Offshore Oil and Gas Development and Production Activities in the Southern California Planning Area

Biological Assessment

Endangered and Threatened Species

Photo Courtesy of Beta Offshore

Prepared for the National Marine Fisheries Service

In Accordance with Section 7(c) of the Endangered Species Act of 1973, as Amended

September 2023

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ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASUREMENT

2D………………………......	Two dimensional
3D………………………......	Three dimensional
AIS………..………………..	Automatic Identification System
ANL………………………...	Argonne National Laboratory
APD……………………….	Application for Permit to Drill
API………………………….	American Petroleum Institute measurement of density of oil
APM…………………………	Application for Permit to Modify
BA……………………….....	Biological Assessment
Bbbl………………………...	Billion barrels of oil
bbl………………………….	barrel of oil (1 bbl = 42 gallons)
BIA……………………..……..	Biologically Important Area
BLM………………………..	Bureau of Land Management
BML………………………..	Below the mudline
BO………………………….	Biological Opinion
BOEM………………………	Bureau of Ocean Energy Management
BOEMRE…………..………	Bureau of Ocean Energy Management, Regulation and Enforcement
BSEE……………………….	Bureau of Safety and Environmental Enforcement
CFR…………………………	Code of Federal Regulations
CSLC……………………….	California State Lands Commission
CV………………………….	coefficient of variation
CWA……………………….	Clean Water Act
dB…………………………..	decibel
dB(A) …………………...…	A-weighted decibel level
DDT………………………..	Dichloro-diphenyl-trichloroethane (pesticide)
DP………………………….	Dynamically positioned
DPP……………………….	Development and Production Plan
DPS………………………..	Distinct Population Segment
EEZ………………………..	Exclusive Economic Zone
EPA………………………..	U.S. Environmental Protection Agency
ESA………………………..	Endangered Species Act
ESU………………………..	Evolutionary Significant Unit
ft…………………………...	foot, feet
FR………………………….	Federal Register
G&G………………………	Geological and Geophysical surveys
GNOME………………….	General NOAA Operational Modeling Environment
gpm……………………….	gallons per minute
hr………………………….	hour

HCl……………………….	Hydrochloric Acid
HESS……………………..	High Energy Seismic Survey
HF………………………...	High-Frequency
HFA………………………	hydrofluoric acid
HRG………………………	High Resolution Geophysical
Hz…………………………	Hertz
ICS………………………...	Incident Command System
IHA………………………..	Incidental Harassment Authorization
Inc…………………………	Incorporated
kHz………………………..	kilohertz
km…………………………	kilometer
kn………………………….	knot
kW…………………………	kilowatt
LE………………………….	cumulative sound exposure level
LF………………………….	Low-Frequency
LLC………………………..	Limited Liability Corporation
MF…………………………	Mid-Frequency
MLLW…………………….	Mean Lowest Low Water
MMPA…………………….	Marine Mammal Protection Act
MMS………………………	Minerals Management Service
MODU……………………	Mobile Offshore Drilling Unit
MSRC……………………..	Marine Spill Response Corporation
MT………………………….	metric tons
MHW………………………	Mean high water line
NEPA…………………….	National Environmental Policy Act
NMFS………………………	National Marine Fisheries Service
nmi………………………….	nautical mile
NOAA………………………	National Oceanic & Atmospheric Administration
NPDES………………….....	National Pollutant Discharge Elimination System
O&G………………………..	oil & gas
OCS………………………..	Outer Continental Shelf
ONRR………………………	Office of Natural Resource Revenues
OSRO………………………	oil spill removal organization
OSRP………………………	oil spill response plan
Pa…………………………...	Pascal
PK or *L*pk……………………	Peak sound level
POCSR………………….....	Pacific OCS Region
PPS…………………………	Pulses Per Second
PSO…………………………	Protected Species Observer

PTS.….………………………	Permanent Threshold Shift
rms…………………………	root mean square
ROMS……………………..	Regional Ocean Modeling System
ROV……………………….	Remotely Operated Vehicle
SD………………………….	standard deviation
SPL.….………………………	Sound pressure level
SSWS………………………	Sea star wasting syndrome
TAP………………………..	Trajectory Analysis Planner
The Bureaus…………….....	BOEM and BSEE
TTS…………………..........	Temporary Threshold Shift
U.S. ………………….........	United States
U.S.C……………….……......	United States Code
UAS.….………………………	Unoccupied Aerial System
UC…………………...........	Unified Command
UME.….………………………	Unusual mortality event
USFWS……………………	U.S. Fish and Wildlife Service
USCG………………….......	U.S. Coast Guard
USGS………………….......	U.S. Geological Survey
μPa…………………...........	micropascal

1.0 INTRODUCTION: PURPOSE AND CONTEXT FOR ASSESSMENT

This programmatic Biological Assessment (BA) describes current and expected activities associated with development and production of oil and gas (O&G) reserves and beginning stages of decommissioning within the Southern California Planning Area of the Pacific OCS Region (POCSR) and requests Section 7 consultation. Specifically, this BA requests consultation for activities authorized, funded, or carried out by Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE). In developing this BA, BOEM reflected on past Endangered Species Act (ESA) consultations, BOEM and BSEE actions, and the potential effects of these actions on species currently listed by National Marine Fisheries Service (NMFS) as endangered or threatened, and designated critical habitat.

The threat of oil spills, sound associated with drilling and production platforms, crew boats, helicopters, facility abandonment (decommissioning), and collisions between vessels and endangered species figured prominently in earlier consultations and are also considered here. O&G production in the POCSR has been decreasing, which has reduced the range and scope of reasonably foreseeable future BOEM and BSEE actions. Lease sales and major construction activities identified in existing biological opinions have either been completed or abandoned. There are no plans to conduct new O&G lease sales at this time, and no new platforms are expected to be installed in the foreseeable future. Emphasis has thus shifted from leasing new areas to maximizing the development of O&G resources within the range of existing platforms and infrastructure.

This assessment is intended to supplement and combine earlier assessments and endangered species consultations for routine O&G development activities that are currently underway or are reasonably foreseeable in the Southern California Planning Area. However, this BA also provides background information on activities that BOEM and BSEE do not consider part of the proposed actions and therefore exclude from consultation, in addition to those for which consultation is requested (Table 1). Section 2.0—BOEM/BSEE Actions and Activities NOT Occurring and NOT Expected to Occur—further describes the reasoning for excluding certain activities from the proposed actions under consultation.

The rest of the BA focuses on activities for which consultation is requested, starting with Section 3.0—BOEM/BSEE Actions and Activities: Consultation Requested. Sections 4.0 through 7.0 assess potential effects and impacts from O&G activities to groups of species. Section 8.0 contains individual species assessments, and Section 9.0 provides conclusions and a summary of determinations.

In describing specific activities, this BA may refer to either BOEM or BSEE, or to both BOEM and BSEE together (as BOEM/BSEE, or the Bureaus). However, this BA is intended to represent the activities and analyses of both agencies. Thus, reference to one agency alone should not be interpreted to exclude the actions or analyses of the other.

Table 1. BOEM and BSEE activities and actions for which Section 7 ESA consultation is not considered (first column) and those for which consultation is discussed (second column) in this BA.

Consultation NOT Requested	report section	Consultation Requested	report section
Lease sales and issuance	2.1	Development and Production Plan Revisions	3.1
Exploration drilling	2.2	Discharges and Emissions	3.2
G&G permits (high energy, deep-penetrating 2D or 3D surveys)	2.2	Support Vessel and Aircraft Activity	3.3
Well conductor installation	2.3	Applications for Permit to Drill and Permit to Modify (includes well stimulation treatments)	3.4
		Well Conductor Removal	3.4.3
		Pipeline Repair and Replacement	3.5
		Cable Repair and Replacement	3.6
		BSEE Inspection Program: Helicopter Flights	3.7
		BSEE Initiated Oil Spill Response Equipment Exercises	3.8
		Decommissioning	3.9

1.1. HISTORY OF FEDERAL MANAGEMENT OF PACIFIC OIL AND GAS (O&G) DEVELOPMENT

Leasing, exploration, development, and production of offshore oil and gas (O&G) reserves on the Outer Continental Shelf (OCS) of the Pacific Coast began in the early 1960s. Initially, DOI's Bureau of Land Management (BLM) was responsible for leasing areas of the OCS, and U.S. Geological Survey (USGS) provided oversight for exploration, development, and production of offshore O&G resources. In 1982, the Minerals Management Service (MMS) was formed within DOI to oversee all Outer Continental Shelf O&G leasing, exploration, development, and production. In 2010, DOI began a reorganization plan to divide MMS into three new agencies. MMS was first renamed the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), and the revenue functions were spun off at that time into the Office of Natural Resource Revenues (ONRR). The following year, DOI split BOEMRE into the new bureaus of BOEM and BSEE. This step completed the reorganization of MMS into the independent entities of BOEM, BSEE, and ONRR.

With this reorganization, BOEM retained the authority for managing and issuing decisions on O&G leasing on the OCS, as well as approval of exploration, development, and production plans and issuance of geological and geophysical permits. BSEE retained the authority to review and approve permits for drilling, rights-of-way, pipeline installations, and decommissioning of offshore structures, as well as day-to-day inspection and enforcement actions associated with offshore O&G production.

BOEM and BSEE have continued to maintain these responsibilities, with close coordination through their shared missions and connected functions with respect to the environment. For example, BOEM assists BSEE with environmental reviews, and BSEE provides enforcement of environmental requirements with feedback to BOEM on the effectiveness of mitigations.

1.2. HISTORY OF PACIFIC O&G ESA CONSULTATIONS

When the ESA was passed in 1973, five O&G production platforms were already installed in Federal waters offshore southern California (Hogan, Houchin, Platform A, Platform B, and Hillhouse), and two additional platforms had been approved for installation (Platform C and Hondo). BLM's first formal ESA consultation with NMFS was completed in 1978 (NMFS 1978) for Lease Sale 48; NMFS considered this consultation to be a "threshold examination." A consultation between NMFS and USGS was completed the following year (NMFS 1979), which covered all then-existing OCS O&G exploration, development, and production activities in the Southern California Bight and future offshore O&G activities that may occur under Lease Sale 48. This ultimately included the installation and operation of nine additional platforms in Federal waters (Elly, Ellen, Grace, Henry, Gina, Edith, Eureka, Habitat and Gilda). In 1980, BLM and USGS jointly consulted with NMFS on leasing and exploration activities associated with Sale 53 (NMFS 1980), and in 1981, a regional approach to consultation for leasing and exploration in the Southern California Bight was conducted (NMFS 1981).

In 1982, MMS assumed BLM's role of consulting on individual lease sales (Lease Sales 73, 80) and associated exploration activities (NMFS 1983a, 1983b). In addition, MMS formally consulted with NMFS on individual Development and Production Plans (DPPs) submitted to MMS for approval (NMFS 1984a, 1984b, 1985, 1986a, 1986b). Those DPPs that were implemented resulted in the installation of seven more platforms (Harmony, Heritage, Hermosa, Hidalgo, Harvest, Irene, and Gail).

The last O&G platform was installed in southern California in 1989. Since then, MMS/BOEMRE (until 2011) and BOEM/BSEE (since 2011) have consulted informally with NMFS on infrastructure repairs and replacements (e.g., pipelines and cables). These agencies have also prepared biological assessments of potential effects to endangered species for revisions of DPPs that proposed drilling into new oil fields from existing platforms to Rocky Point (MMS 2000a, 2000b) and Tranquillon Ridge (MMS 2008). In these examples, NMFS determined that endangered and threatened species were not likely to be adversely affected and formal consultation under ESA was not required (NMFS 2000, 2008a).

In 2014, BSEE requested formal ESA consultation for proposed conductor installation on Platform Harmony. NMFS acknowledged BSEE's request by citing the intra-service Biological Opinion that they had prepared for NMFS issuance of an Incidental Harassment Authorization (IHA) under the Marine Mammal Protection Act for the same activity (NMFS 2014a).

1.3. SPECIES RECEIVING ESA CONSULTATIONS

Past ESA consultations with NMFS have considered the effects of offshore O&G development on the following species: blue whale (*Balaenoptera musculus*), fin whale (*B. physalus*), sei whale (*B. boralis*), humpback whale (*Megaptera novaeangliae*), sperm whale (*Physeter catodon*), gray whale (*Eschrichtius robustus*), North Pacific right whale (*Eubalaena glacialis*), olive ridley sea turtle (*Lepidochelys olivacea*), green sea turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*), and leatherback sea turtle (*Dermochelys coreacea*).

To be thorough, NMFS occasionally added evaluation of a non-listed species to a formal consultation. For example, Monoplacophoran (*Vema hyalina*), a small deep-water mollusk, was never proposed for listing but was included in one opinion (NMFS 1981). The Guadalupe fur seal (*Arctocephalus townsendi*) and northern fur seal (*Callorhinus ursinus*) were first included as candidate species in 1984 (NMFS 1984a). The Guadalupe fur seal was subsequently listed as threatened and considered in subsequent opinions, whereas the northern fur seal was not listed.

NMFS species listed after installation of all platforms include the following: oceanic whitetip shark (*Carcharhinus longimanus*), giant manta ray (*Mobula birostris [*formerly *Manta birostris]*), scalloped hammerhead shark (*Sphyrna lewini*), green sturgeon (*Acipenser medirostris*) steelhead trout (*Oncorhyncus mykiss*), white abalone (*Haliotis sorenseni*), black abalone (*Haliotis cracherodii*), and sunflower sea star (*Pycnopodia helianthoides*). BOEM and BSEE informally consulted with NMFS on these species as new actions were identified. In these previous consultations to date, no offshore O&G activities have been determined likely to have an adverse effect on these species.

1.4. SOUTHERN CALIFORNIA PLANNING AREA AND O&G PRODUCTION

The Bureaus' Southern California Planning Area extends from the Monterey/San Luis Obispo County line southward to the U.S.-Mexico border and includes waters from 3 to 200 miles from shore. As of June 2023, there were 30 active leases, 14 of which are producing, in the Southern California Planning Area, with 23 Federal platforms and 208 miles of pipelines that transport oil and gas to shore (Figure 1, Figure 2, Figure 3, Figure 4, Table 2). Eight of these 23 platforms are no longer on active leases and are in the planning stages of decommissioning. Since 1963, more than 1,450 exploration and development wells have been drilled in this area with more than 1.3 billion barrels of oil and 1.8 trillion cubic feet of natural gas produced through September 2016.

Oil production rates peaked at more than 200,000 barrels per day in 1996 and declined in subsequent years to a production rate of about 50,000 barrels per day. In the last decade, due to various operations issues such as a pipeline rupture, the production has diminished to just over 7,000 barrels per day as of June 2023. Once operational issues are resolved, the daily production is expected to rebound to no more than 50,000 barrels per day but will continue to diminish through time. Gas production has followed a similar declining trend with a production rate of about 77 million cubic feet per day. Gas production has also been affected by the 2015 onshore pipeline failure, resulting in a temporary rate of just over 6,712 million cubic feet per day during 2022. Overall, O&G production in the Southern California Planning Area is expected to continue to decline gradually over time, with drilling and production activities continuing if oil and gas can be produced in paying quantities.

There are now fewer than 400 active development wells at any given time, and this number is not expected to change substantially in the foreseeable future. However, with the advent of decommissioning activities, the number of active development wells may begin to decrease. Approximately 260 million barrels of oil and 540 billion cubic feet of natural gas are estimated to remain in O&G fields within reach of existing platforms in the Southern California Planning

Area. For a summary of the environmental setting of the Southern California OCS Planning Area, see ANL (2019).

The Action Area encompasses the Southern California Planning Area and the surrounding regions that could be affected by activities associated with continuation of O&G development, production, and decommissioning (Figure 5). The Action Area's boundaries are drawn broadly to identify a general region in which activities and effects may occur. Not all areas within the boundaries of the Action Area will be affected. For example, the boundary includes areas potentially affected by a large oil spill; however, large spills are unlikely, and a large spill of the size estimated for this Biological Assessment would not affect the entire Action Area.

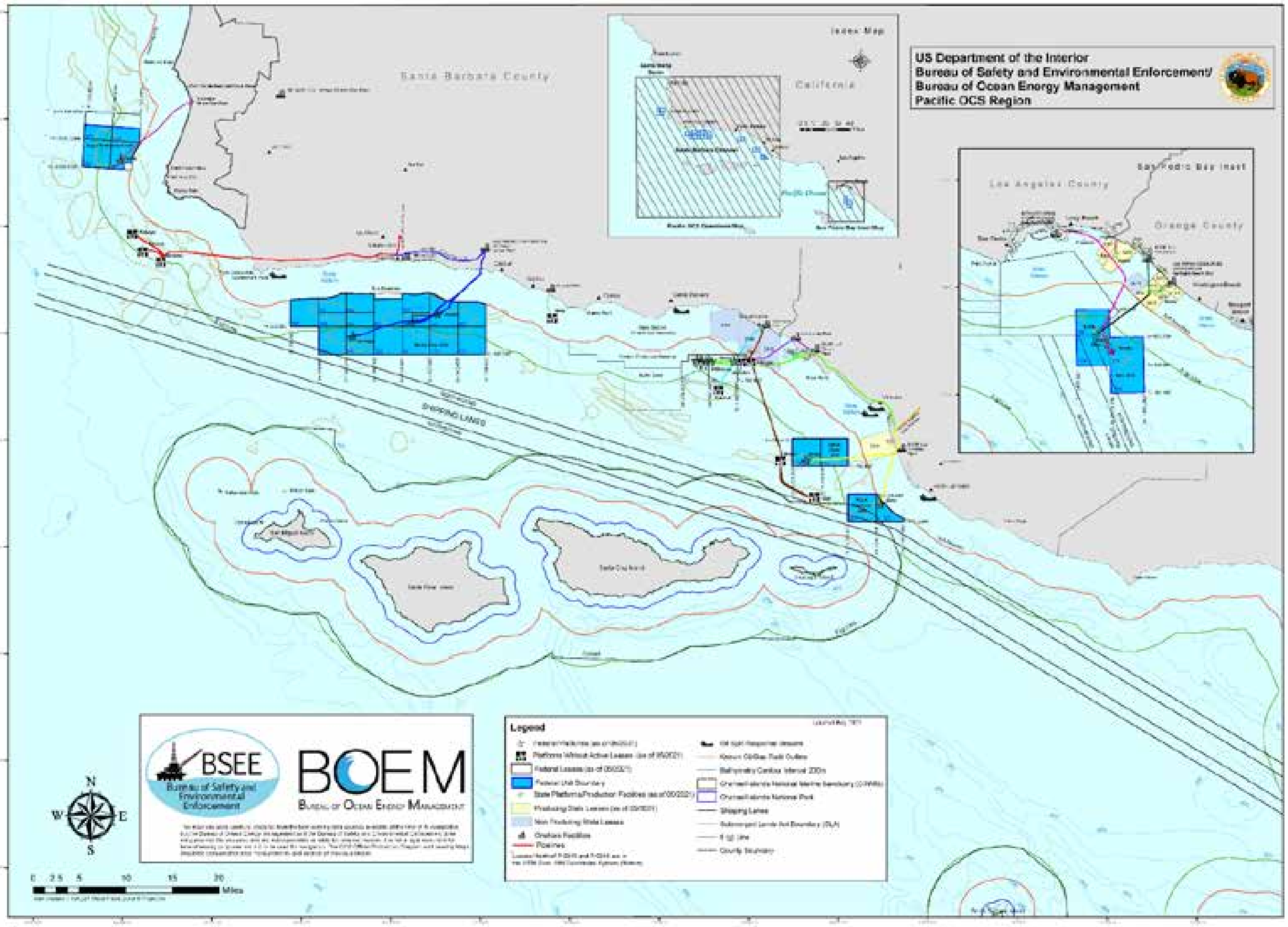

Figure 1. Existing platforms and pipelines in the Southern California Planning Area (for a larger-size, digital file of this figure, see: https://www.bsee.gov/sites/bsee.gov/files/pocsr-map.pdf)

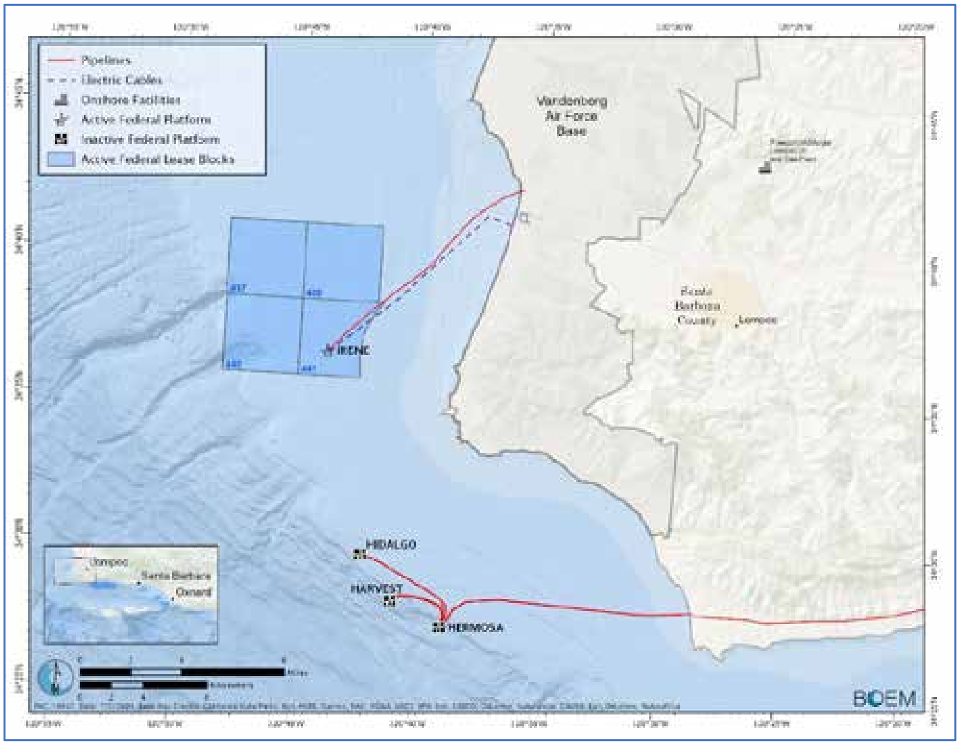

Figure 2. Locations of platforms, pipelines, and power cables and associated lease blocks in the Santa Maria Basin in the northwestern portion of the Southern California Planning Area.

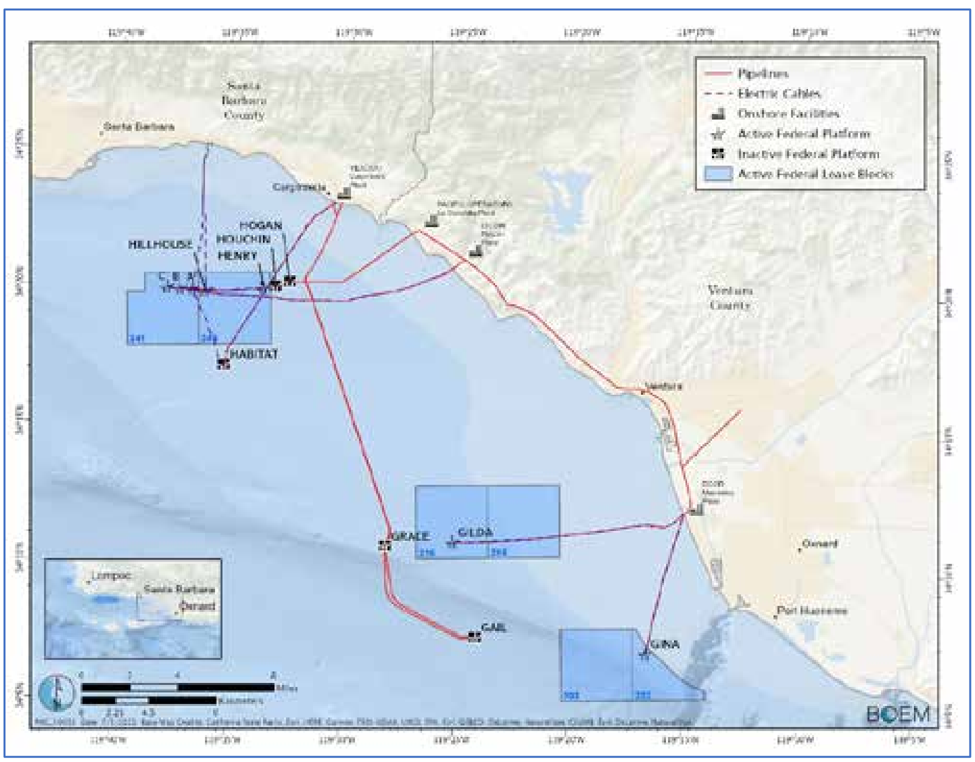

Figure 3. Locations of platforms, pipelines, and power cables and associated lease blocks in the Santa Barbara Channel in the central portion of the Southern California Planning Area.

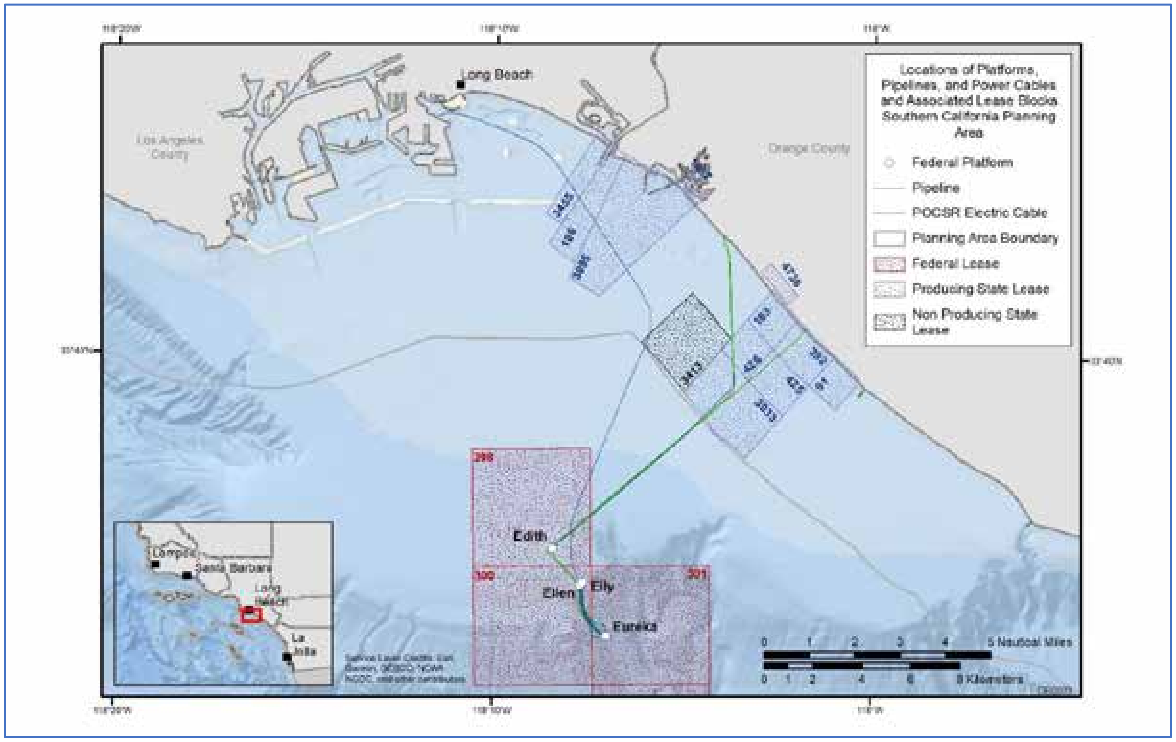

Figure 4. Locations of platforms, pipelines, and power cables and associated lease blocks in the San Pedro Bay at the southeastern end of the Southern California Planning Area.

Table 2. Unit or field names for groups of O&G platforms and the names of individual platforms in the Southern California Planning Area.

Unit/Field Name	Platform Names
Point Pedernales	Irene
Point Arguello	Hidalgo, Harvest, Hermosa
Santa Ynez	Heritage, Harmony, Hondo
Dos Cuadras	A, B, C, Hillhouse
Beta	Edith, Elly, Ellen, Eureka
Carpinteria	Henry, Hogan, Houchin
Pitas Point	Habitat
Santa Clara	Gilda, Grace, Gail
Point Hueneme	Gina

Figure 5. Action Area (white outline) encompassing the Southern California Planning Area.

2.0 BOEM/BSEE ACTIONS AND ACTIVITIES NOT OCCURRING AND NOT EXPECTED TO OCCUR

This section describes activities for which consultation is not requested (Table 1). Some activities can only occur following the sale of an O&G lease, and no new lease sales, leases, or subsequent related activities are planned or likely to occur.

2.1. O&G LEASE SALES AND ISSUANCE OF LEASES

A primary BOEM function is the sale and issuance of OCS leases for energy development; however, in the Southern California Planning Area, no O&G leases have been offered since 1984. From 1984–2008, Congressional and Presidential moratoriums were in effect that prohibited O&G lease sales offshore California. Although these moratoriums were either rescinded or allowed to expire, planning areas offshore California were not included in BOEM's 2017–2022 leasing program. DOI's Proposed Program for the 2023–2028 National Outer Continental Shelf Oil and Gas Leasing Program, published in 2022, did not propose any lease sales for the Southern California Planning Area. While there is potential for new lease sales to be proposed in future programs, at the time of this writing, it is unknown if any will occur in the Pacific Region.

2.1.1. No Projected Activity

There is no potential for future lease sales in the Southern California Planning Area in the 2023–2028 National OCS Oil and Gas Leasing Program, as they were not included in the Proposed Program published in 2022. Therefore, **BOEM is not considering future leasing actions for the Southern California Planning Area in this Biological Assessment**.

2.2. APPROVAL OF O&G EXPLORATION PLANS AND GEOLOGICAL AND GEOPHYSICAL PERMITS

2.2.1. Exploration Drilling

The Southern California Planning Area is not included in the Proposed 2023–2028 National OCS Oil and Gas Leasing Program, so there will be no new lease sales. A new lease and an approved active exploration plan are required for exploration drilling to occur, so there will be no exploration drilling. The last lease sale occurred in 1986, and all the discovered resources within the leased areas are being produced. Upon issuance of a lease, drilling of exploratory wells and associated activities are subject to BOEM-approved exploration plans [30 CFR 550.201]. Since 1963, 295 exploration wells have been drilled in the Southern California Planning area, with the last exploratory well completed in 1989 (MMS 1992). These exploratory wells were drilled using jack-up rigs, mobile offshore drilling units (MODUs), or drillships. **Currently there are no active exploration plans or exploratory drilling activities occurring in the Southern California Planning Area, and none are anticipated in the foreseeable future.**

2.2.2. Geological and Geophysical Survey Permits

BOEM requires permits for geological and geophysical (G&G) surveys conducted (pre-lease or off-lease) for the collection of oil, gas, or sulfur data on the OCS [30 CFR 551.4]. G&G surveys are generally exploratory in nature and may include high energy, deep-penetration seismic surveys or High Resolution Geophysical (HRG) surveys.

