are not anticipated to interfere with these species' migration and feeding routes. Additional Project effects to these species include the release of invasive species, parasites, and pathogens from seed stock. Measures to avoid and minimize any potential adverse effects to the humpback and fin whale are discussed above and include **MM BIO-1 through BIO-11**. With implementation of these measures, the effects of the Project Actions would not jeopardize the continued existence or recovery of these species. As such, the Project Actions **may affect, but are not likely to adversely affect** the humpback and fin whales.

5.1.1.2 Sea Turtles

Direct Effects

Loggerhead, green, and olive ridley sea turtles may traverse the Project Action Area during migration. Should marine debris (e.g., fishing nets or wire not a part of the Project Actions) become entangled on the aquaculture long lines, sea turtles may become entangled leading to injury and/or mortality. Absent mitigation, entanglement would adversely affect these species. However, with incorporation of **MM BIO-1 through BIO-5 and MM BIO-10**, the effect would be reduced.

Project Actions will involve an increase in boat traffic both within the Project Action Area and routes to and from the Ventura Harbor. Absent mitigation, the Project Actions have the potential to result in injury and/or mortality to sea turtles from ship strikes, which would adversely affect these species. However, with incorporation of **MM BIO-6**, the effect would be reduced.

Project Actions have the potential to interfere with sea turtle migration routes. However, the Santa Barbara Channel measures over 20 miles wide and the Project Action Area would be under 2 miles wide. Due to the expansive open ranges that are available for these in the greater region, the Project Actions interference with migration routes would not adversely affect these species.

Project Actions have the potential to result in changes of sea turtle migrating behavior during construction from noise or avoidance of migratory routes. Although noise effects will be very low, these species may temporarily avoid construction areas. Artificial lighting during construction activities and regular operations can be disorienting to sea turtles (as well as seabirds and migratory birds). Absent mitigation, construction activities may adversely affect this species. However, with incorporation of **MM BIO-3, MM BIO-5, MM BIO-6 and MM BIO-12**, the effect would be reduced.

Indirect Effects

Project Actions have the potential to result in inadvertent oil spills. Any sea turtles traversing through areas that enter areas containing material oil spills or other pollutants may experience immediate health effects. Absent mitigation, Project Activities may adversely affect these species. However, with incorporation of **MM BIO-7**, the effect would be reduced.

Determination of Effects

Project Actions have the potential to result in direct and indirect effects to sea turtle individuals and/or their migration behaviors. The highest risk to these species includes entanglement in fugitive nets and fishing line that may become attached to aquaculture gear. Construction activities are anticipated to be relatively brief (several weeks) within each plot which would cause temporary changes to sea turtle and migrating behavior. In addition, due to the availability of open ocean in the Santa Barbara Channel, Project Actions are not anticipated to interfere with these species' migration routes. Additional Project effects to these species include possible ship strikes and the release of invasive species. Measures to avoid and minimize any potential adverse effects to sea turtles are discussed above and include **MM BIO-1 through BIO-12**. With implementation of these measures, the effects of the Project Actions would not jeopardize the continued existence or recovery of these species. As such, the Project Actions **may affect, but are not likely to adversely affect** the loggerhead, green and olive ridley sea turtles.

5.1.2 OTHER NON-LISTED SPECIES PROTECTED UNDER THE MMPA

5.1.2.1 Cetaceans

The common minke whale, common bottlenose dolphin, long-beaked common dolphin, short-beaked common dolphin, and pacific white-sided dolphin are anticipated to experience similar effects as those described for humpback and fin whale. However, these dolphins are resident that may be present in the Santa Barbara Channel year-round. As described below, these species are expected to be directly and indirectly effected by the Project Actions from entanglement, ship strikes, interference with migration or feeding routes, changes in behavior from construction noise, potential oil spills, and release of invasive species, parasites, and pathogens from seed stock. There are few documented cases of interactions between cetaceans and shellfish farms. However, in Australia, studies of bottlenose dolphins indicate that they avoid mussel farms in shallow nearshore waters and the displacement of habitat causes a reduction in fecundity (Kemper et al. 2003). This study involved coastal bottlenose dolphins, and it is unknown if displacement of habitat will occur in offshore waters for offshore bottlenose dolphins. Similarly, in New Zealand, dusky dolphins were seen avoiding mussel leases in shallow waters (they utilize shallow waters for foraging) which may indicate that placing mussel farms in nearshore waters affects their ability to forage. In Chile, a bay used by Chilean dolphins was completed filled in with mussel lines and the dolphins ceased to use the area for foraging

(Kemper et al. 2003). These studies occur in shallow coastal waters and for different species than those that occur on the project site but it habitat displacement may occur to offshore species as well, such as bottlenose dolphins, common dolphins, pacific white-sided dolphins and minke whales in the project area. If these species are prevented from foraging in the project area, it would be a small reduction in their overall foraging area and would not adversely affect these species.

Direct Effects

The common minke whale may migrate along the Project Action Area and many dolphins are year-round residents. If Project Actions occur during the common minke whale migration period, individuals have the potential for entanglement in aquaculture gear. In addition, dolphins have the potential for entanglement year-round. Normally adept at maneuvering around objects, individuals have the potential for entanglement in loose fishing nets, debris and other ghost gear that could become attached to the mussel aquaculture gear. Absent mitigation, entanglement may adversely affect these species. However, with incorporation of **MM BIO-1 through BIO-5 and MM BIO-10**, the effect would be reduced.

Project Actions will involve an increase in boat traffic both within the Project Action Area and routes to and from the Ventura Harbor. Ship strike risk may also increase at nighttime when migrating common minke whales may be resting, unaware of ship presence, and are less visible to staff onboard. In addition, dolphins are known to bow-ride which may result in accidental ship strikes to these species. Absent mitigation, the Project Actions have the potential to result in injury and/or mortality, which would adversely affect these species. However, with incorporation of **MM BIO-6**, the effect would be reduced.

Project Actions have the potential to interfere with common minke whale migration routes. In addition, foraging areas for the common minke whale and dolphins may be disrupted from Project Actions. However, the Santa Barbara Channel measures over 20 miles wide and the Project Action Area would be under 2 miles wide. Habitat displacement could occur for these species, but it would be a small reduction in their overall foraging area. Due to the expansive open ranges that are available for these in the greater region, the Project Actions interference with migration and feeding routes would not adversely affect this species.

Project Actions have the potential to result in changes of common minke whale migration along with whale and dolphin feeding behavior during construction from noise or avoidance of suitable feeding areas. These species may temporarily avoid construction areas or experience more long lasting and adverse effects, as described above. Absent mitigation, construction activities may adversely affect this species. However, with incorporation of **MM BIO-3, MM BIO-5 and MM BIO-6**, the effect would be reduced.

Indirect Effects

Project Actions have the potential to result in inadvertent oil spills. Any common minke whales or dolphins traversing through areas that enter areas containing material from oil spills or other pollutants may experience immediate health effects. Absent mitigation, Project Activities may adversely affect these species. However, with incorporation of **MM BIO-7**, the effect would be reduced.

Project Actions have the potential to result in the release of invasive species, parasites, and pathogens. Absent mitigation, Project Activities may adversely affect these species. However, with incorporation of **MM BIO-4** and **MM BIO-8**, the effect would be reduced.

Determination of Effects

Project Actions have the potential to result in direct and indirect effects to the common minke whale, common bottlenose dolphin, long-beaked common dolphin, short-beaked common dolphin, and pacific white-sided dolphin. The highest risk to these species includes entanglement in gear (loose fishing nets, debris, or other ghost gear that has become entangled in the aquaculture array) and vessel strikes. Construction activities are anticipated to be relatively brief (several weeks) within each plot which would cause temporary changes to whale and dolphin feeding and/or migrating behavior. In addition, due to the availability of feeding habitat in the Santa Barbara Channel, Project Actions are not anticipated to interfere with these species' migration and feeding routes. Additional Project effects to these species include the release of invasive species. Measures to avoid and minimize any potential adverse effects to the common minke whale and dolphins are discussed above and include MM BIO-1 through BIO-11. With implementation of these measures, the effects of the Project Actions would not jeopardize the continued existence of these species. As such, the Project Actions may affect, but are not likely to adversely affect these species.

5.1.2.2 Pinnipeds

Pinnipeds, including the California sea lion and Pacific harbor seal, are expected to experience similar effects as those described for small cetaceans. Similar to dolphins, pinnipeds are resident and are present in the Santa Barbara Channel year-round. As described below, these species are expected to be directly and indirectly effected by the Project Actions from entanglement, ship strikes, interference with feeding routes, changes in behavior from construction activities (disturbance), invasive species, parasites, and pathogens, altered marine food chains/habitat due to fouling the water and changes to the benthic fauna (Kemper et al. 2003). Other affects may include predator control.

Direct Effects

Pinnipeds may be present year round in the Project Action Area. There have been no reported interactions between pinnipeds and shellfish aquaculture (Kemper et al. 2003) indicating a very low possibility of an impact; however, individuals have the potential for entanglement in loose fishing nets, debris and other ghost gear that could become attached to the mussel aquaculture array. Absent mitigation, entanglement may adversely affect these species. However, with incorporation of **MM BIO-1 through BIO-5 and MM BIO-10**, the effect would be reduced.

Project Actions will involve an increase in boat traffic both within the Project Action Area and routes to and from the Ventura Harbor. Absent mitigation, the Project Actions have the potential to result in injury and/or mortality, which would adversely affect these species. However, with incorporation of **MM BIO-6**, the effect would be reduced.

Project Actions have the potential to interfere with pinniped feeding routes. However, the Santa Barbara Channel measures over 20 miles wide and the Project Action Area would be under 2 miles wide. Due to the expansive open ranges that are available for these in the greater region, the Project Actions interference with migration and feeding routes would not adversely affect this species.

Project Actions have the potential to result in changes of pinniped feeding behavior during construction from noise or avoidance of suitable feeding areas. These species may temporarily avoid construction areas or experience more long lasting and adverse effects, as described above. Absent mitigation, construction activities may adversely affect this species. However, with incorporation of **MM BIO-3, MM BIO-5 and MM BIO-6**, the effect would be reduced.

Predator control is unlikely to be needed for this project given the feeding preferences of pinnipeds in the area. However, if predator control is required, **MM BIO-13** will be incorporated.

Indirect Effects

Project Actions have the potential to result in inadvertent oil spills or other pollution. Any pinnipeds traversing through areas that contain material from oil spills may experience immediate health effects. Absent mitigation, Project Activities may adversely affect these species. However, with incorporation of **MM BIO-7**, the effect would be reduced.

Project Actions have the potential to result in the release of invasive species, parasites, and pathogens. Absent mitigation, Project Activities may adversely affect these species. However, with incorporation of **MM BIO-4** and **MM BIO-8**, the effect would be reduced.

Determination of Effects

Project Actions have the potential to result in direct and indirect effects to pinnipeds, including the California sea lion, and Pacific harbor seal. The highest risk to these species includes vessel strikes. Construction activities are anticipated to be relatively brief (several weeks) within each plot which would cause temporary changes to pinniped feeding behavior. In addition, due to the availability of feeding habitat in the Santa Barbara Channel, Project Actions are not anticipated to interfere with these species' feeding routes. Additional Project effects to these species include the release of invasive species, parasites, and pathogens from seed stock. Measures to avoid and minimize any potential adverse effects to pinnipeds are discussed above and include **MM BIO-1 through BIO-11**. With implementation of these measures, the effects of the Project Actions would not jeopardize the continued existence of these species. As such, the Project Actions **may affect, but are not likely to adversely affect** pinnipeds.

5.2 Mitigation Measures

MM BIO-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 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.

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 so as to modify gear and avoid any future entanglements.

MM BIO-2 **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.

MM BIO-3 **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.

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 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.

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.

MM BIO-4 **Cultivation of Spat Off site.** 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 of concern; however, natural mussel spat collected on farm grow-out lines and buoys may also be harvested and cultivated.

MM BIO-5 **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 MM BIO-6; (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 MM BIO-1 should an employee observe an injured marine mammal.

MM BIO-6 **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:

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

MM BIO-7 **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.

MM BIO-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.

MM BIO-9 **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 to 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.

MM BIO-10 **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.

MM BIO-11 **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 of 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.

MM BIO-12 **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.

MM BIO-13 **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.

MM NAV-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.

MM NAV-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 harbormasters (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.

5.3 Cumulative Effects

Section 7 (FESA) regulations require a federal agency taking an action to provide an analysis of cumulative effects when requesting initiation of formal consultation. Cumulative effects include the effects of future state, tribal, local, or private actions, not involving a federal action, that are reasonably certain to occur in or adjacent to the project site. Future federal actions that are unrelated to the Proposed Action are not considered in this analysis, because they require separate consultation pursuant to Section 7. Federal actions may include granting a permit for a project, authorizing funds for a project, or implementing a project. For the purposes of this BA, cumulative effects are defined as environmental change that results from the incremental effects of several projects that may be individually minor, but that become significant when considered collectively. There are no known actions (Federal, State or Tribal) slated to occur in or immediately adjacent to the project area.

5.4 Compensatory Mitigation

No impacts requiring compensatory mitigation will result from implementation of the Project Actions.

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6.0 CONCLUSIONS

This BA forms the basis for the conclusions presented below regarding the effects of the Project Actions on thirteen species with a potential to occur in the action area. Based on a review of the current status of these species, the effects of the Project Actions, and recommended measures to avoid and minimize effects to listed species, the Project Actions may **affect, but are not likely to adversely affect** each of these species. Table 2 below summarizes the effects determination for the Project Actions.

Table 2
Summary of Effects Determinations

Federally Protected Species	No Effect	May Affect, But Is Not Likely to Adversely Affect	Is Likely to Adversely Affect
Balarnoptera acutorostrata Common Minke Whale		✓	
Balaenoptera physalus physalus Fin Whale		✓	
Caretta caretta Loggerhead Sea Turtle		✓	
Chelonia mydas Green Sea Turtle		✓	
Delphinus capensis capensis Long-beaked Common Dolphin		✓	
Delphinus delphis delphis Short-beaked Common Dolphin		✓	
Eschrichtius robustus Gray Whale		✓	
Lagenorhynchus obliquidens Pacific White-sided Dolphin		✓	
Lepidochelys olivacea Olive Ridley Sea Turtle		✓	
Megaptera novaeangliae Humpback Whale		✓	
Phoca vitulina Pacific Harbor Seal		✓	
Tursiops truncatus Common Bottlenose Dolphin		✓	
Zalophus californianus California Sea Lion		✓	

As noted in the Nationwide Permit (NWP) 48 Decision Document (USACE 2017) recently approved by the Corps, which considered shellfish aquaculture uses nationwide, "Compared to the disturbances and degradation caused by

coastal development, pollution, and other human activities in coastal areas, commercial shellfish aquaculture activities present relatively mild disturbances to estuarine and marine ecosystems." The Decision Document concludes that impacts from most aquaculture projects would be *de minimis* on the surrounding environment. This determination is generally reaffirmed in the Corps' 2015 Programmatic Biological Assessment (USACE 2015) that considered new and existing shellfish aquaculture in Washington State, as well as the 2016 Programmatic Biological Opinions from NOAA's NMFS (NMFS 2012f) evaluating the same, which concluded that impacts would be minor upon imposition of identified conservation measures. Notably, the above analyses evaluated shellfish aquaculture at a larger scale than that proposed by the project. NWP 48 covers most shellfish aquaculture projects nationwide and the Programmatic Biological Evaluation evaluated environmental impacts associated with a total of 38,400 commercial aquaculture acres in Washington.

With implementation of the mitigation measures identified in this BA, including measures for navigational safety **MM BIO-14** and **MM BIO-15**, the Project Actions are not expected to directly or indirectly reduce, in any appreciable manner, the likelihood of survival or recovery of the species described above by reducing its reproduction, numbers, or distribution. The measures proposed to offset anticipated effects provide reasonable protections to avoid and minimize adverse effects of the Project Actions. Additionally, no designated critical habitat is present within the Action Area.

Overall, the Project Actions would not result in permanent impacts to ESA-listed or MMPA species, based on: (1) the nature and extent of the activities proposed to be implemented; (2) avoidance and minimization measures proposed in this BA; (3) the relative size of the Project Actions within the Santa Barbara Channel; and (4) the temporary nature of construction activities. See Dudek (2018) for an assessment of Essential Fish Habitat for this project.

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APPENDIX A

Essential Fish Habitat Assessment

ATTACHMENT 4

ESSENTIAL FISH HABITAT ASSESSMENT

FOR THE VENTURA SHELLFISH ENTERPRISE PROJECT

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ATTACHMENT 4

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1.0 INTRODUCTION

This Essential Fish Habitat (EFH) Assessment has been prepared for the Ventura Port District (VPD, project applicant) to evaluate the effects of the Ventura Shellfish Enterprise (VSE) Project (project) on species regulated under a Fisheries Management Plan (FMP), pursuant to the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The project, supported in part through the NOAA 2015 Sea Grant Aquaculture Extension and Technology Transfer to California Sea Grant (NOAA Sea Grant Program), will establish a commercial offshore bivalve aquaculture operation. VPD is applying for a U.S. Army Corps of Engineers (Corps) authorization under Section 10 of the Rivers and Harbors Act. The Corps will act as the federal lead agency on the project. The MSFCMA requires consultation with the National Marine Fisheries Service (NMFS) on all actions or proposed actions that may adversely affect EFH. This EFH Assessment analyzes how the project would affect EFH for species regulated under a FMP and supports the National Environmental Policy Act environmental analysis. A Biological Assessment has also been prepared, which will 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 (50 CFR § 402.01 et seq.) (Dudek 2018).

1.1 Project Location

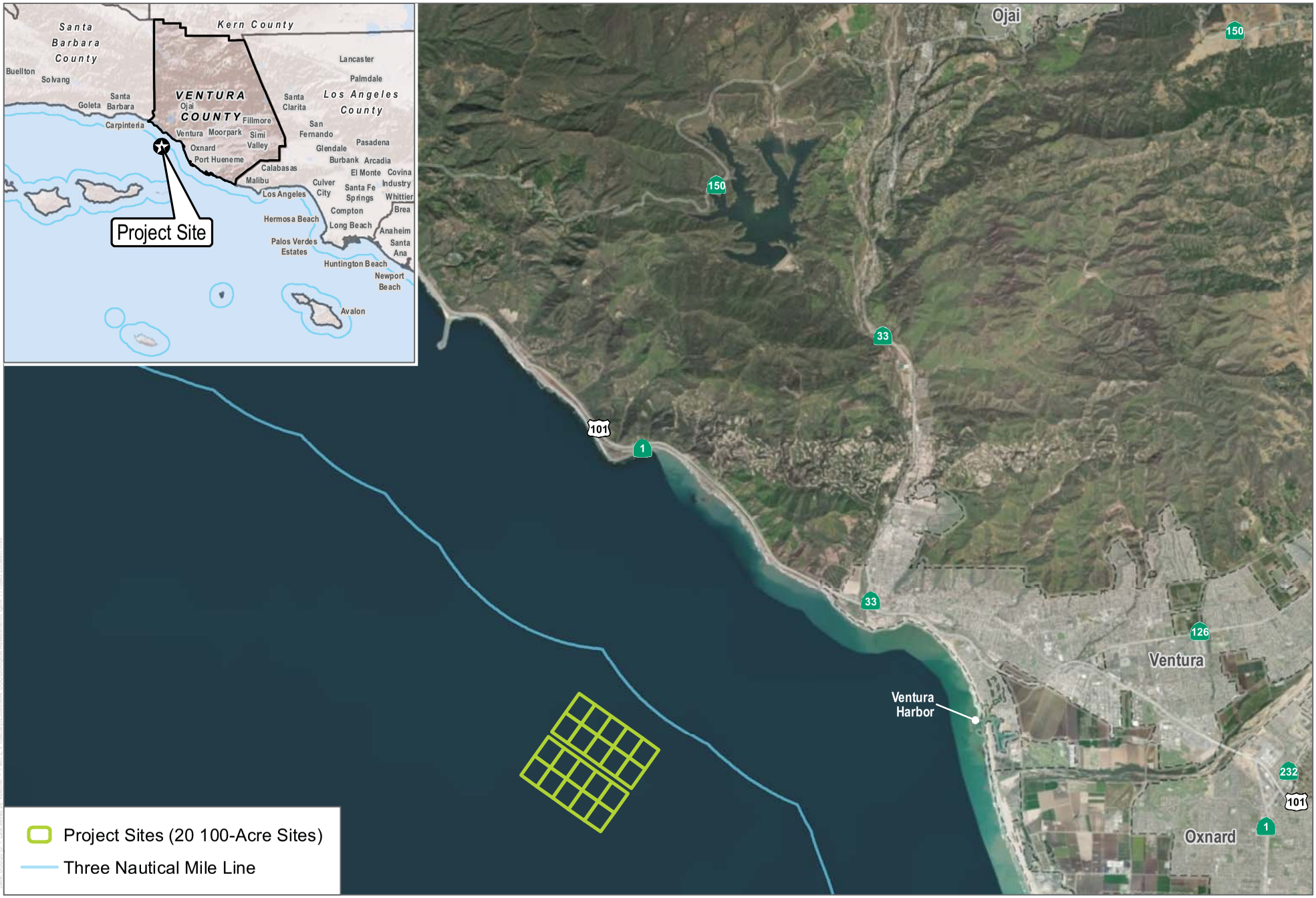
The project will consist of twenty 100-acre plots (total of 2,000 acres) located in open federal waters of the Santa Barbara Channel (Channel) in the Southern California Bight (SCB), northwest of Ventura Harbor (Figure 1), with approximate depths ranging from between 13 – 19 fathoms (78 – 114 feet) mean lower low water (MLLW). The plots are 3.53 miles from the shore. The closest distance to the 3-mile nautical line is 2,900 feet from the plots, with an average closest distance of over 3,000 feet. The closest distance to the City of Ventura limit is 4.5 miles. Ventura harbor is 4.1 miles from the closest plot (8 miles in distance to the most distant plot).The lease 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).

The project site is characterized by a gradually sloping sandy/soft bottom. The SCB is located along the curved coastline of Southern California from Point Conception south to Cape Colnett in Baja California and includes the Channel Islands and the Pacific Ocean. The habitats and biological communities of the SCB are influenced by dynamic relationships among climate, ecology, and oceanography (e.g., currents) (Leet et al. 2001). The SCB provides essential nutrients and marine habitats for a range of species and organisms. Submarine canyons, ridges, basins, and seamounts provide unique deep water habitats within the region. The basins provide habitats for a significant number of mid-water and benthic deep-sea fish near the Channel Islands, whereas nearshore areas provide habitats for kelp and seagrass communities. Nearshore geology includes a variety of bottom types, including soft sediments and rocky bottoms. Hard-substrates environments, such as the rocky intertidal, shallow subtidal reefs, and deep rock reefs, are a key component

of the high productivity found near the project area. Due to linkages among ecosystems, the impacts of ecosystem dynamics contained within the project area extend to interactions with species in the greater Eastern Pacific Ocean. The Santa Barbara Channel is located within the SCB and extends from Point Conception to Point Mugu.

The waters of the Santa Barbara Channel form one of the most biologically productive ecosystems found on Earth. Unlike most of coastal California, which faces due west and the open ocean, the coastal waters of the Santa Barbara Channel are on a south-facing coast and caught between two land masses, the South Coast and the Northern Channel Islands. The project site is 9.1 miles from the Channel Islands National Marine Sanctuary, a Federal Marine Protected Area, and 13.5 miles from the Channel Islands National Park boundary. The western section of the Santa Barbara Channel is a meeting place of the cool Northern California Current and warm Southern California Countercurrent. This type of ecosystem is called a "transition zone." Transition zones are known to promote large concentrations of both biomass and species diversity, as they are the confluence between two or more ecologically distinct systems. In addition, upwelling provides unusually high concentrations of nutrients, especially macrozooplankton, which are one of the primary driving forces behind the Santa Barbara Channel's biological productivity and diversity. Wind patterns around Point Conception and in the Santa Barbara Channel create frequent seasonal upwelling, which force deep nutrient-laden ocean waters to rise up the water column into the biologically rich euphotic zone (Santa Barbara Channelkeeper 2017). Data from last year, for the closest oceanographic buoy to the project site (Station 46217 Anacapa Passage), shows the following average wave action conditions for the project area: an average wave height of 1.04, with a dominant wave period of 10.1, and an average wave period of 6.49, with surface currents generally moving in a SW (249 degrees) direction and an average temperature of 16 °C (National Data Buoy Center 2017). The Ventura area is known to be an area of high swell height, particularly in the winter (Guza and O'Reilly 2001). Wave action is focused by the large fan of sediment deposited on the shelf from the Ventura and Santa Clara rivers. When deep water swell comes in from a WSW direction, these bathymetric features can focus the wave energy northward into the Ventura area. Wave action is slightly less in the summer months when the Channel Islands block southward swells (Guza and O'Reilly 2001).

ATTACHMENT 4



SOURCE: NAIP 2016

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0 6,250 12,500 Feet

FIGURE 1

Project Location

Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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2.0 DESCRIPTION OF PROJECT ACTIONS

The project will establish a commercial offshore bivalve aquaculture operation based from the Ventura Harbor in Ventura, California, focused on the cultivation of Mediterranean mussels (*Mytilus galloprovincialis*). Please refer to the Biological Assessment for the Ventura Shellfish Enterprise (Dudek 2018) and Proposed Best Management Practices to Mitigate Potential Adverse Project Impacts for additional project details.

2.1 Project Actions

2.1.1 PROJECT CONSTRUCTION

The proposed plots will be used for growing Mediterranean mussels via submerged longlines (Figures 2 and 3).

Installation of anchors, longlines, and other facilities will be performed by permitted shellfish companies, in compliance with all permit requirements. Submerged longlines consist of a horizontal structural header line, or "backbone," that is attached to the seafloor by sand screw anchors at each end and is marked and supported by a series of buoys along the central horizontal section. Sand screw anchors have been shown to exhibit superior holding power as compared to other anchoring systems and are removable. Sand screw anchors will be installed by a hydraulic drill with a drill head that operates from a rig lowered to the ocean floor. The sand screw anchors would be screwed into the sandy bottom ocean floor approximately 10 to 20 feet (3 to 6 meters) deep. Each 100-acre plot will contain up to 48 anchors for a total of 960 anchors at full project build out.

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 and Figure 3, surface buoys for each longline would 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 4 through 7. All surface buoys would be uniquely colored for each operator and 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 would be approximately 20 feet but would depend on the lifting capacity of the servicing vessel. The length of the central horizontal section of backbone line would be 575 feet, which would support approximately 8,000 feet of fuzzy cultivation line.

The shape of each of the 100-acre cultivation parcels would be a function of the geometry of the submerged backbone line and anchoring. 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. The submerged longline growing gear configuration would 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 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.

2.1.2 PROJECT OPERATION

The mussels will be grown and harvested by permitted growers/producers and landed at Ventura Harbor. Initial plantings of juvenile seed mussels, commonly referred to as spat, will be purchased from onshore hatcheries certified by the CDFW. At the hatcheries, mussels adhere directly to special textured ropes that promote mussel attachment and growth. When the seed are firmly settled to 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 until the mussels naturally attach with their byssal threads, after which the cotton material naturally degrades. These ropes are then attached to the longlines and buoys, as described above.

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), which will facilitate rapid detachment in the unlikely event of any interaction with the longline. To further minimize entanglement potential, a 1,100 pound 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 headrope are generally under tension partially equivalent (0 to 10 kilograms (0 to 22 pounds)) to their full buoyancy (42 kilograms (93 pounds)).

Cultivated mussels grow by filtering naturally occurring phytoplankton from the ocean. Harvesting involves separating the mussels from the ropes, followed by cleaning, sorting, and bagging. All of these activities will take place aboard the harvesting vessel. Juvenile mussels will grow on lines until an intermediate size where the density of mussels on the fuzzy rope becomes limiting. 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 at a reduced density for their second stage of grow out to market size. Maintenance and inspection of the longlines is proposed to be carried out on a monthly basis, which consists 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 shall take place at a minimum of twice per month. Inspections shall include recordings by depth/fish finder or ROV surveys of lines and/or monitoring performed by SCUBA divers.

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 would be home ported at Ventura Harbor. On average, between 20 to 40 boats would be traveling to the specific lease sites to conduct these activities on a three times per week to daily basis. The maximum distance traveled would be between the harbor and the farthest potential lease area, which could be up to approximately 8.7 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 Food and Drug Administration (FDA), recently began the process of developing NSSP-compliant sanitation protocols for bivalve shellfish cultivated in Federal waters.

Qualified researchers affiliated with universities (i.e., U.C. Santa Barbara - 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 Ventura Port District; 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. The Ventura Port District 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.