High energy, deep-penetrating 2D or 3D surveys use high-pressure airguns and receivers to collect information from below the seafloor. Airguns may be mounted aboard or towed behind a ship while receivers are also towed or dropped on the seafloor. These often precede leasing (or are otherwise off lease) and require a permit. G&G activities on an existing lease, to further delineate known O&G production fields, for example, are authorized through the lease instrument or exploration plans rather than through permits. In the Southern California Planning Area, the most recent G&G permit was issued by MMS in 1995[1]. In 1999, the California State Lands Commission (CSLC), MMS, and NMFS finalized a coordinated process for future review of G&G permit applications in the geographic area extending from the Monterey Bay National Marine Sanctuary south to the U.S.-Mexico border in State and Federal waters (CSLC and MMS 1999), which encompasses the entire action area. This High Energy Seismic Survey (HESS) review process was the result of a two-year consensus-building effort among stakeholders, including NMFS. In this process, NMFS was identified as the lead agency for ESA consultations for high energy seismic surveys in recognition of the service's requirement to issue IHAs under the Marine Mammal Protection Act.

2.2.3. No Projected Activity

Since there is no new leasing program for the Southern California Planning Area, there will be no new exploration plans. Likewise, requests for BOEM to permit high energy, deep-penetrating 2D and 3D G&G surveys in the Southern California Planning Area are not anticipated. Exploration plans and G&G surveys are not anticipated because existing reserves are already known, and no additional data are needed to continue full production. Accordingly, **BOEM is not considering these types of G&G surveys in this Biological Assessment.** Should a G&G permit be requested, BOEM expects to coordinate and cooperate with NMFS as agreed upon in the Pacific Region's HESS process plan for all survey activities that have the potential to affect ESA-listed species or critical habitat.

2.3. APPROVAL OF WELL CONDUCTOR INSTALLATION

BSEE may authorize installation of well conductors with an APD. Conductors are large pipes that carry oil and gas from the sea floor to the deck of an offshore platform. They are inserted through "slots" in the platform structure that guide and support this component of a well. The majority of the conductors are installed when a platform is constructed but some slots may be left empty with a conductor being installed at a later date. Installation of a conductor may require impact, vibratory, or rotary methods to drive the conductor into the sea floor thus making this operation analogous to a pile-driving operation.

The dimensions of the conductors, equipment used, specific location and timing are important variables when considering potential sound impacts. Where sound is expected to affect marine

[1] A G&G permit was submitted by Beta Offshore in 2017, but requests by BOEM for further information have as of yet been unanswered. Should this permit move forward, BOEM would pursue appropriate permit-specific ESA consultation.

mammals, an Incidental Harassment Authorization will be required, and NMFS will conduct an ESA consultation when specific information for a project becomes available.

2.3.1. No Projected Activity

Conductor installation has only occurred once in recent years (Platform Harmony, 2014). Platforms are moving toward the end of their economic life, there are no applications to install conductors, and none are anticipated in the foreseeable future. Therefore, **BOEM is not considering conductor installation as part of this Biological Assessment.**

3.0 BOEM/BSEE ACTIONS AND ACTIVITIES: CONSULTATION REQUESTED

This section covers activities for which consultation is requested (Table 1).

3.1. APPROVAL OF O&G DEVELOPMENT AND PRODUCTION PLANS AND PLAN REVISIONS

Offshore O&G development and production activities must be conducted in accordance with plans approved by BOEM [30 CFR 550.201]. The content and level of detail for development and production plans (DPPs) in the Southern California Planning Area have varied over time, but all describe proposed infrastructure (e.g., platforms, pipelines, and power cables), activities, and general strategies for production of O&G. Several day-to-day production and development activities, including vessel and aircraft operations, are components of plans.

3.1.1. Projected Activity

All major construction activities, under approved DPPs in the Southern California Planning Area, have either been completed or are no longer being considered. It is not anticipated that new DPPs will be submitted in the absence of a new leasing program, but existing plans may be revised or supplemented if substantive changes are proposed. BOEM's regulations at 30 CFR 550.283 provide specific instances where revisions to DPPs are necessary: 1) Change in the type of drilling, production facility or oil/gas transportation mode; 2) Change in the location of a drilling or production facility; 3) Change in the type of production or significant increase in production volume or oil storage capacity; 4) Increased air emissions exceeding the amount specified in the DPP; 5) Significant increase in solid or liquid wastes handled or discharged; 6) Request for new hydrogen sulfide area classification; 7) Change in location of onshore support base from one state to another or expansion of a support base; or, 8) Change in other activity as specified by the Regional Supervisor. Supplementation is necessary when proposed activities would require approval of a license or permit that was not described in the approved plan.

Although BOEM cannot predict what revisions or supplements may be necessary, the Bureau is reviewing the effects of the ongoing discharges, emissions, vessel use, and aircraft use taking place under existing DPPs in this assessment, and therefore requests consultation on these DPP-related activities.

3.2. DISCHARGES AND EMISSIONS

BOEM regulations require operators to submit a copy of their application for a National Pollutant Discharge Elimination System (NPDES) permit from the U.S. Environmental Protection Agency (EPA) with their DPPs [30 CFR 550.248]. BSEE regulations prohibit unauthorized discharges of pollutants into offshore waters [30 CFR 250.300]. Fluid and solid discharges from Federal O&G development and production facilities in southern California are authorized by EPA under a general NPDES permit No. CAG280000 (https://www.epa.gov/npdes-permits/cag280000-general-permit-southern-california-offshore-oil-and-gas-exploration). This permit authorizes 22 types of discharges from all Federal offshore platforms in southern California including drilling muds and cuttings; produced water; well treatment, completion, and workover fluids (including fluids associated with hydraulic fracturing and acidization); deck drainage; sanitary wastes and domestic wastes; non-contact cooling water; and fire control test water (EPA 2014). In 2013, EPA re-evaluated the potential effects of these discharges on ESA-listed species and critical habitat for the offshore lease blocks considered active by BOEM. They concluded that readily available evidence supports the conclusion that the discharges would have no effect on endangered or threatened species. They forwarded their conclusion to NMFS and received no comments (EPA 2013a, 2013b). This permit expired in 2019, and EPA is expected to issue a new permit soon. Permit requirements remain in effect until a new one is issued.

BOEM air emission information requirements for DPPs are found at 30 CFR 550.249. In the Southern California Planning Area, responsibility for air quality management is delegated by EPA to local air quality control boards that monitor and enforce air quality requirements for offshore O&G development and production. BOEM and BSEE work with the local air quality control boards to ensure that their requirements are met.

3.3. SUPPORT VESSEL AND AIRCRAFT ACTIVITY

Day-to-day offshore O&G development and production operations require routine personnel and equipment transfers. Crew and supply boats depart the coast approximately 30 times per day along pre-determined routes from Seal Beach Pier (public pier, Orange County), Terminal Island (Port of Los Angeles), Port Hueneme, Carpinteria Pier (private pier, Santa Barbara County), and Ellwood Pier (private pier, Santa Barbara County) to nearby offshore platforms. Support vessels for activities in the Santa Barbara Channel and Santa Maria Basin operate out of bases in the Santa Barbara Channel. Support vessels traveling to and from the four platforms in San Pedro Bay operate out of Long Beach. Support vessels in the Pacific Region, including both crew and supply boats, have averaged approximately 16 trips per week per platform (Bornholdt and Lear 1995, 1997). However, actual vessel traffic in the Region varies among units and are detailed in the analysis below.

Typical vessels used during support activities may include crew vessels, oil spill prevention and response vessels, platform supply vessels, anchor handling or tug supply vessels, diving support vessels, inspection maintenance and repair vessels, and vessels for remotely operated vehicle (ROV) support. Smaller vessels for spill prevention and response and crew transport may be 15 m (50 ft) in length and are capable of travel at speeds of 25 kn. Larger vessels are 100 m (328 ft) in length, can carry 1,000–2,000 m^3 (6,289–12,579 bbl) of fuel, and are powered by several thrusters, including powerful (~3000 kW) stern thrusters and smaller 800–1,000 kW thrusters for maneuvering. These vessels travel slower (10–16 kn).

OCS helicopter traffic in the Pacific Region operates primarily out of Santa Maria, Lompoc, and Santa Barbara airports. Most of this traffic has been to and from platforms in the western Santa Barbara Channel and Santa Maria Basin. Larger pieces of equipment and certain support services (e.g., commercial dive services) are mobilized from the Port of Long Beach, the Port of Los Angeles, Port Hueneme and, to a limited extent, Santa Barbara Harbor. BSEE inspectors use Camarillo Airport as a base of operations for their helicopter activities. In the past, helicopters averaged approximately 3 to 5 trips per week per platform (Bornholdt and Lear 1995, 1997). The use of helicopters has peaked and is expected to decrease through time as platforms are decommissioned.

3.4. APPROVAL OF APPLICATIONS FOR A PERMIT TO DRILL AND PERMIT TO MODIFY

3.4.1. Production Drilling

General plans for drilling for O&G are included in exploration plans and DPPs approved by BOEM. However, drilling of individual wells must be reviewed and approved by BSEE [30 CFR 250.410]. An Application for Permit to Drill (APD) is used to approve drilling specifications for new wells, new sidetrack wells, and bypasses or deepening of existing wells.

An Application for Permit to Modify (APM) is required when an approved APD is revised or materially changed [30 CFR 250 subpart D]. Well completion and workover operations, for example, are conducted to establish, maintain, or restore production of a well and are generally approved with an APM [30 CFR 250 subparts E and F]. BSEE may also issue well completion or workover field rules to modify specific requirements [30 CFR 250.512 and 30 CFR 250.612].

3.4.1.1. Projected Activity

BSEE will continue to review and approve APDs and APMs that are included in the operators' approved DPPs.

3.4.2. Well Stimulation Treatments

Well stimulation treatments have been approved through APDs or APMs. These treatments include:

Diagnostic Fracture Injection Tests - A diagnostic fracture injection test is used to estimate key reservoir properties and parameters that are needed to optimize a main fracture job. It is a short duration procedure that involves the injection of typically less than 100 bbl of fracturing fluid at pressures high enough to initiate a fracture. Key parameters are estimated from the fluid volume injected and the pressure dissipation profile. The fluid used in a diagnostic fracture injection test is typically the fluid that would be used in the main fracture treatment but with no proppant[2] added, thus allowing the fracture to close naturally as pressure is released.

[2] A proppant is a solid material, typically sand, treated sand, or man-made ceramic materials, designed to keep an induced fracture open during or following a fracture treatment.

Hydraulic Fracturing - Hydraulic fracturing involves the injection of a fracturing fluid at a pressure (as typically determined by a diagnostic fracture injection test) needed to induce fractures within the producing formation. The process generally proceeds in three sequential steps: (1) injection of a fracturing fluid without proppant to create fractures which extend out from the well; (2) injection of a slurry of fracturing fluid and proppant; and (3) injection of breakers, chemicals added to reduce the viscosity of the fracturing fluid. Upon release of pressure, the fracturing fluid is allowed to flow back (the flowback fluid) to the surface platform. Key fluid additives include polymer gels which increase the viscosity of the fluid and allow it to more easily carry proppant into the fractures, crosslinker compounds that help further increase the fluid viscosity, and breaker chemicals which break down the crosslinked polymers and allow them to return more readily to the surface after fracturing is completed. Other important additives may include pH buffers, clay control additives, microbial biocides, and surfactants to aid in fluid recovery. In offshore applications, the base fracturing fluid is filtered seawater.

Acid Fracturing - Acid fracturing is similar to hydraulic fracturing except that instead of using a proppant to keep fractures open, an acid solution is used to etch channels in the rock walls of the fractures, thereby creating pathways for oil and gas to flow to the well. As with a hydraulic fracturing well stimulation treatment, a pad fluid is first injected to induce fractures in the formation. Next, the acid fracturing fluid is injected at pressures above the formation fracture pressure and allowed to etch the fracture walls. The acid fracturing fluid is typically gelled, crosslinked, or emulsified to maintain full contact with the fracture walls. Fifteen percent hydrochloric acid (15% HCl) solutions are typically used in carbonate formations such as limestone and dolomite, while hydrofluoric acid (HFA) solutions and HCl/HFA mixtures are used in sandstone, Monterey shale formations, and other more heterogeneous geologic formations, typically at levels of 12% and 3%, respectively. The fracturing fluid typically also includes a variety of additives at a combined concentration on the order of 1% or less, such as inhibitors to prevent corrosion of the steel well casing and sequestering agents to prevent formation of gels or iron precipitation which may clog the pores.

Matrix Acidizing - In matrix acidizing, a non-fracturing treatment, an acid solution is injected into a formation where it penetrates pores in the rock to dissolve sediments and muds. By dissolving these materials, existing channels or pathways are opened and new ones are created, allowing formation fluids (oil, gas, and water) to move more freely to the well. Matrix acidizing also removes formation damage around a wellbore, which also aids oil flow into the well. The acid solution is injected at pressures below the formation fracture pressure and is thus a non-fracturing treatment. Three distinct fluids are commonly used sequentially: (1) an HCl acid preflush fluid; (2) a main acidizing fluid generated from mixing HCl and ammonium bifluoride to produce an HCl/HFA mud acid at typically 12% and 3%, respectively (some operations use mud acid while some operations primarily use 15% HCl); and (3) an ammonium chloride overflush fluid. The acidizing fluid also includes a variety of additives at a combined concentration of on the order of 1% or less, similar to those used in acid fracturing.

No well stimulation treatments have been approved since 2014. Of the more than 1,630 exploration and development wells drilled in Federal waters on the Pacific OCS between 1982 and 2014, a small percentage were hydraulically fractured completions, occurring on four of the 23 platforms in the Southern California Planning Area. Three of these were in the Santa Barbara Channel, and the fourth was in the Santa Maria Basin. Only three matrix acidizing treatments, defined as well stimulation treatments, occurring in OCS waters during a similar time frame (between 1985 and 2011) have been identified in records, and these were conducted on two of the 23 platforms.

3.4.2.1. Projected Activity

Well stimulation treatments have occurred infrequently, and none have been approved since 2014. Further, BSEE is currently enjoined by court order from approving any well stimulation treatments. Nevertheless, to promote comprehensive analysis of potential future activities, the Bureaus provide analysis of and seek consultation on the well stimulation treatments described in this BA.

3.4.3. Removal of Well Conductors

BSEE may authorize removal of well conductors with an APM. Conductor removal may occur as a part of pre-severance before platform decommissioning.

Removal would involve conductor cutting below the mudline (BML) followed by conductor extraction and sectioning (BOEM 2020, 2021). Cutting would use high-pressure abrasive cutting to sever conductor tubing and any internal casing strings at 4.6 m (15 ft) or more BML. Abrasive cutting methods include using hydraulic pressure to pump an abrasive fluid composed of seawater and an abrasive material such as garnet or iron silicate to cut through conductor piping and casings. A typical conductor cut would require about seven hours and use about 1,600 kg (3,500 lb) of iron silicate abrasive (BOEM 2021), which would be discharged to the ocean. In deep water, mechanical cutting methods might be required to sever conductors. The extraction phase would involve hoisting and cutting the severed conductors/casings into nominal 12-m (40-ft) segments on platform decks to allow loading and transporting to shore, where the conductor segments would be loaded onto trucks for transport to a scrap recycling facility. The process would be repeated for each conductor installed at a platform. Conductor severing, hoisting, and segmenting equipment would be installed on a platform at the time of use. Conductor exteriors would be cleaned of marine growth using high pressure water, possibly using divers for the upper submerged portions prior to hoisting and a ring nozzle for remaining portions as they are hoisted. Marine growth would be discharged to the ocean.

We determined that protective measures of vessel speed reductions to 10 kn and Protected Species Observers (PSOs) on vessels would be sufficient to address potential impacts to ESA-listed species. We are adopting these protective measures as part of the proposed action of conductor removal. As of April 2020, POCSR production platforms had from 12 to 64 conductors individually and 818 in all, 59 of which were empty conductor tubes through which wells had not been drilled (InterAct 2020).

Consultation History for Conductor Removal. In June 2020, NMFS sent a Letter of Concurrence (LOC) to BOEM that the removal of 55 conductors is not likely to adversely affect species listed as threatened and endangered or critical habitats designated under the Endangered Species Act (ESA). In April 2021, NMFS sent an LOC to BOEM that the removal of 66 conductors is not likely to adversely affect the NMFS ESA-listed species and/or designated critical habitat.

3.4.3.1. Projected Activity

BSEE expects to review and approve conductor removals (APMs) as additional platforms move toward decommissioning.

3.5. APPROVAL OF PIPELINE REPAIR AND REPLACEMENT

Repair, replacement (aka, replacement installation), modification, or removal of offshore O&G pipelines may require approval by BSEE [30 CFR 250.1000]. All planned pipelines in the Southern California Planning Area currently necessary for production have been installed. However, BSEE may receive requests for repair of existing pipelines.

Most recently, BOEMRE (2011) described activities for a pipeline replacement-installation project and assessed potential environmental impacts in the Southern California Planning Area. Therefore, we incorporate by reference this EA (i.e., BOEMRE 2011). Similar mobilization of vessels is necessary for cable repair projects as with pipelines, so we also incorporate by reference two EAs for cable repairs in the Southern California Planning Area: MMS (2008) and MMS (2009).

Project phases for pipeline repair/replacement installation may include topside modifications to offshore platforms, pipeline installation (including concrete mattress installation), pipeline tie-in, ITube and clamp installation, and pigging and hydrotesting of the repaired pipeline.

The primary vessel planned for the activity would be a dynamically positioned (DP) vessel, assisted by a crew boat and support vessel. As described in BOERME (2011), the use of a DP vessel reduces impacts to the marine environment compared to a lay barge by eliminating anchoring activities and reducing the number of vessels needed for construction operations.

Based on BOEMRE (2011) and MMS (2008, 2009), we estimate that the project duration for pipeline repair and replacement installation would be approximately 30 days.

3.5.1. Projected Activity (Pipelines)

While no pipeline applications are pending or expected at this time, BSEE may receive requests for repair, replacement, or removal of existing pipelines. We previously conducted informal consultations on ESA, MMPA, and EFH with NMFS for these types of activities (BOEMRE 2011). NMFS concurred with BOEMRE’s determination of no effect on protected species and minimal effects to EFH with no conservation measures requested (BOEMRE 2011).

3.6. APPROVAL OF CABLE REPAIR AND REPLACEMENT

Repair, replacement (aka, replacement installation), modification, removal, or abandonment of offshore O&G cables requires approval by BSEE through right-of-way permits. All planned cables in the Southern California Planning Area have been installed. However, BSEE may receive requests for repair of existing cables.

Project phases may include use of an ROV to locate areas to replace as well as make cuts to cable, cable lay in the right of way (including concrete mattress installation and/or span supports), and testing of repaired cable before energizing.

As described in the above section (3.5), the primary vessel planned for the activity would be a dynamically positioned (DP) vessel, assisted by a crew boat and support vessel. The use of a DP vessel reduces impacts to the marine environment compared to a lay barge by eliminating anchoring activities and reducing the number of vessels needed for construction operations (BOEMRE 2011, MMS 2008, MMS 2009).

Based on BOEMRE (2011) and MMS (2008, 2009), we estimate that project duration for cable repair and replacement installation would be approximately 30 days.

3.6.1. Projected Activity (Cables)

While no cable applications are pending or expected at this time, BSEE may receive requests for repair, replacement, or removal of existing cables. We previously consulted with NMFS on cable repair and replacement activities in the Southern California Planning Area as described in two EAs (MMS 2008, 2009) that we incorporate here by reference. We conducted informal consultations on ESA, MMPA, and EFH with NMFS for these types of activities (MMS 2008, 2009). NMFS concurred with MMS's determination of no effect on protected species, and temporary and minimal effects to EFH with no conservation measures requested (MMS 2008, 2009).

3.7. BSEE INSPECTION PROGRAM: HELICOPTER FLIGHTS

BSEE inspectors are on duty every day of the year to ensure compliance with BOEM and BSEE requirements. BSEE maintains a contract for helicopter services for flights from Camarillo Airport to offshore platforms. BSEE inspectors never use an operator's helicopter to access platforms.

Average BSEE flight usage over the last five years has been 45,000 to 50,000 miles per year and approximately 200–300 platform visits per year, where a visit includes the departure of helicopter from shore, BSEE inspection stops at one or more platforms, and the return of the aircraft to shore. For April 1, 2021–March 31, 2022, there were 194 visits to the nine platform groups, with a range of 7 visits to Point Hueneme platforms up to 53 visits to Dos Cuadras (Table 3).

Table 3. Number of BSEE visits to O&G platforms in the Southern California Planning Area per platform unit, April 1, 2021–March 31, 2022 (194 visits total).

Point Pedernales	Point Arguello	Santa Ynez	Dos Cuadras	Carpinteria	Pitas Point	Santa Clara	Point Hueneme	Beta
9	25	20	53	8	8	33	7	31

BSEE minimizes flight time by inspecting platforms in proximity to each other or dropping off inspectors at closer platforms before continuing to outlying platforms. Flight time is divided among all the facilities, but flight time to individual facilities can vary greatly depending on activity levels or complexity of the inspection mission and proximity of the platform to Camarillo Airport. Helicopter flight paths between points ideally minimize flight distance over land and water but necessarily vary with weather conditions. Transit flight heights are generally maintained at levels greater than 500 ft, unless safety concerns such as poor visibility necessitate a lower flight altitude.

BSEE inspectors may use operators' crew boats to access the offshore facilities; these visits, plus operator aircraft usage, are addressed in Section 3.3 Support Vessel and Aircraft Activity.

3.7.1. Projected Activity

The BSEE inspection program is expected to be active as long as oil and gas is produced offshore. Helicopter use is expected to decrease as platforms are decommissioned; however, the Bureaus seek consultation on the conservative, historic estimate of helicopter use in past years-45,000 to 50,000 miles per year and approximately 200–300 platform visits per year.

3.8. BSEE INITIATED OIL SPILL RESPONSE EQUIPMENT EXERCISES

BSEE must ensure that offshore operators have oil spill response plans and that they are prepared to implement these plans should an oil spill occur. BSEE periodically directs operators to deploy industry-owned oil spill response equipment listed in their response plans. For any given exercise, equipment deployed may include oil spill boom, mechanical skimmers, response vessels, oil storage equipment, aircraft, and marker buoys as described below:

3.8.1. Oil Spill Boom

Booms are floating, physical barriers to oil, made of plastic, metal, or other materials, which slow the spread of oil and keep it contained. While booms can be seen above the waterline, they may have between 18 and 48 inches of material known as a "skirt" that hangs beneath the surface. The largest sizes of boom are used for offshore responses. Containment boom comes in lengths of 500 ft or more and can be connected together into lengths reaching 1,500 ft. Depending on the cleanup tactic being exercised, boom can be deployed directly from a facility by its assigned small boats[3] or by an oil spill removal organization (OSRO) deployed to the scene. For offshore operations, boom may be deployed to completely encircle the platform. It may also be deployed in various configurations (i.e., U-shape, V-shape, J-shape) by one to three vessels coordinating their operations to simulate tactics for corralling spilled oil. When boom is deployed in the U-shaped, V-shaped, or J-shaped configurations, it is often done so in conjunction with a deployment of mechanical skimming device(s). For nearshore[4], boom designed for oil diversion or exclusion from sensitive areas can be of various shapes and lengths. Depending on the environmental conditions (i.e., sheltered harbor, fast currents) different boom sizes, means of flotation, and their means of inter-connection will need to be evaluated and selected. Boom deployed in nearshore and onshore environments generally are moored in place with the use of anchor and weight systems or onshore staking.

3.8.2. Mechanical Skimmers

Skimmers are mechanical devices that remove free floating or corralled oil from the surface of the water. Depending on the specific model these devices can pump anywhere from 100 gallons per minute (gpm) to 1,000 gpm. Two general types are commonly used in the Pacific Region.

[3] Presently, six of the Federal platforms and four platforms in state waters have booms stored onboard. The remaining facilities rely on booms supplied by an oil spill response organization.

[4] Nearshore, defined for the purposes of this document, is the ocean outside of the surf zone and within 1 mile of shore.

Weir skimmers come in several configurations and essentially work like a dam. The weir is adjusted to a height when deployed where oil floating on the water is drawn over the top of the dam at a collection inlet and store in a compartment connected to a pump inside the skimmer. Oleophilic surface skimmers are constructed with materials that attract oil and repel water. The material is incorporated into belts, disks, mop chains, or brushes which are squeezed or scraped in the skimmer to collect oil into various storage devices. Both types of skimmers can be constructed as a permanent part of a vessel's physical design or to float free from a vessel. For offshore oil cleanup, weir and oleophilic skimmers are generally deployed and maneuvered by vessels through an oil slick to actively collect the oil. For example, a vessel can extend a short length of boom on a fixed arm (side collector) to herd oil to an inlet leading to a skimmer. As the vessel moves forward, oil is forced to accumulate in the apex of the boom where the skimmer is located, thereby concentrating the oil by increasing the amount of oil relative to water at the skimmer. Skimmers can also be deployed at an opening at the apex of two booms being towed between two vessels to recover oil that is forced into the apex. In this configuration, the collected oil is typically pumped to a storage barge or other vessel with containment tanks stationed near the apex.

3.8.3. Oil Spill Response Vessels

Self-propelled vessels stationed specifically at offshore facilities or provided by an oil spill response organization can engage in a variety of spill response activities. They serve as platforms to deploy and maneuver boom and mechanical skimmers, ferry equipment and personnel, conduct spill surveillance, apply dispersants, and to tow temporary oil storage devices and barges. Vessels used for these activities range in size from 12-ft skiffs to 207-ft oil spill response vessels. Some vessels used for spill response can achieve speeds up to 30 knots. They are usually dispatched within the first hour of a deployment exercise and achieve their highest speeds when transiting to the site of the simulated spill. Once on scene, vessels generally transit at very low speeds (0 to 5 kts) to conduct spill response operations.

Oil Storage Equipment - Towable temporary oil storage devices are designed to hold and transport recovered oil from a spill site. They are made of rubber or polymer-coated fabrics of various weights and designs and have capacities that range from a few gallons to more than 300,000 gallons. There are three types of towable temporary oil storage devices in use today. The first is a towable, rectangular-shaped, pillow tank, similar to those used on land (i.e., emergency potable water storage), but equipped with special tow rigging. The second type is a towable flexible tank, or "bladder," which is long and cylindrical in shape. When full, it is largely submerged and is characterized by flexibility along the length of the device. The third type of device is a towable open tank, an inflatable barge-type vessel with an open-top storage bag suspended inside the main structure. In addition to the temporary oil storage devices, metal or inflatable barges (sometimes called mini-barges) designed for temporary oil storage can be towed or pushed by a vessel during an exercise. These barges generally have a maximum storage capacity of 250 bbl and can be of various lengths.

3.8.4. Oil Spill Response Aircraft

Helicopters are versatile platforms that can be used for a number of spill response activities. During an exercise, they may be launched from the local Santa Barbara area to demonstrate remote sensing capabilities or simulate dispersant application in a designated offshore area. For the latter activity, helicopters equipped with 32-ft sprayer arms or suspended 250-gal buckets would fly over the exercise area and discharge water to simulate dispersant application. Helicopters may also be deployed in an exercise to drop an incendiary device such as a helitorch to practice in-situ burn operations. However, it is anticipated that the latter exercise activity would be seldom performed and if conducted, would not involve a device that was actually ignited. Similar to rotary wing assets, fixed-wing assets may be deployed in exercises to demonstrate remote sensing and dispersant application activities. For exercises in the Pacific Region, a King Air BE90 aircraft in Concord, California and a C-130 aircraft in Mesa, Arizona could be activated to conduct a coordinated simulated dispersant application operation. In such an exercise, BSEE would request the activation of both assets so that the King Air could provide spotter information to the pilots of the C-130 as the latter aircraft sprayed water in simulated dispersant application runs. This type of coordinated air operations would occur during an actual spill response and BSEE would use an exercise to evaluate the response times and effectiveness of the coordinated operations by the Oil Spill Response Plan (OSRP) plan holder. Aerostats are balloon-like systems that are self-contained, compact platforms that can deploy multiple sensor payloads and other devices into the air. They can generally lift payloads less than 50 pounds and up to 500 ft into the air using a winch-controlled launch and recovery system from a vessel or platform. They are used to survey the extent of an oil spill and provide responders with real-time data to better guide operations.

3.8.5. Marker Buoys

Buoys may be used to demarcate the location of the simulated oil slick. They usually have a weighted, cone-shaped buoy body with a vertically extending narrow, fiber glass pole topped with a highly visible flag. Response vessels are to “capture the flag” to show success in a drill.

3.8.6. Projected Activity

Based on the number of oil spill response plans currently overseen by BSEE in the Pacific Region, normally three BSEE initiated oil spill exercises involving table-top scenarios and/or equipment deployments are conducted annually. However, more than three exercises may be initiated by BSEE if an owner/operator needs to be retested or if new or modified OSRPs are approved in the Region. Equipment deployments during an exercise generally occur for a few hours and rarely longer than a day. BSEE will rarely initiate nighttime equipment deployment for safety reasons unless a low visibility response capability of an owner/operator needs to be evaluated. When mechanical skimmers are deployed and operated during an exercise, they are typically done so for approximately 10 minutes to ensure that they are working properly. BSEE personnel will observe the operation of these devices and generally will be satisfied with their performance when the skimmers are sufficiently drawing and discharging water from and to the marine environment.

3.9. DECOMMISSIONING

All 23 existing offshore platforms and associated pipelines in the Southern California Planning Area will be decommissioned. The structures are generally grouped into two main categories depending upon their relationship to the platform/facilities (e.g., piles, jackets, caissons, templates, mooring devises) or the well (e.g., wellheads, casings, casing stubs). BSEE approves permanent plugging of wells, full or partial removal of platforms and pipelines, and site clearance activities [30 CFR Subpart Q].

Detailed hypothetical decommissioning scenarios for individual platforms are described in BSEE's "Decommissioning Cost Update for Pacific OCS Region Facilities" (BSEE 2015). Environmental impacts of decommissioning are summarized and incorporated by reference: "Draft Programmatic Environmental Impact Statement for Oil and Gas Decommissioning Activities on the Pacific Outer Continental Shelf" (ANL 2022).

Decommissioning of each platform may take more than a year of deconstruction effort depending on the size of the platform, location, and availability of equipment. First, all wells will be permanently abandoned and well conductors and casings severed a minimum of 15 ft below the sea floor. Later, O&G processing equipment and deck modules (e.g., living quarters) will be removed and shipped to shore for disposal. The decks and supporting platform jacket (legs and cross members) will then be cut into smaller pieces for removal. A derrick barge with 500-to-2000-ton lift capacity will be required for lifts at the platform site along with one or more 300–400-foot cargo barges to transport recovered materials to shore.

A varied assortment of severing devices and methodologies has been designed to cut structural targets during the course of decommissioning activities. These devices are generally grouped and classified as either nonexplosive or explosive, and they can be deployed and operated by divers, ROVs, or from the surface. Which severing tool the operators and contractors use takes into consideration the target size and type, water depth, economics, environmental concerns, tool availability, and weather conditions.

Nonexplosive severing tools are used for a wide array of structure and well decommissioning targets in all water depths. Based on 10 years of historical data (1994-2003) from the Gulf of Mexico, nonexplosive severing is employed exclusively on about 37% of platform removals per year. Common nonexplosive severing tools consist of abrasive cutters, diver cutting (e.g., underwater arc cutters and the oxyacetylene/oxy-hydrogen torches), and diamond wire cutters. Many removals in the Gulf of Mexico use explosive technologies either as a prearranged strategy or as a backup method.

Because of concerns over the use of explosives, current decommissioning cost projections for the Southern California Planning Area consider only the use of nonexplosive severing tools for disassembly of platform components; however, the use of explosives cannot be completely ruled out given safety concerns that may arise when considering cuts of this magnitude. We incorporate by reference "Appendix D: Acoustic Impact Analysis for EROS Removal of Oil and Gas Structures Off of southern California from the Draft Programmatic Environmental Impact Statement for Oil and Gas Decommissioning Activities on the Pacific OCS" (ANL 2022). Explosive removal of structures (EROS) generates pressure wave and acoustic energy that is the primary impact-producing factor on marine protected species if EROS is utilized during decommissioning. Non-auditory injury takes for all baleen and endangered species will be 0.002 or less. Auditory injury for all baleen and endangered species will be 0.02 or less. Behavior injury for all baleen and endangered species will be 0.3 or less, primarily due to their low densities. Non-auditory, auditory, and behavioral impacts will be small.

Explosive severance tools can be deployed on almost all structural and well targets in all water depths. Historically, explosive charges are used in about 63% of decommissioning operations in the Gulf of Mexico, often as a backup cutter when other methodologies prove unsuccessful. Explosives work to sever their targets by using (1) mechanical distortion (ripping), (2) high-velocity jet cutting, and (3) fracturing or "spalling."

Mechanical distortion is best exhibited with the use of explosives such as standard and configured bulk charges. If the situation calls for minimal distortion and an extremely clean severing, then most contractors rely upon the jet-cutting capabilities of shaped charges. To "cut" with these explosives, the specialized charges are designed to use the high-velocity forces released at detonation to transform a metal liner (often copper) into a thin jet that slices through its target. The least used method of explosive severing in the Gulf of Mexico is fracturing which uses a specialized charge to focus pressure waves into the target wall and use refraction forces to spall or fracture the steel on the opposing side.

Offshore O&G facilities removed from State waters in California have required both nonexplosive and explosive devices. Devices to be used for the future removal of Federal O&G facilities in the Southern California Planning Area have yet to be proposed.

Seafloor electrical cables running to shore will be completely removed (pulled onto a vessel) and pipeline segments in less than 200 ft of water will be removed up to the state water boundary. Other sections of pipeline in Federal waters will be cleaned and abandoned in place or removed. The fate of pipeline segments in State waters will be determined by the California State Lands Commission.

After all decommissioning work is completed and the structure is salvaged, operators are required to perform site-clearance work to ensure that the sea floor of their lease(s) have been restored to pre-lease conditions. Based upon requirements found in 30 CFR subpart Q, operators have the option of either trawling with commercial nets or conducting diver/high resolution sonar surveys of the lease site.

Partial removal of offshore platforms is a possibility. BSEE supports and encourages the reuse of obsolete O&G structures as artificial reefs and is a cooperating agency in the implementation of the National Artificial Reef Plan. In California, any proposed reefing is subject to State legislation that would allow this activity. Structure removal permit applications requesting a departure from decommissioning regulations under the Rigs-to-Reefs Policy (BSEE Interim Policy Document 2013-07) undergo technical and environmental reviews. The policy document details the minimum engineering and environmental standards that operators/lessees must meet to be granted approval to deploy a structure as an artificial reef. Conditions of approval are applied as necessary to minimize the potential for adverse effects to sensitive habitat and communities in the vicinity of the structure and proposed artificial reef site. Additionally, structures deployed as artificial reefs must not threaten nearby structures or prevent access to O&G, marine minerals, or renewable energy resources.

3.9.1. Projected Activity

As a precursor to platform decommissioning, the permanent abandonment of all the wells on a facility is required. This involves the plugging of the wells according to BSEE regulations [30 CFR 250.1710-1723]. BSEE is currently reviewing APDs that will assess the permanent abandoning of wells at several offshore facilities and BOEM would perform the National Environmental Policy Act (NEPA) analysis. BOEM will be consulting with NMFS, if necessary, on these projects. Currently, 13 leases are terminated, 8 of which have facilities requiring decommissioning. Platform Habitat is currently in a state of preservation and may proceed to decommissioning within the next 10 years. Well-plugging and conductor-removal operations are underway on some of these platforms, and platform and related facility and pipeline decommissioning are expected to occur this decade. This assessment provides a general overview of potential impacts associated with decommissioning. As final decommissioning applications are submitted for review, further analysis and consultation will occur. At this time, based on the available information described above, we have determined there is a reasonable likelihood that decommissioning will not jeopardize the continued existence of ESA-listed species.

4.0 ASSESSMENT OF SOUND FROM O&G ACTIVITIES

Concerns about anthropogenic sound in the marine environment have increased in recent decades as the total amount of anthropogenic sound present in the ocean has increased. Transportation, drilling and production, and decommissioning activities typically produce multi-spectral sound that may be detected by endangered and threatened species. The source level of a sound produced by activities such as these is described as the amount of radiated sound at a particular frequency and distance, usually 1 m from the source, and is commonly expressed in dB re 1 µPa for underwater sound. Much of the following discussion is derived from the detailed review of the sounds produced by offshore activities in Richardson et al. (1995).

4.1. PHYSICAL EFFECTS OF SOUND ON MARINE ANIMALS

Exposure of marine animals to very loud noise can result in physical effects such as changes to sensory hairs in the auditory system, which may temporarily or permanently impair hearing (Table 4, Table 5). Temporary threshold shift (TTS) is a temporary hearing change, and its severity is dependent upon the duration, frequency, sound pressure, and rise time of a sound (Finneran and Schlundt 2013). TTSs can last minutes to days. Full recovery is expected, and this condition is not considered a physical injury. At higher received levels, or in frequency ranges where animals are more sensitive, permanent threshold shift (PTS) can occur. The effect of noise exposure generally depends on a number of factors relating to the physical and spectral characteristics of the sound (e.g., the intensity, peak pressure, frequency, duration, duty cycle), and relating to the animal under consideration (e.g., hearing sensitivity, age, gender, behavioral status, prior exposures).

In 2018, NMFS revised the comprehensive guidance on underwater sound levels likely to cause injury to marine mammals through onset of PTS (harassment by injury or Level A; harassment as defined by the Marine Mammal Protection Act) (MMPA; 16 U.S.C. § 1362(18)(A)). Different thresholds and auditory weighting functions are provided for different marine mammal hearing groups. The generalized hearing range for each hearing group and the PTS onset acoustic thresholds are presented in Table 4, using dual metrics of cumulative sound exposure level (LE) and peak sound level (PK) for impulsive sounds and LE for non-impulsive sounds (NMFS

2018a). Level A harassment radii can be calculated using the optional user spreadsheet[5] associated with NMFS Technical Guidance, or through modeling.

Table 4. Marine Mammal hearing ranges and threshold values underwater for onset of permanent shifts in hearing sensitivity (PTS) (NMFS 2018a). Peak sound pressure (Lpk) has a reference value of 1 µPa, and cumulative sound exposure level (LE) has a reference value of 1 µPa2s. The µPa subscript "flat" is included here to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

Hearing Group	**Generalized Hearing Range[1]**	**PTS Onset Acoustic Thresholds* (Received Level)**	
		Impulsive	**Non-impulsive**
Low-Frequency Cetaceans (LF: baleen whales)	7 Hz to 35 kHz	$L_{pk,flat}$: 219 dB $L_{E,24h}$: 183 dB	$L_{pk,flat}$: 213 dB $L_{E,24h}$: 168 dB
Mid-Frequency Cetaceans (MF: sperm whales)	150 Hz to 160 kHz	$L_{pk,flat}$: 230 dB $L_{E,24h}$: 185 dB	$L_{pk,flat}$: 224 dB $L_{E,24h}$: 170 dB
High-Frequency (HF) Cetaceans	275 Hz to 160 kHz	$L_{pk,flat}$: 202 dB $L_{E,24h}$: 155 dB	$L_{E,24h}$: 173 dB
Phocid Pinnipeds	50 Hz to 86 kHz	$L_{pk,flat}$: 218 dB $L_{E,24h}$: 185 dB	$L_{E,24h}$: 201 dB
Otariid Pinnipeds	60 Hz to 39 kHz	$L_{pk,flat}$: 232 dB $L_{E,24h}$: 203 dB	$L_{E,24h}$: 219 dB

[1] Represents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall et al. 2007) and phocids (approximation).
*Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

[5] The Optional User Spreadsheet can be downloaded from the following website: http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm

Table 5. Thresholds for potential injurious underwater noise exposure for sea turtles and fishes.

Hearing Group	Generalized Hearing Range	Permanent Threshold Shift[1] or Physiological Effects[2] Onset	Temporary Threshold Shift Onset
Sea Turtles	30 Hz to 2 kHz	LE: 204 dB	LE: 189 dB
		*L*pk: 232 dB	*L*pk: 226 dB
Fishes > 2 grams (0.07 ounces)		LE: 187	--
		*L*pk: 206 dB	--
Fishes < 2 grams (0.07 ounces)		LE: 183 dB	--
		*L*pk: 206 dB	--

[1] Applies to sea turtles (Navy 2017)
[2] Applies to fishes (Source: Popper et al. 2014)
Note: Peak sound level (*L*pk) has a reference value of 1 μPa, and cumulative sound exposure level (*L*E) has a reference value of 1 $\mu Pa^2 s$. The μPa subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range.

4.2. BEHAVIORAL EFFECTS OF SOUND ON MARINE ANIMALS

Marine animals may exhibit a variety of behavioral changes in response to underwater sound, which can be generally summarized as modifying or stopping vocalizations or changing from one behavioral state to another. The behavioral response of a marine mammal to an anthropogenic sound will depend on the frequency, duration, temporal pattern, and amplitude of the sound as well as the animal's prior experience with the sound and the context in which the sound is encountered (i.e., what the animal is doing at the time of the exposure). The distance from the sound source and whether it is perceived as approaching or moving away can also affect the way an animal responds to a sound (Wartzok et al. 2003).

NMFS is in the process of developing guidance for behavioral disturbance to marine mammals. However, until such guidance is available, NMFS uses the following conservative thresholds of underwater sound pressure levels[6], expressed in dB re: 1 μPa_{RMS}[7] from broadband sounds that cause behavioral disturbance:

- Marine Mammals
    - impulsive sound: 160 dB
    - non-impulsive sound: 120 dB
- Sea turtles: 175 db
- Fishes: 150 dB - onset of behavioral response (not necessarily take, depending on the circumstances) to noise with frequency less than 1 kHz.

[6] Sound pressure is the sound force per unit micropascals (μPa), where 1 pascal (Pa) is the pressure resulting from a force of one newton exerted over an area of one square meter. Sound pressure level is expressed as the ratio of a measured sound pressure and a reference level. The commonly used reference pressure level in acoustics is 1 μPa, and the units for underwater sound pressure levels are decibels (dB) re 1 μPa.

[7] Root mean square (rms) is the square root of the arithmetic average of the squared instantaneous pressure values. Values in this document are expressed in RMS unless otherwise specified.

In addition, NMFS uses the following thresholds for in-air sound pressure levels from broadband sounds that cause Level B behavioral disturbance:

- 90 dB re 20 μPa_{rms} for harbor seals
- 100 dB re 20 μPa_{rms} for non-harbor seal pinnipeds

For marine mammals, a review of behavioral responses to anthropogenic sound was first conducted by Richardson et al. (1995). More recent reviews (e.g., Nowacek et al. 2007; Southall et al. 2007, 2021; Ellison et al. 2012) address studies conducted since 1995 and focus on observations where the received sound level of the exposed marine mammal(s) was known or could be estimated.

The threshold for fish of 150 dB for behavioral responses to noise with frequency less than 1 kHz is supported by information provided in a number of studies (Andersson et al. 2007; Wysocki et al. 2007; Purser and Radford 2011). Responses to temporary exposure of noise of this level is expected to be a range of responses indicating that a fish detects the sound. These can be brief startle responses, or, in the worst case, it is expected that listed fish would completely avoid the area ensonified above 150 dB.

All behavioral reactions are assumed to reflect stress or cueing responses (except for some vocalization changes that may be compensating for auditory masking). Behavioral responses result in take when they significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Responses can overlap; for example, a flight response is likely to be coupled with cessation of feeding. Individuals of the same species may react differently to the same, or similar, stressor.

4.3. PREDICTED EXPOSURE AND RESPONSE TO SOUNDS FROM O&G ACTIVITIES

BOEM’s continuation of O&G activities in the POCSR may generate sounds above NMFS thresholds for physical and behavioral effects. However, BOEM and BSEE’s phased permitting and authorization process allows opportunities to review and determine if the expected effects are beyond the levels estimated in this BA and consultation. BOEM will consult further with NMFS on planned acoustic activities that have the potential to cause PTS or injury to ESA-listed species or critical habitat.

The following sections describe the probable exposure, response, and summary of effects to ESA-listed species and critical habitat from sound produced by vessels, aircraft, drilling and production, conductor installation, and conductor removal.

4.3.1. Sound from Drilling and Production

Production drilling may be conducted in the Southern California Planning Area. Sound produced by production activities on platforms is relatively weak, because a small surface area of a platform is actually in contact with the water and because the machinery is placed on decks well above the water line (Richardson et al. 1995). Gales (1982) measured noise from production activities on platforms offshore California. Sounds recorded from platforms were very low in frequency, about 4.5-38 Hz measured at 9-61 m. The strongest received tones were very low frequency, about 5 Hz, at 119-127 dB. The highest frequencies recorded were at about 1.2 kHz.

NMFS (2020a) reported source levels for drilling from platforms up to 137 dB at 405 m and estimated this to equal 185 dB at the source (167-192 dBPK).

Other platform operations also generate noise. Noise generation during well stimulation operations, including hydraulic fracture and acidization, is predominantly associated with equipment operations on the platform. Airborne noise levels fluctuate according to the specific operations and presence of vessels. The highest value recorded by Blackwell and Greene (2006) was 62 dBA re: 20 µPa was obtained 300 m from the source construction activities and boats were present. Ambient values were reached 1–4 km from the source. Some noise from on-platform equipment is carried downward through the water column, but underwater noise monitoring of platform operations has repeatedly identified drilling and vessel operations to be the primary activity generating the highest-level of noise (Kim and Richardson 2016; Quijano, et al. 2019).

Drilling noise is expected to be audible at low levels in all directions from the drilling location. Although drilling sound may contribute to a localized increase in ambient sound levels, it will not produce sound levels over great enough distances to cause disturbance. Due to the stationary and localized effects of platform-associated sounds, animals encountering platform sounds would be very brief as they swim by, and the potential effects of these sounds to disturb animals will be insignificant. Any marine mammal or ESA-listed species approaching the platform would be fully aware of its presence before approaching close enough to experience harassment. NMFS has found drilling noise unlikely to cause adverse effects to fish, sea turtles, and marine mammals, including sperm whales, humpback whales, Steller sea lions, beluga whales, and fin whales (NMFS 2017a, 2020a; NOAA 2019). Drilling and production noise from offshore platforms is **not likely to adversely affect** listed species.

4.3.2. Sound from Conductor Removal (Mechanical Cutting)

In 2021, 55 conductors were removed from three oil platforms off southern California. The conductors were cut 6 to 8 m (20 to 25 ft) below the mudline and the cutter revolutions per minute ranged from 60 to 72 RPM. The Bureau consulted with NMFS prior to project approval, focusing on sound as the primary potential impact. Based on the best available information, NMFS concurred with the Bureau’s finding that the conductor removal was not likely to adversely affect listed species (https://www.boem.gov/sites/default/files/documents/regions/pacific-ocs-region/ARGUELLO%20NOAA%20LOC.pdf). BOEM funded an independent study to collect empirical source level data during the cutting of a total of nine wellbores and 16 empty conductors (Fowler et al. 2022). The duration of the cuts was dependent on the number of casing strings that needed to be cut. Wellbores containing more casing strings took much longer to cut compared to the conductors that were empty. The broadband sound pressure levels (SPLs) generated by cutting either wellbore or empty conductors produced similar levels and, based on the spectrums observed, consisted of maximum broadband levels of approximately 150 dB re 1 µPa-m for frequencies of 500–1,000 Hz and 155 dB re 1 µPa-m for the band of 25–3,000 Hz.

Since the cutting occurred below the mudline and the conductors themselves acted at least partially as sound radiators, transmission loss was complex, but an examination of the received levels from multiple receivers indicates that a 15 Log(range) approximation was reasonable. During the field survey ambient sound levels were typically found to be in the 110 to 122 dB

RMS SPL range for a broadband frequency band of approximately 25 – 3,000 Hz, with short periods (tens of minutes) where the ambient noise levels rose to 125 dB as local shipping passed near the survey. Thus, the distance to the marine mammal behavioral threshold for continuous sound of 120 dB is 205 m. However, marine mammals would have to remain in the ensonification zone (i.e., within 205 m of the structure) for a protracted period of time in order to experience the cutting sound levels, while simultaneously being exposed to ambient noise which would likely be masking the cutting noise. This masking would effectively reduce the ensonified radius. The overall result is that it is highly unlikely that a marine mammal would remain within the Level B radius for long and that Level B impacts are not likely to occur.

Mechanical cutting activities associated with O&G platform conductor removal produces underwater sound pressure levels that contribute to the existing underwater ambient acoustic environment; however, sound pressure levels are well below the marine mammal onset for permanent threshold shift and generally lower for marine mammal temporary threshold shift onset (Fowler et al. 2022). Sound produced during conductor removal is therefore **not likely to adversely affect** ESA-listed species.

4.3.3. Sound from Aircrafts

Helicopters are another means of crew transport on and off platforms in the POCSR. Helicopter noise has the potential to propagate underwater at levels that could be detected by marine mammals and sea turtles. Air-to-water transmission depends on 1) the receiver depth, and 2) the altitude, aspect, and strength of the source (Richardson et al. 1995). The angle of incidence at the water surface, water depth, and bottom conditions also strongly influence the propagation and levels of underwater sound from passing aircraft; propagation is attenuated in shallow water, especially when the bottom is reflective (Richardson et al. 1995). Richardson et al. (1995) presented an estimated source level for a Bell 212 helicopter of about 150 dB at altitudes of 150-600 m, with the dominant frequency a 22-Hz tone with harmonics. The rotors are the primary sources of sound from helicopters (Richardson et al. 1995). Duration is variable. For example, a Bell 214 was audible in air for 4 minutes before passing, for 38 seconds at 3-m (9-ft) depth, and for 11 seconds at 18 m (59 ft).

The effects of underwater transmission of airborne noise from helicopters or fixed-wing aircraft is minimal and unlikely to affect marine species. A study by Petel et al. (2006) evaluated helicopter and fixed-wing aircraft noise levels to determine potential effects to Weddell seals (*Leptonychotes weddellii*). They determined that in-water transmission of sound was greatest when aircraft landings and takeoffs took place on surface ice. Underwater transmission was otherwise inaudible or barely audible. Above the water's surface, airborne sound was more substantial and could be heard from aircraft traveling at altitudes up to 914 m (3,000 ft).

The visually observable presence of the aircraft and the airborne noise signals may be a more substantial stressor for marine animals. In a review of the response of cetaceans to aircraft, Luksenburg and Parsons (2009) found that cetaceans responded to aircraft in some manner to varying degrees, in many cases by diving. 'Cryptic' species, such as beaked whales (Ziphiidae), pygmy sperm whale (*Feresa attenuata*) and dwarf sperm whale (*Kogia simus*), showed a stronger response to the airplane than other species. Forty percent (12/30) of the observed *Kogia* spp. and 89% (8/9) of the observed ziiphids changed their behavior in response to the airplane. Of the smaller delphinids, pantropical spotted (*Stenella attenuata*) (43%, 18/42), Clymene (*S.*

clymene) (71%, 5/7), striped (*S. coeruleoalba*) (75%, 6/8), and spinner dolphins (*S. longirostris*) (100%, 4/4) changed their behavior in response to aircraft. Sperm whales reacted in 28% of the observations (7/25). The other cetacean species (e.g., the larger delphinids: short-finned pilot whale (*Globicephala macrorhynchus*), Risso's dolphin (*Grampus griseus*), false killer whale (*Pseudorca crassidens*), Atlantic spotted dolphin (*S. frontalis*), bottlenose dolphin (*Tursiops truncatus*)) responded in less than 29% of the sightings. Behavioral changes were sometimes subtle and became apparent only after statistical analysis (Patenaude et al. 2002). For example, there was a 6.5% increase (resident sperm whales) and a 28% decrease (transient sperm whales) in surface time and a 26% increase (resident and transient sperm whales) in the time to first click after a 'fluke-up' dive after a fly-by from an aircraft (Richter et al. 2006). Aircraft flying at low altitude, at close lateral distances and above shallow water elicit stronger responses than aircraft flying higher, at greater lateral distances, and over deep water (Patenaude et al. 2002; Smultea et al. 2008).

Sea turtles may also respond to aircraft overflights. Based on sea turtle sensory biology (Ridgway et al. 1969; Lenhardt et al. 1994; Bartol et al. 1999; Ketten and Bartol 2005; Ketten and Bartol 2006), sound from low flying aircraft could be heard by a sea turtle that is at or near the surface. Turtles might also detect low flying aircraft via visual cues such as the aircraft's shadow. Auditory response testing by Moein et al. (1993) showed sound-induced swimming and sound-induced head movements in most, but not all Atlantic Loggerhead test subjects. In a study of responses to unoccupied aerial systems (UASs or drones), Bevan et al. (2018) studied behaviors of three species of sea turtle (green turtles, *Chelonia mydas*, flatback turtles, *Natator depressus,* hawksbill turtles, *Eretmochelys imbricata*) to a small commercially available (1.4 kg) multirotor drone. Juvenile green and hawksbill turtles foraging on shallow algae-covered reefs in nearshore waters off nesting beaches or in foraging habitats exhibited no evasive behaviors (e.g., rapid diving) in response to the drone at or above 20-30 m altitude, and at or above 10 m altitude, respectively. Adult female flatback sea turtles were not deterred by drones flying forward or stationary at 10 m altitude when crawling up the beach to nest or digging a body pit or egg chamber.

Very little information is available about fish responses to aircraft. One study found substantial effects from a sonic boom above a fish hatchery (Gladwin, et al. 1988), but routine overflights are highly unlikely to elicit a similar response. Fish are more likely to respond to an aerial predator with short-term evasive movements. For instance, in response to a passing helicopter shadow, fish may dive or change direction. This type of response is within the normal pattern of fish behavior and is unlikely to cause unusual or severe stress response.

Based on these studies, and previous NMFS consultations on scientific research permits involving aerial surveys (NMFS 2017b, 2017c, 2017d, 2017e), BOEM expects that the ESA-listed fish species considered in this Biological Assessment may exhibit no response or short-term behavioral responses with little biological significance to overpassing aircraft. To our knowledge, no physiological responses to aircraft have been documented, and only short-term temporary changes in behavior are expected (CSA Ocean Sciences Inc. 2021). While the above review indicates that ESA-listed species may exhibit short-term behavioral and or stress responses, such responses to aircraft associated with the proposed action are expected to be infrequent and minimal. Routine OCS helicopter traffic would not be expected to disturb animals for extended periods. Helicopters, while flying offshore, generally maintain altitudes above 213 m (700 ft) during transit to and from a working area, and at an altitude of about 152 m (500 ft) between platforms. Pilots rarely alter their flight patterns to more closely observe or photograph marine mammals. The duration of the effects resulting from typical startle responses are expected to be short-term during routine flights, and the potential effects will be insignificant. Therefore, impacts from helicopter flights would be negligible and are **not likely to adversely affect** ESA-listed species.

4.3.4. Sound from Vessels

The Southern California Planning Area has near-constant shipping vessel traffic (Figure 6). The Santa Barbara Channel is a part of an international shipping route leading to and from the Ports of Los Angeles and Long Beach, one of the busiest port complexes in the world. Automatic Identification System (AIS) data compiled by BOSL (2022) are shown in Figure 6. The AIS data showed more shipping activity in 2021 as compared to 2020, with both an increase in the overall number of vessels and an increase in the total nautical miles traversed. Overall, there were 1,159 large vessels (> 300 tons) that transited a total of 714,749 nautical miles-a 23% increase in the number of ships transiting through this area and a 12.6% increase in the overall number of nautical miles traveled within this zone

Worldwide, vessels are the major contributors to overall background noise in the sea (Richardson et al. 1995). Sound levels and frequency characteristics are roughly related to ship size and speed. The dominant sound source is propeller cavitation, although propeller “singing,” propulsion machinery, and other sources (auxiliary, flow noise, wake bubbles) also contribute to the total noise level produced.

Vessel noise is a combination of narrowband tones at specific frequencies and broadband noise and is determined by factors such as ship type, load, and speed, and ship hull and propeller design. For vessels the approximate size of crew and supply boats, tones dominate up to about 50 Hz. Broadband components, caused primarily by propeller cavitation and flow noise, may extend up to 100 kHz, but they peak much lower, at 50-150 Hz. Richardson et al. (1995) give estimated source levels of 156 dB for a 16-m crew boat (with a 90-Hz dominant tone) and 159 dB for a 34-m twin diesel (630 Hz, 1/3 octave). Broadband source levels for small, supply boat-sized ships (55-85 m) are about 170-180 dB. Most of the sound energy produced by vessels of this size is at frequencies below 500 Hz. Many of the larger commercial fishing vessels that operate off southern California fall into this class. Vessel speed restrictions are implemented to minimize collisions with marine mammals. While a slower speed reduces noise levels, that noise reduction is minimal in comparison to ambient noise in this high vessel traffic area. Changing vessel speeds would not affect impacts to mammals from noise. Examples of noise generated by support vessels for O&G industry operations are provided in Table 6.

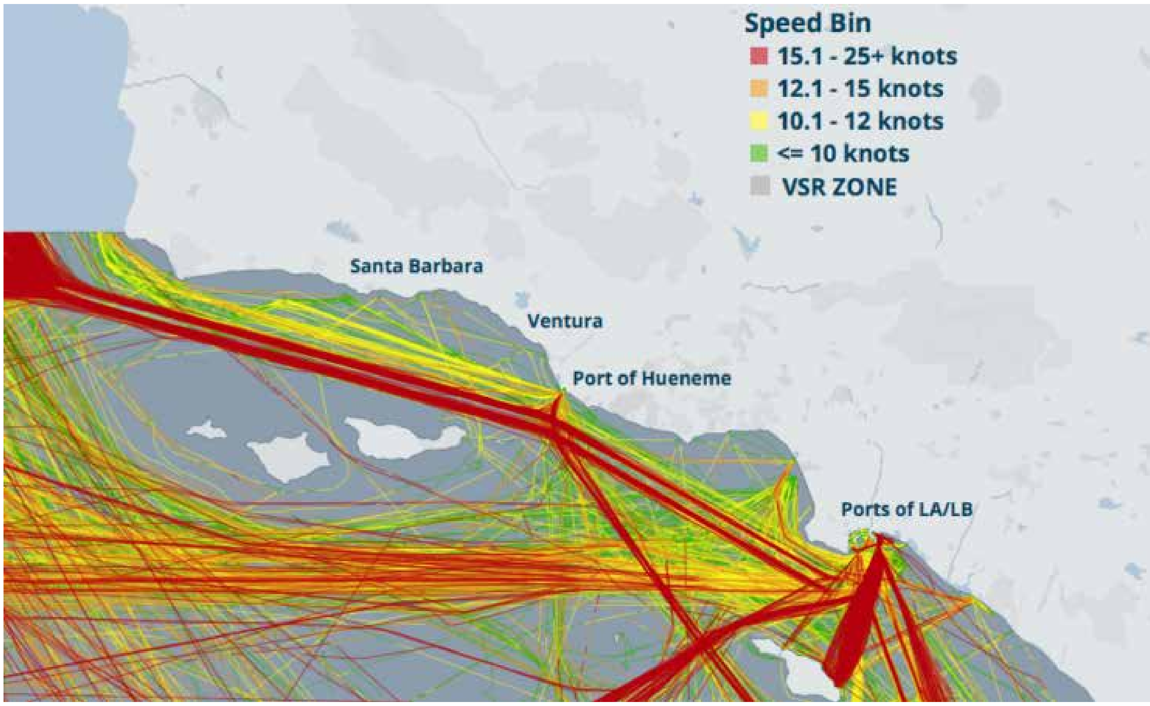

Figure 6. AIS Vessel tracks within the Santa Barbara shipping channel from May 15 to December 15, 2021, shown according to speed: Less than 10 kn (green), 10-12 kn (yellow), 12-15 kn (orange), and more than 15 kn (red). Source: BOSL (2022).

Table 6. Examples of underwater sound levels generated from O&G vessels.

Source of Sound	Source Level (dB)	Frequency (Hz)
Service, crew, and support vessels Tug (4 engine)	160-180 (rms) 187 (peak), 173-177 (rms) 188-191 (peak)	20-10,000 broadband
Seismic Survey Vessel	125-132 (rms) at 500 m (approx. 179-186 [rms] at source)	broadband
Semi-submersible Pipeline Barge	161 (rms) 171 (peak)	10-10,000
Pipe-laying Vessel	170-182 (rms) 179-191 (peak)	broadband
Drilling Ship (MODU) with positioning thrusters (Dynamic Positioning)	195 (rms) 195 (peak)	10-10,000

Acoustic monitoring shows that vessel traffic appears to increase background noise levels in the 71–224 Hz range by 10–13 dB (Hatch et al. 2012; McKenna et al. 2012; Rolland et al. 2012). McKenna et al. (2012) conducted long-term monitoring of underwater sound from ship traffic in the Santa Barbara Channel between 2007 and 2010 and concluded that reduction of 1 ship transit per day resulted in 1.2 dB decrease in average noise. This study used AIS data to estimate the volume of ship traffic. AIS transponders are not required on ships < 300 gross tons and this study may not fully account for the contributions of smaller vessels.

Exposure and response to vessel noise and activities depend primarily on how close in proximity the vessel is to an individual animal. Close vicinity to a particularly loud vessel sound can result in acute noise exposure and disturbance. Long-term, chronic exposure to vessel sound may result in stress and masking of biologically important sounds (Hatch et al. 2012; Rolland et al. 2012). Behavioral changes specifically attributed to vessel noise have been reported to include disruption of normal behaviors such as foraging, habitat avoidance, and alterations of acoustic signaling behavior (Blair et al. 2006; Erbe et al. 2019; Silber et al. 2021). Sound from vessels also has the potential to accumulate from multiple vessels and increase the ambient sound level (Hildebrand 2009).