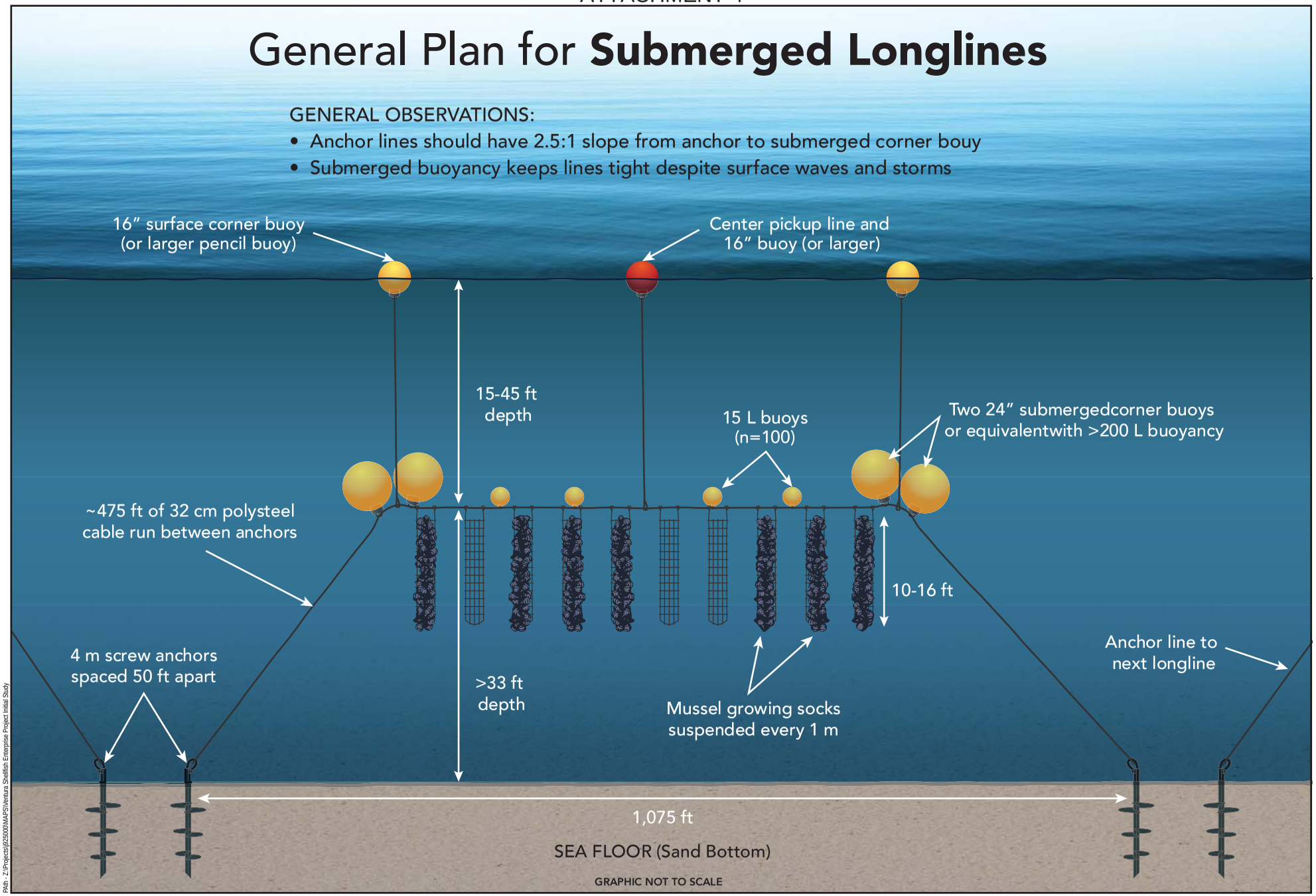

FIGURE 2

Detailed Plan for Shellfish Longlines

Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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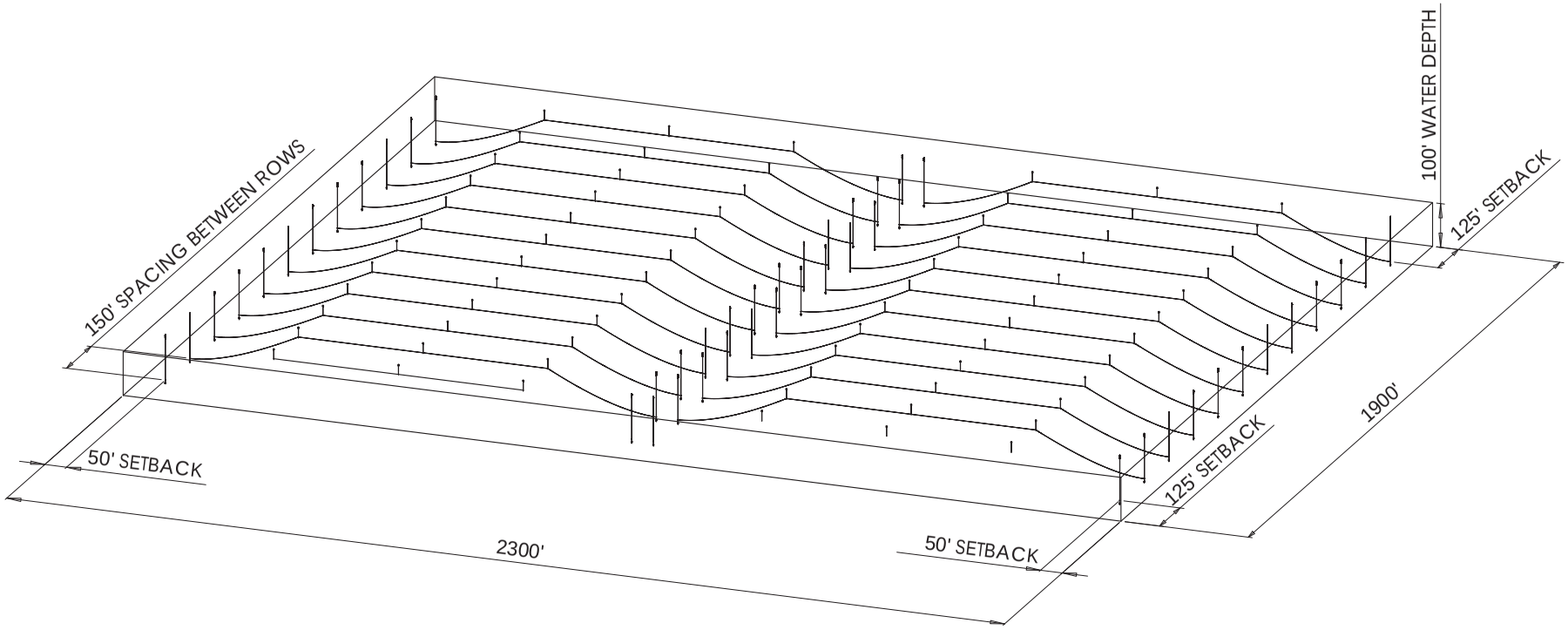

FIGURE **3A**

Parcel Array Overview

Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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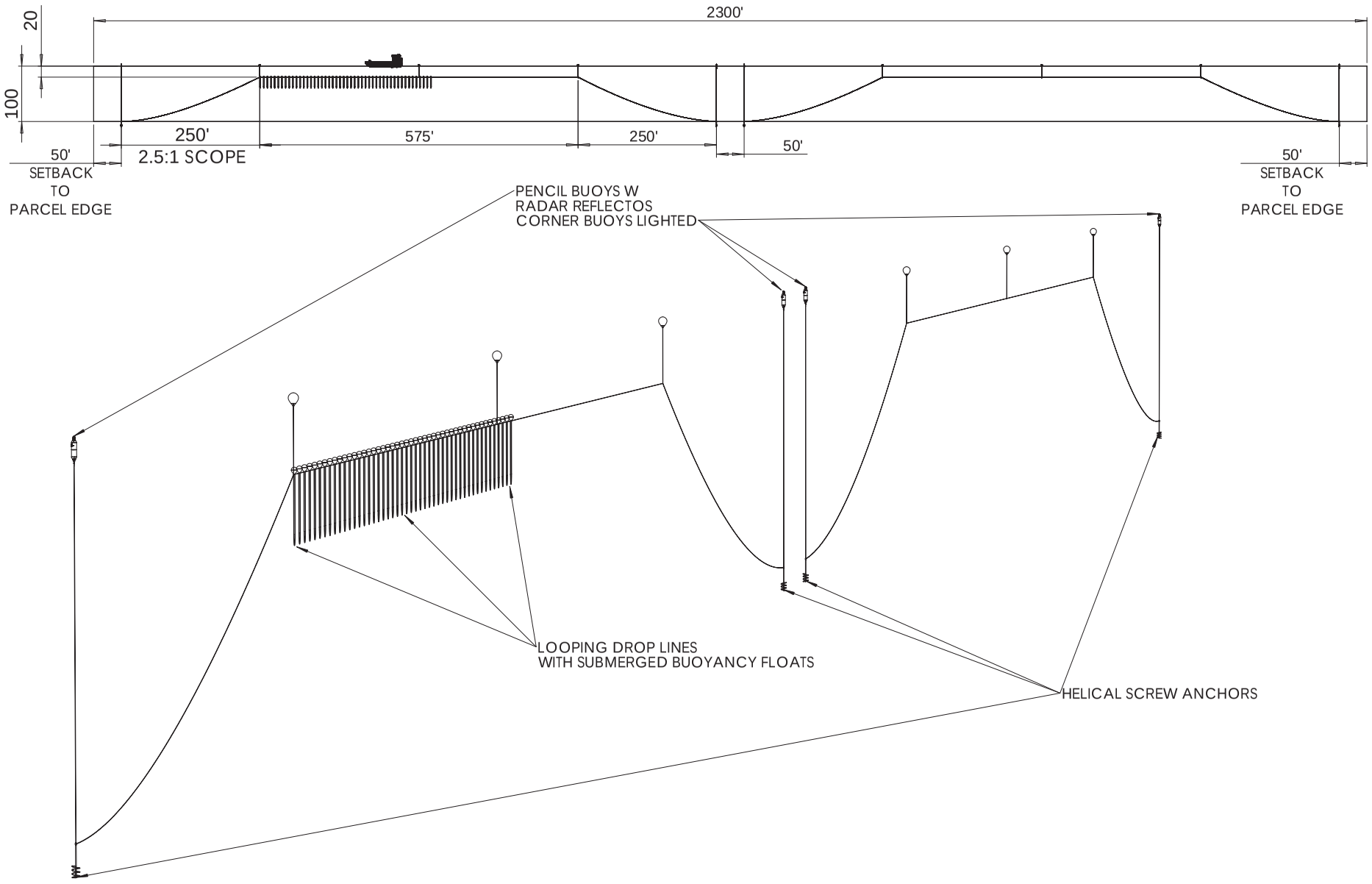

SOURCE: VSE 2018

FIGURE **3B**

Backbone Details

Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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FIGURE **4**

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

Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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FIGURE 5

Simulated View of Parcel Array at the Surface

Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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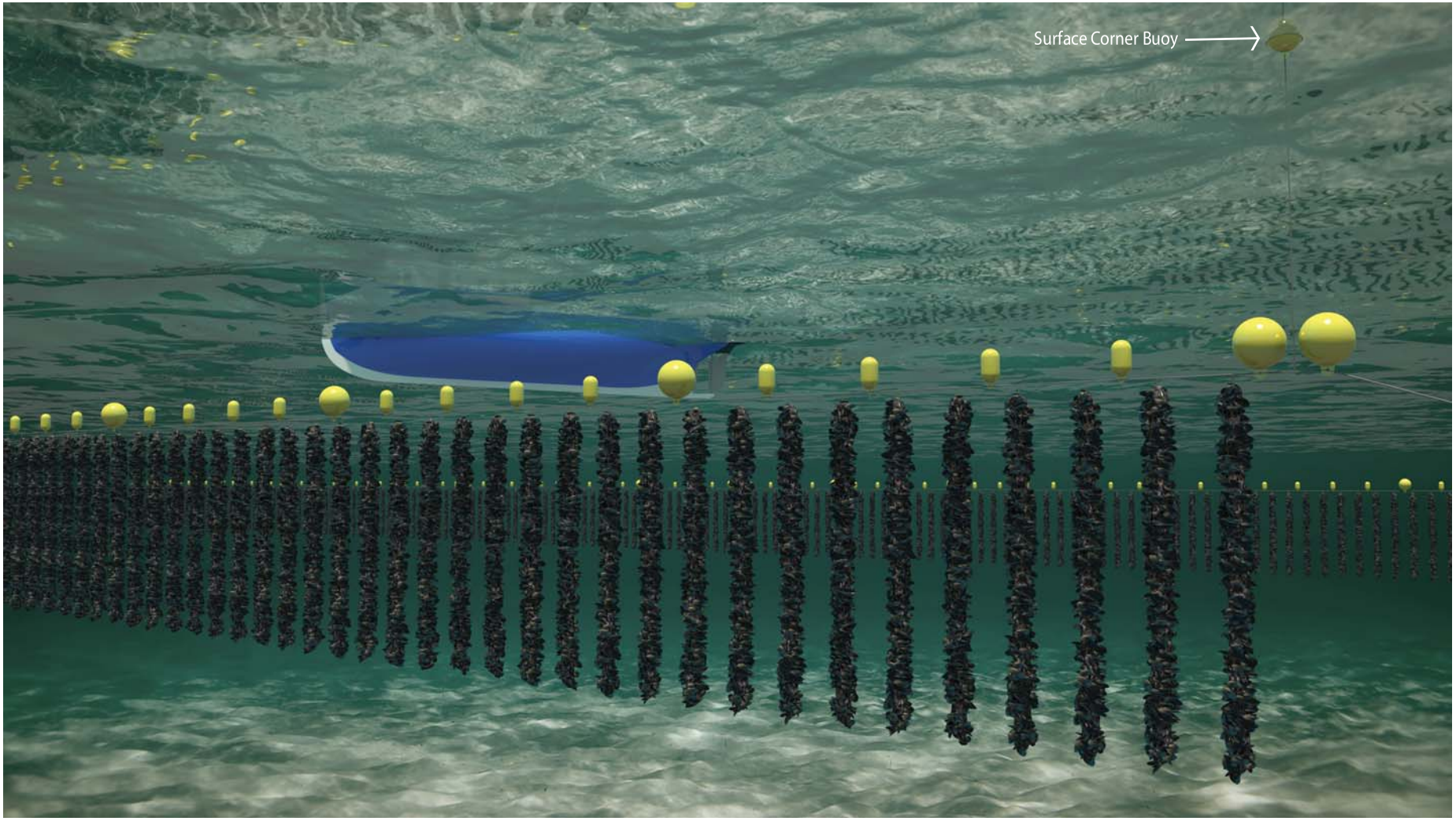

FIGURE 6 Simulated
View of Parcel Array Underwater
Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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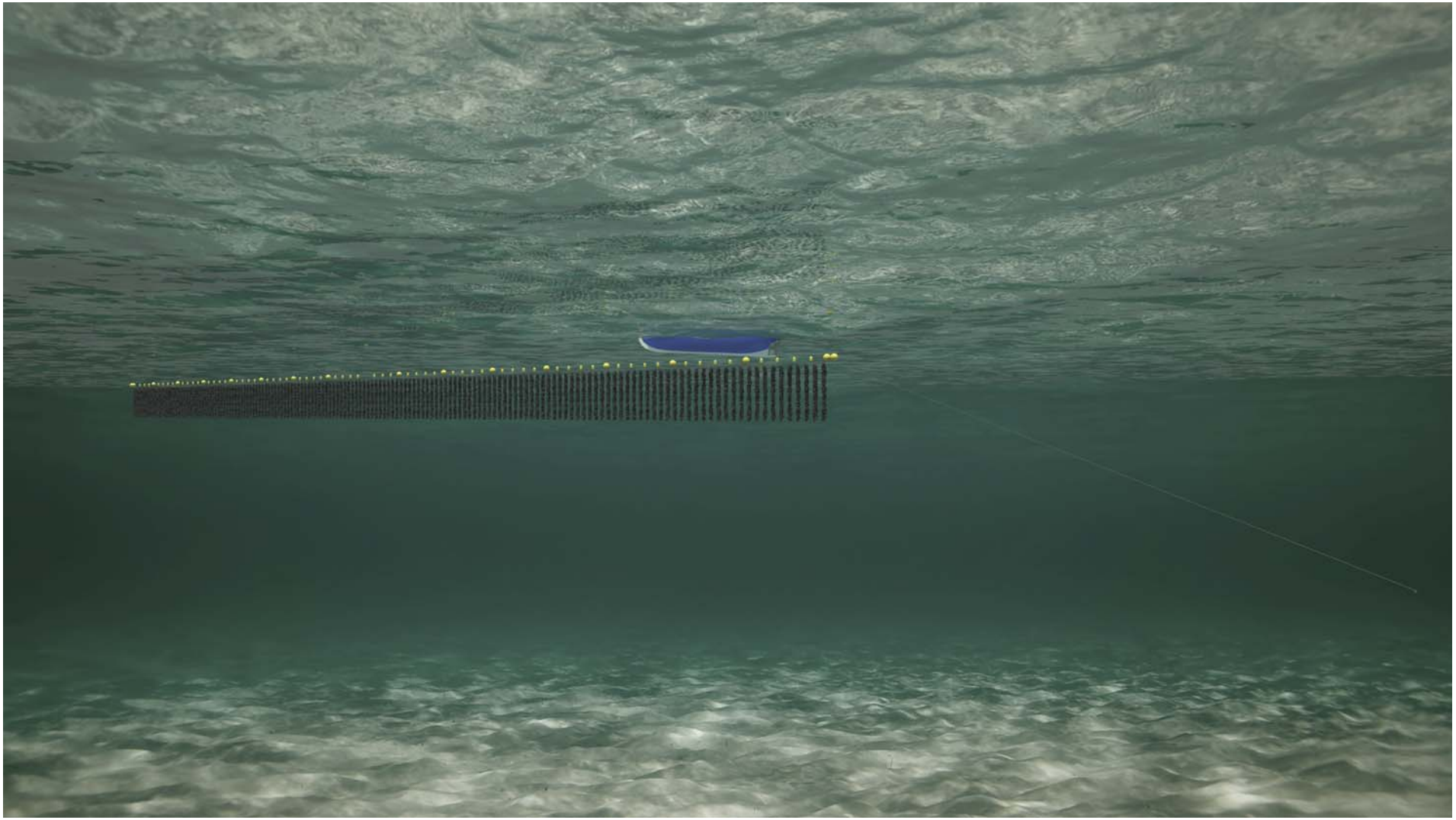

FIGURE 7

Simulated View of Parcel Array Underwater with Anchor Line

Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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2.2 Project Action Area

The Action Area for this project includes the project site (twenty 100-acre growing sites occupying a total project area of 2,000 acres) and all areas within 100 feet of the Project Actions (Figure 8). This Action Area was defined based upon several factors, including the project location and components, the potential noise impacts and disturbance areas for project components, and the properties of underwater acoustics. It is anticipated that the potential noise impacts from the initial installation of the sand screw anchors using a hydraulic drill will be minimal. Helical anchors for mussel farms in open ocean habitats have been installed all over the world, including at Catalina Island. They 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 50 hp hydraulic power pack on the boat (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 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 wildlife, especially cetaceans, are known to be sensitive to noise effects (eNMFS 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, we believe an action area of 100 feet is sufficient.

The Action Area is host to numerous human activities that interact with the natural environment. Human activities occurring in and near the Action Area potentially affecting listed species include both consumptive (removal, harvesting, or depletion risk of resources) and non-consumptive activities. Consumptive activities potentially affecting listed species include oil and gas development, vessel transportation within the busy shipping lanes in nearby waters, non-point source pollution (resulting from many sources of pollution), and commercial and recreational fishing. Recreational fishing charters use the area for baitfish collection. Commercial fishing occurring in the area includes trawling. The California Halibut Trawl Grounds are a designated area located offshore beginning approximately 1 nautical mile from the mainland shore between Point Arguello in Santa Barbara County and Point Mugu in Ventura County. California halibut (*Paralichthys californicus*) is a commercially important flatfish species caught in shallow waters off the Southern California coast.

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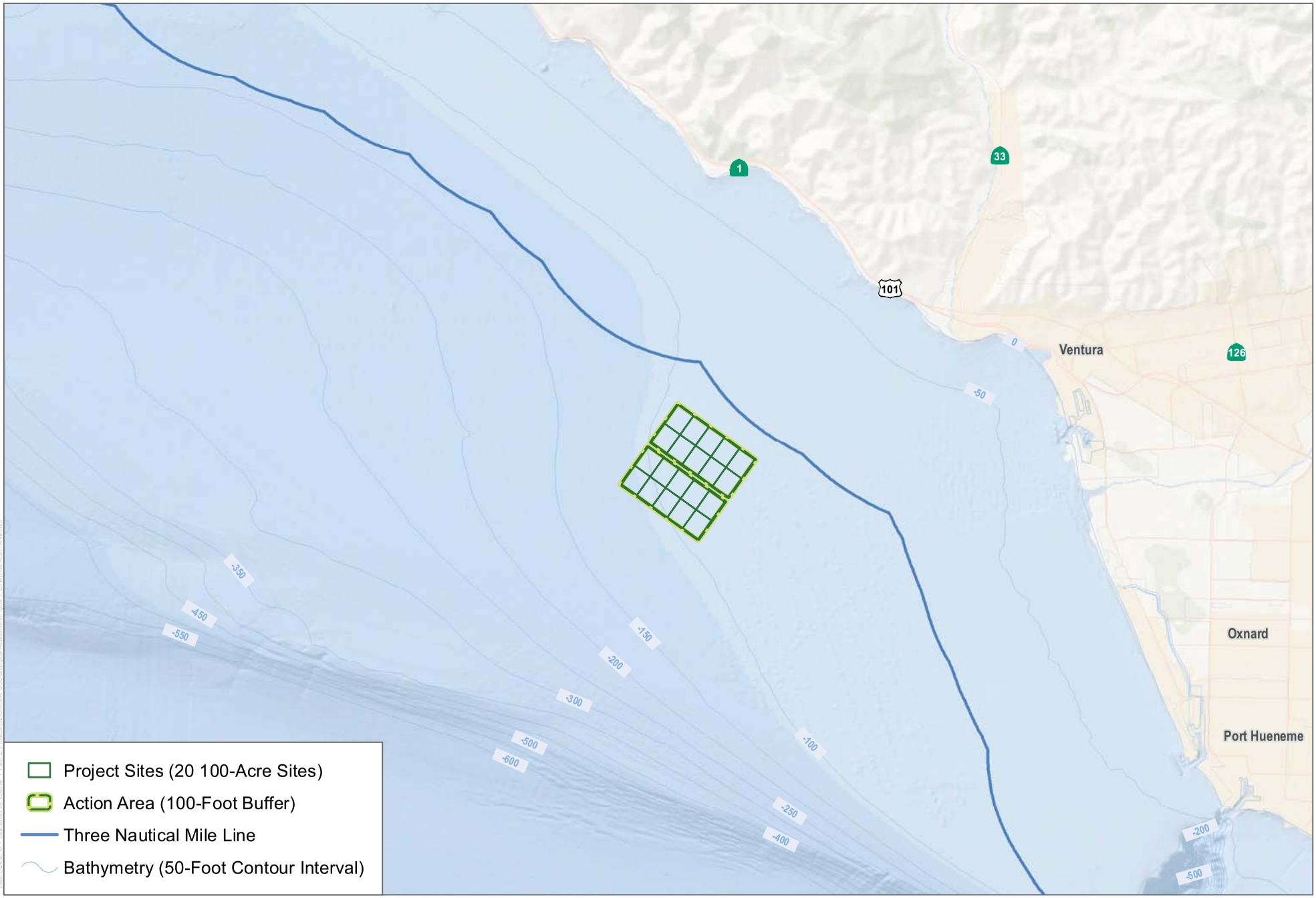

SOURCE: ESRI ArcGIS Online: World Ocean Base

DUDEK

0 1 2 Miles

FIGURE 8

Ventura Shellfish Enterprise Action Area

Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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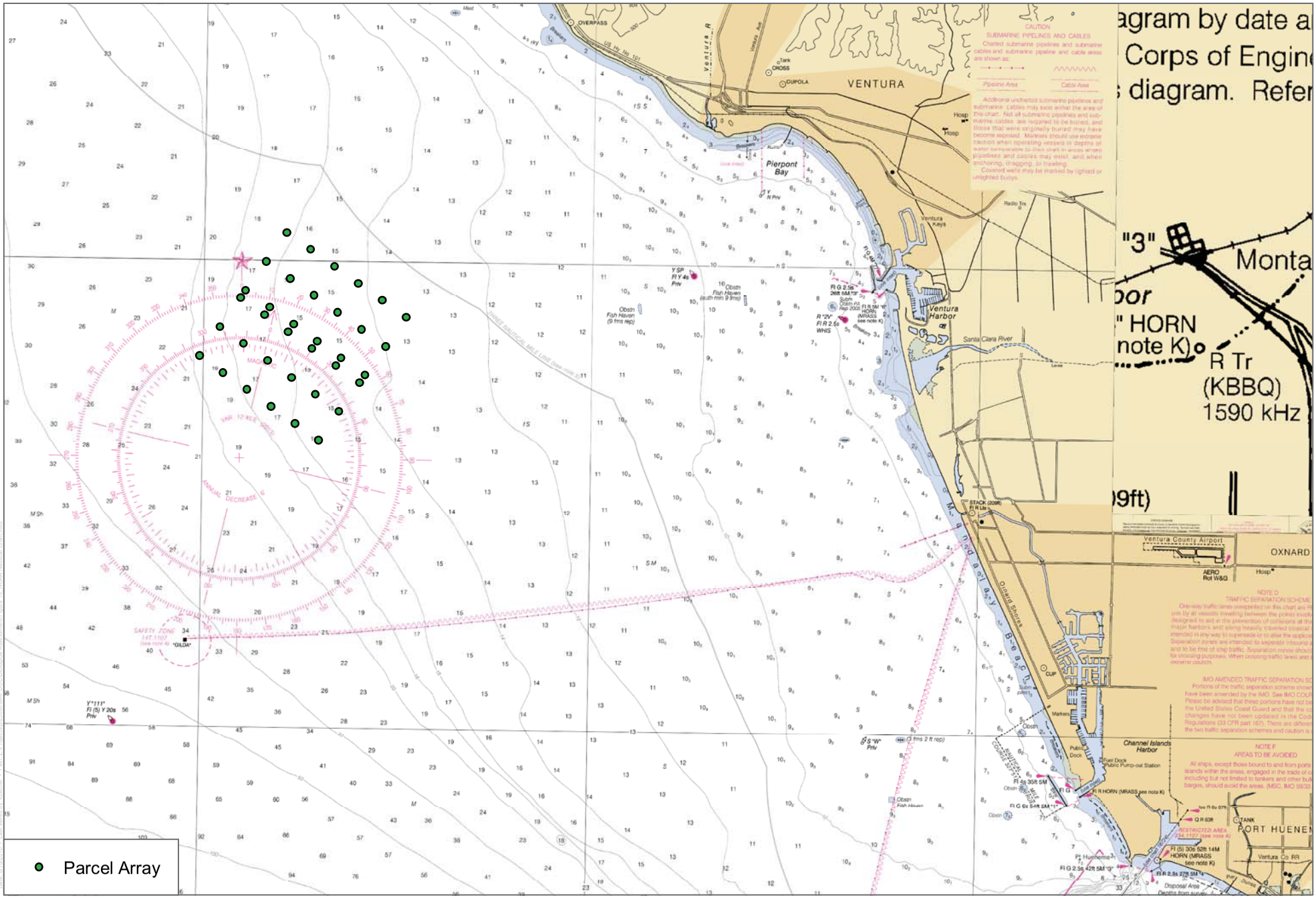

SOURCE: NOAA Raster Nautical Charts (RNC)

FIGURE 9

NOAA Nautical Chart

Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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0 0.75 1.5 Miles

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3.0 REGULATORY SETTING

Essential Fish Habitat 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.

3.1 Magnuson-Stevens Fishery Conservation and Management Act

The MSFCMA has jurisdiction over marine fishery resources in the United States. The MSFCMA was reauthorized and amended by the Sustainable Fisheries Act (SFA) of 1996 (Public Law 104-297) to include the EFH mandate. The SFA set forth a number of new directives for the NMFS, regional Fishery Management Councils (FMCs), and other federal agencies to identify and protect important marine, estuarine, and anadromous fish habitat. To that end, the SFA requires that regional FMCs prepare Fishery Management Plans (FMPs) for the identification, protection, and enhancement of EFH for federally "managed species." The goals of FMPs include the development and sustainability of an efficient and profitable fishery, optimal yield, adequate forage for dependent species, and long-term monitoring. The MSFCMA requires that all federal agencies consult with NMFS on all proposed actions permitted, funded, or undertaken by the agency that may adversely affect EFH. The main purpose of the EFH provisions is to avoid loss of fisheries due to disturbance and degradation of the fisheries habitat.

The Pacific Fishery Management Council (PFMC) is one of eight regional fishery management councils established by the MSFCMA. Under the MSFCMA, the federal government has jurisdiction to manage fisheries in the Exclusive Economic Zone (EEZ), which extends from the outer boundary of state waters (3 nautical miles [NM] from shore) to a distance of 200 NM from shore. With jurisdiction over the 822,817 km^2 (317,690 square miles) of EEZ off Washington, Oregon and California, the PFMC manages fisheries for approximately 120 species, including salmon, groundfish, coastal pelagic species (sardines, anchovies, and mackerel), and highly migratory species (tunas, sharks, and swordfish). The PFMC is also active in international fishery management organizations that manage fish stocks that migrate through the PFMC's area of jurisdiction, including the International Pacific Halibut Commission, the Western and Central Pacific Fisheries Commission (for albacore tuna and other highly migratory species), and the Inter-American Tropical Tuna Commission (for yellowfin tuna and other highly migratory species) (PFMC 2018). Management measures developed by the PFMC are recommended to the Secretary of Commerce through NMFS. Management measures are implemented by NMFS West Coast Regional offices and enforced by the National Oceanic and Atmospheric Administration (NOAA) Office of Law Enforcement, the 11th and 13th Coast Guard Districts, and local enforcement agencies (PFMC 2018).

Congress defined EFH to mean those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. In 2002, NMFS further clarified EFH with the following definitions (50 Code of Federal Regulations [CFR] §§ 600.05–600.930):

- "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate.
- "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities.
- "Necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10).

3.1.1 HABITAT AREAS OF PARTICULAR CONCERN (HAPC)

Habitat areas of particular concern (HAPC) are considered high priority areas for conservation, management, or research because they are rare, sensitive, stressed by development, or important to ecosystem function. The HAPC designation does not necessarily mean additional protections or restrictions are required for an area, but the designation helps to prioritize and focus conservation efforts. EFH guidelines identify HAPC as types or areas of habitat that are identified based on one or more of the following considerations:

- the importance of the ecological function provided by the habitat;
- the extent to which the habitat is sensitive to human-induced environmental degradation;
- whether, and to what extent, development activities are or will be stressing the habitat type; and
- the rarity of the habitat type.

These areas are detailed in EFH sections of FMPs and are summarized within the Regional Council Approaches to the Identification and Protection of Habitat Areas of Particular Concern. Current HAPC types are estuaries, canopy kelp, seagrass, rocky reefs, as well as Marine Protected Areas (MPAs) or Areas of Interest (such as banks, seamounts, and canyons). MPA's are further defined below.

3.1.1.1 Marine Protected Areas

The Southern California MPAs, from Point Conception to the California-Mexico border, cover areas of the Southern California Bight within state waters and islands. The 50 MPAs in this region cover approximately 356 square miles, or about 15% of Southern California state waters (CDFW 2016). The definition of the different MPA's are as follows:

State Marine Reserve (CCR Title 14, Section 632(a)(1)(A)): In a State Marine Reserve, it is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource, except under a scientific

collecting permit issued by the department pursuant to Section 650 or specific authorization from the commission for research, restoration, or monitoring purposes.