Vessel activities and the potential effects to animals are described here in greater detail than for other sources of sound. Routine O&G vessel activities can present an important stressor for animals exposed to vessel noise, sights, smells, and movements. The effects depend on the vicinity to the vessel, the vessel activities, and other factors, Vessel noise is therefore included here in greater detail to allow NMFS to consider the effects of vessel noise on ESA-listed species and critical habitat on a programmatic level.

4.3.4.1. Marine Mammals

Marine mammals' behavioral responses to vessel disturbance range from little to no observable change in behavior to momentary changes in swimming speed and orientation, diving, surface and foraging behavior, and respiratory patterns, as well as changes in vocalizations Watkins et al. (1981) found that both fin whales and humpback whales appeared to react when approached by small vessels by increasing swim speed, exhibiting a startle reaction and moving away from the vessel with strong fluke motions. In a study on North Atlantic right whales, 71 percent of 42 whales that were closely approached by a research vessel (within 10 m) showed no observable reaction; when reactions occurred, they included lifting of the head or flukes, arching the back, rolling to one side, and beating the flukes, or performing a head lunge (Baumgartner and Mate 2003). In another study on North Atlantic right whales, Nowacek et al. (2004) observed no noticeable behavioral responses to passing vessels nor to simulated vessel sounds. Studies of other baleen whales, specifically bowhead and gray whales, have documented short-term behavioral responses to a variety of actual and simulated vessel activity and sounds (Malme et al. 1983; Richardson et al. 1985). Close approaches by small research vessels caused fin whales (n = 25) in the Ligurian Sea to stop feeding and swim away from the approaching vessel (Jahoda et al. 2003). A study on the effects of research vessel presence on sperm whale behavior found that sperm whales (n = 12) off the coast of Norway spent 34 percent less time at the surface and 60 percent more time in a non-foraging silent active state when in the presence of the vessel than in the post-vessel baseline period, indicating costs in terms of lost feeding opportunities and recovery time at the surface (Isojunno and Miller 2015).

A number of factors may influence the type or severity of an animal's response. Changes in cetacean behavior can correspond to vessel speed, size, and distance from the animal, as well as the number and frequency of vessel approaches (Baker et al. 1988; Beale and Monaghan 2004). Characteristics of the individual and/or the context of the approach, including age, sex, the presence of offspring, whether or not habituation to vessels has occurred, individual differences in reactions to stressors, and the behavioral state of the cetaceans can also influence the responses to close vessel approaches (Baker et al. 1988; Wursig et al. 1998; Gauthier and Sears 1999; Hooker et al. 2001; Lusseau 2004; Koehler 2006; Richter et al. 2006; Weilgart 2007). Observations of large cetaceans indicate that cow-calf pairs, smaller groups, and groups with calves appear to be more responsive to close vessel approaches (Hall 1982; Bauer 1986; Bauer and Herman 1986; Clapham and Mattila 1993; Williamson et al. 2016). Cetaceans may become sensitized or habituated to vessels as the result of multiple approaches (Constantine 2001).

Chronic exposure to vessel sound may be a more important stressor than short-term interactions with specific vessels. Chronic noise has been correlated with changes in stress hormones (Rolland et al. 2012) and long- and short-term changes in vocalizations (Parks et al. 2007; Parks et al. 2011; Parks et al. 2012). Some low-frequency sounds, such as those produced by large commercial vessels, are estimated to have reduced the communication space for North Atlantic right whales in the Northeastern United States by up to 67 percent compared to historically lower sound conditions (Hatch et al. 2012). While masking due to vessel sound may be more severe for North Atlantic right whales compared to other whales (Clark et al. 2009), masking of other baleen whale sounds still likely occurs. Whales may adjust their communication to cope with changes in ambient sound, as has been suggested in North Atlantic right whales (Parks et al. 2007; Parks et al. 2011; Tennessen and Parks 2016), but the adjustment may take years.

The biological significance of the typical response to O&G vessel disturbance is low. Research suggests that cetaceans appear to resume typical behavior within minutes of vessels leaving the area (Watkins et al. 1981; Hall 1982; Baker et al. 1983; Malme et al. 1983; Richardson et al. 1985; Au and Green 2000; Baumgartner and Mate 2003; Jahoda et al. 2003; Koehler 2006; Scheidat et al. 2006; Isojunno and Miller 2015). Large whales are continuously exposed to vessel noise in the Santa Barbara Channel, but they occur there regularly, using the area as a migration corridor and feeding area (BOSL 2022). O&G vessel traffic is a small fraction of the area's transit, recreational, and shipping vessel activities.

4.3.4.2. Sea Turtles

Underwater noise generated by vessels could cause behavioral changes or auditory masking to sea turtles. It is unclear whether masking resulting from vessel noise would have biologically significant impacts on sea turtles (CSA Ocean Sciences Inc. 2021). The behavioral responses to vessels could be attributed to both noise and vessel cues. Conservatively, it can be assumed that individual sea turtles disturbed by the vessels will undertake evasive maneuvers, such as diving or altering swimming direction and/or swimming speed to avoid the vessels. Sea turtles exposed to underwater noise greater than 175 dB may experience behavioral disturbance/modification (e.g., movements away from the noise source) (Moein et al. 1994). The noise levels typically produced by O&G vessels generate a small Level B harassment zone located very near the vessels, making disturbance of sea turtles unlikely.

4.3.4.3. Fish and Invertebrates

All fish species can detect vessel noise due to its low-frequency content and their hearing capabilities. Some TTS has been observed in fishes exposed to elevated background noise and white noise. Caged studies on fishes show some TTS after several days or weeks of exposure to increased background sounds, although the fish appeared to recover from hearing loss (e.g., Scholik and Yan 2002; Smith et al. 2004a; Smith et al. 2006). Smith et al. (2004b) and Smith et al. (2006) exposed goldfish to noise with a sound pressure level of 170 dB and found a clear relationship between the amount of TTS and duration of exposure, until maximum hearing loss occurred at about 24 hours of exposure. A short duration (e.g., 10-minute) exposure resulted in 5 dB of TTS, whereas a three-week exposure resulted in a 28 dB TTS that took over two weeks to return to pre-exposure baseline levels (Smith et al. 2004b). Recovery times were not measured by researchers for shorter exposure durations, so recovery time for lower levels of TTS was not documented.

Vessel noise may cause stress or affect fish behavior by causing them to startle, swim away from an occupied area, change swimming direction and speed, or alter schooling behavior (Engas et al. 1995; Engas et al. 1998; Mitson and Knudsen 2003). Physiological responses have also been documented for fish exposed to increased boat noise. Nichols et al. (2015) demonstrated acute physiological stress effects from increased noise (playback of boat noise) on coastal giant kelpfish. Other studies have also shown exposure to continuous or chronic vessel noise may elicit stress responses indicated by increased cortisol levels (Scholik and Yan 2001; Wysocki et al. 2006).

Because of the characteristics of vessel noise, sound produced from vessels is unlikely to result in direct injury, hearing impairment, or other trauma to ESA-listed fish. In the near field, fish are able to detect water motion as well as visually locate an oncoming vessel. In these cases, most fishes located in close proximity that detect the vessel either visually, via sound and motion in the water would be capable of avoiding the vessel or move away from the area affected by vessel sound. Thus, fish are more likely to react to vessel noise at close range than to vessel noise emanating from a greater distance away. Auditory masking due to vessel noise can potentially mask biologically important sounds that fish may rely on. However, impacts from vessel noise would be intermittent, temporary, and localized, and such responses would not be expected to compromise the general health or condition of individual fish.

A range of invertebrates (jellyfish, crustaceans, arrow worms, octopus, and squid) are reported to be sensitive to low-frequency (10–150 Hz) sound disturbances induced by sound waves or other sources (WADIR 2002). Seismic airgun shots have been reported to generate transient alarm responses such as tail-flicks (lobsters), and siphon closing (ascidians) (WADIR 2002). Mortality of giant squid in the Bay of Biscay may possibly have been linked to seismic airgun activity in the area (Guerra et al. 2004). McCauley et al. (2000) examined the effect of marine seismic surveys on captive squid and cuttlefish and reported a strong startle response or directed movement away from airguns during sudden, nearby start-ups at received levels of 174 dB (rms). Alarm responses in squid were also detected during gradual ramp-up of airguns once levels exceeded 156–161 dB (rms). The authors concluded squid significantly alter their behavior at an estimated distance of 2–5 km from an approaching large seismic source. These studies report reactions to sound levels above those from routine vessel traffic. Effects from vessel traffic on listed invertebrates are therefore considered insignificant.

4.3.4.4. Airborne Vessel Noise

To estimate airborne noise levels associated with vessel activities, BOEM provided a scenario developed for the Draft Environmental Impact Statement for Decommissioning (ANL 2022). It was conservatively estimated that one derrick barge and four cargo barge tugboats each with an engine-rated power (8,200 hp) at full capacity will operate simultaneously at Platform Harmony and noise sources are not enclosed. A composite sound power level would be about 144 dB (or 139 dBA) re 20 μPa (Wood 1992). When geometric spreading, air absorption, and ground effects are considered (ISO 1996), maximum distances for airborne exposures at or above the Level B harassment criteria, behavioral disruption for representative marine mammals and pinnipeds are estimated to extend no more than 60 m (197 ft) and 200 m (656 ft) from the source, respectively. Along the sea route of a single tugboat and barge, these distances would be reduced to 20 m (66 ft) and 100 m (328 ft), respectively. Other attenuation mechanisms that would be in effect (e.g., atmospheric absorption) and enclosures around the noise sources would further reduce noise levels.

The generation of vessel-related airborne sound during decommissioning activities would be louder than that of most ongoing production activities. These noise levels could be generated during maintenance projects or large platform support operations. This type of work would be temporary and thus would not result in any long-term increase in airborne noise levels on the POCSR. Normal airborne noise levels are lower. For example, on the drill floor during drilling, Melling (1975) quoted levels in the range 92–98 dB(A)[8]. More recently, HSE (1999) and Gardner (2003) reported similar results. Level B harassment zones would be smaller than estimated for decommissioning. Therefore, potential airborne noise impacts of routine O&G activities on marine mammals are anticipated to be minor, localized (a maximum distance 29 of 200 m (656 ft) from the platform and 100 m (328 ft) along the sea route of a single tugboat and barge), and temporary in nature.

4.3.4.5. Conclusion for Vessel Sound

BOEM expects that the O&G vessels will not substantially add to the local noise environment in their operating area due to the vessel size, propulsion, and other noise characteristics of typical support vessel machinery. The limited amount of project-related vessel traffic relative to existing vessel traffic in the Santa Barbara Channel area would contribute a negligible amount to the overall noise levels in the area. Therefore, vessel noise could result, at most, in a localized minor impact. Any contribution is likely small in the overall environment of regional ambient sound levels. A vessel’s transit past an individual animal will be brief and is not likely to impact any individual’s ability to feed, reproduce, or avoid predators. Brief interruptions in sheltering or communication via masking are possible, but unlikely given the ability of marine mammals and fish to move away from vessel disturbances and to quickly resume normal behaviors. Vessel noise related to ongoing O&G activity in the POCSR is **not likely to adversely affect** ESA-listed species.

5.0 ASSESSMENT O&G VESSEL USE: COLLISION HAZARDS

Two types of boats transport personnel and supplies to platforms: platform supply vessels and crew vessels. Platform supply vessels range in length from 160 to 330 ft (50 to 100 m) and provide logistic support and transportation of goods, tools, equipment, and personnel to and from offshore oil platforms and other offshore structures. Crew vessels are often 15 m (50 ft) in length and are capable of travel at speeds of 25 kn and ferry crew members to and from platforms (also described in Section 3.3). Vessel trips to each platform group occur almost daily, ranging from an estimated 26 roundtrips/mo (from the city of Goleta to Santa Ynez Unit platforms) to 134 roundtrips/mo (from Port of Los Angeles to Beta Unit platforms) (Table 7).

Support vessels for activities in the Santa Barbara Channel and Santa Maria Basin operate out of bases in the Santa Barbara Channel. Support vessels traveling to and from the four platforms in San Pedro Bay operate out of Long Beach. Support vessels for O&G operations in Southern California Planning Area, including both crew and supply boats, have averaged approximately

[8] dB(A) is a measure of the decibel level that has been frequency–weighted for human hearing.

16 trips per week per platform (Bornholdt and Lear 1995, 1997). However, actual vessel traffic in the region varies among units. The Point Arguello platforms average as few as six supply trips per month, while crew and supply boat trips in the eastern Santa Barbara Channel are more frequent. The Southern California Planning Area contains large ports and marinas that support numerous and diverse vessels.

Table 7. Estimated numbers of operator vessel trips per month to groups of platforms.

Platforms or groups of platforms visited	Departure location from shore	Estimated # trips per month
Heritage, Hondo, Harmony (Santa Ynez Unit)	Goleta	26
A, B, C, Hillhouse, Habitat, Henry	Santa Barbara	87
A, B, C, Hillhouse, Habitat, Henry	Port Hueneme	30
Gina, Gilda	Port Hueneme	87
Hogan, Houchin	Carpinteria	43
Gail, Grace	Carpinteria	43
Edith, Ellen, Elly (Beta Unit)	Port of Los Angles	134

Some risk of a vessel strike exists for all vessels in the U.S. West Coast waters. Seventy-four percent of blue whale, 82 percent of humpback whale, and 65 percent of fin whale known vessel strike mortalities have occurred in the shipping lanes associated with the ports of San Francisco and Los Angeles/Long Beach, according to modeling estimates (Rockwood et al. 2017). However, the O&G industry contributes a small fraction to the total vessel traffic in the area (Fig. 6), and there have been no known vessel strikes from O&G vessels in the decades of operations.

Vessel collisions represent a key hazard to marine mammals (Byrnes and Dunn 2020), especially to large, shallow-diving whales. Marine mammals are more likely to be struck by a vessel that is large (i.e., 80 m [262.5 ft] 34 or longer) or traveling at high speed (Laist et al. 2001; Hazel et al. 2007; Vanderlaan and Taggart 2009; Conn and Silber 2013). Larger whale species (e.g., sperm whales and gray whales) are most frequently involved in vessel collisions, (Dolman et al. 2006). While collisions with smaller species have also been reported (Van Waerebeek et al. 2007), these species tend to be more agile swimmers and more capable of avoiding collisions with oncoming vessels. There have been very few documented support-vessel strikes with pinnipeds, and no known strikes of marine mammals by support vessels serving the Southern California Planning Area platforms (AEG 2005).

Sea turtle collisions with vessels are not well-documented (CSA Ocean Sciences Inc. 2021), but observations of stranded sea turtles in Florida show evidence that vessel strikes do occur (Foley et al. 2019). The potential for vessel collisions can be affected by vessel speed, which can also influence both the severity of a collision and the type and success of avoidance responses undertaken by the sea turtle (Byrnes and Dunn 2020). Hazel et al. (2007) conducted a field experiment to evaluate behavioral responses of green sea turtles (*Chelonia mydas*) to a research vessel approaching at slow, moderate, or fast speeds (4, 11, and 19 km/hr [2.5, 6.8, and 11.8 mph], respectively). The proportion of turtles that fled to avoid the vessel decreased significantly as vessel speed increased, and turtles that fled from moderate and fast approaches did so at significantly shorter distances from the vessel than turtles that fled from slow approaches. This implies sea turtles may not be able to avoid being struck by a vessel exceeding a speed of 4 km/hr (2.5 mph). Slower speeds would reduce the risk of vessel strike to sea turtles (Hazel et al. 2007).

The risk of collisions is reduced through O&G industry use of established travel corridors. O&G vessels will generally transit to the work location and remain in the area until work is complete, which would lower the potential for vessel strikes. The Santa Barbara Channel/Santa Maria Basin Oil Service Vessel Traffic Corridor Program is intended to minimize interactions between O&G operations and commercial fishing operations as well as reduce potential for wildlife strikes (e.g., migrating gray whales). It was developed cooperatively by the two industries through the Joint Oil/Fisheries Liaison Office. In addition to providing transit corridors in and out of area ports, the program routes support traffic along the channel seaward of an outer boundary line. East of Gaviota, the outer boundary is defined by the 30-fathom line; west of Gaviota, and north of Point Conception as far as Pedernales Point, it follows the 50-fathom line. In the area west of Gaviota, the 50-fathom line is 4 km (2 nm) or more offshore.

All project related crews are provided the approved OCS operations training program which includes information regarding marine mammal species present in the area. The Port of Long Beach, Draft Master Plan Air Emission Inventory (POLB 2019) states that 7,000 vessel transits occur annually amounting to 19 transits per day. The number of vessel trips for ongoing operations compared to overall vessel transits in the area, as well as the fact that there have been no reports of vessel strikes of large whales, Guadalupe fur seals, or sea turtles related to offshore O&G operations over the last 30+ years, suggests that the likelihood that these species would be struck as a result of vessel activity associated with ongoing operations is extremely low, and discountable (NMFS 2020).

BOEM and BSEE have worked with NMFS implementing protective measures, including conditions for vessel restriction, on project-specific approvals (NMFS 2020). As discussed in section 3.4.3 above, we are adopting vessel speed restrictions and PSOs as part of the proposed action of conductor removals. As ongoing O&G operations will employ a relatively low number of work vessels and barges traveling along a limited number of routes between ports and the platforms, no additional protective measures are needed because the risk of a strike is expected to be low. Vessels for O&G operations are **not likely to adversely affect** ESA-listed species.

6.0 ASSESSMENT OF AUTHORIZED DISCHARGE OF LIQUID WASTE PRODUCTS

Produced water discharges from offshore O&G development activities, including discharges that may contain well stimulation treatment chemicals, may affect listed species through direct contact or ingestion of contaminated food. The Bureaus prepared an environmental assessment of the occasional use of well stimulation treatments in the Pacific Region, and we incorporate that analysis by reference (ANL 2016).

The Clean Water Act (CWA) protects water resources in the United States. Section 402 of the CWA authorizes the EPA to issue NPDES permits to regulate the discharges of pollutants to waters of the United States, the territorial sea, contiguous zone, and ocean. Discharges are regulated to maintain levels that will not cause exceedance of water quality criteria established under the CWA (EPA 1976) as updated in 2003, based on revised EPA guidance (EPA 2002).

EPA regulates discharges from offshore O&G exploration, development, and production facilities in Federal waters off the southern California coast under an NPDES General Permit (EPA 2013a, 2013b). The General Permit issued by EPA regulates 22 identified discharges from O&G facilities, including drilling fluids and cuttings, produced water, well treatment, completion, and workover fluids, deck drainage, domestic and sanitary wastes, and miscellaneous routine discharges. The General Permit sets forth effluent limitations and monitoring and reporting requirements, including pollutant monitoring and toxicity testing of effluents. The point of compliance for effluents is the edge of the mixing zone, which extends laterally 100 m (328 ft) in all directions from the discharge point and vertically from the ocean surface to the seabed. Calculated concentrations of the constituents must meet the permit limits at the edge of the mixing zone, after accounting for dilution. The permit covers all 23 platforms (22 production and one processing) in the Southern California Planning Area. All ocean discharges are tracked through quarterly discharge monitoring reports required by the NPDES permits (Kaplan et al. 2010). The General Permit does not apply to vessels supporting platform operations or pipeline maintenance or installation.

Other discharges are regulated by the U.S. Coast Guard (USCG) or State of California. The USCG regulates vessel discharges, and the State of California regulates ocean discharges into State waters. State waters extend to 3 nautical miles from the coast, as identified in the California Ocean Plan, first issued in 1972 (California EPA 2012). This plan includes effluent limitations for 84 pollutants, which apply to any facility which discharges into State waters (Aspen Environmental Group 2005). Oil platforms in State waters do not discharge into the ocean.

Volumes of drill cuttings and muds reflect the level of well drilling in a given year and a declining trend overall. Steinberger et al. (2004) reviewed NPDES discharge monitoring reports for the platforms operating in POCSR waters to quantify discharges to the Southern California Bight. Lyon and Stein (2010) performed a similar review of platform discharges for 2005. presents a comparison of major discharges by platform group for 1996, 2000, and 2005 drawn from these two studies, the most recent available compilations of such data.

From drilling operations, POCSR oil platforms discharged 12,127 metric tons in 1996, 2,956 in 2000, and 2,314 metric tons in 2005 of drill cuttings. Drilling mud discharge volumes followed a similar pattern. In 1996, platform operators drilled 31 new wells on the POCSR, but only 13 new wells in 2000. Platforms discharging drilling fluids and cuttings dropped from six in 2000 to 4 in 2005 (Lyon and Stein 2010). As of December 31, 2022, lessees have drilled a total of 370 exploration wells and 1,266 development wells, or 1,636 wells in all, on the POCSR. Based on data from 1996, 2000, and 2005, the vast majority of drilling waste discharges in the selected years occurred in the Santa Barbara Basin where the majority of platforms lie (Table 8).

Operators treat produced water to separate oil and other impurities prior to discharge under the NPDES permit or reinjection below the seafloor. Treatment methods include the use of heat, corrugated plate coalescers, electrostatic precipitation, bubbling, and chemical treatment. After treatment, the remaining produced water is mostly brine, but may include trace metals and dissolved hydrocarbons, including benzene, toluene, ethylbenzene, and xylene. Dissolved metals may include arsenic, barium, chromium, cadmium, copper, zinc, mercury, lead, and nickel.

Inorganic constituents may include cyanides and sulfides (Kaplan et al. 2010). Table 8 lists "end of the pipe" concentrations of chemical constituents measured in produced water samples (MRS 2005).

In general, high dilution rates of discharged fluids and the very limited time individuals of ESA-listed species may spend near a platform minimize potential direct exposure effects (BSEE/BOEM 2016). Field studies have shown that the concentrations of trace metals and hydrocarbons in the tissues of fishes around production platforms are within background levels (CSA 1997). Acute or chronic effects of produced water discharges on benthic organisms and fish species have not been observed and are not expected to affect the available prey base for ESA-listed marine mammals or sea turtles.

Table 8. Comparison of major platform discharges for years 1996, 2000, and 2005. Data for 1996 and 2000 from Steinberger et al. (2004); data for 2005 from Lyon and Stein (2010).

Discharge Type and Year	Discharge Volume (in millons of liters; L x 10^6)			
	Santa Maria Basin (4 Platforms)	Santa Barbara Channel Basin (15 Platforms)	San Pedro Bay Basin (4 Platforms)	Totals for all Basin (23 Platforms)
Produced Water				
1996	1,689	3,638	47.0	5,374
2000	1,092	4,512	9.4	5,613
2005	4,264	5,153	30.7	9,448
Drilling Muds				
1996	2.10	45.10	6.9	54.1
2000	1.81	8.85	-	10.7
2005	2.43	4.59	-	7.0
Drill Cuttings (in Metric Tons)				
1996	114	10,466	1,547	12,127
2000	250	2,706	-	2,956
2005	475	1,839	-	2,314
Cooling Water				
1996	399	39,560	6,092	46,051
2000	-	34,272	4,778	39,050
2005	21,442	37,697	367	59,506

Offshore O&G operations in the POCSR contribute relatively less pollution, but relatively higher amounts of hydrocarbons than do the other anthropogenic sources (Lyon and Stein 2010). Other discharge sources include publicly owned treatment works, stormwater runoff, shipping, and natural oil seeps. The four largest treatment facilities each discharge over 100 million gallons per day (Lyon and Sutula 2011). Three of the large facilities are in Los Angeles and Orange Counties near the San Pedro Bay Basin platforms. The fourth large facility serves the city of San Diego.

Untreated stormwater runoff from the watersheds into the Southern California Bight represents a large non-point source of pollutant and nutrient loads. Noble et al. (2003) found that 58% of the shoreline failed to water quality standards during wet weather, typically from late fall to early spring. Ackerman and Schiff (2003) compared stormwater runoff and public treatment emissions and found somewhat comparable contributions of heavy metals. The nutrient contributions differed, with stormwater contributing about 1% of the ammonia of treatment facilities, but an order of magnitude more nitrate. Lyon and Sutula (2011) found that regional stormwater runoff loads of suspended solids, nitrate-N, cadmium, chromium, copper, lead, mercury, zinc, and total DDT (a pesticide) estimated earlier by Ackerman and Schiff (2003) exceeded the levels discharged by large publicly-owned treatment works in 2009.

Other minor sources of chemical releases to coastal waters are related to shipping. These include lubricating and hydraulic fluids from ocean vessel machinery, small releases of antifouling paint, interior paint, and exterior paint from vessels. Discharges of kitchen and septic wastes potentially contain treatment chemicals, soaps, solvents, pathogens, and nutrients and most likely represent a negligible to minimal contribution to contamination of water quality in the POCSR (Kaplan et al. 2010).

The largest contributors of hydrocarbons to offshore waters, however, are the naturally occurring oil seeps within the northwestern Santa Barbara Channel near Point Conception. Southerly winds and currents can carry hydrocarbons from seeps northward into the Santa Maria Basin (Lorenson et al. 2011). These seeps often produce localized, visible sheens on the water and lead to the production of tar balls commonly found on beaches after weathering and oxidation of oil (Hostettler et al. 2004; Farwell et al. 2009). For most of the central California coast there are no O&G facilities. Platform Irene, located just northwest of Point Arguello, is the northernmost platform on the POCSR. There are no marine terminals or other major source of marine pollution in the Santa Maria Basin region, resulting in generally good water quality in this region (MMS 2005).

The regulation of discharges of harmful substances from O&G operations in the POCSR make effects to ESA-listed species and critical habitats unlikely. The EPA’s NPDES permits are subject to the requirements of the ESA and are prohibited from jeopardizing the continued existence of an ESA-listed species or the adverse modification of critical habitat. The reinjection of drilling fluids, limited quantity of releases, application of mixing zone monitoring requirements, and dilution by natural ocean currents reduce the concentrations of contaminants. Discharges related to O&G operations are **not likely to adversely affect** ESA-listed species.

7.0 ASSESSMENT OF OIL SPILL RISK AND IMPACTS

The first half of this section covers leak detection systems for pipelines, pipeline inspections, and structure inspections. This portion of the analysis is intended, in part, to describe those circumstances which address the potential of increased risk associated with aging infrastructure. The second half focuses on oil spills. Appendix A has further details on oil spill risk assessment and a table listing oil spills in the POCSR since 1963 (Appendix, Table A-1).

7.1. PIPELINE LEAK DETECTION SYSTEM

A leak detection system is required on all oil pipelines in the Pacific Outer Continental Shelf Region (POCSR). The authority for the requirement is based on 30 CFR 250.1004(b)(5). The system consists of equipment at both the production end of the pipeline (the offshore platform) and at the onshore delivery point. The system uses instrumentation to compare the volume of material sent from the platform to the volume of material received onshore. If there is no difference in the two volumes, that indicates that there is no leak.

Note that a leak detection system does not prevent a leak from occurring; but it plays a crucial role in limiting the impact of a leak. The system is required to include an alarm so that operators are notified when there is a discrepancy between the input and output volumes. The system is also required to have adequate sensitivity to detect variations between the input and output volumes. In lieu of the foregoing system description, the BSEE can approve an alternate method of a system capable of detecting leaks in the pipeline. Prior to a leak detection system's installation, a BSEE engineer reviews the system. The engineer is also notified at least 72 hours prior to the system's initial testing to allow BSEE the opportunity to witness the test.

7.2. PIPELINE INTERNAL INSPECTIONS

Permittees of pipelines are required to perform internal inspections in alternating years by a third party, within an interval not to exceed 13 months. Inspection plans must be submitted to BSEE for review a minimum of 30 days before the surveys are conducted. The survey results must be received by BSEE within 60 days after inspection completion. The internal surveys are done to identify corrosion and/or damage using methods approved by BSEE. BSEE reviews the inspection results for indications of characteristic "red flags" that would shut in a pipeline, i.e., wall loss of 80% or greater (ASME B 31G); dents over 6% or with a gouge, stress riser, or corrosion; or dents over 2% at girth or seam welds (ASME B 31.3 and 31.8). If a pipeline has a wall loss in the 70–79% range or a significant increase of wall loss from the prior internal inspection, BSEE will consider a verification inspection. If the inspection indicates that the pipeline does not provide safe and pollution-free transportation of fluids, the pipeline will be shut in.

7.3. PIPELINE EXTERNAL INSPECTIONS

Permittees of pipelines are required to perform external inspections in alternating years by a third party, within an interval not to exceed 13 months. Inspection plans must be submitted to BSEE for review a minimum of 30 days before the surveys are conducted. The survey results must be received by BSEE within 60 days after inspection completion. External inspections are to be conducted by a remotely operated vehicle (ROV) with video and sonar, a high- or ultra-high resolution side scan sonar, or another method approved by BSEE. Inspection points include pipeline risers and riser clamps; any grout bags, spans, debris or other object which might constitute a pipeline safety concern or hazard to commercial fishermen or other users; identification of any weight or other coating damage; identification of third-party damage, such as anchor scars; observations of rectifiers and anodes; and visual inspection of the splash zone.

7.4. STRUCTURE INSPECTIONS

Title 30 CFR Part 250 Subpart I contains requirements for the maintenance, inspection, and assessment of platforms and related structures on the OCS. Lessees and operators must ensure the structural integrity of all platforms and related structures on the OCS for the safe conduct of drilling, workover, and production operations.

Lessees and operators must implement a comprehensive in-service inspection plan for all OCS platforms and structures. They must submit an inspection report to BSEE annually. The report must include:

(1) A list of fixed and floating platforms inspected in the preceding 12 months,
(2) The extent and area of inspection for both the above-water and underwater portions of the platform and the pertinent components of the mooring system for floating platforms,
(3) The type of inspection employed (e.g., visual, magnetic particle, ultrasonic testing),
(4) The overall structural condition of each platform, including a corrosion protection evaluation,
(5) A summary of the inspection results indicating what repairs, if any, were needed.

During platform visits, BSEE inspectors visually inspect platforms and the pipelines and conductors that descend from them for structure issues. BSEE inspectors also respond to accidents and other hazardous incidents that are reported by the lessee/operator.

7.5. OIL SPILL RISK ASSESSMENT

For the purposes of this Biological Assessment, BOEM does not consider oil spills to be a *direct* effect of the action, given they are neither authorized nor intended to occur. BOEM does, however, concur that certain smaller oil spills (50 bbl or less) could be an *indirect* effect of the action, as defined under ESA regulations, given they are caused by the proposed action and are later in time, but still are reasonably certain to occur. This Biological Assessment therefore provides scenario and other information related to smaller accidental oil spills in Appendix A.

In the case of low-probability catastrophic spills, such as the 2010 Deepwater Horizon blowout and oil spill in the Gulf of Mexico, BOEM does not consider this category of spill to be an effect of the action, as defined under the ESA implementing regulations at 50 CFR § 402.02, given (1) it is not an anticipated result of the proposed action and (2) it is not reasonably certain to occur, since POCSR fields are mature and the majority of reservoirs have low to no pressure and require artificial lift to access the oil.

In normal, day-to-day platform operations, accidental discharges of hydrocarbons may occur. Such accidents are typically limited to discharges of quantities of less than one barrel (bbl) of crude oil. From 1963 to 2022, 1,451 oil spills were recorded. The total volume of oil spilled in the Pacific Region is dominated by the 1969 Santa Barbara Spill (80,900 bbl) which occurred soon after production began. During 1970–2022, there were 1,449 oil spills with an average volume of 1 bbl/spill and a total volume of 1,508 bbl, which represents less than 2% of the volume spilled in 1969.

The largest spill during 1970–2022 was the 588 bbl Beta Unit spill (“Huntington Beach” spill) in October 2021 from Amplify Energy Corporation’s San Pedro pipeline P00547 (Appendix, Table A-1). In a settlement agreement (Case No. 8:21-cv-01628-DOC-JDE, Document 476-4, U.S. District Court for the Central District of California, 2022), the corporate defendants asserted that the spill was a result of severe damage to pipeline P00547 from two container ships that repeatedly dragged their anchors across it. Without accepting responsibility, the shipping companies agreed to contribute funds to the remediation process.

The next 6 largest spills were (in descending order of size; Appendix, Table A-1): 164 bbl in 1997 due to a pipeline break in the flange metal in State waters due to welding flaws; 150 bbl in 1996 due to equipment failure and error allowing emulsion to flow through flare boom; 101 bbl in 1990 from mineral oil mud released due to incorrectly positioned standpipe and closed valves; 50 bbl in 1994 due to process upset resulting in overflow of oil/water emulsion from tanks into disposal tube; and 50 bbl in 1991 after a pipeline riser ruptured when snagged by grappling hook used by workboat to retrieve a lost anchor. The source of oil spilled in 2012 (35.78 bbl; Appendix, Table A-1) was primarily from Platform Houchin caused by a burst plate (35 bbl, per USCG).

BSEE oil spill reporting requirements, along with development of more stringent regulations, implementation of rigorous inspection programs, imposition of civil and criminal penalties, and changes in equipment and procedures have all contributed to a safer work environment. Most recently, BSEE has promulgated regulations that require offshore operators to develop safety and environmental management systems which are intended to foster a corporate culture of environmentally responsible and safe working conditions.

The current knowledge of the geology and understanding of reservoir characteristics in the Southern California Planning Area is well advanced. Drilling techniques and equipment have improved and drilling into these mature fields is generally considered to be low risk. The Southern California Planning Area has experienced significant changes in the status of the O&G fields being developed and produced. Reservoir pressures have dropped to near zero in the majority of the fields now in production. In these cases, secondary[9] or tertiary[10] recovery methods are being used to force oil to the surface. The risk of a loss of well control (a blowout) resulting in a spill is exceedingly small under these conditions.

BOEM calculated oil spill rates for the Pacific Region using oil spill data (1963–2022) and cumulative production from the Pacific Region (Appendix, Table A-2). BOEM estimated the number of oil spills and the probability of one or more spills that could occur as a result of ongoing activities in the Southern California Planning Area in the “50 to 1,000 bbl” size range using Pacific Region oil spill rates. Oil spill occurrence is calculated as a function of the total amount of oil that could be economically produced in the Southern California Planning Area. The probability is based on the exposure to oil. There is 0.226 Bbbl of oil remaining that could be economically produced (exposed to a potential oil spill). BOEM estimates, in the “50 to 1,000 bbl” size range, there will be 1 spill with a 63% probability of occurrence (Appendix, Table A-2).

For comparison, BOEM calculated oil spill probabilities using oil spill rates derived from all U.S. OCS operations (1996–2010) and the total amount of oil that could be economically produced in the Southern California Planning Area (Anderson et al. 2012). Using spill rates based on all U.S. OCS Operations (1996–2010), the probability of one or more spills occurring in the Pacific Region for the “50 to 1,000 bbl” size range is 95% (Appendix, Table A-2). The lower probability (63%) of spills in the “50 to 1,000 bbl” size range using POCSR oil spill data is reflective of the lower number of oil spills throughout POCSR production history. Using spill rates based on all U.S. OCS operations (1996–2010), the probability of one or more spills occurring in the greater than 1,000 bbl size range is 7% (Appendix, Table A-2). This is a conservative estimate based on overall U.S. OCS operations. For the greater than 1,000 bbl size

[9] Secondary refers to the reinjection of water or gas produced from the reservoir in order to push oil to the surface.

[10] Tertiary refers to the addition of chemicals designed to increase oil flow within a well.

range, BOEM did not calculate oil spill rates with only POCSR data due to the limited dataset (2 spills > 1,000 bbl occurred in 1969). A spill of this size would be an unlikely event in the POCSR, because the majority of reservoirs have low to no pressure now due to the maturity of the oil fields.

Taking into account these factors, the overall risk of an oil spill occurring has declined over time in the Southern California Planning Area. Oil production has continued over the decades, so there is now less oil to be produced and therefore less oil that could be accidentally spilled. However, other factors such as human error or equipment failure can play a role in risk of an oil spill and small spills are expected to continue as long as oil is being produced.

Oil spill probability estimates are conservative given POCSR's:

- oil spill history,
- long established drilling program, including inspections and required maintenance,
- production from mature fields with lower pressure,
- no floating drilling rigs,
- no new platforms being installed, and
- no oil is transported via vessels.

7.6. OIL SPILL TRAJECTORY ANALYSIS

Oil spill trajectory modeling was conducted to determine the movement and fate of spilled oil if a spill occurred in the Southern California Planning Area from existing offshore O&G operations. BOEM collaborated with the National Oceanic & Atmospheric Administration (NOAA) Office of Response & Restoration to create a Trajectory Analysis Planner (TAP) for the Southern California Planning Area. A regional TAP involves the development of a database created by analyzing statistics from a large number of simulated spill trajectories. These trajectories were run using the General NOAA Operational Modeling Environment (GNOME) with forcing from a high-resolution (1 km) Regional Ocean Modeling System (ROMS, Shchepetkin and McWilliams 2005) hindcast. This extensive model output allows modeling of realistic oil spill scenarios over a range of different regional oceanographic regimes (such as upwelling, relaxation, and eddy-driven flow). Modeled spills were started at the locations of the 23 Federal offshore O&G platforms in southern California and four pipeline locations, where oil is brought to shore, and represent the geographic range of the Southern California Planning Area. A maximum hypothetical spill of 1,000 bbl was simulated from each location using a spill rate of 200 bbl per day for 5 days. These numbers are conservative. It is highly unlikely that 200 bbl per day could spill from existing facilities over a 5-day period. Hypothetically spilling this large volume within the modeling environment allows analysts to better visualize where oil may travel if a spill were to occur. The visualizations of the modeled spills can be accessed online through the web-based TAP viewer (https://tap.orr.noaa.gov/#locations/south-california/impact_analysis).

7.7. OIL SPILL RESPONSE

BSEE regulations at 30 CFR Part 254 require that each OCS facility have a comprehensive Oil Spill Response Plan (OSRP). These plans are not subject to Federal approval and thus not included as part of this consultation (Alaska Wilderness League v. Jewell, 788 F.3d 1212, 1224-

25; 9th Cir. 2015). Response plans consist of an emergency response action plan and supporting information that includes an equipment inventory, contractual agreements with subcontractors and oil spill response cooperatives, worst-case discharge scenario, dispersant use plan, in-situ burning plan and details on training and drills. The Coast Guard is the lead response agency for oil spills in the coastal zone and coordinate the response using a Unified Command (UC), consisting of the affected state and the Responsible Party (i.e., the company responsible for spilling the oil) in implementing the Incident Command System (ICS) if an oil spill occurs. Oil spill drills, either agency-lead or self-lead by a company, also use the UC/ICS. California's Office of Spill Prevention and Response (OSPR) assumes the role of the State on-scene coordinator and plays a significant role in managing wildlife operations in the Southern California Planning Area as the State's Natural Resource Agency.

BSEE requires companies that operate in the OCS to have the means to respond to a worst-case discharge from their facilities. Companies meet this requirement by becoming members of Oil Spill Removal Organizations (OSRO).

The Marine Spill Response Corporation (MSRC) is the U.S. Coast Guard-classified OSRO based in Long Beach (www.msrc.org). MSRC is a nation-wide OSRO with multiple responder-class oil spill response vessels and oil spill response barges. They are also equipped to respond to an oil spill 24 hours a day.

MSRC is equipped and prepared to respond to oil spill threats to sensitive shoreline areas through the detailed and up-to-date information on sensitive areas and response strategies from the Los Angeles/Long Beach Area Contingency Plan (https://www.wildlife.ca.gov/OSPR/Preparedness/LA-LB-Spill-Contingency-Plan) and the California OSPR (https://www.wildlife.ca.gov/OSPR).

7.8. FATE AND EFFECTS OF OIL

When an oil spill occurs, many factors determine whether that oil spill will cause significant, long lasting biological effects; comparatively little damage or no damage; or some intermediate degree of effect. Among these factors are the type, rate, and volume of oil spilled, geographic location, and the weather and oceanographic and meteorological conditions at the time of the spill. These parameters determine the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and a measure of the toxicity of the oil. Additionally, the level of oil spill preparedness, rapidity of response, and the cleanup methods used can also greatly influence the overall impact levels of an oil spill.

In the event of an accidental oil spill, a slick forms and part of the slick begins evaporating while the action of breaking waves forms oil droplets that are dispersed into the water column. Oil in the Southern California Planning Area ranges from very heavy (API 12) to very light (API 39). Light oil has a rapid evaporation rate and is soluble in water. Light crude oils can lose up to 75% of their initial volume within a few days of a spill (NRC 2003). In contrast, heavy oil (API < 22) has a negligible evaporation rate and solubility in water.

Depending on the weight of the oil spilled and the environmental conditions (i.e., sea state) at the time of a spill, six to 60% of oil during an oil spill would sink and be in the water column or on the seafloor in the vicinity of the spill. This is supported by a recent study of natural oil seeps at Coal Oil Point in the Santa Barbara Channel that range in depth from six to 67 meters offshore of Goleta, California (Leifer et al. 2006) and are assumed to release 100 bbl/day (Farwell et al. 2009). The distribution of heavy oil in a surface slick in the Santa Barbara Channel is primarily influenced by surface currents and falls out of the slick over a period of 0.4 to 5 days (Leifer et al. 2006).

A 1,000-bbl spill could oil several kilometers of coastline. The likely result would be patches of light to heavy tarring of the intertidal zone resulting in localized effects to contacted biological communities. The recovery time for these communities would depend on the environment. Within several months, natural processes will remove the oil from the rocks and beaches in these high energy rocky coasts, while low energy lagoons and soft-sediment embayments can retain stranded oil residue for several years.

Oil in the marine environment can, in sufficient concentrations, cause adverse impacts to fishes NRC 1985). The effects can range from direct mortality to sublethal effects that inhibit growth, longevity, and reproduction. Benthic macrofaunal communities can be heavily affected, as well as intertidal communities that provide food and cover for fishes.

The Santa Barbara Channel contains some of the most active oil seeps in the world and may contribute 20,000 metric tons (173,200 bbl) of crude oil into the marine environment per year (Kvenolden and Cooper 2003; Henkel et al. 2014).

The field observations of oil spill effects on the marine environment are taken mostly from very large oil spills that have occurred throughout the world over the past three decades. This Biological Assessment assumes the very unlikely scenario of one large spill of 1,000 bbl occurring as a result of the proposed action. In perspective, the *Exxon Valdez* spilled about 36,600 metric tons (~270,000 bbl) of crude oil into Prince William Sound in 1989, and the *Sea Empress* released 73,000 metric tons (~540,000 bbl) of crude oil off southwest Wales in 1996. The *American Trader* spilled about 416,000 gallons (~10,000 bbl) of crude oil offshore Huntington Beach, California in 1990.

8.0 ASSESSMENT OF INDIVIDUAL SPECIES: STATUS, CRITICAL HABITAT, EFFECTS, AND DETERMINATIONS

In this section, BOEM considers the status of NMFS ESA-listed species and potential effects on those species of offshore O&G operations described in this BA.

8.1. BLUE WHALE (*BALAENOPTERA MUSCULUS*)

The blue whale was listed as a federally endangered species on June 2, 1970 [35 FR 8495]. Critical habitat has not been designated for this species. The blue whale recovery plan was finalized in 1998 (NMFS 1998). The primary reason for listing was a severe worldwide population decline due to intensive commercial whaling. The current population worldwide remains uncertain but has been estimated at 5,000–15,000 mature individuals and 10,000–25,000 total (Cooke 2018). The abundance of the eastern North Pacific population, which frequents the waters off California, has been estimated by Calambokidis and Barlow (2020). They estimated abundance at 1,898 (CV = 0.085) based on updated photographic data from 2015–2018. The abundance of eastern North Pacific blue whales along the California coast apparently increased between 1994 and 2013, but a formal trend analysis has not been conducted. This period coincides with evidence for a northward shift in blue whale distribution. Barlow (2016) documented increasing numbers of blue whales found in Oregon and Washington during 1996 to 2014 line-transect surveys, and Bailey et al. (2009) found increasing occurrence of blue whale satellite tracks in Gulf of Alaska and Canadian waters between 1994 and 2007.

Blue whales from the eastern North Pacific stock have been documented in the eastern tropical Pacific, near the Costa Rica Dome in winter, and near the Queen Charlotte Islands of northern Canada and the Gulf of Alaska in winter. Approximately 16,438 km^2 of California waters have been identified as Biologically Important Areas for feeding blue whales during southward migration (June through November) (Figure 7) (Calambokidis et al. 2015). Panels a and b show more detail for the areas where the Biologically Important Areas (BIAs) are located. The BIAs are (from north to south): (1) Pt. Arena to Fort Bragg, August - November; (2) Gulf of the Farallones, July -November (3) Monterey Bay to Pescadero, July-October (4) point Conception/Arguello, June-October: (5) Santa Barbara Channel and San Miguel, June-October; (6) Santa Monica Bay to Long Beach, June-October; (7) San Nicholas Island, June-October; (8) Tanner-Cortez Bank, June-October; and (9) San Diego, June-October.

Each year, approximately 670 whales are thought to occupy the U.S. Pacific West Coast. Estimated seasonal densities of blue whales are shown in Figure 7 (summer) and Figure 8 (winter/spring). Most of this stock is believed to continue migration southward to spend winter and spring in high productivity areas off Baja California and on the Costa Rica Dome (Carretta et al. 2022). Feeding hotspots and possible aggregation areas for blue whales occur at upwellings and areas where wind forces and concentrates colder, nutrient and plankton rich marine water to the surface (Ryan et al. 2022).

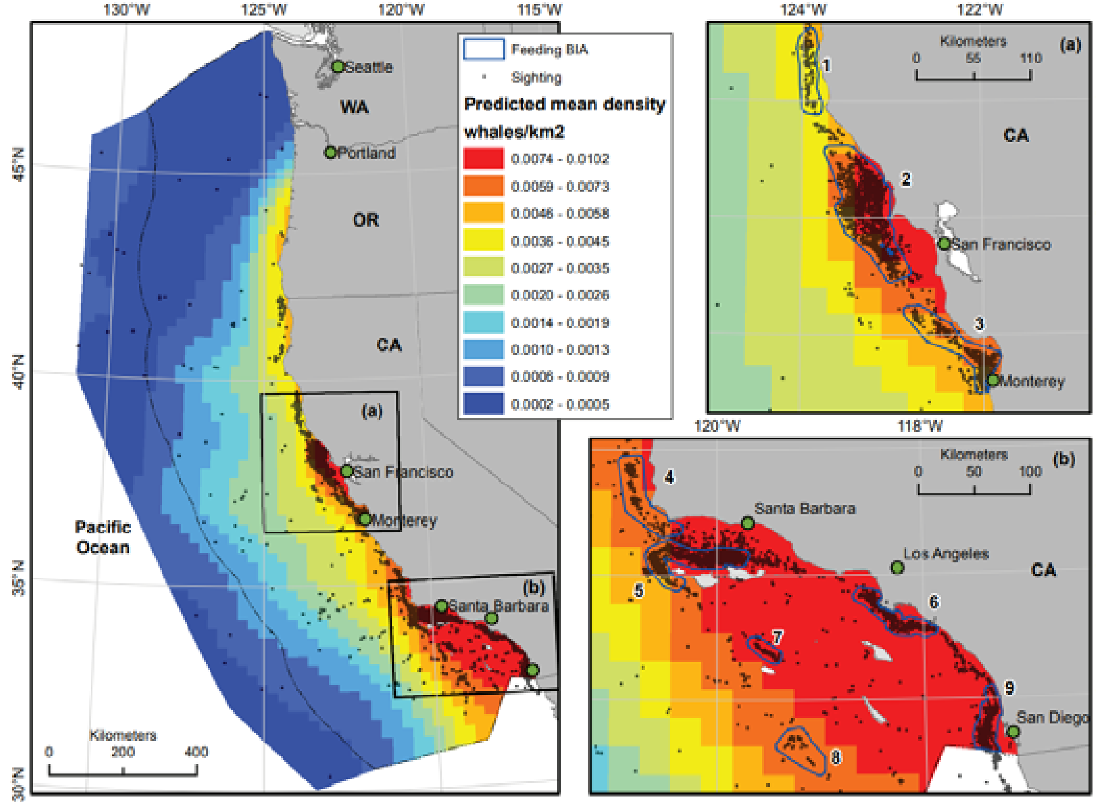

Figure 7. Nine blue whale Biologically Important Areas (BIAs; outlined in blue in panels a and b), overlaid with all sightings and predicted mean densities of blue whales from habitat-based density models generated from Southwest Fisheries Science Center ship surveys. Figure from Calambokidis et al. (2015).

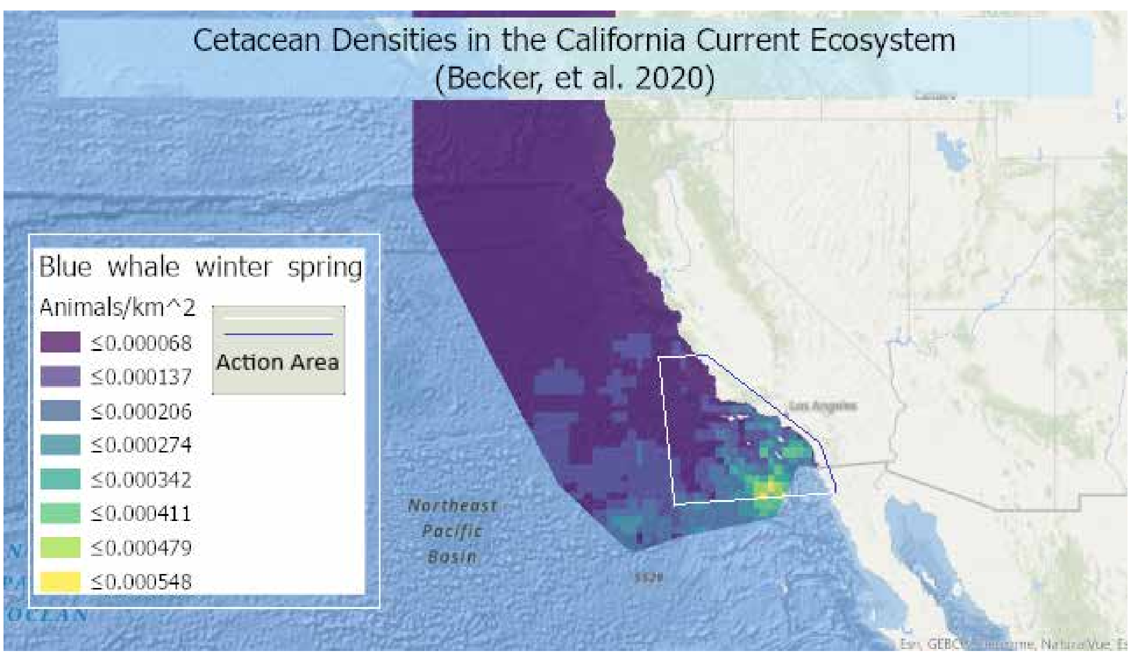

Figure 8. Blue whale spring and winter densities in the Action Area (white outline) (Beker et al. 2020; modified from https://cetsound.noaa.gov/cda).

The primary threats blue whales face are vessel strikes and entanglements in fishing gear (NMFS 1998). Four blue whale vessel strike deaths were observed during 2015–2019, resulting in 0.8 vessel strike deaths per year (Carretta et al. 2021). Since 2007, documented vessel strikes have totaled 14 blue whales and 7 unidentified whales (Carretta et al. 2013, 2021). To account for strikes that go undocumented or unreported, Becker et al. (2016) and Rockwood et al. (2017) modeled strike deaths based on cetacean habitat models generated from July-November line-transect surveys in the U.S. West Coast Exclusive Economic Zone (EEZ). They determined that vessel strike mortality is approximately 18 blue whales annually, which exceeds the estimated amount of human-caused mortality (3 individuals per year) that the population can tolerate without affecting its ability to reach or maintain its optimum sustainable population level (Redfern et al. 2013). Most observed blue whale vessel strikes have been in southern California or off San Francisco, California, where blue whales seasonally occur close to shipping ports (Berman-Kowalewski et al. 2010).

While it is possible for an O&G operator's vessel to strike a blue whale during the course of activities in the POCSR, it is not believed this is likely to occur. The O&G industry has been operating in the Action Area for many years, and there have been no incidents of blue whales being struck by O&G industry support vessels. Observations of blue whales along established vessel corridors between shore bases and offshore facilities are rare. Given the relatively sparse distribution of blue whales and the decadal history of no collisions, we consider the likelihood of vessel strikes to blue whales to be extremely unlikely and thus discountable. Therefore, we conclude that vessel strikes resulting from the proposed action may affect but are **not likely to adversely affect** blue whales.

The discharge of debris into the marine environment is a continuing threat to the status of species in the Action Area. Debris can originate from a variety of land-based or marine industries including fishing, oil and gas, and shipping. Many of the plastics discharged to the sea can withstand years of saltwater exposure without disintegrating or dissolving. Ingestion or entanglement can result in reduced feeding, reduced reproductive success, and potential injury, infection, or death. Entanglement in fishing gear and marine debris has occasionally been documented among blue whales on the U.S. West Coast. An annual entanglement rate of 1.54 blue whales per year was estimated from 2015–2019 based on observed blue whale entanglements (1.5/yr) and partial assignment of values from unidentified whale entanglements (0.04/yr) (Carretta et al. 2021). However, this rate may be higher as not all cases are detected and there is no correction factor to account for undetected events.

Marine debris is a recognized concern affecting the status of the species. However, the contributions of the O&G industry are minor compared to other industries. Large whale entanglement events most often involve fishing lines and nets. The O&G industry is subject to certain rules and regulations to reduce release of marine debris. These include USCG and EPA marine trash and debris regulations that limit discharges from vessels and require facilities operators to develop waste management plans, post informational placards, send trash to shore, and use special precautions such as covering outside trash bins to prevent accidental loss. Therefore, blue whales in the POCSR are **not likely to be adversely affected** by release of marine debris from continuing O&G activities.

All of BOEM's formal ESA consultations with NMFS included the blue whale. Consultations prior to 1986 concluded that blue whales were not likely to be affected by offshore O&G

activities. This was based in part on the observation that blue whales were traveling through the area and not staying for extended periods of time.

The seasonal increase in blue whale observations in southern California is concurrent with existing offshore oil gas operations suggesting that the sound produced from these facilities has not impeded use of the area. Consultations with NMFS in 2000 and 2008 (NMFS 2000, NMFS 2008a) concluded that "large whales, particularly blue and humpback whales, may be temporarily displaced from their foraging grounds due to the presence of oil spill response vessels and aircraft during oil spill cleanup." NMFS further concluded that "the chance of a spill is remote, thus making impacts discountable and that the effect of a spill, should one occur, is minor and that no take should occur, thus the impact on individuals is insignificant." BOEM evaluated whether this conclusion remains valid. There are no reported impacts to blue whales from the 2021 Beta pipeline spill of 588 bbl. (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). The potential for and effects of a 1,000-bbl spill was considered using the most current data on the blue whale population status, distribution, and habitat use, and the NOAA TAP model. BOEM considered these factors in light of activities in the Action Area that are ongoing or reasonably certain to occur. The chance of a spill is low and spill volume will likely be less than 1,000 bbl (based on historic spill volumes). We have therefore determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** the blue whale.

8.2. FIN WHALE (*BALAENOPTERA PHYSALUS*)

The fin whale was listed as a federally endangered species on June 2, 1970 [35 FR 8495]. Critical habitat has not been designated for this species. The most recent fin whale recovery plan was published in 2010 (NMFS 2010). The primary reason for listing was a severe worldwide population decline due to intensive commercial whaling. The minimum population estimate for the California/Oregon/Washington stock of fin whales was about 2,600 individuals (NMFS 2014b), but there is strong evidence that the population has increased since 1991 (Moore and Barlow 2011; Nadeem et al. 2016; Becker et al. 2020). The current best estimate of the total populations size for the California/Oregon/Washington stock is 8,127 (NMFS 2016a). NMFS (2019) provided evidence of population recovery and potential for delisting.

Past consultations with NMFS concluded that fin whales are found in areas of the Southern California Planning Area where oil and gas are being produced, but they occur there infrequently. Therefore, activities associated with offshore O&G production would not likely affect fin whales.

Fin whales are sighted in the Santa Barbara Channel, although they generally occur farther offshore and in waters south of the northern Channel Island chain (Leatherwood et al. 1987; Bonnell and Dailey 1993). There are no reported impacts to fin whales from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Given this species' relative rarity in areas of existing offshore O&G production, we have determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** fin whales. This determination is consistent with our most recent consultations with NMFS (NMFS 2000, 2008a).

8.3. HUMPBACK WHALE (*MEGAPTERA NOVANGLIAE*)

The humpback whale was listed as a federally endangered species on June 2, 1970 [35 FR 8495], and the humpback whale recovery plan was published in 1991 (NMFS 1991). The primary reason for listing was a severe worldwide population decline due to intensive commercial whaling. Like blue whales, humpback whales have increased in abundance over the last several decades with several hundred animals coming to forage in southern California each year (NMFS 2014b). Worldwide, humpback whale populations appear to be increasing, and in response, NMFS initiated a status review for the species in 2009 [74 FR 40568].

In 2016, NMFS identified 14 distinct population segments (DPS) for the humpback whale [81 FR 62260]. Each DPS's endangered species status was re-evaluated, and some segments were delisted. Humpback whales found in the Southern California Planning Area may be part of either the Mexico DPS (threatened) or the Central America DPS (endangered). In 2021, critical habitat was designated for the Mexico and Central America humpback whale DPSs (86 FR 21082). With respect to the Planning Area, the critical habitat includes the Santa Barbara Channel and Channel Islands north to the northern boundary of the Southern California Planning Area (Figure 9).

The seasonal increase in humpback whale abundance in southern California is concurrent with existing offshore oil gas operations, suggesting that these facilities have not impeded use of the area. Consultations with NMFS in 2000 and 2008 (NMFS 2000, 2008a) concluded that "large whales, particularly blue and humpback whales, may be temporarily displaced from their foraging grounds due to the presence of oil spill response vessels and aircraft during oil spill cleanup." Oil spill trajectory modeling conducted using TAP (Appendix A) indicates that a large spill (1,000 bbl) originating from certain POCSR platforms could result in contact with critical habitat for the humpback whale. However, a large spill is itself unlikely (estimate 7% probability of occurrence). Even if a spill did contact critical habitat, it is not anticipated that there would be a notable effect on the essential features of the critical habitat, namely the availability of prey. There are no reported impacts to humpback whales from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547).

The effects of O&G vessel activities in the POCSR are also insignificant. While some risk of a vessel strike exists for all the U.S. West Coast waters, the generally slow vessel speeds and avoidance and minimization measures reduce the risk to a discountable level. Humpback whales use low-frequency communication and could experience the masking effects from vessels that generate noise in overlapping frequencies. However, O&G vessels are a small component of the ubiquitous vessel noise occurring in the Action Area, and account for only a small contribution to the cumulative noise levels. BOSL (2022) reported frequent humpback whale sightings in the Santa Barbara Channel. BOEM has therefore determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** the humpback whale or critical habitat for the Mexico and Central America DPSs.

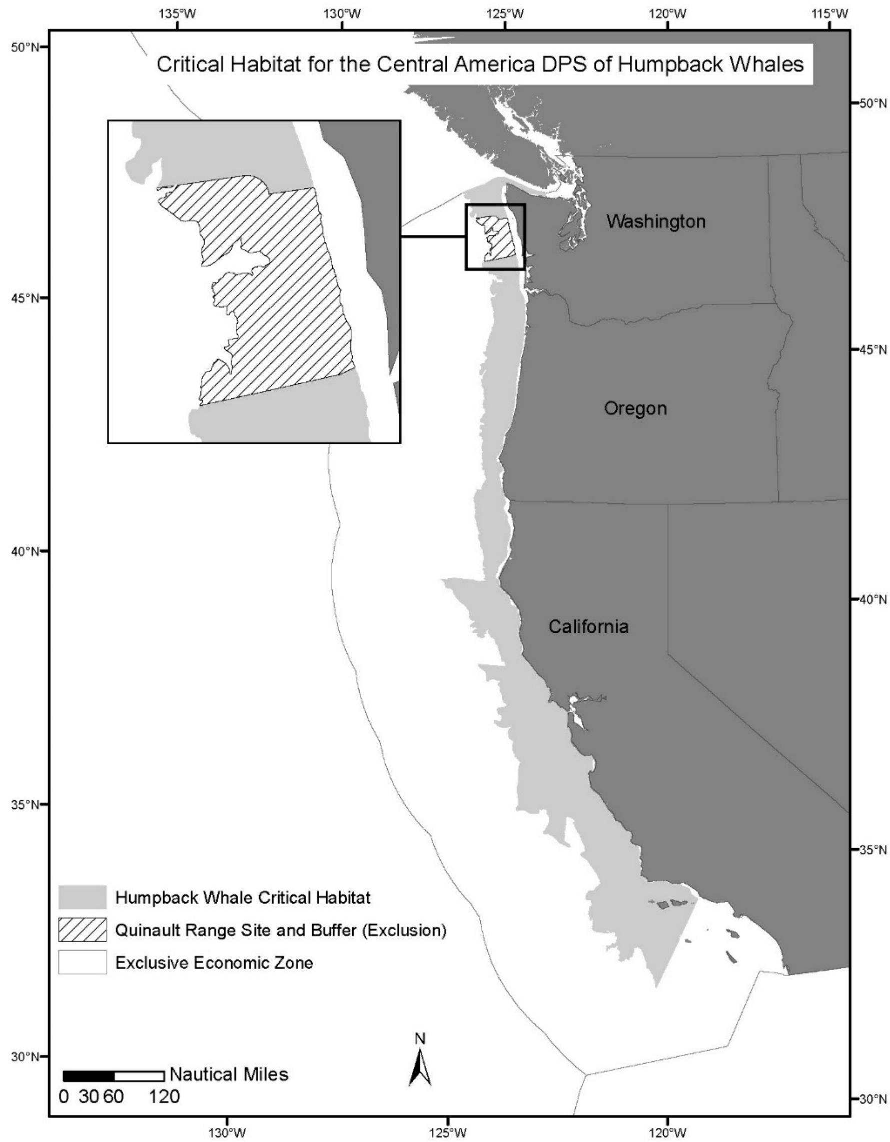

Figure 9. Critical habitat for the Central America DPS of humpback whales. Source: https://www.fisheries.noaa.gov/resource/map/humpback-whale-critical-habitat-maps-and-gis-data

8.4. NORTH PACIFIC RIGHT WHALE (*BALAENA JAPONICA*)

In 2008, NMFS reclassified the northern right whale as two separate endangered species—the North Pacific right whale and the North Atlantic right whale [73 FR 12024]. The North Pacific right whale (referred as *Eubalaena glacialis* in early opinions) was considered in all past NMFS biological opinions. These opinions concluded that although any significant biological effect to a few individual Pacific right whales could jeopardize the species, no historically important habitat existed off California, and Pacific right whales were never abundant off the West Coast. The North Pacific right whale continues to be one of the rarest species in the world with the majority of sightings occurring in the Bering Sea and adjacent areas of the Aleutian Islands (NMFS 2013a). Together the eastern and western populations likely number fewer than 1,000 individuals

NMFS (2017f). The eastern population of Pacific right whales is estimated to consist of approximately 30 individuals (NMFS 2014c; Muto et al. 2017).