State Marine Conservation Area (CCR Title 14, Section 632(a)(1)(C)): In a State Marine Conservation Area, it is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource for commercial or recreational purposes, or a combination of commercial and recreational purposes except as specified in individual MPA regulations. The department may issue scientific collecting permits pursuant to Section 650. The commission may authorize research, education, and recreational activities, and certain commercial and recreational harvest of marine resources, provided that these uses do not compromise protection of the species of interest, natural community, habitat, or geological features.

Special Closure: An area designated by the Fish and Game Commission that prohibits access or restricts boating activities in waters adjacent to sea bird rookeries or marine mammal haul-out sites (restrictions vary).

The closest state or federal marine protected area is the Channel Islands National Marine Sanctuary, a Federal Marine Protected Area, located approximately 9.1 miles from the project site.

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4.0 MANAGED FISHERIES AND HABITAT AREAS OF PARTICULAR CONCERN

The PFMC has approved FMPs for salmon, groundfish, coastal pelagic species, and highly migratory species. The species that have designated EFH in the Action Area may occur in any of several life stages, from larvae to adults, and may include presence at depths or distances beyond the direct influence of the project actions.

4.1.1 SALMON

Salmon EFH for estuarine and marine areas is identified in an area north of the project site that extends from north of Point Conception, California to the northern Washington boarder (PFMC 2008) (Appendix A: Groundfish EFH and HAPC Maps); therefore, no Pacific salmon EFH is designated in the Action Area. Chinook and coho salmon are the main salmon species managed by the PFMC. Chinook salmon are caught commercially and recreationally as far south as Santa Barbara County, located north of the project site. Appendix B: California Commercial Landing for 2017 provides a summary of total fish landed (in pounds) and value (in USD) for the Santa Barbara Area defined as all ports in San Luis Obispo, Santa Barbara, and Ventura Counties. Southern California coast steelhead (steelhead; *Oncorhynchus mykissis*), a salmonid, is federally endangered and managed under the ESA by NMFS. No commercial or recreation landing is permitted for steelhead in the Santa Barbara Area.

4.1.2 GROUNDFISH

The Pacific Coast Groundfish Fishery Management Plan (Groundfish FMP) manages 90-plus species over a large and ecologically diverse area from the Pacific coast border with Mexico to the Pacific coast border with Washington and Canada (PFMC 2016). Information on the life histories and habitats of these species varies in completeness, so while some species are well studied, there is relatively little information on certain other species. Information about the habitats and life histories of the species managed by the Groundfish FMP will certainly change over time, with varying degrees of information improvement for each species. For these reasons, it is impractical for the PFMC to include descriptions identifying EFH for each life stage of the managed species in the body of the FMP (PFMC 2016).

The Action Area is located in designated EFH as defined in the Groundfish FMP (PFMC 2016a) (Appendix A: Groundfish EFH and HAPC Maps). Because the EFH determination from this FMP addresses such a large number of species, it covers areas out to 3,500 meters in depth, shoreline areas up to the MHHW line, and areas up coastal rivers where ocean-derived salinity is at least 0.5 parts per thousand during average annual low flows. The FMP also identifies HAPCs.

The PFMC defines EFH for groundfish as the aquatic habitat necessary to allow for groundfish production to support long-term sustainable fisheries for groundfish and for groundfish contributions to a healthy

ecosystem. The overall EFH for adult and juvenile groundfish, as well as for the pelagic eggs and larvae of groundfish, is designated as the water column and all bottom habitat extending from the shoreline to a depth of 400 meters (m) (200 fathoms) encompassing the steep drop-offs and high relief habitats (i.e., seamounts) that are important for bottomfish (PFMC 1998).

This EFH identification is precautionary because it is based on the currently known maximum depth distribution of all life stages of federally managed species (PFMC 2016).

Potential for Occurrence. EFH is present in the Action Area for over 79 species of groundfish; however, no HAPC for these species is known to occur based on available literature. The Action Area is soft-bottom habitat between 13 – 19 fathoms (78 – 114 feet) MLLW. The Groundfish EFH are shown in Table 1 below. Groundfish that has a high potential to utilize the habitat within the Action Area are flatfish, including sand flounders (Family Paralichthyidae): Pacific sanddab and California halibut; as well as righteye flounders (Family Pleuronectidae): English sole and dover sole. There is low potential for suitable habitat for roundfish or rockfish to utilize the sandy bottom habitat found in the Action Area. These species are primarily found over hard substrate, rocky reef, and/or kelp forest habitats, which are not found within the Action Area (please refer to Table 1).

Table 1
Groundfish EFH in the Action Area

Common Name	Species Name	Fish Species Present in Santa Barbara Area	Commercial Landings in Pounds6	General Habitat Preference	Potential to Occur in Action Area
ELASMOBRANCHS					
Big skate	*Raja binoculata*	Yes	0	Soft bottom habitats [2, 5]	Yes
California skate	*Raja inornata*	Yes	32	Soft bottom habitats [2, 5]	Yes
Leopard shark	*Triakis semifasciata*	Yes	3,523	Soft bottom habitats [2, 5]	Yes
Longnose skate	*Raja rhina*	Yes	2,710	Soft bottom habitats [2, 5]	Yes
Spiny dogfish	*Squalus suckleyi*	Yes	347	Soft bottom habitats [2, 5]	Yes
GRENADIERS					
Pacific rattail	*Coryphaenoides acrolepis*	Yes	0	Soft bottom habitats	No
MORIDS					
Finescale codling	*Antimora microlepis*	Yes	0	Unknown	No
RATFISH					
Ratfish	*Hydrolagus colliei*	Yes	0	Soft and hard substrate [3]	Yes

Table 1
Groundfish EFH in the Action Area

Common Name	Species Name	Fish Species Present in Santa Barbara Area	Commercial Landings in Pounds6	General Habitat Preference	Potential to Occur in Action Area
ROUNDFISH					
Cabezon	*Scorpaenichthys marmoratus*	Yes	5,989	Hard substrate and kelp [1, 3, 5]	No
Kelp greenling	*Hexagrammos decagrammus*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Lingcod	*Ophiodon elongatus*	Yes	45,688	Hard substrate and kelp [1, 3, 5]	No
Pacific cod	*Gadus macrocephalus*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Pacific whiting (hake)	*Merluccius productus*	Yes	148	Open water and hard substrate [3, 5]	No
Sablefish	*Anoplopoma fimbria*	Yes	328,296	Hard substrate and kelp [1,3,5]	No
ROCKFISH					
Aurora rockfish	*Sebastes aurora*	Yes	71	Hard substrate and kelp [1, 3, 5]	No
Bank rockfish	*S. rufus*	Yes	561	Hard substrate and kelp [1, 3, 5]	No
Black rockfish	*S. melanops*	Yes	4	Hard substrate and kelp [1, 3, 5]	No
Black and yellow rockfish	*S. chrysomelas*	Yes	492	Hard substrate and kelp [1, 3, 5]	No
Blackgill rockfish	*S. melanostomus*	Yes	8,638	Hard substrate and kelp [1, 3, 5]	No
Blue rockfish	*S. mystinus*	Yes	2,293	Hard substrate and kelp [1, 3, 5]	No
Bocaccio	*S. paucispinis*	Yes	6,563	Hard substrate and kelp [1, 3, 5]	No
Bronzespotted rockfish	*S. gilli*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Brown rockfish	*S. auriculatus*	Yes	121	Hard substrate and kelp [1, 3, 5]	No
Calico rockfish	*S. dallii*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Canary rockfish	*Sebastes pinniger*	Yes	1,363	Hard substrate and kelp [1, 3, 5]	No
Chilipepper	*S. goodei*	Yes	326	Hard substrate and	No

Table 1
Groundfish EFH in the Action Area

Common Name	Species Name	Fish Species Present in Santa Barbara Area	Commercial Landings in Pounds6	General Habitat Preference	Potential to Occur in Action Area
rockfish				kelp [1, 3, 5]	
China rockfish	*S. nebulosus*	Yes	1	Hard substrate and kelp [1, 3, 5]	No
Copper rockfish	*S. caurinus*	Yes	8,903	Hard substrate and kelp [1, 3, 5]	No
Cowcod	*S. levis*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Darkblotched rockfish	*S. crameri*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Dusky rockfish	*S. ciliatus*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Flag rockfish	*S. rubrivinctus*	Yes	96	Hard substrate and kelp [1, 3, 5]	No
Gopher rockfish	*S. carnatus*	Yes	989	Hard substrate and kelp [1, 3, 5]	No
Grass rockfish	*S. rastrelliger*	Yes	9,899	Hard substrate and kelp [1, 3, 5]	No
Greenblotched rockfish	*S. rosenblatti*	Yes	59	Hard substrate and kelp [1, 3, 5]	No
Greenspotted rockfish	*S. chlorostictus*	Yes	2,481	Hard substrate and kelp [1, 3, 5]	No
Greenstriped rockfish	*S. elongatus*	Yes	185	Hard substrate and kelp [1, 3, 5]	No
Harlequin rockfish	*S. variegatus*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Honeycomb rockfish	*S. umbrosus*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Kelp rockfish	*S. atrovirens*	Yes	409	Hard substrate and kelp [1, 3, 5]	No
Mexican rockfish	*Sebastes macdonaldi*	Yes	8	Hard substrate and kelp [1, 3, 5]	No
Olive rockfish	*S. serranoides*	Yes	63	Hard substrate and kelp [1, 3, 5]	No
Pink rockfish	*S. eos*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Pacific ocean perch	*S. alutus*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Quillback rockfish	*S. maliger*	Yes	0	Hard substrate and kelp [1, 3, 5]	No

Table 1
Groundfish EFH in the Action Area

Common Name	Species Name	Fish Species Present in Santa Barbara Area	Commercial Landings in Pounds6	General Habitat Preference	Potential to Occur in Action Area
Redbanded rockfish	*S. babcocki*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Redstripe rockfish	*S. proriger*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Rosethorn rockfish	*S. helvomaculatus*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Rosy rockfish	*S. rosaceus*	Yes	20	Hard substrate and kelp [1, 3, 5]	No
Rougheye rockfish	*S. aleutianus*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Sharpchin rockfish	*S. zacentrus*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Shortbelly rockfish	*S. jordani*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Shortraker rockfish	*S. borealis*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Silvergray rockfish	*Sebastes brevispinis*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Speckled rockfish	*S. ovalis*	Yes	586	Hard substrate and kelp [1, 3, 5]	No
Splitnose rockfish	*S. diploproa*	Yes	29	Hard substrate and kelp [1, 3, 5]	No
Squarespot rockfish	*S. hopkinsi*	Yes	22	Hard substrate and kelp [1, 3, 5]	No
Starry rockfish	*S. constellatus*	Yes	720	Hard substrate and kelp [1, 3, 5]	No
Stripetail rockfish	*S. saxicola*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Tiger rockfish	*S. nigrocinctus*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Treefish	*S. serriceps*	Yes	375	Hard substrate and kelp [1, 3, 5]	No
Vermilion rockfish	*S. miniatus*	Yes	63,684	Hard substrate and kelp [1, 3, 5]	No
Widow rockfish	*S. entomelas*	Yes	88	Hard substrate and kelp [1, 3, 5]	No
Yelloweye rockfish	*S. ruberrimus*	Yes	0	Hard substrate and kelp [1, 3, 5]	No

Table 1
Groundfish EFH in the Action Area

Common Name	Species Name	Fish Species Present in Santa Barbara Area	Commercial Landings in Pounds6	General Habitat Preference	Potential to Occur in Action Area
Yellowmouth rockfish	*S. reedi*	Yes	0	Hard substrate and kelp [1, 3, 5]	No
Yellowtail rockfish	*S. flavidus*	Yes	1,277	Hard substrate and kelp [1, 3, 5]	No
Speckled rockfish	*S. ovalis*	Yes	586	Hard substrate and kelp [1, 3, 5]	No
SCORPIONFISH					
California scorpionfish	*Scorpaena gutatta*	Yes	673	Hard substrate and kelp [1, 3, 5]	No
THORNYHEAD					
Longspine thornyhead	*Sebastolobus altivelis*	Yes	19,336	Hard substrate and kelp [1, 3, 5]	No
Shortspine thornyhead	*Sebastolobus alascanus*	Yes	260,605	Hard substrate and kelp [1, 3, 5]	No
FLATFISH					
Arrowtooth flounder (turbot)	*Atheresthes stomias*	Yes	0	Soft bottom habitats 2, 5	Yes
Butter sole	*Isopsetta isolepis*	Yes	2,078	Soft bottom habitats [2, 5]	Yes
Curlfin sole	*Pleuronichthys decurrens*	Yes	25	Soft bottom habitats [2, 5]	Yes
Dover sole	*Microstomus pacificus*	Yes	323	Soft bottom habitats [2, 5]	Yes
English sole	*Parophrys vetulus*	Yes	2,538	Soft bottom habitats [2, 5]	Yes
Flathead sole	*Hippoglossoides elassodon*	Yes	0	Soft bottom habitats [2, 5]	Yes
Pacific sanddab	*Citharichthys sordidus*	Yes	3,126	Soft bottom habitats [2, 5]	Yes
Petrale sole	*Eopsetta jordani*	Yes	2,322	Soft bottom habitats [2, 5]	Yes
Rex sole	*Glyptocephalus zachirus*	Yes	0	Soft bottom habitats [2, 5]	Yes
Rock sole	*Lepidopsetta bilineata*	Yes	865	Soft bottom habitats [2, 5]	Yes
Sand sole	*Psettichthys melanostictus*	Yes	228	Soft bottom habitats [2, 5]	Yes
Starry flounder	*Platichthys stellatus*	Yes	0	Soft bottom habitats [2, 5]	Yes

Table 1
Groundfish EFH in the Action Area

Common Name	Species Name	Fish Species Present in Santa Barbara Area	Commercial Landings in Pounds6	General Habitat Preference	Potential to Occur in Action Area
California halibut[7]	*Paralichthys californicus*	Yes	148,763	Soft bottom habitats [2, 5]	Yes

1 Kelp Canopy/Forest
2 Seagrass
3 Rocky Reefs
4 Estuaries
5 AOI/MPAs
6 CDFW Commercial Landings Data for 2017 (Appendix B)
7 Non-MSFCMA species. Managed by the California Department of Fish and Wildlife.

Of the flatfish, California halibut, a state regulated species, is the most important commercial fishery for the Santa Barbara Area with 148,763 lbs. landed in 2017 (Table 1, CDFW 2017). More specifically, commercial catch for the California halibut in two blocks that overlap the Action Area, Blocks 0664 and 0665, were reviewed for landings between 2010 to 2016 (Appendix B and C). During those years, an approximate total of 84,524 lbs., or 1.12% of the total catch of all landings from these two blocks, were landed for California halibut; however, for the Santa Barbara Area, California halibut caught in Blocks 0664 and 0665 represent approximately 26 % to 37% of halibut landed for the area (Table 2; Figures 10 and 11). Further, based upon CDFW trawl data from 2012 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.

While the approximately 2,000 acre proposed site location does overlap with some known halibut trawl fishery activity in Block 0664 (21,363 acres) and 0665 (66,613 acres) 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. Given the small amount of existing usage and conversion of approximately 2.27% of the blocks into a viable commercial mussel aquiculture, the impact to the halibut trawl fishery is considered to be negligible. In the Aquaculture Siting Analysis Results for Ventura Shellfish Enterprise (NOAA/National Ocean Services /National Centers for Coastal Ocean Science (NOS/NCCOS)), halibut trawling data was used along with other variables to determine the most suitable project location and layout. This Siting Analysis utilized the best available, high-resolution spatial data to represent key potential environmental and use conflicts that constrain the siting of an aquaculture operation within the Santa Barbara Channel region of interest. The Siting Analysis confirmed that the proposed site location is in the area that minimizes use conflicts, including fishery conflicts, to the greatest extent possible.

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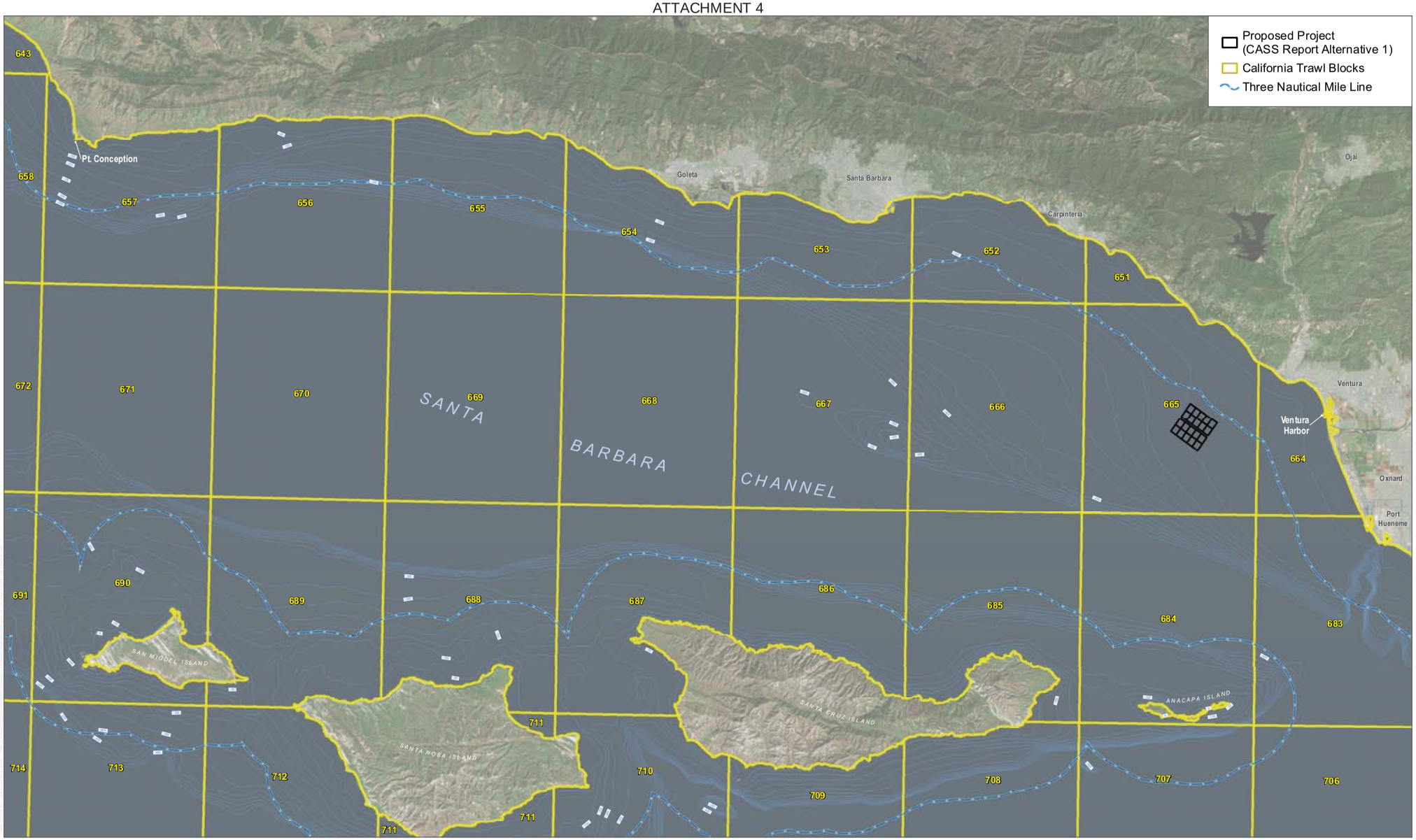

SOURCE: California Department of Fish and Game, Marine Region

DUDEK

0 1 2 3 Nautical Miles

FIGURE 10

California Trawl Blocks - Santa Barbara Channel

Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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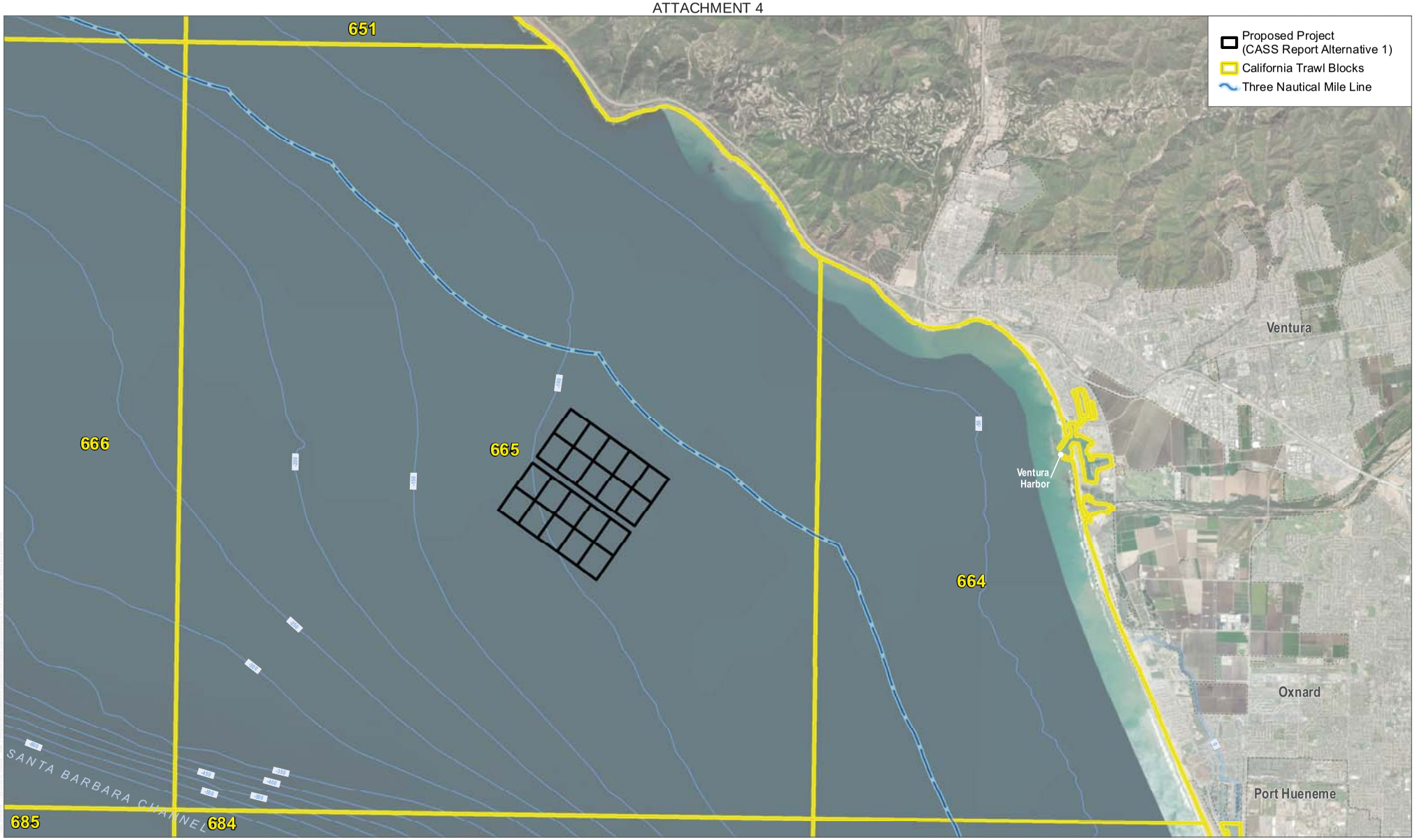

SOURCE: California Department of Fish and Game, Marine Region

DUDEK

FIGURE 11

California Trawl Blocks - Blocks 664 and 665

Essential Fish Habitat Assessment for the Ventura Shellfish Enterprise Project

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Table 2
California Halibut Regional and Trawl Block Landings in Pounds

Year	Santa Barbara Area[1]	Blocks 0664 and 0665[2]	Percentage of Regional Landings
2016	125,684	35,263	28%
2015	99,977	36,326	36%
2014	77,603	21,253	27%
2013	94,593	34,643	37%
2012	111,497	28,629	26%

1 Santa Barbara Area includes ports located in San Luis Obispo, Santa Barbara, and Ventura Counties
2. California halibut caught in Blocks 0664 and 0665 are primarily landed in Santa Barbara Area, but may be landed in ports outside of the Santa Barbara Area.

4.1.3 COASTAL PELAGIC SPECIES

Coastal pelagic species (CPS) include finfish (northern anchovy, Pacific sardine, Pacific mackerel, and jack mackerel) and California market squid as well as krill (PFMC 2016). Pacific herring (*Clupea pallasii pallasii*) and jacksmelt (*Atherinopsis californiensis*) are also included in the Coastal Pelagic FMP as Ecosystem Component Species. EFH designation for CPS is based on a thermal range bordered within the geographic area where a species occurs at any life stage, where the species has occurred historically during periods of similar environmental conditions, or where environmental conditions do not preclude colonization by the species. The east-west geographic boundary of EFH for each individual CPS finfish and California market squid is defined to be all marine and estuarine waters from the shoreline along the coasts of California, Oregon, and Washington to offshore to the limits of the U.S. EEZ and above the thermocline where sea surface temperatures range between 10°C to 26°C (50°F to 78.8°F). The southern extent of EFH for CPS finfish is the United States–Mexico maritime boundary. The northern EFH extent is the position of the 10°C (50°F) isotherm varying both seasonally and annually (PFMC 1998).

The northern anchovy historically ranged from the Queen Charlotte Islands, British Columbia, south to Cabo San Lucas, Baja California. More recently, populations have moved into the Gulf of California, Mexico. Larvae and juveniles are often abundant in nearshore areas and estuaries with adults being more pelagic; however, adults may also be found in shallow nearshore areas and estuaries. Anchovy are non-migratory but do make extensive inshore-offshore and along-shore movements (Emmett et al. 1991). During historic periods of high abundance (from the early part of the 20th century into the 1940s) Pacific sardines ranged from the Gulf of California north to Washington State before the fishery crashed in the 1950s. Today, large populations still occur south of Point Conception into Baja California. The Pacific sardine is epipelagic, occurring in loosely aggregated schools. When abundant, this species can occur up to 150 miles offshore (Wolf et al. 2001). Jack mackerel and Pacific mackerel occur from Santa Maria Bay, Mexico to Yaquina Bay, Oregon. They occur in California bays, estuaries and coastal pelagic ocean waters throughout the year. Both species are schooling fish which prefer shallow water less than 100 feet deep and are most common at depths of 5 to 50 feet deep (CDFW 2013). All coastal pelagics are associated

with the water column except for the female market squid, which lays egg masses on sandy bottoms at depths of about 15–180 feet. The market squid ranges coastally from Baja California to Alaska and can be found within 200 miles of the shore (PFMC 2008).

The Ventura Harbor plays a substantial role in California's commercial fishing industry. Market squid remains California's largest and most lucrative commercial fishery, valued at over $73 million in 2010. In 2011, nearly 33 thousand tons of squid, representing 28% of the state's total catch limit, was unloaded at the Ventura Harbor, making it one of the largest squid landings on the West Coast. Squid generated $16 million in revenues for the fishing companies that operate at the harbor (The California Economic Forecast, 2012).

Table 3
Coastal Pelagic Species in the Action Area

Common Name	Scientific Name	Commercial Landing in Pounds[1]	General Habitat
Northern Anchovy	*Engraulis mordax*	93,862	Open water
Pacific Sardine	*Sardinops sagax*	203,780	Open water
Pacific Mackerel	*Scomber japonicus*	534,813	Open shallow water
Jack Mackerel	*Trachurus symmetricus*	8,697	Open shallow water
Market Squid	*Doryteuthis opalescens*	87,461,026	Open water

1 CDFW Landing Data for 2017 for the Santa Barbara Area (caught in California water) (Appendix B)

Potential for Occurrence. All coastal pelagic species are found in the Action Area. The market squid is the most important of these fisheries. Using the NOS Siting Analysis discussed above, the project site was located in an area that avoids key market squid fishing areas, which occur significantly south of the proposed project site.

4.1.4 HIGHLY MIGRATORY SPECIES

The Highly Migratory Species (HMS) FMP includes important species of tunas, billfish, and sharks, which are harvested by West Coast HMS fisheries. HMS managed under the HMS FMP include tunas (North Pacific albacore, yellowfin tuna, bigeye tuna, skipjack tuna, and pacific bluefin tuna), sharks: common thresher shark, shortfin mako shark, and blue shark), billfish/swordfish (striped marlin and swordfish), and dorado or dolphinfish (Table 4).

Table 4
Highly Migratory Species in the Action Area

Common Name	Scientific Name	Commercial Landing in Pounds[1]	EFH Present	General Habitat
Tunas				
Northern Pacific Albacore	*Thunnus alalunga*	1,528	No	Open water
Yellowfin Tuna	*Thunnus albacares*	351	No	Open water

Table 4
Highly Migratory Species in the Action Area

Common Name	Scientific Name	Commercial Landing in Pounds[1]	EFH Present	General Habitat
Bigeye tuna	*Thunnus obesus*	0	No	Open water
Skipjack tuna	*Katsuwonus pelamis*	0	No	Open water
Pacific bluefin tuna	*Thunnus thynnus*	242	No	Open water
Sharks				
Blue shark	*Prionace glauca*	37	No	Open water
Common thresher shark	*Alopias vulpinus*	26,035	Yes	Open water
Shortfin mako	*Isurus oxyrinchus*	7,571	Yes	Open water
Marlin and Swordfish				
Striped marlin	*Kajikia audax*	0	No	Open water
Swordfish	*Xiphias gladius*	81,890	No	Open water
Other				
Dorado	*Coryphaena hippurus*	0	Yes	Open water

[1] CDFW Landing Data for 2017 for the Santa Barbara Area (caught in California water) (Appendix B)

Potential for Occurrence. Thresher shark, shortfin mako shark, and dorado EFH are found in the Action Area. These are highly migratory and mobile species that have large ranges and could seasonally move through the Action Area.

4.2 Habitat Areas of Particular Concern

In the Southern California Bight, there are seven EFHs in state waters: Point Conception, Potato Bank, Hidden Reef Kidney Bank, Catalina Island, Cherry Bank, Cowcod Conservation Area- west, and Cowcod Conservation Area- east.

In the Santa Barbara Channel area, there are five types of HAPCs: Seagrass, Canopy Kelp, Rocky Reefs, Estuaries, and Areas of Interest. Areas of Interest can correspond to a variety of submarine features such as seamounts, canyons and banks. However, for the Santa Barbara Channel region, Areas of Interest correspond to Marine Protected Areas.

4.2.1 SEAGRASS

Seagrasses are one of the only flowering plants, or angiosperms, that can grow in a marine environment. These plants support a diversity of life and can form extensive beds in shallow, protected, estuarine, or other nearshore environments. Two common seagrasses that occur in the west coast region are eelgrass (genus *Zostera*) and surfgrass (genus *Phyllospadix*), with eelgrass being the most prevalent in California (NOAA 2018a). Eelgrass (*Zostera marina and Z. pacifica.*) beds are located in soft, sandy sheltered seafloor environments,

typically in shallow bays and estuaries. Eelgrass beds function as nursery grounds and provide habitat for juvenile fish, snails, sea stars, anemones, crabs and clams (NPS 2018a), and further serve as potential foraging habitat for sea turtles (NOAA 2018b). In particular, the federally endangered green sea turtle may utilize eelgrass beds as foraging habitat (CDFW 2018). Surfgrass (*Phyllospadix* sp.) beds are located in the rocky intertidal and subtidal zones with turbulent surf. Surfgrass beds are habitat for several species of invertebrates, juvenile fish, and epiphytic algae (NPS 2018b).

Areas of Seagrass HAPC occur along the coast between Point Conception and Campus Point, and at two of the northern Channel Islands: Anacapa Island and Santa Cruz Island. Specific locations of Seagrass HAPC along the coast occur in three areas coinciding with three Marine Protected Areas: Point Conception SMR, Kashtayit SMCA, and Campus Point SMCA (approximately 59, 48, and 26 miles respectively from the project site). An additional area of Seagrass HAPC occurs at Point Mugu, which is approximately 23 miles from the project site.

At the Channel Islands, Seagrass HAPC occurs at Prisoners Harbor on Santa Cruz Island (approximately 22 miles from the project site), and around the entire perimeter of Anacapa Island, corresponding with the Anacapa Island Special Closure area (approximately 17 miles from the project site).

Seagrass HAPC is not present within the action area and seagrasses and eelgrass are not anticipated in or near the project site, given that the project site is located at a depth not suitable for seagrass and eelgrass growth due to light limitations. Therefore, Project Actions are not expected to have a negative effect on Seagrass HAPC or the species that utilize these habitats.

4.2.2 CANOPY KELP

Giant kelp, perhaps the most recognized species of brown macroalgae, forms the more southern kelp forests, from the southern Channel Islands, California to northwestern Baja. In California, there are two dominant species: Giant kelp (*Macrocystis pyrifera*) and bull kelp (*Nereocystis leutkeana*) (NOAA 2018a). Considered an ecosystem engineer, kelp provides a physical substrate and habitat for kelp forest communities (Jones et al. 1997). A wide range of sea life uses kelp forests for protection or food, including fish (particularly rockfish) and many invertebrates, such as amphipods, shrimp, marine snails, bristle worms, and brittle stars. Many marine mammals and birds are also found, including seals, sea lions, whales, sea otters, gulls, terns, snowy egrets, great blue herons, and cormorants, as well as some shore birds (NOAA 2013). In California, *Macrocystis pyrifera* forests, the nudibranch (*Melibe leonina)*, and skeleton shrimp (*Caprella californica)* are closely associated with surface canopies; the kelp perch (*Brachyistius frenatus)*, rockfish (*Sebastes* spp.), and many other fishes are found within the stipitate understory; brittle stars and turban snails(*Tegula* spp.) are closely associated with the kelp holdfast, while various herbivores, such as sea urchins and abalone, live under the prostrate canopy; many seastars, hydroids, and benthic fishes live among the benthic assemblages; solitary corals, various gastropods, and echinoderms live over the encrusting coralline algae (Foster and Schiel 1985). In addition,

pelagic fishes and marine mammals are loosely associated with kelp forests, usually interacting near the edges as they visit to feed on resident organisms.

In the Santa Barbara Channel area, Canopy Kelp HAPC occurs in nearshore waters along the coastline from Point Conception to the City of Ventura. Canopy Kelp HAPC also occurs around the perimeter of the northern Channel Islands: Anacapa, Santa Cruz, Santa Rosa and San Miguel Islands. The nearest Canopy Kelp HAPC is directly shoreward, approximately 3 miles north of the project site.

Canopy Kelp HAPC is not present at the action area. Project Actions are not expected to have a negative effect on Canopy Kelp HAPC or the species that utilize these habitats.

4.2.3 ROCKY REEFS

Rocky reefs are submerged rock outcrops with varying relief, known to be rich in both fish abundance and species diversity (NOAA 2018a). In these systems, rocky reefs provide prey, shelter, and refuge for recruiting, juvenile and adult fishes. Rocky reefs also provide surface area for colonization of algae and invertebrates. It is the physical structure itself of rocky reefs that is the most beneficial to the marine ecosystem. Nearshore rocky reefs receive enough light for photosynthesis and are inhabited by algae, invertebrates, and groundfishes. Rocky reefs in deeper waters do not receive enough light for photosynthesis and are therefore dominated by sessile invertebrates, deep-sea corals, and groundfishes. Several species of groundfish such as lingcod, many species of rockfish, and cabezon prefer rocky reefs (NOAA 2018a). These species inhabit rocky reefs because they can find shelter from predators inside the structure they provide. In reefs close to the surface, algae can attach to the rocks and provide the base of a food chain, making rocky reefs highly productive. When reefs exist at depth below where sunlight can penetrate, invertebrate filter feeders dominate the community, capturing prey as they pass by in the current. Deep-sea corals also form on these reefs (NOAA 2018a).

Rocky Reef HAPC in the Santa Barbara Channel region is found in various locations around San Miguel, Santa Rosa, Santa Cruz and Anacapa Islands, as well as well as two main locations along the Santa Barbara County coastline: Point Conception (approximately 58 miles from the project site) and Carpinteria (approximately 10 miles from the project site, the closest Rocky Reef HAPC to the project site).

Rocky Reefs HAPC is not present at the project site. Project Actions are not expected to have a negative effect on Rocky Reefs HAPC or the species that utilize these habitats.

4.2.4 ESTUARIES

Estuaries are semi-enclosed regions where salt and freshwater mix, leading to a unique and biodiverse community of plant and animal species. Estuaries are characterized by high productivity, sediment deposition, varying salinity, and high biodiversity. Due to the variable salinity, tides, outflow and water properties, many organisms have adapted in a myriad of ways to exploit the environment. Estuaries are vital habitats for marine

fishes that use the shallow protected habitat as rearing zones for juveniles (NOAA 2018a). Without these important habitats, juveniles would be exposed to physical forces beyond their swimming capabilities as well as high predatory pressure from lack of shelter. The nutrient input, calm waters, and sedimentation of estuaries allow many plant species to thrive, forming the base of a very productive ecosystem that influences many habitats and species beyond its borders (NOAA 2018a). Estuaries also provide habitat for a variety of seabirds, invertebrates, marine mammals, and turtles. These habitats are typically classified into intertidal, subtidal, and pelagic communities defined by the occurring depths and associated tidal exposure and include rocky reef, dry reef, the intertidal zone, subtidal sandy bottom (inshore), eelgrass and surfgrass beds, kelp forest, rock jetties, piers, submarine canyon, and bay/harbor.

In the Santa Barbara Channel Area, there are several estuaries that are HAPC along the coastline. In Goleta, there are two estuaries: Devereux Slough and Goleta Slough. Devereux Slough is adjacent to the Campus Point SMCA and is approximately 30 miles from the project site. The Goleta Slough estuary is also designated as an MPA. The Goleta Slough SMCA and is approximately 27 miles from the project site. Another important area for estuaries is located along the coast from Pierpont Bay at the City of Ventura, and continues south down the coast to Mugu Canyon, by Point Mugu. The closest location of Estuaries HAPC is located shoreward, northwest approximately 5 miles from the project site in Pierpont Bay.

Estuaries HAPC is not present at the project site. Project Actions are not expected to have a negative effect on Estuaries HAPC or the species that utilize these habitats.

4.2.5 AREAS OF INTEREST

4.2.5.1 Marine Protected Areas

The Southern California MPAs, from Point Conception to the California-Mexico border, cover the Southern California Bight. The 50 MPAs in this region cover approximately 356 square miles, or about 15% of Southern California state waters (CDFW 2016). There are 19 marine protected areas in the Santa Barbara Channel area, along the coastline and at the Channel Islands. These include:

1. Point Conception SMR, located south of Lompoc along the Gaviota coastline. It is located approximately 59 miles west of the project site.
2. Kashtayit SMCA, located south of Gaviota in Santa Barbara County. It is located approximately 48 miles west of the project site.
3. Naples SMCA, located south of the unincorporated areas of Santa Barbara County known as Naples. It is located approximately 32 miles west of the project site.
4. Campus Point SMCA, located along the Gaviota coastline between Coal Oil Point and Goleta Point, adjacent to the Goleta Slough Ecological Preserve. It is located approximately 26 miles west of the project site.

5. Goleta Slough SMCA, located northeast of Goleta Point and includes the slough adjacent to the Goleta Slough Ecological Reserve. It is located approximately 27 miles west of the project site.
6. Richardson Rock State and Federal Marine Reserve (San Miguel Island), located just off the northwest corner of San Miguel Island, the most westerly island of the Channel Islands. It is located approximately 62 miles southwest of the project site.
7. San Miguel Island Special Closure, located on San Miguel Island, wrapping around Point Bennett to Judith Rock, including the Judith Rock SMR. It is located approximately 61 miles southwest of the project site.
8. Harris Point State and Federal Marine Reserve (San Miguel Island), located on the northern side of San Miguel Island. It is located approximately 52 miles southwest of the project site.
9. Judith Rock SMR (San Miguel Island), located on the southern side of San Miguel Island. It is located approximately 61 miles southwest of the project site.
10. Carrington Point SMR (Santa Rosa Island), located on the northern side of Santa Rosa Island. It is located approximately 38 miles southwest of the project site.
11. Skunk Point SMR (Santa Rosa Island), located on the northeastern corner of Santa Rosa Island. It is located approximately 38 miles southwest of the project site.
12. South Point State and Federal Marine Reserve (Santa Rosa Island), located on the south side of Santa Rosa Island. It is located approximately 48 miles southwest of the project site.
13. Painted Cave SMCA (Santa Cruz Island) is located on the north wide of Santa Cruz Island near the most western point. It is located approximately 28 miles southwest of the project site.
14. Gull Island State and Federal Marine Reserve (Santa Cruz Island), located on the south side of Santa Cruz Island. It is located approximately 31 miles southwest of the project site.
15. Scorpion State and Federal Marine Reserve (Santa Cruz Island), located on the north side of Santa Cruz Island near the eastern point. It is located approximately 12 miles southwest of the project site.
16. Anacapa Island Special Closure encompasses the entire immediate perimeter of Anacapa Island. It is located approximately 17 miles south of the project site.
17. Anacapa Island State and Federal Marine Reserve, located on the northern side of Anacapa Island, is the closest MPA to the project site, located approximately 11 miles away to the south. This area includes Anacapa Island State Marine Reserve and the adjoining federal Anacapa Island Marine Reserve. It covers approximately 11.54 square miles of ocean in State waters and extends for approximately 3.5 miles. At Anacapa Island State and Federal Marine Reserve**,** it is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource.
18. Anacapa Island State and Federal Marine Conservation Area, located on the north side of west Anacapa Island abutting a federal marine conservation area located three nautical miles from Anacapa Island. It is located approximately 12 miles south of the project site.

19. Footprint State and Federal Marine Reserve (Anacapa Channel), located southwest of Anacapa Island between Anacapa and Santa Cruz Islands. It is located approximately 19 miles southwest of the project site.

Given the significant distance between the project site and the MPAs, there are no anticipated effects to the MPA ecosystems due to project actions.

5.0 ANALYSIS OF THE POTENTIAL ADVERSE EFFECTS OF THE ACTION ON EFH AND THE MANAGED SPECIES

An adverse effect is defined in the MSA as "any impact which reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions" (50 CFR 600.810). EFH is present for groundfish, coastal pelagic species, and highly migratory species. The project is not located in an area designated as an HAPC.

The potential adverse effects of the proposed project actions evaluated in this EFH Assessment would be:

- Entanglement in loose fishing gear that becomes caught in longlines;
- Temporary loss of sandy softbottom seafloor habitat from anchor installation and associated turbidity;
- Increased noise during construction;
- Hazardous contaminants from potential oil spills;
- Loss of prey resources due to fouling organisms; and
- Disturbance of the benthic environment from project operations.

5.1 Entanglement

Groundfish, coastal pelagic species, and highly migratory species could become entangled in loose fishing nets, debris, and other ghost gear that could become attached to mussel aquaculture gear. Absent mitigation, entanglement may adversely affect these species. However, with incorporation of MM BIO-1 through BIO-5 and MM BIO-10, which pertain to effective management, maintenance, and oversight of aquaculture gear, this effect is considered insignificant.

5.2 Temporary Loss of Habitat and Increased Turbidity due to Anchor Installation

Installation of the anchors associated with the project has the potential to temporarily increase turbidity and displace groundfish that may be utilizing the soft sediment habitat. However, these temporary impacts would be minimal. Each anchor would only have a footprint of less than one square meter and once installed no rope or chain touches the sea floor which also minimizes seabed disturbance. 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, groundfish would be able to utilize the area soon after installation of the anchors. Therefore, impacts associated with benthic disturbance are considered insignificant.

5.3 Construction Noise

Project Activities 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. Construction noise levels will be well within acceptable thresholds for fish species (ICF Jones & Stokes and Illingworth and Rodkin, Inc. 2009; NMFS 2007a). The fish species that may utilize the project area 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.

5.4 Hazardous Contaminants from Oil Spills

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. Incorporation of Mitigation Measure BIO-7 would effectively mitigate risk associated with potential oil spills.

5.5 Loss of Prey Resources due to Fouling Organisms

Groundfish could potentially lose prey resources in the event that the substrate in or near the project site becomes populated with invasive "fouling organisms." The submerged structures of the Project Actions can provide hard substrate habitat for such 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 groundfish 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.

5.6 Disturbance to the Benthic Environment from Project Operations

Effects on sediment quality underneath shellfish aquaculture gear could be impacted from biodeposits and changes to the benthic invertebrate species composition that can adversely affect groundfish habitat. The Project Actions have 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 operated by 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 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, Mitigation Measure BIO-9 has been incorporated, which requires monitoring of sediment quality and composition to evaluate any benthic impacts associated with the project.

Based on the foregoing, no adverse effects to essential fish habitat or habitat of particular concern are anticipated to occur from development and operation of the project.

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6.0 CONCLUSION

This EFH Assessment represents the assessment of 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 proposed mitigation measures are expected to fully compensate for project impacts and reduce potential impacts on EFH species to negligible levels (Appendix D). 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.

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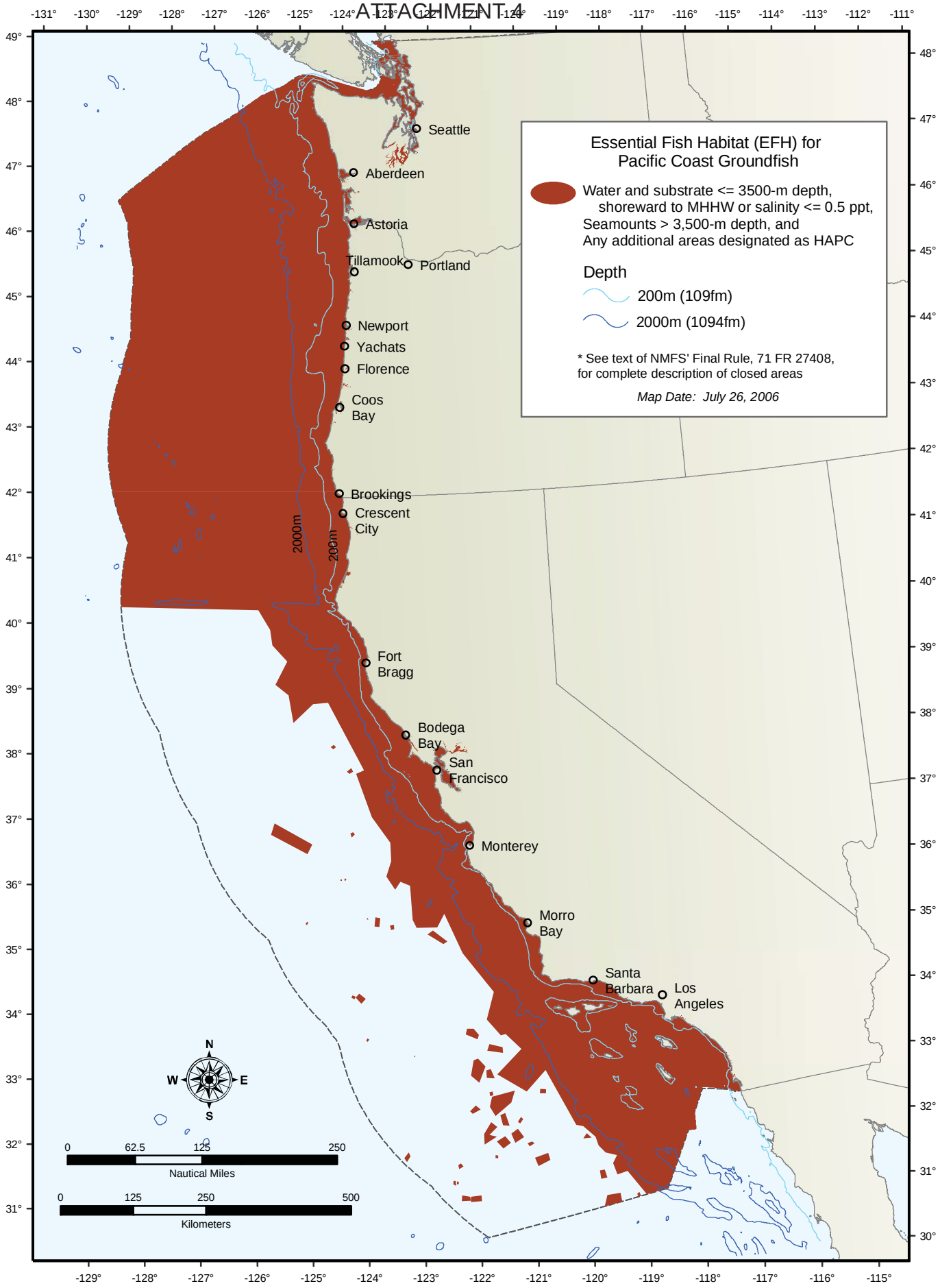
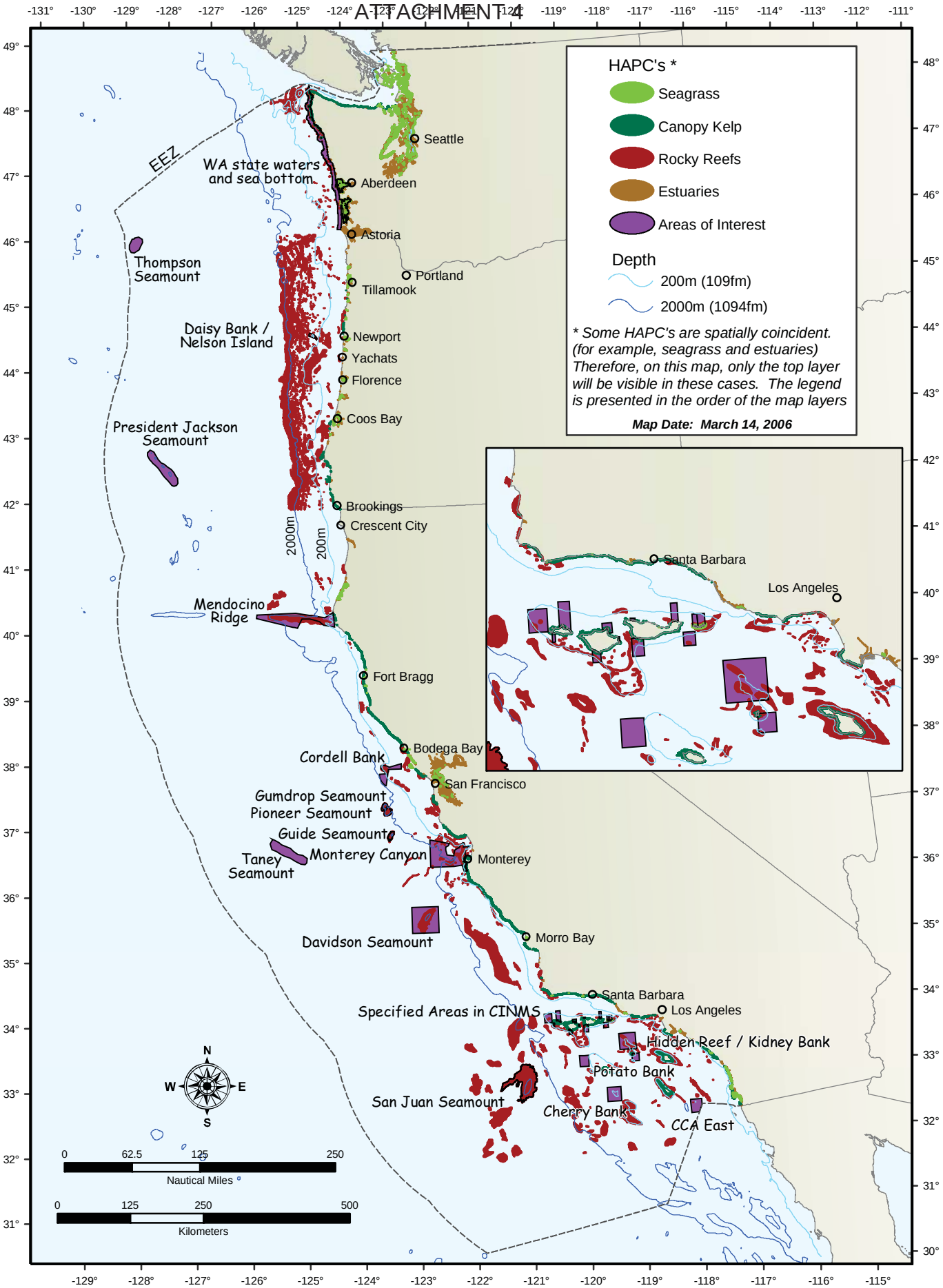
APPENDIX A

Groundfish EFH and HAPC Maps

ATTACHMENT 4




HAPC's *
Seagrass
Canopy Kelp
Rocky Reefs
Estuaries
Areas of Interest
Depth
200m (109fm)
2000m (1094fm)
* Some HAPC's are spatially coincident. (for example, seagrass and estuaries) Therefore, on this map, only the top layer will be visible in these cases. The legend is presented in the order of the map layers
Map Date: March 14, 2006
EEZ
WA state waters and sea bottom
Thompson Seamount
Daisy Bank / Nelson Island
President Jackson Seamount
Mendocino Ridge
Cordell Bank
Gumdrop Seamount
Pioneer Seamount
Guide Seamount
Taney Seamount
Monterey Canyon
Davidson Seamount
Specified Areas in CINMS
San Juan Seamount
Hidden Reef / Kidney Bank
Potato Bank
Cherry Bank
CCA East
2000m
200m
Seattle
Aberdeen
Astoria
Portland
Tillamook
Newport
Yachats
Florence
Coos Bay
Brookings
Crescent City
Fort Bragg
Bodega Bay
San Francisco
Monterey
Morro Bay
Santa Barbara
Los Angeles
N
W
E
S
0 62.5 125 250
Nautical Miles
0 125 250 500
Kilometers

ATTACHMENT 4

APPENDIX B

Final California Commercial Landings for 2017

System: CFIS
Tables09_14

California Department of Fish and Wildlife

Table 12 - Monthly Landings In Pounds In The Santa Barbara Area During 2017

Date: 06/13/2018

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total Landings
California Waters													
Fishes													
Anchovy, northern	0	0	0	0	32,056	60,027	0	0	0	640	0	1,139	93,862
Barracuda, California	0	0	0	0	34	348	102	0	0	3	0	0	486
Bass, giant sea	0	0	237	236	19	863	2,083	705	21	0	130	121	4,416
Bonito, Pacific	821	28	203	236	0	0	71	124	15	221,332	134	154	223,120
Butterfish (Pacific pompano)	352	472	587	196	45	3	51	3	2	48	121	199	2,078
Cabezon	291	254	0	0	805	890	1,211	531	1,139	40	402	426	5,989
Croaker, unspecifed	16	0	0	0	30	0	6	0	0	0	0	0	53
Croaker, white	2,468	2,971	2,123	869	2,003	187	93	38	89	7,944	7,639	1,746	28,170
Eel, California moray	0	8	0	0	0	0	0	0	0	0	0	0	8
Fish, unspecified	101	135	9	0	0	0	0	0	5	85	85	0	420
Grenadier	46	0	0	0	0	0	0	0	0	0	385	320	751
Guitarfish, shovelnose	48	0	23	1,821	40	0	0	0	14	5	410	15	2,376
Hagfishes	0	0	10,571	12,775	12,205	2,523	0	0	0	0	0	0	38,074
Halibut, California	12,417	8,202	14,010	12,907	11,448	13,754	24,871	19,111	9,956	7,918	6,159	8,011	148,763
Halibut, unspecified	0	0	0	40	0	14	23	0	54	282	0	0	413
Kelpfish, giant	0	0	0	0	4	0	0	0	0	0	0	0	4
Lingcod	552	374	0	0	1,689	1,548	2,095	1,060	1,149	944	1,704	1,383	12,499
Lizardfish, California	1,431	2,888	5,607	1,603	7,959	98	77	59	52	9,480	13,696	2,738	45,688
Louvar	0	0	0	0	0	0	0	0	0	0	0	28	28
Mackerel, Pacific	67,798	0	18	1,170	0	4	15	20	5	311,731	80,358	73,693	534,813
Mackerel, jack	3,233	2	50	440	0	0	15	0	0	0	2,161	2,797	8,697
Mackerel, unspecified	1	17	20	96	21	3	22	78	254	168	20	95	795
Mullet, striped	0	0	0	0	0	0	0	0	0	0	2	0	2
Opah	1,516	0	0	0	256	64	0	104	119	822	1,734	3,501	8,116
Opaleye	0	0	0	0	0	0	0	0	0	0	240	0	240
Queenfish	0	11	5	0	0	0	0	0	0	0	0	0	16
Ray, Pacific electric	0	40	61	0	0	0	0	0	0	0	0	0	101
Ray, bat	1,540	908	509	1,015	2,363	522	1,471	953	1,739	403	632	668	12,723
Ray, unspecified	0	0	0	0	0	0	47	15	0	0	0	0	62
Rockfish, China	0	0	0	0	0	0	0	0	1	0	0	0	1
Rockfish, Mexican	0	0	0	0	2	0	0	0	0	0	0	6	8
Rockfish, aurora	0	0	0	0	0	0	0	23	12	22	0	14	71
Rockfish, bank	0	86	3	51	5	0	83	7	0	97	21	208	561
Rockfish, black-and-yellow	0	66	0	0	0	0	72	32	109	0	52	98	429
Rockfish, black	4	0	0	0	0	0	0	0	0	0	0	0	4
Rockfish, blackgill	447	28	366	405	546	53	1,608	1,351	940	414	978	1,504	8,638

System: CFIS
Tables09_14

California Department of Fish and Wildlife

Page: 2
Date: 06/13/2018

Table 12 - Monthly Landings In Pounds In The Santa Barbara Area During 2017

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total Landings
California Waters													
Fishes													
Rockfish, blue	76	117	0	0	127	206	281	80	211	517	251	429	2,293
Rockfish, bocaccio	293	506	0	0	521	740	1,322	549	688	668	639	636	6,563
Rockfish, brown	12	0	0	0	18	20	10	13	0	11	26	12	121
Rockfish, canary	0	55	0	0	14	51	58	92	399	285	178	230	1,363
Rockfish, chilipepper	7	0	0	0	25	35	42	10	11	78	63	55	326
Rockfish, copper	754	332	0	0	1,423	435	1,311	931	1,284	1,068	409	957	8,903
Rockfish, flag	9	6	0	0	16	11	3	11	1	2	10	28	96
Rockfish, gopher	66	5	0	0	50	51	107	35	247	220	38	171	989
Rockfish, grass	492	238	0	0	2,341	1,037	1,642	239	2,207	139	951	614	9,899
Rockfish, greenblotched	0	4	0	0	0	21	6	0	9	16	0	2	59
Rockfish, greenspotted	105	87	0	0	300	249	246	150	267	292	410	376	2,481
Rockfish, greenstriped	5	0	0	0	15	14	13	11	1	24	73	29	185
Rockfish, group nearshore	0	0	0	0	0	0	0	0	0	0	0	58	58
Rockfish, group red	0	0	0	0	0	0	0	0	0	523	0	0	523
Rockfish, group shelf	2	0	0	0	0	0	0	0	0	0	0	0	2
Rockfish, kelp	40	24	0	0	36	2	43	56	70	76	27	36	409
Rockfish, olive	0	47	0	0	0	0	0	0	5	8	0	3	63
Rockfish, rosy	4	5	0	0	11	0	0	0	0	0	0	0	20
Rockfish, speckled	31	59	0	0	15	76	140	32	49	113	52	21	586
Rockfish, splitnose	0	0	2	2	0	0	13	6	0	6	0	0	29
Rockfish, squarespot	10	11	0	0	1	1	0	0	0	0	0	0	22
Rockfish, starry	35	22	0	0	186	34	112	67	71	43	121	30	720
Rockfish, treefish	25	14	0	0	29	11	51	87	101	19	10	29	375
Rockfish, unspecified	2	0	3	0	0	0	56	53	39	181	0	0	334
Rockfish, vermilion	2,273	4,689	0	0	4,740	7,518	8,564	6,820	7,887	5,191	6,601	9,402	63,684
Rockfish, widow	6	2	0	0	3	15	45	1	0	15	0	2	88
Rockfish, yellowtail	47	171	0	0	41	81	95	157	159	127	209	190	1,277
Sablefish	23,594	21,537	14,377	21,459	36,394	10,241	15,543	21,358	22,818	46,424	50,850	43,703	328,296
Salmon, Chinook	0	0	0	0	131	499	0	0	0	0	0	0	630
Sanddab	47	224	57	392	305	110	88	59	187	491	749	419	3,126
Sardine, Pacific	1,157	0	0	13	2,305	107,777	1,538	0	0	58,841	19,786	12,363	203,780
Sargo	0	0	0	0	0	0	0	0	0	0	1	0	1
Scorpionfish, California	49	22	0	0	223	96	21	28	37	71	62	65	673
Seabass, white	782	448	8,438	388	281	41,420	54,100	13,132	55	1,856	758	421	122,078
Shark, Pacific angel	1,834	1,261	1,338	1,251	1,667	3,081	3,905	2,043	427	451	670	765	18,693
Shark, bigeye thresher	0	0	0	0	0	0	0	0	133	0	0	242	375