In southern California in 2017, there were two sightings of North Pacific right whales (Price 2017): one off La Jolla in April and one by the Channel Islands in May. The images obtained for the La Jolla whale were not of good enough quality to match the animal. However, the whale seen off the Channel Islands has been positively identified as a previously unknown animal. Between February 2–14, 2015, there were also reports from the Channel Islands of two North Pacific right whales observed by a NMFS pinniped researcher at San Miguel Island. There are no reported impacts to North Pacific right whales from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Given the scarcity of this species in California, we have determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** the North Pacific right whale. This determination is consistent with our most recent consultations with NMFS (NMFS 2000, 2008a)

8.5. SEI WHALE (*BALAENOPTERA BOREALIS*)

The sei whale was considered in all past biological opinions prepared by NMFS. This species is rarely seen in the California Current (Barlow 2016). Only nine confirmed sightings of sei whales were made in California, Oregon, and Washington during extensive ship and aerial surveys conducted between 1991 and 2008 (NMFS 2014b). The best estimate of abundance for California, Oregon, and Washington waters is 519 (CV = 0.40) sei whales (Barlow 2016). There are no reported impacts to sei whales from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Given this species' relative scarcity in California, we have determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** the sei whale. This determination is consistent with our most recent consultations with NMFS (NMFS 2000, 2008a).

8.6. SPERM WHALE (*PHYSETER CATODON*)

The sperm whale was considered in all past biological opinions prepared by NMFS. This species is widely distributed and may occur year-round in California (NMFS 2014b). The minimum population estimate for sperm whales from the 2014 abundance estimate is 1,270 whales (Moore and Barlow 2017). Marine debris is a threat to this species. Estimated entanglements for 2017 in the California drift gillnet fishery were 2.9 (CV = 1.7) sperm whales (Carretta et al. 2019). Sperm whale ingestion of marine debris is a concern, particularly because their suspected feeding behavior includes cruising along the bottom with their mouths open (Walker and Coe 1990).

Sperm whales are associated with deep water areas well offshore of the coast and are rarely observed in the vicinity of existing O&G facilities. There are no reported impacts to sperm whales from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Given this species' relative scarcity in vicinity of southern California O&G activities, we have determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** the sperm whale. This determination is consistent with our most recent consultations with NMFS (NMFS 2000, 2008a).

8.7. GRAY WHALE, WESTERN NORTH PACIFIC DISTINCT POPULATION SEGMENT (*ESCHRICHTIUS ROBUSTUS*)

The western North Pacific population of gray whales continued to be considered endangered after the eastern North Pacific population was delisted in 1994 [59 FR 31094]. Eastern North Pacific gray whales are frequent visitors to the POCSR, especially as they migrate to more southern waters in winter. Allen and Angliss (2011) estimated abundance in the Southern California Planning Area to be 1,749 to 1,995 in January 2007 (Allen and Angliss 2011). However, members of the western North Pacific population are rare in the area. The usual distribution of the western North Pacific gray whale is found along the coasts of Russia and China, but recent photo identification and satellite telemetry work has confirmed that a few animals photographed/tagged in western North Pacific joined members of the eastern North Pacific population on their migration to breeding lagoons in Mexico [79 FR 58914]. NMFS maintains that the western North Pacific population is genetically distinct and has begun to include the western North Pacific population in consultations for the Pacific Coast of the United States. Unusual mortality events (UME), in the form of increased strandings of gray whales have occurred since January 1, 2019 (https://www.fisheries.noaa.gov/national/marine-life-distress/2019-2023-gray-whale-unusual-mortality-event-along-west-coast-and). The total numbers of strandings have decreased over the last 4 years. NOAA has assembled an independent team of scientists to review the data and determine next steps for the investigation.

Visually, it is impossible to differentiate between western and eastern whales, but western North Pacific gray whales are expected to be rare visitors to the Southern California Planning Area. There are no reported impacts to gray whales from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). We have therefore determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** western North Pacific gray whales.

8.8. GUADALUPE FUR SEAL (*ARCTOCEPHALUS TOWNSENDI*)

Past consultations concluded that the Guadalupe fur seal was not likely to be adversely affected, because of the low probability of an oil spill and the fact that the majority of the population was well outside the project area. Prior to 19th century harvest, this species ranged from Monterey Bay California to the Revillagigedo Islands, Mexico (NMFS 2014b). Since being listed in 1985 [50 FR 51252], Guadalupe fur seals have increased in number, but they continue to breed and pup mainly on Guadalupe Island, Mexico. In recent years several Guadalupe fur seals have been consistently observed at San Miguel Island. In 1997, a pup was observed at San Miguel Island, but no other pups were observed until 2008. In the years since 2008, one to two pups have been observed almost annually (Carretta et al. 2022).

Unusual mortality events (UME), in the form of increased strandings of Guadalupe fur seals, have occurred along the entire coast of California, beginning in January 2015 at eight times higher than the historical average. Strandings have continued since 2015 at well above average rates in California. Additionally, Guadalupe fur seal strandings in Oregon and Washington became elevated in 2019. Along the U.S. West Coast, strandings occur almost annually in California waters, and animals are increasingly observed in Oregon and Washington waters (Carretta et al. 2020). Most stranded animals were less than 2 years old and were malnourished with secondary bacterial and parasitic infections (NMFS 2019b; Carretta et al. 2020). Animals fitted with satellite tags have been documented to travel as far north as Graham Island and Vancouver Island, British Columbia, Canada (Norris et al. 2015). The minimum population size is 31,019 and is taken from the lower bound of the estimate of number of animals provided by García-Aguilar et al. (2018). These observations and the increasing population trends for this species indicate possible greater presence of this species in the POCSR in the future, but they currently remain relatively rare in the POCSR.

There are no reported impacts to Guadalupe fur seals from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Given this species' relative scarcity in southern California, we have determined that the continuation of existing offshore O&G work in the Southern California Planning Area may affect but is **not likely to adversely affect** the Guadalupe fur seal. This determination is consistent with our most recent consultations with NMFS (NMFS 2000, 2008a).

8.9. LEATHERBACK SEA TURTLE (*DERMOCHELYS COREACEA*)

In all past biological opinions, the leatherback sea turtle was considered a rare visitor to southern California and effects were considered minimal. The leatherback sea turtle was listed on June 2, 1970 [35 FR 8495]. The recovery plan for the Pacific populations of leatherback sea turtles was issued in 1998 (NMFS and USFWS 1998). Leatherbacks may be the most common species of sea turtle in the Southern California Planning Area, but they do not occur in high densities. NMFS and USFWS (2020) conducted an evaluation of leatherback status and subpopulations and identified the West Pacific DPS. However, leatherbacks are endangered throughout their range and were not relisted by individual DPS.

A total index of nesting female abundance of the West Pacific population was estimated to be 1,277 females. Leatherback turtles of the West Pacific DPS nest in tropical and subtropical latitudes primarily in Indonesia, Papua New Guinea, and Solomon Islands, and to a lesser extent in Vanuatu (Dutton et al. 2007; Benson et al. 2007a; Benson et al. 2007b; Benson et al. 2011). Oceanic currents help to structure the spatial and temporal distribution of juveniles which lead them to foraging and developmental habitats (e.g., the North Pacific Transition Zone); they undertake seasonal migrations seeking favorable oceanic habitats/temperatures and abundant foraging resources, such as the central California ecoregion (Gaspar et al. 2012) (Figure 10).

Important threats within U.S. waters include marine debris and fisheries bycatch (NMFS and USFWS 2007a, 2020). Floating materials have been shown to concentrate in ocean gyres and convergence zones where Sargassum and consequently juvenile sea turtles are known to occur (Carr 1987). All sea turtles are susceptible to ingesting marine debris, though leatherbacks show a marked tendency to ingest plastic which they misidentify as jellyfish, a primary food source (Balazs 1985). Ingested debris may block the digestive tract or remain in the stomach for extended periods, thereby reducing the feeding drive, causing ulcerations and injury to the stomach lining, or perhaps even providing a source of toxic chemicals (Laist 1987, 1997). Weakened animals are then more susceptible to predators and disease and are also less fit to migrate, breed, or, in the case of turtles, nest successfully (McCauley and Bjorndal 1999; Katsanevakis 2008).

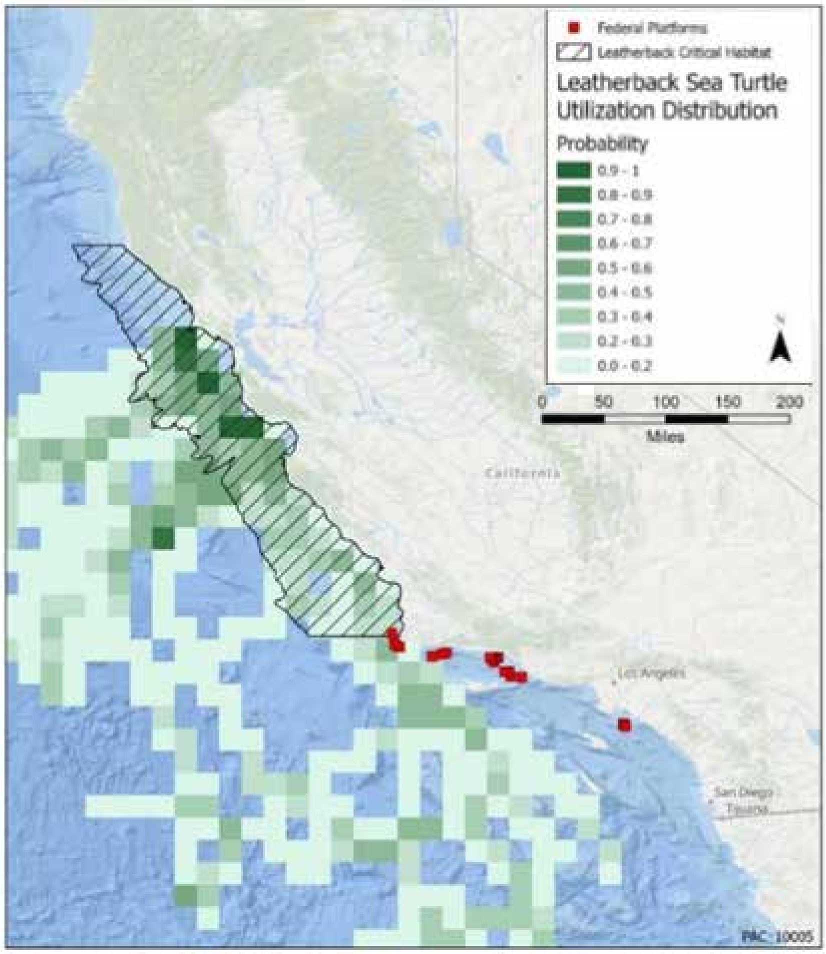

Figure 10. Leatherback sea turtle critical habitat (cross-hatched area) and utilization distribution (Source: NMFS 2012a), relative to locations of O&G platforms (red squares).

Designated critical habitat for leatherback sea turtles was revised in 2012 to include the waters offshore Washington State and portions of the Oregon and California coast [77 FR 4170]. These areas were recognized for their importance as leatherback foraging habitat. In California, critical habitat extends from Point Arena to Point Arguello, overlapping the northern edge of the Southern California Planning Area. Occurrence of prey species, primarily scyphomedusae (jellyfish), is the only primary constituent element identified for leatherback critical habitat. In the critical habitat rule, NMFS identified oil spill response (e.g., use of dispersants) as an activity that may impact prey availability in critical habitat areas. We do not expect oil spills from offshore facilities in the Southern California Planning Area to affect prey availability for leatherback sea turtles because of the low likelihood of an oil spill, and because the prey of the leatherback sea turtle would in no case be expected to be impacted to the extent that it would represent a change to the availability of the prey. Continuation of existing O&G development and production activities in the Southern California Planning Area is not expected to result in the destruction or adverse modification of designated critical habitat for leatherback sea turtles.

NMFS's 2008 biological opinion for offshore O&G activities concluded that no adverse impacts on leatherbacks were expected (NMFS 2008a). There is a low level of risk from underwater noise, oil spills, and vessel collisions. Oil spill trajectory modeling conducted using TAP (Appendix A) indicates that a large spill (1,000 bbl) originating from certain POCSR platforms could result in contact with critical habitat for the leatherback sea turtle. However, a large spill is itself unlikely (estimated 7% probability of occurrence). Even if the spill did contact critical habitat, it is not anticipated that there would be a notable effect on the essential features of the critical habitat, namely the availability of prey. There are no reported impacts to leatherback sea turtles from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Sea turtles are not highly sensitive to acoustic effects. Spills and collisions are highly unlikely events. We have therefore determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** the leatherback sea turtle or its designated critical habitat.

8.10. LOGGERHEAD SEA TURTLE (*CARETTA CARETTA)*

The loggerhead sea turtle was considered in all past biological opinions prepared by NMFS. In all cases, loggerhead sea turtles were considered a rare visitor to southern California and any effects to the species were considered minimal. This species was originally listed as threatened throughout its worldwide range in 1978 [43 FR 32800]. In 2011, NMFS split the listing designation into nine DPSs [76 FR 58868]. Loggerhead sea turtles that may be found in southern California are presumed to be members of the North Pacific Ocean DPS which is now listed as endangered. NMFS (2020b) reported 2015 total nesting abundance of approximately 8,733 nesting females for the entire DPS (95 percent credible limit of 7,834 to 9,736).

Within the North Pacific, loggerhead sea turtles nest in Japan and migrate to foraging areas in the Central and East Pacific. Nesting has only been documented in Japan, while juveniles and adults travel around the Pacific, north of the equator, to forage [76 FR 58868]. Important foraging areas have been identified off the coast of Baja Sur, Mexico (Figure 11), but none are consistently apparent in southern California. Loggerheads may move up the Pacific Coast during El Niño events following pelagic red crabs, a preferred prey species [76 FR 58868]. E) estimated more than 70,000 juvenile loggerheads foraging along the coast of southern California during El Niño conditions in 2015 (compared to none in 2011 and two individuals in 2018; cited in NMFS 2020b).

There are no reported impacts to loggerhead sea turtles from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Given this species' relative scarcity in southern California, we have determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** the loggerhead sea turtle. This determination is consistent with our previous consultations with NMFS (NMFS 2000, 2008a).

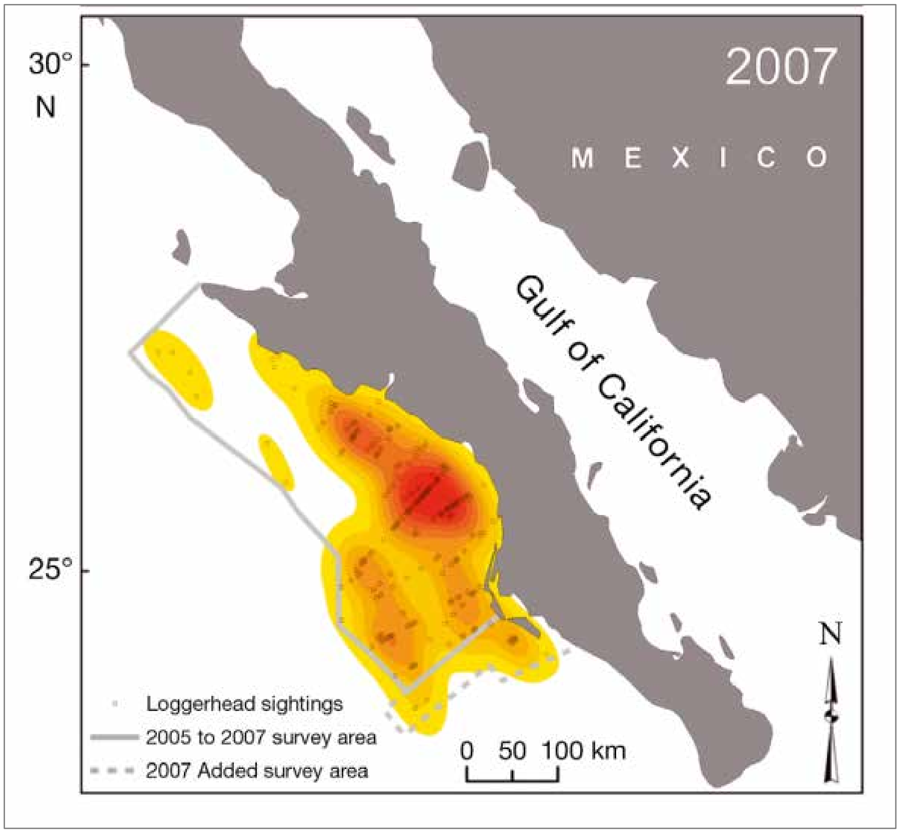

Figure 11. Loggerhead sea turtle foraging hotspots, survey lines, and sightings of the coast of Baja, Mexico (from Seminoff et al. 2014).

8.11. GREEN SEA TURTLE (*CHELONIA MYDAS*)

The green sea turtle was considered in all past biological opinions prepared by NMFS. In all cases, the green sea turtle was considered a rare visitor to southern California, and any effects to the species were considered minimal. On July 28, 1978, this species was listed as threatened throughout most of its range [43 FR 32800].

NOAA has identified 11 DPSs of green sea turtles globally, one of which is the threatened East Pacific DPS (Seminoff et al. 2015). On July 19, 2023, the Federal Register published NOAA's proposal to designate marine critical habitat for the East Pacific DPS and 5 other green sea turtle DPSs [88 FR 46572] (Figure 12). NOAA defined two essential features of its proposed critical habitat for the East Pacific DPS:

- Mean high water line (MHW) to 10 km offshore: "sufficiently unobstructed waters that allow for unrestricted transit of reproductive individuals between benthic foraging/resting and reproductive areas."
- MWH to 20 m depth: "benthic foraging/resting" that includes "underwater refugia and food resources (i.e., seagrasses, macroalgae, and/or invertebrates) of sufficient condition, distribution, diversity, abundance, and density necessary to support survival, development, growth, and/or reproduction."

Figure 12. Proposed marine critical habitat in southern California for the East Pacific DPS of green sea turtles from the mean high water (MHW) line to a depth of 20 meters (teal-green shading) in South and Central San Diego Bay, from Point Loma to Santa Monica Bay (excluding Marine Corps Base Camp Pendleton), and Catalina Island. Proposed migratory critical habitat from MHW to 10 km offshore (dark green shading) between North San Diego Bay and the Mexico border. Source: https://www.fisheries.noaa.gov/s3/2023-07/Proposed-GreenTurtle-CH-mapsGIS.pdf

Holistic protection at nesting beaches and foraging areas in Mexico appears to have led to recovery of the East Pacific DPS with increased numbers and distribution (Massey et al. 2023). Green sea turtles have been seen in more areas in southern California and in greater numbers since 2014 (Figure 13; Hanna et al. 2021). A resident population of green sea turtles has established near La Jolla Shores in San Diego County, a protected site with frequent recreation such as kayaking, snorkeling, and diving (Hanna et al. 2021). In Orange County, green sea turtles are seen regularly and year-round in Seal Beach National Wildlife Refuge and the mouth of the San Gabriel River (Massey et al. 2023).

Prior to the proposal for critical habitat, San Diego Bay was identified as a foraging area for East Pacific green sea turtles (NMFS and USFWS 2007b). Turtles foraging in San Diego Bay likely benefited from warm water effluent associated with the South Bay Power Plant. This plant ceased operation on January 1, 2011, and was decommissioned. None of the existing offshore O&G activities are in the vicinity of San Diego Bay, and there are no known interactions between sea turtles and existing operations in the Orange County area.

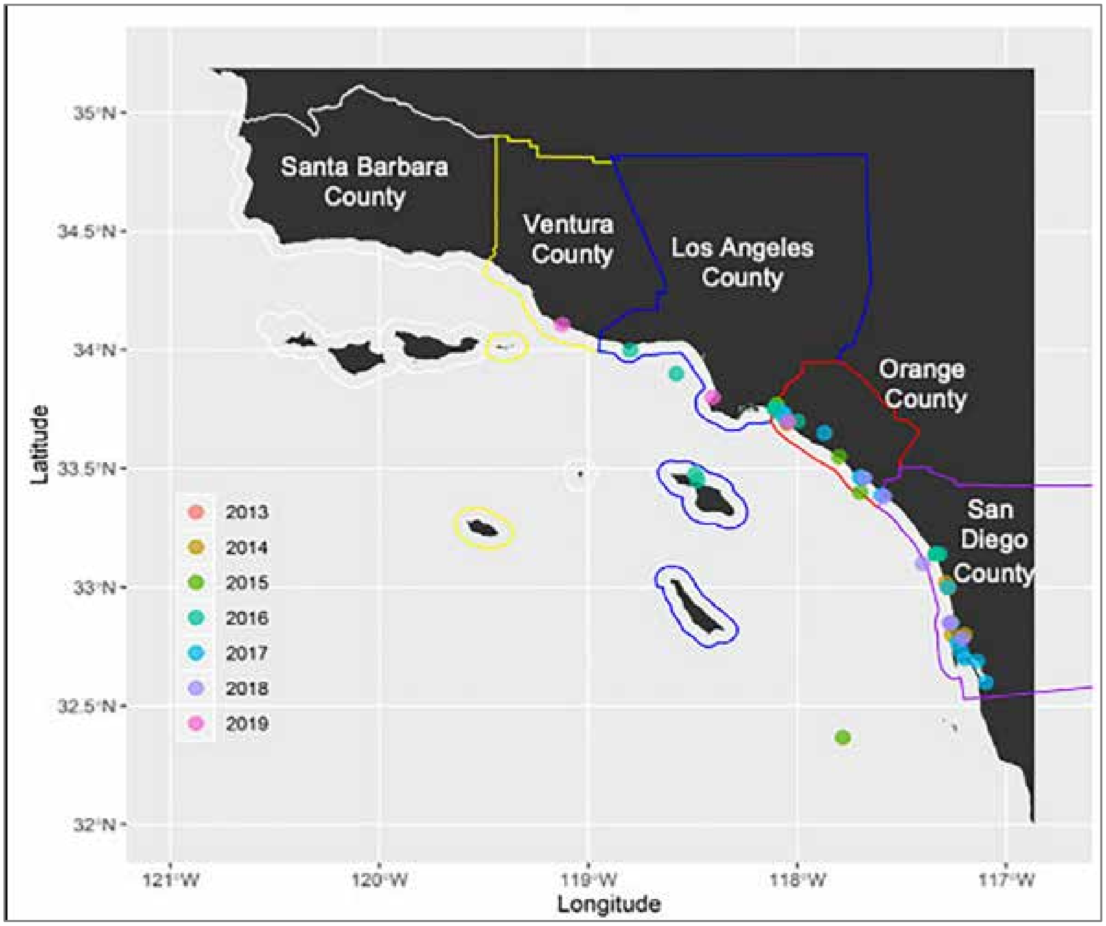

Figure 13. Opportunistic sightings of green sea turtles in southern California, 2013–2019; total number of sightings by year were: 3 sightings in 2013, 9 in 2014, 16 in 2015, 15 in 2016, 15 in 2017, 7 in 2018: 7, and 3 in 2019 (from Hanna et al. 2021).

Oil spill trajectory modeling conducted using TAP (Appendix A) indicates that a large spill (1,000 bbl) originating from certain POCSR platforms could result in contact with proposed critical habitat for green sea turtles. However, a large spill is itself unlikely (estimate 7% probability of occurrence). It is highly unlikely that 200 bbl per day could spill from existing facilities over a 5-day period. These numbers were chosen to be able to visualize how oil may travel if spilled (Appendix A). Large spills therefore present a notable, but unlikely source of effects to green sea turtles. Spill prevention and response plans, exercises, and strategies further reduce the risk. Continuation of existing activities may affect but are **not likely to adversely affect proposed critical habitat** for this species.

There are no reported impacts to green sea turtles from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023; https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Given the distance between POCSR platforms, pipelines, and transit routes from sighting locations and the relative rarity of green sea turtles in the area, BOEM has determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** green sea turtles. This determination is consistent with our most recent consultations with NMFS (NMFS 2000, 2008a).

8.12. OLIVE (A.K.A. PACIFIC) RIDLEY SEA TURTLE (*LEPIDOCHELYS OLIVACEA*)

The olive ridley sea turtle was considered in all past biological opinions prepared by NMFS. In all cases, they were considered a rare visitor to southern California, and any effects to the species were considered minimal. The olive ridley is currently one of the most abundant species of sea turtles in the world although breeding populations on the Pacific Coast of Mexico continue to be listed as endangered due to historic declines and threats from loss and degradation of nesting habitat and overharvest (NMFS and USFWS 2007c). In the Pacific, large nesting populations occur in Mexico and Costa Rica. A single arribada nesting beach remains in La Escobilla, Mexico, where an estimated 450,000 turtles nest, and the Pacific Coast of Costa Rica supports an estimated 600,000 nesting olive ridleys between its two major arribada beaches, Nancite and Ostional (NMFS and USFWS 2014). California appears to be at the extreme northern range for the species, but individuals have been documented as far north as Alaska. There are no reported impacts to olive ridley sea turtles from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Given this species' relative scarcity in California, we have determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** the olive ridley sea turtle. This determination is consistent with our most recent consultations with NMFS (NMFS 2000, 2008a).

8.13. OCEANIC WHITETIP SHARK (*CARCHARHINUS LONGIMANUS*)

The oceanic whitetip shark was listed as a federally threatened species on January 30, 2018 (83 FR 4153). Critical habitat for this species was not determined due to insufficient data to perform the required analyses (83 FR 4153). As such, the proposed action will not affect designated critical habitat.

Oceanic whitetip sharks inhabit circumtropical and subtropical regions across the world and are most abundant between 20°N to 20°S (Compagno 1984; Bonfil et al. 2008). Genetic data describing population structure remain inconclusive to differentiate among ocean basins (Young and Carlson 2020). In the eastern Pacific, they occur from southern California to Peru, including the Gulf of California and Clipperton Island. These large, semi-migratory sharks live offshore in deep water but spend most of their time in the upper part of the water column (< 150 m) feeding on fish, squid, and carrion. A summary of catch data combined with tagging studies and habitat suitability models show that its distribution is strongly predicted by sea surface temperatures greater than 20°C (Bonfil et al. 2008; Musyl et al. 2011; Tolotti et al. 2013). The oceanic whitetip shark is rarely observed offshore California (Love et al. 2021), and, given its thermal preferences, southern California visitations may be due to warmwater incursions associated with oceanographic anomalies.

This species could be affected by oil spills and noise from the proposed action. There are no reported impacts to oceanic whitetip shark from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Given the rarity of this species in the Action Area, any negative effects from these stressors are unlikely, and if exposure did occur, the effects would be of short duration and primarily consist of minor physiological and behavioral responses (e.g., avoidance, stress). Neither stressor is expected to have population-level consequences to oceanic whitetip sharks.

The main threat to oceanic whitetip sharks is bycatch in commercial fisheries combined with demand for its fins. They are frequently caught in pelagic longline, purse seine, and gillnet fisheries worldwide and their fins are highly valued in the international trade for shark products. As a result, their populations have declined throughout its global range (Young and Carlson 2020). Any potential negative effects from the proposed action would result in a negligible contribution to cumulative impacts.

Based on this information, BOEM determines that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** oceanic whitetip sharks.

8.14. GIANT MANTA RAY (*MOBULA BIROSTRIS* [FORMERLY *MANTA BIROSTRIS*])

The giant manta ray was listed as a federally threatened species on January 22, 2018 (83 FR 2916). Critical habitat for this species was not determined due to insufficient data to perform the required analyses (83 FR 2916). As such, the proposed action will not affect designated critical habitat.

Giant manta rays (also known as oceanic manta rays) inhabit circumglobal waters between 40°N and 40°S (Couturier et al. 2012). Their distribution is extremely patchy, and insufficient genetic data exist to determine if population structure exists at finer scales (83 FR 2916). In the eastern Pacific, confirmed observations range from Santa Barbara, California to Peru, including the Gulf of California and Islas Galápagos, but it is rarely observed offshore California (Miller and Lea 1972; Love et al. 2021). With a wingspan that can exceed 7 m, giant manta rays are the largest of batoid fishes. They live offshore in deep water, occupying surface waters for a majority of time where they bask and feed but will make foraging excursions to depths of at least 1,000 m (Stewart et al. 2016; Weigman 2016). They appear to conduct seasonal migrations following prey abundance, with prey including planktonic and micronektonic organisms such as euphausiids, copepods, mysids, decapod larvae and shrimp, and small fishes from both epipelagic and mesopelagic habitats (Notarbartolo di Sciara et al. 2015; Burgess et al. 2016; Stewart et al. 2016). Couturier et al. (2012) find that manta rays prefer temperatures between 20–26°C.

Fishing activities are the main threat to giant manta rays (83 FR 2916). Worldwide they are either targeted or landed as bycatch in recreational, artisanal, and commercial fisheries by harpoon, trawls, driftnets, gillnets, traps, trawls, purse-seines, and long lines (Croll et al. 2016). *Mobula* spp. prebranchial gill plates are highly valued in the international trade for their perceived medicinal value, and this has stimulated increased fishing pressure on manta species (Croll et al. 2016). As a result, their populations have declined throughout its global range. Any potential negative effects from the proposed action would result in a negligible contribution to these impacts.

This species could be affected by oil spills and noise from the proposed action. There are no reported impacts to giant manta ray from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Given the rarity of this species in the Action Area, any negative effects from these stressors are extremely unlikely. Marine vessel collisions could also impact mantas due to their basking behavior. However, the designated traffic corridors and project-specific speed limitations are expected to reduce the risk of collision to negligible levels. Thus, there are no stressors expected to have consequences to giant manta rays.

Based on this information, BOEM determines that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** giant manta rays.

8.15. SCALLOPED HAMMERHEAD SHARK (*SPHYRNA LEWINI*)

The Eastern Pacific Distinct Population Segment (DPS) of the scalloped hammerhead shark was listed as a federally endangered species on July 3, 2014 (79 FR 38213). NMFS found that there are no specific areas under the jurisdiction of the United States that meet the definition of critical habitat (80 FR 71774, November 17, 2015). As such, the proposed action will not affect designated critical habitat.