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Table 12 - Monthly Landings In Pounds In The Santa Barbara Area During 2017

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total Landings
California Waters													
Fishes													
Shark, blue	0	0	0	0	25	0	12	0	0	0	0	0	37
Shark, brown smoothhound	31	19	18	26	164	34	18	3	0	0	0	7	320
Shark, gray smoothhound	0	0	0	0	7	0	0	0	0	0	0	0	7
Shark, leopard	211	1,444	470	201	439	65	64	283	104	38	21	184	3,523
Shark, pelagic thresher	0	0	0	0	0	0	0	12	0	0	0	0	12
Shark, sevengill	0	0	0	0	0	0	0	38	35	0	0	0	73
Shark, shortfin mako	170	0	131	0	286	1,657	1,257	331	594	585	1,260	1,300	7,571
Shark, soupfin	139	551	597	445	781	45	377	259	344	347	2,041	2,050	7,977
Shark, spiny dogfish	80	18	8	5	10	25	101	0	95	5	0	0	347
Shark, swell	15	129	0	0	0	0	0	0	0	0	0	0	143
Shark, thresher	4,973	0	0	238	1,981	2,459	4,714	1,035	596	341	4,612	5,087	26,035
Shark, unspecified	506	708	285	275	140	190	671	427	490	415	230	0	4,336
Shark, white	0	0	0	0	0	0	0	0	0	0	0	130	130
Sheephead, California	2,052	907	0	0	3,141	3,061	4,580	1,344	3,435	378	432	1,225	20,554
Skate, California	9	0	11	0	0	0	0	0	12	0	0	0	32
Skate, longnose	331	103	202	302	262	245	244	277	125	329	116	174	2,710
Skate, unspecified	619	163	270	118	240	215	270	127	760	520	473	498	4,273
Sole, Dover	40	0	0	7	11	19	45	48	33	67	2	51	323
Sole, English	148	262	224	265	257	150	233	62	61	274	264	339	2,538
Sole, bigmouth	1	0	0	0	0	0	0	0	0	0	0	0	1
Sole, curlfin	0	0	0	0	0	0	0	0	19	0	0	6	25
Sole, fantail	89	98	136	20	32	213	523	575	281	34	55	78	2,132
Sole, petrale	52	65	98	255	330	247	277	249	233	179	175	162	2,322
Sole, rock	31	20	21	36	91	200	93	71	75	69	57	101	865
Sole, sand	0	0	0	0	0	86	32	86	4	21	0	0	228
Sole, unspecified	256	68	116	232	379	56	221	92	69	292	124	79	1,985
Splittail	0	601	0	0	0	0	0	0	0	0	0	0	601
Stingray	0	0	0	0	0	950	300	0	99	1,062	17	22	2,450
Surfperch, barred	274	0	192	96	0	0	0	56	14	57	119	0	808
Surfperch, rainbow	0	4	4	0	10	13	2	1	2	0	3	0	39
Surfperch, rubberlip	0	0	0	0	0	0	0	5	0	0	0	0	5
Swordfish	8,807	0	0	0	0	0	4,844	3,139	4,791	6,894	11,917	41,499	81,890
Thornyhead, longspine	2,172	1,262	1,006	2,062	3,146	1,251	2,844	1,846	725	875	1,283	865	19,336
Thornyhead, shortspine	27,502	14,845	18,273	24,105	35,177	12,312	27,872	16,272	13,606	18,754	30,455	21,433	260,605
Thornyheads	0	0	0	0	0	0	12	0	12	0	0	31	55
Trawled fish, unspecified	8	0	0	0	0	0	0	50	0	0	0	0	58

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Table 12 - Monthly Landings In Pounds In The Santa Barbara Area During 2017

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total Landings
California Waters													
Fishes													
Triggerfish	0	0	0	0	0	0	0	0	0	0	4	0	4
Tuna, albacore	0	0	0	0	0	0	0	0	0	1,528	0	0	1,528
Tuna, bluefin	0	0	0	0	0	0	15	227	0	0	0	0	242
Tuna, yellowfin	0	0	0	0	0	0	0	0	351	0	0	0	351
Turbot, hornyhead	0	0	0	0	0	0	2	0	0	0	0	0	2
Turbot	0	0	0	0	0	0	5	4	0	0	0	0	9
Whitefish, ocean	747	74	242	128	356	30	433	247	332	214	584	815	4,203
Whiting, Pacific	31	6	10	30	32	0	0	0	0	0	40	0	148
Yellowtail	0	0	81	475	3,245	6,965	3,245	728	1,888	2,202	11,412	18,046	48,287
Crustaceans													
Crab, Dungeness	0	0	0	2,725	3,710	5,646	0	0	0	0	0	794	12,875
Crab, armed box	0	0	0	0	0	0	9	0	0	0	0	0	9
Crab, box	107	550	1,210	1,408	1,958	4,784	12,744	10,970	2,289	2,524	3,846	5,492	47,882
Crab, brown rock	8,192	10,178	8,184	10,331	5,519	11,713	9,996	9,333	13,430	7,790	6,270	6,921	107,857
Crab, claws	5	0	0	0	0	0	28	0	82	118	71	21	325
Crab, king	0	0	0	28	470	17	137	22	472	492	408	617	2,663
Crab, pelagic red	0	0	0	0	0	0	1,936	0	0	0	0	0	1,936
Crab, red rock	32,156	31,128	30,034	36,301	35,328	57,007	71,605	65,991	44,091	29,096	32,413	31,675	496,826
Crab, rock unspecified	3,564	5,431	4,937	6,087	3,967	3,211	4,730	3,756	1,934	4,208	3,475	3,564	48,864
Crab, southern kelp	0	0	0	0	0	0	0	0	6	5	20	121	153
Crab, spider	5,997	6,680	3,762	3,009	1,600	1,385	3,768	3,938	4,320	7,378	5,955	4,045	51,836
Crab, spider/sheep claws	91	0	0	0	0	0	0	6	0	0	0	0	97
Crab, tanner	0	0	0	0	0	0	0	0	0	0	0	7	7
Crab, yellow rock	10,294	8,887	11,763	13,065	16,238	23,100	34,678	35,089	33,708	22,198	19,317	23,622	251,956
Crustacean, unspecified	354	63	0	0	0	0	0	0	0	0	0	0	417
Lobster, California spiny	70,507	38,129	32,140	0	0	0	0	0	0	83,099	54,617	49,720	328,213
Prawn, golden	0	0	780	0	0	0	0	0	0	0	0	0	780
Prawn, ridgeback	45,449	37,985	66,722	44,149	32,149	544	0	0	0	57,894	40,715	43,181	368,787
Prawn, spot	10	17,393	13,631	5,991	14,621	10,934	14,828	16,131	13,554	29,702	25	106	136,926
Shrimp, mantis	0	0	11	14	0	0	0	0	0	0	0	0	25
Shrimp, unspecified	0	0	1,012	67	0	0	0	0	0	0	0	19	1,098
Echinoderms													
Bat star	0	0	0	0	0	0	938	0	0	0	0	0	938
Sea cucumber, giant red	74	208	1,088	985	352	3,500	21,524	6,962	2,363	1,099	219	101	38,474
Sea cucumber, unspecified	27	5	50	0	0	0	0	15	0	45	532	0	674
Sea cucumber, warty	270	4,332	17,641	12,189	14,395	8,892	8,343	3,116	302	2	0	110	69,591

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Table 12 - Monthly Landings In Pounds In The Santa Barbara Area During 2017

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total Landings
California Waters													
Echinoderms													
Sea urchin, purple	3	0	0	0	0	0	30	100	35	47	174	11	400
Sea urchin, red	342,621	227,183	286,516	142,375	228,540	67,342	283,626	248,546	241,964	170,871	268,727	259,786	2,768,096
Mollusks													
Clam, unspecified	0	224	0	0	0	0	0	0	0	0	0	0	224
Limpet, keyhole	0	0	10	8	10	0	5	101	2	4	0	0	140
Mussel	0	0	0	0	0	0	0	0	0	0	120	0	120
Octopus, unspecified	1	18	2	34	20	2	40	1	8	41	11	37	216
Snail, top	0	0	0	0	0	0	160	405	0	8	0	0	573
Snails, moon	72	197	56	87	123	76	77	218	247	266	240	287	1,946
Squid, market	1,053,293	12	38,971	8,119,115	2,850,369	5,303,390	968,654	110,710	543,755	7,079,949	30,182,570	31,210,238	87,461,026
Whelk, Kellet's	6,525	4,359	4,591	0	0	0	5,843	4,625	5,294	5,824	2,876	3,040	42,975
Worms													
Invertebrate Unspecified	0	21	115	5	0	0	0	0	0	0	0	0	141
Spiders, sea	258	307	0	0	0	0	0	0	0	0	0	0	565
Waters Area Total:	1,753,994	461,010	604,234	8,484,659	3,382,657	5,786,759	1,620,370	618,158	990,077	8,218,272	30,888,301	31,907,844	94,716,336
Other Waters													
Fishes													
Dolphin (fish)	53	0	100	0	90	0	0	0	0	0	0	0	243
Escolar	74	0	403	0	269	0	0	0	0	0	0	0	746
Fish, unspecified	632	0	590	0	442	0	0	0	0	0	0	0	1,664
Goby, yellowfin	0	0	0	27	0	0	0	0	0	0	0	0	27
Opah	5,925	0	5,349	0	7,210	0	0	0	0	0	0	0	18,484
Shark, shortfin mako	102	0	0	0	549	0	0	0	0	0	0	0	651
Swordfish	246	0	287	0	1,506	0	0	0	0	0	0	0	2,039
Tuna, bigeye	3,644	0	12,833	0	26,144	0	0	0	0	0	0	0	42,621
Tuna, skipjack	257	0	40	0	181	0	0	0	0	0	0	0	478
Tuna, yellowfin	1,150	0	856	238	2,493	0	0	0	0	0	0	0	4,737
Wahoo	189	0	221	70	935	0	0	0	0	0	0	0	1,415
Crustaceans													
Crab, brown rock	0	0	0	357	0	0	0	0	0	0	0	0	357
Crab, red rock	0	0	0	801	0	0	0	0	0	0	0	0	801
Lobster, California spiny	0	0	0	0	0	0	0	0	0	0	284	0	284
Mollusks													
Squid, market	0	0	0	0	0	0	0	0	0	0	13,950	178,336	192,286
Waters Area Total:	12,272	0	20,679	1,493	39,819	0	0	0	0	0	14,234	178,336	266,833

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Table 12 - Monthly Landings In Pounds In The Santa Barbara Area During 2017

Date: 06/13/2018

Species		January	February	March	April	May	June	July	August	September	October	November	December	Total Landings
	Grand Total:	1,766,266	461,010	624,913	8,486,152	3,422,476	5,786,759	1,620,370	618,158	990,077	8,218,272	30,902,535	32,086,180	94,983,169

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End of Report

Total Records: 24,196

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Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Date: 06/13/2018

Species	Pounds	Value
VENTURA		
Squid, market	52,045,559	$25,988,613
Lobster, California spiny	78,380	$1,467,925
Prawn, spot	85,400	$1,205,760
Prawn, ridgeback	302,735	$708,534
Halibut, California	52,431	$312,878
Sea urchin, red	96,921	$267,961
Tuna, bigeye	42,621	$164,006
Swordfish	29,436	$147,157
Seabass, white	27,334	$108,674
Bonito, Pacific	220,973	$66,383
Crab, yellow rock	27,115	$50,937
Thornyhead, shortspine	4,855	$39,374
Crab, rock unspecified	23,590	$39,344
Mackerel, Pacific	320,879	$34,534
Opah	21,544	$32,096
Crab, Dungeness	5,646	$29,642
Lizardfish, California	44,018	$26,141
Sea cucumber, warty	4,991	$24,955
Yellowtail	7,545	$24,367
Shark, Pacific angel	10,154	$18,209
Tuna, yellowfin	4,870	$17,999
Sea cucumber, giant red	3,706	$17,590
Croaker, white	23,552	$14,556
Sheephead, California	3,366	$14,088
Crab, red rock	2,934	$12,430
Cabezon	1,532	$12,011
Sablefish	3,920	$11,239
Shark, shortfin mako	4,397	$6,606
Lingcod	2,187	$5,785
Sanddab	2,424	$5,139
Rockfish, grass	455	$4,882
Sole, petrale	2,247	$4,111
Shark, thresher	2,485	$4,033
Guitarfish, shovelnose	2,362	$3,793
Bass, giant sea	1,148	$3,789

California Department of Fish and Wildlife

Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Species	Pounds	Value
VENTURA		
Wahoo	1,415	$3,711
Whitefish, ocean	1,420	$3,592
Rockfish, vermilion	2,814	$3,574
Shrimp, unspecified	1,098	$2,477
Ray, bat	4,503	$2,190
Crab, spider	2,808	$1,977
Snails, moon	1,946	$1,936
Fish, unspecified	1,697	$1,928
Butterfish (Pacific pompano)	1,916	$1,811
Sole, English	2,396	$1,736
Prawn, golden	780	$1,716
Skate, unspecified	2,873	$1,664
Crab, brown rock	888	$1,600
Rockfish, greenspotted	1,073	$1,172
Scorpionfish, California	660	$1,068
Sole, fantail	1,319	$1,047
Escolar	746	$894
Thornyhead, longspine	431	$832
Whelk, Kellet's	937	$773
Dolphin (fish)	243	$729
Sole, rock	725	$725
Rockfish, bocaccio	622	$540
Spiders, sea	258	$516
Tuna, skipjack	478	$478
Mackerel, jack	6,030	$394
Ray, Pacific electric	101	$282
Rockfish, yellowtail	90	$277
Rockfish, chilipepper	290	$277
Crab, box	109	$264
Sole, unspecified	544	$263
Crab, king	90	$247
Crab, claws	110	$247
Rockfish, gopher	45	$225
Rockfish, greenstriped	178	$218
Mackerel, unspecified	118	$206

California Department of Fish and Wildlife

Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Species	Pounds	Value
VENTURA		
Rockfish, copper	72	$206
Shark, swell	129	$193
Rockfish, treefish	17	$170
Shark, brown smoothhound	156	$148
Opaleye	240	$144
Octopus, unspecified	122	$128
Mussel	120	$120
Rockfish, canary	62	$117
Shrimp, mantis	14	$84
Goby, yellowfin	27	$81
Stingray	150	$75
Sardine, Pacific	182,677	$63
Shark, unspecified	72	$61
Rockfish, starry	98	$54
Sea urchin, purple	11	$50
Rockfish, flag	51	$49
Rockfish, brown	22	$32
Thornyheads	31	$31
Anchovy, northern	998	$27
Sole, Dover	28	$24
Shark, leopard	78	$21
Crab, pelagic red	1,936	$19
Ray, unspecified	37	$19
Rockfish, blue	9	$14
Sole, curlfin	25	$13
Barracuda, California	36	$12
Grenadier	24	$12
Rockfish, kelp	7	$11
Skate, longnose	20	$8
Crab, southern kelp	7	$7
Crab, spider/sheep claws	6	$6
Rockfish, black	4	$4
Rockfish, widow	3	$3
Rockfish, speckled	14	$3
Mullet, striped	2	$2

California Department of Fish and Wildlife

Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Species	Pounds	Value
VENTURA		
Rockfish, greenblotched	2	$2
Sole, sand	127	$1
Shark, soupfin	3	$1
Rockfish, squarespot	1	$1
Shark, spiny dogfish	25	$0
Shark, gray smoothhound	7	$0
Sea cucumber, unspecified	27	$0
Tuna, bluefin	15	$0
Crustacean, unspecified	2	$0
Port Totals	53,742,966	$30,939,138
PORT HUENEME		
Squid, market	35,555,303	$17,775,392
Prawn, spot	46,266	$645,813
Anchovy, northern	92,864	$32,268
Mackerel, Pacific	213,871	$20,616
Thornyhead, shortspine	431	$2,997
Sardine, Pacific	21,075	$1,743
Sablefish	515	$1,552
Sea cucumber, giant red	111	$555
Sea urchin, red	790	$395
Stingray	2,300	$65
Mackerel, jack	2,601	$22
Bonito, Pacific	205	$21
Shark, thresher	58	$1
Barracuda, California	13	$0
Port Totals	35,936,403	$18,481,438
SANTA BARBARA HARBOR		
Shark, brown smoothhound	164	
Lobster, California spiny	200,909	$3,876,550
Sea urchin, red	1,788,795	$3,064,420
Thornyhead, shortspine	214,583	$1,833,995
Crab, red rock	491,716	$834,274
Sablefish	288,662	$830,501
Halibut, California	57,391	$326,601
Crab, yellow rock	188,130	$320,362
Crab, brown rock	106,972	$197,184
Prawn, ridgeback	66,039	$172,532

California Department of Fish and Wildlife

Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Species	Pounds	Value
SANTA BARBARA HARBOR		
Sea cucumber, giant red	32,383	$159,158
Crab, box	47,557	$134,391
Rockfish, vermilion	42,131	$130,613
Rockfish, grass	9,445	$108,399
Seabass, white	26,126	$103,499
Sea cucumber, warty	16,945	$86,187
Swordfish	22,006	$80,663
Yellowtail	34,181	$76,003
Crab, spider	39,321	$62,897
Thornyhead, longspine	14,332	$62,189
Rockfish, copper	8,690	$58,017
Whelk, Kellet's	42,038	$49,641
Hagfishes	38,074	$39,983
Crab, rock unspecified	22,587	$38,637
Cabezon	4,346	$34,829
Lingcod	8,088	$29,354
Crab, Dungeness	6,435	$29,298
Sheephead, California	7,105	$28,172
Shark, thresher	10,484	$14,834
Crab, king	1,941	$12,995
Rockfish, blackgill	4,730	$12,224
Rockfish, bocaccio	4,044	$10,057
Shark, soupfin	7,413	$8,454
Rockfish, blue	2,110	$8,407
Ray, bat	8,131	$7,361
Prawn, spot	578	$7,359
Rockfish, gopher	909	$7,134
Salmon, Chinook	630	$6,534
Shark, Pacific angel	5,749	$6,166
Whitefish, ocean	2,169	$4,560
Clam, unspecified	224	$4,480
Tuna, albacore	1,528	$4,248
Bass, giant sea	817	$3,778
Rockfish, black-and-yellow	429	$3,416

California Department of Fish and Wildlife

Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Species	Pounds	Value
SANTA BARBARA HARBOR		
Opah	2,173	$3,162
Rockfish, yellowtail	812	$3,014
Rockfish, treefish	355	$2,885
Bonito, Pacific	1,097	$2,880
Rockfish, kelp	374	$2,615
Croaker, white	4,614	$2,500
Rockfish, greenspotted	984	$2,408
Rockfish, canary	831	$2,186
Shark, shortfin mako	1,409	$2,084
Mackerel, unspecified	626	$1,842
Rockfish, group red	523	$1,832
Sole, unspecified	1,396	$1,760
Halibut, unspecified	351	$1,704
Sea cucumber, unspecified	592	$1,659
Sole, fantail	614	$1,530
Sanddab	540	$1,509
Snail, top	573	$1,395
Rockfish, bank	501	$1,289
Rockfish, starry	499	$1,288
Lizardfish, California	1,670	$1,099
Skate, longnose	1,311	$1,047
Spiders, sea	307	$998
Shark, unspecified	4,210	$987
Splittail	601	$902
Shark, leopard	813	$838
Crustacean, unspecified	415	$810
Sea urchin, purple	389	$770
Crab, southern kelp	146	$587
Invertebrate Unspecified	141	$423
Limpet, keyhole	140	$411
Squid, market	364	$364
Rockfish, speckled	154	$363
Octopus, unspecified	94	$304
Grenadier	727	$282
Sole, rock	138	$270

California Department of Fish and Wildlife

Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Species	Pounds	Value
SANTA BARBARA HARBOR		
Rockfish, brown	74	$248
Fish, unspecified	378	$236
Crab, claws	215	$215
Surfperch, rainbow	39	$197
Sole, sand	101	$186
Crab, spider/sheep claws	91	$159
Rockfish, greenblotched	48	$156
Louvar	28	$154
Shark, bigeye thresher	242	$130
Shark, spiny dogfish	234	$130
Skate, unspecified	1,349	$125
Sole, English	143	$125
Mackerel, Pacific	21	$117
Sole, petrale	76	$115
Rockfish, widow	30	$88
Rockfish, unspecified	334	$84
Rockfish, squarespot	22	$74
Shark, sevengill	73	$73
Sole, Dover	225	$69
Barracuda, California	53	$67
Rockfish, aurora	70	$66
Rockfish, flag	27	$64
Rockfish, chilipepper	25	$61
Mackerel, jack	14	$58
Shrimp, mantis	11	$56
Whiting, Pacific	141	$50
Surfperch, barred	12	$42
Rockfish, splitnose	23	$34
Kelpfish, giant	4	$32
Butterfish (Pacific pompano)	162	$32
Trawled fish, unspecified	58	$30
Rockfish, olive	8	$26
Skate, California	20	$25
Thornyheads	12	$24
Rockfish, Mexican	8	$23

California Department of Fish and Wildlife

Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Species	Pounds	Value
SANTA BARBARA HARBOR		
Shark, swell	15	$16
Ray, unspecified	25	$15
Rockfish, rosy	4	$14
Turbot	9	$14
Rockfish, greenstriped	3	$13
Croaker, unspecifed	53	$8
Scorpionfish, California	2	$6
Rockfish, China	1	$6
Turbot, hornyhead	2	$4
Rockfish, group shelf	2	$2
Shark, blue	12	$0
Queenfish	16	$0
Rockfish, group nearshore	30	$0
Crab, armed box	9	$0
Sardine, Pacific	28	$0
Eel, California moray	8	$0
Port Totals	3,912,104	$12,943,816
OXNARD		
Lobster, California spiny	49,049	$941,960
Sea urchin, red	881,590	$807,390
Thornyhead, shortspine	40,337	$290,334
Seabass, white	65,925	$268,202
Sea cucumber, warty	47,655	$242,979
Halibut, California	36,072	$196,968
Swordfish	32,487	$142,887
Sablefish	35,199	$111,992
Prawn, spot	4,682	$68,761
Rockfish, vermilion	17,216	$54,217
Sheephead, California	10,084	$49,764
Squid, market	51,552	$25,776
Yellowtail	6,085	$19,877
Crab, yellow rock	36,711	$18,149
Crab, spider	9,706	$17,029
Shark, thresher	12,884	$12,911

California Department of Fish and Wildlife

Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Species	Pounds	Value
OXNARD		
Sea cucumber, giant red	2,274	$11,570
Thornyhead, longspine	4,550	$9,931
Bass, giant sea	2,450	$7,663
Rockfish, blackgill	3,908	$4,678
Lingcod	1,265	$3,994
Crab, Dungeness	794	$3,970
Shark, Pacific angel	2,790	$3,749
Crab, rock unspecified	2,687	$3,633
Crab, king	632	$3,551
Crab, red rock	2,977	$3,405
Opah	2,883	$2,612
Rockfish, bocaccio	1,702	$2,530
Shark, shortfin mako	2,207	$2,149
Shark, leopard	2,539	$2,037
Rockfish, canary	471	$1,604
Rockfish, greenspotted	425	$1,299
Skate, longnose	1,378	$1,273
Rockfish, speckled	419	$1,197
Whitefish, ocean	279	$909
Tuna, bluefin	227	$908
Tuna, yellowfin	218	$872
Rockfish, copper	141	$862
Rockfish, yellowtail	374	$843
Sanddab	162	$658
Crab, box	216	$648
Cabezon	112	$529
Shark, white	130	$501
Bat star	938	$469
Shark, bigeye thresher	133	$399
Rockfish, blue	175	$376
Sole, Dover	70	$203
Rockfish, starry	50	$167
Rockfish, widow	56	$167
Rockfish, gopher	35	$166
Shark, soupfin	165	$144

California Department of Fish and Wildlife

Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Species	Pounds	Value
OXNARD		
Sole, fantail	199	$124
Rockfish, kelp	28	$116
Bonito, Pacific	121	$102
Sea cucumber, unspecified	55	$100
Halibut, unspecified	62	$92
Shark, unspecified	55	$83
Rockfish, flag	18	$76
Crab, brown rock	354	$75
Rockfish, rosy	16	$73
Mackerel, unspecified	21	$64
Rockfish, brown	26	$63
Rockfish, group nearshore	28	$56
Rockfish, bank	60	$49
Scorpionfish, California	11	$44
Barracuda, California	384	$33
Rockfish, olive	55	$28
Prawn, ridgeback	13	$26
Triggerfish	4	$22
Rockfish, chilipepper	11	$21
Guitarfish, shovelnose	14	$21
Mackerel, Pacific	20	$20
Rockfish, treefish	3	$18
Rockfish, greenblotched	9	$14
Sole, rock	2	$11
Sole, unspecified	45	$9
Fish, unspecified	9	$9
Whiting, Pacific	7	$7
Rockfish, splitnose	6	$6
Sargo	1	$6
Surfperch, rubberlip	5	$5
Rockfish, greenstriped	5	$5
Rockfish, aurora	1	$2
Sole, bigmouth	1	$1
Shark, spiny dogfish	88	$1
Ray, bat	89	$1

California Department of Fish and Wildlife

Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Species	Pounds	Value
OXNARD		
Skate, California	12	$0
Thornyheads	12	$0
Shark, pelagic thresher	12	$0
Shark, blue	25	$0
Crab, tanner	7	$0
Croaker, white	4	$0
Skate, unspecified	50	$0
Port Totals	1,379,011	$3,350,242
GOLETA BEACH		
Thornyhead, shortspine	399	$3,392
Seabass, white	1,009	$3,344
Shark, shortfin mako	150	$225
Yellowtail	26	$105
Shark, leopard	72	$96
Shark, thresher	33	$92
Thornyhead, longspine	23	$46
Port Totals	1,712	$7,299
SURF BEACH		
Lobster, California spiny	158	$3,000
Surfperch, barred	546	$1,911
Port Totals	704	$4,911
ALL OTHER PORTS		
Halibut, California	2,869	$11,993
Seabass, white	1,684	$6,641
Rockfish, vermilion	1,524	$4,478
Lingcod	959	$2,953
Bonito, Pacific	724	$1,935
Yellowtail	449	$1,348
Whitefish, ocean	335	$1,006
Surfperch, barred	250	$839
Shark, soupfin	396	$791
Rockfish, bocaccio	194	$573
Squid, market	534	$395
Shark, thresher	92	$230
Rockfish, starry	74	$221
Shark, shortfin mako	60	$180

California Department of Fish and Wildlife

Table 19PUB - Poundage And Value Of Landings By Port, Santa Barbara Area During 2017

Species	Pounds	Value
ALL OTHER PORTS		
Mackerel, jack	52	$139
Mackerel, unspecified	30	$60
Mackerel, Pacific	22	$58
Shark, leopard	21	$41
Port Totals	10,268	$33,881
Santa Barbara Area Totals	94,983,169	$65,760,724

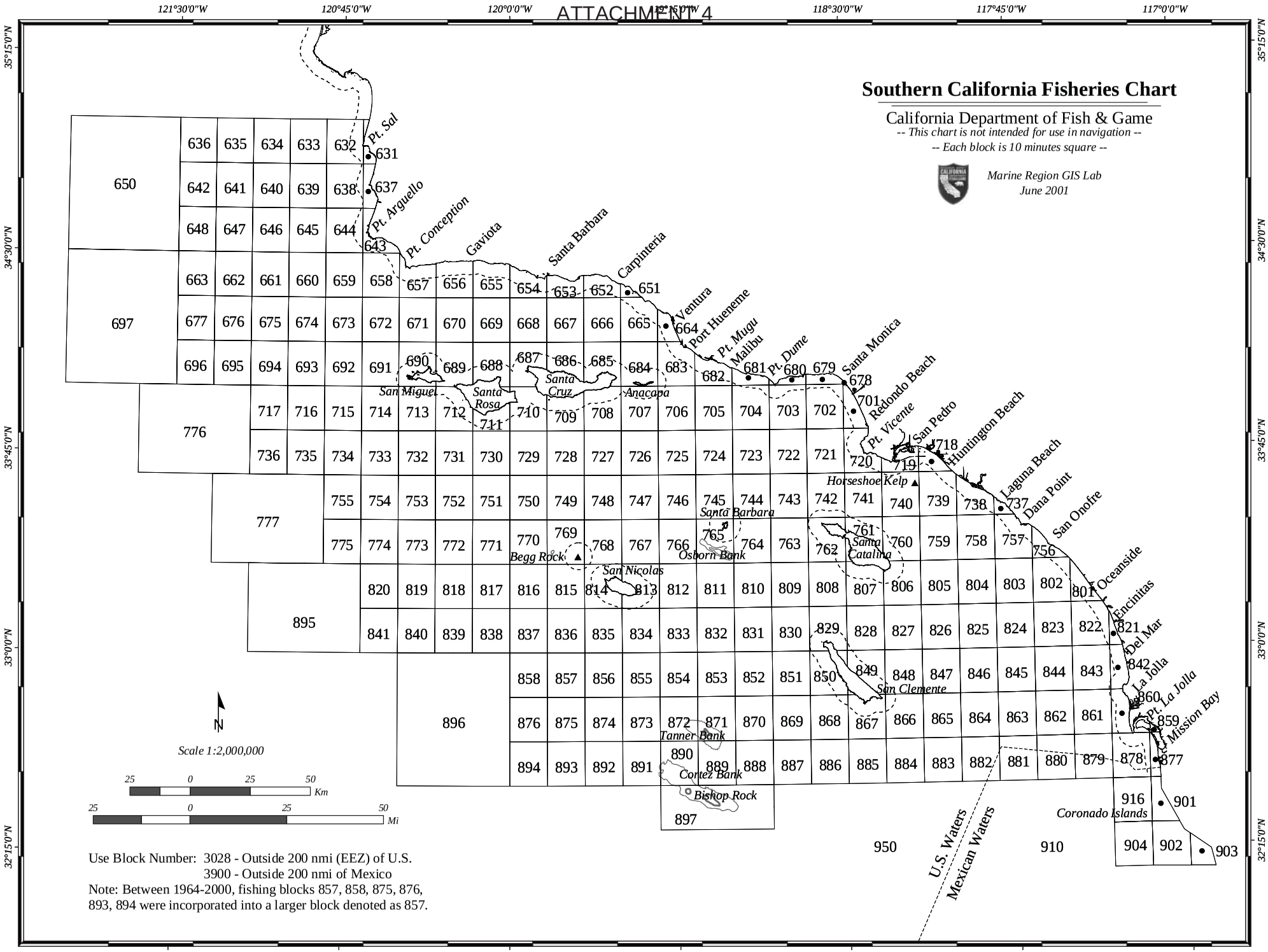
********** Total Records: 24,196

End of Report

ATTACHMENT 4

APPENDIX C

Commercial Fisheries Data for Blocks 0664 and 0665



Use Block Number: 3028 - Outside 200 nmi (EEZ) of U.S.
3900 - Outside 200 nmi of Mexico

Note: Between 1964-2000, fishing blocks 857, 858, 875, 876, 893, 894 were incorporated into a larger block denoted as 857.

ATTACHMENT 4

Year	Block	Species	Value	Pounds
2016	665	711	1583.2	1792
2016	665	80	164	157
2016	665	473	1084.2	1896
2016	665	803	1035.5	997.13
2016	665	238	6	15
2016	665	823	25	25
2016	665	165	2911.37	1735.12
2016	665	222	54.45	9.9
2016	665	130	6549.78	7518
2016	665	803	10320.25	7784.3
2016	665	347	2.19	219
2016	665	999	2.38	238
2016	665	803	1.26	126
2016	665	203	332	326
2016	665	211	71	81
2016	665	155	84	48
2016	665	820	150826.4	7078.9
2016	665	342	122	61
2016	665	731	17.5	17.5
2016	665	803	682	341
2016	664	712	0	3.3
2016	665	222	20	4
2016	664	204	4	4
2016	665	175	39	65
2016	665	225	197.6	464
2016	665	175	195.6	512.51
2016	665	174	390.7	242
2016	665	262	0	14
2016	665	400	3664.7	538.2
2016	665	155	303.7275	192.05
2016	665	801	657.955	427.9
2016	665	222	69.54	570
2016	665	801	6829	4551
2016	665	222	28.97	2897
2016	665	803	0.32	32
2016	665	400	2082.15	396.6
2016	665	813	925.6	356
2016	664	400	3572.8	928
2016	665	253	6	5
2016	664	40	22.5	15
2016	665	222	1104	184
2016	665	155	157.96	136
2016	665	400	1125	225
2016	665	40	65	26
2016	665	820	10235.5	660.3
2016	665	815	7287.5	549

2016	665	175	54	27
2016	664	249	995.4	199.08
2016	664	195	675.5	135.1
2016	665	222	102587.7	19817.45
2016	665	249	37	37
2016	665	809	23.3	23.3
2016	665	50	0.8	2
2016	665	100	6	15
2016	665	249	197.1	65.7
2016	665	253	41.2125	23.55
2016	665	222	81.15	14.3
2016	665	165	28.02	23.7
2016	665	343	651.32	1164
2016	665	457	1594	1594
2016	665	222	5580	984
2016	665	165	395.9	393.6
2016	665	686	0.38	38
2016	664	165	109.62	73.08
2016	665	91	912.75	182.55
2016	665	130	18	9
2016	665	400	156.5	41
2016	665	711	22303.5	44607
2016	665	165	46.5	31
2016	665	222	25056	4260
2016	665	151	1.75	175
2016	665	154	0.33	33
2016	664	803	246	123
2016	665	174	12	8
2016	665	806	0	0.5
2016	665	801	7787.5	5990.12
2016	665	260	176	107
2016	665	256	22.875	9.15
2016	665	254	7.2625	4.15
2016	665	280	384	64
2016	665	165	98.175	89.25
2016	665	153	114.77	417
2016	665	165	42	42
2016	664	711	6613	13226
2016	665	3	0.88	88
2016	665	342	10.83	1083
2016	665	222	2.32	232
2016	665	280	1.11	111
2016	665	801	0.27	27
2016	665	813	15398	7796
2016	665	473	0	20
2016	665	495	7	7
2016	665	165	7418.4	3808

2016	665	400	32388.16	5422
2016	665	400	438	73
2016	665	130	0.07	7
2016	665	206	400.6	522
2016	665	153	10	20
2016	665	222	13442.29	2425.98
2016	665	153	21.56	15.4
2016	665	341	397.6275	1728.15
2016	665	801	7474.5	4983
2016	665	151	0.62	62
2016	665	820	84078.19	4094.45
2016	665	804	0.2	20
2016	665	686	0.58	58
2016	665	222	0.18	18
2016	665	159	1.58	158
2016	665	40	0.16	16
2016	665	815	1227	102
2016	664	151	47.6	34
2016	664	155	22	22
2016	665	754	4504	2252
2016	665	754	8322	4161
2016	664	253	160.8	32.16
2016	665	150	22.5	31.5
2016	665	736	528.6	579
2016	665	712	14	10
2016	665	209	886.6	524
2016	665	200	2323.292	4132.32
2016	665	222	1008	168
2016	665	155	369	246
2016	665	155	579.81	1465
2016	665	341	0.62	62
2016	665	3	1.5	150
2016	665	151	0.21	21
2016	665	151	2.25	225
2016	665	804	0.02	2
2016	665	252	4	2
2016	665	153	18	64
2016	665	165	1735.5	890
2016	665	342	866.8	492
2016	665	802	6	6
2016	665	803	614	307
2016	665	342	209.6	131
2016	664	400	8396	2271
2016	665	813	98574.92	40702.05
2016	665	802	62	62
2016	665	159	20.6	26
2016	665	997	15	15

2016	665	250	12.32	9.8
2016	665	195	611.2125	225.7
2016	665	159	78.12	55.8
2016	665	165	78.76	71.6
2016	665	813	292.5	117
2016	665	342	5043.885	30543.5
2016	665	400	103482.8	27758
2016	665	155	4.24	424
2016	665	130	0.7	70
2016	665	155	2.65	265
2016	665	686	0.44	44
2016	665	130	0.6	60
2016	665	40	0.76	76
2016	665	171	313	313
2016	665	51	13.5	9
2016	664	400	4495.3	1299
2016	665	222	7267	1236
2016	664	110	7679	21940
2016	665	155	1188.46	700
2016	665	165	458.25	235
2016	665	803	12	12
2016	665	174	0.17	17
2016	665	815	720	48
2016	665	803	188	94
2016	664	155	160.1	124
2016	665	473	94.2	157
2016	665	435	712.2	1435.5
2016	665	204	404.3	644.78
2016	665	804	99.5	50
2016	665	151	20	20
2016	665	755	66	32
2016	665	154	46.8	60
2016	665	222	11926.2	2073.75
2016	665	153	65.45	46.75
2016	665	159	42.98	30.7
2016	665	159	363.37	1044
2016	665	209	0.22	22
2016	665	400	1674.76	1093
2016	665	400	0.88	88
2016	665	435	0	15
2016	665	165	81.66	54.44
2016	664	222	2185.04	348.09
2016	665	467	377.6	94.4
2016	664	165	25.5	17
2016	665	686	13	13
2016	665	802	0.02	2
2016	665	801	64	32

2016	664	820	21445.8	1028.67
2016	664	222	94.5	21
2016	665	810	0	10
2016	665	813	2235	894

ATTACHMENT 4

Year	Block	Species	Value	Pounds
2015	665	206	260.6	263
2015	665	238	15.5	31
2015	665	510	68.25	39
2015	665	222	120.55	24.1
2015	665	222	1259.5	228.1
2015	665	400	2497.5	518
2015	665	155	3145.85	4880.4
2015	665	400	1.77	177
2015	665	343	2.82	282
2015	665	280	147.87	423
2015	665	222	0.92	92
2015	665	803	404.5	529
2015	664	110	32406.5	92590
2015	664	42	240	400
2015	664	110	3089.45	8827
2015	665	686	74	74
2015	665	815	2025	153
2015	665	820	4600	184
2015	665	263	112	16
2015	664	757	5382.75	1083
2015	665	813	453	151
2015	665	150	0	5
2015	665	711	723	781
2015	665	222	100818.5	19908
2015	665	204	29.5	59
2015	665	400	6567.9	1139.9
2015	665	165	34.54	31.4
2015	665	400	213458.4	52691
2015	665	400	38172.22	8768
2015	665	130	3.87	387
2015	665	803	104.49	275
2015	665	130	0.05	5
2015	665	179	66	66
2015	665	203	289	289
2015	665	130	228	114
2015	665	342	2505.99	1936
2015	665	820	305505.8	15195.97
2015	665	222	1401.25	295
2015	665	803	464.1	275
2015	665	820	19960.1	1030.2
2015	664	731	0	6.5
2015	665	754	337.5	75
2015	665	184	3	1
2015	665	51	300	100
2015	664	820	4531.8	215.8
2015	665	211	93.99	415.65

2015	665	813	461872.3	187003
2015	665	80	38	62
2015	665	155	3599.725	1930.15
2015	665	222	3230	595.3
2015	665	190	1990	398
2015	665	342	313.4774	25091.74
2015	665	400	1.69	169
2015	665	400	0.11	11
2015	665	731	0.38	38
2015	665	259	1.22	122
2015	665	98	0.22	22
2015	664	801	3770	3029
2015	665	155	26	13
2015	665	209	1016	515
2015	665	154	63	63
2015	665	684	7	7
2015	665	50	26	26
2015	665	165	104.25	75.5
2015	665	222	1025	205
2015	665	686	16.04	20
2015	665	110	1803.75	7215
2015	664	820	51898.75	2779.6
2015	665	200	30	20
2015	665	435	565.24	989.08
2015	665	151	305.12	253
2015	664	165	59.4	54
2015	665	40	23.375	9.35
2015	665	98	359.5375	205.45
2015	664	151	168.5	142
2015	665	151	187	187
2015	665	400	480	80
2015	665	40	13	47
2015	665	801	362.5	290
2015	665	155	0.14	14
2015	665	813	9692	4026
2015	665	171	108	108
2015	665	801	3012.45	2850
2015	665	40	112	56
2015	665	174	53.8	79
2015	665	342	301.63	217
2015	665	280	132.5	53
2015	665	809	90	50
2015	665	802	89.2	144
2015	665	473	4379.4	8132
2015	665	222	2574.05	467.1
2015	665	813	741.65	211.9
2015	665	222	504.6	99.6

2015	665	165	85.7	80
2015	665	280	207	34.5
2015	664	400	17864	4466
2015	665	222	4770	795
2015	665	341	76.428	5054
2015	665	342	58.6	5860
2015	665	820	55214.16	2707.1
2015	665	40	0.22	22
2015	665	820	0.18	18
2015	665	342	0.9	90
2015	665	151	1402.55	832
2015	665	222	4443.3	730
2015	665	400	299	65
2015	665	711	18430.2	81912
2015	665	341	1.39	1
2015	664	820	17742.06	865.7
2015	665	652	407	37
2015	665	815	56688.4	4930.5
2015	665	809	0	1417
2015	665	712	3	5
2015	665	151	1079.06	633.5
2015	665	222	14134.22	6261.8
2015	665	40	5.83	583
2015	665	343	25.88	2588
2015	665	222	0.43	43
2015	665	130	0.25	25
2015	665	686	0.95	95
2015	665	342	2.12	212
2015	665	40	1.35	135
2015	665	804	1657.11	487
2015	665	341	0.2	20
2015	665	343	1.04	104
2015	665	343	845.9	640
2015	665	799	44	44
2015	664	341	0	5
2015	665	802	23	23
2015	665	261	433.5	51
2015	665	200	6107.4	11698
2015	665	754	0	15
2015	665	731	770	402.5
2015	665	225	120.6	205
2015	665	155	2018.108	1218.45
2015	665	153	11.5	11.5
2015	665	815	625.46	65
2015	665	222	28650.46	5379
2015	665	155	2544.36	1662
2015	665	801	20743.55	16414

2015	665	3	0.18	18
2015	665	752	10186.04	8328
2015	665	803	23	23
2015	665	803	3350	1675
2015	665	801	0	70
2015	665	222	313	59
2015	665	174	10	8
2015	665	145	99	18
2015	665	683	56	38
2015	665	420	3	1
2015	665	207	697.2	1577
2015	665	175	1299.64	2231.1
2015	665	165	4478	2687
2015	665	51	4.8	12
2015	665	400	5116.3	813.2
2015	664	222	2808.85	510.7
2015	665	40	186.5	74.6
2015	665	40	97.5	39
2015	665	222	3468	633
2015	664	400	3190	797.5
2015	665	803	263.07	2825
2015	665	341	15.16	1516
2015	665	260	4	2
2015	665	400	2566	635
2015	665	51	1.27	127
2015	665	165	4436.4	2279
2015	665	813	1366	683

ATTACHMENT 4

Species Code	Common Name	Scientific Name
1	Tuna, yellowfin	Thunnus albacares
2	Tuna, skipjack	Katsuwonus pelamis
3	Bonito, Pacific	Sarda chiliensis
4	Tuna, bluefin	Thunnus thynnus
5	Tuna, albacore	Thunnus alalunga
6	Tuna, unspecified	Scombridae
8	Tuna, bigeye	Thunnus obesus
9	Tuna, skipjack, black	Euthynnus lineatus
11	Tuna, longtail	Thunnus tonggol
12	Tuna, blackfin	Thunnus atlanticus
15	Escolar	Lepidocybium flavobrunneum
17	Oilfish	Ruvettus pretiosus
19	Mackerel, bullet	Auxis rochei
40	Yellowtail	Seriola lalandi
41	Jack, Pacific crevalle	Caranx caninus
42	Jacks, unspecified	Carangidae
43	Jack, almaco (amberjack)	Seriola rivoliana
50	Mackerel, unspecified	Scomber / Trachurus
51	Mackerel, Pacific	Scomber japonicus
52	Sierra, Pacific	Scomberomorus sierra
55	Mackerel, jack	Trachurus symmetricus
57	Wahoo	Acanthocybium solanderi
80	Butterfish (Pacific pompano)	Peprilus simillimus
81	Pomfret, Pacific	Brama japonica
91	Swordfish	Xiphias gladius
92	Marlin, striped	Tetrapturus audax
95	Sailfish	Istiophorus platypterus
96	Shark, white	Carcharodon carcharias
97	Shark, bigeye thresher	Alopias superciliosus
98	Shark, pelagic thresher	Alopias pelagicus
100	Sardine, Pacific	Sardinops sagax caeruleus
101	Sardine, juvenile	Sardinops sagax caeruleus
105	Herring, round	Etrumeus teres
110	Anchovy, northern	Engraulis mordax
111	Anchovy, deepbody	Anchoa compressa
113	Anchovy, slough	Anchoa delicatissima
121	Herring, Pacific	Clupea pallasi
122	Herring, Pacific - roe	Clupea pallasi
130	Barracuda, California	Sphyraena argentea
135	Mullet, striped	Mugil cephalus
144	Senorita	Oxyjulis californica
145	Sheephead, California	Semicossyphus pulcher
146	Wrasse, rock	Halichoeres semicinctus
147	Skate, longnose	Raja rhina
149	Shark, blacktip	Carcharhinus limbatus
150	Shark, unspecified	Selachii spp.

151	Shark, shortfin mako	Isurus oxyrinchus
152	Shark, spiny dogfish	Squalus acanthias
153	Shark, leopard	Triakis semifasciata
154	Shark, brown smoothhound	Mustelus henlei
155	Shark, thresher	Alopias vulpinus
156	Shark, basking	Cetorhinus maximus
158	Shark, smooth hammerhead	Sphyrna zygaena
159	Shark, soupfin	Galeorhinus zyopterus
160	Sharks, cow	Hexanchidae
161	Shark, sixgill	Hexanchus griseus
162	Shark, sevengill	Notorynchus cepedianus
163	Shark, swell	Cephaloscyllium ventriosum
164	Shark, dusky	Carcharhinus obscurus
165	Shark, Pacific angel	Squatina californica
166	Ratfish, spotted	Hydrolagus colliei
167	Shark, blue	Prionace glauca
168	Shark, salmon	Lamna ditropis
169	Shark, horn	Heterodontus francisci
170	Ray, unspecified	Rajiformes
171	Ray, bat	Myliobatis californica
172	Ray, Pacific electric	Torpedo californica
173	Stingray	Dasyatidae
174	Guitarfish, shovelnose	Rhinobatos productus
175	Skate, unspecified	Rajidae
176	Skate, big	Raja binoculata
177	Skate, California	Raja inornata
178	Skate, thornback	Platyrhinoidis triseriata
179	Shark, gray smoothhound	Mustelus californicus
180	Smelts, true	Osmeridae
181	Grunion, California	Leuresthes tenuis
182	Smelt, surf	Hypomesus pretiosus
184	Jacksmelt	Atherinopsis californiensis
185	Smelt, whitebait	Allosmerus elongatus
186	Topsmelt	Atherinops affinis
187	Smelt, night	Spirinchus starksi
188	Eulachon	Thaleichthys pacificus
189	Silversides	Atherinidae
190	Sablefish	Anoplopoma fimbria
191	Louvar	Luvarus imperialis
195	Lingcod	Ophiodon elongatus
196	Tomcod, Pacific	Microgadus proximus
197	Cod, Pacific	Gadus macrocephalus
198	Grenadier	Macrouridae
200	Sole, unspecified	Pleuronectiformes
201	Flounder, arrowtooth	Atheresthes stomias
202	Sole, bigmouth	Hippoglossina stomata
203	Sole, rock	Pleuronectes bilineata

204	Sole, fantail	Xystreurys liolepis
205	Sole, sand	Psettichthys melanostictus
206	Sole, English	Pleuronectes vetulus
207	Sole, rex	Errex zachirus
208	Sole, butter	Pleuronectes isolepis
209	Sole, petrale	Eopsetta jordani
210	Sole, slender	Eopsetta exilis
211	Sole, Dover	Microstomus pacificus
212	Sole, tongue	Symphurus atricauda
220	Halibut, unspecified	Pleuronectiformes
221	Halibut, Pacific	Hippoglossus stenolepis
222	Halibut, California	Paralichthys californicus
225	Sanddab	Citharichthys spp.
226	Sanddab, longfin	Citharichthys xanthostigma
227	Sanddab, Pacific	Citharichthys sordidus
228	Sanddab, speckled	Citharichthys stigmaeus
230	Flounder, unspecified	Pleuronectidae
231	Flounder, starry	Platichthys stellatus
235	Turbot, curlfin	Pleuronichthys decurrens
236	Turbot, diamond	Hypsopsetta guttulata
237	Sole, C-O	Pleuronichthys coenosus
238	Turbot, hornyhead	Pleuronichthys verticalis
239	Turbot, spotted	Pleuronichthys ritteri
240	Turbot	Pleuronectidae
245	Rockfish, cowcod	Sebastes levis
246	Rockfish, copper (whitebelly)	Sebastes caurinus
247	Rockfish, canary	Sebastes pinniger
249	Rockfish, vermilion	Sebastes miniatus
250	Rockfish, unspecified	Sebastes spp.
251	Rockfish, black-and-yellow	Sebastes chrysomelas
252	Rockfish, black	Sebastes melanops
253	Rockfish, bocaccio	Sebastes paucispinis
254	Rockfish, chilipepper	Sebastes goodei
255	Rockfish, greenspotted	Sebastes chlorostictus
256	Rockfish, starry	Sebastes constellatus
257	Rockfish, darkblotched	Sebastes crameri
258	Rockfish, China	Sebastes nebulosus
259	Rockfish, yellowtail	Sebastes flavidus
260	Scorpionfish, California	Scorpaena guttata
261	Cabezon	Scorpaenichthys marmoratus
262	Thornyheads	Sebastolobus spp.
263	Rockfish, gopher	Sebastes carnatus
264	Rockfish, pinkrose	Sebastes simulator
265	Rockfish, yelloweye	Sebastes ruberrimus
267	Rockfish, brown	Sebastes auriculatus
268	Rockfish, rosy	Sebastes rosaceus
269	Rockfish, widow	Sebastes entomelas

270	Rockfish, splitnose	Sebastes diploproa
271	Rockfish, Pacific ocean perch	Sebastes alutus
272	Sculpin, staghorn	Leptocottus armatus
273	Sculpin, yellowchin	Icelinus quadriseriatus
275	Bass, rock	Paralabrax spp.
276	Bass, spotted sand	Paralabrax maculatofasciatus
277	Bass, kelp	Paralabrax clathratus
278	Bass, barred sand	Paralabrax nebulifer
280	Bass, giant sea	Stereolepis gigas
289	Greenling, rock	Hexagrammos lagocephalus
290	Greenling, kelp	Hexagrammos decagrammus
291	Triggerfish	Balistidae
292	Sunfish, ocean	Mola mola
300	Salmon	Oncorhynchus spp.
301	Salmon, chum	Oncorhynchus keta
302	Salmon, Chinook	Oncorhynchus tshawytscha
303	Salmon, pink	Oncorhynchus gorbuscha
304	Salmon, coho	Oncorhynchus kisutch
306	Salmon, Roe (Chinook, Coho)	Oncorhynchus spp.
316	Trout, rainbow	Oncorhynchus mykiss
320	Catfish, unspecified	Siluriformes
322	Bullhead, brown	Ameiurus nebulosus
324	Shad, threadfin	Dorosoma petenense
325	Shad, American	Alosa sapidissima
335	Bass, striped	Morone saxatilis
340	Tilapia	Tilapia spp.
341	Crab, red rock	Cancer productus
342	Crab, yellow rock	Cancer anthonyi
343	Crab, brown rock	Cancer antennarius
345	Carp	Cyprinus carpio
346	Hardhead (freshwater)	Mylopharodon conocephalus
347	Splittail	Pogonichthys macrolepidotus
348	Hitch	Lavinia exilicauda
349	Blackfish, Sacramento	Orthodon microlepidotus
361	Stickleback, threespine	Gasterosteus aculeatus
365	Squawfish	Ptychocheilus grandis
375	Sucker	Catostomidae
400	Seabass, white	Atractoscion nobilis
410	Seabass, totuava	Totoaba macdonaldi
415	Snapper -Mexico-	Lutianidae
420	Croaker, unspecifed	Sciaenidae
421	Croaker, black	Cheilotrema saturnum
422	Croaker, spotfin	Roncador stearnsii
423	Croaker, yellowfin	Umbrina roncador
426	Corbina, California	Menticirrhus undulatus
427	Corvina, shortfin	Cynoscion parvipinnis
430	Grouper	Mycteroperca / Epinephelus

431	Cabrilla, spotted	Epinephelus analogus
432	Grouper, broomtail	Mycteroperca xenarcha
435	Croaker, white	Genyonemus lineatus
440	Queenfish	Seriphus politus
445	Flyingfish	Exocoetidae spp.
446	Saury, Pacific	Cololabis saira
450	Eel	Osteichthyes
451	Eel, blenny	Lumpenus anguillaris
452	Eel, California moray	Gymnothorax mordax
453	Lamprey, Pacific	Lampetra tridentata
454	Eel, wolf (wolf-eel)	Anarrhichthys ocellatus
455	Eel, spotted cusk-	Chilara taylori
456	Eel, monkeyface (prickleback)	Cebidichthys violaceus
457	Hagfishes	Eptatretus spp.
467	Opah	Lampris guttatus
470	Sturgeons	Acipenseridae
471	Sturgeon, green	Acipenser medirostris
472	Sturgeon, white	Acipenser transmontanus
473	Lizardfish, California	Synodus lucioceps
474	Perch-like, unspecified	Kyphosidae/Pomacentridae
475	Opaleye	Girella nigricans
476	Needlefish, California	Strongylura exilis
477	Bonefish	Albula vulpes
478	Halfmoon	Medialuna californiensis
479	Blacksmith	Chromis punctipinnis
480	Sargo	Anisotremus davidsonii
481	Dolphin (fish)	Coryphaena hippurus
482	Garibaldi	Hypsypops rubicundus
483	Mudsucker, longjaw	Gillichthys mirabilis
484	Salema	Xenistius californiensis
485	Midshipman, plainfin	Porichthys notatus
486	Goby, bluebanded	Lythrypnus dalli
487	Goby, yellowfin	Acanthogobius flavimanus
488	Goby, zebra	Lythrypnus zebra
490	Whitefish, ocean	Caulolatilus princeps
491	Killifish, California	Fundulus parvipinnis
495	Whiting, Pacific	Merluccius productus
501	Kelpfish, giant	Heterostichus rostratus
510	Kelpfishes	Gibbonsia spp.
550	Surfperch, unspecified	Embiotocidae
551	Surfperch, barred	Amphistichus argenteus
552	Surfperch, black	Embiotoca jacksoni
553	Surfperch, redtail	Amphistichus rhodoterus
554	Surfperch, shiner	Cymatogaster aggregata
555	Seaperch, striped	Embiotoca lateralis
556	Surfperch, white	Phanerodon furcatus
557	Surfperch, walleye	Hyperprosopon argenteum

558	Surfperch, rubberlip	Rhacochilus toxotes
559	Surfperch, pile	Rhacochilus vacca
560	Surfperch, calico	Amphistichus koelzi
561	Surfperch, dwarf	Micrometrus minimus
562	Surfperch, rainbow	Hypsurus caryi
563	Surfperch, pink	Zalembius rosaceus
564	Surfperch, silver	Hyperprosopon ellipticum
601	Kahawai	Annipis trutta
602	Zebraperch	Hermosilla azurea
650	Rougheye rockfish	Sebastes aleutianus
651	Rockfish, olive	Sebastes serranoides
652	Rockfish, grass	Sebastes rastrelliger
653	Rockfish, pink	Sebastes eos
654	Rockfish, greenstriped	Sebastes elongatus
655	Rockfish, copper	Sebastes caurinus
656	Blackspotted rockfish	Sebastes melanostictus
657	Rockfish, flag	Sebastes rubrivinctus
658	Rockfish, treefish	Sebastes serriceps
659	Rockfish, kelp	Sebastes atrovirens
660	Rockfish, honeycomb	Sebastes umbrosus
661	Rockfish, greenblotched	Sebastes rosenblatti
662	Rockfish, bronzespotted	Sebastes gilli
663	Rockfish, bank	Sebastes rufus
664	Rockfish, rosethorn	Sebastes helvomaculatus
665	Rockfish, blue	Sebastes mystinus
666	Rockfish, squarespot	Sebastes hopkinsi
667	Rockfish, blackgill	Sebastes melanostomus
668	Rockfish, stripetail	Sebastes saxicola
669	Rockfish, speckled	Sebastes ovalis
670	Rockfish, swordspine	Sebastes ensifer
671	Rockfish, calico	Sebastes dallii
672	Rockfish, shortbelly	Sebastes jordani
673	Rockfish, chameleon	Sebastes phillipsi
674	Rockfish, aurora	Sebastes aurora
675	Rockfish, redbanded	Sebastes babcocki
676	Rockfish, Mexican	Sebastes macdonaldi
677	Rockfish, shortraker	Sebastes borealis
678	Thornyhead, longspine	Sebastolobus altivelis
679	Thornyhead, shortspine	Sebastolobus alascanus
680	Anemones	Anthozoa
681	Jellyfish	Hydrozoa
682	Sea pansy	Renilla koellikeri
683	Limpet, keyhole	Megathura crenulata
684	Snail, tegula	Tegula spp.
685	Crab, hermit	Paguristes sp.
686	Crab, spider/sheep claws	Loxorhynchus spp.
687	Sand dollar	Dendraster excentricus

688	Bryozoan	Ectoprocta
689	Flatworm, marine	Platyhelminthes
690	Hornsnail	Cerithidea spp.
699	Invertebrate Unspecified	
700	Abalone	Haliotis spp.
701	Abalone, black	Haliotis cracherodii
702	Abalone, red	Haliotis rufescens
703	Abalone, green	Haliotis fulgens
704	Abalone, pink	Haliotis corrugata
705	Abalone, white	Haliotis sorenseni
706	Abalone, threaded	Haliotis assimilis
707	Abalone, pinto	Haliotis kamtschatkana
708	Abalone, flat	Haliotis walallensis
709	Limpet, unspecified	Archaeogastropoda
710	Squid, jumbo	Doscidicus gigas
711	Squid, market	Loligo opalescens
712	Octopus, unspecified	Octopus spp.
717	Scallop, weathervane	Patinopecten caurinus
718	Scallop, rock	Crassadoma gigantea
719	Scallop, unspecified	Pectinidae
720	Clam, unspecified	Bivalvia
721	Clam, common littleneck	Protothaca staminea
722	Clam, Pismo	Tivela stultorum
723	Clam, softshell	Mya arenaria
725	Clam, northern razor	Siliqua patula
726	Clam, gaper	Tresus nuttalli
727	Clam, common Washington	Saxidomus nuttalli
728	Clam, California jackknife	Tagelus californianus
729	Sea slug	Opisthobranchia
730	Mussel	Mytilus spp.
731	Whelk, Kellet's	Kelletia Kelleti
732	Snail, sea	Gastropoda
733	Clam, freshwater	Corbicula fluminea
734	Clam, purple	Nuttallia nuttallii
735	Clam, rosy razor	Solen sicarius
736	Snails, moon	Polinices spp.
737	Clam, northern quahog	Mercenaria mercenaria
740	Oyster, unspecified	Ostreidae
741	Oyster, eastern	Crassostrea virginica
742	Oyster, California native	Ostrea lurida
743	Oyster, giant Pacific	Crassostrea gigas
745	Oyster, european flat	Ostrea edulis
746	Snail, bubble	Bulla gouldiana
747	Snail, top	Astraea undosa
749	Sea hare	Aplysia spp.
750	Echinoderm, unspecified	Echinodermata
751	Sea stars	Asteroidea

752	Sea urchin, red	Strongylocentrotus franciscanu
753	Sea urchin, purple	Strongylocentrotus purpuratus
754	Sea cucumber, giant red	Parastichopus californicus
755	Sea cucumber, unspecified	Holothuroidea
756	Sea urchin, white	Lytechinus anamesus
757	Sea cucumber, warty	Parastichopus parvimensis
760	Sponges	Porifera
769	Invertebrates, colonial	Cnidaria
781	Snail, freshwater	Gastropoda
799	Mollusk, unspecified	Mollusca
800	Crab, Dungeness	Cancer magister
801	Crab, rock unspecified	Cancer spp.
802	Crab, claws	Cancer spp.
803	Crab, spider	Loxorhynchus spp.
804	Crab, king	Paralithodes spp.
805	Crab, sand	Emerita analoga
806	Crab, shore	Pachygrapsus crassipes
807	Crab, pelagic red	Pleuroncodes planipes
808	Crab, tanner	Chionoecetes tanneri
809	Crab, box	Lopholithodes foraminatus
810	Shrimp, bay	Crangonidae
811	Shrimp, ghost	Callianassa californiensis
812	Shrimp, ocean (pink)	Pandalus jordani
813	Prawn, ridgeback	Eusicyonia ingentus
814	Shrimp, unspecified	Crustacea
815	Prawn, spot	Pandalus platyceros
816	Prawn, golden	Penaeus Californiensis
817	Shrimp, coonstriped	Pandalus danae
818	Shrimp, red rock	Lysmata californica
819	Shrimp, brine	Artemia salina
820	Lobster, California spiny	Panulirus interruptus
821	Shrimp, mantis	Hemisquilla ensigera californiensis
823	Crab, armed box	Playmera gaudichaudi
825	Crayfish, signal	Pacifastacus leniusculus
826	Barnacle	Cirripedia
827	Crayfish, red swamp	Procambarus clarkii
828	Crayfish, unspecified	Astacidae
830	Spiders, sea	Pycnogonida
840	Tunicates	Urochordata
850	Worms, marine	Polychaeta
851	Themiste	Themiste spp.
860	Chiton, unspecified	Polyplacophora
899	Crustacean, unspecified	Crustacea
915	Lancelets, amphioxus	Branchiostoma californiense
920	Frog	Rana spp.
921	Frog, bull	Rana catesbiana
930	Turtle	Chelonia mydas

931	Terrapin	Malaclemys spp.
950	Kelp	Macrocystis spp.
951	Agar	Gelidium spp.
953	Algae, marine	Phycophyta
956	Rockfish, group bocaccio/chili	Sebastes/group
957	Rockfish, group bolina	Sebastes/group
958	Rockfish, group deepwater reds	Sebastes/group
959	Rockfish, group red	Sebastes/group
960	Rockfish, group small	Sebastes/group
961	Rockfish, group rosefish	Sebastes/group
962	Rockfish, group gopher	Sebastes/group
964	Rockfish, group rougheye/blackspotted	Sebastes/group
970	Rockfish, quillback	Sebastes maliger
971	Rockfish, group canary/vermili	Sebastes/group
972	Rockfish, group black/blue	Sebastes/group
973	Rockfish, group nearshore	Sebastes/group
974	Rockfish, group shelf	Sebastes/group
975	Rockfish, group slope	Sabastes/group
976	Rockfish, group deep nearshore	Sebastes/group
992	Trawled fish for animal food	Osteichthyes
995	Herring, Pacific - roe on kelp	Clupea/algae
997	Trawled fish, unspecified	Osteichthyes
999	Fish, unspecified	Osteichthyes

ATTACHMENT 4

APPENDIX D

Best Management Practices

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 of concern; however, natural mussel spat collected on farm grow-out lines and buoys may also be harvested and cultivated.	Grower/Producer[1]	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 to 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 be searched for, collected, properly disposed of onshore, and documented in the annual inspection report. Monitoring shall occur	Grower/Producer to inspect and respond VPD to identify disposal facility	VPD and NOAA Fisheries

[1] Note that all Grower/Producer responsibilities will be spelled out as conditions in grower/producer leases with VPD, thus establishing VPD enforcement authority for those conditions.