The scalloped hammerhead shark is a circumglobal species found worldwide primarily from 45°N to 30°S in coastal, pelagic, and semi-oceanic waters off and on continental shelves of the Atlantic, Indian, and Pacific Oceans (Compagno 1984). Although the distribution of this species within the eastern Pacific Ocean extends from the coast of southern California, including the Gulf of California, to Ecuador and possibly Peru, it rarely occurs in the Action Area and when it does, solitary individuals are observed (Love et al., 2021). Nursery areas and the large aggregations typical of the species (and which make it vulnerable to fishing mortality) have not been observed within the Southern California Bight. These large, semi-migratory sharks live offshore in deep water and spend most of their time in the upper part of the water column (< 200 m), although excursions to at least 1200 m have been recorded (Anderson et al. 2022). Scalloped hammerheads feed on fishes, crustaceans, and cephalopods, with squid as a primary prey item (Gallagher and Klimley 2018). In the eastern Pacific, ultrasonic transmitters were used to track sharks and showed that this species exhibits a thermal preference for waters within 23–27°C (Ketchum et al. 2014).

When the scalloped hammerhead shark was listed, significant declines in the population were attributed to commercial fishing activities, schooling behavior of the species, and a lack of current adequate regulatory mechanisms, all of which remain ongoing concerns in the most recent 5-year review for the Eastern DPS of Scalloped Hammerhead Shark (NMFS 2020c). Any potential negative effects from the proposed action would result in a negligible contribution to impacts.

This species could be affected by oil spills and noise from the proposed action. Given the rarity of this species in the Action Area, any negative effects from these stressors are extremely unlikely. Neither stressor is expected to have consequences to scalloped hammerhead sharks.

Based on this information, BOEM determines that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** scalloped hammerhead sharks.

8.16. GREEN STURGEON (*ACIPENSER MEDIROSTRIS*)

The southern DPS of the North American green sturgeon was listed as threatened in 2006. [71 FR 17757]. Critical habitat for the southern DPS was finalized in 2009 and includes coastal marine areas (to a depth of 60 fathoms) and specified riverine, estuarine and marsh areas from Monterey Bay, California, north to the U.S. -Canada border [74 FR 52300]. Between the U.S.-Mexico border and Monterey Bay, green sturgeon from the southern DPS may be present, but this has not been confirmed (NMFS 2009b). Acoustically-tagged fish from the southern DPS have not been detected south of Monterey Bay, but a total of 4 green sturgeon of unidentified origin were reported through fishing interactions in southern California between 1941 and 1993 (NMFS 2009b).

In 2010, NMFS published a “4d” rule exempting some forms of take for green sturgeon [75 FR 30714]. NMFS concluded that the southern DPS of the green sturgeon is at risk of extinction primarily because of “elimination of freshwater spawning habitat, degradation of freshwater and estuarine habitat quality, water diversions, fishing, and other causes.” Oil spill trajectory modeling conducted using TAP (Appendix A) indicates that a large spill (1,000 bbl) originating from certain POCSR platforms would not come in contact with critical habitat for the green sturgeon. There are no reported impacts to green sturgeon from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Given the relative scarcity of green sturgeon in southern California, the lack of any threats to green sturgeon from existing offshore O&G development and production activities, and the lack of any effects from O&G activities on the designated critical habitat for the species, we have determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** the southern DPS of the green sturgeon. Continuation of existing O&G development and production activities in the Southern California Planning Area will have no effect on designated critical habitat for green sturgeon, because designated critical habitat does not occur within the Southern California Planning Area.

8.17. STEELHEAD TROUT (*ONCORHYNCUS MYKISS*)

The Southern California Evolutionarily Significant Unit (ESU) of West Coast Steelhead was listed as endangered and the South-Central California Coast ESU as threatened on October 17, 1997 [63 FR 32996]. Critical habitat for this species was designated in September 2005 [70 FR 52488]. The South-Central California steelhead occupies habitat that is located to the north of the POCSR (NMFS 2013b). Coastal currents are expected to move any spilled oil originating from platforms or pipelines toward the south of the facilities. For this reason, ongoing O&G work in the Southern California Planning Area may affect but is **not likely to adversely affect** the South-Central California Steelhead and will have no effect critical habitat (Figure 13)

We have examined NMFS’s recovery plan and 5-year review of Southern California Coast steelhead (NMFS 2012b and NMFS 2016b, respectively). Total abundance of steelhead in this ESU is extremely low and declining.

Southern California steelhead populations in this region have declined from estimated annual runs totaling between 32,000 and 46,000 adults to fewer than 500 total adults (Busby et al. 1996). The run-size estimates represent average annual estimates that likely include wide variations in a region with a highly variable climate. However, these averages are extremely small, and the consensus of the most current biological review team was that the status of the Southern California steelhead has not changed appreciably in either direction since publication of the initial status review in Busby et al. (1996) (NMFS 2012b). The Southern California steelhead is still in danger of extinction (Williams et al. 2011).

Risk factors for this ESU are freshwater habitat deterioration due to sedimentation and flooding related to land management practices. Offshore O&G activities are not specifically identified as a concern, but each stream system occupied by breeding adults terminates at the coast with some type of estuary-lagoon system. Juvenile steelhead over-summer in these lagoons, where they grow rapidly (Bond 2006; Hayes et al. 2008). Estuarine functions have been adversely affected in a wide variety of ways and water quality degradation is among them.

An offshore oil leak or spill could present a risk of estuary contamination. The risk to coastal and estuary habitat due to oil spills is not likely to cause adverse effects to Southern California steelhead. The O&G industry is required to develop spill response plans to prevent spills and minimize their effects. Spill response organizations help industry operators prevent, prepare for, and respond to spills. BSEE conducts regular spill response exercises. Spill response materials are stored and staged near potential sources. These conditions help reduce both the potential for and size of spills.

Although this exercise demonstrates the possibility that O&G operations could have adverse effects to Southern California steelhead, it also demonstrates that these effects are not likely to occur. There are no reported impacts to steelhead trout from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). The risk of a spill in this same size class is 62.8%, but the likelihood that each of the other factors affecting spill trajectories would align with the worst-case outcome is extremely low. The selected spill site was only one of 27 possible source locations, most of which show a lower risk of coastal contact. The model did not account for seasonal changes in use of coastal habitat by steelhead, and no cleanup operations or spill response tactics for protection of important habitat were incorporated. Each of these factors reduce the probability of effects below the modeled 50% contact rate.

In conclusion, the combined probability of a spill occurring and resulting in adverse effects to Southern California steelhead or critical habitat does not reach a threshold of likelihood. The low probability of this type of event indicates that adverse effects are unlikely.

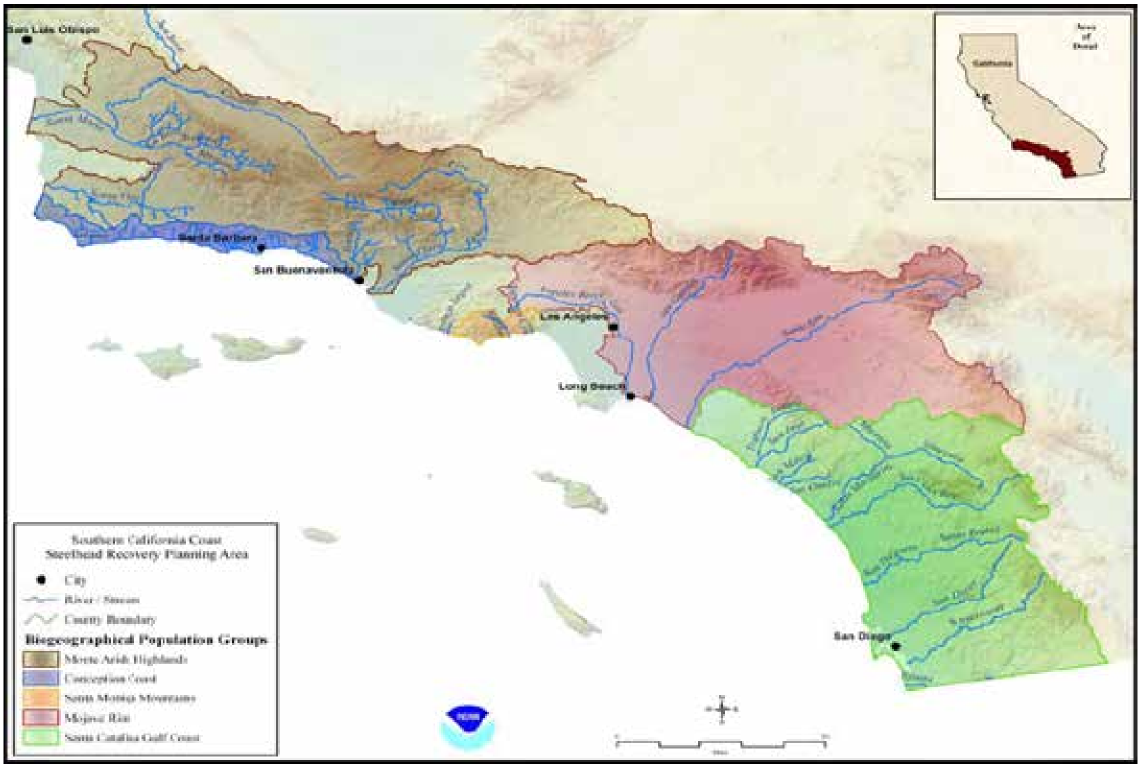

Figure 14. Steelhead trout biogeographical population groups in the Southern California Steelhead Recovery Planning Area (NMFS 2012b).

In previous consultations, NMFS (2000, 2008a) concluded offshore O&G activities may affect but would not likely adversely affect steelhead trout because they are found in low numbers within the Southern California Planning Area and that the likelihood of contact with a small accidental oil spill is very low. Our current analysis continues to support this conclusion. We have determined that that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** steelhead trout.

Critical habitat for steelhead trout includes coastal watersheds that are not affected by existing offshore O&G development and production activities in the Southern California Planning Area. Oil spill trajectory modeling conducted using TAP (Appendix A) indicates that a large spill (1,000 bbl) originating from certain POCSR platforms would not result in contact with critical habitat for steelhead trout. Therefore, there will be no affect to steelhead trout critical habitat.

8.18. WHITE ABALONE (*HALIOTIS SORENSENI*)

The white abalone was listed by NMFS as an endangered species June 28, 2001, after a comprehensive status review of the species was completed [66 FR 29054]. A final recovery plan for the species was published on October 10, 2008 (NMFS 2008b). No critical habitat has been designated for this species due to concerns that identifying critical habitat areas would increase the threat of poaching [66 FR 29048]. The most recent population estimate is 3,745 individuals (NMFS 2018b). Historic overfishing and poaching, together with ongoing low population density, are considered to be responsible for the decline and lack of recovery of the white abalone (Stierhoff et al. 2012).

White abalone live on rocky substrates on offshore islands, submerged banks, and some locations along the mainland at depths up to 55 m (180 ft). There are few surveys of abalone associated with POCSR O&G infrastructure. During targeted surveys for the ExxonMobil Santa Ynez Unit One, no abalone were observed (Sanders 2012).

Cumulative effects in the Southern California Planning Area to white abalone include sediment dredging and disposal, anchoring, fishing/trawling, vessel traffic, and other pollutant inputs point and non-point sources. In addition, climate change could affect invertebrate communities through habitat loss, the alteration of large-scale oceanographic and ecosystem processes, and through direct physiological action from changes in water temperature, pH, oxygen, and salinity (Bindoff et al. 2019). Effects of ongoing O&G activities on invertebrates would be similar to the effects of existing activities, representing a negligible incremental addition to past and ongoing impacts. In the final listing rule, O&G development was identified as having potential for affecting white abalone habitat due to potential for future leasing that could result in additional O&G development and exploration activities between Point Conception and the U.S.-Mexico border [66 FR 29046]. Future leasing and expansion of existing offshore O&G facilities is not reasonably certain to occur and is not being considered for this programmatic consultation. The white abalone is also an exclusively subtidal species and is not considered particularly vulnerable to oil spills. Low population abundance decreases the likelihood that any particular spill would make contact with individuals. The most recent 5-year status review did not identify hydrocarbon contamination or spills as a threat (NMFS 2018b). There are no reported impacts to white abalone from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). Considering this information, we have determined that the continuation of existing offshore O&G development and production activities in the Southern California Planning Area may affect but is **not likely to adversely affect** the white abalone. This determination is consistent with our most recent consultation with NMFS (NMFS 2008a).

8.19. BLACK ABALONE (*HALIOTIS CRACHERODII*)

The black abalone was listed as a federally endangered species on January 14, 2009 [74 FR 1937]. Critical habitat for this species was designated on October 27, 2011 [76 FR 2011] and includes several sections of coastline adjacent to the Southern California Planning Area (Figure 14). When the black abalone was listed, significant declines in the population were attributed to commercial/recreational harvest and disease. Ongoing concerns identified in the final rule included accidentally spilled oil from offshore drilling platforms [74 FR 1937].

Threats to black abalone include construction and drilling discharges. NMFS published the critical habitat rule in 2011 [76 FR 2011]. Mineral and petroleum exploration and extraction were listed as an activity that may affect the physical and biological features of the designated critical habitat. Specifically, the rule cites the possibility of increased sedimentation of rocky substrate related to construction activities, the potential for a negligible effect of drilling muds on settlement of abalone larvae, and the possibility that oil spills could affect water quality.

New construction or expansion of onshore facilities to support Pacific OCS O&G activities is not reasonably foreseeable at this time as the platforms and activities have been in place for decades.

Drilling mud discharges are regulated by EPA under NPDES permits that are subject to ESA consultation. Prevention of discharges into areas with critical habitat is an important measure for reducing effects of drilling mud discharges in the vicinity of black abalone habitat.

Effects to critical habitat from oil spills and response efforts were also highlighted in the critical habitat rule for black abalone. The rule identifies USCG as the agency responsible for ESA consultations related to oil spill response. Small oil spills may temporarily affect water quality, but the effects of a spill to critical habitat of the black abalone would likely be undetectable within hours or days based on normal tidal flushing and the continuous deposition of oil from natural sources that is common along the southern California coast (Lorenson et al. 2009).

Large spills are a greater risk to black abalone. There are no reported impacts to black abalone from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547). In 2015, three black abalone were found within the impact zone for the Refugio oil spill, which originated on land in Santa Barbara County. The effects of the spill on black abalone and their habitat are still under evaluation and restoration funds were approved (cited in NFMS 2020d). In 1997, the Torch/Platform Irene oil spill off the Santa Barbara County coast affected 20 acres of abalone habitat and directly oiled at least one black abalone (Torch/Platform Irene Trustee Council, 2007).

Oil spill trajectory modeling conducted using TAP (Appendix A) indicates that a large spill (1,000 bbl) originating from certain POCSR platforms could result in contact with critical habitat for the black abalone. However, a large spill is itself unlikely (estimate 7% probability of occurrence). It is highly unlikely that 200 bbl per day could spill from existing facilities over a 5-day period. These numbers were chosen to be able to visualize how oil may travel if spilled (Appendix A). The 2021 Beta pipeline spill of 588 bbl of oil did not reach Catalina Island or the Palos Verdes Peninsula black abalone critical habitat. Large spills therefore present a notable, but unlikely source of effects to black abalone. Spill prevention and response plans, exercises, and strategies further reduce the risk.

MMS specifically considered effects of offshore O&G development on black abalone and consulted with NMFS when this species was listed in 2009 (NMFS 2009a). Oil spills were the only potential risk to the species identified. Given that the risk of an oil spill was low, an oil spill that may occur would likely be small, and the probability of an oil spill contacting the mainland or Channel Islands was low, NMFS concluded that offshore drilling and production activities may affect but would not likely adversely affect black abalone (NMFS 2009a).

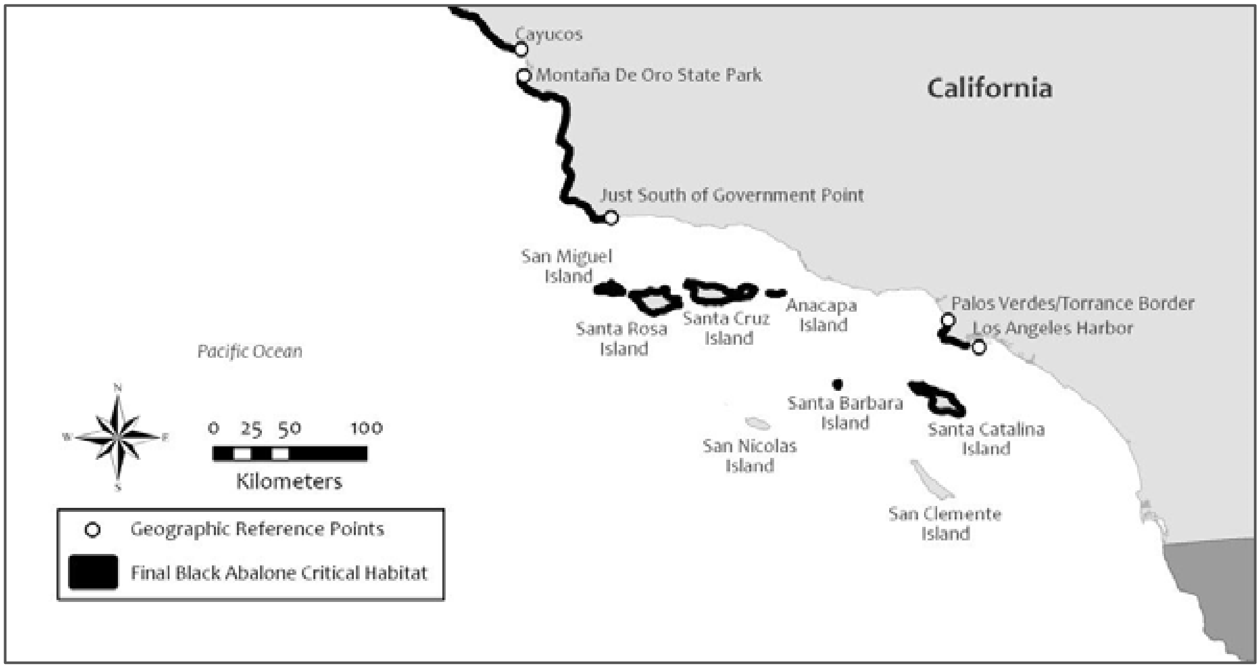

Figure 15. Critical habitat for the black abalone in the Southern California OCS Planning Area. Map modified from original by Mathew Dorsey in NMFS (2020d).

Upon consideration of our consultation with NMFS in 2009, the review of the critical habitat rule published in 2011, the NMFS recovery plan published in 2020 (NMFS 2020d), and current oil spill trajectory analysis (Appendix A), BOEM has determined that the continuation of existing offshore O&G development and production in the Southern California Planning Area may affect but is **not likely to adversely affect** the black abalone. Continuation of existing activities may affect but are not likely to adversely affect critical habitat for this species.

8.20. SUNFLOWER SEA STAR (*PYCNOPODIA HELIANTHOIDES*)

The sunflower sea star was proposed to be listed as threatened under the Endangered Species Act on April 11, 2023 (https://www.fisheries.noaa.gov/action/proposed-rule-list-sunflower-sea-star-threatened-under-endangered-species-act). The species is a large, fast moving, many-armed sea star, native to the eastern Pacific Ocean from Baja California, Mexico to the Aleutian Islands, Alaska. The species is most abundant in the waters off eastern Alaska and British Columbia. Between 2013 and 2017, sea star wasting syndrome (SSWS) killed an estimated 90% of the population (Lowry et al. 2022).

Threats to the sunflower sea star were broadly grouped into the five ESA Section 4(a)(1) categories of: 1) present or threatened destruction, modification, or curtailment of habitat or range; 2) overutilization for commercial, recreational, scientific, or educational purposes; 3) competition, disease, or predation; 4) adequacy of existing regulatory mechanisms; and 5) other natural or manmade factors affecting continued existence (Lowry et al. 2022).

To examine sunflower sea star distribution in the Southern California Bight, we looked to the Channel Islands National Park Kelp Forest Monitoring Program, which has monitoring data back to 1983. The sunflower sea star is found in low densities (1 per transect) at the colder water islands (San Miguel and Santa Rosa Islands) and even less frequently at Santa Cruz Island. All sunflower sea stars disappeared from Channel Islands National Park by 2014; their densities dropped to 0 (Sprague et al. 2022; Figure 15). We also obtained monitoring data from the California Marine Life Protection Act monitoring effort (Carr et al. 2022). This dataset shows similar trends of 1 or fewer sunflower sea stars per transect along the Santa Barbara mainland, Palos Verdes Peninsula, and Northern Channel Islands. There are no reported impacts to sunflower sea stars from the 2021 Beta pipeline spill of 588 bbl (NMFS 2023 https://wildlife.ca.gov/OSPR/NRDA/Pipeline-P00547).

Given the historical low densities and now absence of the sunflower sea star in the Southern California Planning Area, ongoing O&G activities are **not likely to adversely affect** *Pycnopodia helianthoides*.

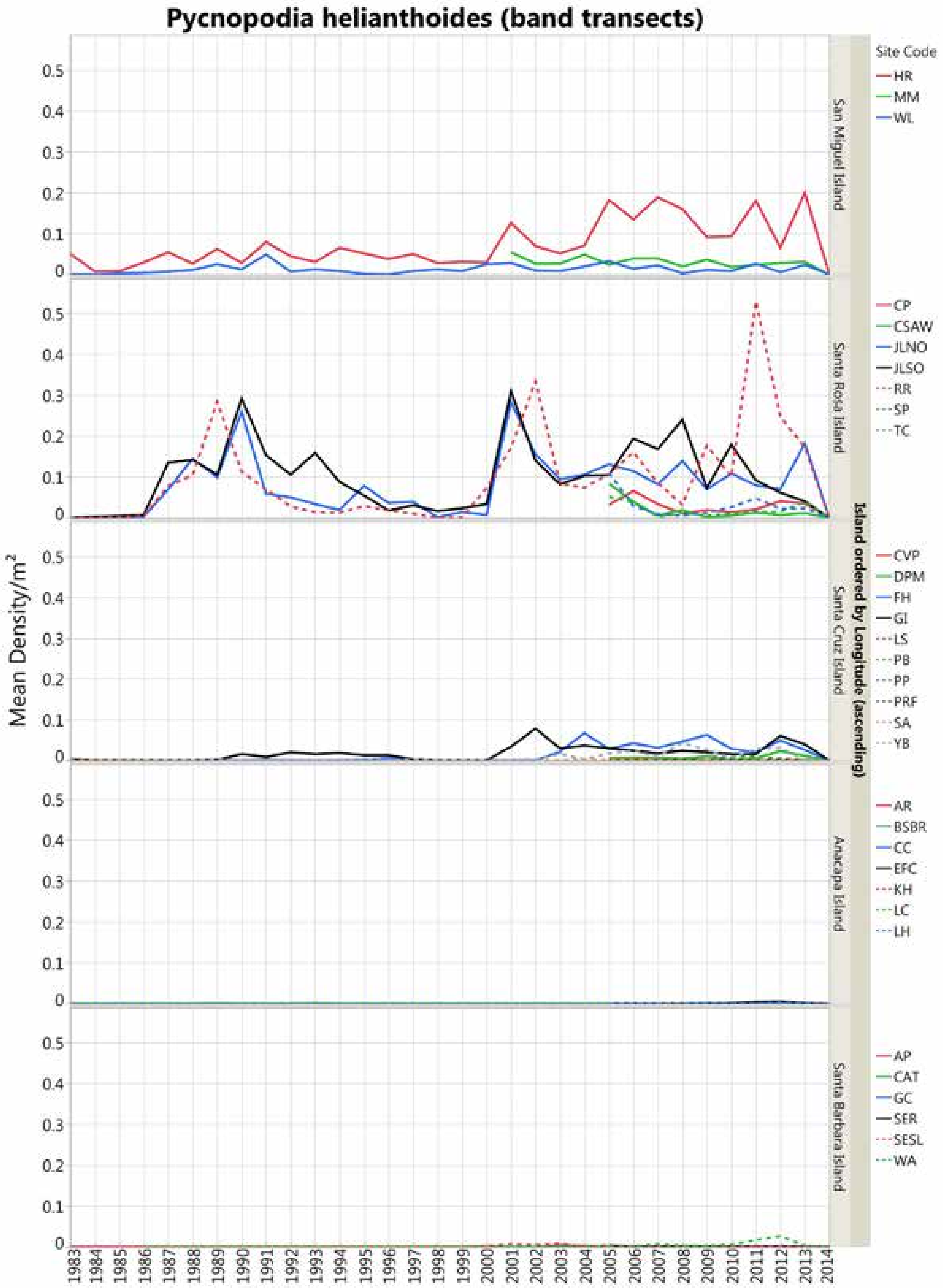

Figure 16. Densities of *P. helianthoides* at National Park Service transect sites for the 5 California Channel Islands from 1983 to 2014. Figure reproduced from Sprague et al. (2022)

9.0 SUMMARY AND CONCLUSIONS

A summary of determinations for NMFS ESA-listed species and critical habitat is provided in Table 9.

Upon review of the most recent information on the status of NMFS threatened/endangered species,Bureau activities, and the recent Beta Unit pipeline oil spill of 588 bbl, BOEM and BSEE conclude that NMFS ESA-listed species and their critical habitat are **not likely to be adversely affected** by ongoing offshore O&G activities at existing facilities in the Southern California Planning Area.

The Bureaus will continue to coordinate with NMFS on future actions as they are considered in the Pacific Region. This ongoing coordination may confirm that an action is included within the scope of this programmatic BA, or that additional consultation would be required. For example, decommissioning of offshore facilities is discussed in this document, but the Bureaus anticipate that project specific coordination and consultation will be necessary when a detailed decommissioning plan is submitted.

The Bureaus are committed to continued coordination with NMFS on future activities and additional consultation as the need arises.

Table 9. Summary of determinations for NMFS ESA-Listed Species and species proposed for listing. For all species considered here, the determination for impacts of ongoing activities was "not likely to adversely affect" (NLAA). DPS = Distinct Population Segment. ESU = Evolutionary Significant Unit.

Common Name	DPS, ESU, or Stock (and Status)	Potential Impacts	Species Determination	Critical Habitat Determination	Comments
Blue Whale (*Balaenoptera musculus*)	Eastern North Pacific Stock (endangered)	Noise, Collision, Oil Spill	NLAA	N/A	See section 8.1
Fin Whale (*Balaenoptera physalus*)	California/Oregon/Washington Stock (endangered)	Noise, Collision, Oil Spill	NLAA	N/A	Infrequent spatial overlap
Humpback Whale (*Megaptera novaeangliae*)	Mexico DPS (threatened) or the Central America DPS (endangered)	Noise, Collision, Oil Spill	NLAA	NLAA; 86 FR 21082	See section 8.3
North Pacific Right Whale (*Eubalaena glacialis*)	Eastern stock (critically endangered)	Noise, Collision, Oil Spill	NLAA	N/A	Little or no spatial overlap
Sei Whale (*Balaenoptera borealis*)	Eastern North Pacific Stock (endangered)	Noise, Collision, Oil Spill	NLAA	N/A	Little or no spatial overlap
Sperm Whale (*Physeter catodon*)	California/Oregon/Washington Stock (endangered)	Noise, Collision, Oil Spill	NLAA	N/A	Little or no spatial overlap
Western Gray Whale (*Eschrichtius robustus*)	Western North Pacific Stock (endangered)	Noise, Collision, Oil Spill	NLAA		Little or no spatial or temporal overlap
Guadalupe Fur Seal (*Arctocephalus townsendi*)	Entire species (threatened)	Oil spill	NLAA	N/A	Little spatial overlap
Leatherback Sea Turtle (*Dermochelys coriacea*)	West Pacific DPS (not separately listed; endangered throughout its range)	Collision, Oil Spill	NLAA	NLAA; 77 FR 4169	Little spatial or temporal Overlap
Loggerhead Sea Turtle (*Caretta caretta*)	North Pacific Ocean DPS (endangered)	Collision, Oil Spill	NLAA	N/A	Little or no spatial overlap
Green Sea Turtle (*Chelonia mydas*)	East Pacific DPS (threatened)	Collision, Oil Spill	NLAA	NLAA; 88 FR 46572	See section 8.11
Olive Ridley Sea Turtle (*Lepidochelys olivacea*)	Mexico Pacific Coast breeding population (endangered)	Collision, Oil Spill	NLAA	N/A	Little or no spatial overlap
Oceanic Whitetip Shark (*Carcharhinus longimanus*)	Entire species (threatened)	Noise, Oil Spill	NLAA	N/A	Little or no spatial overlap
Giant Manta Ray (*Mobula birostris* [formerly *Manta birostris*])	Entire species (threatened)	Noise, Collision, Oil Spill	NLAA	N/A	Little or no spatial overlap
Scalloped Hammerhead Shark (*Sphyrna lewini*)	Eastern Pacific DPS (endangered)	Noise, Oil Spill	NLAA	N/A	Little or no spatial overlap
Green Sturgeon (*Acipenser medirostris*)	Southern DPS (threatened)	Oil spill	NLAA	No Effect; 74 FR 52299	Little or no spatial overlap
Steelhead Trout (*Oncorhyncus mykiss*)	Southern California (endangered), South-Central California Coast (threatened)	Oil spill	NLAA	No Effect; 65 FR 7764	See section 8.17
White Abalone (*Haliotis sorenseni*)	Entire species (endangered)	Oil spill	NLAA	N/A	See section 8.18
Black Abalone (*Haliotis cracherodii*)	Entire species (endangered)	Oil spill	NLAA	NLAA; 76 FR 66806	See section 8.19
Sunflower Sea Star (*Pycnopodia helianthoides*)	Entire species (proposed threatened)	Oil spill	NLAA	N/A	See section 8.20

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APPENDIX A: PACIFIC OUTER CONTINENTAL SHELF REGION PROGRAMMATIC OIL SPILL RISK ANALYSIS

This appendix covers oil spill risk, fate of oil, trajectory analysis, and response.

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A-1: OIL SPILL RISK ASSESSMENT AND METHODS

In normal, day-to-day platform operations, accidental discharges of hydrocarbons may occur. Such accidents are typically limited to discharges of quantities of less than one barrel (bbl) of crude oil. From 1963 to 2022, 1,451 oil spills were recorded. The total volume of oil spilled in the Pacific Region is dominated by the 1969 Santa Barbara Spill (80,900 bbl) which occurred soon after production began. During 1970–2022, there were 1,449 oil spills with an average volume of 1 bbl/spill and a total volume of 1,508 bbl, which represents less than 2% of the volume spilled in 1969.

The largest spill during 1970–2022 was the 588 bbl Beta Unit spill (“Huntington Beach” spill) in October 2021 from Amplify Energy Corporation’s San Pedro pipeline P00547 (Table A-1). In a settlement agreement (Case No. 8:21-cv-01628-DOC-JDE, Document 476-4, U.S. District Court for the Central District of California, 2022), the corporate defendants asserted that the spill was a result of severe damage to pipeline P00547 from two container ships that repeatedly dragged their anchors across it. Without accepting responsibility, the shipping companies agreed to contribute funds to the remediation process.