	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. 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 so as to modify gear and avoid any future entanglements.		
Wildlife – 2	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.	VPD to identify potential predator species and deterrence methods Grower/Producer to implement identified methods as necessary	Any methods of predator control are subject to prior approval of VPD, U.S. Fish and Wildlife Service, and NOAA Fisheries
Wildlife – 3	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. 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 mammals in the area of potential sound effects during construction; (3) dates and times when observations and in-water project	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	VPD and NOAA Fisheries

	construction activities were conducted; and (4) dates and times when in-water construction activities were suspended because of marine mammals. 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.		
Wildlife – 4	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.	Grower/Producer	VPD
Wildlife – 5	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.	VPD to prepare training curriculum Grower/Producer to provide training	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: 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	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	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

	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.		
Storage and disposal of supplies – 2	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.	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 of 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 harbormasters (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	VPD	U.S. Coast Guard

	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.		

APPENDIX B

Federally Protected Species Potential to Occur

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
Marine Mammals[2]				
Cetaceans				
Balarnoptera acutorostrata	Common minke whale	MMPA	Worldwide distribution. Polar, temperate, and tropical waters in both coastal and offshore habitats (NMFS 2018a).	**Moderate** potential to occur. Foraging and migration habitat is present in the Action Area. Some individuals are residents in California waters. Minke whales feed on euphausiids, copepods and small schooling fish, which are present in the Channel. In addition, this species has been recorded since 1988 in the Santa Barbara Channel and within 1 mile of the Action Area (PBCS 2018).
Balaenoptera borealis borealis	Sei whale	Endangered, MMPA	Worldwide distribution in subtropical, temperate, and subpolar waters. This species prefers deeper waters far from the coastline (NMFS 2018a). This species' habitat preference is the continental shelf edge and slope (NMFS 2018a).	Low potential to occur. This species may traverse through the Action Area during migration. In general, sei whales migrate annually from cool and subpolar waters in summer to temperate and subtropical waters for winter, where food is more abundant. Foraging resources (krill, copepods, small schooling fish, cephalopods) are likely present in the Action Area.
Balaenoptera edeni	Bryde's whale	Proposed Endangered, MMPA	Prefers highly productive tropical, subtropical and warm temperate waters worldwide.	Low potential to occur. This species may be found in all oceans from 40°S to 40°N; however, some populations migrate seasonally while others are resident and do not migrate (NMFS 2018). Year-round residents appear to be present along the west coast of Baja California, Mexico (Kenyon 1971). Foraging resources (krill, copepods, small schooling fish, crustaceans) are likely present in the Action Area. This species displays a preference for subtropical and tropical zones, inhabiting waters 16°C (60°F) or warmer) (Jefferson et al. 2008).
Balaenoptera musculus musculus	Blue whale	Endangered, MMPA	Worldwide, from sub-polar to sub-tropical latitudes; generally occurs more offshore than other whales (NMFS 2018a).	Low potential to occur. This species has been observed migrating and feeding through the Santa Barbara Channel on many occasions, with several occurrences within the Action Area (PBCS 2018). In general, this species migrates poleward to feed in the summer and to the tropics to breed in the winter (Jefferson et al. 2008). Most occurrences are north of Santa Rosa and western Santa Cruz Island along the 200 meter isobath (Cascadia 2011), approximately 7.4 miles east of the Action Area. In addition, foraging resources (predominantly krill) are likely present in the Action Area.
Balaenoptera physalus physalus	Fin whale	Endangered, MMPA	Worldwide, primarily in temperate to polar latitudes and less common in the tropics.	**Moderate** potential to occur. This species has been observed migrating and feeding through the Santa Barbara Channel on many occasions, with one occurrence (12

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
				individuals) noted within 1 mile of the Action Area in 2011 (PBCS 2018; Cascadia 2011). This species' distribution is not well known, but it generally migrates poleward to feed in the summer and to the subtropics to breed in the winter (Jefferson et al. 2008). Resources (krill, small schooling fish, squid) are likely present in the Action Area. This species is more commonly associated with the 200 meter isobath, which is approximately 7.4 miles from the Action Area (Cascadia 2011)
Berardius bairdii	Baird's beaked whale	MMPA	Throughout the North Pacific Ocean and adjacent seas. This species prefers deep, cold waters of 3,000 feet (nearly 1,000 meters) or greater and may occur near shore along narrow continental shelves. Beaked whales are deep divers that prefer submarine canyons, seamounts, and continental slopes (NMFS 2018a).	Low potential to occur. Migration and distribution are poorly known (Jefferson et al. 2008). Suitable foraging resources (e.g., deep water and bottom-dwelling crustaceans, cephalopods, gadiform fish; Jefferson et al. 2008) are not likely present in the Action Area. This species prefers deep waters that are not present within the Action Area. This species has been observed far south of the Channel Islands, and west of Point Conception (Baumann-Pickering et al. 2013).
Delphinus capensis capensis	Long-beaked common dolphin	MMPA	Coastal habitats; prefers shallower tropical, subtropical, and warmer temperate to cool waters closer to the coast (within 50-100 nautical miles (90-180 km)) and the continental shelf (NMFS 2018a).	**High** potential to occur. Foraging resources (small schooling fish and squid) are likely present in the Action Area. This species has been recorded multiple times and in great numbers (e.g., occurrences with 1,500 individuals) in the Santa Barbara Channel, including the Action Area (PBCS 2018). This species displays a habitat preference for coastal waters, sometimes coming close to shore within waters that are only a few meters deep (Jefferson et al. 2008).
Delphinus delphis delphis	Short-beaked common dolphin	MMPA	Warm tropical to cool temperate waters, primarily oceanic and offshore. Species also occurs along the continental slope in waters 650-6,500 feet (200-2,000 m) deep (NMFS 2018a).	**Moderate** potential to occur. Foraging resources (small schooling fish and squid) are likely present in the Action Area. This species has been recorded multiple times and in great numbers (e.g., occurrences with 1,500 individuals) in Santa Barbara Channel and adjacent to the Action Area (PBCS 2018). This species is often associated with areas of upwelling and areas of steep sea-bottom (Jefferson, Webber and Pitman 2008).
Eschrichtius robustus	Gray whale (Eastern North Pacific stock)	MMPA	Occurs in coastal waters along the west coast of North America from Mexico to Alaska and in eastern Siberia. Usually feeds along the Bering, Chukchi, and Beaufort seas during the summer, and winters along breeding and calving areas off the coast of	**High** potential to occur. This species is a frequent visitor to the Ventura coastline and Santa Barbara Channel and commonly observed during migration, especially during the northward migration from Baja to Alaska. This species is a bottom feeder (epibenthic fauna such as mysids, amphipods, polychaete tube worms) and so are restricted

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
			Baja California. Calves are born from January to February (NMFS 2018a). During their northward migration from Baja to Alaska, cow-calf pairs stay particularly close to shore to avoid predation by orcas (NMFS 2014). Bottom feeder that consumes benthic amphipods.	to shallow continental shelf waters (Jefferson et al. 2008). Gray whales are often observed close to shore and has multiple occurrences in the Action Area (PBCS 2018).
Eubalaena glacialis	North Pacific right whale	Endangered, MMPA	Pacific Ocean between 20°N and 60°N latitude, from temperate to subpolar waters. Primarily occurs in shelf or coastal waters (NMFS 2018a).	Low potential to occur. Distribution is not well known but they appear to have a northward migration in the spring and a southward migration in the fall. This species is extremely rare with likely less than 50 individuals in U.S. waters (MMC 2018) and a scattered distribution throughout its range (NMFS 2018a). Suitable foraging resources (zooplankton) may be present within the Action Area. The most recent and closest occurrences for this species include 2 possible individuals sighted near San Miguel Island (February 2015), 10 individuals off Monterey (May 2016, PBCS 2018), and 1 individual off La Jolla (April 2017, MMC 2018). This species is historically known to inhabit offshore waters in depths sometimes greater than 2,000 m (Jefferson, Webber and Pitman 2008).
Grampus griseus	Risso's dolphin	MMPA	Temperate, subtropical, and tropical waters generally greater than 3,300 feet (1,000 m) and seaward of the continental shelf and slopes (NMFS 2018a).	Low potential to occur. Suitable foraging resources (cephalopods and crustaceans) may be present within the Action Area. This species has been observed in the Santa Barbara Channel, with many occurrences located south and northwest of the Action Area (PBCS 2018). This species prefers deeper waters on the continental shelf and slope, between 30° and 45° latitude (Jefferson et al. 2008), and is unlikely to occur in the Action Area.
Globicephala macrorhynchus	Short-finned pilot whale	MMPA	Prefers warmer tropical and temperate waters, typically within waters of 1,000 feet or more deep (NMFS 2018a).	Not expected to occur. Once common around the Channel Islands, a strong El Nino in 1982-1983 brought changes to the ecosystem affecting prey and this species disappeared from the area (Jefferson et al. 2008). This species inhabits areas with a high density of squid, their preferred prey. The most recent documented sighting occurred in October 2014 off Dana Point, Orange County, CA (OC Register 2018). This species prefers deep waters and is unlikely to occur in the Action Area.
Kogia breviceps	Pygmy sperm whale	MMPA	Worldwide distribution. Prefers tropical, sub-tropical and temperate waters. Most	Not expected to occur. In addition, based on shipboard surveys from 1991 to 2014, this species has only been

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
			common along waters seaward of the continental shelf edge and slope. Mostly forages in mid- and deep-water environments (NMFS 2018a).	sighted a handful of times (including unidentified *Kogia* sp.) off the coast of Central and Southern California (NMFS 2017a). This species prefers deep waters (outer continental shelf and beyond) and therefore is unlikely to occur in the Action Area.
Kogia sima	Dwarf sperm whale	MMPA	Worldwide; prefers tropical, sub-tropical, and temperate waters. Most common along the continental shelf edge and slope (NMFS 2018a).	Not expected to occur. This species inhabits warmer waters in offshore areas, and there is no evidence of migrations. Dwarf sperm whales feed on deep-water cephalopods (Jefferson, Webber and Pitman 2008). Based on shipboard surveys from 1991 to 2014, *Kogia* sp. have only been sighted a handful of times off the coast of central and southern California (NMFS 2017b). This species prefers deep waters and is unlikely to occur in the Action Area.
Lagenorhynchus obliquidens	Pacific white-sided dolphin	MMPA	North Pacific Ocean; cool, temperate waters from the continental shelf to the deep open ocean (NMFS 2018a).	**Moderate** potential to occur. Exhibits seasonal inshore/offshore and north/south movements. Foraging habitat is present in the Action Area. This species feeds mostly on cephalopods and small schooling fish in deep offshore waters but also on the continental shelf (Jefferson, Webber and Pitman 2008). In addition, this species has numerous occurrences within the Santa Barbara Channel and a few occurrences in the Action Area (PBCS 2018).
Lissodelphis borealis	Northern right-whale dolphin	MMPA	Endemic to deep, cold temperate waters of the North Pacific Ocean from Baja California to the Gulf of Alaska; generally in waters over the continental shelf and slope colder than 66°F (NMFS 2018a).	Low potential to occur. Although foraging habitat (i.e., for market squid) is present in the Action Area, this species has several scattered observations within the Santa Barbara Channel and no known observations within the Action Area (PBCS 2018). Northern right-whale dolphins are an open ocean species and are known only to come nearshore where there are deep submarine canyons (Jefferson, Webber and Pitman 2008).
Mesoplodon densirostris	Blainville's beaked whale	MMPA	Worldwide in temperate and tropical waters; prefers deep waters (WDC 2018).	Not expected to occur. Blainville's beaked whale has the most extensive distribution of the genus and inhabits depths between 200 to 1,000 m (Jefferson, Webber and Pitman 2008), where squid are plentiful. This species prefers deep waters and is unlikely to occur in the Action Area.
Mesoplodon stejnegeri	Stejneger's beaked whale	MMPA	North Pacific Ocean; prefer cold temperate and subarctic waters; generally found in	Not expected to occur. Inhabiting the North Pacific basin, this species is primarily oceanic but also inhabits the continental slope. It feeds on deep-water squid (Jefferson,

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
			deep, offshore waters from 2,500-5,000 feet deep (NMFS 2018a).	Webber and Pitman 2008). This species prefers deep waters and is unlikely to occur in the Action Area.
Megaptera novaeangliae	Humpback whale	Threatened (Mexico DPS) and Endangered (Central America DPS), MMPA	Worldwide distribution from the equator to sub-polar latitudes; feeding areas for the Mexico DPS occur off the coast of central California; Migrating individuals from the Central America DPS may migrate through the Action Area on their way to feeding grounds located off the Pacific Northwest (NMFS 2018a). This species stays near the surface of the ocean when migrating and prefers shallow waters when feeding and calving. This species can be seen close to shore when conditions allow for prey switching from krill to small schooling fish, which inhabit nearshore areas.	**Moderate to high** potential to occur. Foraging and migration habitat is present in the Action Area. Numerous observations of this species have been documented within the Santa Barbara Channel both close to shore and near the Channel Islands (PBCS 2018). In addition, this species is strongly associated with the 200 meter isobaths (Cascadia 2011).
Orcinus orca	Killer Whale (Southern Resident DPS – consisting of pods J, K, and L, Eastern North Pacific Transient Stock, and Eastern North Pacific Offshore Stock)	Endangered MMPA (all populations)	The Southern Resident DPS reside for part of the year in the inland waters of Washington State and British Columbia and have been known to travel to coastal sites as far south as central California (71 FR 69054-69070). Transient forms (Eastern North Pacific Transient Stock) of the species prefer coastal waters from Alaska through California, and offshore forms (Eastern North Pacific Offshore Stock) can be found from Mexico to Alaska (71 FR 69054-69070). In general, this species is most abundant in colder waters and high latitudes; fairly abundant in temperate waters; lower densities in tropical, subtropical, and offshore waters (NMFS 2018a, 70 FR 69903-69912).	Low potential to occur. Foraging resources (primarily fish) are present in the Action Area, which could be prey for offshore stocks that occasionally visit the area (feed primarily on sharks). Residents have only been observed as far south as Monterey Bay. However, transients (which prey on marine mammals) are more common in the Santa Barbara Channel, with more occurrences nearer to the islands than the shore (PBCS 2018).
Peponocephala electra	Melon-headed whale	MMPA	Primarily in deep waters throughout the tropical areas of the world (NMFS 2018a).	Not expected to occur. The Action Area is located outside of this species' known range. The closest habitat occurs in Baja. This species is rarely found nearshore. They feed on squid and small fish deep in the water column (Jefferson, Webber and Pitman 2008). This species prefers deep waters and is unlikely to occur in the Action Area.
Phoceonoides dalli	Dall's porpoise	MMPA	North Pacific open ocean, prefers temperate to boreal waters than are more than 600 feet	Low potential to occur. This species feeds on mid-water fish and squid in offshore waters, only using nearshore

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
			(180 meters) in depth and temperatures between 36-63°F (NMFS 2018a).	waters if there are deep-water features such as canyons (Jefferson, Webber and Pitman 2008). Although there are many scattered observations of this species in the Santa Barbara Channel (predominantly north of Santa Cruz Island), the closest occurrences near the Action Area occurred in 2007 (PBCS 2018). This species prefers deep waters and unlikely to occur in the Action Area.
Phocoena phocoena	Harbor porpoise	MMPA	North temperate and subarctic coastal and offshore waters; commonly found in bays, estuaries, harbors, and fjords less than 650 feet deep. Along the North American coast, range from central California to the Beaufort Sea (NMFS 2018a).	Not expected to occur. The Action Area is located outside of this species' known range. The Action Area may have their preferred prey species (cephalopods and small schooling fish) but the southern range of the species extends only to Point Conception. A shallow-water species, they normally inhabit waters less than 100 m (Jefferson, Webber and Pitman 2008). In addition, the closest incidental observation of the species were located along the Gaviota coast in 1992 (PBCS 2018).
Physeter catodon (=microcephalus)	Sperm whale	Endangered, MMPA	Worldwide; prefer deep waters and consumes deep water species (e.g., squid, sharks, skates, and fish) (NMFS 2018a)	Not expected to occur. A somewhat migratory species, sperm whales inhabit continental slope and oceanic waters with steep drop-offs where they prey on cephalopods (Jefferson, Webber and Pitman 2008). Although a few incidental observations of this species has occurred in the Santa Barbara Channel (dated 2002, 2004, and 2016; PBCS 2018), this species prefers deep waters and is unlikely to occur in the Action Area.
Pseudorca crassidens	False killer whale	MMPA	Ranges in the U.S. in Hawaii, along the west coast, and mid-Atlantic coast. Prefer tropical to temperate waters deeper than 3,300 feet (1,000 meters) (NMFS 2018a).	Not expected to occur. False killer whales are found in deep, offshore waters, and sometimes occur on the continental shelf (Jefferson, Webber and Pitman 2008). They feed on cephalopods and fish which are present in the Channel. However, this species prefers deep waters and is unlikely to occur in the Action Area.
Stenella coeruleoalba	Striped dolphin	MMPA	Mainly found seaward of the continental shelf from 50°N to 40°S latitude. Prefer highly productive tropical to warm temperate waters (52-84°F) that are oceanic and deep; often occurs in areas of upwelling and convergence zones (NMFS 2018a).	Not expected to occur. Primarily a warm water species that can be associated with convergence zones. They feed on fish in pelagic zones, along the continental slope or oceanic regions (Jefferson, Webber and Pitman 2008). This species prefers open oceans, has been recorded west of the Channel Islands (NMFS 2017c), and is unlikely to occur in the Action Area.
Steno bredanensis	Rough-toothed dolphin	MMPA	Worldwide; found primarily in deep waters throughout tropical and warmer temperate areas. Two recognized stock occur in Hawaii and Northern Gulf of Mexico (NMFS	Not expected to occur. This warm open ocean species rarely ranges north of 40° N (Jefferson, Webber and

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
			2018a). May be a specialist feeder on mahi mahi (*Coryphaena hippurus*).	Pitman 2008). Suitable deep water habitats are absent in the Action Area.
Tursiops truncatus	Common bottlenose dolphin	MMPA	Worldwide ranging from 45°N to 45°S latitude; found in temperate and tropical waters. Coastal populations migrate into bays, estuaries, and river mouths. Offshore populations inhabit pelagic waters along the continental shelf.	**High** potential to occur. A common coastal species and a generalist feeder (Jefferson, Webber and Pitman 2008). This species has many occurrences throughout the Santa Barbara Channel and within or directly adjacent to the Action Area (PBCS 2018). This species is also known to regularly occur within 1 kilometer of shore (Carretta et al. 1998).
Ziphius cavirostris	Cuvier's beaked whale	MMPA	Worldwide in temperate, subtropical, and tropical waters; prefer deep pelagic waters (typically 3,300 feet or deeper along the continental slope and edge or deep geologic features)(NMFS 2018a).	Not expected to occur. This widely distributed species is found in offshore waters, especially deep waters near the continental slope, necessary for catching deep-sea squid.(Jefferson, Webber and Pitman 2008). This species prefers deep waters and unlikely to occur in the Action Area.
Mustelids				
Enhydra lutris nereis	Southern sea otter	Threatened, MMPA	North Pacific Ocean; occurs in only two areas of California: the mainland coastline from San Mateo County to Santa Barbara County, and San Nicholas Island, Ventura County (USFWS 2015).	Low potential to occur. One of four disjunct remnant populations, the central/southern California population sea otters are found in shallow, nearshore waters along the coast (Jefferson, Webber and Pitman 2008). This species known range is both north and south of the Action Area and this species usually occurs within 2 kilometers (1.2 miles) of shore (USFWS 2015). However, it is possible that foraging/travelling individuals may traverse the Action Area.
Pinnipeds				
Arctocephalus philippii townsedii	Guadalupe fur seal	Threatened, MMPA	Tropical waters of the Southern California/Mexico region. This non-migratory species breeds along rocky coastal habitats and associated caves (NMFS 2018a).	Low potential to occur. This species has known haulouts and breeding colonies (rookeries) along the Channel Islands, San Miguel Island (CDFW 2009), and Guadalupe Island, Mexico (where most of the known rookeries are located)(NMFS 2018a). This species travels great distances to foraging areas for lanternfish and squid and therefore may traverse and/or forage in the Action Area. They are highly pelagic species and foraging areas are not well known. They prefer far offshore to deep oceanic areas for feeding (Jefferson, Webber and Pitman 2008).
Callorhinus ursinus	Northern fur seal	MMPA (Depleted – Eastern Pacific Stock)	Open ocean for foraging and rocky beaches for reproduction. Haul out habitat may include rocky or sandy beaches (NMFS 2018a).	Low potential to occur. Northern fur seals migrate from the Bering Sea southward to the North Pacific to feed in the winter. This species is known to haulout and breed at San Miguel Island (NMFS 2018a, CDFW 2009). This

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
				species has the potential to forage on fish and squid in the Action Area, however, they are one of the most pelagic pinnipeds and their foraging is usually offshore at the edge of the continental shelf and slope (Jefferson, Webber and Pitman 2008).
Eumetopias jubatus	Steller sea lion	Endangered (Western DPS) and Delisted due to Recovery (Eastern DPS), MMPA	North Pacific Ocean, mainly around coasts to outer continental shelf and slope. Prefer cold temperate to sub-arctic waters. Haul-outs and rookeries usually on beaches, ledges, and rocky reefs (NMFS 2018a).	Low potential to occur. On the west coast of North America, Steller sea lions range from the Aleutian Islands to Central California (formally southern California). This species is rarely seen south of Monterey Bay (Jefferson, Webber and Pitman 2008). Although foraging resources (fishes and cephalopods) are present in the Action Area, the closest known rookery is located at Año Nuevo Island off the coast of central California (Allen and Angliss 2014).
Mirounga augustirostris	Northern elephant seal	MMPA	Eastern and central North Pacific Ocean most of the year (9 months); prefer sandy beaches when on land. Range from Alaska to Mexico and typically breed in the Channel Islands or Baja California (NMFS 2018a).	Low potential to occur. This species migrates to and from their rookeries twice a year. Rookeries range from Baja to northern California (Jefferson, Webber and Pitman 2008). In addition, this species is known to haulout and breed at the Channel Islands (NMFS 2018a, Lowry et al. 2014, CDFW 2009). This species is a deep diver (300-800 meters) and prefers to forage in deeper pelagic waters, often with seamounts and other underwater features (Jefferson, Webber and Pitman 2008). Foraging resources (e.g., squid, fishes) are present in the Action Area. However, when present at the Channel Islands, they are spending their time molting. Their preferred foraging areas are north of the islands.
Phoca vitulina	Pacific harbor seal	MMPA	Generally non-migratory. On the U.S. west coast this species is found in coastal and estuarine waters from Canada to Baja California, Mexico. Temperate coastal habitats and uses rocks, reefs, beaches, and drifting glacial ice for hauling out and pupping sites (NMFS 2018a).	**High** potential to occur. This species is non-migratory and inhabits the coast to the continental slope (Jefferson, Webber and Pitman 2008). Harbor seals have known haulouts and rookeries at Rincon Point (Santa Barbara County) and Point Mugu (Ventura County); and haulouts from Point Conception to Santa Barbara and along all of the Channel Islands (CDFW 2009). Diving averages less than 35 meters and they are generalist feeders (Jefferson, Webber and Pitman 2008).
Zalophus californianus	California sea lion	MMPA	Eastern North Pacific Ocean from central Mexico to Canada; shallow coastal and estuarine waters; prefers sandy beaches for haul out sites but will also haul out on marina docks, jetties, and buoys (NMFS 2018a).	**High** potential to occur. This species is present along the west coast from Puerto Vallarta to Alaska. Males (adult, subadult and juveniles) undertake a northward migration to Central California and Washington after the breeding season in southern rookeries are generalist feeders (Jefferson, Webber and Pitman 2008).This species has

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
				known haulouts along all of the Channel Islands and rookeries at San Nicholas Island (CDFW 2009, NMFS 2018a). California sea lions are generalist opportunistic feeders and utilize the continental shelf and slope, but have also been observed in deeper oceanic waters (Jefferson, Webber and Pitman 2008).
Birds				
Brachyramphus marmoratus (nesting)	Marbled murrelet	Threatened	Breeds along the coast from Santa Cruz County north to Alaska. Nests in old-growth coastal forests, sea-facing talus slopes, or cliffs (Nelson 1997). During migration and winter (mostly July to February), occurs from Baja California to Alaska during the non-breeding season, in nearshore and protected coastal waters. Usually feeds nearshore within 5 kilometers (3 miles) and in waters less than 60 meters (197 feet) deep. Dives and pursues prey (opportunistic feeder) by flying underwater. This species is opportunistic and feeds on fish, crustaceans, and squid (Nelson 1997).	Low potential to feed. Suitable foraging habitat is present within the Action Area. However, while this species occurs regularly north of Point Conception, it occurs far less frequently farther south (CLO 2018, Lehman 2018, Garrett and Dunn 1991). In addition, the Action Area is located 3 miles off the coast of Ventura County, at the very edge of where this species potentially occurs. Not expected to nest. The Action Area occurs in open water, and nesting habitat is absent.
Phoebastria albatrus	Short-tailed albatross	Endangered	Nests on several isolated islands of the northwestern Pacific, but travels over much of the northern Pacific to forage in open waters for squid, fish, fish eggs, shrimp, and crustaceans.	Very low potential to forage. This species forages widely throughout the North Pacific Ocean and Bering Sea (USFWS 2018e). The global population is extremely low (approximately 1,200 individuals), and this species is an extremely rare visitor to offshore waters along the California coast, with only 43 records in the state since the 1970s (USFWS 2018e, CBRC 2018). The majority of occurrences are from north of Point Conception, but several have been observed farther south, with the nearest reports being of 1 subadult at Prisoner's Harbor, Santa Cruz Island, in July 2005, and 1 subadult at Santa Barbara Island in February and March 2002 (CBRC 2018). Not expected to nest. The Action Area occurs in open water, so nesting habitat is absent.
Sternula antillarum browni (nesting colony)	California least tern	Endangered	Breeding range extends from the San Francisco Bay Area south to Baja California, Mexico, including nesting colonies in coastal Santa Barbara and Ventura counties. May migrate coastally or over open water.	Low potential to forage. The site is farther from shore and in deeper water than where this species prefers to forage. Individuals may occasionally pass through the Action Area during migration.

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
			Forages in shallow estuaries and lagoons. During the nesting season, foraging primarily takes places within 2 miles of shore and in waters less than 60 feet deep (USFWS 2006). Nests on sandy beaches or exposed tidal flats.	Not expected to nest. The Action Area is in open water, and nesting habitat is absent.
Sea Turtles[3]				
Caretta caretta	Loggerhead sea turtle (North Pacific Ocean DPS)	Endangered	Occurs in tropical to temperate waters in the Pacific Ocean. Nesting in the Pacific basin occurs along Japan and Australia, where it nests on ocean beaches, usually with high energy, narrow, steeply slopes, and coarse-grain sand. Migrates from nesting grounds in Japan and Australia to feeding grounds located along the west coast from central to north America. Baja California has the largest known aggregations of loggerhead sea turtles. Migrates along nearshore coastal waters (neritic zone). Typically feeds on benthic invertebrates in hard bottom habitats, although fish and plants are occasionally consumed (NMFS and USFWS 1998a).	**High** potential to feed and migrate. During ideal conditions (water temp/break), this species is known to migrate along the coast of California including the Santa Barbara Channel. Although there is no suitable feeding habitat (hard bottoms, benthic invertebrates) within the Action Area, during migration they may enter the Action Area. Sightings of this species along the U.S. west coast typically are of juveniles measuring 20-60 centimeter shell length (NMFS and USFWS 1998a). This species has also been observed at San Clemente Island (NMFS and USFWS 2007). This species has stranded on Ventura beaches in 2014 and 2017 (Dan Lawson, NMFS Protected Resources Division, 2018, pers. comm.). Not expected to nest. Nesting occurs mainly on open beaches or along narrow bays having suitable sand, and often in association with other species of sea turtles. No beach habitat is present in the Action Area and the Santa Barbara Channel is outside of nesting range. There are no known nesting habitats that occur along the western seaboard of the U.S. or Hawaii (NMFS and USFWS 1998a). The closest known loggerhead nesting beaches in the North Pacific Ocean are located in Japan (NMFS and USFWS 2007).
Chelonia mydas	Green sea turtle (East Pacific DPS)	Threatened	Eastern Pacific Ocean range. This species forages in the open ocean as well as shallow waters of lagoons, bays, estuaries, mangroves, eelgrass, and seaweed beds	**High** potential to occur. Green sea turtles are generally found in shallow waters except when migrating. They have been observed at Sterns Wharf in Santa Barbara harbor and at the Channel Islands. This species may migrate and/or forage in the Action Area. A regular visitor in the waters off the southwest coast of the US. Residents occur in the San Gabriel River, Long Beach (NMFS and USFWS 1998b). This species has stranded on Santa Barbara and

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
				Ventura beaches in 2014, 2015 and 2017 (Dan Lawson, NMFS Protected Resources Division, 2018, pers. comm.). Not expected to nest. This species requires open beaches with a sloping platform and minimal disturbance for nesting. The closest known nesting occurrences are in Mexico (NMFS and USFWS 1998b).
Dermochelys coriacea	Leatherback sea turtle (Western Pacific Population)	Endangered	Pacific Ocean pelagic marine waters; foraging habitat unknown. This population migrates from their nesting grounds in the Indo-Pacific to feeding areas off the Pacific coast of North America.	Not expected to occur. This species migrates to the west coast of North America to forage on jellyfish, salps and pyrosomes. They utilize both open ocean and coastal habitats. Despite the Channel Islands area not being within the Final Critical Designated Habitat for Leatherback sea turtles, this species could nonetheless migrate and/or forage in the Action Area. This species has been observed in Monterey Bay (NMFS and USFWS 1998c). Not expected to nest. Nesting for the Western Pacific Population occurs in Indonesia. Their preferred nesting beaches are typically on continent shores and have unobstructed, often deep offshore access (NMFS and USFWS 1998c).
Eretmochelys imbricata	Hawksbill sea turtle	Endangered	Circumtropical oceans (generally 30°N to 30°S latitude), including the Pacific Ocean pelagic marine waters	Not expected to occur. This species is rare to nonexistent in most localities (NMFS and USFWS 1998d) but may migrate and/or forage (specialist sponge carnivore) in Action Area. However, the Action Area is a sandy bottom habitat, and this species is typically found feeding in the vicinity of rock or reef habitats in shallow tropical waters. No sighting have been documented in recent history (NMFS and USFWS 1998d). Not expected to nest. Hawksbill sea turtles nest high up on the beach under/in dune vegetation, commonly in pocket beaches without a lot of sand. The largest remaining concentrations of nesting hawksbills occur on remote oceanic islands of Australia and the Indian Ocean. Other known nesting sites include Hawaii. American Samoa, Guam, Republic of Palau, Commonwealth of the Northern Mariana Islands, Republic of the Marshall Islands, and the Federated States of Micronesia (NMFS and USFWS 1998d).

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
Lepidochelys olivacea	Olive Ridley sea turtle	Threatened[4]	Pacific Ocean pelagic marine waters; foraging habitat unknown (NMFS and USFWS 1998d).	**Moderate** potential to occur. This species distribution ranges from Southern California to Northern Chile. Olive Ridley sea turtles are mostly pelagic but will also inhabit coastal areas. This species feeds on algae, lobster, crabs, tunicates, mollusks, shrimp, and fish. Olive Ridley sea turtles may migrate and/or forage in the Action Area. This species has been observed in the Los Angeles Harbor (NMFS and USFWS 1998e). This species has stranded on Santa Barbara County beaches in 2014 and 2015 (Dan Lawson, NMFS Protected Resources Division, 2018, pers. comm.). Not expected to nest. In the eastern Pacific, the largest nesting concentrations occur in southern Mexico and northern Costa Rica, with some nesting as far north as southern Baja California. This species nests on continental margins, and exhibits an unusual nesting habit called "arribada" whereby up to thousands of turtles come ashore at the same time to nest.
Sharks/Rays				
Carcharhinus longimanus	Oceanic whitetip shark	Threatened	Worldwide, in tropical and sub-tropical waters and found up to 30°N and 30°S latitude (USFWS 2018c). This species is pelagic, mostly offshore in open ocean or along the continental shelf. They are opportunistic feeders and top predators, and prefer fish and cephalopods (NMFS 2018a).	Not expected to occur. Action Area is outside of this species known range.
Cetorhinus maximus	Basking shark	NMFS Species of Concern	Inhabits tropical and arctic waters but most commonly observed in coastal temperate waters. This species is a filter feeder, forages at the surface, and consumes zooplankton (NMFS 2018b).	Low potential to occur. This species is not common, and has had a dramatic decline since the mid-1900's from fishing and the eastern Pacific population has not rebounded (NMFS 2018b). The Action Area is located at the southernmost extent of their range.
Manta birostris	Giant manta ray	Threatened	Inhabits temperate, subtropical and temperate waters, utilizing all habitats: offshore, oceanic and coastal areas.. This species feeds mainly on zooplankton and can be found diving to depths of 10 – 1,000 meters (NMFS 2018a).	Low potential to occur. Manta rays can be found in temperatures as low as 19°C (66.2°F). Santa Barbara Channel waters are not normally warm enough for this species. Last year in Ventura waters, only the month of August was warm enough for this species (NOAA 2018d).
Fish				

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
Acipenser medirostris	Green Sturgeon (southern DPS)	Threatened, NMFS Species of Concern	Ranges from Alaska to Mexico and spawns in the Rogue River, Klamath River Basin and the Sacramento River. Spawns in deep pools in large, turbulent, freshwater rivers; adults live in oceanic waters, bays, and estuaries, feeding on benthic invertebrates (NMFS 2015a).	Low potential to occur. Adults may migrate and/or forage in the project vicinity. There is very little data on green sturgeon use from Monterey south to the Mexican border. The area may be used minimally by the southern DPS (NOAA 2009).
Catostomus santaanae	Santa Ana Sucker	Threatened	Small, shallow, cool, clear streams less than 7 meters (23 feet) in width and a few centimeters to more than a meter (1.5 inches to more than 3 feet) in depth; substrates are generally coarse gravel, rubble, and boulder (USFWS 2011)	Not expected to occur. Habitat is unsuitable for this species. This species inhabits freshwater streams only.
Gadus microcephalus	Pacific cod (Salish Sea Population)	NMFS Species of Concern	This specific population inhabits Puget Sound, the Strait of Juan de Fuca and the Strait of Georgia. They feed on krill, shrimp, sand lance and crabs. They are often found over sandy bottoms and eelgrass may play a role in habitat selection (NMFS 2011a).	Not expected to occur. Although the Action Area is a sandy bottom substrate, no eelgrass is present at these depths. The Action Area not within the species known range.
Eucyclogobius newberryi	Tidewater goby	Endangered	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County, to the mouth of the Smith River (USFWS 2005).	Not expected to occur. Unsuitable habitat for tidewater goby, as they are a freshwater and brackish water species Rincon Creek, Santa Clara River and Ventura River are the closest known locations of this species to the Action Area.
Merluccius productus	Pacific hake (Georgia Basin DPS)	NMFS Species of Concern	The Georgia Basin DPS includes three stocks: the highly migratory stock that ranges from southern California to Queen Charlotte Sound, a central-south Puget Sound Stock and a Strait of Georgia stock (NMFS 2009a).	Not expected to occur. The highly migratory stock range includes southern California waters were the Action Area is located. The highly migratory stock spawns in the winter in California and migrates northward to feed as far north as Vancouver Island in the summer and spring. They are found at moderate depths of up to 3,000 feet (910 meters) (NMFS 2009a).
Oncorhynchus keta	Chum salmon	Threatened	Inhabits the lowermost reaches of rivers and streams, open ocean for anadromous form. Historical distribution included as far south as Monterey, however presently major spawning populations are found only as far south as Tillamook Bay, Oregon (NMFS 2017d).	Not expected to occur. The Action Area not within the species' known range.

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
Oncorhynchus kisutch	Coho salmon (Puget Sound/Strait of Georgia ESU)	NMFS Species of Concern	Inhabits streams and freshwater tributaries with gravel substrates, open ocean for anadromous form. This species distribution is from central California to Alaska (NMFS 2016a).	Not expected to occur. The Action Area not within the species' known range.
Oncorhynchus mykiss	Steelhead trout-Oregon Coast ESU	NMFS Species of Concern	Ranges from Asia, through Alaska and south to Southern California. This is a coastal species (NMFS 2008).	Not expected to occur. Oceanic range is unknown. However, spawning rivers only occur in rovers basins on the coast of Oregon from the Columbia River south to Cape Blanco (NMFS 2008).
Oncorhynchus mykiss irideus	Southern steelhead-Southern California DPS	NMFS Species of Concern	This DPS includes watersheds from the Santa Maria River to the U.S. Mexican border, coast and inland habitats. Clean, clear, cool, well-oxygenated streams; needs relatively deep pools in migration and gravelly substrate to spawn, open ocean for anadromous form (NMFS 2016b).	Low potential to occur. Adults may migrate and/or forage in project vicinity Steelhead were observed in 2017 occupying the Ventura River (A. Dransfield, pers. comm.).
Oncorhynchus nerka	Sockeye salmon (Snake River ESU and Ozette Lake ESU)	Endangered (Snake River) and Threatened (Ozette Lake)	In the U.S., these populations occur in Oregon and Washington, and critical habitat is designated for this species in Snake River and Ozette Lake. This species inhabits riverine, marine and lake environments (lakes are a requirement), and feed on aquatic insects and plankton (NMFS 2015b).	Not expected to occur. The Action Area is outside of species range.
Oncorhynchus tshawytscha	Chinook salmon (Central Valley Fall, Late-fall run ESU)	NMFS Species of Concern	In the U.S., Chinook salmon ranges from Alaska to California. This ESU spawns in the Sacramento River and San Joaquin River. Chinook salmon require deeper and larger freshwater streams than other salmonids; open ocean for anadromous form. They range from Alaska to Southern California, and feed on aquatic insects, amphipods, crustaceans, and, once they are large enough, fish (NMFS 2010).	Not expected to occur. The Action Area not within the species' known range.
Sebastes levis	Cowcod	NMFS Species of Concern	The species ranges from central Oregon to central Baja California and Guadalupe Island, Mexico. Inhabits deep shelf and upper continental slope, inhabiting depths of 65 to 1,600 feet (20 to 500 meters) in rocky areas, and feeds on squid, octopus and other fish (NMFS 2009b).	Low potential to occur Unsuitable habitat for cowcod, individuals may migrate through the area. Southern California has been recognized as the center of distribution of the species since the 1880s (Eigenmann and Beeson 1894).

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
Sebastes paucispinus	Bocaccio (Southern DPS)	NMFS Species of Concern	Ranges from Baja California to Alaska; most common between 160-820 feet in depth, but found up to 1,560 feet in depth. This species feeds on other fish species (mainly other rockfish) (NMFS 2007b).	Not expected to occur. This species prefers deep waters and is unlikely to occur in the Action Area.
Sebastes ruberrimus	Yelloweye rockfish	Threatened	Yelloweye rockfish range from northern Baja California to Alaska. This species is associated with rocky reefs, kelp canopies, and artificial structures like oil platforms. Adults prefer deeper waters and rocky bottoms. This species is commonly found in depths of 300 to 590 feet (91 to 180 meters)(NMFS 2017e).	Not expected to occur. This species prefers deep waters, is more common from Central California northward, and is unlikely to occur in the Action Area.
Sphyrna lewini	Scalloped hammerhead shark	Threatened	In the east Pacific, scalloped hammerhead sharks range from southern California to Ecuador. Inhabits coastal warm temperate and tropical seas, ranging from intertidal to depths of up to 1000 meters. Adults are common at seamounts (Miller et al. 2013).	Low potential to occur Adults may migrate and/or forage in the project vicinity.
Thaleichthys pacificus	Pacific eulachon (Southern DPS)	Threatened	Ranges from Northern California to Alaska and into the southeastern Bering Sea. Critical habitat is designated for the Southern DPS in northern California in Mad River, Redwood Creek and Klamath River. Anadromous fish, endemic to northeastern Pacific Ocean. In the US, most euchalon production originates in the Columbia River Basin (NMFS 2011b).	Not expected to occur. The Action Area is outside of this species' known range. No records at the Channel Islands, Critical habitat extends as far south as the Mad River, Northern California (NMFS 2011b).
Invertebrates				
Haliotis corrugate	Pink abalone	NMFS Species of Concern	Ranges from Point Conception to Baja California. This species required sheltered waters with depths from 20 to 118 feet (6 - 36 m) (NMFS 2007c).	Not expected to occur. Suitable habitat not present. Very low population numbers.
Haliotis cracherodii	Black abalone	Endangered	This species feeds predominantly on kelp and inhabits rocky, low intertidal zones up to 6 meters deep (NMFS 2009c) Their range extends from Point Area in Mendocino County to Northern Baja California.	Not expected to occur. Suitable habitat not present. Very low population numbers. The nearest critical habitat to the Action Area is at Anacapa Island (NMFS 2011c).
Haliotis fulgens	Green abalone	NMFS Species of Concern	Ranges from Point Conception to Baja California. This species is found in rock crevices in shallow water on exposed coast	Not expected to occur. Suitable habitat not present. Very low population numbers.

Scientific Name	Common Name	Federal Status[1]	Distribution and Primary Habitat Associations	Potential to Occur
			from the low intertidal to depths of 60 feet (18 m) (NMFS 2009d).	
Haliotis kamtschatkana	Pinto abalone	NMFS Species of Concern	Ranges from Sitka, Alaska to Point Conception. This species is usually found in the tidal zone up to 30 feet but can be at depths of up to 330 feet. Pinto Abalone are associated with kelp beds in exposed areas (NMFS 2014).	Not expected to occur. Suitable habitat not present. Very low population numbers. The Action Area is not within this species known range.
Haliotis sorenseni	White abalone	Endangered	Open low- or high-relief rock or bolder areas interspersed with sand channels. This species inhabits rocky pinnacles and deep reefs in Southern California; especially those off the Channel Islands (Hobday and Tegner 2000).	Not expected to occur. Suitable habitat not present. Observed along the coastline in Santa Barbara County and the Channel Islands. They usually occur at depths of 20-60 meters and to be most abundant between 25-30 meters (80-100 feet)(Hobday and Tegner 2000).

Notes:

[1] **Federal Status:** MMPA = Marine Mammal Protection Act (50 CFR Part 216); Depleted species population stock is below optimum sustainable populations; NMFS Species of Concern = National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) Species of Concern (not federally listed or protected under the Endangered Species Act).

[2] The best potential to occur assessment has been provided given the paucity of information available for marine mammals, especially whales. Low potentials to occur do not negate the possibility of a given whale species occurring in the Action Area.

[3] Sea turtles are highly migratory and much of their geographic range and/or foraging habitat in the Pacific Ocean is unknown (e.g., see NMFS and USFWS 1998a)

[4] Endangered status provided to the breeding colony populations on the Pacific Coast of Mexico.

Appendix C

PHYTOPLANKTON POPULATION IMPACT ANALYSIS

The proposed project could potentially affect phytoplankton populations in and near the project site, which could affect food resources for other marine resources. Cultured shellfish consume natural foods suspended in the water column, including phytoplankton and other organic matter, and potentially compete with other filter feeders for food. Therefore, this analysis has been prepared to determine what impact the project will have on food resources available to filter feeding organisms. The methodology to evaluate this impact was adapted from the mitigated negative declaration associated with Santa Barbara Mariculture Company's offshore mussel aquaculture farm prepared by the California Department of Fish and Wildlife to estimate the maximum effect of a mussel farm on phytoplankton (CDFG 2018).

Estimating the Maximum Effect of the Project on Phytoplankton:

The methodology: (1) identifies the maximum clearance rates of mussels; (2) applies this rate to the estimated maximum mussel production for the project; (3) using minimum flow rates, assesses how much phytoplankton is removed by the mussel farm; and (4) compares the turnover rate to the flow rate of seawater through the project site to determine the maximum estimated effect of the project on phytoplankton amounts.

The maximum clearance rate (CR_max) for mussels is defined in Brigolin *et al.,* (2009) as 107 liters/day (g DW). Brigolin *et al.,* (2009) also provides conversion ratios for wet to dry weight (17.4:1 including the shell weight).

The project anticipates growing a maximum of 22,000,000 pounds of mussels at a time. This is an extremely conservative estimate that assumes that all plots are leased, and all arrays are at the grow-out stage simultaneously. This is equivalent to 9,979,032 kg or 573,507 kg DW. The maximum clearance rate for mussels grown as part of the project would therefore be 573,507 kg DW x 107 liters/day, or 61,365,249 liters/day. This assumes the mussels are filtering seawater at their maximum rate.

The next step is to identify how long it takes the entire volume of seawater at the farm to go through mussels, which is known as the turnover time. This is determined by the total volume of water in the farm area (the area multiplied by water depth) divided by the maximum clearance rate.

Water Volume = Area (2000 acres) x Average Depth (30m) = 2000 acres[1] = 242,811,600 m^3. The total water volume divided by the CR_max (61,365,249 m^3/day) = Approximately 4 days.

The next step is to compare the turnover time to how long seawater resides in the project area. This is calculated using the minimum flow velocity in the project site area (10 cm/s) to assess the maximum residence time within the proposed farm. The minimum flow rate estimate comes from wave data from buoy Station 46217 (Anacapa Passage) and the National Date Buoy Center. The minimum annual average wave period for this station is 3.43 cm/s. This is an average wave period that is calculated in 30 minute increments.

Max_res_time = Farm_size(sqrt(2000acres)) / Min_Speed (3.43 cm/s)
= (sqrt(8.09 sqkm) / 0.0000343 km/s
= 2.84 km / 2.96 km/day
= 0.9594 day

[1] One acre = 4,046.86 m^2.

= 23 hours

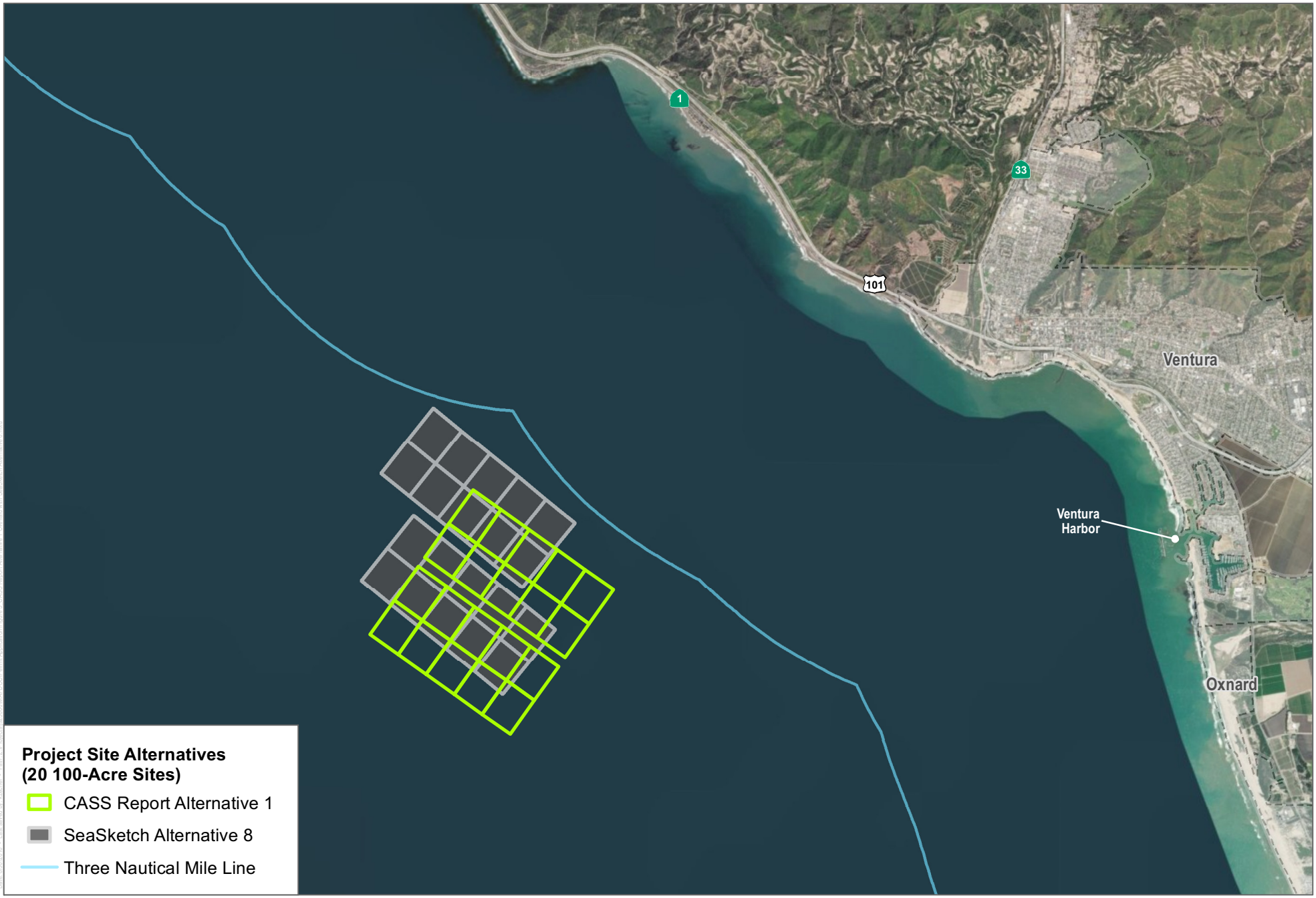
Note that the time scales differ by orders of magnitude (23 hours & 4 days) and the mussels will not clear much of the water passing through the farm.

The phytoplankton concentration entering the farm will likely range from 1 to 20 mgChl/m3 (average from the Plumes and Blooms program). Given the extremely low residence time within the project site, over the 0.95 days of transit of a water parcel through the farm, the mussels will filter a small amount of seawater based upon the maximum total farm clearance rate calculation above.

Since these two time scales described above differ by more than two orders of magnitude, it was determined that the total production of the reconfigured farm at full build-out would have an inconsequential impact on phytoplankton and zooplankton populations in the Channel. Furthermore, 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. In conclusion, no adverse effect on phytoplankton population is anticipated with this project.

APPENDIX C

Phytoplankton Population Impact Analysis



SOURCE: NAIP 2016

DUDEK

0 3,600 7,200 Feet

FIGURE 5

CASS Report Alternative 1 Overlaid with SeaSketch Alternative 8

Ventura Shellfish Enterprise Project

VENUTRA PORT DISTRICT
VENTURA SHELLFISH ENTERPRISE
RESPONSE TO 9/12/18 PUBLIC COMMENTS
9/26/18

Comment	Response
The project will significantly impact the commercial trawl fishery	The Ventura Shellfish Enterprise conducted a lengthy site selection process and outreach campaign prior to selecting the site in federal waters. The key factor motivating the decision to move to federal waters was feedback from the fishing community that it did not want the project to overlap with the limited areas of state waters available for the halibut trawl fishery. Two separate and independent site selection analyses, conducted by the UC Santa Barbara Bren School of Environmental Science and National Oceanic and Atmospheric Association's (NOAA) National Ocean Service (NOS), concluded that the proposed site was the best site available to minimize user conflicts, including fishing interests. The NOS study in particular conducted a six-month review of available and objective fishing data. It concluded that, while there was some amount of overlap with trawl fisheries, the proposed project site avoided the most significant fishing areas for halibut (located northwest of the project site) and market squid (located significantly south of the project site). NOS and the Ventura Port District (VPD) also reviewed actual trawl data collected by the California Department of Fish and Wildlife (CDFW) 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 was 1,508 nautical miles. • The total trawl length within proposed project site was 145 nautical miles. Therefore, based upon CDFW trawl data, the project will require the

Comment	Response
	commercial trawling fishery to relocate approximately 0.4% of their total trawls within the Santa Barbara Channel. The project site also avoids the three blocks within the region with the most reported commercial fishing landings.
VSE needs to take into account that this area has more than just trawling. There is gillnetting, hook and line, lobster and seabass fisheries.	The project site analysis considered the most economically important regional fisheries, market squid and halibut; however, the essential fish habitat assessment takes into account all fisheries under their respective fishery management plan (FMP) prepared by the Pacific Fisheries Management Council. Block-specific and regional landing data for species covered under the FMPs, including all gear types, are sufficiently assessed. Note that the proposed longlines will be spaced sufficiently to permit hook and line fishing to the extent that it does not interfere with the proposed shellfish operation.
We need to make sure that one large entity isn't able to buy up all of the permitted areas. We need to make sure small growers have a chance.	VPD is committed to ensuring that the project site accommodates a variety of commercial shellfish interests, including both large and small companies and local sea farmers. One of the key objectives in the Ventura Shellfish Enterprise's Task 1 document and Sea Grant application was to "provide economies of scale and technical support to small producers who would not otherwise be able to participate in shellfish aquaculture." This goal is reiterated in the VPD staff report, the project's biological assessment that will be submitted to the U.S. Army Corps of Engineers (Corps), and VPD's Coastal Commission application. It is important to note that without the project, it will be difficult, if not impossible, for small, local sea farmers to start their own shellfish aquaculture farm. The current costs of permitting, environmental review, and monitoring (currently estimated to average $400,000 per farm in California) have prevented all but the largest shellfish companies from obtaining new aquaculture permits in California. One of the critical objectives of the project is for the VPD to obtain the permits and provide economies of scale so that small and local growers can take advantage of a turn-key sub-permit without the need of going through the costly and time-consuming regulatory process.
The VPD must utilize all available fishing data.	The Ventura Shellfish Enterprise gathered feedback from commercial fishermen regarding key fishing locations as part of its previous outreach process and NOS did an exhaustive search for sources of objective fishing

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	data. The CASS Technical Report has been updated to provide additional detail and context regarding data sources and the screening process for incorporating data. The CASS Report includes the best available, verifiable fisheries data for the region. VPD would be willing to consider any additional objective and verifiable fishing data.
Based on experience with crab fisheries, there will be marine mammal entanglement.	There have been very few reported incidents of marine mammal entanglement with mussel aquaculture longlines. 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. 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. 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. 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. In contrast to fishing gear, there are far fewer documented entanglement cases

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	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 2017). 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). Project operation and construction are also designed to reduce the risk of entanglement. The mussel grow-out ropes are 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. Spat collection lines, which have been known Grow ropes will be attached to the headrope with a low-breaking-strength twine which will facilitate rapid detachment in the unlikely event of any interaction. Furthermore, a 1,100-pound breakaway link will be installed between the surface buoys and vertical lines. Mitigation measures include a marine wildlife entanglement plan.
The project will create marine debris.	The proposed aquaculture gear is robust and designed to withstand rough sea conditions. Siting consideration included a minimum of 80' bottom depth to reduce potential storm surge and gear is located 15-45 feet below the water surface, which will avoid the most significant wave activity. Helical screw anchors have been shown to exhibit superior holding power as compared to other anchoring systems. 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. To address this concern, Mitigation Measure BIO-10 incorporates and aquaculture gear monitoring and escapement plan to routinely check and maintain aquaculture gear to prevent breakage and quickly retrieve any gear that breaks free.

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Closures have already impacted many fishermen's sites. Block 665 is a highly used fishing area. A lot of what local fishermen catch is from this block. If you take this block away, fishermen's livelihoods are at stake.	The project only covers a small area within Block 665.The total acreage of Block 665 is 58,602 acres (taking into consideration that fishermen cannot trawl less than 1 mile offshore). The total revenue for Block 665 over a six-year period (2012 - 2017) was $8,022,254, and the project proportionally would only impact 3.4% ($272,756) of that total amount. Eliminating those species not impacted by the mussel aquaculture farm (lobster, ridgeback prawns, etc.), the total six-year period revenue is $982,914 and the total corresponding impact is $33,419. The small area that the project occupies in Block 665 will therefore not substantially impact fisheries. Further, VPD anticipates that some fishermen may seek to replace this lost income through participating in the project, which is anticipated to provide a sustainable and significant source of potential income that would more than offset the above estimated financial impact.
Can you fish in the area if no one is leasing it?	Areas that are not sub-permitted will be available for fishing, provided that such fishing does not interfere with other sub-permitted areas.
Who will police the area?	The Ventura Port District is responsible for the area and individual growers will have responsibility to follow the BMPs.