The next six largest spills were (in descending order of size; Table A-1): 164 bbl in 1997 due to a pipeline break in the flange metal in State waters due to welding flaws; 150 bbl in 1996 due to equipment failure and error allowing emulsion to flow through flare boom; 101 bbl in 1990 from mineral oil mud released due to incorrectly positioned standpipe and closed valves; 50 bbl in

1994 due to process upset resulting in overflow of oil/water emulsion from tanks into disposal tube; and 50 bbl in 1991 after a pipeline riser ruptured when snagged by grappling hook used by workboat to retrieve a lost anchor. The source of oil spilled in 2012 (35.78 bbl; Table A-1) was primarily from Platform Houchin caused by a burst plate (35 bbl, per USCG).

The oil spill risk in the "50 to 1,000 bbl" range was calculated for the Pacific Region using historic oil spill data (1963–2022) and cumulative production from the Pacific Region. BOEM estimated the number of oil spills and the probability of one or more spills that could occur as a result of ongoing activities in the Southern California Planning Area in the "50 to 1,000 bbl" size range using Pacific Region oil spill rates (Table A-2). Oil spill rate is calculated as a function of the volume of oil handled or the amount of oil that could be exposed. Oil exposed is defined as the volume of oil produced or transported within a given area. Therefore, the total amount of oil that could be economically produced in the Southern California Planning Area was used as this exposure variable. In the "50 to 1,000 bbl" size range we estimate there will be 1 spill with a 63% probability of an oil spill occurring (Table A-2). The probability of an oil spill occurring decreases with the decreasing amount of oil left to be produced. Note that the 80,900 bbl 1969 spills were not included in this calculation, since they do not fall within the "50 to 1,000" bbl size range for spill probability calculations; a spill of this size is an extreme event and not reasonably foreseeable.

For comparison, we calculated oil spill probabilities using oil spill rates derived from all United States Outer Continental Shelf (US OCS) operations (1996–2010) and the total amount of oil that could be economically produced in the Southern California Planning Area (Anderson et. al. 2012). Using spill rates based on all US OCS Operations (1996–2010), the probability of one or more spills occurring in the Pacific Region for the "50 to 1,000 bbl" size range is 95%. The lower probability (63%) of spills in the "50 to 1,000 bbl" size range using POCSR oil spill data reflects the lower number of oil spills throughout POCSR production history.

The probability of one or more spills occurring in the greater than 1,000 bbl size range is 7% (Table A-2). This is a conservative estimate calculated using the same methodology as for the "50 to 1,000 bbl" range and based on all US OCS operations (1996–2010). For the greater than 1,000 bbl size range, we did not calculate oil spill rates with only POCSR data due to the limited dataset (2 spills > 1,000 bbl occurred in 1969). A spill of this size would be an unlikely event in the POCSR.

Table A-1: Number and volume (in barrels, bbl) of crude, diesel, or other hydrocarbon spills recorded in the POCSR, 1963–2022, shown for three size categories of spills: 1) less than or equal to 1 bbl, 2) greater than 1 but less than 50 bbl, 3) greater than or equal to 50 bbl.

Year	# Spills ≤ 1 bbl	Vol. spills ≤ 1 bbl	# Spills 1–50 bbl	Vol. spills 1–50 bbl	# Spills ≥ 50 bbl	Vol. spills ≥ 50 bbl	Total # spills	Total volume	Cumulative vol. 1970–2022
1963	0	0.00	0	0.00	0	0.00	**0**	**0.00**	
1964	0	0.00	0	0.00	0	0.00	**0**	**0.00**	
1965	0	0.00	0	0.00	0	0.00	**0**	**0.00**	
1966	0	0.00	0	0.00	0	0.00	**0**	**0.00**	
1967	0	0.00	0	0.00	0	0.00	**0**	**0.00**	
1968	0	0.00	0	0.00	0	0.00	**0**	**0.00**	
1969	**0**	**0.00**	**0**	**0.00**	**2**	**80,900.00**	**2**	**80,900.00**	
1970	0	0.00	0	0.00	0	0.00	**0**	**0.00**	**0.00**
1971	0	0.00	0	0.00	0	0.00	**0**	**0.00**	**0.00**
1972	0	0.00	0	0.00	0	0.00	**0**	**0.00**	**0.00**
1973	0	0.00	0	0.00	0	0.00	**0**	**0.00**	**0.00**
1974	0	0.00	0	0.00	0	0.00	**0**	**0.00**	**0.00**
1975	1	0.10	0	0.00	0	0.00	**1**	**0.10**	**0.10**
1976	3	1.10	1	2.00	0	0.00	**4**	**3.10**	**3.20**
1977	11	2.20	1	4.00	0	0.00	**12**	**6.20**	**9.40**
1978	4	1.20	0	0.00	0	0.00	**4**	**1.20**	**10.60**
1979	5	1.70	1	2.00	0	0.00	**6**	**3.70**	**14.30**
1980	11	4.90	2	7.00	0	0.00	**13**	**11.90**	**26.20**
1981	21	6.00	10	75.00	0	0.00	**31**	**81.00**	**107.20**
1982	24	3.20	1	3.00	0	0.00	**25**	**6.20**	**113.40**
1983	56	7.70	3	6.00	0	0.00	**59**	**13.70**	**127.10**
1984	65	4.70	3	36.00	0	0.00	**68**	**40.70**	**167.80**
1985	55	9.30	3	9.00	0	0.00	**58**	**18.30**	**186.10**
1986	39	5.50	3	12.00	0	0.00	**42**	**17.50**	**203.60**
1987	67	7.50	2	11.00	0	0.00	**69**	**18.50**	**222.10**
1988	47	3.70	1	2.00	0	0.00	**48**	**5.70**	**227.80**
1989	69	4.10	3	8.33	0	0.00	**72**	**12.43**	**240.23**
1990	43	2.70	0	0.00	1	101.00	**44**	**103.70**	**343.93**
1991	51	2.80	1	13.00	1	50.00	**53**	**65.80**	**409.73**
1992	39	1.20	0	0.00	0	0.00	**39**	**1.20**	**410.93**
1993	32	0.76	0	0.00	0	0.00	**32**	**0.76**	**411.69**
1994	18	0.40	2	33.00	1	50.00	**21**	**83.40**	**495.09**
1995	25	0.90	1	1.43	0	0.00	**26**	**2.33**	**497.42**
1996	39	0.90	1	5.00	1	150.00	**41**	**155.90**	**653.32**
1997	20	1.50	0	0.00	1	164.00	**21**	**165.50**	**818.82**
1998	29	1.00	0	0.00	0	0.00	**29**	**1.00**	**819.82**
1999	26	1.35	1	10.00	0	0.00	**27**	**11.35**	**831.17**
2000	36	1.00	0	0.00	0	0.00	**36**	**1.00**	**832.17**
2001	48	1.70	0	0.00	0	0.00	**48**	**1.70**	**833.87**
2002	55	1.30	1	9.00	0	0.00	**56**	**10.30**	**844.17**
2003	56	1.37	0	0.00	0	0.00	**56**	**1.37**	**845.54**
2004	36	1.00	0	0.00	0	0.00	**36**	**1.00**	**846.54**
2005	46	2.60	0	0.00	0	0.00	**46**	**2.60**	**849.14**
2006	46	1.99	0	0.00	0	0.00	**46**	**1.99**	**851.13**
2007	45	1.19	1	1.19	0	0.00	**46**	**2.38**	**853.51**
2008	45	1.20	1	27.00	0	0.00	**46**	**28.20**	**881.71**
2009	36	1.10	0	0.00	0	0.00	**36**	**1.10**	**882.81**
2010	33	0.63	0	0.00	0	0.00	**33**	**0.63**	**883.44**
2011	38	0.02	0	0.00	0	0.00	**38**	**0.02**	**883.46**
2012	30	0.08	1	35.70	0	0.00	**31**	**35.78**	**919.24**

Year	# Spills ≤ 1 bbl	Vol. spills ≤ 1 bbl	# Spills 1–50 bbl	Vol. spills 1–50 bbl	# Spills ≥ 50 bbl	Vol. spills ≥ 50 bbl	Total # spills	Total volume	Cumulative vol. 1970–2022
2013	26	0.03	0	0.00	0	0.00	**26**	**0.03**	**919.27**
2014	10	0.48	0	0.00	0	0.00	**10**	**0.48**	**919.75**
2015	13	0.11	0	0.00	0	0.00	**13**	**0.11**	**919.86**
2016	0	0.00	0	0.00	0	0.00	**0**	**0.00**	**919.86**
2017	0	0.00	0	0.00	0	0.00	**0**	**0.00**	**919.86**
2018	0	0.00	0	0.00	0	0.00	**0**	**0.00**	**919.86**
2019	0	0.00	0	0.00	0	0.00	**0**	**0.00**	**919.86**
2020	0	0.00	0	0.00	0	0.00	**0**	**0.00**	**919.86**
2021	0	0.00	0	0.00	1	588.00	**1**	**588.00**	**1,507.86**
2022	0	0.00	0	0.00	0	0.00	**0**	**0.00**	**1,507.86**
Total	**1,399**	**92.00**	**44**	**313.00**	**8**	**82,003.00**	**1,451**	**82,408.00**	**1,507.86**

Oil spill probability estimates are conservative given POCSR's:

- oil spill history,
- long established drilling program,
- producing from mature fields with lower pressure,
- no floating drilling rigs,
- no new platforms being installed, and
- no oil is transported via vessels.

Table A-2: Estimated spill rate, mean number of oil spills, and spill occurrence probability in the POCSR for 1) 50-1,000 bbl: oil spills with volumes greater than 50 but less than 1,000 bbl, and 2) ≥ 1,000 bbl: oil spills equal to or greater than 1,000 bbl. Numbers are based on oil spill data from POCSR operations (1963–2022) or U.S. OCS Spill Data (1996–2010). Anticipated POCSR production is 0.226 Bbbl (billions of barrels). Spill rate based on methodology from Anderson et al. (2012).

Spill volume (bbl)	Dataset	Years	Structures	Spill rate	Estimated mean # spills	Probability ≥ 1 spill
50–1,000	POCSR	1963-2022	Platforms & Pipelines	4.38	1	63%
50–1,000	U.S. OCS	1996-2010	Platforms & Pipelines	12.88	3	95%
≥ 1,000	U.S. OCS	1996-2010	Platforms	0.25	0.06	3%
≥ 1,000	U.S. OCS	1996-2010	Pipelines	0.88	0.20	4%
≥ 1,000	US OCS	1996-2010	Total	1.13	0.25	7%

Formulae used in the Oil Spill Occurrence and Probability Calculations:

Spill rate λ = number of spills per Bbbl

Estimated Mean Number of Spills = spill rate λ x volume handled t (Bbbl) = λ t

Probability [n spills over future exposure t] = $[(\lambda t)^n e^{-\lambda t}] / n!$

Probability of Zero Spills = $[(\lambda t)^0 e^{-\lambda t}] / 0! = [1 \times e^{-\lambda t}] / 1 = e^{-\lambda t} = 1 / e^{\lambda t}$

Probability of One or More Spills = 1-Probability[zero spills] = $1 - 1 / e^{\lambda t}$

A-1.1 Oil Spill Assessment 1970s and 1980s

The 1975 Environmental Impact Statement (EIS) for Oil Development in the Santa Barbara Channel estimated 1 to 2 billion barrels (Bbbl) of oil would be produced (USGS 1975). To date the Southern California Planning area has produced 1.37 Bbbl of oil with a remaining production estimate of 0.2256 Bbbl. Therefore, the production estimates for the region are within what was estimated in the 1975 EIS. This section reviews, by geographic location, the oil spill assessments completed in the 1970s and 1980s environmental documents. This information is provided to support the discussion of the current status of the species, to provide background on previous determinations of effects to threatened and endangered species, to boost confidence in BOEM's current calculations, and to serve as a comparison with current estimates.

Santa Barbara Channel:

- USGS 1975 EIS: estimated a 70% chance that there would be at least one platform spill of 1,000 bbl, and if a large platform spill occurred, there was an 80% chance the spill would exceed 2,380 bbl (USGS 1975). (Platforms covered: Hogan, Houchin, Hillhouse, A, B, C, Henry, Grace, Habitat)
- 1980 Environmental Impact Report – Environmental Assessment (EIR-EA) for the Platform Gina and Gilda development: estimated that an average rate of operational platform spills is 1 spill per production platform per 10.6 years (Dames and Moore, 1980). Thus, it was estimated that Platform Gilda would have 1.9 spills over the 20-year production lifetime. (Platforms covered: Gina, Gilda)
- 1986 Platform Gail Environmental Assessment (EA): cumulative oil spill analysis estimated that during 32 years of production in the Southern California Planning Area there would be 14.5 spills ≥ 1,000 bbl and 6.6 spills ≥ 10,000 bbl (MMS 1986). (Platforms covered: Gail)
- 1984 Santa Ynez Unit Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) examined spills ranging from 10 bbl to more than 500,000 bbl and categorized a platform blowout as spilling between 1,000 and 500,000 bbl (SAI 1984). (Platforms covered: Hondo, Harmony, Heritage[11], and a fourth platform that was never installed)
- 1984 Point Arguello EIR/EIS estimated that a cumulative total of 144,000 bbl of oil would be expected to be spilled over a 30-year project lifetime (ADL 1984; Appendix H). (Platforms covered: Hildalgo, Harvest, Hermosa)
- Spills since 1969, ≥ 50 bbl:
    - Platform Habitat: 1990—100 bbl of drilling mud with mineral oil
    - Platform Gina: 1991—50 bbl of oil from a broken pipeline
    - Platform Hogan: 1994—50 bbl of oil
    - Platform Heritage: 1996—150 bbl of oil

[11] A fourth platform was also covered by this document, but never installed. The platform has since been removed from the current Development and Production Plan for the Santa Ynez Unit.

San Pedro Bay:

- 1978 Beta Unit EIR-EA analyzed the following spills: 5000-bbl platform spill, 50-bbl pipeline spill, 50-bbl Long Beach Harbor spill, and a catastrophic 80,000-bbl platform spill (SLC, PLB, USGS 1978). (Platforms covered: Elly, Ellen, Eureka, Edith)
    - Beta Unit: 2021—588 bbl pipeline spill

Santa Maria Basin:

- 1985 Santa Maria Basin EIS/EIR analyzed oil spills ranging from 10 to 100,000 bbl (ADL 1985). (Platforms covered: Irene)
- Spills since 1969:
    - Platform Irene: 1997—164 bbl pipeline spill

A-1.2 Worst Case Discharge

Pacific OCS Region operators are required to submit oil spill response plans (OSRPs) which show the worst case volume of oil that could be spilled from three sources associated with offshore operations: vessels, tanks, and piping on board platforms, pipelines, and loss of well control events (Table A-3; 30 CFR 254; 30 CFR 550). These plans are not authorized by BSEE and therefore not part of this consultation Alaska Wilderness League v. Jewell, 788 F.3d 1212, 1224-25; 9th Cir. 2015). The intent of this conservative requirement is to ensure that each operator has adequate spill response capabilities to respond to the largest conceivable oil spill from their facilities. If surface intervention is unsuccessful, an operator needs to mobilize a drilling rig to the Southern California Planning Area and drill a relief well. The largest worst case discharge volume is calculated as the release of stored oil on a platform, oil in the associated pipeline, plus the total flow released from a loss of well control up to the drilling of a relief well. The worst-case discharge volumes vary significantly across facilities. A continuous spill event (i.e., from a loss of well control) is more difficult to quantify but unlikely to occur given the reservoir pressures in the POCSR (13 of the 23 platforms have no pressure; Table A-3).

Worst Case Discharge Scenario, Largest Volume in POCSR

Platform Heritage, Santa Ynez Unit, located approximately 8 miles offshore Gaviota, California, has the largest worst case discharge estimate for a loss of well control (blowout) with an estimated maximum daily flow rate of 33,986 bbl. It is estimated to take 17 days to stop the flow using surface capping equipment, for a total discharge volume of 577,762 bbl. If surface intervention is not achieved, the estimated maximum time it would take to mobilize a rig and drill a relief well would be 170 days, with a total discharge volume of 5,777,620 bbl. This would be a catastrophic event that is not reasonably certain to occur.

A-1.3 Summary of Oil Spill Risk Assessment

- This assessment assumed a maximum spill of 1,000 bbl at a rate of 200 bbl per day for 5 days.
- The probability of an oil spill occurring in the 50 to 1,000 bbl range is 63%.
- Projected oil production in the Southern California Planning Area is within what was analyzed in the environmental documents from the 1970s and 1980s.
- A large catastrophic event is not reasonably certain to occur.

Table A-3: Worst case discharges identified in Oil Spill Response Plans (OSRPs) in POCSR.

Facility	Pipeline (bbl)	Storage[1] (bbl)	Drilling (bbl/day)	Reference
Hogan	Pipeline to Shore = 41 (oil + water) Inter-Platform (Houchin) = 49	324	0	Pacific Operators Offshore OSRP 2012
Houchin	See Information for Hogan	324	0	Pacific Operators Offshore OSRP 2012
Elly	16” Pipeline Elly to Beta Pump Station = 3,111	8,925	0 (no drilling)	Beta Unit Complex OSRP 2012
Ellen	No Pipeline, transfers through Elly = 0	1840	45	Beta Unit Complex OSRP 2012
Eureka	Pipeline = 1,026	4,232	105	Beta Unit Complex OSRP 2012
Gail	Pipelines at Gail = 168	2,068	650	Santa Clara Unit OSRP 2012
Grace	Pipelines at Grace and Grace to Shore = 292	1,557	110	Santa Clara Unit OSRP 2012
Hermosa	Pipeline Hermosa to Shore = 2,502	3,760	0	Plains Exploration and Production Company OSRP 2012
Hildalgo	Pipeline Hildalgo to Hermosa = 489	2,478	0	Plains Exploration and Production Company OSRP 2012
Harvest	Pipeline Harvest to Hermosa = 221	3,820	0	Plains Exploration and Production Company OSRP 2012
Irene	Pipeline Irene to Shore = 1,124	1,064	750	Plains Exploration and Production Company OSRP 2012
Gilda	Pipeline Gilda to Shore = 1,994	857	200	DCOR OSRP 2012
Gina	Pipeline Gina to Shore = 546	223	0	DCOR OSRP 2012
“C”	Pipeline C to B = 11	306	2	DCOR OSRP 2012
“B”	Pipeline B to A = 92	646	0	DCOR OSRP 2012
“A”	Pipeline A to Shore = 3,685	589	0	DCOR OSRP 2012
Hillhouse	Pipeline Hillhouse to A = 57	1,534	0	DCOR OSRP 2012
Henry	Pipeline Henry to Hillhouse = 3	118	0	DCOR OSRP 2012
Edith	Pipeline Edith to Elly = 122	2,352	0	DCOR OSRP 2012
Habitat	No Pipeline, gas production	385	0	DCOR OSRP 2012
Harmony	Pipeline Harmony to Shore = 6,210	2,607	< 2,000	ExxonMobil OSRP 2014
Heritage	Pipeline Heritage to Harmony = 731	2,684	33,986	ExxonMobil OSRP 2014
Hondo	Pipeline Hondo to Harmony = 560	3,811	< 2,000	ExxonMobil OSRP 2014

[1] Vessels, piping, tanks

A-2: Fate of Oil

In the event of an accidental oil spill, a slick forms and part of the slick begins evaporating while the action of breaking waves forms oil droplets that are dispersed into the water column. Oil in the Southern California Planning Area ranges from very heavy (API 12) to very light (API 39). Light oil has a rapid evaporation rate and is soluble in water. Light crude oils can lose up to 75% of their initial volume within a few days of a spill (NRC 2003). In contrast, heavy oil (API < 22) has a negligible evaporation rate and solubility in water.

Depending on the weight of the oil spilled and the environmental conditions (i.e., sea state) at the time of a spill, 6 to 60% of oil during an oil spill would sink and be in the water column or on the seafloor in the vicinity of the spill (ADL 1984). This is supported by a study of natural oil seeps at Coal Oil Point in the Santa Barbara Channel that range in depth from six to 67 meters offshore of Goleta, CA (Leifer et al. 2006) and are assumed to release 100 bbl/day (Farwell et al. 2009). The distribution of heavy oil in a surface slick in the Santa Barbara Channel is primarily influenced by surface currents and falls out of the slick over a period of 0.4 to 5 days (Leifer et al. 2006).

A-3: Oil Spill Response

BSEE regulations at 30 CFR Part 254 require that each OCS facility have a comprehensive Oil Spill Response Plan (OSRP). These plans are not subject to Federal approval and thus not included as part of this consultation (Alaska Wilderness League v. Jewell, 788 F.3d 1212, 1224-25; 9th Cir. 2015). Response plans consist of an emergency response action plan and supporting information that includes an equipment inventory, contractual agreements with subcontractors and oil spill response cooperatives, worst-case discharge scenario, dispersant use plan, in-situ burning plan and details on training and drills. The Coast Guard is the lead response agency for oil spills in the coastal zone and coordinate the response using a Unified Command (UC), consisting of the affected state and the Responsible Party (i.e., the company responsible for spilling the oil) in implementing the Incident Command System (ICS) if an oil spill occurs. Oil spill drills, either agency-lead or self-lead by a company, also use the UC/ICS. California's Office of Spill Prevention and Response (OSPR) assumes the role of the State on-scene coordinator and plays a significant role in managing wildlife operations in the Southern California Planning Area as the state's Natural Resource Agency.

BSEE requires companies that operate in the OCS to have the means to respond to a worst-case discharge from their facilities. Companies meet this requirement by becoming members of Oil Spill Removal Organizations (OSRO).

The Marine Spill Response Corporation (MSRC) is the U.S. Coast Guard-classified OSRO based in Long Beach (www.msrc.org). MSRC is a nation-wide OSRO with multiple responder-class oil spill response vessels and oil spill response barges. They are also equipped to respond to an oil spill 24 hours a day.

MSRC is equipped and prepared to respond to oil spill threats to sensitive shoreline areas through the detailed and up-to-date information on sensitive areas and response strategies from the Los Angeles/Long Beach Area Contingency Plan (https://www.wildlife.ca.gov/OSPR/Preparedness/LA-LB-Spill-Contingency-Plan) and the California OSPR (https://www.wildlife.ca.gov/OSPR).

A-4: Oil Spill Trajectory Analysis

Oil spill trajectory modeling was conducted to determine the movement and fate of spilled oil if a spill occurred in the Southern California Planning Area from existing offshore oil and gas operations. BOEM collaborated with the National Oceanic & Atmospheric Administration (NOAA) Office of Response & Restoration to create a Trajectory Analysis Planner (TAP) for the Southern California Planning Area. A regional TAP involves the development of a database created by analyzing statistics from a large number of simulated spill trajectories. These trajectories were run using the General NOAA Operational Modeling Environment (GNOME) (Zelenke et al. 2012; NOAA 2015) with forcing from a high-resolution (1 km) Regional Ocean Modeling System (ROMS; Shchepetkin and McWilliams 2005) hindcast. This extensive model output allows modeling of realistic oil spill scenarios over a range of different regional oceanographic regimes (such as upwelling, relaxation, and eddy-driven flow). Modeled spills were started at the locations of Federal offshore oil and gas operations in southern California. A maximum hypothetical spill of 1,000 bbl was simulated from each location using a spill rate of 200 bbl per day over 5 days.

The visualizations of the modeled spills can be accessed online through the web-based TAP viewer (https://tap.orr.noaa.gov/#locations/south-california/impact_analysis). Users can select features of the model's output for graphic display, including spill source (platform or pipeline) time since start, and level of concern. Figure A-1 shows one example of trajectory analysis results generated by the model. Figure A-2 shows the combined trajectory model results from multiple spill sources. It represents the full extent of areas that could be affected by the estimated maximum spill size (1,000 bbl).

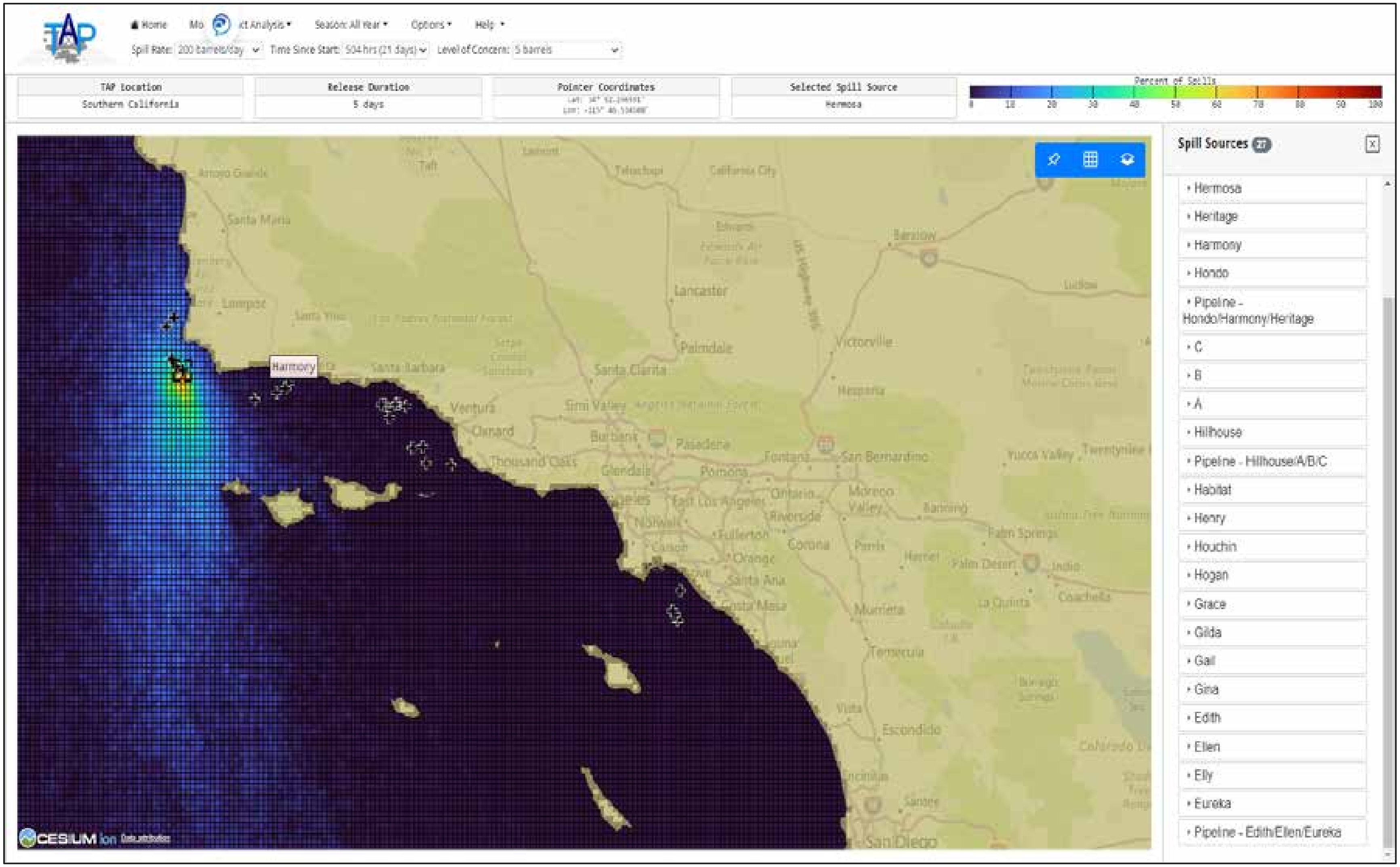

Figure A-17: Example graphic visualization of model results from Trajectory Analysis Planner (TAP) for the Southern California Planning Area. https://tap.orr.noaa.gov/#locations/south-california/impact_analysis.

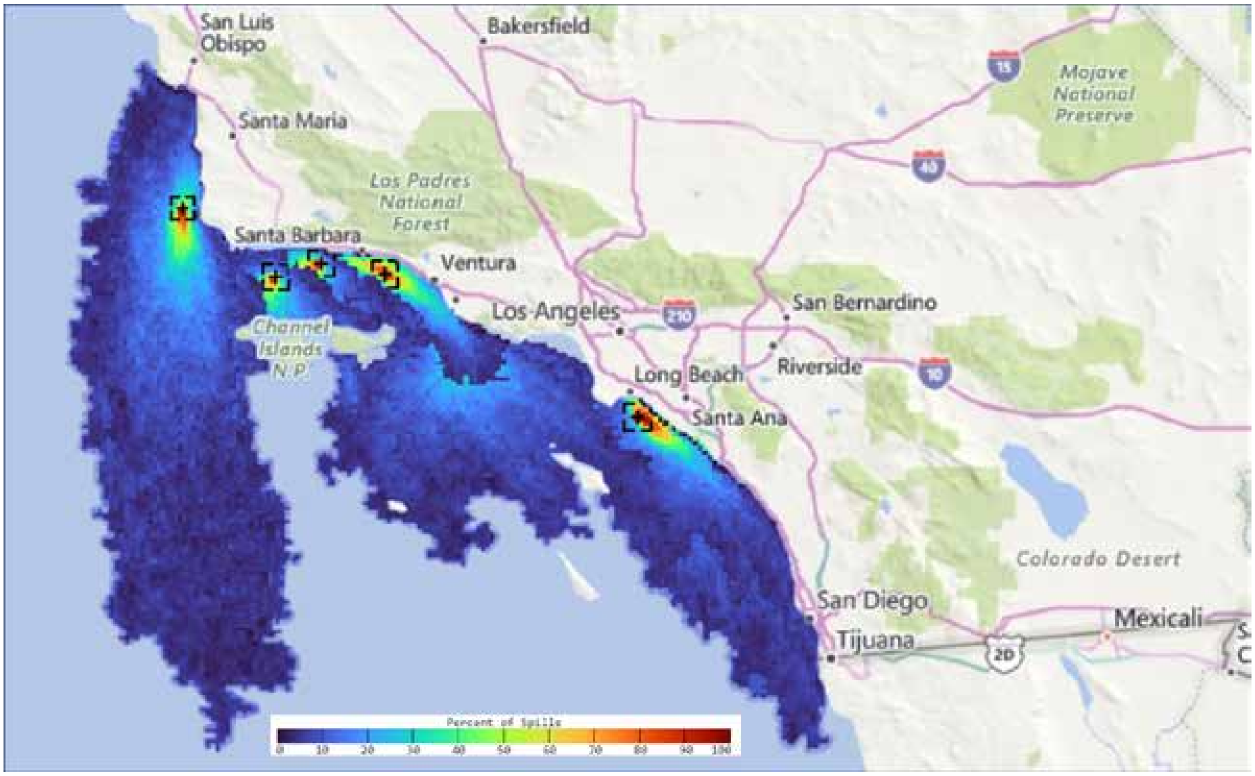

Figure A-18: Combined spill trajectory model results. Areas with colors represented on the color scale had greater than approximately 10 percent of modelled spills resulting in accumulation of 5 bbl or more by 21 days since the maximum spill occurrence (200 bbl per day for 5 days).

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